



Revisiting "upstream public engagement" in nanotechnologies : from the perspective of the public sphere

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List of Abbreviations

BfR	Federal Institute for Risk Assessment in Germany
CASG-nano	Competent Authority Subgroup on Nanomaterials
CEFIC	European Chemical industry Council
CIEL	Center for International Environmental Law
CSOs	Civil Society Organizations
DG	Directorate General
EC	European Commission
ECHA	European Chemicals Agency
EEB	European Environmental Bureau
EFSA	European Food Safety Agency
EHS	Environment, health, and safety
ELSI	Ethical, Legal and Social Implications
EP	European Parliament
ETUC	European Trade Union Confederation
EU	European Union
NIA	Nanotechnologies Industry Association
OECD	Organization for Economic Co-operation and Development
REACH	Registration, Evaluation, Authorization, and Restriction of Chemical Substances
R&D	Research and Development
RIVM	National Institute for Public Health and the Environment in the Netherlands
RS/RAEng	Royal Society and Royal Academy of Engineering inquiry
SCCP	Scientific Committee on Consumer Products
SCENIHR	Scientific Committee on Emerging and Newly Identified Health Risks
STS	Science and Technology Studies

Table of Contents

Acknowledgment.....	i
List of acronyms.....	iii
Introduction.....	5
Chapter I: Upstream public engagement: a new governance vision.....	11
A. A review of STS literature.....	12
1. Deficit model (from 1960s to mid-1990s)	12
2. Upstream public engagement (2000s onwards)	15
2.1. Tensions and dilemmas.....	17
2.1.1. Too broad/ too narrow dilemma	17
2.1.2. Implicit linear model of innovation.....	18
2.1.3. Lack of a link with the political system	20
B. Revisiting ‘upstream public engagement’: from a Habermasian perspective.....	21
1. Conceptual tools.....	22
1.1. The circulation of political power.....	23
1.2. CSOs and the public sphere.....	24
1.3. The definition of ‘upstream public engagement’	25
2. Research Methodology.....	25
2.1. Content analysis	26
2.2. Semi-structure interviews	26
3. Research design.....	29
Chapter II: Awareness-raising phase (2000-2005).....	32
A. Background	34
1. Fear of the small thing: ‘Grey Goo’	34
2. Anti-nanotech campaign ignited by ETC Group.....	37
3. Not another GMO: the societal dimension of nanotechnologies highlighted.....	40
3.1. Policy documents	42
3.2. Engagement activities and programs.....	43
3.3. Informal commitment of the EU policymakers.....	45
B. Emerging actors, different approaches.....	46

1. Leading position of the UK.....	47
2. Divergences between Greenpeace UK and ETC Group.....	49
3. Local direct actions against nanotechnologies.....	54
4. Common concerns shared by CSOs.....	59
4.1. EHS aspect of nanoparticles.....	59
4.2. Public engagement.....	61
4.3. Other ethical and social concerns	62
C. Explaining CSOs' approaches: three factors.....	63
1. Novelty, broadness and complexity of nanotechnologies.....	63
2. Different outlooks and values of CSOs	64
3. Policymakers' prompt anticipation helps creating positive interaction space.....	67
D. Conclusion	68
Chapter III: Capacity-building phase (2006-2009).....	70
A. Background.....	71
1. Nanotechnologies as a matter of policy concern.....	71
2. From 'science and society' to 'science in society'	74
3. Worldwide CSOs established a coalition to address nanomaterials.....	78
4. The dual influence of REACH on CSOs' approaches towards nano.....	80
B. Approaching the communication process of EU level CSOs.....	83
1. Key activities.....	84
2. Key concerns: both wider and narrower.....	88
2.1. Going beyond 'benefits versus risks' framing: wider concerns of CSOs.....	88
2.2. Narrower concerns: regulatory aspects of nanotechnologies.....	91
3. Evolution of CSOs' strategies and position.....	93
4. Key Results.....	96
4.1. CSOs' voices remain marginalized in nano-governance debates.....	96
4.2. Enhanced cooperation among CSOs.....	98
4.3. The EP favors the precautionary principle in governing nano.....	101
C. Conclusion.....	103
Chapter IV: Alliance-forming phase (2009 onwards).....	105

A. ‘Moving forward’ or ‘moving back’: two approaches of CSOs.....	105
1. EU level CSOs: cooperation and complementation.....	109
2. Stagnation in several CSOs’ engagement.....	112
B. Exploring reasons behind CSOs’ retreat	115
1. Internal factors.....	116
1.1. Limitation of resources	116
1.2 Cognitive barrier: if you are CSOs, you are against nano.....	118
1.3 Frustration about the sterile game of token participation.....	121
1.4. Incompatible with CSOs’ priorities and agenda-setting.....	123
1.5. Lack of public responsiveness.....	124
2. External factors.....	126
2.1. Persistence of ‘deficit model’	126
2.2. A stereotypical division of labor	127
2.3. ‘Paralysis by analysis’	129
2.4. The ‘inertia’ of administrative power.....	131
C. Conclusion.....	132
Chapter V: The interplay between CSOs and system.....	135
A. CSOs’ influences on the political system: three layers of legislation.....	136
1. Law: a transformer between system and lifeworld.....	137
2. Product-specific legislation.....	139
2.1. Nanomaterial in cosmetics: CSOs’ first success.....	140
2.2. The definition of nanomaterial.....	146
2.3. EP: to ban certain nanomaterials in electrical and electronic equipment (EEE)	150
2.4. Nanomaterials in food: an intense lobbying battle.....	153
2.5. Nanomaterial in biocides.....	158
3. Towards an EU nano register: a conflicting process.....	160
3.1. Member states’ demand for an EU nano register.....	161
3.2. Belgium and Denmark follow France to introduce national register plan..	165
3.3. CSOs’ advocacy.....	168

3.4. Primary result: an EU nano register rejected by the EC.....	173
3.5. Explaining CSOs' failure: lack of bottom-up public resonance.....	175
4. Nanomaterials in REACH: a long and unfinished story.....	176
4.1. CSOs: a 'nano patch' to address the loopholes of REACH.....	176
4.2. Some member states support the proposal of 'nano patch'.....	178
4.3. The second regulatory review triggers new momentum of debates.....	180
4.4. The EC proposes six policy options to modify REACH annex.....	184
4.5. Innovation vis-à-vis precaution: different rationales behind actors' stance.....	187
B. Examining CSOs' influences on the economic system.....	188
1. Beyond the hype: claims of benefits more realistic.....	188
2. Industries assume corporate responsibilities.....	189
C. Conclusion.....	190
Chapter VI: Moving ahead: challenges & opportunities.....	194
A. 'Green alliance' puts nano high on the policy agenda.....	195
1. Member states: 'pace-setters' in governing nanomaterials.....	197
1.1. France.....	197
1.2. The Netherlands.....	201
1.3. Sweden and Denmark.....	202
2. Next plans of CSOs.....	205
B. Regulators' emphasis on mutual understanding.....	209
C. Conclusion.....	210
Conclusion.....	213
References.....	218
Appendix: Interview questions.....	246

Introduction

Nanotechnologies are technologies that operate on the nanoscale, about one billionth of a meter. For comparison, the width of a human hair is about 80,000 nm. Although there is no universal working definition, it is generally accepted that nanotechnologies involve *«the design, characterization, production and application of structures, devices and systems by controlling shape and size at the nanoscale»*(RS/RAEng 2004, 5). Small size could bring novel properties to traditional materials, which can be used to build, for example, miniaturized diagnostics, photothermal cancer therapy, light-weight high-strength materials, scratch-resistant coatings and other interesting applications. These examples illustrate the ‘platform’ or ‘enabling’ nature of nanotechnologies, which *«act as an improver, multiplier and enhancer of already existing technologies»* (Godman 2008). Many products that we use on a daily basis already utilize nanotechnologies. According to a survey, nanomaterials are already present in more than 1,800 consumer products, which represents a thirty-fold increase over the 54 products originally listed in 2005 (Vance et al 2015).

Heralded as ‘the next big thing’, nanotechnologies have attracted wide attention due to its promising potentials for revolutionizing almost every sector of industry (Crow and Sarewitz 2001). Since Bill Clinton’s announcement of the National Nanotechnology Initiative (NNI), a government research and development (R&D) program of the United States (US), several OECD countries have established themselves as leading developers of nanotechnologies, most notably the US, Japan, Germany, the United Kingdom (UK), France and South Korea; emerging economies like China are also conducting applied and basic research in nanotechnology (Falkner and Jaspers 2012). It is estimated that the global value of nano-enabled products, nano-intermediates, and nanomaterials will reach USD 4.4 trillion by 2018 (Lux Research 2014).

Another part of the story has been the rising concerns about the risks that nanotechnologies could bring on environment, health, safety (EHS) as well as economic equality and social justice. For example, mindful of past ‘miracle’ technologies, EU-level civil society organizations (CSOs) noted that putative benefits cannot legitimate the use of nanotechnologies outside of all democratic control¹. Activist groups such as Pièces et main d’oeuvre (PMO) identified nanotechnologies as the next target after biotechnology. The fear of repeating the mistakes of GMO (genetically modified organism), the excitement about the benefits that nanotechnologies could bring and the increasing interest of activist groups in nanotechnology were all factors which gave rise to a greater willingness among EU regulatory bodies to engage the public more proactively.

As Janez Potocnik, the former Science and Research Commissioner of the European Union (EU), put it, *«if the full potential of nanoscience is to be exploited however, public concerns must be taken into account... If Europe does not address problems early on, they will come back later with more force.»*² An awareness of the necessity to intervene from the early stage of the R&D process constitutes a striking feature of nanotechnologies governance landscape in the EU. All these discussions and dynamics in the infancy of nanotechnologies’ development also provide fertile ground for theoretical discourses.

Nanotechnologies came along at a specific time during which the impetus was gathering in democratizing science and technology (Toumey 2006). Scholars note that nanotechnologies represent a golden opportunity for building in social science insights from the outset (Macnaghten, Kearnes, and Wynne 2005; Davies, Kearnes and Macnaghten 2010) and a ‘test case’ in experimenting with novel approaches of risk governance on emerging technologies (Bensaude-Vincent 2012; Stilgoe 2007). It is suggested that dealing with the societal dimension of nanotechnologies should be a

¹ ETUC. 2009. “Why there must be a public debate on nanos.” Special report 30/30

² CORDIS news. 2006. “Communication and risk assessment: keys to unleashing nano-potential.” October 20. http://cordis.europa.eu/news/rcn/26531_en.html.

prerequisite for its further development (Mnyusiwalla, Daar, and Singer 2003; Wilsdon and Willis 2004). Against this backdrop, the researches on public perception and attitude towards nanotechnologies and its applications have boomed (Cobb and Macoubrie 2004; Gaskell et al. 2005; Siegrist et al. 2007; Satterfield et al. 2009). In 2007, an academic magazine entitled *NanoEthics* was founded, focusing specifically on ethical and social concerns related to nanotechnologies. Scholars observe that *«study of perceptions, at so early a stage in the development trajectory of a technology, is probably unique in the risk perception and communication field»* (Pidgeon, Harthorn, and Satterfield 2011).

What have driven these rapid academic interest towards nanotechnologies? A scholar points out that it is *«a historical coincidence, not a scientific result»* (Toumey 2006). A researcher of Demos, a political think-tank in the UK, also notes that *«nanotechnology happened to be the thing that came along at the right time to have that debate»* (Bullich 2009, 69). Apart from the ‘enabling’ or ‘platform’ nature of nanotechnologies, the specific ‘timing’ that technologies of the infinitely small have arrived at should also be taken into consideration so as to examine its distinctive character: academically, among a trend of re-negotiation about the relationship of science, technology and society; politically, during a paradigm shift related to the chemical regulatory framework in the EU, in which REACH has been debated, developed and shaped and the principle of ‘no data, no market’ established (Chaskiel 2013; Suraud 2013).

As one of the next transformative technologies after biotechnology, nanotechnologies become an important site for both theoretical and practical inquiry. We could see a multitude of Science and Technology Studies (STS) in which ‘upstream public engagement’ has become a popular notion since the beginning of the twenty-first century.

Considering that the trajectories of nanotechnologies were still undetermined, scholars actively advocated to move public engagement ‘upstream’ and to re-conceptualize the science-technology-society relationship (Wilsdon and Willis 2004; Wilsdon, Wynne, and Stilgoe 2005; Rogers-Hayden, Mohr, and Pidgeon 2007). The shift of science-society relationship is the backdrop against which the work for this dissertation was carried out. ‘Upstream public engagement’ has come under criticism due to its lack of a ‘link’, or ‘feedback loops’, to the political system (Krabbenborg and Mulder 2015). Drawing on conceptual tools provided by Jürgen Habermas, this dissertation seeks to investigate and clarify this ‘link’ with a specific focus on the capacity of CSOs to ‘distill’, ‘transmit’ and ‘problematize’ societal concerns in amplified form to the public sphere.

Have we been moving forward or in circles? Irwin posed this question and suggested that no such easy shift has been made in despite of all the ‘from deficit to democracy’ talk (Irwin 2014). In addressing nanotechnologies, has there been a shift towards more democratic governance? How public engagement initiatives influence the dynamics of the public spheres? The objective of this dissertation is to investigate whether and to what extent ‘upstream public engagement’ could trigger an institutional learning process within the EU regulatory authorities, and how such process further influences the strategies and positions that CSOs adopt towards nanotechnologies, studying the factors which may contribute or limit their involvement in policy debates.

In order to tackle these research questions, it is necessary to provide a historical review of the policy development concerning nanotechnologies over the past decade and to examine the interplay between CSOs and the political system. Scholars outline the phases of nanotechnologies development in the EU according to different criteria. For example, focusing on the debates about the social aspects of nanotechnologies, Doubleday (2007a) sums up “emerging period” (2000-mid 2003), “expansion and assessment” (mid 2003-early 2005) and “institutional responses” (2005 onwards).

From the perspective of the EU policy development, Jaspers (2012) provides analyses on the dynamics of “agenda-setting phase” (the late 1990s to the early 2000s), the “information gathering phase” (2004-2008) and the “decision-making phase” (2008 onwards).

Inspired by precedent research, this dissertation attempts to give a historical review of the dynamics in the public spheres that have made salient the roles of EU level CSOs in policy debates on nanotechnologies. It seeks to acquire a deeper understanding about how CSOs maneuver within differing political contexts and whether they could succeed in bringing some concrete policy outcomes. Based on content analysis and semi-structured interviews with relevant stakeholders, I divide the process of CSOs’ involvement into three phases: the “awareness-raising phase” (2000-2005), the “capacity-building phase” (2006-2009) and the “alliance-forming phase” (2009 onwards).

The remainder of the dissertation is structured as follows. In the first section, I set the scene by reviewing STS literature related to nanotechnologies and on that basis, formulates research themes for ‘upstream public engagement’ and its limitations. It further introduces the conceptual tools proposed by Habermas concerning the circulation of political power, explaining how his thought can be productive for understanding the link between engagement process and political system. Finally, it specifies the methodology and research design.

The next three chapters, corresponding to the “awareness-raising phase”, the “capacity-building phase” and the “alliance-forming phase”, provide a historical review of the dynamics in the public spheres over the past decade. Specific attention is paid to the roles that CSOs have played, explaining why collaborative rather than confrontational strategies have been adopted in addressing the issues of nanotechnologies at the EU level. It also argues that the government thinking marked by a blend of inclusiveness and scientism, together with other factors, have led to a

few CSOs' retreat from this arena.

Chapter V focuses on the interplay between CSOs and the political/economic system. It firstly examines the policy developments regarding three layers of legislation on nanomaterials at the EU level (product-specific legislation, an EU nanomaterials register, and nanomaterials in REACH), clarifying CSOs' role in the process of alliance-forming. It then investigates CSOs' influences on the economic system, arguing that CSOs, through resonant and autonomous public spheres, could exert influences "in a siege-like manner". Chapter VI envisages the opportunities and challenges for CSOs to gain new momentum in future debates in the EU, set against the backdrop of growing institutional divergence between the "pro-industry alliance" and the "green alliance". I conclude with a synthesis and some suggestions for future studies.

Chapter I: Upstream public engagement: a new governance vision

During past decades, huge disasters (e.g. the Fukushima nuclear accident, the AZF explosion in Toulouse), controversies (e.g. GMOs, human genetics, waste incineration), health scandals (e.g. asbestos, mad cow disease) have led to mounting public concerns over the negative impact, sometimes irreversible, of emerging technologies on environment, health, safety as well as economic equality and social justice. Consumer backlash, petition, demonstration, environmental movements, etc., testify to the growing tension between science, technology and society.

The impetus is gathering in opening up the ‘black box’ of science and its governance. The autonomy of science in producing knowledge and fostering ‘progress’ becomes problematized, and the need for legitimation becomes increasingly acute (Lovbrand, Pielke, and Beck 2011; Suraud et al. 2011; Chaskiel 2014). As noted by Habermas, in the case of legitimation crisis, *«grounds for the legitimizing force of this formal procedure must be given»* (Habermas 1988, 98). What’s required is a de-politicalized public realm which could contribute to a robust social process.

One institutional reaction in several EU member states has been the introduction of institutional arrangements to foster public understanding and debates regarding risk-related technological issues, e.g. the foundation of the UK *Committee on the Public Understanding of Science* in 1985, the establishment of *Danish Board of Technology* in 1986, the creation of *French National Commission of Public Debate* in 1995. The EU also highlighted the necessity to *«build public confidence in the way policy makers use expert advice»* and *«structure the EU’s relationship with civil society»* (Commission of the European Communities, 2001).

These initiatives and commitments testify to the booming of various approaches and proposals with the aim of exploring richer understanding of the relationship between science, technology and society. The focal point of STS literature has shifted from ‘deficit model’ to ‘upstream public engagement’.

A. A review of STS literature

1. Deficit model (from 1960s to mid-1990s)

According to Bauer et al., the efforts to promote “scientific literacy” and “public understanding of science”, supported by top-down science education and one-way communication, have dominated earlier research (Bauer, Allum, and Miller 2007). Literature and scholarship committed to improving scientific literacy as well as investigating factors that influence public attitude towards science is well documented (Miller 1998; Bauer and Schoon 1993; Evans and Durant 1995).

Some scholars observe a small positive correlation between general knowledge and attitudes towards science; however, the correlation tends to be lower or zero when it comes to controversial issues (Allum et al. 2008). For example, comparing the Eurobarometer survey conducted in 1991, 1993 and 1996, Gaskell (1997) finds a slight increase of knowledge towards basic biology; in contrast, optimism about the contribution of biotechnology to improve way of life has declined. His research also shows a striking mismatch between the concerns of regulators about issues of risk and safety, and that of the public about moral acceptability. Far-flung efforts and activities of knowledge dissemination, with the aim to *«abolish ignorance and correct misunderstandings of agreed facts»* (Turney 1996), have proved to be inadequate and failed to generate desirable results in explaining the loss of public confidence in science.

Although the emphasis of “scientific literacy” and “public understanding of science”, with the former on measurement of knowledge level and the latter on public attitude, is slightly different, both of the two approaches assert “public deficiency, but

scientific sufficiency”(Gross 1994) or “public problematic, but science sound” (Gaskell and Allum 2001) . Such attempts have been subjected to critical scrutiny and came to be known as ‘deficit model’ (Irwin and Wynne 1996; Durant 1999; Sturgis and Allum 2004). Under this model, the public is merely assumed to be receivers and repositories of information (Michael 1996).

Subsequent researches indicate that local or context-specific knowledge grounded in everyday experience could provide important insights and alternative perspectives in addressing a range of practical issues (Horlick-Jones 1998, 2004; Horlick-Jones et al. 2007). Scholars also highlight the role that the “mediating institution” (e.g. environmental groups, mass media, local industry, interpersonal networks) could play in conveying scientific argumentation to the general public (Kasperson et al. 1988; Irwin and Wynne 1996, 10). As a consequence, scientific knowledge needs to be more reflexive and self-aware, as it has no superior status, but must compete with all other sorts of knowledge (Irwin, Dale, and Smith 1996).

Literature on risk society suggests that risks are not “real”, they are “becoming real” (Beck 1992; Van Loon 2000). Scholars suggest that risks and uncertainties around science and technologies must be tackled as not only a scientific-technical matter, but also involving public values and social preferences (Fischhoff 1996; Gaskell et al. 2005; Renn 2008). These thoughts highlight the ‘constructivist’ aspect of risks. Against this backdrop, some show concerns that *«the prospect of a society that entirely rejects the values of science is too awful to contemplate»* (Collins 2009). Above-mentioned literature does not deny the usefulness or value of scientific knowledge, but the indeterminacy, complexity and ambiguity of emerging technologies are highlighted. Under this context, scientists alone cannot have all the answers and acquire the whole picture.

At the millennial turning point, the House of Lords report noted that a fundamental crisis of trust in the UK science policy-making had occurred, and *«society's relationship with science is in a critical phase»* (House of Lords 2000) . According to Miller, with the announcement of “demise of the deficit model” by British Science Minister Lord Sainsbury, a new era is being ushered in (Miller 2001). The legitimization crisis of science and technology could also be examined, to a greater or lesser degree, in other European countries. For example, the White Paper on Governance released by the European Commission (EC) highlighted the necessity to *«build public confidence in the way policymakers use expert advice»* (EC 2001).

The fading of ‘deficit model’ was in line with a more general trend of re-conceptualizing the division of labor among science, government, and civil society. As scholars put it, *«science will not be represented as a simple ‘body of facts’ or as a given ‘method’, but as a much more diffuse collection of institutions, areas of specialized knowledge and theoretical interpretations whose forms and boundaries are open to negotiation with other social institutions and forms of knowledge»* (Irwin and Wynne 1996, 8). A researcher claimed that the age of science for its own sake was coming to an end (Levy-Leblond 2000). And science was to a less extent considered as a pure, neutral, and value-free process guaranteed by depoliticized peer review, but characterized by the co-constructed, hybrid and contingent feature (Wynne 2002; Horlick-Jones et al. 2007, 16). Jasanoff also observed the shift of the focal point from “preserving science’s autonomy and integrity” in the 1960s to more discussion on “regulation and control of scientific production” in the 1990s (Jasanoff 2005).

The greater movement across institutional boundaries and the increasing complexity of modern society (Gibbons 1999), the closer and denser networks of relationship of science with business and politics (Wilsdon and Willis 2004), the emergence of new actors, e.g. ethics committees, CSOs that address the topic of science and technology (Bensaude-Vincent 2012; Suraud 2013), the explosion of risks issues raised in the public sphere (Beck 1992; Bonneuil 2004), etc., all these factors

cut across the conventional division of labor among state, science, and society. And a new social contract is required in this regard. Although this is not agreed by all, especially some scientists (Taverne 2004; Graur 2007), the callings for dialogue and engagement have gradually gained mainstream support in the dawn of the 21st century (Bensaude-Vincent 2012, Burgess 2014), among which ‘upstream public engagement’ has become an influential ‘sub-branch’, especially in addressing the issues of nanotechnologies .

2. Upstream public engagement (2000s onwards)

Heralded as ‘the next big thing’, nanotechnologies have attracted wide attention due to its promising potentials for revolutionizing almost every sector of industry (Crow and Sarewitz 2001). The magnitude of such transformations also triggers the burgeoning of science and technology studies, among which ‘upstream public engagement’ has become a popular notion.

The notion of ‘upstream public engagement’ originated in the UK and has been actively advocated by the political think-tank Demos and other scholars. Earlier technological controversies— such as mad cow disease and GMOs— encouraged scholars to re-conceptualize the science-technology-society relationship such that it would shift from the education-focused deficit model, by emphasizing two-way communication in the form of dialogue, to upstream public engagement (Wilsdon and Willis 2004). With the aim of restoring public trust and *«building more reflective capacity into the practice of science»* (Wilsdon, Wynne and Stilgoe 2005, 35), STS scholars use nanotechnology to test novel forms of engagement and deliberation at an early stage of the R&D process and in advance of significant applications or social controversy (Pidgeon and Rogers-Hayden 2007). As scholars put it, *«much nanotechnologies is at an equivalent stage in R&D terms to biotechnology in the late 1970s or early 1980s. The forms and eventual applications of the technology are not yet determined. We still have the opportunity to intervene and improve the social sensitivity of innovation processes at the design-stage—to avoid the mistakes that*

were made over GM and other technologies» (Willis and Wilsdon 2003). Rogers-Hayden and co-authors note that what is new about upstream public engagement is its emphasis on involving the public (or different publics) “prospectively” rather than “retrospectively” (Rogers-Hayden, Mohr and Pidgeon 2007).

These reflections are not confined to academic circles, as we could see some official policy documents of the UK as well as other EU member states incorporated the idea of ‘upstream public engagement’ rapidly. For example, the UK government showed determination to *«enable public debate to take place ‘upstream’ in the scientific and technological development process, and not ‘downstream’ where technologies are waiting to be exploited but may be held back by public scepticism brought about through poor engagement and dialogue on issues of concern»* (HM Treasury 2004, 105). The 2004 report by Royal Society and Royal Academy of Engineering inquiry (RS/RAEng) suggested that most developments in nanotechnologies were ‘upstream’ in nature when accounting for three factors: current decisions, impacts and public acceptance (RS/RAEng 2004, 64). The report continued by noting that *«the upstream nature of most nanotechnologies means that there is an opportunity to generate a constructive and proactive debate about the future of the technology now, before deeply entrenched or polarized positions appear»* (Ibid. 67).

In the Netherlands, the 2006 Dutch parliamentary documents suggested that *«the Cabinet wants to work towards a societal basis for nanotechnologies by engaging in dialogue with citizens. If there is one thing that we have learned from the debate on genetically modified organisms, it is that societal acceptance of technologies that have ethical questions alongside risks only comes about when these questions are taken seriously in an early stage.»*³ Experiences of ‘upstream public engagement’ employed for nanotechnologies in Europe also inspired the development of a new

³ Parliamentary Documents. (2006). Vision Document: Nanotechnologieën: Van Klein naar Groot (29338 No. 54). The Hague. Translated by Lotte Krabbenborg

vision of ‘participatory technology assessment’ in the US, which emphasized supplementing expert opinion with early input of society (Sclove 2010; Nature 2010) .

Despite the encouraging signals that favor upstream public engagement, it is clear from later research that putting the notion into practice entails a variety of dilemmas and paradoxes.

2.1. Tensions and dilemmas

As researchers of Demos put it, *«the sudden vogue for upstream engagement may prove ephemeral, or may develop into something more promising»* (Wilsdon and Willis 2004, 21). Since 2007, more scholars have joined the discussion and provided further clarification and investigation of this notion, pointing out the potentials as well as limitations and tensions that ‘upstream public engagement’ holds. It is of particular interest to see how this notion has been defined, deployed and for some reasons abandoned as an instrument in addressing nanotechnologies.

2.1.1. Too broad/ too narrow dilemma

When translated into practice, the first and foremost challenge is the ‘too broad/ too narrow’ dilemma. Instead of focusing narrowly on downstream impacts or ‘side effects’ of new technologies, ‘upstream public engagement’ holds the potentials of opening up broader framing and wider agenda, which put the assumed ends and the purposes of scientific research in line with public accountability (Rogers-Hayden, Mohr, and Pidgeon 2007). However, it is also this broadness and open-ended nature that poses one of the greatest challenges.

Scholars point out that *«on the one hand it must be broad enough not to restrict and decontextualize debate, on the other hand too much flexibility means recommendations are rather abstract and thus difficult for policymakers to utilize»* (Pidgeon and Rogers-Hayden 2007). Several practitioners of ‘upstream public engagement’ claimed to have encountered such dilemma in practice. For instance,

Richard Jones, the chair of the UK Nanotechnologies Engagement Group, noted that *«the uncertain nature of the subject itself has sometimes made it hard to focus the discussions»* (Gavelin, Wilson, and Doubleday 2007). Jack Stilgoe, the coordinator of another project, Nanodialogues, mentioned in an interview, *«the lesson of all of that is it was all pretty messy, nobody really knew what he was doing»* (Bullich 2009, 70).

Together with the ‘too broad/ too narrow’ dilemma is the paradox of participation. According to Collingridge, *«as public awareness of an issue and its implications is often lowest precisely when the margins for influencing decision making are widest, while public awareness tends to be much greater only when those margins narrow»* (Collingridge 1981). The nascent nature of nanotechnology means wide margins of influences, but the public as well as CSOs may lack interest and know-how to get involved. Concerns are also raised that upstream public engagement could empower activist groups who advocate their own special interests instead of that of common good, manipulating policy in misguided directions (Taverne 2004; Tait 2009). By contrast, scholars of Demos and Lancaster University indicate that such charges exaggerate the capacities of CSOs (Kearnes et al. 2006). Researchers argue that models of engagement often appear to be based on ‘half-baked ideas’ of the public (Stilgoe, Lock, and Wilsdon 2014). In this regard, more studies about how CSOs manoeuvre in upstream mode are needed.

2.1.2. Implicit linear model of innovation

The term of ‘upstream’ is used by scholars to “identify moments of flexibility” (Wilsdon and Willis 2004). However, there remains much ambiguity and difficulty regarding how to define the conditions that make up ‘upstreamness’. Scholars argue that upstream public engagement is still embedded in a linear model of innovation that displays the deterministic connotation of a necessary direction of flow (Joly and Kaufmann 2008; Stirling 2008).

Demos researchers acknowledge the linearity of the metaphorical stream and tend to describe ‘upstream engagement’ as: *«a process of ongoing deliberation and social assessment which embeds dialogue... within all stages of the R&D process»* (Wilsdon, Wynne and Stilgoe 2005, 38). Mohr holds the same view, referring ‘upstream public engagement’ as ‘a continuous flow’ (Mohr 2007). This dissertation suggests that such critiques and corrections may ignore the critical edge that ‘upstream public engagement’ holds. And it is the very emphasis of ‘moving upstream’ that makes it distinguished from other concepts such as ‘analytic deliberative process’ (Renn 1999).

It is worth noting that ‘upstream’ here not simply means ‘early’, but also represents a proactive approach characterized by foresight, anticipation and deliberation (Pidgeon and Rogers-Hoyden 2007; Barben et al. 2007; Jaspers 2012). Other proposals and notions, such as ‘real-time technology assessment’ (Guston and Sarewitz 2002), ‘safety by design’ (Kelty 2009), ‘value-sensitive design’ (Van den Hoven, Lokhorst, and Van de Poel 2012), though different in details, all indicate a more proactive and inclusive tendency.

As Vicki Colvin, Director of the Center for Biological and Environmental Nanotechnology, Rice University, put it, *«nanotechnology has a unique opportunity in the history of technology: this could be the first platform technology that introduces a culture of social sensitivity and environmental awareness early in the lifecycle of technology development»*⁴. Wynne held similar point of view, arguing that *«the ‘upstream’ metaphor was never intended to be a catch-all model. But it made one central analytical point of distinction—the difference between innovation-oriented and protection-oriented science—from which much else follows»* (Kearnes, Macnaghten, and Wilsdon 2006, 75).

⁴ Vicki, Colvin. 2002. “Responsible nanotechnology: Looking beyond the good news.” EurekAlert. <http://www.eurekalert.org/context.php?context=nano&show=essays&essaydate=1102>

In this regard, Doubleday proposed moving beyond discussion about the way to identify the conditions characteristic of ‘upstreamness’, but to consider the locations for a ‘democratic space’ about the role of science and technology in society. Based on a laboratory-based collaboration between STS and nanoscience, he suggested a new perspective to view ‘upstreamness’ :*«as a location in space rather than a point in time at which interventions in the emergence of new technologies are possible»* (Doubleday 2007b). Inspired by this proposal, the dissertation will draw on the theoretical tool of ‘public sphere’ as such a ‘location’, which refers to a social space generated in communicative action (Habermas 1996, 360).

2.1.3. Lack of a link with the political system

Last but not least, “pull one hair and the whole body moves”, as a Chinese proverb goes. Upstream public engagement underlines the importance of “pulling the hair”, that is to say triggering the reconceptualization of the science-society relationship; however, it does not give much in the way of any indication about how the “whole body” can be moved. In other words, moving engagement ‘upstream’ does not necessarily bring an improved regulatory system and institutional change. It remains unclear how public input could be incorporated into the policy-making process and bring some concrete policy outcomes. Other scholars highlight the short of knowledge regarding the interactions between the microcosm of public participation and the wider world (Marris, Joly, and Rip 2008).

Such ambiguity could lead to the situation marked by “all talk but no action”. Fiorino develops three rationales in explaining the motivation behind public engagement: normative (it is the right thing to do), substantive (to produce a better result) and instrumental (to achieve a predefined end) (Fiorino 1990). The authors of Demos observe that *«the language of ‘upstream engagement’ is there, but... the motivations for doing it are instrumental rather than substantive»* (Wilsdon and Willis 2004, 49).

Scholars claim that the true purpose of policymakers seems only to “manufacture public opinion”, as *«too often these forums are too restrictive... and seem to be designed only to alleviate <groundless fears>»* (Wullweber and Vlandas 2006). Concerns are raised that ‘upstream public engagement’ is only used as a more sophisticated and subtle tactic to familiarize the public with nanotechnologies before they become commercialized so as to generate public acceptance and avoid controversies (Delgado, Lein Kjolberg, and Wickson 2011). As highlighted by precedent research, *«upstream engagement would fail if it simply moves the same set of ‘downstream’, risk-based questions to an earlier point in the research process»* (Wilsdon, Wynne, and Stilgoe 2005, 32). In this case, the efforts of promoting engagements may “hitting the notes, but missing the music” (Wynne 2006).

As the editorial of *Nature* put it, *«upstream engagement is no panacea»* (Nature 2004). Without commitments and genuine openness, a democratic governance of emerging technologies would not be automatically achieved by simply moving public engagement ‘upstream’. Demos researchers also acknowledged that *«engagement processes need some kind of link to the political system»* (Wilsdon and Willis 2004, 46). At this point, Habermas’s analysis concerning the interplay between civil society and the political system could serve as a theoretical entry point for clarifying and examining this ‘link’. Research in that direction remains an understudied area. And this dissertation seeks to provide some tentative analysis to fill the gap.

B. Revisiting ‘upstream public engagement’: from a Habermasian perspective

Have the experiments over the past decade in opening up nanotechnologies at an early stage lived up to the expectation of its proponents and practitioners? What gains have been achieved and what have been dismissed or downplayed? Some scholars share the view that the shift towards more democratic engagement with nanotechnologies hasn’t been as profound and complete as has been expected (Kurath and Gisler 2009; Toumey 2011). In the UK, Pidgeon and his colleagues observe that the

ethos of public engagement has been declining subtly (Pidgeon et al. 2009). Doubleday observes that major actors, including social scientists, CSOs, and the government, are taking a step back due to different reasons: *«my sense is that we have entered in a very quiet period ... I have seen nothing of particular interest since 2007»* (Bullich 2009, 79) . Bullich examines the case of Switzerland, concluding that *«the culmination of mobilization around debates on nanotechnologies seems to have passed⁵»* (Bullich 2009, 8) . Interest towards ‘upstream public engagement’ has decreased significantly, with the precise form and timing varied in different countries.

What are the factors behind the disappearing enthusiasm towards ‘upstream public engagement’? Apart from the implicit tension and dilemma discussed above, this dissertation argues that previous literature has mostly included theoretical reflection or one-off case studies, and research based on long-term observations is scant. We should avoid dismissing the significance of ‘upstream public engagement’ out of hand. For example, scholars suggest that policy debate on nanotechnology in its upstream stages is in itself “an enormous achievement” (Sarah, Phil, and Matthew 2009,11). The dynamics in the public spheres over the past decade or so provide valuable opportunities to investigate the real potential offered by ‘upstream public engagement’ and to infuse some new vitality to existing discussions.

1. Conceptual tools

My contribution is to revisit ‘upstream public engagement’ by drawing on the conceptual tool of ‘communicative power’ proposed by Habermas. This concept occupies an important place in the building of Habermas’s two-track deliberative politics. It provides a standpoint from which we could examine how public opinions in engagement activities could be incorporated into the policy-making process by addressing two research questions:

⁵ The original text: *«le pic de mobilisation autour d’un débat sur les nanotechnologies semble être passé»* .

1) whether moving public engagement ‘upstream’ could contribute to a more vibrant public sphere;

2) how and to what extent the influences that CSOs acquire in the public sphere could coalesce into communicative power.

1.1. The Circulation of Political Power

In his early work, Habermas suggested to *«erect a democratic dam against the colonializing encroachment of system imperatives on areas of the life-world»* (Habermas 1992). And it was through later academic works that his ideas became clearer with regard to how such a ‘democratic dam’ could fulfill its function.

In the book *Between Facts and Norms*, Habermas envisages the ‘communicative power’ as the key normative resources of life-world, which is supposed to counter the norm-free steering media of ‘money’ and ‘administrative power’ (Habermas 1996; Flynn 2004). As he puts it, *«the social substratum for the realization of the system of rights consists...in the currents of communication and public opinion that, emerging from civil society and the public sphere, are converted into communicative power through democratic procedures»* (Habermas 1996, 442). The word ‘power’ is likely to cause ambiguity, which requires further clarification.

Habermas’s thought regarding ‘power’ has undergone fundamental changes. In his early works such as *Knowledge and Human Interest* and *The Theory of Communicative Action*, ‘power’ is primarily understood as the ability of an agent to coerce or dominate others owing to hierarchical priorities; or as non-symbolic steering medium of the system which facilitates the organization and management of complex modern society.

Inspired by Hannah Arendt, who opposes ‘power’ to ‘violence’ but considers it as *«the potential of a common will formed in noncoercive communication»* (Ibid., 147-148), Habermas further differentiates political power into ‘administrative power’

and ‘communicative power’. The two respond to ‘system’ and ‘life-world’ respectively, the former being in charge of collective binding decisions and the latter acting as a “pool of reasons”, providing legitimate force. It is the medium of law that renders feasible a sociological model of constitutionally regulated circulation of power: *«legitimate law is generated from communicative power and the latter in turn is converted into administrative power via legitimately enacted law»* (Ibid.,169).

Given the cases in which administrative or social power bypasses communicative power and cuts across the circuit of democratic decision-making, the model proposed by Habermas places considerable normative responsibility on civil society: *«this weight depends primarily on whether civil society, through resonant and autonomous public spheres, develops impulses with enough vitality to bring conflicts from the periphery into the center of the political system»* (Ibid., 330). It is of necessity to introduce Habermas’s thought on CSOs and the public spheres.

1.2. CSOs and the public sphere

According to Habermas, CSOs form the ‘organizational substratum’ of the general public of citizens. He defines CSOs as *«those more or less spontaneously emergent associations, organizations, and movements that, attuned to how societal problems resonate in the private life spheres, distill and transmit such reactions in amplified form to the public sphere. The core of civil society comprises a network of associations that institutionalizes problem-solving discourses on questions of general interest inside the framework of organized public spheres»* (Ibid., 366-367).

In this dissertation, CSOs mainly refer to environmental organizations, consumer associations and trade unions concerned with nanotechnology issues and devoted to defending ‘general interests’. From a Habermasian perspective, this dissertation will investigate whether and how upstream public engagement could add vibrancy to the public spheres and facilitate the formation of communicative power, thus limiting and influencing the function of the system.

1.3. The definition of ‘upstream public engagement’

Before moving on to the introduction of research methodology, I provide some clarifications about what ‘upstream public engagement’ means in this dissertation. As discussed above, with different objectives, ‘upstream public engagement’ may have diverse meanings under different context. While for Doubleday, ‘upstream’ means a location for ‘democratic space’ (Doubleday 2007b); for others, it is the general title of a series of experiments in opening up science and its governance. With a specific focus on the dynamics of EU-level CSOs, I define ‘upstream public engagement’ as follows: the provision of opportunities for a broad set of actors to participate and deliberate from the very beginning of the R&D process.

Once the definition settled, some questions now come to the fore: where exactly at the EU level are procedures, practices, and arrangements created, if any, to further ‘upstream engagement’? Would ‘upstream engagement’ encourage particular forms of action or strategies that CSOs utilize in addressing nanotechnologies⁶? Scholars, based on analyses at the member state level, have provided some insights in this regard. For example, Wullweber argues that the new stratagems of the government seem to be successful, as *«the resistance to nanotechnology is by no means as strong as e.g. the anti-GMO protests»* (Wullweber 2007). This dissertation attempts to shed light on the dynamics in the public spheres at the EU level, which is still under-emphasized.

2. Research methodology

In order to answer the research questions posed above, content analysis and semi-structured interviews have been used to investigate the interplay between CSOs and the political system.

⁶ This question has been addressed by Seifert and Plows in their article <From Anti-Biotech to Nano-Watch: Early Risers and Spin-Off Campaigners in Germany, the UK and Internationally>. However, their research, as indicated in the title, is mainly focusing on the Member State level.

2.1. Content analysis

As a first step, I analyze the materials obtained from CSOs' websites. These materials include CSOs' position papers, reports, joint letters, press releases, meeting records, contributions to public consultation, video materials, etc. A dynamic analysis enables me to track the evolution of CSOs' stance and strategies towards nanotechnologies in different phases.

In order to see whether 'upstream public engagement', as a new governance vision, actually inspired the EU regulators, I also study the principal EU policy documents regarding the governance of nanotechnologies, e.g. the Communication *Towards a European Strategy for Nanotechnology*, action plan, code of conduct, two regulatory reviews of nanomaterials, the 2009 resolution of the European Parliament (EP), etc. Workshops, seminars reports, EU-funded projects and CASG-nano meeting records have also been collected and analyzed.

2.2. Semi-structure interviews

While content analysis provides a preliminary and general picture of CSOs' involvement in the policy-making process of nanotechnologies, semi-structured interviews allow me to gain a deeper understanding of the subtle relationship, tensions, and interactions between different stakeholders.

In total, twenty-three interviews had been conducted with a range of stakeholders between June and December 2014, either face-to-face in Brussels or by telephone (see Table 1 for the list). The semi-structured interviews lasted roughly an hour each, and were subsequently fully transcribed.

Table 1. List of interviewees

DG SANCO	3
DG ENV	1
DG ENTR	1
DG EMPL	1
Advisor to the Parliament	2
Official of member state	1
Environmental organization	9
Consumer association	3
Trade union	2
Total Interviewees	23

In selecting the interviewees, I mainly consider two factors: firstly, an interviewee should have a solid understanding of the policy development of nanotechnologies in the EU. Secondly, an interviewee should have been actively involved in the policy-making process of nanotechnologies, for example, rapporteur, shadow rapporteur, advisors to the Members of the European Parliament (MEPs), different Directorates-General (DGs) of the Commission, regulatory authorities of member states. Focusing narrowly on the interplay between CSOs and the political system, other important stakeholders such as industry representatives and research community are not in the list of interviewees.

23 stakeholders have finally accepted the invitation for an interview. Among them, nine were conducted with the EU regulatory authorities, including an advisor to the Parliament, representatives of the DG for Health and Consumers (DG SANCO), Environment (DG ENV), Enterprise and Industry (DG ENTR), and Employment, Social Affairs & Inclusion (DG EMPL) as well as one official from the Netherlands.

Interviewed EU-level CSOs include the Center for International Environmental Law (CIEL), ClientEarth, the European Consumers' Organization (BEUC), the European Consumer Voice in Standardization (ANEC), the European Environmental Citizens Organization for Standardization (ECOS), the European Trade Union Institute (ETUI) and Health Care Without Harm Europe (HCWH Europe). As several member states of the EU play a critical role in nanotech debates, interviews have also been undertaken with CSOs that act at the national or regional level, for example Friends of the Earth Germany (BUND), the French Democratic Confederation of Labor (CFDT), the Danish Ecological Council, the Belgian Inter-Environment Wallonie (IEW), and the Mediterranean Information Office for Environment Culture and Sustainable Development (MIO-ECSDE). I also communicated with Greenpeace UK, Greenpeace Europe and the Health and Environment Alliance (HEAL) by e-mail. These three CSOs do not or no longer have long-term interest in nanotechnology.

The interviewees can be divided into two groups. Interviewees from the 'system' were mainly asked about: 1) what lessons have been learned with regard to involving CSOs in policy-making process of nanotechnologies; 2) how would they evaluate the roles that CSOs have played in debates around nanotechnologies. The members of the other group, composed of CSOs, were asked about: 1) whether 'upstream public engagement' has brought more political opportunities to get involved in the policy-making process of emerging technologies; 2) how do their approaches and tactics evolve within different political contexts and to what extent their advocacy has been incorporated into the policy results. Both of the groups were asked about their observations towards the challenges, difficulties as well as future opportunities in generating genuine and constructive dialogue between different stakeholders.

During the process in contacting the interviewees, a lot of difficulty emerged. Firstly, it was extremely difficult in gaining contact with regulatory authorities, especially the MEPs. Several MEPs (e.g. Satu HASSI) declined the interview invitation directly; some main actors were not standing in re-election (e.g. Hiltrud

Breyer, Malcolm Harbour, Carl Schlyter) during the 8th EP election in May 2014, and others (e.g. Michele Rivasi, Christa Klaß, Jill Evans) did not give any response. The DGs of the Commission were relatively more accessible. They responded my e-mails personally and provided abundant time for carrying out the interviews. As a result, we could see an imbalance of number distribution with regard to interviewees who come from the Commission and those of the Parliament. Great efforts have also been made to talk with regulatory authorities of member states, especially those of the Netherlands, France, Belgium, Denmark and Sweden. However, only Monique Bosman, Dutch Ministry of Infrastructure and the Environment, finally accepted the invitation for a phone interview.

Secondly, this dissertation succeeded in getting contact with most of EU level CSOs which addressed the topic of nanotechnologies. However, senior policy officers of two principal CSOs— Tatiana SANTOS (EEB) and Aida Ponce Del Castillo (ETUI)—did not accept the invitation. Fortunately, Doreen Fedrigo-Fazio, who has working experiences in both EEB and ETUI, has contributed her knowledge and insight to this research. Greenpeace UK only agreed to respond to two questions through e-mail. Although some useful information has been obtained, it is not sufficient to fully understand the whole process why Greenpeace UK lost interest in nano issue. Furthermore, due to high turnover of personnel, there is no campaigner available within Friends of the Earth Europe (FoE Europe) who has advocacy experiences on the topic of nanotechnologies. The author contacted the policy officer of FoE Australia and U.S. for complementary information.

3. Research design

On the basis of content analysis and the interview results, the following table is summarized to show how decisions taken by CSOs to address nanotechnology differed in terms of timing and background. Two points can be drawn from Table 2.

Firstly, ‘upstream public engagement’ did not succeed in generating much early interest of EU level CSOs, as we could see only two CSOs from Member States—Greenpeace UK and PMO— started to address the topic of nanotechnologies from the very beginning of R&D process. This conclusion is in line with early research, which suggests that *«campaigning intensity seems rather moderate... European groups are few and started to raise their voices at a relatively late stage»* (Seifert and Plows 2014). CSOs’ engagement is not as ‘upstream’ as some STS scholars envisage, which acts as another manifestation of the above-mentioned dilemma and difficulties when translating ‘upstream public engagement’ into practice.

Secondly, the number of CSOs which started to get engaged has increased significantly between the year of 2006 and 2009. During this period, NanoCap Project, funded by the Sixth Framework Programme (FP6), was launched by the Commission. As an interviewee of ECOS put it, *«nanotechnology is a very complex topic, which requires a lot of organizations, like CSOs, to be able to first understand and to influence.»*⁷ This demonstrates the importance of expertise and capacity building in influencing CSOs’ decisions to address a topic.

EU-level CSOs’ involvement in the nanotech debates is accordingly divided into three phases: the awareness-raising phase, the capacity-building phase and the alliance-forming phase. The following chapters will evaluate in more detail the interplay between CSOs and the political system in each phase. The last chapter provides some concluding remarks.

⁷ Interview with Dania CRISTOFARO, Policy Officer of ECOS, 21/10/2014

Table 2. CSOs that were involved in the nanotech debates

Name	Country	Time	Background
PMO	France	2002	The specific context of the local political environment of Grenoble, France.
Green peace	UK	2003	GMOs open up windows of opportunity to promote debates on nanotechnology
EEB	EU level	2006	CSOs Capacity Building Project NanoCap
ETUC	EU level	2006	CSOs Capacity Building Project NanoCap
MIO-ECSDE	Mediterranean	2006	CSOs Capacity Building Project NanoCap
ANEC	EU level	2006	The release of several documents, e.g. the risk assessment review by SCENIHR, the development of the Woodrow Wilson database
BEUC	EU level	2006	Consumer products that contain nanomaterials continued to pour into the EU market, such as in the areas of food, toys
CIEL	EU level	2007	Nano has been under the radar of other CSOs; Given that nanotech is still young, CSOs could limit the possible risks from early on
CFDT	France	2007	Nanomaterials appeared in the workplace; Militant groups started to target nanomaterials
FoE	EU level	2008	The mobilization of sister CSOs, e.g., FoE Australia
ECOS	EU level	2008	The release of the programming mandate (M/409 nanotechnology)
HEAL	EU level	2008	Push from membership organizations and partner organizations; Hearing from concerned scientists
Client Earth	EU level	2010	Addressing nanomaterials is in line with its priority on toxic chemicals
IEW	Belgium	2010	Encouraged by the Belgian presidency, who brought the traceability of nanomaterials on the policy agenda
HCWH Europe	EU level	2012	Concerns about the use of nano in medicine and medical devices

Chapter II: Awareness-raising phase (2000-2005)

European nanotech policy direction is located in the EC's DG for Research and in particular in its "Nanosciences and Nanotechnologies Unit", headed by Renzo Tomellini (ETC Group 2005b). The Commission adopted the *Communication Towards a European Strategy for Nanotechnologies* in 2004 and the *Nanosciences and nanotechnologies: An action plan for Europe 2005-2009* in 2005, proposing a 'safe, integrated and responsible' strategy and setting the tone for the EU nanotechnology policy. Believing that nanotechnologies could contribute to the knowledge-based objectives of the Lisbon process, the EU increased its funding with 1.4 billion euros allocated under FP6⁸ and a further doubled budget under FP7 (EC 2005). Nanotechnologies, identified as one of the EU's key enabling technologies (KETs), started to be put on the agenda of the regulatory authorities. As Kulinowski (2004) put it, nanotechnologies were given a 'very high wow index'.

Meanwhile, large budget invested into the R&D of nanotechnologies has aroused civil society scrutiny. CSOs and concerned scientists showed concerns about the possible negative impact of nanotechnologies on environment, safety, health as well as its ethical and societal implications. Voices calling for a worldwide moratorium on nanotechnology by ETC Group (action group on Erosion, Technology and Concentration), a CSO based in Canada, tended to attract growing attention (ETC Group 2003). A scholar observed the influence of the atmosphere marked by legal uncertainty in the industry, *«indiscriminate use of nanotechnology within consumer products in the mid-2000s led to some business shying away from the technology»* (Maynard 2015).

Against this backdrop, Kulinowski (2004) alarmed that *«societal and ethical concerns can rapidly turn "wow" into "yuck"»*. Will nanotechnologies experience this rapid turn? How will European CSOs respond to ETC Group's proposal of a

⁸ FP6: Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices <https://cordis.europa.eu/fp6/nmp.htm>

moratorium on nanotech? This chapter examines CSOs' approaches towards nanotechnologies during the early period and finds out that the real situation is much more complex than a 'wow' or 'yuck' assertion. Rather than bearing in one mind, CSOs' responses were quite diverse and uneven: while several activist groups from Member States (e.g. PMO, France; THRONG, the UK) resorted to confrontational methods (e.g. demonstrations, direct action) and rapidly turned against nanotechnologies, branches of supranational CSOs (e.g. Greenpeace UK, FoE) were relatively mild, balanced and in some cases slow⁹. And they participated in a cooperative, argumentative and expertise-based manner. EU-level CSOs, the main subject of this article, were largely absent during early debate. How can this preference for different approaches be explained? The indeterminate and embryonic feature of nanotechnologies has provided an interesting testing ground on which we could observe how different stakeholders strive to define, shape and frame nanotechnologies.

Centered on these questions, this chapter will be structured as follows: it begins with an introduction of the policy development of nanotechnology in the world as well as in the EU, outlining key events during the awareness-raising phase. After the introduction of the background, the second section examines CSOs' approaches towards nanotechnologies, arguing that their uneven and diverse responses actually helped to diluting the momentum of potential anti-nanotech campaigns, winning a relatively positive environment for nanotechnologies' early development in the EU; the third section concludes three factors in explaining CSOs' preference for different approaches, including the indeterminacy and broadness of nanotechnologies, the different outlooks and values behind each CSO as well as the wider regulatory environment.

⁹ For example, it was not until 2008 that FoE Europe published its first report on nanotechnologies.

A. Background

The early period saw both utopias and dystopias discourses around nanotechnologies. Proponents spoke highly of the great potentials and revolutionary breakthrough that nanotechnologies could bring. As Mark Modzelewski, executive director of the Nanobusiness Alliance, put it, *«nanotech's promise is clean industries, cures for disease, nearly unlimited energy supplies, a continuance of Moore's Law and perhaps the end of hunger.»*¹⁰ Another camp, represented by celebrities (e.g. Bill Joy, Prince Charles) and CSOs (e.g. ETC Group), warned the catastrophic consequences that nanotechnologies could bring on society and proposed monitoring this emerging technology with great caution. A polarized debate has emerged between those who believe that the rapid growth of nanotechnologies will have strongly positive economic benefits, and those who on the grounds of environmentalism and social equity seek to slow or halt its development (Wood, Jones, and Geldart 2003). As a scholar puts it, *«nanotechnology is not a definite technology, but an empty signifier and a political project that serves certain interests and strategies»* (Wullweber 2008).

1. Fear of the small thing: 'Grey Goo'

2003 is a year of significance in the development of nanotechnologies in the EU: Prince Charles' concerns about nanotechnologies triggered wide media coverage; ETC Group was invited to attend a seminar at the office of the Parliament; Greenpeace UK published a report and started to participated in nano debates the same year. As Philip Ball, science writer for *Nature*, put it, *«2003 was the year when nanotechnologies collided with the real world. It was a painful collision, bringing prophecies of doom, fears of hidden dangers and call for a moratorium on nanoscience»*¹¹. Nanotechnologies started to appear on the radar screen of the media and militant groups.

¹⁰ McKibben, Bill. 2003. "Promising the World, or Costing the Earth?" *The Ecologist*, May 1. http://www.theecologist.org/investigations/science_and_technology/268683/promising_the_world_or_costing_the_earth.html

¹¹ Ball, Philip. 2003. "2003: nanotechnology in the firing line." *Nanotechweb.org*, December 23. <http://nanotechweb.org/cws/article/indepth/18804>

These early prophecies of doom and fears were mainly caused by ‘grey goo’, a buzz word popularized in early debates on nanotechnologies. Coined by Eric Drexler in his book *Engines of Creation*, the term ‘grey goo’ describes an end-of-the-world scenario where self-replicate nanorobots go out of control and bring planetary catastrophe, threatening the very extinction of human beings. Bill Joy expanded discussions of ‘grey goo’ from science fiction to the real world. In 2000, he published an influential article <*why the future doesn’t need us*> in *Wired* magazine. In this article, he showed grave concerns about the ever accelerating expansion of GNR (genetics, nanotechnologies, and robotics) technologies, which, according to him, could threaten to make humans an endangered species¹². Others echoed his concerns, underlining that «*the power of science to alter nature has reached such a state that society needs to have a much more fundamental place in considering its support*» (Nature 2003). The later publication of the best-seller science fiction novel *Prey* put the ‘grey goo scenario’ once again into the spotlight.

ETC Group, the first CSO worldwide which ignited an anti-nanotech campaign, depicted another term of ‘green goo’: the merging of living and non-living matter resulting in hybrid organisms, which are previously unknown on earth. According to ETC Group, this merging underpinned by nanobiotechnology could bring not only ethical problems (e.g. the blurring of distinction between biological and non-biological materials, human enhancement), but also uncontrollable and unpredictable disastrous impact (ETC Group 2003a; 2004c).

The approach of ETC Group to marry fears of GMOs to their campaign on nanotechnologies proved to be successful. A particularly visible manifestation is the response of Prince Charles. He was reported to ask RS/RAEng to launch a study to investigate the risks of nanotechnologies after reading ETC Group’s report <*The Big*

¹² Joy, Bill. 2000. “Why the future doesn’t need us.” *Wired*, April.
<http://archive.wired.com/wired/archive/8.04/joy.html>

Down¹³. It is worth noting that Prince Charles has always been interested in topics regarding technological risks. He has attacked GM food in various occasions. For example, he pointed out that *«mixing genetic material from species that cannot breed naturally, takes us into areas that should be left to God. We should not be meddling with the building blocks of life in this way...Advanced technology brings its own dangers.»*¹⁴ In light of precedent knowledge and insights, he proposed dealing with nanotechnologies with great caution given the incredible power it may bring: *«discovering the secrets of the Universe is one thing; ensuring that those secrets are used wisely and appropriately is quite another.»*¹⁵

Scholars observed that there were three sources which dominated the major sources of media coverage from the year of 2002 to 2003: Michael Crichton's novel *Prey*, ETC Group's report, and the speech of Prince Charles (Gaskell et al. 2005). The news coverage crystallized around several frames: risks, control, lessons from past mistakes, ethical implications, etc. Faced with mounting discussion on nanorobotics or 'grey goo', Stephen Wood, professor of Sheffield University, alarmed that *«the debate at the moment is being framed wrongly and in extreme ways.»*¹⁶ There were concerns that early actors who were skeptical of GMOs would continue to campaign against nanotechnologies; and public perceptions were at risk of becoming mixed into 'an exotic cocktail' (Moore 2004).

With the release of several scientific and policy documents (RS/RAEng 2004; Swiss Re 2004; EC 2004), the focus of debates started to shift from future scenario towards more near-term concerns. Debates on nanoparticles toxicity and associated health and safety concerns began to gain momentum, which were considered to be

¹³ Radford, Tim. 2003. "Brave new world or miniature menace? Why Charles fears grey goo nightmare." The Guardian, April 29. <http://www.theguardian.com/science/2003/apr/29/nanotechnology.science>

¹⁴ BBC News. 1999. "Prince Charles speaks out against GM food." April 9. http://news.bbc.co.uk/2/hi/special_report/1999/02/99/food_under_the_microscope/285408.stm

¹⁵ BBC News. 2004. "Prince warns of science 'risks' ." July 11. http://news.bbc.co.uk/2/hi/the_UK_news/3883749.stm

¹⁶ Radford, Tim. 2003. "Nanotech moves the future to a new level." The guardian, July 28. http://www.theguardian.com/the_UK/2003/jul/28/nanotechnology.science

more urgent issues. For example, CSOs pointed out that some nanotubes may share structural similarities with asbestos fibers (ETC Group 2002b; Arnall 2003) and nanoparticles may even cross the blood-brain barrier (Kreuter et al. 2002). With the accelerating commercialization of synthetic nanoparticles, many toxicologists agreed that too little was being done to address the toxicity of nanoparticles (Giles 2003). Swiss Re, the second largest re-insurance company in the world, contributed to the discussion and alarmed that *«the precautionary principle should be applied whatever the difficulties»* (Swiss Re 2004, 47).

2. Anti-nanotech campaign ignited by ETC Group

Early period has witnessed the emergence of CSOs which started to eye nanotechnologies as the next target after biotechnology. Among these CSOs, ETC Group is the most active and prominent one. Its activities have not only attracted the attention of policymakers and nanotechnologists, but also mobilized other CSOs to get involved in monitoring nanotechnologies.

ETC Group, the former Rural Advancement Foundation International, is a CSO located in Canada. As a highly flexible organization with only nine staff members¹⁷, ETC Group has profound expertise and know-how in addressing new technologies issues. A scholar describes the feature of ETC Group as *«smart, highly wired, fast, seemingly intangible yet highly respected for its breadth of knowledge»* (Osgood 2001, 95). Since the beginning of the twenty-first century, ETC Group has observed the emergence of nanotechnologies. It predicted that *«this complex of new technologies will change the world more than any other technological advance»* (Mooney 2001, 45). At that time, ETC Group had not yet developed a clear position towards nanotechnologies. After two years of investigation, ETC Group came up with a decision and demanded for *«an immediate moratorium on commercial production of new nanomaterials»* (ETC Group 2002). Since then, ETC Group has put nanotechnologies highly on its agenda and published more than 20 bulletins and

¹⁷ <http://www.etcgroup.org/people>

reports during the early period, covering a wide range of topics.

A review of these reports enables us to see the evolution of ETC Group's strategies: two reports were published in 2002, which mainly dealt with environmental and health aspects of nanotechnologies. The issue of nanoparticle toxicity was put to the fore. These reports highlighted that "size matters". For instance, particles at nano scale may penetrate living cells and accumulate in animal organs. New forms of carbon (e.g. nanotube and fullerenes) may bring unknown impacts on the environment (ETC Group 2002a; 2002b).

The year of 2003 and 2004 saw an increased number of reports (15 in total). More evidence was assembled by ETC Group to support its alarm of nanoparticle toxicity. It listed 'Ten Toxic Warnings', highlighting the following scientific findings: buckyballs are toxic to water fleas; titanium dioxide and zinc oxide nanoparticles from sunscreen may cause free radicals in skin cells and damage DNA (ETC Group 2004b). These reports also investigated the social and economic aspects of nanotechnologies, covering regulatory aspects, the convergence of technologies, nanobiotechnology and 'green goo', control and monopoly, etc. (ETC Group 2003c; 2004d).

The year of 2005 saw several in-depth reports regarding the possible impacts that nanotechnologies could bring on the global south and marginalized communities and risk governance issues. ETC Group believed that under the current patent and trade systems, which characterized by the privatization of science and the concentration of corporate power, nanotechnologies will only exacerbate rather than reduce existing inequalities between North and South. This 'technological tsunami' will bring social-economic disruptions to the vulnerable and poor which are not well prepared (ETC Group 2005d). As a consequence, it proposed a moratorium on nanotechnologies before its impacts in a larger social and political context examined

and best practices established (ETC Group 2005c). These publications translate complex scientific information and re-frame the policy discourse, offering rich sources for later debates and discussions.

Apart from publishing reports, ETC Group also organized seminars and workshops to advocate its claims. For example, the seminar organized at the World Summit on Sustainable Development in Johannesburg was considered by attending scholars as “a wake-up call for nanotechnologies”. Scholars of Toronto University observed the gap between the rapid development of nanotechnologies and the lagging behind of ethics, suggesting that *«either the ethics of nanotechnology will catch up, or the science will slow down»* (Mnyusiwalla, Daar, and Singer 2003). Another seminar that ETC Group held at the EP’s office aroused the attention of green MEPs as well as other CSOs. More analysis will be provided below.

ETC Group’s activities are eye-catching and sensational. As Pat Mooney, its Executive Director, put it, *«we are obnoxious, and that is part of our strategy. It gets us attention»* (Osgood 2001, 95). This ‘smart’ CSO is good at linguistic invention to catch the attention of the media and the general public. The phrase ‘terminator seed’ was created and widely circulated during its anti-agricultural biotechnology campaign. The good use of linguistics continued to be applied to the nanotechnologies case. Apart from ‘green goo’, it also creates the term ‘atomtechnology’ to highlight nanotechnologies’ feature of manipulating the fundamental building blocks of matter, just like “a painter controls a palette of pigments” (ETC Group 2003b). It also uses ‘Little BANG’ (Bits-Atoms-Neurons-Genes) to replace the official saying of ‘NBIC’ (Nanotechnologies-Biotechnology-Information-Cognitive) by national and international institutions. Although its sensationalism received a lot of criticism, ETC Group has successfully turned nanotechnologies into an issue of concern. Its campaigns have attracted wide media coverage, including those of *the Economist*, *BBC News*, *the Guardian*, *New York Times*, just name a few. It has also done

important conceptual work regarding a general social critique of nanotechnologies in the form of many well-written reports, providing an ‘entry point’ for other interested actors and CSOs.

In the times of globalization, each part is closely connected with one another. Faced with mounting anti-nanotechnologies campaigns at the other side of the Atlantic, European CSOs couldn’t sit by and ignore such an important issue. New actors began to come to the scene. Still in embryonic, nanotechnologies provide an interesting testing ground on which we could observe how CSOs, holding different values and commitment, frame an emerging issue and maneuver under conditions of upstream engagement.

3. Not another GMO: the societal dimension of nanotechnologies highlighted

Will technologies bring a ‘brave new world’? How to set the limit between “exploring nature” and “playing God”? How to define an acceptable level of risk? These questions cannot be answered by scientists alone. Earlier controversies around GMOs have revealed the power of ‘social constitutions’ of technologies. A learning process is triggered among scientists, industries and policymakers, who begin to reflect on the relationship between science and society.

As Mark Welland, head of Nanoscience Center of Cambridge University, put it, *«I’ve learned from the GM debate. It’s easy to condemn a technology, but hard to fight back»* (Giles 2003). In the light of past mistakes, his team recruited an ‘unusual member of staff’— a social scientist to conduct research on the social dimension of nanotechnologies. As this new member put it, *«the project at the Nanoscience Center reflects a turn to the social sciences by science policymakers in response to recent controversies over new technologies»* (Doubleday 2007a).

Scientists and industrialists were concerned that *«a fledgling industry might suffer stigmatization and amplified public concern»* (Pidgeon, Harthorn, and Satterfield 2011). According to Tim Palmer, Chief Executive Officer and President of Cientifica, the world's largest supplier of nanotechnology information, nanotechnology was not a helpful term in business affairs: *«we need to quickly move away from the nanotechnology word and describe its applications»* (Moore 2004).

Nanotechnologies also started to appear on the radar screen of militant groups. French activist group PMO targeted and agitated against nanotechnologies rapidly, emphasizing the importance of 'anticipation': *«be offensive rather than defensive»* ¹⁸. CSOs like Greenpeace UK seized the opportunity and called for a 'root-and-branch rethink' of deeper issues about science and innovation (Parr 2005).

This situation has resulted in a surge of interest and commitment in incorporating public concerns and preferences early into the R&D process of nanotechnologies. Ian Pearson, the UK government minister, noted that nanotechnologies' development was *«an ethical as well as a scientific question, and the public's voice should be heard in answering it.»* ¹⁹ We could find similar statements at the other side of the Atlantic ocean: the report of the US National Research Council acknowledged that *«failure to attend to dialogue at the early stages of problem framing can be particularly costly, for if a key concern is missed in subsequent analysis the danger is that the whole process may be invalidated»* (Fineberg et al. 1996). As Editorial of *Nature* put it, on both sides of the Atlantic, funders of nanotechnology research started to *«take the issue of public acceptance seriously»* (Nature Materials 2003).

In this regard, great efforts have been made to engender public acceptance and avoid repeating past mistakes of GMOs. For example, companies like DuPont began

¹⁸ The original text: *«une critique dont on peut énoncer quelques lignes élémentaires : Anticiper. Contester à propos, avant coup plutôt qu' après coup - les nanotechnologies par exemple. Etre offensif plutôt que défensif»* . PMO website: <http://www.piecesetmainoeuvre.com/spip.php?page=plan>

¹⁹ http://www.dius.gov.the UK/news_and_speeches/speeches/past_ministers/ian_pearson/nanotechnologies

to invest in environmental risks studies (Nature nanotechnology 2007). The report of Greenpeace UK remarked «*some nano-advocate awareness of environmentally-sound practice*» (Arnall 2003, 41). The EU policymakers well recognized the possible negative impact that GMOs could have on the framing of nanotechnologies. As an interviewed DG SANCO put it,

“in terms of the quality and nature of the debate, I would say GMOs actually played a negative role. The temptation was for people who had been engaging in GMOs to use what they knew to have positions towards nano, which is very different”.

The fear of repeating the GMO mistakes, the excitement about the benefits that nanotechnologies could bring and the increasing interest of activist groups in nanotechnologies were all factors which gave rise to a greater willingness among the EU regulatory bodies to engage the public. Against this backdrop, a timely, anticipative and proactive approach towards nanotechnologies has become part of the mainstream policy discourse of the EU (EC 2004; 2005) and various initiatives in this respect have been introduced. This section will provide an overview of the procedures, arrangements, initiatives that put into practice in response to the reinforced demands for ‘upstream public engagement’ at the EU level.

3.1. Policy documents

The Commission adopted the Communication *Towards a European Strategy for Nanotechnology* in 2004, in which it showed the determination to «*adopt a proactive stance and fully integrate societal considerations into the R&D process... This needs to be carried out as early as possible and not simply expecting acceptance post-facto*» (EC 2004). The following 2005-2009 action plan for nanosciences and nanotechnologies highlighted once again the need to «*integrate societal*

considerations into the R&D process at an early stage and encourage a dialogue with citizens» (EC 2005). An interviewed DG SANCO, who has participated in the drafting work, introduced the context within which the action plan was released,

“(we had) very bad experiences with GMOs and we were convinced that the engagement of the public was a necessity. It was a relatively top-down enlightened approach, and at that time the public knew nothing about nanotechnologies... It was a policy decision to actually go from research to an European action plan and to include the societal considerations.”²⁰

Remarking the proactive approach of the EU policymakers, a scholar highlights that it is remarkable to see the rate at which societal considerations emerge on the policy agenda (Scheufele 2011). The commitments of policymakers signaled a shift in mindset as a result of an accelerated learning process, which helped create favorable conditions for conducting upstream public engagement.

3.2. Engagement activities and programs

At the Member State level, various innovative initiatives and activities, which include focus groups, citizens’ juries, consensus conferences, and larger scale national debates, have gained impetus (e.g. the NanoJury in the UK; the Nanoviv and Nanomonde conferences in France; the ‘Publifocus’ project in Switzerland; the establishment of NanoKommission in Germany) (Laffite and Joly 2008). By contrast, activities to promote public engagement, which were initiated by the EU institutions during the early stage, were more in traditional form. The activities include stakeholder workshops, seminars, public consultations, EU-funded projects (Nanologue²¹, NanoDialogue²²), etc.

²⁰ Interview with a DG SANCO, 20/06/2014

²¹ ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nanologue_projectdescription_en.pdf

²² Final report of Nanodialogue
<http://cordis.europa.eu/documents/documentlibrary/102583451EN6.pdf>

It is remarkable to see the rate at which CSOs got involved in the policy debates on nanotechnologies. For example, in mid-2003, green MEP Caroline Lucas invited the ETC Group to present their views of nanotechnology as the ‘centrepiece’ of a meeting comprising other CSOs (e.g. ETC Group, Genewatch UK, Greenpeace), decision-makers from the Parliament, and the Commission (Healey and Glimell 2004, 6). Many participant MEPs came from a political grouping which had *«taken a strong line in favor of the moratorium on GM crops»* (Ibid., 6). Claiming that innovation was running ahead of regulation, Caroline Lucas called for a moratorium on nano-products applied to the skin during the meeting²³. Her tough stance also triggered the media interest (e.g. the Guardian²⁴, BBC News²⁵) as well as follow-up deliberation among scientists and regulatory authorities²⁶. The subsequent workshop *Mapping Out Nano Risks* organized also invited CSOs such as Greenpeace to participate²⁷. According to an organizer of the workshop,

“I invited Greenpeace to the very first meeting that I organized on this subject. But it became increasingly difficult to get Greenpeace to come to the table. Very soon in the process that Greenpeace and other groups like FoE completely got out of the discussion”.

Based on content analysis, we could find that Greenpeace UK has withdrawn from this arena since the publication of its position paper in 2007. Greenpeace Europe never touched upon nanotechnology issues officially. Chapter IV will provide more detailed analyses with regard to the evolution of CSOs’ strategies and approaches towards nanotechnologies.

²³ CORDIS News. 2003. “Nanotechnology: opportunity or threat?” June 12. http://cordis.europa.eu/news/rcn/20401_en.html

²⁴ Lucas, Caroline. 2003. “We must not be blinded by science.” The Guardian, June 12.

²⁵ BBC News. 2003. “The truth about nanotechnology.” June 19.

²⁶ The Guardian. 2003. “Don’t believe the nanotechnology scare stories.” June 17.

²⁷ EC. 2004. “Nanotechnologies: A Preliminary Risk Analysis on the Basis of a Workshop Organized in Brussels.” March 1-2. http://ec.europa.eu/health/ph_risk/documents/ev_20040301_en.pdf

3.3. Informal commitment of the EU policymakers

As Janez Potocnik, the former Science and Research Commissioner of the EU, put it, *«if the full potential of nanoscience is to be exploited however, public concerns must be taken into account... If Europe does not address problems early on, they will come back later with more force.»*²⁸ A vigilance has been cultivated among EU policymakers to *«integrate potentially antagonistic positions»* and anticipate probable public backlash against nanotechnologies in a proactive way (Wullweber 2008). Interviewed DGs of the Commission also shared the opinion that big lessons have been learned from the earlier GMOs case. The whole context made the EU policymakers more aware of the importance of engaging the public. Some passages are selected:

“GMO was a major disaster story. People did not want to see the same happen with nanomaterials...That’s the reason why we involved the CSOs in the early discussions”.²⁹

“a lot of things have been done wrong. Some of the work has not been anticipated properly and some unexpected things basically had not been taken into account.”³⁰

Considering the past controversies over GMOs and the risks that could potentially be associated with nanotechnologies, policymakers showed determination to create a positive and favorable environment for nanotechnologies from the very beginning of the R&D process. Scholars argue that nanotech policy’s emphasis on inclusion and public engagement constitutes a ‘political opportunity’ for CSOs (Seifert and Plows 2014). For example, apart from early involvement, an interviewed Dutch regulatory authority also pointed out the necessity of supporting CSOs,

²⁸ CORDIS news. 2006. “Communication and risk assessment: keys to unleashing nano-potential.” October 20. http://cordis.europa.eu/news/rcn/26531_en.html.

²⁹ Interview with a DG SANCO, 17/06/2014

³⁰ Interview with a DG ENV, in charge of incorporating nanomaterials in REACH and CLP Regulation, 20/06/2014

“once the discussion is framed, it is very difficult to frame it back again. Being open about uncertainties and having all parties involved from the start is very important...it was important to support our own counterforces, to keep policymakers and politicians ‘sharp’, to learn from as many different opinions as possible, and to keep in touch with CSOs.”³¹.

Although these informal commitments signal a ‘shift of mind’ among regulatory authorities, the motivation behind is more to win public acceptance rather than open up the innovation process to the public. We could in fact see a broad spectrum of initiatives which are inspired by the ‘deficit model’, ‘upstream public engagement’, or a combination of the two. In this point, scholars call for ‘a radical shake-up’ in developing public engagement and highlight the importance to *«develop a healthy skepticism about the rhetoric of the win-win situation.»*³² As Moore (2004) puts it, *«society and scientists should be grateful when someone raises a warning flag before a real public-relations disaster happens.»*

CSOs attempted to use the opportunity to trigger deeper reflection and discussion on the science-technology-society relationship and other fundamental issues. It was against this backdrop that new players emerged and CSOs started to address nanotechnologies. Their intervening further contributed to influencing the trajectory of nanotechnologies in the EU.

B. Emerging actors, different approaches

During the awareness-raising phase, a few CSOs began to come on the scene and put the topic of nanotechnologies onto their agenda. These CSOs include branches of supranational CSOs (e.g. Greenpeace UK, FoE) and local CSOs of Member States (e.g. PMO; Trades Union Congress; GeneWatch; Corporate Watch; THRONG; ITDG).

³¹ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

³² EurActiv. 2009. “Nanotech at risk of repeating ‘GM food fiasco’”. September 29.

<http://www.euractiv.com/innovation-enterprise/nanotech-risk-repeating-gm-food-news-222615>

It is worth noting that CSOs which operate at the EU level, the main subject of this dissertation, are largely absent during the early debate. This demonstrates that EU level CSOs could have less flexibility and organizational feasibility compared with local ones or well-established ones. The absence of EU-level CSOs also brought to the fore the failure of ‘upstream public engagement’ in stimulating considerable interest in civil society.

Scholars point out that there exists a continuing misunderstanding which assumes the public as a homogeneous mass (Irwin and Wynne 1996) and CSOs to be purposeful institutionalized, of one mind, and to manipulate policy in misguided directions (Grove-White et al. 2004). As Williams puts it, «*there is in fact no masses, but only ways of seeing people as masses*» (Williams 1989, 11). This dissertation observes that in dealing with the issue of nanotechnologies, CSOs’ positions and strategies are diverse, varied and in constant change.

We were able to examine a range of responses towards this emerging technology: while local CSOs represented by PMO and the Heavenly Righteous Opposed to Nanotech Greed (THRONG) turned against nanotechnology rapidly; well-established ones (e.g. Greenpeace UK; FoE) engaged in a cooperative, argumentative and expertise-based manner. Others (e.g. Corporate Watch; ITDG), while identified nanotechnologies as an issue of concern, were not sure how to address such a new and broad issue. And they did not develop a clear position yet. The following section will investigate European CSOs’ strategies and positions towards nanotechnologies, their interaction with transnational ones (mainly ETC Group), and their reinforced demands for ‘upstream public engagement’.

1. Leading position of the UK

It’s worth noting that most of CSOs involved from the start come from the UK. ETC Group observes that «*issue of nanotechnologies has registered higher on*

government and public radar in the UK than in any other country so far» (ETC Group 2005b). The following figure summarizes the distribution of nanotechnologies advocacy CSOs in different regions. Based on a web-based search, the author has analyzed 64 CSOs in total, demonstrating that CSOs from the EU lag behind those from the North America and the UK (Lee 2006, 6).

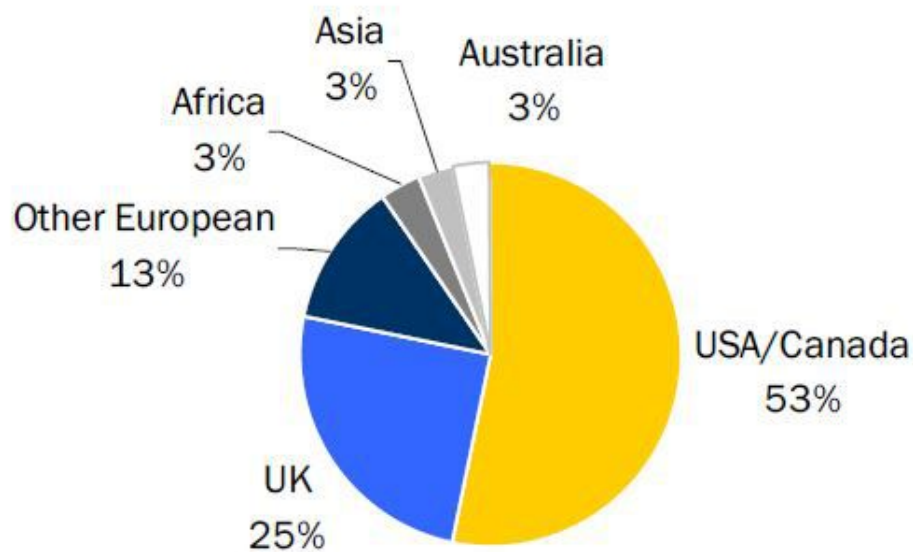


Figure 1: Advocacy CSOs by Country/ Region

Source: Lee 2006

Two factors are summarized here to explain the rapid involvement of British CSOs. First of all, after a series of food safety scandals and controversies, a fundamental crisis of trust in the UK's science policy-making occurred (House of Lords Select Committee on Science and Technology 2000). This situation mobilized various stakeholders to find a solution together and to re-conceptualize the relationship between science, technology and society. Secondly, during the preparation of its report, RS/RAEng have invited civil society to make comments and suggestion. During a meeting, some attendees shared with the view that *«now is a prime time to instigate this (communication) process, as there is an increasing desire*

amongst scientists to act as citizens, and, post-GM, an awareness amongst business of the importance of engagement.» (RS/RAEng 2003). The provision of opportunity has triggered the early interest of CSOs (e.g. GeneWatch, FoE, ITDG) to get involved in the process. For example, FoE, in its contribution to the stakeholder consultation, advocated a precautionary approach to minimize or eliminate risk at an early stage of public scrutiny³³.

By contrast, in other EU countries, the involvement of CSOs in nano debates remained weak. For example, Rinie van Est, Coordinator of Technology Assessment, Rathenau Institute, introduced the example of the Netherlands. Although they organized a discussion on nano risks as early as 2004, it was quite hard to get the environmental organizations involved, as *«it was not on their agenda at that time.»* (Bullich 2009, 23).

2. Divergences between Greenpeace UK and ETC Group

In his article <why the future doesn't need us>, Bill Joy claimed that 'relinquishment' may be the only alternative for avoiding catastrophic results caused by over-speeding development of GNR (genetics, nanotechnologies, and robotics)³⁴. On 11th June, 2003, ETC Group disseminated its proposal with regard to a moratorium on nanomaterials in Europe: a two-day seminar was organized in the Parliament, which brought together CSOs (e.g. ETC Group, Greenpeace, Genewatch UK), decision-makers and other interested actors to discuss the societal impacts of nanotechnology. The context was considered as the signal that anti-nanotechnology campaigners declared war on this new technology. Observers claimed that *«it is very comparable to the situation in GM food 8 or 9 years ago.»*³⁵ However, ETC Group did not succeed in mobilizing the branches of supranational CSOs in supporting its proposal. And the 'anti-nano war' was not triggered, but largely muted.

³³ Friends of the Earth. 2003. "The Royal Society and Royal Academy of Engineering study on nanotechnology: comments from Friends of the Earth." <http://www.nanotec.org.uk/evidence/43FOTE.htm>. Accessed 19 June 2003

³⁴ Joy, Bill. 2000. "Why the future doesn't need us." Wired, April. <http://archive.wired.com/wired/archive/8.04/joy.html>

³⁵ Hogan, Jenny. 2003. "Anti-Nanotech Campaigners Declare War on Tiny Things." New Scientist, June 21.

During the seminar, a wide range of issues concerning ownership and control, global equality, health and environmental risks as well as potential benefits of nanotechnologies were discussed. ETC Group highlighted the ‘revolution’ that nanotechnologies could bring to the whole society and the current situation which was marked by ‘regulatory vacuum’. Green MEP Caroline Lucas claimed that innovation was running ahead of regulation, calling for a moratorium on products applied to the skin³⁶. She further expressed concerns that nanotechnologies just provided another profitable ‘technofix’ for the affluent rather than addressing the root causes of inequality, poverty and hunger or other pressing problems³⁷. Greenpeace UK paid specific attention to the issue of public engagement. Its chief scientist Doug Parr underlined that policy must not be composed by small groups of experts and bureaucrats, and the EU should act as a technology facilitator with a user or civil society forum³⁸. Renzo Tomellini, the Head of Nanotechnology Unit, also attended the seminar. Faced with growing concerns over possible risks of nanotechnologies, he highlighted the need for science-based information and responsible research³⁹.

The media have given extensive coverage to this seminar. And the strategies of ETC Group received a lot of criticism. As *New Scientist* put it, *«scare-mongering and ill-informed campaigning undermine the debate.»*⁴⁰ The *Nature* editorial commented its campaign as ‘downright ludicrous’ and ‘patent nonsense’: in the seminar, one activist even claimed that *«potatoes could be constructed from nanorobots, threatening traditional methods of agriculture»* (Nature 2003). The editorial continued by pointing out the challenge to convey the risks of nanotechnologies without painting it as “a panacea or a plague”. The pamphlet of Demos proposed using the precautionary principle wisely, arguing that *«CSOs are often too quick to invoke the precautionary principle to justify a ban, which can be unhelpful»* (Wilsdon and Willis 2004, 54). One

³⁶ Cordis News. 2003. “Nanotechnology: Opportunity or Threat?” http://cordis.europa.eu/news/rcn/20401_en.html

³⁷ Green Party. 2003. “Getting past ‘grey goo’”. May 22. <https://www.greenparty.org.uk/archive/news-archive/567.html>

³⁸ Cordis News 2003. “Nanotechnology: Opportunity or Threat?” 12 June

³⁹ CORDIS News. 2003. “Supporting responsible nanotechnology research will benefit Europe’s citizens, says head of unit.” June 24. http://cordis.europa.eu/news/rcn/20466_en.html

⁴⁰ New Scientist. 2003. “Why fighting nanotech is anti-globalisation’s new cause.”

month later, a report commissioned by Greenpeace UK was released, suggesting that *«an externally imposed nanotech moratorium seems both unpractical and probably damaging at present»* (Arnall 2003, 41). This conclusion could be considered as a signal that ETC Group's anti-nanotech campaign failed to invoke much resonance among principal European CSOs.

The report of Greenpeace UK provides a balanced review of nanotechnologies, which examines both the benefits and risks of this emerging technology. The report notes that nanotechnologies could bring benefits such as energy-efficient products, cleaner manufacturing processes and other promising applications. It also highlights the environmental (e.g. nanoparticles infiltrating humans, self-replication) and socio-political concerns (e.g. the nano-divide, medical ethics, destructive uses) posed by nanotechnologies. Faced with the moratorium proposal of ETC Group, the chief scientist of Greenpeace UK suggested taking both the merits and risks of nanotechnologies into consideration. He also renounced the employment of confrontational methods in addressing nanotechnologies. As he put it, *«campaigning to stop things—as Greenpeace frequently does—is fundamentally unsatisfying. We would like to see answers to problems — technology has the ability to deliver some of these answers»* (Parr 2003). Although Greenpeace UK disagrees with a ban on nanomaterial, it highlights that industry should take the issue of public acceptance seriously, otherwise, a fate of public backlash will be 'virtually self-imposed' (Arnall 2003, 41).

Apart from the 'moratorium or not' argument, there exist divergences between ETC Group and Greenpeace UK in other aspects. To begin with, ETC Group highlights that nanotechnologies, due to its unparalleled breadth and scale, will bring 'technological tsunami' and large socio-economic disruptions to the vulnerable and marginalized communities: *«when the nanotech-wave comes to shore, it will bring rapid, monumental, inescapable and potentially devastating change»* (ETC Group

2005c). By contrast, Greenpeace UK believes that *«we are unlikely to witness any radical developments during the next 15 years unless a series of fundamental breakthroughs occur between now and then.»* The development of nanotechnologies is ‘evolutionary’ rather than ‘revolutionary’: *«these changes are likely to be gradual as, on the whole, the displacement of an old technology by a new one tends to be both slow and incomplete»* (Arnall 2003, 41).

Secondly, two CSOs utilize different strategies to address nanotechnologies. ETC Group, given its rich experiences in dealing with emerging technologies, has made up a good number of reports and bulletins on its own, adopting a radical and clear position towards nanotechnologies. Greenpeace UK did not develop its own conclusive position on this emerging technology during the early period⁴¹. Instead, it commissioned Imperial College London to provide independent advice. According to Douglas Parr, *«a deliberative public process at the very early stages of technology development seemed like the best way of achieving progress in these areas rather than endless Greenpeace policy papers»*(Parr 2005a). Thus, Greenpeace UK has made a lot of efforts in organizing citizen’s jury, public debates, deliberation, etc. For example, it has co-organized a five-week citizens’ jury— “NanoJury UK”—together with the Guardian, Cambridge University Nanoscience Center and the Ethics and Life Sciences Research Center of the University of Newcastle in summer 2005. NanoJury provided an opportunity to invite the ordinary public to contribute their voices and opinions. As Douglas Parr put it, *«the implications of the findings of Nanojury reach far into not just science and innovation policy in the UK, but also the political model of economic resource deployment which underpins the technology commercialization process»* (Ibid.).

Last but not least, ETC Group is a small and professional CSO, which operates on a global scale. ‘ETC’ implies *«Erosion is created by Technology introduced in the context of corporate class power Concentration»* (Mooney 2001). This abbreviation

⁴¹ It was not until 2007 that Greenpeace published its position paper on nanotechnologies.

demonstrates its emphasis on the Ethical, Legal and Social Implications (ELSI) aspects of technologies. By contrast, Greenpeace is an environmental organization with more than 40 years of histories, having branches in more than 40 countries⁴². It is worth noting that Greenpeace UK was —if not the only, then certainly a key branch— addressing nanotechnologies ‘upstream’. Neither its sister organizations nor Greenpeace International was involved in this arena. Greenpeace UK, which operates at both national and European scale⁴³, conducts campaigns more from the Environment, Health, and Safety (EHS) perspective. Technology is not per se good or bad. What’s important is on what conditions and towards which aims that technology develops (Greenpeace 2002).

Table 3 gives a brief summary of the above-mentioned diverging aspects between ETC Group and Greenpeace UK, revealing their different reference frames and scale of interest in addressing nanotechnologies.

Table 3. Position of ETC Group and Greenpeace UK towards nanotechnologies

	ETC Group	Greenpeace UK
Focus area	ELSA issues	EHS issues
Scope	Global	National and European level
Activities	Reports and bulletins; Seminars; lobbying	Debates and deliberation (e.g. Nanojury)
Evaluation of nanotech’s impact	Revolutionary; Technological tsunami	Evolutionary; Gradual
Position towards nanotech	Moratorium	No conclusive position

⁴² <http://www.greenpeace.org/international/en/about/>

⁴³ Though located in a Member State, Greenpeace UK actively promoted discussions on nanotechnology in both the UK and the EU.

Greenpeace UK's report evoked wide responses. Tim Harper, the executive director of the European NanoBusiness Association, claimed to have breathed a sigh of relief among "a worrying trend towards demonizing nanotech indiscriminately"⁴⁴. And he highlighted the significance of the report: *«having one of the world's most prominent environmental organizations weigh in on the side of rationality has lowered this risk (public backlash) enormously.»* Authors of Demos report also praise Greenpeace UK for its 'subtle and intelligent stance' (Wilsdon and Willis 2004, 62). An interviewed DG SANCO praised the efforts of Greenpeace UK as drafting *«a very good report, which asked very good questions.»*⁴⁵ Besides Greenpeace UK and FoE, other EU level CSOs did not develop any activities on nanotechnologies during the first half of 2000s.

Despite the surge of activism led by ETC Group, the momentum against nanotech seemed to abate rather than intensify in the EU. According to the commentary of *New Scientist*, Greenpeace UK *«put the brakes on a full-scale campaign against the science of small things.»*⁴⁶ Although 'full-scale' campaign was faltered, we could examine some sparse protests against nanotechnologies emerged at the Member State level.

3. Local direct actions against nanotechnologies

In contrast with the branches of supranational CSOs, activist groups from Member States largely based their positions on historical experiences in dealing with precedent technologies (biotechnology, nuclear technology, etc.). Adopting a critical and skeptical position, a few activist groups quickly turned against nanotechnologies by using confrontational methods, e.g. direct action, demonstrations. Among these CSOs, PMO is a typical example.

⁴⁴ Harper, Tim. 2003. "Greenpeace to nanotechnology: let's be rational about this." Nanotechweb.org, August 1. <http://nanotechweb.org/cws/article/articles/17979>

⁴⁵ Interview with a DG SANCO, 20/06/2014

⁴⁶ Hogan, Jenny. 2003. "No nanotech ban, says Greenpeace." *New Scientist*, July 26 <http://www.newscientist.com/article/mg17924051.000-no-nanotech-ban-says-greenpeace.html>

PMO, an activist group located in Grenoble, France, was established in the autumn of 2000. It is the first CSO within the EU that conducted campaigns against nanotechnologies. Since 2002, PMO has started to monitor this topic and organized several protest activities against nanotechnologies. Technology was considered by PMO as *«the principal front of the battle between the powerful and the powerless.»*⁴⁷ And it based its position more on political reflection rather than scientific understandings. By using its own words, *«nanotechnologies is not a scientific project, but a political and philosophical issue»* (PMO 2006a).

Within local context, PMO paid more attention to ethical (e.g. social control, human enhancement, privacy, liberty and autonomy, research ethics), local social-economic (e.g. environmental damages; impacts on local employment structure, real estate and renting), as well as democratic concerns (e.g. lack of public participation). For example, PMO objected to the takeover of Grenoble by the ‘military-scientific-industrial complex’⁴⁸. Faced with an emerging technology which was still in the infancy, PMO proposed anticipating rapidly: *«be offensive rather than defensive.»*⁴⁹

The criticism led by PMO mainly comes from the following aspects: Firstly, nanotechnologies further strengthen the domination of ‘techno-divin’, leading to ‘a totalitarian world’. According to PMO, nanotechnologies will bring a series of potentially damaging applications, including homo-robot, eugenics, enhanced Radio Frequency Identification (RFID), military weapons. These applications could bring grave consequences like ubiquitous surveillance, replacement of human labor, nanotechnologies arms race, further enhancing enslavement of citizens and threatening citizens’ autonomy, freedom and dignity.

⁴⁷ Original text: *«le front principal de la guerre entre le pouvoir et les sans-pouvoir»* .

PMO website: <http://www.piecesetmaindoeuvre.com/spip.php?page=plan>

⁴⁸ <http://www.indymedia.org.the.UK/en/2004/12/302728.html>

⁴⁹ PMO website: <http://www.piecesetmaindoeuvre.com/spip.php?page=plan>

Secondly, PMO criticizes the logic behind the development of nanotechnologies, which is assumed to focus on economic gains instead of social goods. PMO has published a series of publications entitled ‘today the nano world’ (*Aujourd’hui le nanomonde*), in which Bill Joy’s words are put in the prominent position. As Bill Joy put it, *«we are being propelled into this new century with no plan, no control, no brakes.»*⁵⁰ And PMO claims that *«Bill Joy has noticed something that our decision-makers neglect»* (PMO 2003). PMO calls for redefining the progress of humankind, which goes towards *«a social organization guided by the common good and the fight against social inequalities, ecological disaster, the degradation of human relationships, the concentration of powers, the loss of autonomy of the population»* (PMO 2006c)⁵¹.

Thirdly, the democratic deficit of the decision-making process also meets with strong criticism. PMO comments the local government as *«an opaque structure, enclosed, and constantly monitored»* (PMO 2006c)⁵². Decisions are dominated by ‘techno-gratin’ and citizens have no access to influence the policy-making process. PMO also observes the manipulation of media by ‘techno-gratin’ with the aim of ‘faire acceptabilité’ (PMO 2006b). PMO comments the manipulation ironically, *«briefly we can talk about everything except for the social and ecological effects of the semi-conductor industry, let alone its military implications ... Everything is fine. And everything is nice»* (PMO 2006c)⁵³.

While Greenpeace UK acknowledges the benefits that nanotechnologies could bring in dealing with some urgent problems, PMO considers nanotechnologies as another tool of attracting industrial and military profits. According to PMO,

⁵⁰ Joy, Bill. 2000. “Why the future doesn’t need us.” Wired, April.
<http://archive.wired.com/wired/archive/8.04/joy.html>

⁵¹ Original text: *«d’une organisation sociale orientée par le Bien commun et la lutte contre les inégalités sociales, le désastre écologique, la dégradation des relations humaines, la concentration des Pouvoirs, la perte d’autonomie de la population»* .

⁵² Original text: *«le CEA-Grenoble est une structure opaque, clôturée, surveillée en permanence»* .

⁵³ Original text: *«bref on parle de tout, sauf des nuisances sociales et écologiques de l’industrie des semi-conducteurs, encore moins de ses implications militaires...Tout il est beau, tout il est gentil»*

nanotechnologies do little to fix more pressing problems like inequality, loss of autonomy, environmental degradation. Operated at local context, PMO believes that the ‘Grenoble Model’ (research, industry, employment) in developing nanotechnologies will bring negative local social-economic consequences, such as the rising of local rent, environmental damages. Figure 2, made by a French scholar, illustrates the different or even opposite vision between officials and activists towards nanotechnologies.

	Officials’ vision	Activists’ vision
Objectives of technological development	Economic development	Programme of control through state and market interests
Local context	The Grenoble model as a model of efficient cooperation between local actors for the sake of technical and economic progress	The Grenoble model as representing a reprehensible collusion between science, politics and the market, and an illustration of non-democratic decision-making processes
Forms of convergence	Technological areas and public and private institutions that cooperate on interdisciplinary projects	Technological areas and ‘converging fights’: various forms of anti-technology critiques and corresponding social movements
Links to external discourses	No link between Grenoble and futuristic discourses of convergence	A direct link between Grenoble and American discourses of human enhancement

Figure 2: two visions towards nanotechnologies in Grenoble

Source: Laurent 2007

This figure reveals the different perspective of looking at emerging technologies between officials and activists: on the one hand, activists were skeptical about the motivation behind the development of nanotechnologies and refused to have dialogue with the industries or the local regulatory authorities; on the other, according to the observation of social scientists who have participated in the preparation of local public debate, local policymakers, still sticking to technocratic governance, were not ready to enter a genuine public engagement process (Joly and Kaufmann 2008). This dilemma poses a tough challenge for promoting public debate and other participatory measures.

Against this backdrop, polarized positions have been formed from the very early R&D process of nanotechnologies. The year of 2004 has witnessed several protests emerged in the UK as well as France. In November, the Nanotech/Convergent Technologies conference in Leeds was disrupted by stink bombs. Protesters claimed that nanotechnologies *«puts mind control, body control, social control and control of the natural world more firmly in the hands of the state, the corporations and the ruling elite.»*⁵⁴ Their advocacy echoed the argument of ETC Group, which noted that *«controlling Bits, Atoms, Neurons and Genes adds up to a little BANG theory enabling a godlike mastery over all knowledge, matter, mind and life»* (ETC Group 2004d).

In December, activists from THRONG dressed up as angels and disrupted another nanotechnologies conference in Buckinghamshire, a ceremonial county in South East England. (see Figure 3). These ‘angles’ claimed that former proponents of biotechnology now attempted to rush nanotechnology to market: *«the same greedy corporations who messed with the genetic basis of life are now seeking to alter and privatize nature right down to the atomic level.»*⁵⁵ The same month, activist groups located in Grenoble interrupted the construction and occupied the cranes on the site of Minatec, which set to be the largest center for nanotech in Europe⁵⁶.

⁵⁴ <http://www.indymedia.org.uk/en/regions/leedsbradford/2004/11/301222.html>

⁵⁵ See the website of ‘Angels Against Nanotech’:

<http://www.angelsagainstanotech.blogspot.fr/2004/12/press-release-nanotech-protest.html>

⁵⁶ PMO. “Quand les Verts s’opposent à Minatec”. <http://www.piecesetmaindoeuvre.com/spip.php?article79>



Figure 3: activists from THRONG interrupted conference on nanotechnologies

Source: Indymedia UK, 2004⁵⁷

These protests brought to the fore the lack of trust on industries and the regulatory authorities. As the ‘angels’ put it, *«we have little to gain by entering into dialogue with an organization that can only ever represent the interests of industry and not the concerns of the public.»*⁵⁸ Democratization of technologies remained one of the primary concerns of local militant groups.

4. Common concerns shared by CSOs

4.1. EHS aspect of nanoparticles

Apart from the divergences discussed above, European CSOs also have some common concerns. Given the knowledge gap concerning the toxicology of nanoparticles, the first and foremost concern shared by CSOs is the EHS aspects of engineered nanoparticles.

⁵⁷ Indymedia the UK. 2004. “Angels at nano-tech conference.” December 9. <https://www.indymedia.org.the UK/en/regions/oxford/2004/12/302576.html>

⁵⁸ See the website of ‘Angels Against Nanotech’: <http://angelsagainstanotech.blogspot.fr/>

Small size may bring interesting new properties to traditional materials. However, will it also bring new threats and unknown risks? Will this small size make it easier for nanoparticles to infiltrate human bodies? European CSOs have two-fold concerns: firstly, by reducing to nano-scale, materials may become more reactive and therefore potentially more toxic. It is claimed that ultra-small particles appear to have inherent toxic properties (FoE 2003; Corporate Watch 2005); some nanotubes may share structural similarities with asbestos fibres (Arnall 2003; FoE 2003). Secondly, CSOs find it even more worrying that human bodies may have not evolved to recognize nanoparticles. Thus, there exists possibility that particles in nano-scale slip the human immune system without being noticed (Arnall 2003; Corporate Watch 2005). Trades Union Congress (the UK), one of the earliest worker unions that address nanotechnologies, showed concerns that nanoparticles could get into the body through the skin, lungs and digestive system, even cross the blood-brain barrier⁵⁹.

Concerns are also expressed about the possible damages that nanotechnologies could bring to the environment. PMO argues that the R&D of nanotechnologies not only consumes clear water and energy, but also generates tons of electronic wastes which are toxic.⁶⁰ The report of Greenpeace UK also highlights that *«quantum dots, nanoparticles, and other throwaway nanodevices may constitute whole new classes of non-biodegradable pollutants that scientists have very little understanding of»* (Arnall 2003, 36). In its comments to the consultation by the RS/RAEng, FoE claimed that self-replicating substances with no equivalent in nature may pose many risks to the environment (FoE 2003).

CSOs advocated that the precaution principle should be applied in dealing with the above-mentioned EHS concerns. For example, mindful of early asbestos tragedy, Trades Union Congress reacted promptly and stressed the importance of protecting

⁵⁹ Worker Union TUC. 2004. "Nanotechnology factsheet." July 29.

<https://www.tuc.org.uk/workplace-issues/health-and-safety/nanotechnology-factsheet>

⁶⁰ PMO. 2003. "Aujourd'hui le nano monde #3." September 24.

http://www.piecesetmaindoeuvre.com/IMG/pdf/A_h_le_nanomonde_3.pdf

the safety and health of workers. It suggested that the production and use of nanoparticles should be carried out in a contained process⁶¹. Based on discussions with citizens during NanoJury, Greenpeace UK came up with some provisional recommendations: to label manufactured nanoparticles and test them in controlled environments (Parr 2005a).

4.2. Public engagement

How would nanotechnologies be deployed? In which direction and for whose benefits? European CSOs claimed that public value and social preferences should be incorporated ‘upstream’ into the R&D process of nanotechnologies. As Greenpeace UK put it, *«if nanotech is going to be as big as many think, then it’s a question that every person on Earth has a stake in»* (Parr 2003). PMO had similar demands: *«we should all decide the project that concerns every one of us»* (PMO 2003). PMO also criticized strongly the lack of access to the decision-making process of nanotechnologies, which was only confined within the ‘techno-divin’. As PMO put it, *«the Grenoble development (research, industry, jobs) does not have an odor. Our living standard is not negotiable»* ⁶²(Ibid.).

GeneWatch UK, a CSO dedicated to addressing the issue of genetic technologies, has started to track nanotechnologies since mid-2003. Its director Mayer Sue argued that the debate on nanotechnologies was quite insular: *«the ability to generate materials from atoms and molecules raises many serious questions, yet only the scientists themselves are debating its future»* (Mayer 2002) . She examined the dislocation of science from the public and democratic processes, proposing engaging civil society in the shaping of the research agenda. She alarmed that *«if the science that is funded or the attitudes underpinning it are at odds with broader social values, trouble may emerge»* (Mayer 2003).

⁶¹ Worker Union TUC. 2004. “Nanotechnology factsheet.” July 29.
<https://www.tuc.org.uk/workplace-issues/health-and-safety/nanotechnology-factsheet>

⁶² Original text: *«nous devrions tous décider de ce projet qui nous concerne tous...le développement grenoblois (recherche, industrie, emplois) n'a pas d'odeur. Notre niveau de vie n'est pas négociable»* .

During the preparation of the report on nanotechnologies, RS/RAEng asked CSOs to provide input and comments. Attendant CSOs claimed that lessons from precedent controversial technologies should be learned, where *«technological progress needed to slow down to keep pace with citizen deliberations and democratic controls, and decision-making»* (Ibid.). Several initiatives and deliberation measures were introduced in this regard, e.g. Nanojury in the UK, Nanologue and NanoDialogue at the EU level.

4.3. Other ethical and social concerns

Nanotechnologies hold potentials for improving medical diagnosis and therapy; however, it may also bring essential ethical concerns: how to define the line between human enhancement and therapy? Will nanotechnologies bring genetic discrimination or ‘ability-divide’? Could the rich and the poor have equal access to the technological benefits? During the early period, wider ethical and social issues, which include human enhancement, privacy, military uses, nano-divide, ownership and control, etc., were put forward by European CSOs.

Focusing on monopoly and patenting issue, a comparison is made between biotechnology and nanotechnologies: while the former creates patents on life, the latter is linked to patents on matter and nature (the ‘building blocks of life’ by using ETC Group’s words). CSOs argued that this could raise fundamental ethical questions (FoE 2003; Corporate Watch 2005). Corporate Watch examined ‘a gold rush to claim patents at the nanoscale’, where 800 nano-related patents were granted in 2003 (Corporate Watch 2005). In its comments to the RS/RAEng consultation, GeneWatch UK showed its concern that *«if the scope of monopoly rights is too wide, fundamental knowledge and basic techniques are patented, innovation will be stifled.»*⁶³ As the report of Greenpeace UK put it, *«‘nano’ can be viewed as a useful tag with which to boost funding»* (Arnall 2003, 60).

⁶³ Royal Society and Royal Academy of Engineering Working Group on Nanotechnology: Comments from GeneWatch UK. 2003

CSOs showed concerns that if driven simply by industrial interests instead of real societal needs, nanotechnologies may open new ownership and corporate concentration. CSOs alarmed that this could bring huge economic as well as social disruptive impacts to the poor or marginalized, for instance, the impacts on trade commodities, displacement in terms of unemployment, farmers' rights for free choices, enlarged gap between the 'haves' and 'have-nots' (FoE, 2003; Arnall 2003; Corporate Watch 2005; ITDG 2004).

C. Explaining European CSOs' approaches: three factors

As discussed above, while the branches of supranational CSOs represented by Greenpeace UK and FoE adopted cooperative stances towards nanotechnologies, local CSOs rejected the invitation for a dialogue by the local government, developing polarized stances towards nanotechnologies rapidly. This section seeks to figure out the factors behind their divergences and preference for different approaches in addressing nanotechnologies.

1. Novelty, broadness and complexity of nanotechnologies

During the early period, nanotechnologies are still in the infancy of the R&D process. Faced with the novelty as well as the broadness of nanotechnologies' potential applications, a learning process is necessarily required for all interested stakeholders. They need to firstly acquire a basic understanding of the whole picture and then to address this emerging technology.

According to the chief scientist of Greenpeace UK, *«we wanted to ground our view on a solid understanding of what such technologies are capable of...Greenpeace sees no reason to consider nanotechnologies intrinsically harmful or damaging»* (Parr 2003). Two years later, in 2005, Douglas Parr still held the view that *«Greenpeace believes that it is impossible to have a 'view' about nanotechnologies as a whole»* (Parr 2005). In an e-mail exchange, he shared his idea about a feasible approach to

address such a broad issue: *«those can be treated individually on their merits rather than treating a heterogeneous set of applications (nanotech) as a single entity.»*⁶⁴

As a scholar put it, different from biotechnology or nuclear technology, nanotechnologies, rather than a discrete technology, more represents ‘a way of thinking or doing things’. This makes it particularly difficult to discuss potential risks of nanotechnologies in general terms (Maynard 2006). Such a wide-encompassing topic poses a challenge for not only CSOs, but also the EU policymakers. According to an interviewed DG SANCO, it has taken a long time for different DGs of the Commission to acquire basic understanding about nanotechnologies,

“I am an expert, I do not feel competent at all... It is an area of high complexity, and very few people could really understand. I feel frustrated when I see some CSOs just put things neatly in a package and try to solve the problems.”⁶⁵

During the early period, several European CSOs started to identify nanotechnologies as an issue of concerns; however, most of them had not developed a decisive stance towards this new topic. As ITDG put it, *«the challenge for ITDG in defining its position with respect to nanotechnologies is that we do not have a record of work in the area... We need to draw on our strong intellectual and philosophical traditions»* (ITDG 2004,16). This situation renders it even less possible for CSOs to bear in one mind and trigger another round of anti-nanotech campaign, as supposed by some stakeholders (Taverne 2004).

2. Different outlooks and values of CSOs

CSOs adopt different approaches in addressing nanotechnologies out of their different missions and values. Faced with a whole new field, CSOs turn to draw from

⁶⁴ E-mail exchange with Dr. Doug Parr, senior scientist of Greenpeace UK, 21/05/2014

⁶⁵ Interview with a DG SANCO, who is in charge of the working groups of the European Scientific Committee on Emerging to develop risk assessment and methodologies and to develop potentially regulatory definitions of nanomaterials, 17/06/2014

existing experiences and capacities. *«Conflicts and differences of political value and on ethical questions are going to condense onto features of these technologies»*⁶⁶, and also onto features of CSOs themselves.

Analyses begin with Greenpeace UK, a principal actor during early debates. Established in 1971, Greenpeace is one of the most influential environmental organizations all over the world. From environmental degradation to climate change, from toxic pollution to nuclear technology, its campaign covers a wide range of topics and generally focusing on EHS aspects. As Kellow (2000) puts it, the campaigns of Greenpeace are strictly limited to environmental issues, factoring out other in the green ideology connected topics like gender, racism or third-world. The argument of its chief scientist also indicates the values and tradition of Greenpeace UK: *«our position is about scientific risks. Our kind of globally applicable standard is the science of environmental risk. You can say that's the basis of our campaign policy and that's where we're coming from»* (Robin Grove-White et al. 2004, 79).

In the case of nanotechnologies, Greenpeace UK holds on this tradition and bases its position on scientific evidence and results from citizen deliberation, avoiding stepping into value-based discussions. For example, in 2002, Greenpeace and New Scientist magazine co-organized a series of four debates entitled *Science, Technology and the Future*, which provided a platform for triggering public deliberation on issues around emerging technologies⁶⁷. Greenpeace UK indicated in its report that *«most contemporary experimental capabilities in this area are still in their infancy... It is extremely difficult to foresee many outcomes that developments in this field will bring over the next 10 years, let alone assess their likelihood»* (Arnall 2003, 41), acting in a balanced and cautious manner. To conclude, Greenpeace UK has to incorporate new issues into its mission in addressing environmental problems.

⁶⁶ Grove-White, Robin. 2002. "New Scientist and Greenpeace Science Debates." May 14. <http://www.greenpeace.org.uk/files/pdfs/migrated/MultimediaFiles/Live/FullReport/4906.pdf>

⁶⁷<http://www.greenpeace.org.UK/media/reports/new-scientist-and-greenpeace-science-debates-science-technology-and-our-future-the-big-questions>

Well-established CSOs like Greenpeace have advantages including high reputation, a wide membership base, and relatively abundant resources; however, it may sometimes lack flexibility compared with smaller-scale CSOs. For example, the establishment of GeneWatch in 1997 was partly in reaction to the perceptions that Greenpeace was too slow to take up the GM issue (Robin Grove-White et al. 2004, 14). Reduced into a passive position, Greenpeace was then forced to respond to mounting public unease concerning this topic. Scholars observe that environmental CSOs like Greenpeace UK is keen to re-position itself regarding technological issues after being seen as anti-technology in the GM debate (Pidgeon and Rogers-Hayden 2007). This is another factor in explaining Greenpeace UK's balanced and mild approach towards nanotechnologies.

Similar trend can be traced when we examine the dynamic of CSOs during the early period: small-scale CSOs took up the issue of nanotechnologies quicker than the well-established ones. Besides Greenpeace UK, other EU level CSOs like FoE Europe, EEB, ETUC, etc., were rather slow in joining the debates. Instead of waiting until more science-based evidence being investigated and proved, local activist groups acted promptly and proactively when there was still possibility to make a difference and influence the R&D process. As PMO put it, *«there is pointless to groan. We must act in time. It is now that we should take action.»*⁶⁸

Local activist groups developed their positions on the grounds of historical experiences in dealing with precedent technologies and came up with a decisive position rapidly. For example, opponents at Leeds, based on earlier experience in dealing with genetic engineering and biotechnology, considered nanotechnologies as *«the newest weapon against diversity, rebellion, difference, autonomy and freedom.»*

⁶⁹ And they called for 'drastic action' to confront this newest weapon.

⁶⁸ Original text: «rien ne sert de gémir, il faut agir à temps. C'est maintenant qu'il faut s'y employer» . PMO(2003) AUJOURD'HUI LE NANOMONDE #1

⁶⁹ <http://www.indymedia.org.uk/en/regions/leedsbradford/2004/11/301222.html>

Furthermore, local activist groups tended to associate the issue of emerging technology with wider trend of capitalism and globalization. For example, as PMO put it, *«this mechanism of the ‘link between research and industry’ is under the belief of capitalism, since Watt’s engine and the first industrial revolution»* (PMO 2003) ⁷⁰. Nanotechnologies just act as another tool to enhance the control of the powerful over the powerless.

3. Policymakers’ prompt anticipation helps creating positive interaction space

As scholars put it, a common pattern in governing new technologies often goes as: addressing hopeful promises and functional issues first, and sequentially addressing broader aspects like regulations and societal embedding (Deutena, Ripa, and Jelsma 1997). In the case of nanotechnologies, efforts have been made to do things differently: a perceived ‘legitimation crisis’ and reinforced demands for ‘upstream public engagement’ have made the EU policymakers well recognize the necessity to integrate societal consideration into the R&D process ‘as early as possible’ (EC 2004; EC 2005). The prompt and anticipatory approach of the EU regulatory authorities is another contributing factor in explaining the relatively calm, balanced and cooperative approaches of well-established CSOs.

In the UK, the release of the report by the Royal Society is widely considered as a watershed in the R&D process of nanotechnologies. This report adopted a precautionary tone and attached great importance to social and ethical issues around nanotechnologies. As Pidgeon put it, *«a new understanding of science and society is spreading through the work of the Royal Society»* (Wilsdon and Willis, 15). Besides *NanoJury UK* (2005) mentioned above, there were another three public engagement projects initiated in 2006, including “People’s Inquiry on Nanotechnologies and the Environment”, “Small Talk” and “Nanotechnologies, Risk and Sustainability”

⁷⁰ Original text: *«ce mécanisme que la “liaison recherche-industrie” est une idée reçue du capitalisme, depuis la machine de Watt et la première révolution industrielle»* .

(Doubleday 2007a). A scholar points out that nanotechnologies have elicited little protest, because *«potentially critical stakeholders were included in the nanotechnologies debate at a very early stage»* (Wullweber 2014). According to an interviewed DG SANCO, *«with the work in nano, in a sense, we have opened up rich potential forms for better framing of the issue.»*⁷¹. The forums, initiatives and policy measures by the EU as well as Member States have shown policymakers' determination and commitment to restoring public trust in science and technology and to create a positive and dynamic communication space with civil society.

D. Conclusion

Before Bill Clinton's announcement of the NNI, a R&D program of the U.S. Government, nanotechnologies were more framed within the scientific field. Within merely five years, nanotechnologies were transformed into a heated discussed topic in the political battleground. According to Renzo Tomellini, head of unit for nanosciences and nanotechnologies in the EC, with expectations and hopes, polemics and fears, nanotechnologies have become "a bit of a show piece"⁷².

During this period, new players began to come to the scene and put the topic of nanotechnologies onto their agenda, seeking to influence the trajectory of nanotechnologies development. As ETC Group put it, *«the barren policy landscape around nanotech risks and issues has begun to take on features and shapes»* (ETC Group 2005b). It is interesting to see that stakeholder debates have not followed, but preceded or accompanied formal policy decisions made by the European regulatory authorities. Several factors (e.g. anti-nanotech campaign initiated by ETC Group; engagement initiatives introduced by policymakers; the intervention of celebrities like Prince Charles and Bill Joy) have helped improve the awareness of European CSOs into the issue of nanotechnologies.

⁷¹ Interview with a DG SANCO, 20/06/2014

⁷² CORDIS News. 2003. "Supporting responsible nanotechnology research will benefit Europe's citizens, says head of unit." June 24. http://cordis.europa.eu/news/rcn/20466_en.html

CSOs who involved from the start are still in the minority. And most of them had records of campaigns against GMOs. Given the ‘upstream’ nature of nanotechnology, green activism remained relatively fragmentary and localized. CSOs have developed uneven stances towards nanotechnologies: while well-established ones represented by Greenpeace UK and FoE adopted a cooperative and expertise-based form of involvement, local activist groups which came from France and the UK turned against nanotechnologies rapidly. Between these poles stood an array of CSOs whose approach was neither to promote nor to stop nanotechnologies. Considering nanotechnologies are still in an embryonic stage, these CSOs believed that their knowledge was not sufficient to develop a decisive position towards such a wide issue.

According to Habermas, *«the communicative structures of the public sphere constitute a far-flung network of sensors that react to the pressure of society-wide problems and stimulate influential opinions»* (Habermas 1996, 300). It is of importance to hold a dynamic view and keep evolving with the communication process within the public spheres, and to identify key concerns and different frame of reference of key actors. As mentioned above, the UK has been in a leading position in addressing nano-related issues. And most CSOs emerged during the early period came from the UK. However, subsequent chapters will demonstrate that this leading position did not last for long. And the UK soon lost CSOs’ support.

Chapter III: Capacity-building phase (2006-2009)

The capacity-building phase sees a multiplication of participatory exercises and deliberation activities introduced at both Member State and the EU level (Laffite and Joly 2008). Amidst these activities, CSOs have more opportunities to participate in the policy-making process. And we can see an increasing number of CSOs began to put the issue of nanotechnologies onto their agenda. These ‘new comers’ include consumer associations (e.g. BEUC, ANEC, ECOS), worker unions (ETUC and ETUI), environmental organizations (e.g. EEB, FoE Europe, CIEL, HEAL), etc. These are also some CSOs which are based at Member State or regional level. As they have also contributed to the policy debates at the EU level (e.g. Which? the UK; BUND, Germany; MIO-ECSDE), their activities and input will also be taken into consideration. This period is characterized by the burgeoning capacity and enhanced professionalism of CSOs.

It is interesting to note that early actors of the precedent phase (e.g. Greenpeace UK; PMO; GeneWatch UK) are mainly composed of the ‘spin-off’ campaigners of anti-GMOs movement (Seifert and Plows 2014). By contrast, these relatively ‘late-comers’, which emerged on the scene during 2006 and 2009, do not necessarily have similar records against GMOs. They seldom use confrontational strategies, while preserve a critical position towards emerging technologies. When it comes to the case of nanotechnologies, they stick to a kind of expertise-based form of involvement and seek to find out a solution together with other stakeholders.

Based on semi-structured interviews with EU level CSOs, they took up the topic of nanotechnologies for different reasons: the invitation of regulatory authorities, the fact that an increasing number of nano-products hitting the market place, the release of scientific reports and policy documents, hearing from concerned scientists, etc. The various motivations in part reveal the trend that the framing of debates around nanotechnologies has started to step out of the shadows of GMOs and develop its own distinctive feature.

The rest of this chapter will be structured as follows: the first section introduces the background that EU level CSOs started to put nanotechnologies on their agenda between 2006 and 2009, outlining important events happened in the EU and worldwide. The second section investigates the communication process of EU level CSOs, which include: 1) how EU level CSOs enhanced their expertise (key activities); 2) the forming and evolution of their positions towards nanotechnologies (key concerns); 3) the influences that CSOs have exerted on the policy-making process of nanotechnologies (key results). Specific attention will be paid to the dynamics of green activism during this phase, what the convergences and divergences are among different stakeholders, and how precaution practices, as expressed in the ‘no data, no market’ principle of REACH, facilitate the dialogue and cooperation between CSOs.

A. Background

Before turning to analyses of the dynamics of EU level CSOs along this line, it is necessary to introduce some background information, especially the parallel development of the policy toward nanotechnology in the world as well as in Europe so as to set the stage for the work.

1. Nanotechnologies as a matter of policy concern

In March 2006, Germany saw what appeared to be the first recall of a nanotechnology product: a number of consumers experienced serious respiratory problems after using a bathroom cleaner called ‘*Magic-Nano*’ (see the media coverage⁷³). Even if it was later proved that the product didn’t, in fact, contain any nanoparticle, FoE Australia⁷⁴ and ETC Group⁷⁵ used this opportunity to advocate their concerns over the lack of regulation on nanomaterials. A scholar noted that the

⁷³ The Economist. 2006. “Has all the magic gone? A nanotechnology product is recalled in Germany after health concerns.” April 12. <http://www.economist.com/node/6795430>

Weiss, Rick. 2006. “Nanotech Product Recalled in Germany.” The Washington Post, April 6. <http://www.washingtonpost.com/wp-dyn/content/article/2006/04/05/AR2006040502149.html>

⁷⁴ FoE Australia. 2006. “First ever nano product recall.” May 1. <http://emergingtech.foe.org.au/first-ever-nano-product-recall/>

⁷⁵ ETC Group. 2006. “Nanotech Product Recall Underscores Need for Nanotech Moratorium: Is the Magic Gone?.” April 7. <http://www.etcgroup.org/fr/node/14>

word ‘nano’ was no longer a hot marketing term in the eyes of some companies (Gewin 2006). In early 2008, Soil Association, the largest organic certification body of the UK, became the first organization in the world to ban man-made nanomaterials from its certified organic products⁷⁶.

Although the market withdrawal of Magic Nano and the ban of nanomaterials by organic body have received some media attention, academic research indicated that public awareness towards nanotechnologies was still low (Gaskell et al. 2005). Scholars pointed out that Europeans considered nanotechnologies as useful and morally acceptable, where the majority view was positive and without concern that the technology was risky (Gaskell et al. 2006, 20).

Independent institutions were requested by the EU regulatory authorities to provide scientific opinions. In 2006, SCENIHR provided its scientific opinion to the Commission, suggesting that *«current risk assessment methodologies require some modification... in particular that existing toxicological and ecotoxicological methods may not be sufficient to address all of the issues arising with nanoparticles»* (SCENIHR 2006, 4). In 2008, the Royal Commission on Environmental Pollution underlined that *«it is extremely difficult to evaluate how safe or how dangerous nanomaterials are because of our complete ignorance about so many aspects of their fate and toxicology»* (Royal Commission on Environmental Pollution 2008, 30). These results have highlighted the situation marked by great uncertainty and gaps in the scientific understanding of nanomaterials. A scholar showed concern about the widening knowledge gap: *«our understanding of the interaction of nanoscale objects with living matter, even at the level of single cells, has not kept pace with the explosive development of nanoscience in the past decades»* (Klein 2007).

⁷⁶ Smithers, Rebecca. 2008. “Soil Association bans nanomaterials from organic products.” The Guardian, January 15. <http://www.theguardian.com/environment/2008/jan/15/organics.nanotechnology>

Meanwhile, scientific research has revealed some worrying results. An article published in *Nature* demonstrated that some carbon nanotubes can cause precancerous growths in the same way that asbestos does, suggesting *«great caution before introducing such products into the market if long-term harm is to be avoided»* (Poland et al. 2008). Nanotechnologists called for prompt government action to ensure that carbon nanotubes to be properly regulated (Sanderson 2008). The Royal Commission on Environmental Pollution highlighted that *«while any kind of blanket moratorium does not seem appropriate, there may well be specific cases where it is necessary to slow or even hold up the development while concerns are investigated»* (Royal Commission on Environmental Pollution 2008, 8). Arie Rip, researcher of Twente University, considered ‘slow innovation’ as a more sustainable approach to developing new technologies, which could allow the society to make preparation for technological innovations⁷⁷.

Nanotechnologies, with its indeterminacy and tremendous prospects, open up a new challenge for its governance within the EU. According to the observation of the *Wall Street Journal*, *«the debate over how the EU should regulate nanomaterials is just beginning.»*⁷⁸ Against this backdrop, the Competent Authorities for REACH and CLP (CARACAL) subgroup on nanomaterials, CASG Nano, was set up in 2008, which brought together interested stakeholders to look at how REACH could be worked for nanomaterials. EEB and ETUC act as observers within this group⁷⁹. It is reported that the EU policymakers, competent authorities of Member States, CSOs, and industry stakeholders have been “on a steep learning curve” to pick up knowledge regarding nanomaterials and REACH⁸⁰.

⁷⁷ EurActiv. 2009. “Nanotech at risk of repeating ‘GM food fiasco’.” September 29

<http://www.euractiv.com/innovation-enterprise/nanotech-risk-repeating-gm-food-news-222615>

⁷⁸ Dalton, Matthew. 2008. “Nanotechnology experts are calling for declare the use of carbon nanotubes.” *The Wall Street Journal*, May 29. <http://www.wsj.com/articles/SB121201044102027389>

⁷⁹ <http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2385>

⁸⁰ Chemical Watch. 2008. “REACH authorities mull options for nanotechnology.” December 03.

The EC conducted the first regulatory review on nanomaterials, noting that *«current legislation covers to a large extent risks in relation to nanomaterials and that risks can be dealt with under the current legislative framework... needs mostly to be enhanced by improving implementation of current legislation»* (EC 2008e). It later released *A code of Conduct for Responsible Nanosciences and Nanotechnologies Research*, a soft law instrument with non-binding feature (EC 2008a). Seven general principles—meaning, sustainability, precaution, inclusiveness, excellence, innovation and accountability—were offered to guide the actions of relevant stakeholders. Voluntary measures are welcomed by CSOs, but considered as with limit effectiveness.

The conclusion of the Commission regarding the adequacy of existing regulation was questioned by CSOs as well as the EP. An interviewed policy officer of ANEC commented the review as *«of poor quality... not a sound and proper assessment»*⁸¹. Green MEP Carl Schlyter, the rapporteur of the EP’s 2009 resolution, pointed out that the current rules were about as effective as trying to “catch plankton with a cod fishing net”. He further suggested that good regulation could not only better protect the environment and mankind but also provide certainty and predictability to economic operators (Schlyter 2009). Improving the implementation of existent legislation, as proposed by the EC, was considered insufficient and unsatisfying. The EC was under growing pressure to revise and adapt existent laws to incorporate the particular features of nanomaterials.

2. From ‘science and society’ to ‘science in society’

Science has long been being viewed as a system which enjoys autonomy and authority. Habermas observes a trend of ‘scientism’: *«we can no longer understand science as one form of possible knowledge, but rather must identify knowledge with science»* (Habermas 1971, 4). However, with a series of safety scandals such as asbestos, mad cow disease, and heated debates around nuclear technologies, GMOs,

⁸¹ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

the previous authority that science enjoyed has been weakened significantly. The EC White Paper on Governance singled out for explicit mention that «*the advent of biotechnologies is highlighting the unprecedented moral and ethical issues thrown up by technology*» (EC 2001). A growing literature has suggested that scientific expertise is facing a problem of legitimacy (Lovbrand, Pielke, and Beck 2010).

According to an interviewed DG SANCO, «*the public no longer has faith on science as they used to have. This shift of culture is very strong.*»⁸² Under this situation, «*the constitutional scheme for regulating access to normative reasons acquires a sharper profile... characterized by a consciousness of crisis, a heightened public attention, an intensified search for solutions, in short, by problematization*» (Habermas 1996, 357). One manifestation of the “consciousness of crisis” is the European regulatory bodies’ determination to involve the civil society and foster public trust in science and technology and its governance. A series of engagement programs and projects have been introduced in this regard.

Take the funding programme for example. The EU initiated *the Science and Society Work Programme* under FP6 (2002-2006), with 88 million euro allocated. This programme continued to be funded under FP7 (2007 and 2013), with the budget quadrupled. It is interesting to note that the project’s name turned into *the Science in Society Work Programme*. From ‘Science and Society’ to ‘Science in Society’, this slight change signals a shift in mindset regarding the science-society relationship, which is resulted from an accelerated learning process. Science is to less extent regarded as autonomous, but an integral part of the society. José Manuel Silva Rodríguez, a DG Research of the Commission, argued that «*clear messages have emerged, confirming that the shift... requires a transformation of the way research and research-based policies are developed*» (Stirling 2006).

⁸² Interview with a DG SANCO, who is in charge of the working groups of the European Scientific Committee on Emerging to develop risk assessment and methodologies and to develop potentially regulatory definitions of nanomaterials, 17/06/2014

Nanotechnologies have received substantial amount of funding from FP6 and FP7 projects. Between 2001 and 2012, the Commission has spent around €19 million to fund projects related to ELSA and governance aspects of nanotechnologies (Hullmann 2008). Among these projects, the capacity building programmes for CSOs are worth noting, which include: ‘NanoCap’⁸³, to improve the understanding of worker unions as well as environmental CSOs towards nanotechnologies; ‘DEEPEN’⁸⁴, to develop methodological tools for engaging the civil society; ‘NANOPLAT’⁸⁵, to offer a platform for deliberative processes on nanotechnologies; ‘CONSIDER’⁸⁶, to investigate CSOs’ involvement in EU-funded research; ‘NanoDiode’⁸⁷, to combine ‘upstream’ public engagement with ‘midstream’ and ‘downstream’ strategies for communication, outreach, education and training, just name a few.

The findings of a meeting organized by the Rathenau Institute revealed that participation by the CSOs cannot be taken for granted; and some encouragement was required (Hanssen, Walhout, and Est 2008). The coordinator of NanoCap project, a CSO capacity-building project, also noted that CSOs were not motivated to have nanotechnology as a topic for deliberation as there was nothing at stake for them (Krabbenborg 2015). NanoCap project is particularly notable, as it contributed to the direct involvement of CSOs in nanotech debates. Funded under FP6, NanoCap has supported various working conferences, position discussions, workplace visits, etc.⁸⁸ Five environmental CSOs⁸⁹ and five worker unions⁹⁰, with the technical input of five academic institutions, have participated and developed their position paper on nanotechnology. A programme officer of MIO-ECSDE, a participant CSO, introduced the background under which NanoCap Project was initiated,

⁸³ <http://www.nanocap.eu/Flex/Site/Page4662.html?PageID=%26Lang=>

⁸⁴ Deepening Ethical Engagement and Participation in Emerging Nanotechnologies (DEEPEN) https://www.dur.ac.uk/geography/research/research_projects/?mode=project&id=241

⁸⁵ <http://www.nanoplat.org/>

⁸⁶ <http://www.consider-project.eu/>

⁸⁷ <http://www.nanodiode.eu/>

⁸⁸ <http://www.nanocap.eu/Flex/Site/Page4662.html?PageID=%26Lang=>

⁸⁹ They are: Baltic Environmental Forum, EEB, LEGAMBIENTE, MIO-ECSDE and Natuur en Milieu

⁹⁰ They are: FNV, EUTC, Kooperationsstelle Hamburg, AMICUS and PPM

“they realized that the progress made in the nanotechnologies sector was very fast, and EU level CSOs were less developed and informed in order to keep up with the developments.”⁹¹

NanoCap Project, by bringing ten CSOs together, actually laid the foundation for their future concerted efforts. This interviewee continued by arguing that *«things are quite advanced. CSOs became more organized when they came to address this issue... It was a learning process for every stakeholder who has participated in the project.»*⁹² It was through the NanoCap Project that major EU level CSOs (represented by EEB and ETUC) started to deal with nanotechnologies. They started to play an increasingly important role in subsequent policy debates.

The Commission has also initiated a Communication Roadmap of nanotech, promoting ‘a new communication model’, which was supposed to shift from “public understanding of science” towards “scientific understanding of the public”. This report also acknowledges that *«the responsibilities conventionally entrusted to science are currently being re-examined»* (EC 2010a, 33). As observed by Krabbenborg, in the case of nanotechnologies, *«spaces for interaction are organized proactively at an early stage of the development»* (Krabbenborg 2013, 11).

These engagements and capacity-building activities could bring direct as well as indirect impacts on regulatory debates on nanotechnologies. For example, as an interviewee put it, *«a lot of people who participated in the NanoCap project continued to be active in the policy debates. They met frequently with CSOs.»*⁹³ For example, we can see that Carl Schlyter, the rapporteur of the Parliament’s 2009 resolution, also attended the NanoCap final conference⁹⁴. He used CSOs’ reports (Azoulay 2012) as instruments in supporting his own position with regard to the shortcomings of

⁹¹ Interview with Dr. Thomais Vlachogianni, Programme Officer of MIO-ECSDE, 02/12/2014

⁹² Ibid.

⁹³ Ibid.

⁹⁴ Final conference of NanoCap Program
<http://www.nanocap.eu/Flex/Site/Page533b.html?PageID=15409>

REACH in covering nanomaterials⁹⁵.

Not only regulatory bodies, but also industries seek to develop cooperation with civil society and the wider public. For example, collaboration was established between a green NGO (Environmental Defense) and a large industrial group (chemical company DuPont), which have jointly released a ‘Nano Risk Framework’ to address the potential risks of nanomaterials⁹⁶. While David Byrne, the former EU commissioner for health and consumer protection, considered this cooperation as “moving in the right direction”; a coalition of CSOs claimed that this project was ‘fundamentally flawed’. In a open letter, twenty CSOs, which include ETC Group, FoE, Greenpeace, Corporate Watch, etc., jointly claimed that such an industry-CSO cooperation was just a “public relations campaign”, in which *«broad public participation in government oversight of nanotech policy is usurped by industry and its allies.»*⁹⁷

As a scholar puts it, *«social and ethical concerns have become an obligatory footnote to nanotechnology’s technological promise»* (Stilgoe 2007, 16). All of the above-mentioned efforts have demonstrated the determination of policymakers and industries to deal with the legitimization problems and to foster public trust in the governance of emerging technologies.

3. Worldwide CSOs established a coalition to address nanomaterials

In early 2007, an international coalition of nearly 70 CSOs, spanning six continents, released a joint declaration on *Principles for the Oversight of Nanotechnologies and Nanomaterials*. Eight principles were highlighted (Nanoaction 2007), which included:

⁹⁵ Carl Schlyter. 2012. “Second regulatory review of nanomaterials. To Mr. J.Potočník.” European Parliament.

⁹⁶ EurActiv. 2007. “Former foes join forces to assess nanotech risks.” June 29.
<http://www.euractiv.com/science/foes-join-forces-assess-nanotech-risks/article-164991>

⁹⁷ CSOs Joint letter. 2007. “Civil Society-Labor Coalition Rejects Fundamentally Flawed DuPont-ED Proposed Framework.” April 12.
http://www.etcgroup.org/sites/www.etcgroup.org/files/publication/610/01/coalition_letter_april07.pdf

- I. A Precautionary Foundation
- II. Mandatory Nano-specific Regulations
- III. Health and Safety of the Public and Workers
- IV. Environmental Protection
- V. Transparency
- VI. Public Participation
- VII. Inclusion of Broader Impacts
- VIII. Manufacturer Liability

Among them, less than ten CSOs (e.g. Vivagora, France; BUND, Germany) came from the EU. The mobilization of European CSOs was still weak when the declaration was released. Taking FoE as an example: the engagement of FoE Australia and U.S. was much more active than those located in the EU. It is of necessity to introduce some activities of supranational CSOs here, which act as the context of EU level CSOs' engagement.

FoE Australia has been involved in nanotech debates since 2006, with a series of independent reports released. The cosmetic field was the earliest area on which FoE Australia focused: in a 32-page report, FoE Australia analyzed 116 cosmetics, personal care products and sunscreens that incorporated nanomaterials, which were assumed to pose serious toxicity concerns. For example, as FoE Australia put it, *«nanoparticles of titanium dioxide and zinc oxide...are photoactive, producing free radicals and causing DNA damage to human skin cells when exposed to UV light»* (Miller 2006b) . It suggested that specific attention should be paid to possible penetration of nanoparticles through broken skin (Miller 2006a). In another report published at the same year, FoE Australia considered nanotechnologies as a 'technological tsunami' which may bring disruptive impacts on society, including nano-divide between rich and poor, an elite minority of nano-enhanced humans, threats on the labor markets and global trade (Miller and Senjen 2006). Apart from publishing reports, FoE Australia also ignited campaigns in advocating a moratorium

on nanotechnologies. For example, it called on Samsung to recall its ‘Nano Silver’ rang (e.g. washing machine, refrigerator) from sale in Australia⁹⁸. BUND is another early player which has published a position paper on nanotechnologies. It actively dealt with this topic at national and the EU level, hoping to *«contribute to the development of a common European policy of Friends of the Earth on this issue»* (BUND 2007).

ETC Group, a principal actor during the previous period, continued its eye-catching campaigns. It used novel methods to attract attention and to advocate its calling for a moratorium on nanotechnologies. In September 2006, ETC Group launched an ‘International Nano-hazard Symbol Design Competition’, which attracted 482 designs from 24 countries⁹⁹. Media groups have also reported this event¹⁰⁰. CIEL appraised the ‘forward-looking’ approach of ETC Group. It decided to put the topic of nanotechnology onto their agenda given the fact that *«nanotechnologies have been under the radar of some CSOs.»*¹⁰¹ According to a report of the Rathenau Institute, for most Dutch CSOs, *«their attention was drawn to nanotechnologies through attendance at international conferences and/or contacts with international partners and sister organizations»* (Hanssen et al. 2008). Scholars argue that trans-national nanowatch campaigners actually play a role of ‘intellectual vanguard’ (Seifert and Plows 2014).

4. The dual influence of REACH on CSOs’ approaches towards nano

The regulatory issues of nanomaterials arose precisely at the time when Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH)–the

⁹⁸ FoE Australia. 2007. “FoE calls for Samsung ‘Nano Silver’ washing machine recall in face of growing risk concerns.” February 26. <http://emergingtech.foe.org.au/162/>

⁹⁹ ETC Group. 2007. “Winners of Nano-Hazard Symbol Contest: Announced at World Social Forum, Nairobi, Kenya”. News Release, January 24. http://www.etcgroup.org/sites/www.etcgroup.org/files/publication/604/02/wsffinalcontestjan24_07.pdf

¹⁰⁰ Weiss, Rick. 2007. “Signs Done on Speck”. Washington Post, January 21. <http://www.washingtonpost.com/wp-dyn/content/article/2007/01/20/AR2007012001565.html>

¹⁰¹ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

flagship chemicals policy of the EU— was in the process of being shaped and adopted. ‘Timing’ is an important factor that should be taken into consideration so as to track the dynamics of green activism at the EU level.

From the Informal Environment Council in Chester (April 1998) where concerns were raised over chemical legislation in Europe, to 1st June, 2007 when REACH finally entered into force, this far-reaching chemical legislation has taken a long time to develop. The drafting, shaping and final adoption of REACH has triggered one of the most fierce lobbying battles in the EU. During the public consultation, the Commission had received more than 6,400 contributions from those of governments, regulatory authorities, CSOs, industries, scientists, etc.¹⁰² Guido Sacconi, the former rapporteur on REACH, claimed that *«unbelievable pressure was brought to bear on MEPs by big businesses.»*¹⁰³

During this ‘lobbying battle’, most well-established CSOs had involved and launched campaigns, e.g. WWF’s DetoX campaign¹⁰⁴, FoE’s Safer Chemicals Campaign¹⁰⁵. ‘Chemical Reaction’, a new and single issue organization, was established by three CSOs (Greenpeace, FoE, and EEB), which have joined their forces together and worked closely and extensively in influencing the process of REACH (Coen and Richardson 2009). Tony Musu, ETUC chemicals advisor, highlighted that *«alliances with Environmental and Consumers NGOs are key.»*¹⁰⁶ A scholar argues that CSOs, the strongest supporters of a radical change in chemicals policy, have played a crucial countervailing power to the chemicals industries (Pesendorfer 2006). However, it is worth noting that the topic of nanomaterials was only mentioned and addressed by these CSOs occasionally. For example, ‘Chemical

¹⁰²http://ec.europa.eu/enterprise/sectors/chemicals/documents/reach/archives/consultation/contributions/index_en.htm

¹⁰³ BBC News. 2005. “Euro MEPs back major chemicals law.” November 17
<http://news.bbc.co.uk/2/hi/europe/4444550.stm>

¹⁰⁴ WWF. 2007. “DetoX: Campaigning for safer chemicals.”
http://d2ouvy59p0dg6k.cloudfront.net/downloads/detox___campaigning_for_safer_chemicals.pdf

¹⁰⁵ http://www.foe.co.uk/sites/default/files/downloads/cyw_24_chemical_generation.pdf

¹⁰⁶ ETUI. 2013. “How to monitor and influence the EU decision-making process from a trade union perspective: A guide for trade unions.” <https://www.etui.org/content/download/11471/96669/file/manualEtui-V4.6-WEB.pdf>

Reaction’ expressed its concerns over the potentially adverse effects of nanoparticles, proposing regarding nanomaterials as new substances and adjust REACH threshold quantity (Chemical Reaction 2007, 32). WWF also showed concerns that nanomaterials, produced in low volumes, may not be adequately covered by REACH and proposed a ‘simple registration’ for nanomaterials¹⁰⁷. For these CSOs, nanomaterial was an appendage and extension of existing work on REACH and far from an independent issue of concerns.

The final adoption of REACH was considered as a victory of the alliance of green policy advocates (Selin 2007). This dissertation suggests that the green advocacy coalition formed during former negotiations on REACH continued to influence the trajectory of nanomaterials in Europe. For example, an interviewed Dutch regulatory authority introduced how Member States continued their joint efforts in dealing with regulatory issues of nanomaterials, *«we used the good network that we have established on the REACH dossier for this action... We hope our actions could help finding a solution.»*¹⁰⁸ Some CSOs, encouraged by their earlier gains in REACH debates, continued to use their experiences and expertise into the case of nanomaterials. Joint actions led by CSOs were largely resulted from their convergence of interests in chemical issues. According to an interviewee who has working experiences in both EEB and ETUC, *«we found that the views were generally the same, so we continued to work together very closely... That was something built on the joint efforts that were made in working on REACH.»*¹⁰⁹ The actors who addressed chemicals issues continued to actively address nanomaterials¹¹⁰.

¹⁰⁷ WWF. 2004. “The REACH Files: a policy guide.” <http://assets.panda.org/downloads/reachfilespolicyguide.pdf>

¹⁰⁸ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

¹⁰⁹ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

¹¹⁰ E.g. Aida Ponce of ETUI, Tatiana SANTOS of EEB, Vito Buonsante of ClientEarth, David Azoulay of CIEL, Franz Fiala of ANEC.

On the other hand, the considerable efforts and resources put into REACH debates gave rise to a feeling of fatigue among some CSOs. An interviewee observed that,

“nanomaterials came more towards the end of all of the work was being done to agree the REACH legislation ... A lot of people who were working on chemicals at the time stopped then. When you have a piece of legislation you say ‘OK my work is finished’. And now we want to move on other issues... I feel that the lobbying is there, but it was not as strong as it was when it was on chemicals generally under REACH.”¹¹¹

An interviewed policy officer of ClientEarth had similar remark, adding that the decision to move on to other priorities was dependent not only on CSOs themselves but also on the decisions of the funders¹¹². Under this context, some CSOs chose to retreat from this field and turned to address other issues. This contradictory duality—earlier experiences in addressing REACH are both enabling and restrictive at the same time—helps shape the specific features of EU-level CSOs that are concerned with nanotechnology issues.

B. Approaching the communication process of EU level CSOs

The complex and technical nature of nanotechnologies requires some knowledge and expertise in order to provide constructive input to debates. As we discussed in Chapter II, there were only a few European CSOs which addressed the topic of nanotechnologies during the early period. This situation started to change with the launch of NanoCap Capacity Building Project as well as the shift of policy development of nanotechnologies in the EU.

¹¹¹ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

¹¹² Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

Since the NanoCap Project, EEB and ETUC have begun to deal with nanotechnologies. They coordinated the activities of environmental organizations and worker unions at the EU level respectively. An interviewee of ETUI introduced the context in which they started to show interest in nanotechnologies,

“the idea of ‘no data, no market’, which was not being respected with nanomaterials, made it an interesting issue to follow. At the same time, we could not identify some very fundamental risk management and risk assessment issues, such as hazard and exposure. It was an interesting regulatory issue as well from that perspective.”¹¹³

The engagement of CSOs is worth studying. Firstly, they deal with “questions of general interest”, which bring them higher reputation and trustworthiness compared with other stakeholders. Furthermore, CSOs possess wide base and close access to the general public. For example, The ETUC comprises 85 national organizations from 36 countries. EEB, the largest federation of environmental organizations of Europe, has more than 140 member organizations from 31 countries with a membership base of more than 15 million individuals /households¹¹⁴. The following section will examine the communication process of EU level CSOs, presenting their key activities, key concerns as well as key results concerning nanotechnologies.

1. Key activities

According to Habermas, *«the communication structures of the public sphere are linked with the private life spheres in a way that gives the civil-social periphery, in contrast to the political center, the advantage of greater sensitivity in detecting and identifying new problem situations»* (Habermas 1996, 381). CSOs, dedicated to safeguarding ‘general interests’, have carried out wide-ranging activities to raise public awareness, promote dialogue and transmit societal concerns into the

¹¹³ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

¹¹⁴ EEB Website: <http://www.eeb.org/>

policy-making process of nanotechnologies.

EEB, for example, set up a new working group on nanomaterials at the beginning of 2007. Since then, it has incorporated nano-related issues into its annual report. Between 2009 and 2010, EEB had published a series of reports addressing topics that range from the health, safety and environmental aspects to governance issues of nanotechnologies. These reports served as capacity building tools to empower its member organizations and other CSOs (Senjen 2009a, 2009b, 2009c; Fedrigo and Senjen 2010). Consumer unions conducted independent surveys in order to better inform and protect consumers. For example, the UK consumer association *Which?* conducted a citizen panel to explore consumer perception and understanding of nanotechnologies. The results revealed a low level of public awareness towards nanotechnologies: six in ten adults had not heard of the term ‘nanotechnologies’ (Which? 2008a). Worker unions paid a specific focus towards the safety and health issues of workers. FNV, federation of unions in the Netherlands and participant of NanoCap project, formulated a 17-page manual for the safe handling of nanomaterials for workers¹¹⁵.

Apart from publishing reports, some CSOs have created nano-specific websites to provide background information and knowledge regarding nanoscience and nanotechnologies. For example, based on what they have gained through NanoCap project, Mediterranean CSOs created the website *Nanovirtualium*¹¹⁶, providing the latest information on nanotechnologies in eight languages. French CSO Vivagora established *the Citizens Alliance on Nanotechnology Issues (L’Alliance citoyenne sur les Enjeux des nanotechnologies)* in early 2009. One of its objectives was to enhance the capacity-building of CSOs¹¹⁷.

¹¹⁵http://www.fnv.nl/site/nieuws/webassistent/h.hubregtse/wereldprimeur_handleiding_nanodeeltjes/handleiding_o_mgaan_met_nanodeeltjes.pdf

¹¹⁶ www.mio-ecsde.org/_uploaded_files/nanovirtualium/

¹¹⁷ <http://veillennanos.fr/wakka.php?wiki=PagePrincipale>

A number of CSOs (BUND 2007; Greenpeace 2007; HEAL 2008; ETUC 2008; EEB 2009; MIO-ESCDE 2009; FNV 2009; ANEC&BEUC 2009; Legambiente 2009; BEF 2009; AMICUS 2009) have developed their position paper towards nanotechnologies. These CSOs had been actively following and contributing to the policy consultation and deliberation during the capacity-building phase. Coalitions among CSOs can be examined: for example, in the Netherlands, WECF, Milieudefensie and Stichting Natuur en Milieu decided to work together on nanotechnologies since May 2008¹¹⁸. Under the coordination of Baltic Environmental Forum (BEF), a participant of NanoCap project, a coalition of Lithuanian environmental CSOs joined their efforts and published their position paper on nanotechnologies (BEF 2009).

CSOs also attended or organized workshops and seminars, with some specific questions being explored deeply. Instead of holding a decisive position towards nanotechnologies in general, some CSOs like Practical Action focused on specific applications or products enabled by nanotechnologies. For example, focusing on water problems of the South, Practical Action sought to find answers to the question with regard to whether nanotechnologies could bring real benefits in the provision of potable water for the poor. Centered on this question, Practical Action has organized several workshops in Zimbabwe and Peru, engaging local groups as well as scientists from both the North and South into debates. FoE Europe published two reports in 2008 and 2010, dealing with the topic of food and agriculture, and climate and energy respectively.

Activist groups continued to do campaigns against nanotechnologies by using confrontational methods. On 1st June, 2006, more than 1000 people (800 people according to the police) went to the streets of Grenoble, opposing the inauguration of

¹¹⁸ WECF, 2008. "Dutch NGOs keep sharp eye on nanotechnology developments". May 12. <http://www.wecf.eu/english/articles/2008/06/nanotechnologie-netherlands.php>

Minatec and ‘the totalitarian nanoworld’¹¹⁹. The demonstration against nanotech was reported to be the largest scale of this kind worldwide¹²⁰. A provisional activist group *Opposition Grenobloise aux Nécrotechnologies* was established. It has organized about 50 activities in preparation for direct action at the national level. Their activities included film projection, workshops, meetings, salons, etc., and they were held in tens of cities in France, Italy and the Switzerland¹²¹.

It is also noteworthy that other CSOs like CIEL have started to ‘watch’ nanotechnologies. An interviewee introduced the context in which they decided to address the issue,

“the idea was that nanotechnology was early enough in the development process, which could be used as a case to study how new technology can be integrated into society and regulated... The interest started in 2007 and 2008, but it took some time to find necessary funding so as to start working on this.”¹²²

To conclude, CSOs have developed wide-ranging activities (e.g. position papers, publications, workshops, direct actions) so as to make the regulatory authorities more ‘sensitive’ to public concerns from the bottom up. Through these activities, CSOs have developed more expertise and know-how in dealing with nanomaterials. And these wide-ranging activities have also contributed to the increased the visibility of CSOs’ key concerns.

¹¹⁹ Le Figaro. 2006. “Manifestation contre les «nécrotechnologies» .” June 02.
http://www.lefigaro.fr/sciences/2006/06/02/01008-20060602ARTFIG90204-manifestation_contre_les_necrotechnologies.php

¹²⁰ Quiret, Matthieu. 2006. Les nanotechnologies déjà condamnées? Les ECHOS, November 14.
http://www.lesechos.fr/14/11/2006/LesEchos/19793-068-ECH_les-nanotechnologies-deja-condamnees--.htm

¹²¹ <http://heberg.ironie.org/ogn/ogn.ouvaton.org/calendrier.html>

¹²² Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

2. Key concerns: both wider and narrower

Comparing with the previous period (2000-2005), the concerns that EU level CSOs have raised during the capacity-building phase (2006-2009) were both wider and narrower: on the one hand, CSOs tried to go beyond the traditional ‘benefits versus risks’ framing, reflecting wider deliberation of the public dimensions of nanotechnologies (Miller and Scrinis 2010); on the other hand, with capacity and professionalism strengthened, CSOs were able to deal with narrower questions with regard to the regulatory aspects of nanotechnologies, which always required technological knowledge basis.

As Habermas puts it, *«civil society has the opportunity of mobilizing counterknowledge and drawing on the pertinent forms of expertise to make its own translation»* (Habermas 1996, 372). The present section deals in particular with the question regarding how CSOs develop their counterknowledge and propose alternative framing of issues around nanotechnologies.

2.1. Going beyond ‘benefits versus risks’ framing: wider concerns of CSOs

As an enabling or platform technology, nanotechnologies are assumed to bring transformative impact to the society. How are nanotechnologies going to be deployed? To what ends? Who controls it? Will the benefits be enjoyed by the rich and the poor equally? The implications of nanotechnologies go far beyond the traditional ‘benefits versus risks’ framing. Given the immaturity of nanotechnologies, CSOs endeavor to seize the opportunity to bring more fundamental questions onto the table.

CSOs’ first concern is whether nanotechnologies could bring real benefits driven by societal demands. Portrayed as the next technological revolution, nanotechnologies bear potentials to bring fantastic futuristic applications: better energy storage capability, great potential of coping with water crisis or reducing ecological footprint, scientific breakthroughs concerning medical diagnosis, etc. However, faced with these ‘déjà vu’ promises, CSOs, with reserved enthusiasm, act in a suspicious manner.

CSOs questioned the motives that drive the R&D of nanotechnologies (Fedrigo and Senjen 2010; BEF 2009; MIO-ECSDE 2009). CSOs argued that the driving force for nanotechnological innovation was ‘competitiveness’ or ‘marketability’ rather than real societal needs. CSOs noted that nanotechnologies should provide real solutions to more pressing problems, while many products or applications (e.g. self-cleaning windows, odourless socks, nano-enhanced tennis racquet) were of ‘accessory’ nature, serving merely short-term economic purpose (MIO-ECSDE 2009). A coalition of Lithuanian CSOs adopted a tough stance, demanding that *«no further market introduction should be allowed in case of nonessential nanoproducts»* (BEF 2009). EEB proposed that societal engagement and participation should act as a starting point for identifying real societal preferences in developing nanotechnologies (Fedrigo and Senjen 2010).

Furthermore, the claimed benefits or promises that nanotechnologies could bring also come under close scrutiny. Mindful of past ‘miracle’ technologies, ETUC claimed that *«putative benefits to society cannot legitimate the use of nanotechnologies outside of all democratic control.»*¹²³ EEB examined several hot potential applications of nanotechnologies (environmental remediation, waste management, water treatment, etc.), identifying the commercial availability, technological feasibility, actual benefits and EHS issues in each area. It concluded that many solutions were still in the pilot stage or were being tested in the field and the benefits may be years away (Senjen 2009b). In a joint report, International POPs Elimination Network (IPEN) and EEB questioned the mismatch between claims and reality: while benefits claimed were often over-promised and under-delivered, the ‘downsides’ to nanotechnologies were rarely acknowledged. These ‘downsides’ included greater energy demands, potentially generation of toxic waste, and the eco-toxic behavior of many nanoparticles (IPEN and EEB 2009). EEB warned that *«deep skepticism or even a severe public backlash can be expected when it becomes*

¹²³ ETUC. 2009. “Why there must be a public debate on nanos.”Special report 30/30 https://www.etui.org/content/download/1034/9551/file/HESAmag_1_THE_UK_41.pdf

clear that many of those predictions are unrealistic» (Fedrigo and Senjen 2010). During a workshop organized by Practical Action, a tentative conclusion was agreed by the Zimbabwean community groups and scientists that *«there is no real water quality issue that cannot be solved with existing technologies»* (Grimshaw, Stilgoe, and Gudza 2006, 3).

FoE Europe paid specific focus on the issue of food and agriculture, arguing that nanotechnologies may cause more problems than it could solve: it may entrench reliance on chemical and fossil fuel intensive industrial agriculture, intensify existing trends towards ever larger scale farming operations; It could also lead to a higher overall ecological footprint due to the expansion of nanotechnologies in food processing and packaging (FoE 2008).

Another broad set of CSOs' concerns was about possible exacerbating of existing inequalities between the South and the North (FoE Europe 2008; Greenpeace 2007; IPEN and EEB 2009). FoE Europe pointed out that nanotechnologies did nothing to redress the root cause of existing inequities in global food distribution. EEB and IPEN had similar concerns: the deployment of nano-water treatment technologies may increase the market access of private, profit-driven companies. Practical Action demanded *«a comprehensive capture of the complexity and inter-related issues in relation to the presenting problem»* (Grimshaw, Stilgoe, and Gudza 2006, 18), proposing a collaborative approach and knowledge sharing with the local community. CSOs also pointed out that developing countries should not act as a potential dumping ground for nano waste or as an easy, not strictly regulated market¹²⁴.

Lastly, some CSOs showed concerns about specific issues of nanotechnologies according to their expertise and advocacy history. For example, Cooperate Watch focused on monopolistic patents at the nanoscale and corporate concentration; CSOs

¹²⁴ Hontelez, John . 2010. "Positions and perspectives of Environmental NGOs on Nanotechnologies and Nanomaterials". EEB, NanoCap Final Conference, April 2.
<http://www.nanocap.eu/Flex/Site/Download74be.pdf?ID=4117>

that worked on animal welfare issues (e.g. the Dutch Society for the Replacement of Animal Testing; Dr Hadwen Trust For Humane Research) actively advocated non-animal testing in developing nanotechnologies¹²⁵.

2.2. Narrower concerns: regulatory aspects of nanotechnologies

As Habermas puts it, *«the structures of a vibrant civil society and an unsubverted political public sphere must bear a good portion of the normative expectations, especially the burden of a normatively expected democratic genesis of law»* (Habermas 1996, 461). Through various capacity-building projects, activities, communication as well as exchange with other stakeholders, CSOs have gained more knowledge and deeper understanding about nanotechnologies. They started to contribute to discussions about more concrete questions, i.e. the regulatory aspects of nanotechnologies.

During this period, a good number of CSOs have published their position paper towards nanotechnologies, seeking to not only advocate the precautionary principle, but also operationalize it to guide current practices. As a scholar puts it, *«between 2003 and around 2007, there was a notable shift in the debate on nanotechnologies safety away from the question of whether to apply precaution amidst uncertainty towards the question of how best to reduce uncertainty, including through regulatory means»* (Jaspers 2012). Table 4 summarizes CSOs' demands with regard to the regulatory aspects of nanomaterials.

¹²⁵ Submissions Scientific Hearing on Nanotechnology
http://ec.europa.eu/health/archive/ph_risk/committees/04_scenihr/docs/nano_submissions.pdf

Table 4. Proposals of CSOs in regulating nanomaterials

	EEB	Legambiente	MIO-EC SDE	BEF	ETUC	AMICUS	BUND	FNV	HEAL
Precaution principle	√		√	√	√	√	√	√	√
Nano specific regulation	√	√							
Mandatory labeling	√	√	√	√	√		√		√
Notification and registry	√				√		√	√	√
Research funds	√		√	√	√	√	√		√
Nano definition	√		√		√		√		
Amendment of REACH	√		√	√	√			√	
Public participation	√		√	√	√	√	√		√
Partial moratorium							√		√
Restriction of market introduction	√			√	√				

3. Evolution of CSOs' strategies and position

This dissertation argues that it is of great importance to bear a dynamic view towards the roles that CSOs play in the debates around nanotechnologies. The influences that CSOs exert on the policy process of nanotechnologies are evolving, and their stances are also in constant change. Instead of finding a fixed conclusion, the present research focuses more on the evolution of CSOs' strategies and positions, examining what factors may contribute or limit their roles in influencing the policy-making process of nanotechnologies.

Close communication and exchange with scientists and regulators has helped triggering a learning process within CSOs. With a number of new scientific findings and policy development, CSOs also upgrade their position towards nanotechnologies. A scholar examines the case of Swiss and the Netherlands, demonstrating that in both of the countries, *« increasing involvement of unions and consumer associations partially offsets the weak mobilization of large NGOs »* (Bullich 2009, 13). Literature based on analysis at a local or national level is well-documented (Seifert and Plows 2014; Laurent 2007; Bullich 2009). This dissertation seeks to investigate the features of green activism at the EU level. It appears that the positions and strategies of environmental organizations (represented by EEB, CIEL), worker unions (ETUC, ETUI) as well as consumer associations (BEUC, ANEC, ECOS) are in continuing flux. Here the case of ETUC is utilized to show how CSOs adapt their approaches to keep pace with the latest development of nanotechnologies.

ETUC published two resolutions in August 2008 and December 2010 respectively. In the first report, ETUC described nanotechnologies as 'driver of the next industrial revolution'; and two years later, it added another term to describe nanotechnologies: 'a paradigm shift'. After analyzing the two resolutions as well as other reports, meeting records, news releases, contribution to public consultation, etc., we could see the evolution of ETUC's position towards nanotechnologies, which could be illustrated from following three aspects:

First of all, ETUC enlarged the scope of concern from human health, safety and environmental aspects to include wider societal dimension. As Joël Decaillon, the confederal secretary of ETUC, put it, *«after the asbestos scandal, ETUC finds it unacceptable that products should now be manufactured without their potential effects on human health and the environment being known»* (ETUC 2008). An interviewed policy officer introduced the background under which ETUC started to deal with the issue of nanomaterials,

“nanomaterials were interesting because they were starting to cross into the wider consumer area around the year of 2007. At the same time was the change in the EU chemical management—REACH. The idea of ‘no data, no market’, which was not being respected with nano, made it an interesting issue to follow.”¹²⁶

In an earlier period, ETUC paid more attention to EHS aspects of nanotechnologies. ETUC, for example, asked for at least 15% of national and European public research budgets to be earmarked for EHS aspects; it also required that all research projects should include health and safety aspects as a compulsory part of their reporting (ETUC 2008).

In 2010, ETUC held a seminar entitled *Nanotechnologies: national and European trade union strategy* in Brussels, bringing together member organizations, representatives of the EC, scientific community, etc. During the seminar, the participants highlighted the need to *«embed the social dimensions and personal liberties into the nanotechnologies process»*¹²⁷. In the subsequent resolution, the first and foremost demand by ETUC was “inclusion of the societal dimension of nanotechnologies”. Regarding the issue of budget, it requested the EC to *«set a percentage commitment to allocate sufficient funding for societal and ethical*

¹²⁶ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

¹²⁷ ETUC. 2010. “Seminar for a Trade Union strategy on nanotechnologies.” October 19 http://www.etui.org/content/download/2484/27213/file/ETUI_seminar_nanotechnology_October2010.pdf

concerns, in particular those relating to social justice, privacy, human dignity, environment, and responsibility towards future generations» (ETUC 2010). In comparing the demands by ETUC in the two resolutions, it appears that its scope of concerns have enlarged significantly.

Secondly, the tone of ETUC became more demanding. While the first resolution ‘CALLS ON’ Member States authorities to set up a national register on production, import and use of nanomaterials, the second resolution highlighted that Member States ‘MUST’ develop mandatory registers of articles containing nanomaterials, with life-cycle assessment included. ETUC also showed particular attention to transparency and traceability of nanomaterials. To update its approach, ETUC organized seminars with its trade union members to find strategies to address nanomaterials together. Joël Decaillon, ETUC Deputy General Secretary, highlighted that *«trade unions cannot afford to put off action here... The trade union movement must get involved, and soon, if it is not to store up big trouble for itself.»*¹²⁸

Last but not least, from the idea of ‘no data, no market’ to ‘no data, no exposure’, ETUC further operationalized and enriched its definition of the precautionary principle. According to ETUC, ‘no data, no exposure’ meant that *«where no data on risks are available, workers must not be exposed and processes have to be performed in closed systems»* (ETUC 2010). Both of the two reports highlighted the significance of the precautionary principle. However, in the prior report, the precautionary principle was more of a conception which was rather abstract and general. The latter report, as a step further, also identified the function and scope of application of the precautionary principle. According to ETUC, the precautionary principle, applied to deal with issues “in an attentive, careful, reasonable and transparent manner”, could take the form of many initiatives, including *«risk reduction measures, early warning actions with specific attention to health monitoring, and the registration of workers*

¹²⁸ ETUI. 2010. “ETUI seminar on nanotechnologies”. October 19-22.
http://www.etui.org/content/download/2484/27213/file/ETUI_seminar_nanotechnology_October2010.pdf

exposed» (ETUC 2010).

In conclusion, the case of ETUC well illustrates the process during which CSOs construct and develop their stance in response to the latest developments of nanotechnologies. To adopt what strategies is also partly determined by the extent to which CSOs' advocacy being transformed into the institutionalized procedures.

4. Key Results

During the capacity-building phase, CSOs had been actively involved in the policy-making process of nanotechnologies. They advocated that precautionary measures should be put into place given the lack of appropriate data and assessment methods relating to the possible adverse risks of nanotechnologies. There always exists the 'too early/too late' dilemma in the risk governance of emerging technologies. Built upon analyses about the policy debates around nanotechnologies, we could see that major stakeholders, including the EU policymakers, industries, scientists, CSOs, etc., held different views and preferences towards, for example, the principle of precaution vis-à-vis innovation, information transparency vis-à-vis confidentiality. A fierce battle was undergoing concerning how to frame and govern nanotechnologies in the EU.

4.1. CSOs' voices remain marginalized in nano-governance debates

The precedent section has introduced the key concerns and demands of CSOs, both broader and narrower, regarding nanotechnologies. Based on examination of the policy development (e.g. the Commission's regulatory review, the FP7 program that supports nanotechnologies, implementation reports of the EU action plan), we could remark that CSOs' concerns remained largely marginalized by the dominant frame used by nanotechnology developers. This observation is in accordance with the analyses by Miller and Scrinis (2010), who conclude that CSOs have limited political leverage in nanotechnology debates.

For example, CSOs advocated that more research budgets should be earmarked for the ELS aspects of nanotechnologies (e.g. AMICUS asked for 8%, BUND 10-15%, ETUC and EEB 15%, Natuur en Milieu 30%). Although the Community funding for research on risk assessment and management had continued to grow (from EUR 25 million in the four-year period 2003-2006, to more than EUR 50 million in the two-year period 2007-2008), the figure represented only roughly 5% of the total nanotechnology funding (EC 2009c). And among the EUR 3.5 billion allocated to nanosciences, nanotechnologies, materials and new production technologies under FP7 (2007 to 2013), only 2.3% (around EUR 82 million) had been funded to study the ELS impact of nanomaterials by 2011¹²⁹.

With increased budget devoted into nanotechnologies innovation and growing number of nanoproducts being poured into the market, the EU regulatory authorities, in particular the EC, showed little willingness to slow down the rapid pace of developing this key enabling technology. A report of the EC highlighted that *«the deployment of KETs in the EU is not only of strategic importance but is indispensable»*; efforts should be made so as to *«avoid delays in introduction of new technologies in the EU»* (EC 2009a). In spite of the ‘no data, no market’ principle advocated by CSOs, the market was moving ahead of regulation. ETC Group commented that *«REACH’s guiding principle appears to have morphed into ‘no data, no regulation’.*»¹³⁰ Neither the proposal of a moratorium on certain nanoproducts (ETC Group 2003; Greenpeace 2007; HEAL 2008; BUND 2007; FoE Europe 2008; Natuur en Milieu 2009), nor CSOs’ demand for limiting the market introduction of the ‘nonessential’ nanoproducts were incorporated into regulatory decisions. Scholars note that CSOs’ demands for examining the ‘claimed benefits’ of nano-products rarely figure in regulation (Miller and Scrinis 2010).

¹²⁹ Foss Hansen, Steffen & Gee, David. 2014. “The EU needs more anticipatory funding of health and environmental research”. EurActiv, September 17.
<http://www.euractiv.com/sections/health-consumers/eu-needs-more-anticipatory-funding-health-and-environmental-research>

¹³⁰ ETC Group(2010). The Big Downturn? Nanogeopolitics. ETC Group Communiqué # 105

The EC considered the existing legislative framework sufficient to cover nanotechnologies in its first regulatory review (EC 2008e) and proposed *A code of Conduct for Responsible Nanosciences and Nanotechnologies Research*, a soft law instrument with non-binding feature (EC 2008a). Seven general principles—meaning, sustainability, precaution, inclusiveness, excellence, innovation and accountability—were provided so as to guide the actions of all relevant stakeholders. The voluntary measures were welcomed by CSOs, but considered as with limited effectiveness.

Apart from these failures, we should bear in mind that it often requires some time in order to transform the influences that CSOs acquire in the public spheres into ‘communicative power’, which entails a more gradual transition. My argument is that the capacity of CSOs to «*catalyze the growth of autonomous public spheres*» (Habermas 1996, 488) should not be ignored when we evaluate their impact on formal decision-making. CSOs, with their cooperation strengthened, hold the potential to play a more prominent role in the subsequent phase.

4.2. Enhanced cooperation among CSOs

Generally speaking, CSOs address nanotechnologies from different perspectives, that’s to say, green organizations pay more attention to environmental issues and the sustainability of nanotechnology; worker unions focus on workplace safety in dealing with nanomaterials; and consumer associations safeguard consumers’ health, safety and their rights to make informed choices. However, we could see growing convergences among CSOs’ demands, in which precautionary practices, as expressed in the ‘no data, no market’ principle of REACH, have greatly facilitated their dialogue and cooperation.

For example, the focusing area of ETUC went beyond traditional occupational health and safety issues and took a wider range of issues into consideration. As an interviewee of ETUI, the research and training center of ETUC, put it,

“we find that the views were generally the same, so the collaboration continued to work together very closely... You can’t just focus on jobs or working conditions. It is about the environmental impact. I think that this is a very positive message, because if you focus purely on worker health, you are missing half of the picture.”¹³¹

We can find similar reflection within consumer associations and environmental organizations. Different CSOs, by putting their knowledge and expertise together, started to compel the political system to *«switch over to the official circulation of power»* (Habermas 1996, 373). As a policy officer of ANEC noted,

“it is a good thing that some CSOs take the lead of some issues and others follow. It is quite useful in dealing with the issues and sharing sources. Everyone has his areas, specialty and expertise.”¹³²

Centered on nanotechnologies, EU level CSOs have developed close contact with each other. Take EEB as example, the following figure indicates the dense cooperation between EEB with other EU level CSOs as well as national member organizations.

¹³¹ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

¹³² Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

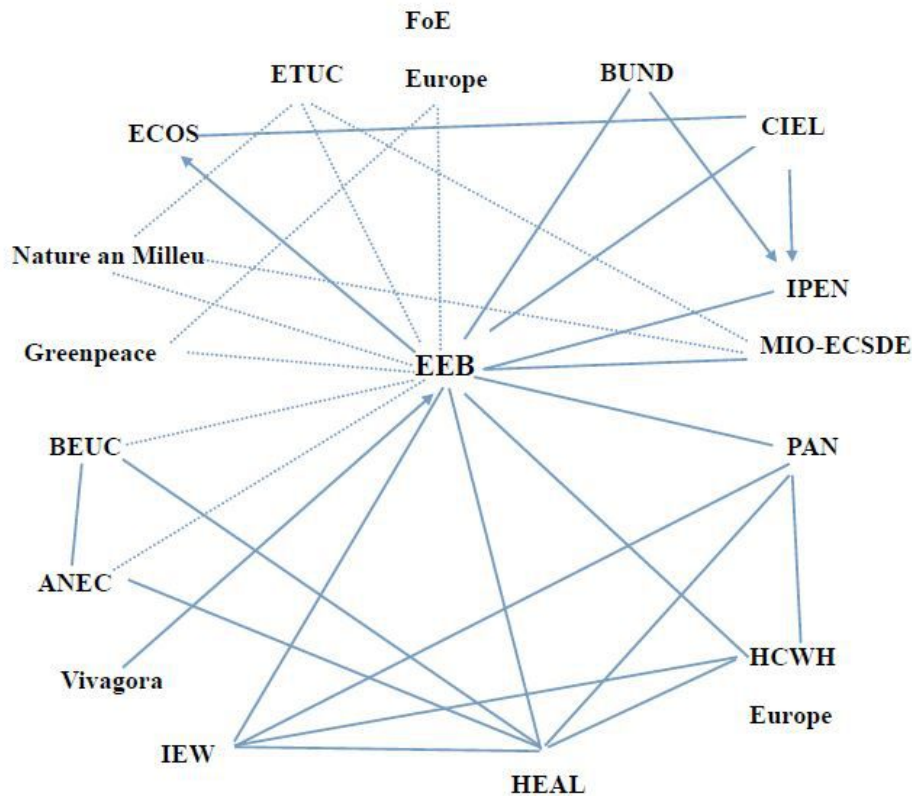


Figure 4: EEB's cooperation with other CSOs¹³³

- CSOs jointly publish reports and develop position
- Members of NGO federation (e.g. Vivagora joined EEB in 2010; EEB Policy Officer is member of ECOS task force on nanotechnologies)
- Workshops, meetings and other communication activities among CSOs

EEB showed determination to address nanotechnologies differently. As indicated in its 2008 annual report, *«as there is no official legislative process addressing nanotechnologies or nanomaterials within the EU regulatory framework, EEB is not employing its traditional lobbying tools and approaches in the work in this policy area.»*¹³⁴ This dissertation suggests that demands for upstream engagement and close collaboration with other CSOs are key elements of its 'novel lobbying tools'. For example, an interviewee from the Danish Ecological Council, a member organization of EEB, introduced its close collaboration with EEB,

¹³³ This picture is based on annual reports of EEB from 2007 to 2010 as well as other joint reports with CSOs.

¹³⁴ EEB. 2008. "Annual Report".

<http://www.eeb.org/?LinkServID=9A228EB7-999F-20E3-50BD73B537201A4B&showMeta=0>

“we have annual meetings in Brussels, and we have phone conferences regularly. Each time around ten to fifteen CSOs participated.”¹³⁵

A coalition among CSOs not only enables them to share expertise and experiences in dealing with common issues, but also to reduce costs and spending. For example, in a joint report by the Green 10¹³⁶, the issue of nanotechnologies was put forward explicitly, *«restrict the marketing and use of nano materials on the EU market, until the environment and health implications of nanotechnologies are more fully understood. An adequate regulatory framework based on the precautionary principle is needed, which includes clear labeling requirements.»*¹³⁷ Although only half of these CSOs had experiences in dealing with nanotechnologies, wider ‘green forces’ were infused into the debates on nanotechnologies with the support of other CSOs. These cooperative activities have helped improving the visibility of CSOs’ proposals and concerns. Most importantly, CSOs have won the support of the Parliament. The regulatory landscape of nanotechnologies, with more actors stepped in, started to shift in the EU.

4.3. The EP favors the precautionary principle in governing nano

As discussed above, CSOs have been advocating the precaution principle—‘no data, no market’ and ‘no data, no exposure’—to be applied into the governance of nanotechnologies. This principle could take the form of a number of initiatives and measures (e.g. mandatory labeling, traceability and transparency, pre-market approval). Apart from the demand for prior registration of labeled products, most of CSOs’ proposals were backed by the EP¹³⁸ in its resolution towards regulatory aspects

¹³⁵ Interview with Lone Mikkelsen, chemicals policy officer of the Danish Ecological Council, 26/09/2014

¹³⁶ Green 10 include: Bankwatch Network ;BirdLife International; Climate Action Network Europe (CAN) ; European Environmental Bureau (EEB) ;Friends of the Earth Europe ;Friends of Nature International ;Greenpeace European Unit ;Health and Environment Alliance ;European Federation for Transport and Environment (T&E) WWF European Policy Office

¹³⁷ A Joint Document From The Green 10. 2008. “Environment at the heart of Europe: An environmental roadmap for 2009-2014.”

http://www.env-health.org/IMG/pdf/9-Green10_Environment_at_the_heart_of_Europe_-_Environmental_Roadmap_-_Election_document_edit_FINAL_May_2009.pdf

¹³⁸ EEB. 2009. “Parliament supports NGOs' calls for stricter controls.” March 31.

of nanomaterials on 24th April, 2009.

Before the resolution being adopted, EEB had lobbied heavily by sending letters, meeting advisors, rapporteur and shadow rapporteur MEPs, etc.¹³⁹ EEB, together with BEUC, ANEC and HEAL, also sent voting recommendations to MEPs before the plenary vote, asking them to support the resolution¹⁴⁰. Finally, among the 398 votes, only three were against the resolution¹⁴¹. The final adoption was hailed by EEB as ‘a significant victory’ in the ongoing debate¹⁴².

The Parliament took a strict stance on the governance issue of nanomaterials, noting that *«the concept of the “safe, responsible and integrated approach”... is jeopardized by the lack of information»* (EP 2009b). And it questioned whether, in the absence of explicit provisions for nanotechnologies in Community law, legislation can be deemed adequate to cover the risks related to nanomaterials. The Commission was thus requested by the EP to conduct a regulatory review within two years with the aim of ensuring safety for all applications of nanomaterials. This resolution was considered by commentators as a signal of paradigm change concerning the regulation of nanotechnologies in the EU, which shifted from a rather reluctant government position toward a more explicit approach¹⁴³. As an interviewed DG SANCO put it,

“some of them (CSOs) certainly got some gains, which were secured through parliamentarians. The Parliamentarians will not have been as sensitive to nano if there had not been all these works of CSOs.”¹⁴⁴

<http://www.eeb.org/index.cfm/news-events/news/parliament-supports-ngos-calls-for-stricter-controls-on-nanotechnology/>

¹³⁹ EEB. 2009. “EEB Annual Report.”

<http://www.eeb.org/?LinkServID=E753F629-A6F4-1B71-A3446D134F990FDB&showMeta=0>

¹⁴⁰ ANEC, BEUC, EEB and HEAL. 2009. “Resolution on Regulatory Aspects of Nanomaterials: NGOs’ voting recommendations for 24 April EP Plenary Vote.” April 23.

¹⁴¹ EurActiv. 2009. “MEPs back tougher rules for nanotechnologies.” April 28

<http://www.euractiv.com/innovation-enterprise/meps-back-tougher-rules-nanotech-news-221703>

¹⁴² EurActiv. 2009. “‘No data, no market’ for nanotechnologies, MEPs say.” April 02.

<http://www.euractiv.com/innovation-enterprise/data-market-nanotechnologies-mep-news-221588>

¹⁴³ Widmer, Markus & Knébel, Stephan. 2009. “A change of paradigm for nanotechnologies regulation in Europe?” The Innovation Society, <http://emergingtech.foe.org.au/329/>

¹⁴⁴ Interview with a DG SANCO, 20/06/2014

Their gains are particularly notable, as scholars observe the change in the political culture with competitiveness relationships among EU institutions and the growing power of the EP in shaping regulatory policies on risk issues (Justo-Hanani and Dayan 2015). An interviewed policy maker also mentioned that «*the EP has been instrumental in raising issues about governance vis-à-vis society*»¹⁴⁵. The shift in policy development led by green MEPs further motivated EU level CSOs to continue their advocacy on nanotechnologies.

C. Conclusion

Chapter III investigates the dynamics of CSOs that addressed nanotechnologies issues from 2006 to 2009. The encouragement of the European regulatory bodies, growing evidence in terms of safety and environmental risks associated with nanotechnologies, the fact that more and more nano-enable products entering into the market, the specific ‘timing’ that nanomaterials have arrived as well as international CSOs’ joint action... all these factors constituted the background in which EU level CSOs got involved in debates on nanotechnologies.

During this phase, CSOs had carried out wide-ranging activities to enhance their professionalism and expertise so as to provide real and constructive input to the policy-making process. On the one hand, CSOs tried to go beyond the traditional ‘benefits versus risks’ framing, promoting discussions about wider deliberation of the public dimensions of nanotechnologies (Miller and Scrinis 2010); on the other hand, CSOs contributed to discussions about ‘narrower’ issues, i.e. policy debates of nanotechnologies. They advocated for the introduction of precautionary measures in governing nanotechnologies, such as mandatory labeling, traceability and transparency, pre-market approval of nanomaterials.

¹⁴⁵ Interview with a DG SANCO, 28/06/2014

Although ‘wider’ concerns remain marginalized by the dominant frame used by nanotechnology developers, CSOs’ demands for the precautionary principle have won the support of the EP. We could see considerable convergence between CSOs’ proposals and those of the Parliament towards regulatory aspects of nanotechnologies. Against this backdrop, a series of nano-specific legislative amendments started to be introduced (nanomaterials in cosmetics, food legislation, etc.), opening up more political opportunities for CSOs. My argument is that the capacity of CSOs to *«catalyze the growth of autonomous public spheres»* (Habermas 1996, 488) should not be ignored when evaluating their impact on formal decision-making. We can expect that CSOs, with strengthened cooperation, could play an increasingly critical role in subsequent phases.

Chapter IV: Alliance-forming phase (2009 onwards)

On the basis of the former two phases, CSOs have become more qualified and capable in addressing the topic of nanotechnologies, and the regulatory landscape in the EU, with more actors stepped in and out, continues to shift during the alliance-forming phase (2009 onwards).

With several nano-related legislation activities gradually developed in the EU, including the definition of nanomaterials, product-specific legislation (e.g. the Cosmetic Directive, the Novel Food Directive, the biocides laws), regulatory reviews, revision of REACH, etc., the activities of CSOs have entered into a new phase. CSOs started to come up with concrete proposals and suggestions in a more organized and coordinated way, closely getting involved in the policy-making process.

However, many interviewees share the view that not so numerous CSOs address the topic of nanotechnologies at the EU level. Based on content analysis of CSOs' websites, position papers, reports, etc., we could examine two different approaches of CSOs towards nanotechnologies: while several new CSOs (e.g. CIEL, Avicenn, HCWH Europe, Swedish Society for Nature Conservation, ClientEarth) started to participate in the policy debates, active CSOs in the precedent period (Greenpeace UK, FoE Europe, HEAL), due to different reasons, have taken a step back and withdrawn from this arena. This chapter seeks to illustrate the different strategies and approaches of CSOs, examining the reasons behind their 'moving forward' or 'moving back' in the policy debates on nanomaterials.

A. 'Moving forward' or 'moving back': two approaches of CSOs

As discussed in the previous chapters, earlier controversies such as mad cow diseases and GMOs have opened up a new window for shifting the way the relationship of science with the rest of society would be thought about.

Nanotechnologies represent a good opportunity for CSOs to be involved from the very beginning of the R&D process. As a program officer of MIO-ECSDE put it, *«nanotechnologies field, unlike other research and development fields, offers the opportunity to do things in a better more improved way... The operationalization of the precautionary principle, taking into account the full life-cycle of nano-enabled products and the involvement of CSOs is crucial towards that end»*¹⁴⁶. It is also believed that nanotechnologies could set a blueprint for discussions about future new technologies¹⁴⁷.

It is interesting to see that both the political system and civil society are determined to address the societal aspects of nanotechnologies right from the early stage, even if there exists little bottom-up concern from the general public. The previous chapter has introduced a series of proactive and anticipatory initiatives by the system, which are dedicated to creating an interactive space more positive and constructive with CSOs.

From a normative view, early involvement is widely welcomed by CSOs. For instance, as interviewee of CFDT put it, *«a proactive approach is one thousand times better than the one under which the decision is already made»*¹⁴⁸. Another interviewee held the same view, pointing out that *«we believe that it is never too early to engage into a policy debate! Everybody should be on board from zero point»*¹⁴⁹. Will this positive interaction space encourage particular forms of tactics that CSOs utilize towards nanotechnologies?

This dissertation argues that, against this backdrop, CSOs had more access to the regulatory authorities and gained more opportunities to get involved in the

¹⁴⁶ Interview with Dr. Thomais Vlachogianni, Programme Officer of MIO-ECSDE, 02/12/2014

¹⁴⁷ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

¹⁴⁸ E-mail exchange with Gérald Hayotte, in charge of activities on nanotechnologies within CFDT, member of dialogue committee on « Nanos » of French Agency for Food, Environmental and Occupational Health & Safety (ANSES), 14/09/2014

¹⁴⁹ Interview with Dr. Thomais Vlachogianni, Programme Officer of MIO-ECSDE, 02/12/2014

decision-making process. For example, CIEL, ETUC and EEB have actively participated in the CASG-nano conferences. ETUC also occupies a seat on the European Chemicals Agency (ECHA) Management Board and sits in various committees¹⁵⁰. ANEC, CIEL and ClientEarth were invited to give a presentation at the workshop on the second regulatory review on nanomaterials. Other CSOs like BEUC have actively participated in the *Nanotechnology Safety for Success Dialogue*, organized by the EC regularly since 2007.

At the Member States level, BUND has been invited to participate in the activities organized by NanoKommission, a central dialogue body of the German Federal Government. French CSOs have contributed to the national debates on nanotechnologies organized by the National Commission of Public Debate (CNDP). A Belgian CSO, IEW, received funding from the federal administration to work on policy issues of nanotechnologies. As a policy officer of IEW noted, *«this soon involvement and the clear agenda helped us to adapt our action at the critical moment»*¹⁵¹.

Here, mutual dynamics between the regulatory bodies and civil society could be examined. As an interviewee of CIEL put it, *«discussions with the regulatory authorities allow me to have a better understanding of the landscape. We try not to stay only at the stage of criticism, but also constructive participants»*¹⁵². It is worth noting that ‘constructive’ here means that CSOs are willing to get involved in the decision-making process and contribute to shaping the trajectory of nanotechnologies development; their views and opinions remain critical, and in many cases oppose official views. A scholar observes that civil society have largely refrained from campaigning against nanotechnologies and often engaged with policy makers and industry on a constructive and technical level (Jaspers 2012). An interviewed DG

¹⁵⁰ WHAT ARE THE ETUI AND ETUC DOING?

<http://www.etui.org/Topics/Health-Safety/Chemicals-and-REACH/What-are-the-ETUI-and-ETUC-doing>

¹⁵¹ Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

¹⁵² Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

SANCO also favors a proactive and inclusive approach, arguing that:

“CSOs were better informed, and sooner became part of the debate. I take the view that it is healthier for society to have this education and communication. And I do think that in the long run, everybody will have benefits... With the work in nano, in a sense, we have opened up rich potential forms for better framing of the issue.”¹⁵³

While acknowledging the opportunities that they have been offered in participating in policy discussions, an interviewee of BUND highlighted that *«we hardly see any activity really taken up into the results of this long Kommission work»*¹⁵⁴. There are evidences suggesting that the old approach, marked by ‘business as usual’, still persists.

Scholars claim that the true purpose of policymakers seems only to ‘manufacture public opinion’, as *«too often these forums are too restrictive... and seem to be designed only to alleviate <groundless fears>»* (Wullweber and Vlandas 2006). For instance, the aim of the Communication Roadmap of nanotechnologies initiated by the EC is *«increasing the consensus between stakeholders, society and policymakers on EC decision-making about nanotechnology; and strengthening the image of the EC as an impartial, transparent and trustworthy communicator on nanotechnology»* (EC 2010a), according to Herbert von Bose, Director of Industrial Technologies. This ‘consensus-oriented’ approach, with a latent exclusive nature, does not go as far as ‘genuine dialogue’ advocated by STS scholars or ‘a very broad-based debate’ proposed in the RS/RAEng report (RS/RAEng 2004, 64). The latter encourages more options and alternatives to be discussed and deliberated. As Irwin puts it, the government sees no contradiction between *«both increased openness and a more professional/centralized control over risk management»* (Irwin 2006).

¹⁵³ Interview with a DG SANCO, 20/06/2014

¹⁵⁴ Interview with Rüdiger Stegemann, Policy Officer of BUND, August 2014

This ambiguous context, marked by a blend of inclusiveness and scientism, gave rise to two different approaches of CSOs: while some of them took advantage of the existing windows of opportunities and addressed nanotechnology in a constructive and cooperative manner, others lost interest in nanotech issues and withdrew from this field for different reasons. We discuss firstly the first approach.

1. EU level CSOs: cooperation and complementation

How to take good advantage of the existing windows of political opportunities and make CSOs' lobbying more effective? A policy officer of HCWH Europe provided an answer, *«working together. We have a lot of E-mail groups and we share information and studies. We also share some kind of inside information about particular authorities that may be more favorable to us»*¹⁵⁵. The answer of 'working together' illustrates well the enhanced cooperation developed among EU level CSOs in the policy debates on nanotechnologies.

During earlier debates on REACH, European trade unions have already joined environmentalists in arguing for strong legislation on chemicals, according to the reportage of BBC¹⁵⁶. This alliance continued to join their forces together to address the issue of nanomaterials. Scholars argue that in debates around nanomaterials, French trade unions and green organizations have overcome their tensions and conflicts regarding technological risks, which were regularly observed in former cases like nuclear or chemical issues (Chaskiel and Suraud 2014). Another researcher compares the cases of two Member States—France and Germany, pointing out that *«conflicts potentials were mitigated and directed onto cooperative tracks»* (Seifert 2013).

¹⁵⁵ Interview with Laurel Berzanskis, policy officer of HCWH Europe, August 2014

¹⁵⁶ BBC News. Q&A: Reach chemicals legislation. 28 November 2005
<http://news.bbc.co.uk/2/hi/europe/4437304.stm>

Interviews with trade unions testify to the trend towards more cooperation. For example, an interviewed policy officer of CFDT claimed that *«the interest is great to work together, including contact with NGOs, because the field that should be taken into consideration is wider; and we enrich the views and opinions of each other... The work of CFDT fits well with this approach. De-compartmentalization of problems (business, company ...) where each one brings its specialties and expertise»* ¹⁵⁷.

Based on content analysis as well as interviews with different CSOs at both national and the EU level, this dissertation argues that CSOs, by putting knowledge and resources together, have developed a complementary and cooperative approach towards nanotechnologies. Environmental CSOs, trade unions, consumer associations... each CSO contributes its expertise and knowledge in a specific area. And they also openly support each other's demands and proposals. As scholars put it, *«at the European level, the strengthening of civic solidarity (environmental CSOs and worker unions) alters the balance of power in the process of developing European regulations specific to nanotechnology»* (Suraud et al. 2011, 38)¹⁵⁸.

Umbrella organizations like EEB and ETUC play an important role in educating and raising the awareness of their member organizations. EEB has issued a series of reports since 2009, addressing topics that range from those about health and environmental concerns to governance issues on nanotechnologies, serving as capacity building tools. ETUC and its research institute ETUI coordinate the action of trade unions at the EU level. Apart from NanoCap, they are also a partner of the

¹⁵⁷ The original text: «l'intérêt est grand de travailler ainsi, y compris au contact d'ONG, car le champ pris en considération est ainsi plus large; et l'on s'enrichit du regard et de l'avis de L'autre... Le travail que fait la CFDT s'inscrit bien dans cette démarche. Le décloisonnement des problèmes (entreprises, société...) où chacun apporte sa spécificité et son expertise» .

E-mail exchange with Gérard Hayotte, in charge of activities on nanotechnologies within CFDT, member of dialogue committee on « Nanos » of ANSES, 14/09/2014

¹⁵⁸ The original text: «au niveau européen le renforcement de la solidarité civique (associative et syndicale) modifie les rapports de force dans le processus d'élaboration des règlements européens propres aux nanotechnologies» .

EU-funded FP7 NanoDiode project. Through wide communication with research institutions and scientific community, ETUI conducts policy analysis on topics including traceability of nanomaterials, workers safety, governance issues, providing input to the two resolutions on nanotechnologies by ETUC. On the one hand, ETUC informs and educates its member organizations; on the other, its member organizations transform their experiences and contribute to the position of ETUC at the EU level. As an interviewee of CFDT, a trade union based in France, noted, *«the position of ETUC is essentially the position of CFDT and vice versa! We are in close contact with ETUC and ETUI. We know each other and we work together. CFDT has made great contribution to the position of ETUC»*¹⁵⁹.

Believing that consumers have the right to know and to choose, consumer associations conduct independent surveys to trigger further actions of the regulatory authorities. For instance, BEUC and ANEC have compiled inventory of products which claimed to contain nanomaterials, finding 151 products in 2009 and 475 products in 2010 (BEUC & ANEC 2010). Based on these findings, they called on the ending of ‘the health and safety roulette’¹⁶⁰. As a policy officer of BEUC put it, *«if you want to convince policymakers, you need evidence»*¹⁶¹. Consumer associations have used the inventory database as a policy instrument to ask for better consumer information and prompt definition of nanomaterial.

CIEL and ClientEarth, with their expertise in legal analysis, developed an instrument of ‘nano patch’ together with BUND, aiming at addressing the deficiencies of REACH in governing nanomaterials. ‘Nano patch’ is used as a legal tool for other grass-root CSOs. CIEL also establishes and chairs the nanotechnologies working

¹⁵⁹ Original text: «la position de la CES est pour l’essentiel la position de la CFDT et vice versa ! Nous sommes en lien étroit avec la CES et avec son « expert » l’ETUI. Nous nous connaissons bien; nous travaillons de concert et nous, CFDT, avons apporté une large contribution au positionnement de la CES» .

E-mail exchange with Gérald Hayotte, in charge of activities on nanotechnologies within CFDT, member of dialogue committee on « Nanos » of ANSES, 14/09/2014

¹⁶⁰ ANEC & BEUC. 2010. “ANEC/BEUC inventory exposes a game of roulette.” October 25. <http://www.anec.eu/attachments/ANEC-PR-2010-PRL-012.pdf>

¹⁶¹ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

group of IPEN, aiming at strengthening the capacities of CSOs to deal with the legal challenges presented by nanotechnologies¹⁶². A three-year project has been launched jointly by CIEL and ECOS with the objective of enhancing their expertise in standardization work¹⁶³. According to a policy officer of ECOS, their role is more to provide information and expertise for other CSOs, *«we do not do campaigns, and we do not lobby directly. Whenever we find some valuable information, we try to pass the message»*¹⁶⁴.

It is worth noting that the year of 2009 has witnessed the establishment of the first CSO that addresses specifically the issues of nanomaterials. Based in France, Avicenn (Association de veille et d'information civique sur les enjeux des nanosciences et des nanotechnologies) acts as a useful platform for information exchange and policy analysis for all interested stakeholders¹⁶⁵.

To conclude, the 'upstream' nature of nanotechnologies, the political opportunities opened up after earlier technological controversies, the unwillingness of the EC to genuinely open up the regulatory process... all these factors have helped triggering a learning process among EU level CSOs, which have overcome their tensions and tended to adopt cooperative and complementary approaches in dealing with nanotechnologies.

2. Stagnation in several CSOs' engagement

The enthusiasm for engagement was not universally shared, as some supranational CSOs which addressed chemical issues (e.g. WWF, Greenpeace Europe) were absent in the debates on nanomaterials. And it is also noteworthy that some 'early risers' have more or less withdrawn from this field. For example, Greenpeace UK no longer officially addressed nanomaterials since its publication of its position

¹⁶² CIEL. Annual report 2010. http://www.ciel.org/Publications/AnnualReports/CIEL_Report_2010.pdf

¹⁶³ ECOS and CIEL launch a three-year project for the safe development of nanomaterials in Europe. http://www.ciel.org/Chem/Nano_EU_Mar2014.html. Accessed March 2014

¹⁶⁴ Interview with Dania CRISTOFARO, policy officer of ECOS, 21/10/2014

¹⁶⁵ <http://avicenn.fr/wakka.php?wiki=PagePrincipale>

paper in 2007. FoE Europe, after releasing two reports, got completely out of the discussion, standing in remarkable contrast with the active involvement of its sister organizations located in other countries, e.g. FoE Australia, FoE U.S., or those based in Member States like BUND in Germany, Les Amis de la Terre in France. Some CSOs (e.g. CHEM Trust, ChemSec, Pesticide Action Network), which address chemicals generally, consider nanomaterials as a ‘sub-topic’ together with other substances like endocrine disruptors (EDCs), substances of very high concern (SVHC), chemical mixtures¹⁶⁶.

Greenpeace UK, as one of the earliest CSOs which has involved actively in the nanotech debates, is an example illustrative of the stagnation in CSOs’ activity. I provide a brief review in terms of its approach in different periods. During e-mail exchanges, its chief scientist Dr. Parr introduced the background behind Greenpeace UK’s decision to put nanotechnologies on its agenda,

“we were using nanotech as a reason to promote a discussion in UK and EU about what science is done and for whose benefit, in the window of opportunity that opened up after the rejection of GM food”¹⁶⁷.

The argument of Dr. Parr further demonstrates the high determination of Greenpeace UK during the early period, *«what marks out nanotech is that its potential is so huge for either good or bad, getting it right is a prize worth working for.»*¹⁶⁸ From 2006 onwards, Greenpeace UK showed decreased interest in nanotechnologies issues, and it has released only one position paper and a few articles since then. Its change of stance towards nanotechnologies is also notable: while Greenpeace UK claimed a moratorium on nanotech “unpractical and probably damaging” (Arnall 2013) in 2003, it actively called for *«a moratorium on the commercial and environmental*

¹⁶⁶ Joint NGO letter to Environment Ministers on 7th EAP

<http://www.eeb.org/EEB/?LinkServID=1F87180E-5056-B741-DBE8777841C966FF>

¹⁶⁷ E-mail exchange with Dr. Doug Parr, senior scientist of Greenpeace UK, 21/05/2014

¹⁶⁸ Parr, Douglas. 2003. “Small stuff, big questions.” NewScientist, July 26.

<http://www.newscientist.com/article/mg17924053.500-small-stuff-big-questions.html>

release of further engineered nanomaterials» together with other CSOs in 2006¹⁶⁹. In its position paper which was made public one year later, Greenpeace reiterated its call for ‘an immediate moratorium’ given the absence of any established regulatory system (Greenpeace 2007).

According to its chief scientist, Greenpeace UK has taken a step back and removed the topic of nanotechnologies from their agenda, which is due to the fact that *«the powers of the governing institutions of science proved to be too strong to shift»*¹⁷⁰. Although Greenpeace no longer has official programs on nanotechnologies, they follow and participate in the discussion on this topic occasionally. For example, David Santillo, expert of Greenpeace Research Laboratories, participated in the 3rd *Nanotechnology Safety for Success Dialogue* and delivered a presentation on the issues of nano-particles in paints. Kevin Stairs, chemical policy director of Greenpeace Europe, expressed his concerns about the lagging behind of legislation on nanomaterials¹⁷¹. While identifying nanotechnologies as an important issue, Kevin Stairs describes Greenpeace Europe’s approach as “on an ad hoc basis”¹⁷². Greenpeace is no longer a leader, but a participant which addresses the topic of nanotechnologies occasionally.

It is of necessity to point out the structural difference between ‘corporation-like’ Greenpeace and ‘network organization’ FoE: national groups of the former are established as branches of the international organization, and the latter is more de-centralized, with its national groups having more sovereignty and autonomy (Doherty 2009). FoE network is an important actor, which has provided abundant analysis and information. FoE Australia, with the establishment of the *Emerging*

¹⁶⁹ Joint Letter by Greenpeace, Soil Association, Friends of the Earth, Practical Action, ETC group, Animal aid, Corporate Watch and International Federation of Journalists. 2006. “Nanotechnology must be controlled.” The Independent, July 12. <http://www.independent.co.uk/voices/letters/letters-the-natwest-three-407584.html>

¹⁷⁰ E-mail exchange with Dr. Doug Parr, senior scientist of Greenpeace UK, 21/05/2014

¹⁷¹ Weichert, S.S. & Rinaldi, L. (2013) Lack of research prevents action on tiny chemicals. Reporting EU Spring 2013. <http://reportingeuspring2013.mediajungle.dk/2013/03/19/lack-of-information-prevents-action-on-small-substances-with-unknown-effects/>

¹⁷² E-mail exchanges with Kevin Stairs, chemicals policy director of Greenpeace Europe, 29/08/2014

Technology Project in early 2005, is particularly active. Although FoE Europe is not as active as before, FoE Australia and BUND are still important players in nano debates at the EU level.

Regarding the reason behind Greenpeace UK's recoil, Doubleday provides his explanations. As he puts it, *«like Greenpeace, because they participated in the Nanojury, they even were a major player in that, they just feel, quite instrumentally, that the return on the investment of time is no significant enough for them... They are very busy, very overstretched, so they expected more impact from this kind of operation»* (Bullich 2009, 79). This dissertation suggests that Greenpeace UK's retreat can also be explained by its discontent with the UK government's approach in regulating nanomaterials. The next section will provide detailed analysis regarding the factors that influence CSOs' campaign towards nanotechnologies.

B. Exploring reasons behind CSOs' retreat

When reviewing the academic discussion regarding public engagement with science and technology over the last twenty years, Irwin argues that he is less inclined to think in 'from... to...' terms, as scientific governance is often *«messy and contradictory business where dilemmas and paradoxes abound»* (Irwin 2014). Stilgoe and coauthors also note that STS scholars should not be over-promised on what public engagement exercises can deliver, as *«for all of the changing currents on the surface, the deeper tidal rhythms of science and its governance remain resistant»* (Stilgoe, Lock, and Wilsdon 2014).

In the case of nanotechnologies, upstream public engagement and the accompanying political opportunities proved to be insufficient in sustaining CSOs' interest towards this topic. Why have the above-mentioned CSOs retreated from their positions, especially given the fact that the potential of nanotechnology is so huge? What are the obstacles or limiting factors in the way towards more vibrant public spheres? Scholars explain the stagnation of activism by highlighting two aspects: low

policy impact and low public responsiveness (Seifert and Plows 2014). This dissertation, on the basis of interviews with representatives of CSOs as well as the EU regulatory authorities, suggests that other factors, both internal and external, should be taken into consideration so as to explain the shaping of the specific features and dynamics of EU level CSOs in nanotechnologies debates. It should be pointed out that these factors are closely linked with one another.

1. Internal factors

1.1. limitation of resources

A common challenge that most CSOs face is the lack of long-term resources and funding, which actually constrain the scope of their activities. As a policy officer of ECOS noted, *«for a CSO, it is very difficult to continue finding funding on the same topic for more than three years»*¹⁷³. Another interviewee, who has participated in the NanoCap project, encountered the same difficulty and claimed that lack of continuous funding posed a barrier for their activities: *«there is no continuity in our efforts, and this weakens the whole thing»*¹⁷⁴. HEAL, while drafting its position paper on nanomaterials in 2008, stopped their activities on nanomaterials due to a lack of dedicated funding¹⁷⁵.

Confronted with policy-makers' demand for more 'sound evidence', some CSOs try to do independent surveys so as to make their arguments more convincing. However, it often requires high investment and big costs. For example, as a policy officer of BEUC pointed out, *«it is extremely expensive for our members to test food products to see whether there are ingredients at nano scale»*¹⁷⁶.

¹⁷³ Interview with Dania CRISTOFARO, policy officer of ECOS, 21/10/2014

¹⁷⁴ Interview with Dr. Thomais Vlachogianni, Programme Officer of MIO-ECSDE, 02/12/2014

¹⁷⁵ E-mail exchanges with Lisette van Vliet, senior policy advisor of HEAL, 29/08/2014

¹⁷⁶ EurActiv.2010. "Consumer group: Food ads still targeted at kids." November 30.
<http://www.euractiv.com/specialweek-foodandresponsiblemarketing/ruthe-veale-interview-500113>

Apart from the financial aspect, human resources also act as a constraining factor. Many of the interviewed CSOs have less than five persons who work on nanomaterials, and they also need to address other issues. For example, an interviewee of ANEC argued that,

“there is one person which is in charge of service and environment. Part of environment is chemical, and part of chemical is nanomaterials. You can say it is ten percent of one person. We do not have good cards in this game.”¹⁷⁷

Through contact with BUND, its head office noted that BUND was not as active as before, as its foremost campaigner Jurek Vengels has left at the end of 2013. An interviewee noted that *«we could not even really replace him by a full-time staff, because of constraints and limitations»*¹⁷⁸. The high turnover of personnel also poses an obstacle for CSOs’ institutional learning about new technologies. The situation of ETUI is not much better. According to a policy officer, there are only six to eight staff members who work on health and safety generally, and nanomaterial is only one of the various topics that they need to address¹⁷⁹.

The strength of the industry stands in remarkable contrast with that of CSOs. An interviewed DG SANCO recognized the imbalance of resources between different stakeholders. As he put it,

“there are very different levels of education and resources for certain topics. Industry organizations and trade associations have very large groups of people in their companies who are highly competent and who also know politics. They are working full-time. (There are) hundreds of people who work only on nano-policy issues”.¹⁸⁰

¹⁷⁷ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

¹⁷⁸ Interview with Rüdiger Stegemann, Policy Officer of BUND, August 2014

¹⁷⁹ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

¹⁸⁰ Interview with a DG SANCO, 20/06/2014

For instance, Nanotechnologies Industry Association (NIA), an industry-focused trade association in nanotechnology, was established as early as 2005. And its membership is composed of companies from a variety of industry sectors, including healthcare, chemicals, automotive, materials processing, and consumer products¹⁸¹. Dr. David Carlander, Director General of NIA, was formerly the scientific officer of European Food Safety Authority, who could gain access to key decision-makers of the Commission. An article of Corporate Europe Observatory has revealed the intense corporate lobbying on the EU policy making concerning labeling of nano ingredients in food¹⁸². The imbalance of resources could frustrate CSOs.

1.2. Cognitive barrier: if you are CSOs, you are against nano

In 1959, C. P. Snow's lecture *The Two Cultures* highlighted the split, or even opposition between the sciences and the humanities: *«the intellectual life of the whole of western society is increasingly being split into two polar groups... Literary intellectuals at one pole—at the other scientists... Between the two a gulf of mutual comprehension—sometimes hostility and dislike, but most of all lack of understanding»* (Snow 1961). When addressing the topic nanotechnologies, a similar barrier among CSOs, industry and the government could be examined. According to Cormick, *«efforts to bring different stakeholders together to share different perspectives have tended to lead to competition rather than cooperation»* (Cormick 2012).

Firstly, industry and the government have a tendency to perceive CSOs as anti-technology and scientifically illiterate. This argument can be corroborated by interviews with the EU policy makers. For instance, a DG SANCO considered CSOs as the blameworthy agent for triggering public concerns about emerging technologies. And he questioned the motivation of CSOs in joining the policy debates:

¹⁸¹ <http://www.nanotechia.org/about-nia>

¹⁸² <http://corporateeurope.org/agribusiness/2014/03/food-lobby-fights-labelling-nano-ingredients>

“It’s very easy for people like Greenpeace to ask very general questions. If you want to bring them into specific, practical and concrete situations, you lose them. This prevents them from making big media campaigns. That’s very frustrating.”¹⁸³

Robert Madelin, the highest-ranked health official in the EU executive, openly criticized CSOs for fueling confusion among the public and stoking fear of “a new technology with significant potential”. He urged CSOs to “invest in the expertise” and take a “more responsible and networked approach”¹⁸⁴. However, early research shows that these charges, which imply that CSOs purposefully act to manipulate policy and create controversy, may misrepresent the capacity of CSOs (Grove-White et al. 2004).

In the face of such accusations, CSOs seek to re-position themselves and utilize more argumentative and expertise-based forms of involvement, resulted from a learning process. For instance, Greenpeace UK renounced the employment of confrontational methods in addressing nanotechnologies. As its senior scientist put it, *«campaigning to stop things—as Greenpeace frequently does—is fundamentally unsatisfying. We would like to see answers to problems — technology has the ability to deliver some of these answers»* (Parr 2003).

During discussions with other CSOs including CIEL and ECOS, Ian Illuminato, a policy officer of FoE Australia and U.S., called on CSOs *«not take extreme standpoints... to be careful not to overuse media.»*¹⁸⁵ Illuminato further highlighted the damage of sensationalism on CSOs’ credibility, noting that,

¹⁸³ Interview with a DG SANCO, who is in charge of the working groups of the European Scientific Committee on Emerging to develop risk assessment and methodologies and to develop potentially regulatory definitions of nanomaterials, 17/06/2014

¹⁸⁴ EurActiv. 2009. “Lobbyists ‘fuelling confusion’ on nanotech, EU warns.” June 16. <http://www.euractiv.com/innovation-enterprise/lobbyists-fuelling-confusion-nan-news-221949>

¹⁸⁵ Strategic Workshop on Nanotechnology: Bridging the gap between policy and science Event Summary, February 15, 2015. http://www.ciel.org/Publications/Nano_Workshop_15Feb2015.pdf

“you have to be honest with the public. You have to tell them what you know truthfully... Our greatest lobbying is going to be the truth, not kind of judgment.”¹⁸⁶

Furthermore, there exists rooted impression or stereotypes that CSOs should be militant; ‘constructive participants’ may be viewed as compromising CSOs’ critical edge in the political battleground. This stereotype is identified by Rayner (2004) as another obstacle for CSOs’ institutional learning about new technologies. Compared with their traditional mode of operation, engaging in early dialogue is a new challenge for CSOs. With limited human and financial resources, some CSOs tend to work in a critical and eye-catching way so as to attract media attention and mobilize the wider public to trigger policy changes. It is believed that once CSOs lose their critical position, their appeals and accountability will also be damaged.

For instance, in 2007, green CSO Environmental Defense and chemical company DuPont jointly released Nano Risk Framework, establishing an unusual collaboration between ‘former foes’¹⁸⁷. This collaboration was attacked severely by other CSOs, who considered this cooperation as ‘public relations campaign’ in a joint letter¹⁸⁸. There were around twenty CSOs which have signed the letter. Scholars point out that CSOs are afraid of being co-opted by other types of actors such as companies (Krabbenborg and Mulder 2015). From this example, we could see that a good number of CSOs highly value their critical position and cultivate and safeguard this tradition. This dissertation suggests that CSOs could move beyond traditional campaigning stances, seeking to explore new and more creative forms in contributing to democratize the governance of science and technology.

¹⁸⁶ Interview with Ian Illuminato, policy officer of FoE Australia and U.S., 23/03/2015

¹⁸⁷ EurActiv. 2007. “Former foes join forces to assess nanotech risks.” June 29.

<http://www.euractiv.com/science/foes-join-forces-assess-nanotech-risks/article-164991>

¹⁸⁸ ETC Group et al. 2007. Civil Society-Labor Coalition Rejects Fundamentally Flawed DuPont-ED Proposed Framework: Urges All Parties To Reject The Public Relations Campaign

<http://www.etcgroup.org/content/civil-societylabor-coalition-rejects-fundamentally-flawed-dupont-ed-proposed-nanotechnology>

1.3. Frustration about the sterile game of token engagement

In analyzing different levels concerning the degrees that public value being taken into consideration by the formal decisions, scholars list five types which include: ‘non-dialogue’, ‘technocratic style’, ‘public relations approach’, ‘real dialogue’ (predominated by ‘sound science’) and ‘public consultation’(Gaskell and Allum 2001). Only the last type represents an attempt which could make the participants feel committed to the outcome. The approach of the EC appeared to be an in-between of the ‘public relations’ approach and the ‘real dialogue’ approach. For example, Hagendijk observed both an ‘inclusive voice’ and a ‘scientific’ voice in the Commission’s report *Science, Society and the Citizen in Europe*, which reads *«as if two voices are struggling to be heard»* (Hagendijk 2004). The authors of Demos also noted that *«the language of ‘upstream engagement’ is there, but... the motivations for doing it are instrumental rather than substantive»* (Wilsdon and Willis 2004, 49).

Through interviews undertaken with different CSOs, many of them expressed the feeling of frustration with regard to their limited influences on the policy results. CSOs argued that without being fed into policy results, the usefulness and value of these engagement activities were dubious. Here are the passages from interviews with two consumer associations:

“it is nice to be invited. But inviting somebody is one thing, and following the statement is another thing.”¹⁸⁹

“the good point is that we are concerned, and we have possibility to give certain comments. The problem is that the EC is not taking into account any of our comments related to the urgent need to better regulate nanomaterials for many years.”¹⁹⁰

¹⁸⁹ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

¹⁹⁰ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

Sue Davies, chief policy adviser of *Which?*, highlighted during the first *Nanotechnology Safety for Success Dialogue* that it was «*not enough just to engage... must address issues raised*»¹⁹¹. Interviewees, including those of CIEL, ClientEarth, HCWH Europe, ETUI, etc., also expressed their frustration in this regard.

The UK is one of the earliest countries which dedicated to experimenting novel initiatives of dialogue and public engagement in nanotechnologies. As introduced in Chapter II, most CSOs involved in the awareness-raising phase come from the UK, and there was rich and active civil society movement during the early phase. However, an advisory body of the UK indicated that the leading position that the UK enjoyed at the time of the publication of the RS/RAEng report was no longer as highly regarded due to “a distinct lack of Government activity or funding” in research into EHS aspects of nanomaterials (The Council for Science and Technology 2007, 5). Furthermore, the reluctance of the UK government in introducing mandatory regulations is another cause for CSOs’ discontent. In 2006, the UK Government Department for Environment, Food and Rural Affairs (Defra) initiated a voluntary reporting scheme for manufactured nanomaterials. Eight CSOs released a joint letter, highlighting that such a scheme would further delay regulatory action and make products containing nanomaterials “untested, unregulated and unlabelled”¹⁹². According to an official report presented to Parliament, the voluntary reporting plan had received only 13 responses from the industry, and the Royal Commission on Environmental Pollution suggested that Defra should make nanomaterials reporting mandatory¹⁹³.

¹⁹¹ Which? 2007. “The consumer perspective on applications of nanoscience and nanotechnologies.” http://ec.europa.eu/health/nanotechnology/events/ev_20071025_en.htm

¹⁹² Joint Letter by Greenpeace, Soil Association, Friends of the Earth, Practical Action, ETC group, Animal aid, Corporate Watch and International Federation of Journalists. 2006. “Nanotechnology must be controlled.” The Independent, July 12.

<http://www.independent.co.uk/the-uk/voices/letters/letters-the-natwest-three-407584.html>

¹⁹³ UK Government Response to The Royal Commission on Environmental Pollution (RCEP) Report. 2009. “Novel Materials in the Environment: The Case Of Nanotechnology” https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228785/7620.pdf

EU-level CSOs also encountered difficulties in transforming public opinions into the institutionalized procedures. An interviewee of ClientEarth claimed that they have invested very limited efforts into the topic of nanomaterials, which accounted for only about 5%,

“things just do not move. And that’s can be frustrating... It is good to sit around the table, but we’ve arrived at the stage in which we meet and we basically repeat the same thing over and over again. So until nanomaterials will be regulated better, these efforts are becoming a bit less meaningful.”¹⁹⁴

Previous research has pointed out the harm of ‘empty rhetoric’ (Kyle and Dodds 2009). Without openness and real commitment, engagement activities initiative by policymakers may risk of being transformed into endless dialogue, causing fatigue and even suspicion of stakeholders.

1.4. Incompatible with CSOs’ priorities and agenda-setting

Re-opening REACH to address nanomaterials is incompatible with the priorities of some CSOs. For example, Kevin Stairs, chemical policy director of Greenpeace Europe, notes that addressing nanomaterials is not in line with their Detox Campaign, which focuses on hazardous chemicals. As he put it,

“Only the EU has chemical legislation with the appropriate tools to phase out hazardous chemicals... Unless the REACH implementation work is successful, nano or any other related issues will be adequately addressed.”¹⁹⁵

WWF, one of the major actors in earlier lobbying battle around the drafting of REACH, no longer put any efforts into nanomaterials. An interviewee pointed out the controversies that some CSOs faced in addressing nanomaterials:

¹⁹⁴ Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

¹⁹⁵ E-mail exchanges with Kevin Stairs, chemicals policy director of Greenpeace Europe, 29/08/2014

“WWF does not deal with chemicals anymore. WWF, which protects animal welfare, realizes that finding out if chemicals are dangerous means testing a chemical, and testing a chemical means killing or experiencing animals. It is a big dilemma for organizations. There are a lot of controversies, especially for bigger organizations.”¹⁹⁶

An interviewee of HEAL observed that these big organizations closed down their large chemicals campaigns at certain points—which had been running to get REACH enacted. They decide to close or continue for reasons of political strategy and funding.¹⁹⁷

1.5. Lack of public responsiveness

Scholars indicate that public responsiveness is a critical factor in deciding whether to pursue or abandon certain campaigns (Seifert and Plows 2014). Early literature has demonstrated low public awareness on nanotechnologies (Satterfield et al. 2009). According to the 2010 Eurobarometer survey, the majority (54%) of Europeans has never heard of nanotechnologies (EC 2010c). Thus, there exist little bottom-up concerns from the general public and member organizations towards nanotechnologies, which makes it less interesting and, considered to be less urgent, compared with other topics. For example, it was not until the year of 2010, when the issue of nanomaterials traceability was put highly on the policy agenda by the Belgian EU Presidency and other regulatory authorities, did Belgian CSOs start to intensify their activities on nanotechnologies. As a policy officer of IEW put it, *«we have limited funding and we can't follow everything. Our lobbying is more 'reactive' than 'proactive'»*.¹⁹⁸

¹⁹⁶ Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

¹⁹⁷ E-mail exchanges with Lisette van Vliet, senior policy advisor of HEAL, 29/08/2014

¹⁹⁸ Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

One of the reasons behind low public awareness is the technical and enabling nature of nanotechnologies, which makes it quite difficult to turn nanotechnologies into a public issue. Different from GMOs or nuclear, nanotechnologies is something that people can not experience one with the other, which, according to Doubleday, is *«not as a physical product but as a social process»* (Bullich 2009, 81). Under this context, the general public as well as CSOs may lack interest and know-how to get involved in the policy-making process. Here are the quotes from interviews with two CSOs:

“The debate now has become extremely technical, which requires a lot of background work. In order to well position and propose something that really makes sense, we need to invest time to read all the background information and all the emerging development in order to participate constructively.”¹⁹⁹

“Nanotechnology is a very complex topic, which requires a lot of organizations to be able to first understand and to influence. I see CSOs involved but I also see the difficulties.”²⁰⁰

Ecotoxicology and toxicology background are often required in addressing the risk governance of nanotechnologies. CSOs generally have more expertise in addressing policy and regulatory issues. As an interviewee of ECOS noted, *«this is so new, and very few people have the knowledge. Since the policy did not develop very much, there was not very much motivation for them to lobby.»*²⁰¹ Scholars observed that German trade unions were reluctant to get involved in a new and highly specialized subject against the backdrop in which *«an overload of tasks set against a backdrop of shrinking resources»* (Schomberg and Davies 2010, 97). With limited resources, CSOs have to adjust their agenda-setting to prioritize certain issues and topics. Operating in a centrally-coordinated way, CSOs, especially supranational ones,

¹⁹⁹ Interview with Dr. Thomais Vlachogianni, Programme Officer of MIO-ECSDE, 02/12/2014

²⁰⁰ Interview with Dania CRISTOFARO, policy officer of ECOS, 21/10/2014

²⁰¹ Ibid.

tend to address topics which could have higher public visibility.

2. External factors

2.1.Persistence of ‘deficit model’

There is an abundance of research into how the deficit model is continually reinvented (Rayner 2004; Bauer et al 2007). Through analysis of the EU policy documents and interview materials, we could also find that ‘deficit model’ prevails among some regulatory authorities towards the governance of nanoscience and nanotechnologies. This is the first external factor that prevents stakeholders from constructive dialogue and mutual learning towards more democratic governance of emerging technologies.

One manifestation of ‘deficit model’ is that CSOs and the general public are routinely labeled by some interviewees as ‘lack of knowledge’ and ‘scientifically illiterate’. For example, an interviewed DG SANCO boiled down the failure of stakeholder dialogue to the lack of CSOs’ expertise in addressing nanotechnologies. As he put it,

“CSOs do not have the necessary knowledge to cope with the topic. Everybody recognized that the expertise was not there and there was no point continue... Too much political involvement, too many people want to play politics and who do not understand science.”²⁰²

Against this backdrop, there is only minimal scope for CSOs’ interventions. A scholar observes that the only role that CSOs could play is to serve as ‘watchdog’, as *«there is little else at stake for CSOs during an innovation trajectory than expressing concern about things that might go wrong»* (Krabbenborg 2013, 96). The findings of FP7 research project *CONSIDER* also indicate that the prevailing model of science—a

²⁰² Interview with a DG SANCO, who is in charge of the working groups of the European Scientific Committee on Emerging to develop risk assessment and methodologies and to develop potentially regulatory definitions of nanomaterials, 17/06/2014

traditional top-down approach based on the knowledge and advice of experts—dominates in FP7 research projects. CSOs seem to be considered by project coordinators as ‘end user representatives’ rather than equal partners²⁰³.

It is worth noting ‘system’ is not a homogeneous entity. Chapter II has introduced the commitment among some EU regulatory bodies to engage the public more proactively. The Parliament’s supports for CSOs’ proposals also demonstrate that CSOs are capable of influencing the beliefs and decisions of authorized members of the political system. According to Habermas, *«the parliamentary complex is the most open for perceiving and thematizing social problems, but it pays for this sensitivity with a lesser capacity to deal with problems in comparison to the administrative complex»* (Habermas 1996, 355). The readiness of some open-minded policy-makers could act as a kind of ‘counter balance’ to those guided by ‘deficit model’.

2.2. A stereotypical division of labor

In reviewing the continuity and change around the practice of public engagement with science over the past two decades, Stilgoe and coauthors note that *«for all of the changing currents on the surface, the deeper tidal rhythms of science and its governance remain resistant»* (Stilgoe, Lock, and Wilsdon 2014). There is a common belief that the realm of risk governance of emerging technologies is an exclusive affair which should be left to experts and scientists. ‘Sound evidence’ occupies a privileged position in providing legitimacy in the policy-making process of nanotechnologies. As a scholar puts it, *«science is not simply one activity or aspect of society, but has become the primary culture of legitimation for modern society»* (Rayner 2004).

²⁰³ CONSIDER (Civil Society Organisations in Designing Research Governance)
http://ec.europa.eu/research/swafs/pdf/pub_other/optimising_civil_society_participation.pdf

In spite of STS scholars' efforts in opening up the black box of science and the considerable political willingness to engage the public, scholars note that most projects and endeavors are still guided by traditional methodological approaches, with the expert/lay division persists (Kurath and Gisler 2009). Literature indicates that more importance has been attached to 'back-end' questions (e.g. 'benefits versus risks' discussion, regulation), while 'front-end' questions (visions, direction of innovation, alternative options, etc.) remain less addressed (Doubleday 2007a; Miller and Scrinis 2010). The statements of an interviewed DG Employment reflect the government thinking driven by 'deficit model'. As he put it,

"I would still be inclined to believe that it is essentially a technical scientific manner... If you accept the principle that nanotechnologies are complex technical area, you have to leave it to the scientists and their expertise to decide what is sound or not. When it comes to risk management measurement, I disagree fundamentally with those who believe that concerns should be elements in decision-making. I am always in favor of informing the public, but I'm not in favor of opening the decision-making process to the public. If early engagement is to mean influencing the process, I am not in favor."

During the interview, the DG EMPL cited above repeatedly insisted that different people with different roles contributed their knowledge and skills in coping with a sophisticated world. He further questioned the mode of operation of CSOs, which use political statements, beliefs or concerns to develop their stance. As he put it, *«what is your evidence to support (your point of view)? We do not discuss principles.»* The argument of Dick Taverne, the Chair of 'Sense About Science', House of Lords, also manifests the prevalence of the traditional division of labor. Faced with rising demands for 'upstream public engagement', Taverne (2004) claimed that *«the fact is that science, like art, is not a democratic activity. You do not decide by referendum whether the Earth goes round the Sun»* .

The above arguments are largely driven by a deeply entrenched ‘simplistic contrast structure’, which *«opposes science and the public as two self-contained, antagonistic social entities»* (Kurath and Gisler 2009). Under this view, only ‘one-dimensional realist risk framework’ (Wynne 2002) holds value, while other fundamental questions (e.g. the legitimacy, driving aims and direction of technological development) should not be open to the public. The division of responsibility is problematized and has been questioned by a considerable amount of literature. Scholars call for ‘a new social contract’ with science, with the focus shifted from ‘reliable’ to more ‘socially robust’ knowledge (Gibbons 1999; Lubchenco 1998; Jasanoff 2005).

As a senior scientist of Greenpeace UK put it, *«in the end, the traditional approach that prioritized the role of senior scientists thinking and their priorities... proved to be too strong to shift.»*²⁰⁴ This situation renders the voice of CSOs even smaller. A policy officer of BUND also expressed his frustration with regard to the narrow definition of ‘science’, *«what is mainly regarded as ‘science’ is only certain sectors related to government and academic institutions... Re-designing and opening ‘science’ is one aspect coming forward.»*²⁰⁵

2.3. ‘Paralysis by analysis’

The lack of government action is always justified by the requirement for more ‘sound evidence’. Policy makers, especially those of the Commission, have frequently used the argument such as “want more evidence of the risks posed by nanomaterials”²⁰⁶ as groundings to prolong the regulatory process. For example, researchers indicate that the Commission requested SCENIHR to provide scientific opinion with a purpose of delaying decisions on regulatory measures on nanosilver: *«by initiating one review after the other, regulators have created an unfortunate*

²⁰⁴ E-mail exchange with Dr. Doug Parr, senior scientist of Greenpeace UK, 21/05/2014

²⁰⁵ Interview with Rüdiger Stegemann, Policy Officer of BUND, August 2014

²⁰⁶ Chemical Watch. 2014. “Sweden presses European Commission on nano proposals: Further delays on amendment of REACH annexes.”

situation of ‘paralysis by analysis’» (Hansen and Baun 2012). A scholar alarms the danger of a new ‘deficit model’, which assumes that the difficulties in regulating nanotechnologies under uncertainty are due to a deficit of scientific information on the health and environmental impacts of manufactured nanomaterials, and this deficit can only be solved by obtaining more scientific facts (Brown 2009). Instead, an adaptive governance regime is advocated.

As pointed out by EEB, the insistence on ‘evidence-based’ risk governance seems to be based pre-dominantly on corporate and economic values (Fedrigo and Senjen 2010). CSOs represent ‘common goods’ or ‘universalizable interests’ in the Habermasian sense. Faced with uprising demands by CSOs to apply the principle ‘no data, no market’ and ‘no data, no exposure’ to regulate nanomaterials, a DG SANCO argued that *«nanomaterials were in the market for a long time. People say in principle, but do in practice. (We can only) make a list of the whole cases, and start to get data on them.»* This government thinking actually gave nanotechnology industries a green light to continue introducing nanomaterials into markets with little testing. Here is another example. As early as 2004, proposals like the lowering of the registration threshold and labeling products of nanotechnologies have been identified by participants as options for future policies during *Mapping out Nano Risks* workshop²⁰⁷. Ten years later, the same proposals are still under discussion, and labeling only applies to several sectoral regulations (e.g. in cosmetics, food, biocides). An organizer of the workshop admitted that,

“part of the frustrations that occur is that the dialogues that we had with stakeholders did not go anywhere. They served information, awareness, etc., but they did not touch the law-making. Neither did they become an institutional reality nor a piece of law.”²⁰⁸

²⁰⁷ EC. 2004. “Nanotechnologies: A Preliminary Risk Analysis on the Basis of a Workshop Organized in Brussels.” March 1-2. http://ec.europa.eu/health/ph_risk/documents/ev_20040301_en.pdf

²⁰⁸ Interview with a DG SANCO, June 2014, Brussels

Regardless of various efforts to promote dialogues, deliberation, public consultations and debates, which makes nanotechnologies an interesting ‘test case’ in STS studies, it appears to be long and complicated to turn ‘dialogue’ into further ‘action’.

2.4. The ‘inertia’ of administrative power

There are scholars who investigate the factors which have led to a kind of ‘scientific inertia’, for instance, the requirement for high levels of proof via well replicated studies, the conservative approach of research funders (Hansen and Gee 2014). Analysis of risk governance of nanotechnologies directs our attention to ‘administrative inertia’, which poses another obstacle for CSOs to achieve further democratic impetus.

The ‘inertia’ lies first of all in the ideological aspect. As we will discuss in Chapter V, the Commission has been disregarding the callings of the ‘green alliance’ (composed of CSOs, green MEPs and tens of Member States) for stricter regulation of nanomaterials, prioritizing competitiveness and innovation over precautionary approaches. A campaigner of FoE Australia shows concerns that apart from intense lobbying pressure from the powerful industries, there are deeper ‘systemic problems’, that is, *«the institutionalized belief that social progress is the same thing as continuous technological advancement.»*²⁰⁹ A policy officer of CIEL argues that it is widely believed among the Commission that technology innovation is equal to progress, and progress worth taking risks. This poses a real challenge for the involvement of CSOs, *«you can discuss as much as you want, but if you are really challenging this ideology, then you are laying behind.»*²¹⁰ Other interviewees also boil down the lack of action to the ideological flaws that exist in the mind of the EU regulators, especially those of the Commission. A green MEP advisor concluded two factors: on the one hand, the

²⁰⁹ Sales, Louise. 2014. “Corporate influence over nanotechnologies regulation.” <http://www.foe.org.au/corporate-influence-over-nanotechnology-regulation>

²¹⁰ Interview with David Azoulay, Managing Attorney of CIEL, August 2014

industry does not want to provide any information; on the other hand, several DGs ENTR hold their own mindset, believing that nano-specific provisions are not necessary²¹¹. ETUI also mentioned two points,

“I think the approach taken by the Commission is about not threatening or putting in danger issues of competitiveness or economic growth. The other thing is that the Commission does not want to over-regulate new technologies.”²¹²

When standing in the dilemma of regulating ‘too early / too late’, the Commission appears to pay less attention to the possible negative consequences in the latter case, which may take tens of years to emerge and to be proved. According to a report drafted by the European Environment Agency (EEA), *«there remains a developmental environment that hinders the adoption of precautionary yet socially and economically responsive strategies in the field of nanotechnology»* (EEA 2013, 530). New technologies are assumed to hold great potentials in pulling the economic development and helping the EU to get out of the financial crisis, which is considered to be a more urgent issue.

With various actors pulling and pushing in different directions, which hold diverse policy preferences and interests, it may take long time to reconcile those differences and come up with an ambitious change as envisaged by STS scholars.

C. Conclusion

Chapter IV provides analysis about the dynamics and key features of EU level CSOs during alliance-forming phase (2009 onwards), presenting two approaches of CSOs in addressing nanotechnologies issues: on the one hand, ‘upstream public engagement’ employed for nanotechnologies enables CSOs to be better informed, and sooner become part of the policy debates. A good number of CSOs portrayed

²¹¹ Interview with a Green MEPs adviser, June 2014, Brussels

²¹² Interview with Doreen Fedrigo-Fazio, NanoDiode Project Coordinator within ETUI, December 2014

themselves as ‘constructive participants’, which have abandoned radical and confrontational tactics and refrained from conducting anti-nanotech campaigns. These CSOs have developed enhanced cooperation and played participative and complementary roles in nano debates. On the other hand, some CSOs, including Greenpeace UK, FoE Europe and HEAL, have quit this field in frustration at the tokenistic engagement and out of fatigue after the intense lobbying battle for REACH. The stagnation of CSOs’ activities renders STS scholars’ assumptions such as ‘ongoing deliberation’ (Wilsdon, Wynne and Stilgoe 2005) or ‘a continuous flow’ (Mohr 2007) untenable.

Some encouraging signals towards more democratic governance of nanotech can be examined, and there is research suggesting that *«public thematization of “nanos” reveals a turning point in the way along which scientific research fall within society»* (Suraud 2013). By contrast, others point out that the endeavors and research results of social scientists could easily get lost in institutional translations (Joly and Kaufmann 2008). Just as the discrepancies between laboratory and real-world results that often happened in the studies of natural sciences, many unexpected factors could influence the translation process from theories into practice. This chapter investigates the factors which may contribute or limit CSOs’ involvement in policy debates.

There are scholars who have explained the reasons behind the stagnation of CSOs’ engagement, for instance low policy impact, low public responsiveness (Seifert and Plows 2014), broader institutional and cultural contexts (Krabbenborg and Mulder 2015). The present dissertation, on the basis of extensive interviews with CSOs and policy-makers, provides a detailed analysis of the factors, both internal and external, that should be taken into consideration in order to track the dynamics of green activism at the EU level. It concludes that the ‘upstream’ nature of nanotechnologies can be ‘boost’ for certain CSOs, while proved to be ‘irrelevant’ or ‘unattractive’ for the others. Given the persistent obstacles to institutional learning

about new technologies, this dissertation holds the view that, at least in the EU, the governance of nanotechnologies represents a ‘shift’ rather than a ‘turning point’.

CSOs are considered as important dialogue partners, and their responses could to some extent indicate the effectiveness of public engagement initiatives. A good understanding of different CSOs’ approaches towards nanotechnologies could act as a first step to better formulate the structures and arrangement of engagement activities in the future.

Chapter V: The interplay between CSOs and system

This chapter investigates the process of transformation from ‘influence’ into ‘communicative power’ in the Habermasian sense. It seeks to explore whether and how CSOs could succeed in bringing some policy outcomes and how they attempt to do this. A close look at the policy-making process around nanomaterials enables me to loosely divide the main actors involved into two advocacy coalitions: the pro-industry alliance (which is composed of DG ENT, DG Employment, industries, etc.) vis-à-vis the green alliance (which is composed of environmental ministers of ten Member States, CSOs, green MEPs, DG ENV, etc.). Table 5 summarizes the members of the green alliance.

Table 5. Composition of the green alliance

Main actors at the EU level	DGs Environment; Green MEPs (Hiltrud Breyer, Caroline Lucas, etc.) CSOs: CIEL, EEB, BUND, ETUC, BEUC, ANEC, ClientEarth, and ECOS National competent authorities: Henrik Eriksen (Norway), Paul Magnette (Belgium), Ida Auken (Denmark), Norbert Roettgen (Germany), Ségolene Royal (France), Alexander Zilberszac (Austria), Joop Atsma (the Netherlands), Carl Schlyter (Sweden)
Supportive actors at the EU level	EU Member States: Czech Republic, Finland, Italy, Luxembourg, Spain, and Croatia CSOs: FoE Europe, WECF, MIO-ECSDE, and HCWH Europe
International supportive actors	CSOs: FoE Australia and the U.S.

A good number of examples will be employed to fully elucidate the role of CSOs in the process of alliance-forming. My argument is that CSOs, with their closer proximity to the grassroots constituencies and higher sensibility to societal problems, could add vibrancy to the public spheres and build up a modest level of counter-expertise vis-à-vis the powerful industries.

In the following sections, I will first introduce CSOs' advocacy in monitoring three layers of legislation on nanomaterials (i.e. product-specific legislation, registry of nanomaterials, nano in REACH), specifying what gains CSOs have achieved and what remain disregarded. Specific attention will be paid to the role of CSOs in inspiring and mobilizing a good number of actors to support their demands. I will then turn to discussing how public spheres, "a sounding board for problems", amplify the pressure of problems and exert influences on the economic system. I conclude with a synthesis and some suggestions for the studies of 'upstream public engagement' in emerging technologies.

A. CSOs' influences on the political system: three layers of legislation

Since 2009, various nano-related legislation activities have been developed in the EU, including the definition of nanomaterials, the specific provisions on nanomaterials in sectoral regulations (e.g. the Cosmetic Directive, the Novel Food Directive), national initiatives in France, Belgium and Denmark to adopt national mandatory nano registers, etc. Otto Linher, Deputy Head of the Chemicals Industry Unit of the EC, identifies three layers of legislation on nanomaterials, which include:

- legislation for specific products which contain nanomaterials;
- the registry of nanomaterials;
- and REACH to deal with nanomaterials as substances or mixtures²¹³.

²¹³ Köster, V. (2013). The Challenges of Regulating Nanomaterials. ChemViews. <http://doi.org/10.1002/chemv.201300093>

The regulatory landscape of nanotechnology in the EU continues to shift and is marked by increasing divergence between the Commission, the Parliament, Member States, CSOs, industries, and other stakeholders. As previous literature indicates, the main actors in the EU are *«pulling and pushing in different directions»* (Castillo 2013). In this light, some important questions come to the fore: what does this institutional divergence imply for the maneuvering space of CSOs? How does ‘administrative power’ and ‘communicative power’ interplay in the regulatory process of nanomaterials? The dissertation explores these questions by firstly drawing on Habermas’s thought on law to investigate the communication process.

1. Law: a transformer between system and lifeworld

As Habermas puts it, *«the legal code not only keeps one foot in the medium of ordinary language... It also accepts messages that originate there and puts these into a form that is comprehensible to the special codes of the power-steered administration and the money-steered economy»* (Habermas 1996, 81). Thus, Habermas uses the language of law as a ‘transformer’ circulating between system and lifeworld. The question with regard to whether and to what extent communicative power actually underlies the administrative power of the government becomes operationalized. We need to track the lawmaking process in order to answer this question.

According to Habermas, CSOs, through resonant and autonomous public spheres, could influence the political system “in a siege-like manner”: *«public influence is transformed into communicative power only after it passes through the filters of the institutionalized procedures of democratic opinion- and will-formation and enters through parliamentary debates into legitimate lawmaking... Not influence per se, but influence transformed into communicative power legitimates political decisions.»* (Habermas 1996, 371). Habermas’s thoughts offer a theoretical entry point for looking at how CSOs actively seek to access and embed themselves in the policy network relating nanotechnologies so as to improve the effectiveness of their involvement and to transform ‘influence’, via the medium of law, into ‘communicative power’.

Given the fact that there is no nano-specific provision within the EU regulatory framework, CSOs have been closely following the lawmaking process of nanomaterials through various means, such as lobbying, releasing position paper and joint letters. They have also been actively participating in public consultation, on invitation or at their own initiatives. Based on analyses of CSOs' reports, position papers, as well as semi-structured interviews with campaigners, we could observe a cooperative and complementary approach among CSOs in dealing with the above-mentioned three layers of legislation:

EEB and BEUC closely followed the food and cosmetic legislation revision—two sensitive sectors that the public showed high concerns; HCWH Europe focused specifically on nanomaterials in health care sectors²¹⁴; ANEC addressed nanomaterials in articles, e.g. toys, textiles; CIEL, ClientEarth and BUND proposed a stand-alone 'nano patch' to address the loopholes of REACH in dealing with nanomaterials (Azoulay and Buonsante 2012); ETUC highlighted the issue of transparency and traceability of nanomaterials in its resolution (ETUC 2010). Besides, CSOs expressed common interest in the definition issue as well as nano registry. They called for the establishment of a mandatory reporting system of nanomaterials at the EU level, or at national level during the transitory period. As an interviewed policy officer of BEUC put it,

“we have in different CSOs experts focusing on different areas relevant for nanomaterials. We have worked with them together. All CSOs in Brussels put their expertise and knowledge together on nanomaterials.”²¹⁵

²¹⁴ HCWH Europe. 2012. “Nanomedicine new solutions or new problems?”

<https://noharm-europe.org/sites/default/files/documents-files/2462/HCWH%20Europe%20Nanoreport.pdf>

²¹⁵ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

The following sections review the recent evolution of policy debates regarding the above-mentioned three layers of legislation. It will be examined with regard to how and to what extent CSOs' demands were integrated into the regulatory process, and how CSOs' involvement contributed to shifting the power distribution among the EU governing institutions and Member States.

2. Product-specific legislation

The resolution of the Parliament called for *«a multi-faceted, differentiated and adaptive body of law based on the precautionary principle»* to cover nanomaterial in the EU (EP 2009b). The EC was urged to conduct a review of all relevant legislation within two years. Since then, several pieces of sectoral regulations started to incorporate specific provisions on nanomaterials. Discussions around the definition of nanomaterials also speeded up.

Among CSOs which address product-specific legislation, we could find more consumer associations (e.g. BEUC, ANEC, Which?, ECOS) and a few environmental organizations (EEB, FoE Europe, BUND, etc.). They have been calling for the incorporation of nano-specific requirements, which include the introduction of a nanomaterials definition, labeling of nano-products, bans of certain nanoparticle, specific risk assessment, etc. Nano-applications and products intended for direct consumer use, for instance in food or cosmetic, have received particular attention. Besides, they have also been advocating to drive the innovations of nanotechnology applications in line with real societal needs and sustainable development.

Various strategies have been used by CSOs to make their voices and concerns heard by the EU regulatory bodies. For example, three consumer associations, including ANEC, BEUC and the Austrian Standards Institute Consumer Council, have organized two conferences in 2011²¹⁶ and 2013²¹⁷ respectively, calling for

²¹⁶ <http://www.anec.eu/attachments/Conference%20on%20chemicals%20in%20products.htm>

²¹⁷ <http://www.anec.eu/attachments/ANEC%20ASI%20CC%20Conference%20Home.htm>

strengthening the legal framework for chemicals in products. Nanomaterial was also on the agenda of the two conferences. Regulatory authorities from Member States, which include Austria, Belgium, Denmark, the Netherlands, Germany, Sweden, have participated in the conferences. According to an interviewed policy officer of ANEC,

“the basic message is that with regard to chemicals in articles, REACH is not an appropriate instrument for doing this. Therefore we need an effort to better regulate chemicals in products by using product regulations... When we did the conference, we had the support of a number of authorities from some Member States.”²¹⁸

With the objective of addressing chemicals in products in mind, consumer associations have been closely following the regulatory process in developing several pieces of legal instruments that incorporate nanomaterials. The policy debates around the following areas will be introduced: cosmetics, food, electrical and electronic equipment, biocide. I’ll also discuss the heated debate around the definition of nanomaterial. A close look at what happened in the ‘political battleground’ enables us to see how different stakeholders try to defend certain interests and frame an issue from different perspectives. We’ll see how CSO ‘distill’, ‘transmit’ and ‘problematize’ societal concerns in amplified form to the public sphere.

2.1. Nanomaterial in cosmetics: CSOs’ first success

The New Regulation for Cosmetic Products (EC/1229/2009), which replaces the former 1976 cosmetics Directive, is the first European legal tool that provides specific provisions for nanomaterials used in consumer products. It is also for the first time that a piece of law in the EU contains a legislative definition of nanomaterial. Green MEP Hiltrud Breyer commented the revision of cosmetics legislation as ‘a radical departure’ from the previous EU position²¹⁹, in which the Commission has stated in its

²¹⁸ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

²¹⁹ Hiltrud Breyer Press Release.2009. “A lift for cosmetics legislation as Greens secure nanomaterial safeguards.”

first regulatory review that *«current legislation covers to a large extent risks in relation to nanomaterial and that risks can be dealt with under the current legislative framework»*(EC 2008e). During the process in revising the cosmetic legislation, CSOs, with the support of the EP, have been struggling to push forward the integration of nanomaterial in cosmetic regulation. The final adoption can be considered as the first success of CSOs in product-specific legislation .

Caroline Lucas, Green party MEP for the south-east of England, has shown her concerns about nano-enabled cosmetics since 2003²²⁰. As she put it, with everyday health and beauty nano-products being introduced into markets, *«thousands of women are acting as unwitting ‘guinea pigs’ for the cosmetics industry.»*²²¹ And she called for a moratorium on products applied to the skin²²². In 2006, the EC estimated that 5% of cosmetic products contained nanoparticles²²³. The PEN nanomaterial database made by Wilson Center indicates that ‘Health and Fitness’ has been the largest main category since its first inventory in 2006 (See Figure 5) . Most experts of RIVM panel shared the view that *«personal care products and cosmetics are expected to lead to high possible exposure»* (RIVM 2009, 5).

<http://hiltrudbreyer.eu/en/ct/488-A-lift-for-cosmetics-legislation-as-Greens-secure-nanomaterial-safeguards>

²²⁰ Written Question by Caroline Lucas (Verts/ALE) to the Commission. 1 July 2003

<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:92003E002248>

²²¹ Press release of Green Party. “Women face greater exposure to ‘grey goo’ science.” May 22.

<https://www.greenparty.org.uk/archive/news-archive/568.html>

²²² Cordis News. 2003. “Nanotechnology: Opportunity or Threat?”

http://cordis.europa.eu/news/rcn/20401_en.html

²²³ ObservatoryNANO.2010. “Nanotechnology in Cosmetics.”

<http://www.yumpu.com/en/document/view/3405965/nanotechnology-in-cosmetics-observatorynano>

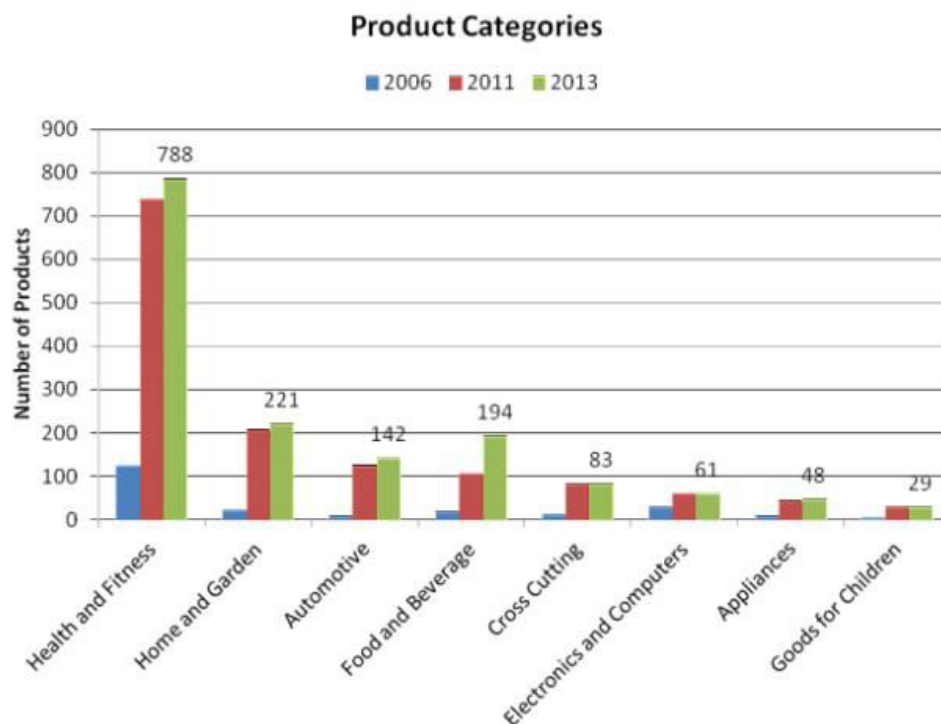


Figure 5: Number of nanotechnology consumer products

Source: Project on Emerging Nanotechnologies²²⁴

At the EU level, it is mainly the consumer associations which follow this issue. For example, consumer association *Which?* wrote to 67 cosmetics companies and asked for information with respect to the use of nanotechnology in their products, getting very poor response (Which? 2008b). FoE Europe has not made as much as effort compared with its sister organizations located in Australia or the U.S., which called for «*a moratorium on the further commercial release of personal care products that contain engineered nanomaterial*» until they proved to pose no harm to safety and environment (Miller 2006).

Faced with rising concerns from civil society, accompanied by industry's reluctance to share information, the Scientific Committee on Consumer Products (SCCP) was requested by the EC to provide a scientific opinion in this regard. Its

²²⁴ Project on Emerging Nanotechnologies. 2013. "Consumer Products Inventory." <http://www.nanotechproject.org/cpi>

report indicated ‘insufficient knowledge’ in various key areas (hazard identification, exposure assessment, possible health effects, etc.) as well as methodological difficulties in assessing the safety of cosmetics containing nanoparticles (SCCP 2007). Subsequent to this opinion, a DG Enterprise sent a letter to one representative of cosmetic industry, highlighting the urgent need to provide more information: *“without these gaps being closed, it will, in the medium term, be hardly defensible for industry and authorities to assert that cosmetic products containing nanomaterial are safe.”*²²⁵ However, when we examine the EC’s proposal for a Cosmetic Regulation, which was initiated on 5th February, 2008, we found no specific rules relating to nanomaterial (EC 2008c).

According to green MEP Hiltrud Breyer, it was through the initiative of the Greens/European Free Alliance that nanomaterial finally appeared on the policy agenda²²⁶. A policy officer of BEUC introduced the role that they have played in this process:

“we looked into specific types of legislation and we tried to make sure that policymakers took the consumer interests into account... When cosmetic legislation was revised, we managed to trigger amendments, (which were) adopted by the EP.”²²⁷

During the Parliament’s Environment Committee meeting, nanomaterial became a topic which has triggered heated debate. The greens held very strict stance and proposed banning all nanomaterial except those which could gain specific approval²²⁸. During the debate around the recast version of cosmetic products, Green MEP

²²⁵ Chemical watch. 2008. “EU gets tough on data gaps for nano in cosmetics.” September 11. <https://chemicalwatch.com/1079/eu-gets-tough-on-data-gaps-for-nano-in-cosmetics>

²²⁶ Debates on Cosmetic products, 23 March 2009, Strasbourg
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+CRE+20090323+ITEM-015+DOC+XML+V0//EN&language=hr&query=INTERV&detail=1-110>

²²⁷ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

²²⁸ Chemical Watch. 2008. “MEPs battle over amendments to EU cosmetics Regulation.” December 03. <https://chemicalwatch.com/1433/meps-battle-over-amendments-to-eu-cosmetics-regulation>

Margrete Auken noted that *«this has been a tough fight. It is as though the industry has tried to stifle the debate on the safety of nanomaterials.»*²²⁹ Although the banning proposal was defeated, MEPs reached agreements on other amendments like labeling on nanomaterials. Finally, the EP voted and adopted the proposed Regulation for Cosmetic Products in March 2009 (EC 2009b). This result was applauded by CSOs, which claimed that *«we are pleased that our campaigning on nanomaterial has finally reaped some rewards.»*²³⁰

The new Cosmetic Regulation came into effect in July 2013, which included several provisions that dealt with nanomaterials specifically. Firstly, a definition of nanomaterial was for the first time provided, which went as: *«an insoluble or biopersistent and intentionally manufactured material with one or more external dimensions, or an internal structure, on the scale from 1 to 100 nm»* (Ibid.). This definition was considered as “a step in the right direction”, but the scope of definition was considered by CSOs and green MEPs as too narrow. The new regulation of cosmetic products also highlighted the need to assess and label nanomaterials. For example, the article 16 demanded that *«cosmetic products containing nanomaterials shall be notified to the Commission... six months prior to being placed on the market»*, and the article 19 required that *«all ingredients present in the form of nanomaterials shall be clearly indicated in the list of ingredients. The names of such ingredients shall be followed by the word ‘nano’ in brackets»* (Ibid.). However, the labeling on cosmetics was resisted by Germany, which believed that a product contained nanomaterial could be viewed by consumers as a warning²³¹.

As a consequence, the EU became the first region in the world that adopted nano-specific provision. This made CIEL believe that there were more opportunities

²²⁹ Debates on Cosmetic products, 23 March 2009, Strasbourg
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+CRE+20090323+ITEM-015+DOC+XML+V0//EN&language=HR>

²³⁰ BEUC(2009) nanomaterial in Cosmetics: BEUC cautiously welcomes new regulation.

²³¹ EurActiv. 2009. “Germany opposed ‘nano’ label for cosmetics.” November 24
<http://www.euractiv.com/enterprise-jobs/germany-opposed-nano-label-cosmetics/article-187583>

for CSOs to get involved in the EU²³². Thus, the achievements not only lay in concrete policy uptake, but also represented in *«the ambition of changes have been linked»*²³³. More CSOs started to join the debate and to assume the role of watchdog to monitor the implementation of the cosmetic regulation.

BEUC has utilized different occasions to advocate their demands. For example, during the 3rd *Nanotechnology Safety for Success Dialogue*, its policy officer used NanoTiO₂ in sunscreens and cosmetics as a case study to show their concerns over the loopholes in the new cosmetics regulation, e.g. restrictive definition, enforcement, doubt over the control system for existing products²³⁴. When the Commission released the recommendation on the definition of nanomaterial, BEUC came up with a proposal to align the two differing definitions, highlighting several elements that should be taken into account, for instance, lowering down the number of particles to 0.15%, including nano-particles below 1 nm such as fullerenes, covering by-products and so forth (BEUC 2012).

While the regulation requires that *«by 11 January 2014, the Commission shall make available a catalogue of all nanomaterial used in cosmetic products placed on the market... indicating the categories of cosmetic products and the reasonably foreseeable exposure conditions»* (EC 2009b), there is already more than one year overdue. And such a catalogue is not established yet. CSOs expressed their dissatisfaction with regard to the delay and the inadequate information that have been allocated by the EC (EEB et al. 2015).

According to the EC, this delay was caused by ‘erroneous notifications’ provided by the cosmetic industries²³⁵. A DG SANCO was reported to encourage the cosmetics

²³² Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

²³³ Interview with a DG ENV, in charge of incorporating nanomaterials in REACH and CLP Regulation, June 2014, Brussels

²³⁴ 3rd annual nanotechnology Safety for Success Dialogue Workshop, 3-4 November 2009
http://ec.europa.eu/health/nanotechnology/docs/ev_20091103_co06_en.pdf

²³⁵ Chemical Watch. 2015. “Anomalies in notifications behind nanomaterial inventory delay.” March 05.
<https://chemicalwatch.com/23044/anomalies-in-notifications-behind-nanomaterials-inventory-delay>

industry to take the rules regarding nanotechnology ‘seriously’ to avoid the stigmatization of nanomaterials²³⁶. Industry association Cosmetics Europe identified several ‘loose ends’ in the implementation of the EU cosmetics regulation, with nanomaterial being *«the biggest open end of all»*²³⁷. According to him, this was because the regulation was enacted when little was known about nanotechnologies, but political anxiety was high. A review with regard to the provisions concerning nanomaterial in cosmetics will be undertaken by 11 July 2018.

2.2. The definition of nanomaterial

A clear and overarching definition is the cornerstone for further regulatory activities. After the first version of definition adopted in the New Regulation for Cosmetic Products (EC/1229/2009), more and more stakeholders started to pay specific attention to questions regarding how nanomaterial should be defined and how to incorporate such a definition in different pieces of law.

As early as in its first resolution, ETUC has highlighted the “urgent need” of a standardized terminology for nanomaterials. And it proposed that the definition of nanomaterials should not restrict to objects below 100 nanometers in one or more dimensions (ETUC 2008). The EP called for the EC to introduce ‘a comprehensive science-based definition of nanomaterials’ (EP 2009b). Under growing pressure calling for a clear definition, the EC issued its draft recommendation of nanomaterials definition in 2010. During the public consultation period, a total of 195 stakeholders’ responses were received²³⁸. Great divergences can be remarked among CSOs, industries and different DGs in several aspects, among which the size range and number distribution threshold triggered most disagreements.

²³⁶ Chemical Watch. 2014. “EU cosmetics industry must address nano perception, says Commission.” June 11. <https://chemicalwatch.com/20114/eu-cosmetics-industry-must-address-nano-perception-says-commission>

²³⁷ Chemical Watch. 2015. CosmeticsEurope highlights Regulation’s ‘loose ends’. April 20. <https://chemicalwatch.com/23583/cosmeticseurope-highlights-regulations-loose-ends>

²³⁸ Public consultation on the definition of nanomaterials http://ec.europa.eu/environment/consultations/pdf/Nano_Consultation%20comments.pdf

According to DG ENV Henrik Laursen, *«it is easy to agree it should be based on science... we will have to make a policy decision.»*²³⁹ After the release of the draft definition drawn up by DG ENV, discussions have heated up. And there existed antagonistic opinions among different DGs of the Commission, representing their respective interests and values²⁴⁰. According to Chemical Watch, DG ENTR called for ‘mass’ to be used as the measuring unit for nanomaterials, while DG SANCO insisted a particles-based way. Regarding the 1% size distribution percentage proposed by DG ENV, DGs ENTR considered it as too strict and demanded a dramatic increase to 50%, while DG SANCO asked for the percentage to be lowered to 0.15% to be in accordance with the recommendation of SCENIHR²⁴¹. DG ENV Karl Falkenberg noted that the definition issue is *«triangular—we have to put together environmental, trade and health perspectives»*²⁴².

Regarding the definition issue, CSOs have united their forces to contribute to the public consultation. They also invited international partners to participate in the debate. As a result, a coalition of 46 global CSOs was established under the coordination of EEB and CIEL, which favored a “cautious and broad” definition of nanomaterial²⁴³. An interviewed policy officer of CIEL described the rationale behind this coalition:

“they (e.g. FoE Australia) have lots of technical knowledge, and we have lots of institutional knowledge about the EU. So we put forces together to bring more expertise into the process.”²⁴⁴

²³⁹ Chemical Watch. 2011. “EU Commission expects legal nano definition before mid year.” March 31. <https://chemicalwatch.com/7119/eu-commission-expects-legal-nano-definition-before-mid-year>

²⁴⁰ Chemical Watch. 2011. “Nano definition continues to divide European Commission. Questions remain on adequacy of REACH for nano.” September 23.

²⁴¹ Chemical Watch. 2011. “EU Commission directorates argue over nano definition.” April 6. <https://chemicalwatch.com/7163/eu-commission-directorates-argue-over-nano-definition>

²⁴² Chemical Watch. “EU Commission directorates argue over nano definition.”

²⁴³ CIEL et al. 2010. “Reply form for the public consultation on Proposal for a Commission definition of the term ‘nanomaterial’”. http://www.ciel.org/Publications/Nanomaterials_ReplyForm_Nov10.pdf

²⁴⁴ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

The coalition of CSOs argued that the recommended size range of 1 nm-100 nm was too restrictive, and they pointed out their favor for a larger size range (i.e. 0.3 to 300 nm²) to define nanomaterial. ANEC further reminded the EU policymakers the necessity to take into account the specific features of nanomaterials used in medical applications, which were in the size range of 1000 nm²⁴⁵. FoE Australia criticized the draft proposal of nanoscale upper limit of 100nm advised by International Organization for Standardization (ISO), claiming that *«the ISO definition will in turn cite this (SCENIHR) review... This cycle of self-referencing could continue and infinite»*²⁴⁶.

By contrast, industries represented by European Chemical industry Council (CEFIC) urged that the definition should be in line with international organization like ISO and OECD so as to “avoid barriers to, or distortions of trade”²⁴⁷. CEFIC proposed using weight based size distribution instead of number based size distribution. And it also objected to the inclusion of aggregate and agglomerate. Its demands actually went against the recommendation of CSOs and DG ENV. For fear of certain nanomaterials escaping the scope of further legislative regulation, CSOs preferred a broader definition so as to better protect health and environment. An interviewed DG SANCO pointed out the dilemma in fixing a definition of nanomaterials,

“the problem is if you offer too broad, then you can take plenty of nanomaterials which do not require any specific handling. If you are too restrictive, you miss so many cases that you should take care of.”²⁴⁸

²⁴⁵ ANEC Statement. 2011. “The European Commission needs to define what nanomaterials are in order to offer consumers effective protection.” March 29. <http://www.anec.eu/attachments/ANEC-PR-2011-PRL-008.pdf>

²⁴⁶ Public consultation on the definition of nanomaterials. pp116.

http://ec.europa.eu/environment/consultations/pdf/Nano_Consultation%20comments.pdf

²⁴⁷ Public consultation on the definition of nanomaterials: Compilation of responses. pp123.

http://ec.europa.eu/environment/consultations/pdf/Nano_Consultation%20comments.pdf

²⁴⁸ Interview with a DG SANCO, who is in charge of the working groups of the European Scientific Committee on Emerging to develop risk assessment and methodologies and to develop potentially regulatory definitions of nanomaterials, 17/06/2014

On 18th October, 2011, the EC adopted the definition of nanomaterial: *« ‘nanomaterial’ means a natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution, one or more external dimensions is in the size range 1 nm-100 nm »* (EC 2011). The following table provides a summary of different stakeholders’ preference towards the elements of nanomaterial definition.

Table 6. Different views towards nanomaterial definition

	Measuring unit	Size range	Number distribution threshold	Inclusion of aggregates and agglomerates
Draft version	Particle numbers	1-100 nm	1 %	Support
CSOs	Particle numbers	0.3-300 nm	1%	Support
Industry	Mass concentration	1-100 nm	50%	Against
Adopted version	Particle numbers	1-100 nm	50%	Support

As a scholar put it, *«nanotechnology is not a definite technology, but an empty signifier and a political project that serves certain interests and strategies»* (Wullweber 2008). An interviewed DG SANCO also noted that *«it is sometimes difficult to reconcile politics with science.»*²⁴⁹ The recommended definition was questioned by industries as too broad (e.g. CEFIC), while considered by CSOs as too narrow (e.g. EEB, CIEL). Industries reaffirmed their opinion that weight

²⁴⁹ Interview with a DG SANCO, who is in charge of the working groups of the European Scientific Committee on Emerging to develop risk assessment and methodologies and to develop potentially regulatory definitions of nanomaterials, 17/06/2014

concentration instead of particle number distribution should be used to determine the cut-off criterion for nanomaterials²⁵⁰. CSOs pointed out that it was remarkable to see the 50% number distribution threshold finally adopted was 50 times greater than 1% suggested in the draft proposal, and 333 times greater than 0.15% recommended by SCENIHR. FoE Australia argued that the finally adopted definition reflected intense industry lobbying²⁵¹. In spite of the ongoing tension, the EU is the only jurisdiction with a horizontal legal definition of nanomaterials in place²⁵², which represents a significant step forward.

To summarize, discussions about the definition of nanomaterial become an intense trade-off among stakeholders who stick to different values and interests. As a scholar puts it *«uncertainty and risk are no longer seen strictly as matters of science(what do we know or not know), but of preference, culture and value (what should we do or not do)»* (Pidgeon 2008).

2.3. EP: to ban certain nanomaterials in electrical and electronic equipment (EEE)

The debate on nanomaterial in EEE is worth studying, as it demonstrates the ambitious and precautionary stance of the Parliament as well as the intense resistance of industries and other stakeholders. Similar with the Cosmetic Regulation, the original proposal of the Commission to revise the Restriction of Hazardous Substances Directive (RoHS Directive) did not contain any specific provisions on nanomaterials (EC 2008b). Green MEP Jill Evans was appointed as rapporteur to draft a report, which noted that *«proposals for specific provisions on nanomaterials will be added in January 2010 following further evaluation of the situation»* (EP 2009a).

²⁵⁰ Chemical Watch. 2011. "Industry, NGOs comment on EU Commission's nanomaterial definition." October 18 <https://chemicalwatch.com/8751/industry-ngos-comment-on-eu-commissions-nanomaterial-definition>

²⁵¹ FoE Australia. 2010. "European Commission caves to industry pressure on nano definition, leaves people and environment at risk." October 19. <http://emergingtech.foe.org.au/european-commission-caves-industry-pressure-nano-definition-leaving-people-and-environment-risk/>

²⁵² CIEL, ECOS & Öko-Institut. 2014. "Nanomaterials definition fact sheet." November 02. http://ecostandard.org/wp-content/uploads/Nano_definition.pdf

CSOs seized this opportunity and lobbied the Council and the EP to submit additional amendments to restrict the use of nanosilver in EEE products, arguing that its ionic form has *«environmentally damaging properties and is acutely toxic to aquatic organisms at very low concentrations»* (EEB, HEAL, and WECF 2010).

In reviewing a set of amendments to the RoHS Directive in EEE, MEPs held different views with regard to whether or not to ban new substances. Rapporteur Jill Evans proposed in the Amendment 97 to prohibit the use of nanosilver and certain carbon nanotubes in EEE on the grounds that some uses of nanosilver were ‘superfluous’, and carbon nanotubes could have asbestos-like properties (Evans 2010a). Orgalime, the European Engineering Industries Association, considered this proposed amendment *«lacks any scientific evidence and justification»*²⁵³. And it urged the committee to reject it. Other MEPs (Kathleen Van Brempt, Judith A. Merkies and Åsa Westlund) noted in Amendment 317 that *«further research remaining necessary, labelling would be a first step to support careful handling of these substances»* (Evans 2010b).

On 15th June, 2010, MEP Jill Evans finalized the report tabled for plenary, with several rigorous and ambitious measures concerning nanomaterials introduced: labeling of EEE that contains nanomaterial (Amendment 15), definition of nanomaterial (Amendment 37), notification (Amendment 52), prohibiting the use of certain hazardous substances (i.e. nanosilver and long multi-walled carbon nanotubes) in EEE (Amendment 88), etc. (EP 2010). The Parliament justified these amendments related to nanomaterials by highlighting the risks that nanomaterials could pose to health and environment. For example, Amendment 6 stated that *«some carbon nanotubes may behave like asbestos fibres»* and *«nanosilver particles... may have severe impacts on soil, aquatic and terrestrial organisms»* (Ibid.).

²⁵³ Orgalime Position Paper. 2010. “COMMENTS AND RECOMMENDATIONS ON DRAFT REPORT OF RAPPORTEUR JILL EVANS ON THE PROPOSAL FOR A RECAST RoHS DIRECTIVE 2002/95/EC 2008/0240(COD).” February 17.
http://www.orgalime.org/sites/default/files/position-papers/PP_Comments_Rapporteur_Evans_RoHS_report_Feb10.pdf

This report is considered by scholars as *«a remarkable step towards making Europe the first region to ban certain types of nanomaterial»* (Nasu and Faunce 2012). Industries commented the initiative of the Parliament *«with strong language and a heavy hand.»*²⁵⁴ The proposals of the Committee on the Environment, Public Health and Food Safety (ENVI) triggered fierce opposition from the industry. For example, NIA considered the demand for labeling proposal ‘nonsensical’, as *«every transistor in a computer chip would...include a hazardous substance.»*²⁵⁵

Partly owing to the strong opposition from the industry as well as the divergences within the EP, the approved RoHS Recast Directive, which was adopted in June 2011, represented ‘a significant setback backwards’ from the original draft report. Various ambitious proposed amendments regarding nanomaterials were removed. And only the following commitment was made,

“as soon as scientific evidence is available, and taking into account the precautionary principle, the restriction of other hazardous substances, including any substance of very small size or with a very small internal or surface structure (nanomaterial) which may be hazardous due to properties relating to their size or structure, and their substitution by more environmentally friendly alternatives which ensure at least the same level of protection of consumers should be examined.” (Official Journal of the European Union 2011a, preamble paragraph 16)

Although the precautionary principle was acknowledged, no new substances were added to the existing blacklist. In response to the result, green MEPs and CSOs, while preferred stronger legislation, considered the compromise as an improvement.

²⁵⁴ NIA. 2010. “European Parliament approaches nanomaterial in Electrical and Electronic Equipment with strong Language and a heavy Hand.” April 27.
<http://www.nanotechia.co.theUK/news/news-articles/european-parliament-approaches-nanomaterials-electrical-and-electronic-equipment>

²⁵⁵ NIA News. 2010. “‘Hazardous Substance inside?’ NIA comments on Demands for Labelling of Electronics.” June 14
<http://www.nanotechia.org/news/nia-press/hazardous-substance-inside-nia-comments-demands-labelling-electronics>

Rapporteur Jill Evans noted that nanomaterial, which would be subject to a priority review under RoHS, *«will no longer escape the oversight of the regulator.»*²⁵⁶ To conclude, the legislative discussion about nanomaterials in EEE products started with ambitious proposals and ended up with limited take-up, illustrating the different interpretation of the precautionary principle among the Parliament, the Council, CSOs and other stakeholders.

2.4. Nanomaterials in food: an intense lobbying battle

Health and safety scandals over the past decade have triggered the enhancement of the EU food regulation, e.g. the creation of European Food Safety Agency (EFSA) as an independent European agency (Breggin et al. 2009, 64). These new institutional settings further influenced the policy debates about nanomaterials in food regulation. A close look at the policy-making process enabled us to see how scientific opinions were finally translated (or not) into policy outcomes and what factors, in practice, affect the translation process.

In January 2008, the Commission adopted a proposal to revise the Novel Foods, acknowledging that *«novel food should therefore include ... foods modified by new production processes, such as nanotechnology and nanoscience»* (EC 2008d). The recognition made by the EC signaled the beginning of a new lobbying battle: on the one hand, CSOs advocated to put into place precautionary measures so as to better protect health, safety, environment as well as consumers' right to make informed choices in choosing food; on the other hand, food industries like FoodDrinkEurope highlighted the unnecessary administrative burden that new regulation related to nanomaterials in food would bring²⁵⁷.

²⁵⁶ Chemical Watch. 2010. "European Parliament votes in favour of RoHS recast." November 24. <https://chemicalwatch.com/6043/european-parliament-votes-in-favour-of-rohs-recast>

²⁵⁷ Corporate Europe Observatory. 'Hard-core' lobbying: a sample of "voting recommendations" sent by lobbyists to MEPs on the new EU food labeling regulation. <http://corporateeurope.org/sites/default/files/sites/default/files/files/article/voting-recommendations.pdf>

Among the CSOs involved, FoE Europe reacted quickly and held a tough stance towards the use of nanotechnologies in the food sector. In April 2008, it published a well-documented report concerning nanotechnologies in food and agriculture, serving as a useful tool for other CSOs. This report identified 104 products that have entered into the food chain, alarming possible new risks that nanotechnologies could bring to human health, environment as well as broader challenges to the development of more sustainable food and farming systems. In light of these risks and uncertainties, FoE Europe called for «*a moratorium on the further commercial release of food products, food packaging, food contact materials and agrochemicals that contain manufactured nanomaterial*» (Miller and Senjen 2008) until new legislation established. An interviewed policy officer of FoE Australia and U.S. pointed out specifically their concerns over the influences that nanotechnologies could bring to food culture, noting that,

“we could be eroding certain food culture with nanomaterials...Food is going to be manipulated by technologies, and people have the right to give their input.”²⁵⁸

With increasing demand for regulatory measures for the applications of nanomaterials in the food sector, the Austrian Ministry of Health called for a ‘moratorium within a European context’ (Zilberszac 2008). EFSA was requested by the EC to provide scientific opinions, with its result revealed great knowledge gaps. EFSA’s opinions stated that available data on oral exposure to specific engineered nanomaterial was ‘extremely limited’ and «*any individual risk assessment is likely to be subject to a high degree of uncertainty*» (Barlow et al. 2009).

²⁵⁸ Interview with Ian Illuminato, policy officer of FoE Australia and U.S., 23/03/2015

Faced with great uncertainties and the fact that a growing number of food products enabled by nanotechnologies entered into the EU market, more CSOs joined the policy debate and demanded precautionary measures to be put into place. Their proposals included mandatory labeling of nanomaterials in food, pre-market risk assessment and approval. These CSOs closely followed the regulatory process by releasing reports and position paper, sending letters to MEPs, participating in public consultation (BEUC 2008; 2010; Which? 2010; EEB and MIO-ECSDE 2010). EEB put nano-labeling in food as one of its top ten priorities in the first half of 2011²⁵⁹. Following the organic farming association Naturland's decision to remove all nanomaterial from its products, BUND called for the exclusion of nanomaterial from the organic food industry²⁶⁰.

According to an interviewed policy officer of BEUC, *«in food and in cosmetics, we have contacted policy advisors of the EP to create network.»*²⁶¹ CSOs' constant efforts have gained some results: on 25th October, 2011, the EP and the Council adopted the Regulation (EU) No 1169/2011 on the provision of food information to consumers, stating that *«all ingredients present in the form of engineered nanomaterials shall be clearly indicated in the list of ingredients. The names of such ingredients shall be followed by the word 'nano' in brackets»* (Official Journal of the European Union 2011b, Article 18, paragraph 3).

The dust appeared to be settled. However, with the EC coming up with a delegated act to amend the definition of 'engineered nanomaterials' in food, a new round of debate started, with the divergence between the EC and the EP intensified. In December 2013, the EC proposed that food additives should not be covered by the definition of engineered nanomaterials in order not to 'confuse the consumer' (EC

²⁵⁹ Chemical Watch. 2010. "Tough rules for nano food ingredients top priority for H1 2011, says EEB." December 23.

²⁶⁰ Chemical Watch. 2011. "BUND recommends exclusion of nanomaterial from organically approved food." August 18.

<https://chemicalwatch.com/8212/bund-recommends-exclusion-of-nanomaterials-from-organically-approved-food>

²⁶¹ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

2013a, preamble paragraph 12). It also added a 50% nano-particles threshold to qualify as nanomaterials (Ibid., article 1). This move fuelled anger of green MEP Carl Schlyter, who argued that *«the EP has repeatedly called for proper nano-labelling and it is highly surprising that the Commission even tried to weaken what has been decided by both Parliament and the Council.»*²⁶² According to the observation of Corporate Europe Observatory, a non-profit group dedicated to exposing the impact of corporate lobbying on the EU policy making, industry lobbyists from industries, for instance ELC, FoodDrinkEurope and CEFIC, have managed to win their most important demands²⁶³.

Believing that the justification provided by EC ‘erroneous and irrelevant’, the EP rejected the delegated regulation, stating that the blanket exemption violated consumers’ right to make informed choices. The EP also pointed out that a threshold of 10% was more appropriate, as it was in line with the recommendation of EFSA (EP 2014). The tough stance of the EP was welcomed by BEUC, which sent a letter to Committee members and urged them to support the Motivation of resolution (BEUC 2014). At the Assembly’s plenary session in Strasbourg, most MEPs voted for rejecting the EC’s proposal, sending it back to the drawing board²⁶⁴.

In November 2014, the EP took a step further and voted to propose a moratorium on the use of nanomaterials in food²⁶⁵. The committee report tabled for plenary stated that foods for which production processes required specific risk assessment—including nanomaterials— should not be authorized until they are approved by EFSA (Nicholson 2014, 42). It was also noted that *«only nanomaterials entered in a*

²⁶² European Parliament News. 2014. “Nanofoods: MEPs object to new labelling rules.” March 12. <http://www.europarl.europa.eu/news/en/news-room/content/20140307IPR38125/html/Nanofoods-MEPs-object-to-new-labelling-rules>

²⁶³ Corporate Europe Observatory. 2014. “Food lobby fights labelling of nano ingredients.” March 10. <http://corporateeurope.org/agribusiness/2014/03/food-lobby-fights-labelling-nano-ingredients>

²⁶⁴ EurActiv. 2014. “Parliament rejects draft EU law allowing nanomaterials in food.” March 12. <http://www.euractiv.com/health/parliament-opposes-commission-na-news-534093>

²⁶⁵ ENVI Press release. 2014. “Novel foods: MEPs call for moratorium on nano-foods and labelling of cloned meat.” November 25. <http://www.europarl.europa.eu/news/en/news-room/content/20141125IPR80424/html/Novel-foods-MEPs-call-for-moratorium-on-nano-foods-and-labelling-of-cloned-meat>

list of approved substances should be present in food packaging» (Ibid., 25). MEPs insisted on the 10% nano-particles threshold in the report (Ibid., 36). These measures were considered by BEUC as “a wise move”²⁶⁶.

In light of the tough stance of the Parliament, the Commission made a concession and decided to remove the exemption for the so-called ‘old’ food additives. But the EC still maintained the originally-described 50% nano-particles threshold in defining ‘engineered nanomaterial’²⁶⁷. At the time of writing, the negotiation is still undergoing among major policymakers. The following diagram summarizes the evolution of their position.

Table 7. Negotiation between the EC and the EP on nanomaterials in food

	Particle distribution threshold	Exempting certain food additives
EC proposal (Dec 2013)	50%	Support
EP resolution (Feb 2014)	10%	Against
EP report (Dec 2014)	10%	Against
EC revised proposal (Dec 2014)	50%	Against

²⁶⁶ BEUC. 2014. “EU Parliament upgrades novel food laws.” November 25.

http://www.beuc.org/publications/beuc-web-2014-028_eu_parliament_upgrades_novel_food_laws.pdf

²⁶⁷ Chemical Watch. 2014. “EU Commission revises nano food additives proposal.” December 01.

<https://chemicalwatch.com/22100/eu-commission-revises-nano-food-additives-proposal>
EC proposal: https://members.wto.org/crnattachments/2014/TBT/EEC/14_5251_00_e.pdf

2.5. Nanomaterial in biocides

The Biocidal Product Regulation is the first piece of the EU legislation which incorporates the Commission's 2011 definition of nanomaterial. It is also described as “the most ambitious piece of nanospecific legislation”²⁶⁸ given its stringent provisions on nanomaterials. Various CSOs have joined their efforts and closely followed the policy-making process.

Considering the fact that the original proposal of the EC contained no specific provisions on nanomaterials, the EP became the driving force in advancing regulatory action. ENVI released a draft report, suggesting several amendments related to nanomaterial in biocide products (Klaß 2010). According to VeilleNanos, several MEPs (e.g. the rapporteur Christa Klaß, Michèle RIVASI) have played ‘a role of motor’ in preparing the text²⁶⁹. During this process, CSOs (e.g. PAN Germany, UK and Europe, HEAL, EEB, WECF, HCWH Europe, BUND, IEW) have lobbied heavily MEPs and the Council by sending a series of joint letters (e.g. in February²⁷⁰, April²⁷¹, June²⁷², October²⁷³, December 2010²⁷⁴, and September 2011²⁷⁵).

These CSOs showed concerns about the wide use of nano-biocides and their possible negative impact on human health and environment, alarming that 17 tonnes

²⁶⁸ Chemical Watch. 2014. “The biocides market for nano actives.” Global Business Briefing, May.
<https://chemicalwatch.com/19748/the-biocides-market-for-nano-actives>

²⁶⁹ VeilleNanos: Quel encadrement des nanomatériaux dans les biocides en Europe?
<http://veillenanos.fr/wakka.php?wiki=ReglementationBiocidesEurope>

²⁷⁰ Joint NGO Position on Draft report of EP – Rapporteur Christa Klaß (EPP) in view of the Commission proposal for a regulation concerning the placing on the market and use of biocidal products – COM (2009) 267 final. 22-02-2010

http://www.env-health.org/IMG/pdf/NGO_Position_EPEnv_KLASSReport_22_02_10_final.pdf

²⁷¹ NGO recommendations in view of the considerations in the ENVI-Committee on the amendments to the Commission's proposal for a biocide regulation (COM 267) 27-04-2010

http://www.pan-germany.org/download/biocides/NGO_ENVI_recommendation_biocides_20100427.pdf

²⁷² Joint NGO recommendations on the European Parliament ENVI Committee's vote on amendments to the Commission's proposal for a biocide regulation (COM (2009) 0267), Brussels 22 June 2010

http://www.pan-germany.org/download/biocides/NGO_Position_EPEnv_vote_biocides_100615.pdf

²⁷³ Joint NGO recommendations for the forthcoming considerations of Council Working Group for Environment concerning the biocide regulation (COM (2009) 267) 12-10-2010

http://www.pan-germany.org/download/biocides/NGO_Council_biocides_20101012_final.pdf

²⁷⁴ Urgent recommendations concerning the biocide regulation. 14-12-2010

http://www.pan-germany.org/download/biocides/Biocides_Jointletter_Council_20101214.pdf

²⁷⁵ Joint NGO recommendations for EP ENVI Committee's 2nd reading on the biocide regulation (COM (2009) 267) 06-09-2011

http://www.env-health.org/IMG/pdf/11006_NGO_recom_biocide-regulation_ENVI_2nd_reading.pdf

of nano silver were released every year in water due to the machine washing of anti-odour socks containing nano silver in France only²⁷⁶. On the one hand, there were more and more biocidal products containing nanosilver (BEUC&ANEC 2012); on the other, the information available was very limited: according to the reportage of Chemical Watch, no data on nanosilver has been produced in the registration dossiers until the 2010 REACH deadline.²⁷⁷

The Regulation was finally adopted in May 2012, with several requirements tailored specifically to nanomaterials being introduced (Official Journal of the European Union 2012):

- integrate the Commission's new definition on nanomaterial (Article 3 (1)(z))
- the approval of an active substance not cover nanomaterial (Article 4(4))
- separate risk assessment for nanomaterial (Article 19(1)(f))
- exclusion of nanomaterial from the simplified authorization procedure (Article 25)
- mandatory labeling, with the word “nano” in brackets (Article 58 (3)(d))
- When test methods are applied to nanomaterial, an explanation shall be provided of their scientific appropriateness for nanomaterial, and where applicable, of the technical adaptations/adjustments that have been made in order to respond to the specific characteristics of these materials (Annex III(5)) (Official Journal of the European Union 2012).

As a policy officer of EEB put it, *«MEPs have shown once again that nanomaterials cannot be given a free ride until specific safety methods are developed.»*²⁷⁸ The revised Biocidal Product Regulation, which entered into force in September 2013, was applauded by CSOs as “a definite step forward”²⁷⁹. Apart from

²⁷⁶ Recommendations from the « Agence française de sécurité sanitaire de l'environnement et du travail » (Afsset), 24 March 2010, <http://www.afsset.fr/index.php?pageid=452&newsid=546&MDLCODE=news#>

²⁷⁷ Chemical Watch. 2010. “REACH 2010 deadline will not yield data on nanosilver.” Global Business Briefing, November <https://chemicalwatch.com/5973/reach-2010-deadline-will-not-yield-data-on-nanosilver>

²⁷⁸ Press release. 2010. “European Parliament Committee strengthens draft biocides law, but concerns remain.” HEAL, PAN Germany and EEB. June 23. http://www.env-health.org/IMG/pdf/23062010_Biocides_ENVI.pdf

²⁷⁹ HEAL Press release. 2012. “EU biocides law considered a ‘standstill’ by NGOs.” January 19

the above pieces of law, CSOs also advocated that all relevant product legislation should incorporate nano specific requirements (EEB et al. 2014; ANEC 2014). For example, ANEC demanded for banning the use of nanomaterials in toys, unless endorsed by a scientific committee²⁸⁰.

To conclude, various amendments in sectoral regulations that incorporate nanomaterials have been proposed and debated, ranging from labeling, bans, moratorium, notification, specific safety assessment, etc.. This reflects the different positions that regulatory authorities, CSOs and industries hold. In a letter sent to the Commission, green MEP Carl Schlyter highlighted that it was the Parliament which *«drove the insertion of specific provisions on nanomaterial into various laws under review... The Commission has not made use of its right of initiative.»*²⁸¹ A review of the policy-making process regarding product-specific legislation made it clear that the Parliament has been the most ambitious and proactive actor in enhancing the regulatory framework on nanomaterials, and *«the Council is in general a little more reluctant to include specific provisions on nanomaterial.»*²⁸²

3. Towards an EU nano register: a conflicting process

The EP firstly introduced the idea of an EU-wide nano register in its 2009 resolution. It called upon the EC *«to compile before June 2011 an inventory of the different types and uses of nanomaterials on the European market»* (EP 2009b, 6). This issue continued to be discussed widely during the EC's consultation for Nanotechnology Action Plan 2010-2015, which showed an 'overwhelming demand' for such an inventory (EC 2010b). The subsequent years have witnessed several important events at national as well as the EU level, during which the issue of nanomaterials register was put highly on the policy agenda of regulatory authorities.

<http://www.env-health.org/resources/press-releases/article/eu-biocides-law-considered-a-1367>

²⁸⁰ ANEC Position paper. 2014. "On the application and effectiveness of Directive 2009/48/EC on the safety of toys." <http://www.anec.eu/attachments/anec-child-2014-g-064%20final.pdf>

²⁸¹ Carl Schlyter. 2012. "Second regulatory review of nanomaterials. To Mr. J.Potočník." European Parliament.

²⁸² Axel Singhofen. 2012. "Towards an effective governance of nanomaterial: Overview of European Parliament's position on how to regulate nanomaterial." Nanomaterial Policy Conference, The Hague

3.1. Member States' demand for an EU nano register

The EC has been hesitated for adopting an EU-wide nano register or reporting system in spite of the fact that a growing number of nano-products continued to be introduced into the EU market. For example, the inventory that RIVM conducted regarding the number of nano-products on the European market witnessed a six-fold increase from 143 products in 2007 to 858 products in 2010 (RIVM 2011). Against this backdrop, a number of Member States have come up with their proposals and impelled the EC to adopt stricter control on nanomaterials.

Among these Member States, France has played a role of 'locomotive' at the European level²⁸³. According to *Chemical Watch*, the French government started the discussion about nanomaterial reporting plan as early as 2007. It adopted the 'Grenelle Law I' in 2009, which made its commitment to introducing a mandatory reporting scheme for the manufacture, import and placing on the market of nanomaterials and products containing them within two years²⁸⁴.

The proactive action of France motivated other Member States to adopt further action to regulate nanomaterials, either through establishing national mandatory reporting system (Belgium and Denmark), or by pushing forward an EU-wide nano registry (e.g. the Netherlands, Sweden, Germany). Through various activities, which include organizing high level conferences, initiating joint letters, supporting the work of CSOs, etc., several competent authorities of Member States have successfully put the transparency and traceability issue of nanomaterials highly on the policy agenda of the EU. As observed by NIA, *«a small Working Group of like-minded European Member States has formed, consisting of Belgium, Italy And France as 'Core Members', and Germany, The Netherlands, Denmark, Sweden, and Austria as*

²⁸³ France Nature Environnement. 2010. "Pour répondre aux 5 questions qui nous sont le plus souvent posées dans ce débat public sur les nanotechnologies."

<http://www.fne.asso.fr/fr/nos-actions/sante--environnement/nanotechnologies.html>

²⁸⁴ Chemical Watch. 2012. "Legal Spotlight: French nano firms must file annual declarations." Global Business Briefing, November.

<https://chemicalwatch.com/12931/legal-spotlight-french-nano-firms-must-file-annual-declarations>

*‘Observer Members’, in order to push forward the creation of a Europe-wide database on nanomaterials.》*²⁸⁵ Together with green MEPs as well as CSOs, a ‘green alliance’ has been developed and shaped.

In September 2010, the Belgian Presidency organized a high-level event on nanomaterial traceability, which brought together top level representatives of regulatory bodies from twelve Member States, Norway and the EU. During this event, the industry went strongly against the proposal to improve information transparency. For example, Lena Perenius, executive director of CEFIC, claimed that *«REACH is the mandatory reporting system that we need.»*²⁸⁶ An a policy officer of CIEL commented: *«their main arguments are: we do not need the information; then, anyway, REACH can deliver the information.»*²⁸⁷ Against this backdrop, CIEL actively advocated the urgency of this issue, *«if we ask nicely, we do not get the answers. We have to put something compulsory.»*²⁸⁸

In the conclusion of the conference, the Belgian Presidency highlighted the need for a mandatory register of nanomaterials as well as a traceability mechanism. This conclusion sent out a clear signal to the European and national authorities about their determination to *«dispel doubts...at the earliest.»*²⁸⁹ According to the news release of NIA, the Presidency also encouraged Member States to *«draw up integrated national strategies and concrete measures in favour of risk management, information and monitoring»* during a transitory period.²⁹⁰

²⁸⁵ NIA. 2010. “Advances towards a European Database on nanomaterials: Towards harmonization of national databases for nanomaterials on the market.” <http://www.nanotechia.org/news/members-alerts/nia-exclusive-update-advances-towards-european-database-nanomaterials-towards>

²⁸⁶ Chemical Watch. 2010. “EU Presidency proposes nanomaterials register.” September 15. <https://chemicalwatch.com/4940/eu-presidency-proposes-nanomaterials-register>

²⁸⁷ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

²⁸⁸ Ibid.

²⁸⁹ The Belgian Presidency of the Council of the European Union. 2010. “Regulation of products containing nanomaterial: Traceability, a pre-condition to acceptability.” September 14. <http://www.eutrio.be/pressrelease/regulation-products-containing-nanomaterial-traceability-pre-condition-acceptability>

²⁹⁰ NIA News. 2010. “Belgian Presidency proposes Register for Supply-Chain Traceability of Nanomaterials.” September 16. <http://www.nanotechia.org/news/news-articles/belgian-presidency-proposes-register-supply-chain-traceability-nanomaterials>

The impact of this event is far-reaching. Firstly, the initiative of the Belgian Presidency has struck ‘overwhelming resonance’ amongst Member States. An increasing number of regulatory authorities were convinced about the importance and necessity of a nano register. For example, Norbert Roettgen, Environment Minister of Germany, openly claimed that *«I strongly support stepping up research into risks and establishing a European nanoproduct register.»*²⁹¹ According to the summary of the 7th Meeting of Competent Authorities for REACH and CLP, an ‘informal taskforce’ has been set up among five Member States: *«Italy, France and Belgium and experts from the Competent Authorities of Germany and the Netherlands are presently studying the content for national databases of nanomaterials as substances on their own, contained in mixtures and or in articles and in consumer products, and working towards a harmonized common basis for those databases so that exchange on information is easy.»*²⁹² As David Azoulay, Managing Attorney of CIEL, put it, *«the lack of progress in CASG-nano forward with future decisions resulted in the EU Member States to become more involved in its meetings.»*²⁹³ The alliance among Member States continued to expand.

Secondly, the conference provided motivation and momentum for Belgian CSOs to get involved. They started to coordinate their efforts to address the topic of nanomaterials. An interviewee introduced the context in which they decided to put nanomaterials onto the agenda,

“after that conference, the Minister of Environment asked the Federal Council for Sustainable Development to provide advice of what should be done concerning nanomaterials in Belgium. Our funding from federal administration covered the participation of the federal council sustainable development. And we

²⁹¹ Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety Press Releases. 2011. “Röttgen: We should use the opportunities of nanotechnology”. Berlin, February 02.

http://www.bmub.bund.de/en/press/press-releases/detailansicht-en/artikel/roettgen-we-should-use-the-opportunities-of-nanotechnology/?tx_ttnews%5BbackPid%5D=1892&cHash=d5c0e76881868f88277ea69991e19d1b

²⁹² EC. “Summary Record: 7th Meeting of Competent Authorities for REACH and CLP 7-8-9 February 2011”.

http://ec.europa.eu/enterprise/sectors/chemicals/files/caracal/minutes-110207-09_en.pdf

²⁹³ Chemical Watch. 2011. “Wrangling over substance ID hits REACH nano project.” January 14.

started at that time to work on nanotechnologies.”²⁹⁴

According to this interviewee, since then, Belgian CSOs have been participating in public consultation, meeting and lobbying the Minister of Environment and Employment, advocating their demands so as to keep the topic on the policy agenda. Besides, the initiative of the Belgian Presidency was also welcomed by ETUC²⁹⁵ and EEB, who acknowledged its efforts to *«bring crucial issues...on the agenda of the European Council and of the EU as a whole.»*²⁹⁶

Thirdly, this conference informed and mobilized the European Council to include the challenges of nanotechnologies as one of its priorities in the second Action Plan on Environment and Health at the end of 2010. The European Council provided a mandate and called upon the EC to *«evaluate the need for... further development of a harmonized database for nanomaterials.»*²⁹⁷ These issues continued to be kept on the policy agenda during the next Council meeting in mid-June, during which the Dutch delegation put forward a paper and identified three steps to improve the regulation of nanomaterials: to adopt definition of nanomaterials; to ensure traceability of nanomaterials (e.g. through mandatory registration system); and to develop an adequate risk assessment system (Netherlands Delegation 2011). This proposal won the support of ten Member States²⁹⁸ as well as (the then) candidate country, Croatia. Under the coordination of Joop Atsma, the Dutch State Secretary for Infrastructure and the Environment, these countries sent a joint letter to the EC, calling for the adoption of urgent measures with regard to legislation on registration or market surveillance of nanomaterials (Joop 2012).

²⁹⁴ Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

²⁹⁵ ETUC News. 2010. “The Belgian Presidency calls for nanomaterials register.” September 27. <http://www.etui.org/Topics/Health-Safety/News/The-Belgian-Presidency-calls-for-nanomaterials-register>

²⁹⁶ EEB. 2010. “EEB’s assessment of the environmental results of the Belgian Presidency of the EU.” <http://www.eeb.org/?LinkServID=04B91438-F0FF-E662-08A29E376FD713BF&showMeta=0>

²⁹⁷ 3061st Environment Council meeting. 2010. “Improving environmental policy instruments: Council conclusions.” http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/envir/118646.pdf

²⁹⁸ They are Austria, Belgium, Czech Republic, Denmark, Finland, France, Italy, Luxembourg, Spain, and Sweden.

These new developments triggered urgent action of industries, which paid close attention to the new dynamics and developments and adapted their approaches at critical moments. Arguing that nanomaterial specific regulations initiated by these Member States would be ‘the worse-case scenario’ for industries, NIA called for *«immediate (pro)action by the Nanotechnology Industries in working with the regulators.»*²⁹⁹ Industries’ lobbying proved to be effective: regardless of uprising demands for more information and transparency of nanomaterials by the EP, some Member States, as well as CSOs, the only proposal that the EC provided was to *«create a web platform with references to all relevant information sources»* (EC 2012b). This proposal was considered by the ‘green alliance’ as of limited added value and cannot overcome the existing deficits of the regulatory framework in governing nanomaterials. In the subsequent workshop on the second regulatory review of nanomaterials, DG ENTR Antti Peltomäki noted in the opening speech that *«we want to use tools which deliver results quickly and effectively and we do not want to create new regulatory burdens where we are not convinced that this is justified.»*³⁰⁰ The EC’s approach in governing nanotechnologies was taking on the form of a cautious and incremental manner. In this light, some Member States started to speed up their pace in initiating national actions.

3.2. Belgium and Denmark follow France to introduce national register plan

Discontented with the pro-industry stance of the Commission, green MEP Satu Hassi urged Member States to *«take action preferably in a diverging manner to trigger EU action.»*³⁰¹ More and more Member States started to search for their own paths in improving the transparency of the use of nanomaterials.

²⁹⁹ NIA Breaking News. 2010. “NIA’s proactive Initiative regarding regulatory Action on Nanomaterials.” September 21.
<http://www.nanotechia.org/news/nia-press/nia-breaking-news-nias-proactive-initiative-regarding-regulatory-action-nanomaterials>

³⁰⁰ EC. 2013. “Workshop on the Second Regulatory Review on Nanomaterials.” January 30.
http://ec.europa.eu/enterprise/sectors/chemicals/files/reach/docs/events/nano-rev-ws-peltomaki_en.pdf

³⁰¹ Satu Hassi. 2013. “Initial reactions and planning in the Parliament.” Workshop on the Second Regulatory Review on Nanomaterials, January 30.
<http://ec.europa.eu/DocsRoom/documents/8128/attachments/1/translations/en/renditions/native>

Belgium and Denmark, following the footsteps of France, notified their proposal to adopt a national register on nanomaterials to the EC in July 2013 and November 2013 respectively. Several regulatory authorities held a strong commitment to the regulatory issues of nanomaterials, such as the Danish Environment Minister Ida Auken, the Belgian Minister Juan Piñeros Garcet, the Belgian Green MP Thérèse Snoy³⁰², just name a few. As the Danish Environment Minister Ida Auken put it, *«I want a green transition, where both the environment and growth go hand in hand.»*³⁰³ The strong commitment of these regulatory authorities motivated Belgian and Danish CSOs to join the debates, which in turn provided grassroots support.

In Brussels, we could see the rising momentum of civil society movement. In May 2013, six Belgian CSOs released a joint letter, calling for the establishment of a Belgian register of nanomaterials³⁰⁴. As an interviewed policy officer of IEW put it, *«the EC did nothing about nano register. It helped us to put some pressure to drive for national register... We had really good alliances between three of us (trade unions, consumer associations and environmental organizations) about this topic.»*³⁰⁵

In Denmark, the proposal regarding a mandatory nanomaterials product database could be traced back to September 2012. According to the reportage of Chemical Watch, the idea was largely sparked by the Danish Environment Minister³⁰⁶. Such a proposal received rapid responses from the industry, which highlighted the heavy administrative burden the plan could bring and asked the Ministry to perform an impact assessment³⁰⁷. Although the result of impact assessment indicated that the product database could *«reduce the competitiveness and innovation of Danish*

³⁰² Chemical Watch. 2011. “Belgian MP calls for better regulation of nanomaterials.” September 30.

<https://chemicalwatch.com/8550/belgian-mp-calls-for-better-regulation-of-nanomaterials>

³⁰³ Chemical Watch. 2012. “Denmark plans mandatory nanomaterials product database.” September 18.

<https://chemicalwatch.com/12363/denmark-plans-mandatory-nanomaterials-product-database>

³⁰⁴ IEW et al. 2013. “Etablir un registre Belge des nanomatériaux: lettre ouverte.” May 07.

<http://www.iewonline.be/spip.php?article5581>

³⁰⁵ Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

³⁰⁶ Chemical Watch. 2012. “Denmark plans mandatory nanomaterials product database.” September 18.

<https://chemicalwatch.com/12363/denmark-plans-mandatory-nanomaterials-product-database>

³⁰⁷ Chemical Watch. 2012. “Nano industry responds to Danish database plan.” October 29.

<https://chemicalwatch.com/12753/nano-industry-responds-to-danish-database-plan>

companies»³⁰⁸, a proposal regarding a mandatory product database was finally approved by the Danish government. The dissertation suggests that the activities of Danish CSOs constitute a kind of counterbalance vis-à-vis the forces of industry during the policy-making process. For example, Danish Consumer Council and Ecological Council, in collaboration with Roskilde University and Technical University of Denmark, developed a product database with the objective of ensuring consumers' rights to make informed choices. Their database identifies more than 1,200 products that may contain nanomaterials³⁰⁹. Danish CSOs were invited by the Danish Environmental Protection Agency to participate in meetings and fellow groups. According to an interviewed policy officer, *«we would like to make their focus change.»*³¹⁰ After long negotiation and discussion, Belgium and Denmark ratified their national mandatory register on nanomaterials in February and June 2014 respectively.

Other Member States carried out studies to investigate the feasibility of alternative plans. For example, Germany contributed to the discussion by publishing an impact assessment of an European nanomaterials register. This study, commissioned by the Federal Environment Agency (UBA), concluded that *«the creation of a horizontal European register of products containing nanomaterials... is preferable to a separate register»* (Hermann et al. 2013, 5). In a CASG-nano meeting, a UBA spokesperson claimed that *«if the EC does not propose such a measure, Germany is likely to discuss having its own nano registry.»*³¹¹ Dick Jung, Deputy Director Safety and Risks of the Dutch Ministry of Infrastructure and the Environment, plead for an EU-wide inventory rather than national initiatives³¹². Other Member States like Italy and the UK adopted voluntary information gathering

³⁰⁸ Chemical Watch. 2012. "Denmark publishes nano product database impact on companies." December 04. <https://chemicalwatch.com/13150/denmark-publishes-nano-product-database-impact-on-companies>

³⁰⁹ Chemical Watch. 2012. "Denmark publishes nano product database impact on companies." December 04. <https://chemicalwatch.com/13150/denmark-publishes-nano-product-database-impact-on-companies>

³¹⁰ Interview with Lone Mikkelsen, chemicals policy officer of the Danish Ecological Council, 26/09/2014

³¹¹ Chemical Watch. 2014. "European Commission, Member States weigh options for nano inventory." March 27. <https://chemicalwatch.com/18891/european-commission-member-states-weigh-options-for-nano-inventory>

³¹² Workshop on the second regulatory review of nanomaterials <http://www.euromines.org/sites/default/files/content/files/h8-nanomaterials/2013-01-30-ec-workshop-2nd-reg-review-nano.docx>

schemes. In Norway, the Pollution Control Authority also introduced a voluntary scheme, which asked the businesses to report their use of nanomaterials in chemical products. It also added a ‘NANO box’ that registrants should mark if the chemical contains nanomaterials³¹³. More elaborated analyses concerning the actions of different Member States towards nano register are provided by *VeilleNanos*³¹⁴. As an interviewee put it,

“what is for my surprise, however, I must say is that they could implement such instruments despite the fact that there is no big public concerns about all this. That’s really remarkable about these nano discussion.”³¹⁵

The proactive and foreseeing measures of the green alliance represent encouraging steps towards a more precaution-oriented governance culture in addressing emerging technologies. As a Dutch regulatory authority put it, *«in the Netherlands, we learn and work to be honest about uncertainties. We try to be as open as possible. I think it is import to admit that you do not know.»*³¹⁶ CSOs, which have been actively advocating under the slogan ‘no data, no market’, have played an important role in contributing to such a culture shift. Next section addresses specifically how CSOs succeeded in winning the support of a number of regulatory authorities.

3.3. CSOs’ advocacy

From the very outset of debates, CSOs have been calling for the transparency of information and traceability of nanomaterials. These measures are believed to be of great importance in monitoring possible environmental and healthy contamination,

³¹³ Nanotech News. 2009. “Businesses asked to declare use of nanomaterials”. June 25. http://nanotech.law.asu.edu/Documents/2009/08/norway%20sft%20reportng_213_2010.pd

³¹⁴ <http://veillenanos.fr/wakka.php?wiki=LesDifferentsRegistresNanoEchelleNationale>

³¹⁵ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

³¹⁶ Interview with Monique Bosman, national coordinator of the NANoREG Project, Ministry of Infrastructure and the Environment, 22/12/2014

boosting consumer confidence and trust, etc. When we examine the dynamics in the public sphere during the past decade, it is notable that CSOs' approaches have been well-adapted according to the political agenda in different periods. This enabled their advocacy to be more effective and well-focused. For example, IEW has changed its stance regarding nanomaterials from the original proposal regarding a 'moratorium' on nanomaterials to the calling for a mandatory register plan. As an interviewed policy officer put it,

“we did not ask for a moratorium any more, because we understood it was asking too much. Having a register is already a big step.”³¹⁷

As discussed above, the high level event that the Belgian EU Presidency organized in 2010 showed the determination of participant regulatory authorities in addressing nanomaterials issues, which actually opened up political opportunities for CSOs to get involved. During this event, the Belgian minister Paul Magnette claimed that 'no data, no market', which meant a de facto moratorium, would be too restrictive. Instead, he considered the proposal of a nano registry as an endeavor to *«strike a balance between calls for a moratorium on nanomaterials based on the precautionary principle and arguments from industry groups.»*³¹⁸. His argument sent a clear signal to Belgian and EU level CSOs with regard to the direction of policy development. IEW, which maintained good relationship with regulatory authorities, highlighted the importance of 'adaptation', *«this soon involvement and clear agenda helped us to adapt our action at critical moments.»*³¹⁹

It is the same case with EEB. The original demand of EEB, noted in its 2009 position paper, was to create *«a pre-market registration and approval framework... before further market penetration occurs»* (EEB 2009). Five years later, EEB actively

³¹⁷ Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

³¹⁸ EurActiv. 2010. "REACH register to ensure traceability of nanomaterials." September 15.

³¹⁹ Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

advocated the establishment of an EU-wide nano registry as well as nano-labeling or declaration requirements for all nano-containing products together with other CSOs (EEB et al. 2014).

Based on analyses of the two resolutions released by ETUC in 2008 and 2010, we could see that the tone of ETUC became more demanding: from ‘CALLS ON’ to the statement that Member States ‘MUST’ develop harmonized mandatory registers of articles containing nanomaterials (ETUC 2008; 2010). ETUI also prepares a ‘lobbying training manual’ for trade unionists, summarizing the best practices which include: *«negotiating, convincing, mobilizing, organizing, establishing alliances, disseminating knowledge, raising awareness and participation, planning campaigns, and elaborating strategies.»*³²⁰ This manual is not specific to nanomaterials, but it reflects the approach that ETUI adopts in monitoring and influencing the EU decision-making process.

The present dissertation concludes three roles that CSOs have played in the debates on nanomaterials transparency and traceability issue: Firstly, CSOs played an important role in awareness-raising and education. For example, MIO-ECSDE updated their position paper in 2012, providing a useful instrument for more than 120 Mediterranean CSOs (MIO-ECSDE 2012). CIEL and ClientEarth, mainly composed of lawyers, provided legal analyses that have been used to empower other CSOs. As an interviewee put it, *«we use law to trigger changes... The role of us is to support the demands of more campaigning organizations and bring some intelligence and knowledge.»*³²¹

³²⁰ Pennella, Silvana. 2013. “How to monitor and influence the EU decision-making process from a trade union perspective.” ETUI.
<http://www.etui.org/Publications2/Guides/How-to-monitor-and-influence-the-EU-decision-making-process-from-a-trade-union-perspective>

³²¹ Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

ETUI, by introducing national and European initiatives, offered timely and updated policy analysis on issues regarding nanomaterial traceability³²². During the public consultation period, EU level CSOs (e.g. CIEL, ECOS) and national ones (e.g. IEW) prepared template of answers so as to mobilize more CSOs and the wider public to get involved and contribute their input³²³. HCWH Europe joined the debates in 2012. It contributed its expertise by publishing reports and fact sheets on nanomedicine in healthcare, highlighting that «*patients and health workers are already exposed to nanomaterials*»³²⁴. Two years later, it published a position paper to support the creation of an EU nanomaterials registry³²⁵.

Secondly, CSOs seized political opportunities and lobbied regulatory authorities through both informal and institutional channels. They participated in high level meetings, stakeholder conferences, public consultation; and they also met and spoke with regulatory authorities about their demands for establishing an EU wide nano register. As an interviewee of CIEL put it,

“we spoke and disseminated ideas in conferences. The question of traceability came up in formal discussion with Belgium government, and this was how the Belgium government started to push for the idea of an EU registry.”³²⁶

I’ve tried to contact Belgian authorities (e.g. the minister Paul Magnette) so as to confirm whether CSOs have contributed to the agenda-setting. But it was extremely difficult to have access to national policy-makers. Several consumer associations have developed nanomaterials database to support their demands for urgent regulatory

³²² ETUI Policy Brief, 2011. “Nano governance: how should the EU implement nanomaterial traceability?” Issue 2/2011. http://www.etui.org/content/download/2646/29689/file/Policy_Brief_Social_Policy-Issue2-2011_EN.pdf

³²³ CIEL& ECOS. 2014. “Impact Assessment on Possible Measures to Increase Transparency on Nanomaterials on the Market: Public Consultation— Non-industry Stakeholders.” http://ciel.org/Publications/Nano_Public_25Jul14.pdf

³²⁴ HCWH Europe. 2012. “Nanomedicine new solutions or new problems?” <https://noharm-europe.org/sites/default/files/documents-files/2462/HCWH%20Europe%20Nanoreport.pdf>

³²⁵ HCWH Europe. 2014. “Comments on the Impact Assessment on Possible Measures to Increase Transparency on Nanomaterials on the Market.” <https://noharm-europe.org/sites/default/files/documents-files/2798/Nano%20Register%20Position%20Paper.pdf>

³²⁶ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

action, for example the database developed by EU level consumer associations (BEUC & ANEC 2010), BUND³²⁷ and Consumer Council and Ecological Council located in Denmark³²⁸. These databases served as useful tools for the public as well as policy-makers. For instance, the online database run by BUND has received roughly 90,000 views in the year of 2014 (EEB et al. 2015). ANEC and BEUC presented their 2010 inventory to John Dalli, the European Commissioner for Health & Consumer Policy³²⁹. According to an interviewed adviser to green MEPs, *«the consumer associations have played an active role in trying to alert the Commission.»*³³⁰ EEB also invited Member States (France, the Netherlands, Denmark, etc.) as well as DG ENV to participate in their discussion at the bi-annual working group on nanomaterials in December 2012³³¹.

Last but not least, CSOs protect workers, consumers, and the wider public by triggering bottom-up alertness. For example, one of the objectives of Avicenn is to *«promote the development of a collective vigilance together with all concerned stakeholders.»*³³² Under the ‘Nesting Nano’ project, WECF provides information about the risks of nano-particles for women and babies. It suggests consumers to search for labels of products which contain nano-particles, asking the retailer or manufacturer for additional information³³³. ETUI contributes to cultivating such alertness through the FP7 NanoDiode project. As the ETUI coordinator of this project puts it, as the information that is meant to be legally provided along the supply chain is not available, ETUI aims to provide capacity building tools in the workplace, which could *«help worker representatives to develop the logic required to ask the right questions to get necessary information.»*³³⁴ These activities could enhance the

³²⁷ http://www.bund.net/themen_und_projekte/nanotechnologie/

³²⁸ <http://nano.taenk.dk/>

³²⁹ ANEC Press release. 2010. “ANEC/BEUC inventory exposes a game of roulette.” October 25. <http://pr.euractiv.com/pr/anecbeuc-inventory-exposes-game-roulette-90292>

³³⁰ Interview with an adviser to green MEPs, 22/06/2014

³³¹ EEB. Annual Report 2012.

<http://www.eeb.org/EEB/?LinkServID=E6EF9887-5056-B741-DB89351B012180C6>

³³² Original text: *«favoriser le développement d'une vigilance collective par l'ensemble des acteurs concernés»* . <http://avicenn.fr/wakka.php?wiki=ObjectifsActions>

³³³ <http://www.projectnesting.org/nano/long>

³³⁴ ETUI. 2014. “NanoDiode: Start-up meeting Community of Practice.”

engagement from the bottom up and to empower consumers, workers and the wider public to develop a vigilance towards nanomaterials.

3.4. Primary result: an EU nano register rejected by the EC

At the time of writing, it has been six years since the EP urged the EC to establish an inventory of nanomaterials. In spite of rising demands by the ‘green alliance’, the EC has been slow and reluctant to introduce further action in this regard. DGs ENV contributed to the discussion by commissioning a study to assess the feasibility of an EU-wide database, concluding that *«an EU-wide database could be useful if there was new legislation requiring companies to declare which products contain nanomaterials.»*³³⁵ According to an interviewee, there exists a constant split among different DGs within the EC regarding nano registry issue,

“the DG ENTR will do its best to say we do not need a registry. DG ENV is a weak counterpart, but it is a counterpart.”³³⁶

According to the reportage of Chemical Watch, different DGs have not been able to reach an agreement *«due to the complexity of the issue.»*³³⁷ An interviewed regulatory authority of the Netherlands boiled the split down to “a conflict of Interests”³³⁸. Under this context, the EC launched a public consultation on transparency measures for nanomaterials on the market between May and August 2014, setting out five policy options:

[http://www.etui.org/content/download/16162/126096/file/NanoDiode+projetct+-+A.+Ponce+\(ETUI\).pdf](http://www.etui.org/content/download/16162/126096/file/NanoDiode+projetct+-+A.+Ponce+(ETUI).pdf)

³³⁵ Wijnhoven, S.W.P. et al. 2012. “Development of an inventory for consumer products containing nanomaterials: Final Report.” http://ec.europa.eu/environment/chemicals/nanotech/pdf/study_inventory.pdf

³³⁶ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

³³⁷ Chemical Watch. 2014. “Sweden presses European Commission on nano proposals.” March 26.

<https://chemicalwatch.com/18852/sweden-presses-european-commission-on-nano-proposals>

³³⁸ Interview with Monique Bosman, national coordinator of the NANoREG Project, Ministry of Infrastructure and the Environment, 22/12/2014

- to remain with the status quo;
- to create a ‘soft law’ approach by providing recommendation on best practices;
- to collect all available information in a nano observatory at the EU level;
- to create an EU nanomaterials registry focused on substances, similar to the French model;
- to create an EU nanomaterials registry focused on use (including substances, mixtures and articles), inspired by the Belgian and Danish model³³⁹.

The consultation was considered by an interviewee of CIEL as a way to defer the attention: *«after so much pressure from everyone, they have to show that they are doing something.»*³⁴⁰ After various studies, consultations, debates, negotiation, etc., the EC disregarded the demands of non-industry stakeholders, claiming that *«a register is not an appropriate way to provide consumers with relevant information on nanomaterials»* at the CASG-nano meeting in December 2014³⁴¹. Three CSOs —EEB, CIEL and BUND— released a joint letter to express their dissatisfaction with such a conclusion (EEB et al. 2015). FoE Australia also criticized the strong pro-industry bias of the Commission³⁴². ETUC does not have any official response yet, but a policy officer notes that *«it is just another manifestation for me. The EC’s approach is about not to jeopardize development or competitiveness.»*³⁴³ Shortly, the Sweden Ministry of the Environment came up with a decision, asking Swedish Chemical Agency Kemi to develop a proposal for a national register for nanomaterials in products³⁴⁴.

³³⁹ Chemical Watch. 2014. “European Commission, Member States weigh options for nano inventory: the French experience being considered”. March 27.

³⁴⁰ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

³⁴¹ Chemical Watch. 2014. “EU nanomaterials register looks unlikely.” <https://chemicalwatch.com/22241/eu-nanomaterials-register-looks-unlikely>

³⁴² FoE Australia. 2015. “European Commission appears determined to scupper nano-register.” March 10. <http://emergingtech.foe.org.au/european-commission-appears-determined-to-scupper-nano-register/>

³⁴³ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

³⁴⁴ Chemical Watch. 2015. “Swedish chemicals agency to draft nanomaterial registry.” May 28. <https://chemicalwatch.com/23958/swedish-chemicals-agency-to-draft-nanomaterial-registry>

Until then, CSOs' advocacy regarding a nano register failed to generate substantial results at the EU level. The industry lobbying proved to be intense and effective. However, CSOs have succeeded in triggering uprising national actions. And many actors agreed that a harmonization of nano register at the EU level could provide more benefits in the long run. As an interviewee put it,

“it does not make things easier. It just means you multiply the processes. And industry will be under pressure anyway. It does not get rid of the demand.”³⁴⁵

The industry was reported to be *«increasingly concerned about EU Member States putting in place their own requirements for data collection.»*³⁴⁶ It can be anticipated that CSOs' demands for more information and transparency will continue.

3.5. Explaining CSOs' failure: lack of bottom-up public resonance

A review of the long and conflicted policy-making process enable us to see both the gains and failure of CSOs. Although they have won the support of the Parliament and a good number of Member States, which in fact facilitated the forming of a 'green alliance'; but CSOs failed to transfer 'influence' into 'communicative power' at the EU level, as the EC rejected an EU register of nanomaterials. As an interviewed policy officer of ANEC put it,

“there are in fact a number of authorities who have strong commitments. That's quite fine, but it's not enough to bring changes... It is still a small proportion.”³⁴⁷

The dissertation suggests that apart from external factors (e.g. strong lobbying from the industry), a major reason behind CSOs' failure lies in the fact that their activity has not or little touched upon the broad mass of the wider population.

³⁴⁵ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

³⁴⁶ Chemical Watch. 2013. “Nanotechnology association opposes Danish register.” August 20. <https://chemicalwatch.com/16106/nanotechnology-association-opposes-danish-register>

³⁴⁷ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

Compared with the enormous efforts devoted to the previous lobbying battle for REACH (for example, a wide range of CSOs—environmental, consumer, health and women’s groups— have mobilized 22,000 citizens in signing the Declaration for a Toxics-Free future in 2003³⁴⁸), only a relatively small number of CSOs continued to address nano-related issues. An interviewee noted that, *«(registry) was more consumer issues. So consumer associations work on it more than environmental CSOs.»*³⁴⁹ Lacking of bottom-up support and mobilization, *«a movement remains rudimentary and fails to build up the bargaining power required to have any substantial impact»* (Seifert and Plows 2014).

4. Nanomaterials in REACH: a long and unfinished story

REACH, the EU flagship chemical regulation, has entered into force on 1st June, 2007. Whether and how REACH could appropriately address nanomaterials has been heatedly debated over the past decade. CSOs have been united under the slogan ‘no data, no market’, as envisaged by REACH.

4.1. CSOs: a ‘nano patch’ to address the loopholes of REACH

Invited to take part in the CASG-nano, CIEL had the opportunity to closely communicate with other stakeholders. It came to realize that *«there were issues not only in implementation, but also in the main text of REACH.»*³⁵⁰ Other CSOs also showed concerns about the inadequacy of the REACH provisions, for example, the absence of a definition in the REACH text, inadequacy of tonnage thresholds, inadequate implementation of phase-in rules for the vast majority of nanomaterials, etc. However, no concrete solution has been put forward. This situation enabled CIEL, and later ClientEarth and BUND, to drive the discussion into a new phase. It was against this backdrop that the idea of adding a ‘nano patch’ to REACH developed. According to an interviewed policy officer of CIEL,

³⁴⁸ Greenpeace. 2003. “Protect us from hazardous chemicals: European coalition presents Declaration for a Toxics Free Future.” July 8. <http://www.greenpeace.org/international/en/news/features/coalition-presents-declaration/>

³⁴⁹ Interview with Dania CRISTOFARO, Policy Officer of ECOS, 21/10/2014

³⁵⁰ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

“we need to go beyond just asking more to be done. It is not enough to identify the gaps. It is important to propose the solution.”³⁵¹

The year of 2012 has witnessed the publication of several well-documented reports by CSOs (EEB & ClientEarth 2012; Azoulay 2012). These reports identified the loopholes of REACH in regulating nanomaterials and put forward concrete proposals to bridge the regulatory gap. Believing it to be the simplest and most efficient way to adapt REACH to the specificity of nanomaterials, and to make existing regulation ‘nano fit’, CSOs actively disseminated the idea of ‘nano patch’. That’s to say, to add a stand-alone legislation for the registration of nanosubstance to existing REACH legislation (Azoulay and Buonsante 2012). This proposal was welcomed and supported by other CSOs, such as EEB³⁵², the Danish Ecological Council, and Swedish Society for Nature Conservation (Azoulay and Tuncak 2014; The Danish Ecological Council 2012).

CSOs have joined their efforts in spreading the idea of ‘nano patch’. CIEL and ClientEarth played the role of providing legal knowledge and analyses. According to the interviewed policy officers of the two CSOs put it,

“We do not have the capacity to do big campaigns. We give other organizations something to focus on, then they can use it to do communication...By being useful to all of the players, that is something which makes us very strong.”³⁵³

“(We) use law to trigger changes... The role of us is to support the demands of campaigning organizations and provide some intelligence and knowledge.”³⁵⁴

³⁵¹ Ibid.

³⁵² EEB (2014) Annual report 2012.

<http://www.eeb.org/EEB/?LinkServID=E6EF9887-5056-B741-DB89351B012180C6>.

³⁵³ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

³⁵⁴ Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

CSOs like EEB and BUND, who have wide networks with their member organizations, provide grassroots support to disseminate the idea of ‘nano patch’³⁵⁵. For example, EEB claimed to have intensified its work on nanomaterials within REACH in 2012³⁵⁶. By organizing workshop, phone conferences, annual meetings, etc., EEB nano working group bring together interested CSOs, which greatly facilitate and enhance their coordinated action.

4.2. Some Member States support the proposal of ‘nano patch’

After searching the database, 13 articles provided by Chemical Watch contained the key word ‘nano patch’. A brief review of these articles enables me to see the different reaction of stakeholders towards this proposal. On the one hand, ‘nano patch’ has received criticism of industries. For example, NIA accused CSOs of trying to *«fix something that is not broken.»*³⁵⁷ The EC believed that it was more important to get REACH work instead of drawing up a new co-decision legislation, which may take a long time (at least five years)³⁵⁸.

By contrast, the proposal of ‘nano patch’ received the support of other CSOs³⁵⁹. It also provided inspiration to the EP³⁶⁰ and other agencies. For example, Kemi released a draft proposal to amend REACH, which resembled CSOs’ proposal.³⁶¹ An interviewee of ClientEarth introduced that *«after the ideas of ‘nano patch’, more and more we started to have Member States come forward with their own ideas and*

³⁵⁵ EEB 2012 annual report

<http://www.eeb.org/EEB/?LinkServID=E6EF9887-5056-B741-DB89351B012180C6>

³⁵⁶ EEB Work Programme & budget 2013

<http://www.eeb.org/?LinkServID=959FBCF1-5056-B741-DB956F815688ACED&showMeta=0&aa>

³⁵⁷ Chemical Watch. 2012. “DG Enterprise, industry deny REACH unable to regulate nanomaterials.” November 14. <https://chemicalwatch.com/12903/dg-enterprise-industry-deny-reach-unable-to-regulate-nanomaterials>

³⁵⁸ Detailed comments on the justification given for a ‘nano-patch’ legislation. Ref. Ares(2013)16575 - 08/01/2013

³⁵⁹ For example, the Swedish Society for Nature Conservation (SSNC) claims to fully support the ‘nano patch’ approach to adjusting REACH to nanomaterials

³⁶⁰ Green MEP Satu Hassi proposed a ‘mini-REACH’ at the workshop on the second regulatory review on nanomaterials

³⁶¹ Chemical Watch. 2013. “Sweden wants REACH to be adapted for nano: Kemi draft proposal introduces 10kg threshold”. April 10. <https://chemicalwatch.com/14442/sweden-wants-reach-to-be-adapted-for-nano>

proposals to change legislation.» ³⁶² David Azoulay, a policy officer of CIEL, argued that *«it would not be a crazy NGO idea, but also supported by other stakeholders.»* ³⁶³

Most importantly, some competent authorities of Member States considered ‘nano patch’ to be a workable policy option. As a reportage of Chemical Watch put it, *«the idea (‘nano patch’) has the support of some Member States.»* ³⁶⁴ Norway Climate and Pollution Agency highlighted the necessity to adapt REACH to address nanomaterials³⁶⁵. In March 2012, the Dutch environment ministry organized a nanomaterials policy conference entitled *Choices for Safety* in The Hague. This conference brought together delegates from 14 Member States and other stakeholders to consider the roadmap for EU nano policy. The Chairs’ conclusions identified two complementary ways forward: (1) amending the relevant annexes and guidance documents of REACH in 2012 and (2) considering a nano patch in parallel and referring to REACH before 2014³⁶⁶.

One month later, regulatory authorities of Norway sent a letter to the EU regulators, singling out for explicit mention that *«the possibility to add a ‘nano patch’ to the regulation would specify how REACH tools and provisions should be applied with respect to nanomaterials.»* ³⁶⁷ Such a suggestion was in conformity with the proposal of CSOs. The official press release of Norway considered the ideas expressed in the letter as a sign of “offensive nano-politics”³⁶⁸. CSOs have successfully transformed ‘nano patch’ into a workable policy option, winning resonance among national regulatory authorities who share similar priorities and

³⁶² Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

³⁶³ Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

³⁶⁴ Chemical Watch. 2012. “Which way now for nanos and REACH?” Global Business Briefing, July/August 2012. <https://chemicalwatch.com/11693/which-way-now-for-nanomaterials-and-reach>

³⁶⁵ Chemical Watch. 2012. “Norway suggests adaptation of REACH to address nanomaterial risk.” January 18. <https://chemicalwatch.com/9680/norway-suggests-adaptation-of-reach-to-address-nanomaterial-risk>

³⁶⁶ Nanomaterials Policy Conference Choices for Safety – RIVM. 8-9 March 2012.

<http://rivm.nl/dsresource?type=pdf&disposition=inline&objectid=rivmp:119609&versionid=&subobjectname=>

³⁶⁷ Royal Norwegian Ministry of the Environment. Effective regulation of nanomaterials--Comments by Norway. 23 April 2012.

https://www.regjeringen.no/globalassets/upload/europaportalenimages/2999/innspill_nanomaterialer_23april2012.pdf?id=2314582

³⁶⁸ <https://www.regjeringen.no/nb/aktuelt/norge-tar-til-orde-for-offensiv-nano-p-2/id693342/>

policy goals. The convergence of interests has contributed to the forming of a ‘green alliance’, which pressed the Commission to introduce more stringent proposals on nanomaterials.

4.3. The second regulatory review triggers new momentum of debates

Tensions were brought to a head in 2012 when REACH and the regulatory aspects of nanomaterials came under review. Discussions have gained new momentum and have taken several steps forward.

Before the EC published the second regulatory review of nanomaterials, the conference held in the Hague had seen broad support among participants for ‘urgent action’ on the regulation of nanomaterials³⁶⁹. Later in June 2012, under the coordination of Joop Atsma, the Dutch Secretary of Infrastructure and the Environment, a joint letter was initiated together with other ten Member States and (the then) candidate country, Croatia, urging the Commission to fill the regulatory gap *«either through an amendment of REACH or through supplementary legislation»* (Joop 2012). As an interviewed official of the Netherlands put it,

“Member States have tried over and over again to persuade the Commission to adapt the legislation. We saw the ongoing split between DG Enterprise and DG Environment, and we hope our actions could help find a solution.”³⁷⁰

According to the UK Department for Environment, Food and Rural Affairs (Defra), the UK did not sign this letter as it believed that the demand for regulatory adaptations *«was not based on evidence of risk.»*³⁷¹ Shortly, Green MEP Carl Schlyter sent a letter to the Commission and echoed the demands of ten Member States. He

³⁶⁹ Chemical Watch. 2012. “Which way now for nanomaterials and REACH?.” Global Business Briefing, July/August 2012. <https://chemicalwatch.com/11693/which-way-now-for-nanomaterials-and-reach>

³⁷⁰ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

³⁷¹ Chemical Watch. 2012. “Dutch lead call for urgent EU action on nanomaterials: Ten Member States, Croatia and key MEP call for action ahead of Commission’s.” July 11. <https://chemicalwatch.com/11720/dutch-lead-call-for-urgent-eu-action-on-nanomaterials>

highlighted that the EC failed to meet the expectations of the Parliament, alarming that the EC *«risk to seriously jeopardize public confidence in nanomaterials.»*³⁷² A green alliance has been gradually taking shape, which has been putting pressure on the Commission to enhance the regulatory framework for nanomaterials.

Despite repeated demands to remedy the shortcomings of REACH, the Commission's second regulatory review drew the conclusion that *«REACH sets the best possible framework for the risk management of nanomaterials»* (EC 2012b). But the EC made a compromise by proposing modifications in some of the REACH Annexes and asked ECHA to revise guidance documents. This conclusion, while supported by industry³⁷³ and Member States such as the UK, was subject to opposition from the 'green alliance'.³⁷⁴

A joint letter of ten CSOs, which included environmental organizations, consumer associations, trade unions and women's organizations, criticized the Commission for putting the interests of industry ahead of the well-being of society (EEB et al. 2012). An interviewee of ANEC described the background of this joint action, *«That was an opportunity that we joined forces and we together (drafted a letter) with a number of organizations. Generally our views were very much in line.»*

³⁷⁵ In 2013, another two joint letters of CSOs were released: one letter was sent to the ENVI to echo CSOs' concerns regarding the second regulatory review³⁷⁶; Another one questioned the conclusions of a letter by Titanium Dioxide Manufacturers association, asking the EC to *«review the Classification and Labelling notifications... classifying ultrafine/nano TiO₂ as a possible carcinogen by TiO₂ producers.»*³⁷⁷

³⁷² Carl Schlyter. 2012. "Second regulatory review of nanomaterials. To Mr. J.Potočník." European Parliament.

³⁷³ Industry associations (2013) Europe needs safe and innovative nanotechnologies and nanomaterials. <http://www.cefic.org/Documents/PolicyCentre/Nanomaterials/Industry-messages-on-nanotechnologies-and-nanomaterials-June2013.pdf>. Accessed: 27 June 2013

³⁷⁴ Chemical Watch. 2012. "NGOs, industry split over EU nano regulatory review." October 3. <https://chemicalwatch.com/12514/ngos-industry-split-over-eu-nano-regulatory-review>

³⁷⁵ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

³⁷⁶ EEB et al. 2013. "NGO joint letter to ENVI Committee." January 09. <http://www.anec.eu/attachments/ANEC-ML-2013-0005.pdf>

³⁷⁷ EEB et al. 2013. "Stakeholders' Response to Titanium Dioxide Manufacturers association's letter on Titanium dioxide." September 17.

A policy officer of ETUI further expressed her concerns about the future generations of nanomaterials: *«the complexity, the legal, the ethical issues of the future generations are not even considered... They have gone beyond the regulatory capacities.»*³⁷⁸ While the Staff Working paper acknowledged that these future generation of nanomaterials *«are either at research or development stage or at an early stage of market development»* (EC 2012a, 10), no corresponding measures or planning have been introduced in that regard. This interviewee continued by pointing out that *«the engagement was there. But the EC's reaction did not meet the demands of worker protection, safety products on the market, and environmental protection.»*³⁷⁹ CSOs intensified their activities to press the Commission to take their demands into consideration.

The Parliament reacted to the second regulatory review by sending a letter through the chairman of ENVI. It welcomed the proposal regarding the modifications of Annexes but considered such measures “insufficient”. The EC was urged to *«initiate complementary legislation to overcome intrinsic limitations of the REACH regime with regard to nanomaterial.»*³⁸⁰ Green MEP Satu Hassi compelled the EC to fix the deficiencies of REACH with a stand-alone ‘mini-REACH’ for nanomaterials during the workshop on the second regulatory review of nanomaterials³⁸¹.

Several Member States expressed their doubts as to whether amendments to the REACH annexes would suffice, regretting that the Commission had not responded more substantially to their previous letter³⁸². These Member States reclaimed that two solutions should be taken into account in order to fill the regulatory gap: either to introduce new legislation on nanomaterials, either through changes to REACH main

<http://www.eeb.org/?LinkServID=24F72BC7-5056-B741-DBBA37E87CAC5E30>

³⁷⁸ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

³⁷⁹ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

³⁸⁰ ENVI Chairman: letter to the Commission. IPOL-COM-ENVI D (2013) 36547

<http://veillenanos.fr/wakka.php?wiki=NanoComEnviSept2013/download&file=20130718-Com-ENVI.pdf>

³⁸¹ Hassi S. 2013. “First reaction to the second regulatory review on nanomaterials.” European Commission workshop, Brussels. January 30

<http://ec.europa.eu/DocsRoom/documents/8128/attachments/1/translations/en/renditions/native>.

³⁸² European Commission. 2013. “11th meeting of competent authorities for REACH and CLP.” January 16 http://ec.europa.eu/enterprise/sectors/chemicals/files/caracal/minutes-121128-29_en.pdf.

text³⁸³. Considering the need to maintain the legal stability, the German federal authorities inclined to support the latter solution. Three German federal agencies published a report in January 2013, proposing adapting the main legal text of REACH as well as its annexes. Such a proposal was considered to be the third possible solution.

The proposal of Germany includes a series of amendments, including modification of the tonnage thresholds of REACH with the creation of simplified registration for all nanomaterials produced above 100 kg and more detailed registration requirement for all nanomaterials produced over 1 tonne per year, and a new annex detailing the quantity-dependent, and specific data requirements needed for nanomaterials³⁸⁴. This proposal was appraised by Austria's environment ministry as "a very good basis" for future discussions with regard to adaptations of REACH in regulating nanomaterials³⁸⁵. Considering the lack of progress, Member States attempted to influence the pace-setting of EU nano policy.

As a policy officer of ANEC puts it, *«the EC ran a little bit risk to upset a number of Member States. It was for the first time that I met a number of Member States attack the EC in a joint action (e.g. through releasing joint letter).»*³⁸⁶ The dissertation suggests that such a new phenomenon can be explained by the good network and cooperation established in previous debates on REACH, as well as the prominent stance that several proactive national competent authorities have adopted towards the topic of hazard chemicals and nanomaterials.

³⁸³ Chemical Watch. 2013. "EU countries question Commission's stance on nanomaterials regulation." March 19. <https://chemicalwatch.com/14178/eu-countries-question-commissions-stance-on-nanomaterials-regulation>

³⁸⁴ The Federal Institute for Occupational Safety and Health (BAuA), the Federal Institute for Risk Assessment (BfR) and the Federal Environment Agency (UBA). 2013. "Nanomaterials and REACH Background Paper on the Position of German Competent Authorities." <http://www.bfr.bund.de/cm/349/nanomaterials-and-reach.pdf>

³⁸⁵ Chemical Watch. 2013. "Member States consider road for EU nano policy." Global Business Briefing, March. <https://chemicalwatch.com/14159/member-states-consider-road-for-eu-nano-policy>

³⁸⁶ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

4.4. The EC proposes six policy options to modify REACH annex

At the press conference in Brussels which was to reveal the REACH 2013 registration deadline results, it was stated that among the 9084 registration dossiers, four substances have been registered as nanomaterials in 80 dossiers based on the preliminary assessment³⁸⁷. Six months later, the head of evaluation at ECHA openly asked companies to update their REACH dossiers to incorporate nanomaterials, as *«only around ten substances in our database that are indicated by registrants as nano.»*³⁸⁸ In light of the poor results gathered by REACH as well as mounting pressure from the ‘green alliance’, the EC launched a consultation on the modification of REACH Annexes on nanomaterials between June and September 2013. The public consultation proposed six policy options:

Option 1: a baseline position, to remain with the status quo;

Option 2: clarity option, aimed at clear description of the information required in the registration dossier for substances in nano form;

Option 3: soft law based on voluntary measures and guidance;

Option 4: additional measures, e.g. changes to the REACH annexes;

Option 5: changing the annexes to lighten the compliance burden in order to ‘focus on competitiveness and innovation’;

Option 6: full implementation of the measures in Option 2 and Option 4³⁸⁹

In response to the consultation, we could find the divergence between the industry and CSOs: while the former, represented by NIA and CEFIC, favored the fifth option, CSOs expressed their strong preference to Option 6³⁹⁰. EEB held a pessimistic view, arguing that the consultation focused more on costs and the

³⁸⁷ Follow this link to view the press conference (nanomaterials are mentioned from 38:01 until 38:37) <http://webcast.streamdis.eu/mediasite/Viewer/?peid=839e6802f828453896391d6e9ec7474a1d>.

³⁸⁸ Chemical Watch. 2013. “ECHA calls for nano data in REACH dossiers.” November 28. <https://chemicalwatch.com/17437/echa-calls-for-nano-data-in-reach-dossiers>

³⁸⁹ Chemical Watch. 2013. “EU nano group debates REACH annex options: NGOs concerned about proposal to reduce compliance for nanomaterials.” April 24. <https://chemicalwatch.com/14579/eu-nano-group-debates-reach-annex-options>

³⁹⁰ <http://veilleanos.fr/wakka.php?wiki=NanoReach>

effectiveness rather than safety and the urgency to register nanomaterials: *«little action will follow... As there is not enough political will for this to happen.»*³⁹¹ A policy officer of ANEC predicted that *«the real situation is probably either nothing or a lean version. Regarding REACH reviews, I believe the changes will be kept to the minimum. I do not think this would be a jump forward.»*³⁹² France supported an ‘ambitious’ regulation of nanomaterials, which went further than mere amendments of REACH Annex, with the precautionary principle applied³⁹³.

In the following years, the Commission has been dragging its feet in presenting proposals to amend the REACH annexes. The debates were brought into another stalemate. Member States voiced their anger over the long delay and “apparent lack of progress” during the CASG-nano meeting in March 2014³⁹⁴. A Swedish representative commented that the EC had “bad and disappointing track record”³⁹⁵. CSOs asked for the REACH thresholds to be lowered to 10 kg/year for registering nanomaterials (EEB et al 2014.).

Environment Ministers of some Member States (including Austrian, Belgian, Danish, German, French, Dutch and Swedish delegations, and Norway, and supported by the Croatian and Luxembourg delegations)³⁹⁶ recalled the letter that they sent in July 2012. They urged the new EC to beef up the regulation of nanomaterials under REACH³⁹⁷, through *«adaptations of REACH and other EU legislation to take account*

³⁹¹ Chemical Watch. 2013. “Guest column: nano & REACH, Tatiana Santos, EEB.” Global Business Briefing, July/August 2013. <https://chemicalwatch.com/15813/guest-column-nano-reach-tatiana-santos-eeb>

³⁹² Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

³⁹³ Réponse des autorités françaises à la consultation publique de la Commission européenne relative à la révision éventuelle des annexes du règlement REACH pour les adapter aux nanomatériaux. http://www.sgae.gouv.fr/webdav/site/sgae/shared/04_Consultations_publicques/Reponse_FR2013/20130916_ReponseFR_REACH_nanomatériaux.pdf Septembre 2013.

³⁹⁴ Chemical Watch. 2014. “Sweden presses European Commission on nano proposals.” March 26. <https://chemicalwatch.com/18852/sweden-presses-european-commission-on-nano-proposals>

³⁹⁵ Chemical Watch. 2014. “European Commission presents ‘non paper’ on nano.” May 15. <https://chemicalwatch.com/19677/european-commission-presents-non-paper-on-nano>

³⁹⁶ These Member States are: Austria, Belgium, Denmark, Germany, France, the Netherlands and Sweden, supported by those from Norway, Croatia, Luxembourg and Greece

³⁹⁷ ENDS Europe. 2014. “Ministers tell Brussels to strengthen chemical regulation.” October 30.

of nanomaterials, as well as the development of an EU database on nanomaterials.》

³⁹⁸ The executive director of ECHA also asked the Commission to “speed up nano work” before the 2018 registration deadline of REACH³⁹⁹.

More recently, the EU Environment Commissioner Karmenu Vella, under growing demand for addressing chemicals-related issues, claimed that *《new rules providing clarity on the registration requirements for nanomaterials will be ready for adoption early in 2015 and will enter into force.》*⁴⁰⁰ Interviewed CSOs like ECOS and the Danish Ecological Council claim that they will continue their work to make the modification of Annex as effective as possible. For example, as a policy officer of ECOS puts it, *《we have enough understanding about how to improve the current situation. We know something that we did not know three years ago. We are well placed to push the EC to do this, and also we are back up by the EP.》*⁴⁰¹ Communication and debates have actually contributed to ‘an intellectualizing effect’ among CSOs and other stakeholders.

A comparison of two regulatory reviews on nanomaterials drafted by the EC enables us to see how the regulatory framework on nanomaterials has developed and advanced in the intervening years. From noting *《current legislation covers in principle the potential health, safety and environmental risks in relation to nanomaterials》* (EC 2008e) to *《the EC envisages modifications in some of the REACH Annexes》* (EC 2012b), it is clear that some achievements have been achieved by CSOs. At the time of writing, the negotiation is still going on, and it remains to be seen how far-reaching the REACH annex changes will be and to what extent the new rules will meet the expectation of Member States, CSOs and the Parliament.

³⁹⁸ Chemical Watch. 2014. “EU environment ministers tell Commission to prioritise chemicals actions.” December 18.

<https://chemicalwatch.com/22347/eu-environment-ministers-tell-commission-to-prioritise-chemicals-actions>

³⁹⁹ Chemical Watch. 2014. “Dancet asks EU Commission to speed up nano work.” December 4.

<https://chemicalwatch.com/22158/dancet-asks-eu-commission-to-speed-up-nano-work>

⁴⁰⁰ Chemical Watch. 2014. “REACH nano registration rules coming next year, says Vella.” December 18.

<https://chemicalwatch.com/22345/reach-nano-registration-rules-coming-next-year-says-vella>

⁴⁰¹ Interview with Dania CRISTOFARO, Policy Officer of ECOS, 21/10/2014

4.5. Innovation vis-à-vis precaution: different rationales behind actors' stance

During interviews with regulators, a DG ENTR and a DG ENV held similar opinion about the necessity to maintain the legal stability during current stage. They showed concerns that opening up REACH could bring serious negative consequences. For example, as a DG ENTR noted,

“making a proposal to amending REACH to the Council and the Parliament, it is likely to trigger a very big discussion. It is much easier to have discussions after 2018. Now is a critical period and stability is needed. That’s why we did not accept ‘nano patch’... We are not excluding it, but not at this moment, that is kind of policy choices.”⁴⁰²

A DG ENV shared with this view, arguing that, *«if we open REACH, we will not close it for the next five or ten years. What comes out is everyone’s guess.»*⁴⁰³ These arguments reflect a logic which favors economic development and competitiveness over precaution and safety.

To conclude, in the discussions to make REACH “nano fit”, CSOs have been instrumental in putting forward concrete proposals, inspiring and mobilizing a good number of regulators to support their advocacy. An interviewed DG ENTR claimed that *«CIEL was very much behind the calls of ten Member States.»*⁴⁰⁴ According to a DG ENV, *«these consistent pressure helped us to progress. We have not really taken something up directly. Certainly we got inspirations... These would not even happen if there was no pressure from Member States, as well as from the EP and CSOs.»*⁴⁰⁵ Although the Commission did not finally adopt ‘nano patch’, CSOs’ activities have

⁴⁰² Interview with a DG ENTR, 19/06/2014

⁴⁰³ Interview with a DG ENV, 20/06/2014

⁴⁰⁴ Interview with a DG ENTR, 19/06/2014

⁴⁰⁵ Interview with a DG ENV, 20/06/2014

provided important grassroots support, acting as a ‘pool of reasons’ for the regulatory authorities. After years of debate and negotiation, the positions of different stakeholders are becoming clearer. And it now turns to the Commission to make a balance and put forward new plans.

B. Examining CSOs’ influences on the economic system

1. Beyond the hype: claims of benefits more realistic

‘Nano’ was reported to be an advertising buzz word or a selling point for funding agencies (Brumfiel 2006). However, such an effect of ‘bandwagon’ did not last long. Before long a scholar observed that *«gloss is already beginning to fade»* (Gewin 2006), which was partly due to the incident of Magic Nano. A scientist of the Woodrow Wilson International Center for Project on Emerging Nanotechnologies noted that *«some controversy surrounding nanotechnologies has led manufacturers to remove any mention of nanomaterials from their products»*, even driving the R&D of nanotechnologies ‘going underground’⁴⁰⁶. This was true particularly for some sensitive sectors. For example, a scholar observes that some industries have been holding back the introduction of nanofood for fear of being targeted by consumer advocacy groups (Duncan 2011).

Three DGs SANCO highlighted in a report that *«the first signs of public anxiety have appeared... We have reached a critical time which makes or breaks nanotechnology. Now is the time for building public trust»* (Garkov, Bontoux, and Martin 2010). For fear of a potential consumer boycott or negative public perception towards nanotechnologies, industries act in a more cautious manner.

A reports indicates that nanotechnology is still in the pre-industrialization phase. According to the coverage of *Le Monde*, Robert Plana, the former Nanotechnologies Program Director of National Agency for Research, France, pointed out that, *«the*

⁴⁰⁶ EurActiv. 2009. “Nanotech claims ‘dropped’ for fear of consumer recoil”. June 15.
<http://www.euractiv.com/innovation-enterprise/nanotech-claims-dropped-fear-con-news-221915>

expected big boom is continually delayed... The announcements were a little bit rapid and the major economic impact of nanotechnologies would not be achieved before 2020.»⁴⁰⁷ Similarly, the second resolution of ETUC noted that *«the development of nanotechnologies in a number of areas has taken considerably longer than initially claimed by its proponents»* (ETUC 2010). According to an interviewee of ETUI, although there is still development in terms of research on different potential uses of nanotechnologies, *«it is much slower or much less than what it appeared to be from the early ‘hype’ stage.»*⁴⁰⁸

2. Industries assume corporate responsibilities

As awareness raising activities have been carried out by CSOs since the initial stage of the R&D process of nanotechnologies, ‘alertness’ could be developed bottom up among workers, consumers, and the wider public. This ‘alertness’ holds the potential to render the industry more self-aware and accountable. As an interviewed DG SANCO put it,

“there are some companies who are actually proactive about the risks of nanomaterials. They do more than what the regulation requires. In a sense, by having this debate, by basically framing the issues differently by saying, ‘we want benefits with a minimum of certainty about the innocuity of nanomaterials and nano-products.’ We actually create a more levelled playing field.”⁴⁰⁹

One typical example is the decision of *Dunkin’ Donuts*, an American global doughnut company, to remove titanium dioxide from its powdered donuts for fears that it might contain toxic nanomaterials⁴¹⁰. Such an announcement was committed as

⁴⁰⁷ Original text: «le grand boom espéré est sans cesse retardé... les annonces ont été un peu rapides et l’impact économique majeur des nanotechnologies n’est pas attendu avant 2020» .

Plana, Robert. 2013. “Les nanotechnologies, une filière entre pro-messes et interrogations.” *Le Monde*, April 10 http://www.lemonde.fr/sciences/article/2013/04/10/les-nanotechnologies-une-filiere-entre-promesses-et-interrogations_3151370_1650684.html

⁴⁰⁸ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

⁴⁰⁹ Interview with a DG SANCO, 20/06/2014

⁴¹⁰ The Guardian. 2015. “Dunkin’ Donuts to remove titanium dioxide from donuts.” March 11.

part of a reaction to the intense pressure by the civil society. A coalition of CSOs from U.S. and other regions (e.g. CIEL from Geneva) jointly released a recommendation, suggesting companies *«avoiding or reducing the risks from nanomaterials in food products and packaging.»*⁴¹¹ An interviewed policy officer of FoE Australia and U.S. noted that it was one success that they've gained after conducting a lot of communication and engagement activities with nanotechnology companies⁴¹².

According to the reportage of *The Guardian*, only a handful of commercial food products contain artificial nanoparticles to date⁴¹³. And the use of nanotechnology in food has been very limited, in part due to *«people's reluctance to see technology tampering with what they eat.»*⁴¹⁴ French scholars note that *«the expansion of the economic system, especially that of the industry, confronts a limitation»*⁴¹⁵; and decision makers have been hesitating to promote an over rapid development of nanotechnologies faced with an increasingly demanding civic sphere (Chaskiel 2014; Chaskiel and Suraud 2014). In this respect, both nanotechnologies itself and the influences of CSOs are 'evolutionary' rather than 'revolutionary'.

C. Conclusion

CSOs have opportunities in mobilizing counterknowledge and drawing on the pertinent forms of expertise to make its own translations (Habermas 1996, 372). The fifth chapter centers around the question with regard to whether, how, and to what extent the considerations of EU level CSOs, as kind of 'counterknowledge', have been incorporated into the institutionalized procedures. As Habermas considers 'law' as a transformer between system and lifeworld, and between administrative power and

<http://www.theguardian.com/sustainable-business/2015/mar/11/dunkin-donuts-to-remove-whitening-agent-from-donuts>

⁴¹¹ Coalition of NGOs Releases Nanotech Recommendation Reflecting Concern About Use of Nanotech In Foods. March 12, 2015. <http://www.iatp.org/files/Nano%20Policy%20Press%20Release%2020150309%20final.pdf>

⁴¹² Interview with Ian Illuminato, policy officer of FoE Australia and U.S., 23/03/2015

⁴¹³ The Guardian. 2013. "Nanotechnology offers small food for thought." April 26. <http://www.theguardian.com/what-is-nano/nanotechnology-small-food-for-thought>

⁴¹⁴ The Guardian. "Nanotech's role in feeding the planet." October 22. <http://www.theguardian.com/what-is-nano/nanotech-feeding-the-planet-nanotech-s-role-in-feeding-the-planet>

⁴¹⁵ Original text: *«l'expansion du système économique, plus particulièrement de l'industrie, se heurte à une limitation»*.

communicative power, this chapter pays more attention to the influences that CSOs have on the political system. Their impacts on the economic system have also been briefly introduced.

Section A provides a detailed review of the policy developments regarding three layers of legislation on nanomaterials at the EU level: product-specific legislation, register of nanomaterials and nanomaterials in REACH. Some concrete results (e.g. nano-specific provisions in sectoral legislation, several Member States' initiatives of national nano register, the EC' decision to modify REACH annex) have been achieved by CSOs. These new developments, to a varying degree, have offered an interesting entry point for us to look at the process of transformation from 'influence' into 'communicative power'.

In the first layer of legislation, various nano-specific regulatory amendments have been inserted into several pieces of law (e.g. cosmetics, food, biocide), ranging from labeling, inclusion of a nanomaterial definition, notification, specific safety assessment, etc. A review of the policy-making process enables us to see the different policy preference and commitment of the EU regulators: while the Commission played a pro-industry approach and failed to make good use of its right of initiative, the Parliament held an ambitious and precautionary stance towards nanomaterials. For example, green MEPs had tried to ban certain nanomaterial in EEE and the use of nanomaterials in food, which was in conformity with CSOs' advocacy. CSOs not only participated in the policy-making process, but also watched and scrutinized the implementation and enforcement of existing provisions on nanomaterials in sectoral regulations.

When it comes to the second layer of legislation, the proposal regarding an EU-wide register has been rejected by the EC at the end of 2014. In despite of the active roles that CSOs have played in awareness-raising, education and mobilization, the pressure that they exerted on the Commission has turned out to be insubstantial.

Previous academic analyses highlighted the ‘weakness’ of CSOs, noting that low public responsiveness explained to a large extent why CSOs lacked the ‘bargaining power’ required to trigger a new momentum (Miller and Scrinis 2010; Seifert and Plows 2014). To push reflection a step forward, the present dissertation suggests that the capacity of CSOs to *«catalyze the growth of autonomous public spheres»* (Habermas 1996, 488) should not be ignored when evaluating their impact on formal decision-making. Considering the uprising national initiatives introduced by France, Denmark and Belgium, as well as other Member States’ inclination for an EU nano register (e.g. Germany, the Netherlands, Sweden), the involvement of CSOs has to some extent contributed to shifting the power distribution among the EU governing institutions and Member States.

With regard to the debate surrounding “nanomaterials under REACH”, CSOs have been actively advocating the idea of adding a ‘nano patch’ to fix the loopholes of REACH. Although the EC has been dragging its feet in introducing more ambitious proposals (e.g. introducing a new piece of law, adding a ‘nano patch’ to REACH, or changing the main texts of REACH), EU level CSOs have succeeded in mobilizing a wide range of regulatory authorities, which include tens of Member States and the Parliament, to support their demands. A ‘green alliance’ is taking shape, which pushes for more stringent regulation on nanomaterials under the precautionary principle.

In Section B, the spotlight is directed toward CSOs’ influences on the economic system. As the above-mentioned examples demonstrate, CSOs, through resonant and autonomous public spheres, could exert an influence on the political and economic system “in a siege-like manner”. Their gains are better secured by other influential members of the green alliance who share similar policy beliefs. For example, Sweden has been actively promoting its “non-toxic environment” goal at the EU level. We are still short of knowledge about the specific national context of nanotechnology in the above-mentioned ten Member States. In this regard, some extended studies could be valuable.

‘Upstream public engagement’ could actually add vibrancy to the public spheres and facilitate the formation of communicative power. We should not bear a too narrow view on the effectiveness and value of engagement exercises, which is not confined to direct output on short-term policy results. Indirect ones, such as its value of cultivating a culture of external scrutiny in science and technology governance, should also be taken into consideration. Scholars highlight the necessity to consider the wider performative character of such forms of engagement: *«what they bring into being and how they are productive (but also reflective) of social and institutional arrangements»* (Horst and Irwin 2010). Jasanoff also underlines that *«political culture must be seen not only as resilient and resistant to change, but also as constructed, flexible and subject to renewal»* (Jasanoff 2005, 22). The specific dynamics in the public sphere around nanotechnologies are both shaping and shaped by the EU governance on emerging technologies.

Chapter VI: Moving ahead: challenges & opportunities

This chapter attempts to move ahead to explore the challenges as well as opportunities that CSOs could have in contributing to future debates on nanotechnologies and risk controversies. As discussed in the previous chapter, the regulatory landscape of nanotechnology in the EU continues to shift and is marked by the increasing divergence between the ‘green alliance’ and the ‘pro-industry alliance’.

As Peterson puts it, *«highly politicized environmental policy debates ... can be viewed as battles between competing advocacy coalitions—broadly advocating environmental protection vs. industrial interests—for influence within EU environmental policy networks»* (Peterson 2004, 110). It is worth noting that the boundaries between the two coalitions are not clear cut when we examine the case of nanotechnologies. It is dependent on the issues and topics discussed. For example, Germany opposed labeling nanomaterials for cosmetics and played a role of ‘foot-dragging’ in the debates on the EU cosmetic regulation⁴¹⁶. Meanwhile, Germany acted as a ‘pace-setter’ in pushing for an EU-wide nano register. Norbert Roettgen, Environment Minister of Germany, openly supported the establishment of a European nanoproduct register.⁴¹⁷ The blurring of boundaries illustrates well the changing dynamics and flow of power distribution among the EU governing institutions and Member States.

As Habermas puts it, *«in periods of mobilization, the structures that actually support the authority of a critically engaged public begin to vibrate. The balance of power between civil society and the political system then shifts.»* (Habermas 1996, 379). In the case of nanotechnologies, CSOs’ gains are better secured by other

⁴¹⁶ EurActiv. 2009. “Germany opposed ‘nano’ label for cosmetics.” November 24. <http://www.euractiv.com/enterprise-jobs/germany-opposed-nano-label-cosmetics/article-187583>

⁴¹⁷ Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety Press Releases. 2011. “Röttgen: We should use the opportunities of nanotechnology”. Berlin, February 02. http://www.bmub.bund.de/en/press/press-releases/detailansicht-en/artikel/roettgen-we-should-use-the-opportunities-of-nanotechnology/?tx_ttnews%5BbackPid%5D=1892&cHash=d5c0e76881868f88277ea69991e19d1b

influential members of the green alliance who shares similar policy beliefs and values. This chapter seeks to explore the prospects for CSOs' engagement in future debates.

A. 'Green alliance' puts nano high on the policy agenda

Apart from following the regulatory process of nanotechnologies, CSOs have also worked to mobilize regulatory authorities to bring and maintain nanomaterials on the EU policy agenda. The 7th Environment Action Programme (EAP) *Living Well within the limits of our planet* will be guiding the EU environmental policy to be achieved until 2020. CSOs have seized the opportunity and lobbied regulatory authorities to integrate nanomaterials and other chemical substances into this programme.

The Commission launched the Consultation on the *EU Environment Policy Priorities for 2020: Towards a 7th EU EAP* between March and June 2012. Competent authorities of Member States as well as CSOs provided their input, identifying chemical issues as policy priorities. German Federal Environment Agency pointed out that nanomaterials and nanotechnologies, given little knowledge about its exposure to humans and the environment, should be addressed in the new EAP. It further stressed that not only the first generation, but also advanced nanomaterials need to be taken into consideration⁴¹⁸. Competent authorities of Norway suggested that «*a prioritized area should be to work towards a toxin-free environment.*»⁴¹⁹

⁴¹⁸ Commission Consultation on the EU environment policy priorities for 2020: Towards a 7th EU Environment Action Programme. German Federal Environment Agency: Additional comments to our replies to the questions of the Commission's questionnaire. 31 May 2012
<http://ec.europa.eu/environment/newprg/pdf/Position%20Papers%20received/DE%20-%20Federal%20Environment%20Agency.pdf>

⁴¹⁹ Commission Consultation on the EU environment policy priorities for 2020: Towards a 7th EU Environment Action Programme. Submission from Norway.
<http://ec.europa.eu/environment/archives/newprg/pdf/Position%20Papers%20received/Norway.pdf>

Apart from independent contribution to the consultation (EEB⁴²⁰, ANEC⁴²¹, etc.), twelve CSOs identified nanomaterial as one of the four cases of concerns (the other three cases are: EDCs, chemical mixtures and SVHC) in a joint letter, asking the EU Environment Ministers to introduce measures in the 7th EAP⁴²². Before the EU Environment Council Meeting on 17th December, 2012, BEUC wrote a letter to the Danish Environment Minister Ida Auken⁴²³; EEB wrote a letter to the Environment Ministers of EU Member States, demanding them to take the safety concerns from nanomaterials into account⁴²⁴. As a policy officer put it,

“we also lobbied, together with environmental CSOs, the EP to make changes in the draft of the 7th EAP. When it was adopted, there were also some specifications on what has to be done with regard to nanomaterials. So we can use this reference to call on the Commission for further activities in the next five years.”⁴²⁵

Adopted in November 2013, the final version of the 7th EPA dealt with nanomaterial specifically, defining it as one of the issues that should be addressed with priority: *«the safety and sustainable management of nanomaterials and materials with similar properties will be ensured as part of a comprehensive approach involving risk assessment and management, information and monitoring»* (Official Journal of the European Union 2013). The programme also envisaged an Union-wide database to increase the transparency and regulatory oversight of nanomaterials.

⁴²⁰ EEB. 2012. “Position on the 7th Environmental Action Programme ‘Staying within ecological boundaries’.” May 31. <http://ec.europa.eu/environment/archives/newprg/pdf/Position%20Papers%20received/EEB.pdf>

⁴²¹ ANEC. 2012. “ANEC on crucial goals for the 7th Environmental Action Programme.” June 01. <http://ec.europa.eu/environment/archives/newprg/pdf/Position%20Papers%20received/ANEC%20-%20Consumers%20in%20Standardisation.pdf>

⁴²² EEB et al. 2012. “Joint NGO letter to Environment Ministers on 7th EAP.” April 05. WECF, EEB, HEAL, PAN-Europe, ClientEarth, HCWH Europe, ChemSec, CHEM Trust, RES, CCOO, Swedish Society for Nature Conservation, The Danish Ecological Council. <http://www.eeb.org/EEB/?LinkServID=1F87180E-5056-B741-DBE8777841C966FF>

⁴²³ BEUC. 2012. “letter to Ida Athe UKen og Martin Lidegaard.” December 13. http://taenk.dk/sites/taenk.dk/files/brev_om_7._miljoehandlingsprogram.pdf

⁴²⁴ EEB. 2012. “Input to the EU Environment Council Meeting, Brussels.” December 17. <http://www.eeb.org/?LinkServID=F7FE0E37-5056-B741-DB8B8008BAA57F1C&showMeta=0&a>

⁴²⁵ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

1. Member States: ‘pace-setters’ in governing nanomaterials

Scholar summarizes three categories in describing the different roles that Member States play in Europeanization: pace-setting, foot-dragging and fence-sitting (Börzel 2002). And he lists six Member States in the category of ‘pace-setters’ in dealing with European environmental policies: Germany, the Netherlands, Denmark, Sweden, Austria, Finland. We can see that these six countries are also members of the ‘green alliance’ discussed above which have been actively engaged in policy debates on chemical issues as well as nanomaterials. Previous literature examines the trends to *«institutionalize and professionalize public engagement with science»* (Chilvers 2012) in some European countries. During this process, the Danish Board of Technology of Denmark, the Rathenau Institute of the Netherlands, and the Center for Technology Assessment of Switzerland, etc., have played important roles.

Apart from general commitment to environmental issues, each Member State started to get involved in nano policy debates under different contexts. Scholars call for a more sophisticated, often case specific, flexible understanding of the social context of a given issue (Cutcliffe, Pense, and Zvalaren 2012). This section will introduce the activities of several pace-setting Member States, exploring how CSOs’ involvement, together with other factors (governance culture, political priorities, etc.), contribute to shaping the specific feature of the dynamics in each country.

1.1. France

With regard to policy debates on nanomaterials, France has set several precedents: the French government took a leading role to launch a nationwide debate on nanotechnologies during October 2009 and February 2010⁴²⁶; Avicenn is the first CSO worldwide that addresses specifically the issues of nanomaterials; France is also the first EU Member State which adopted a mandatory reporting scheme on nanomaterials, which has entered into force in January 2013. And it is also interesting

⁴²⁶ See the website of CNDP: <http://cpdp.debatpublic.fr/cdpd-nano/debat/cndp.html>

to see that campaigns against nanotechnologies led by activist groups have also been the most severe. France is at the forefront in governing nanomaterials. Is there probably a link with the activities of CSOs?

While it is not difficult to pose the question, efforts to answer it lead to analytic difficulties: due to the complexity of demonstrating causality, it is hard to examine influences or impact, as there are so many interrelated factors that could actually play a role. We can't draw a direct link between PMO's campaigns with the proactive initiatives that the French government has taken. However, the dissertation suggests that the anti-nanotechnology activities led by PMO act as a kind of 'spark', which brings the debates on nanomaterials to the forward and thus receive higher visibility. For example, the militant stance of PMO activists is one of the reasons behind Grenoble authorities' decision to invite social scientists to help preparing local public debates (Joly and Kaufmann 2008). Furthermore, PMO's intervention also mobilizes other CSOs to address this issue. As an interviewee of CFDT noted,

“CFDT has put nanotechnology in the agenda since it emerged in the workplace and that militants started to show interest in this subject.”⁴²⁷

CSOs acknowledge the effectiveness of PMO's approach in awareness-raising⁴²⁸. But some of them do not favor its strategies and techniques, which actually shut down the possibility of debates and aggravate the cognitive barrier: if you are CSOs, you are against nanotechnologies. More CSOs move from the stage of “raising questions” to “trying to find solutions together”, acting in a cooperative and non-confrontational way. For example, a French CSO VivAgora claimed to *«go beyond scaremonger's and*

⁴²⁷ Original text: «la CFDT a pris ce sujet des nanotechnologies en charge dès lors qu'il est apparu dans le milieu professionnel et que des militants ont commencé à s'y intéresser» .

Interview with Gérard Hayotte, in charge of activities on nanotechnologies within CFDT; member of dialogue committee on « Nanos » of ANSES, 14/09/2014

⁴²⁸ For example, David Azoulay of CIEL argues that *«they (i.e. PMO) raise the profile more than I have been doing in the past 5 years»* .

transhumanist's speeches» and considered nanotechnologies as an opportunity to “mettre la science en culture (put the science in culture)”⁴²⁹. A policy officer of CFDT highlighted that,

“we work in the spirit of exchange, of confrontation of points of view. We favor de-compartmentalization. At this point, the topic of nanotechnologies is interesting.”⁴³⁰

When the government initiated the national debate on nanotechnologies, a good number of French CSOs have made their contribution to the process (e.g. Sciences et Démocratie, Vivagora, Avicenn, Association Sciences et Démocratie, CFTC, CFDT and consumer association CLCV⁴³¹). Claudia Neubauer, a policy officer of Fondation Sciences Citoyennes (Citizen Science Foundation), noted that *«just as governments and debates about risk are moving upstream, so civil society is now moving upstream»* (Wilsdon, Wynne, and Stilgoe 2005, 42). Although their emphasis and positions are sometimes different and diverging, which range from *«a total moratorium on the research and commercialization of nanotechnologies»* (e.g. Les amis de la terre; Fondation Sciences Citoyennes) to *«a partial moratorium on the non-medical use of nano-objects and those that are in contact with the human body»* (e.g. France Nature Environnement) and also the range of in-betweens (Suraud et al. 2011), civil society movements have contributed to more vibrant public spheres in France.

⁴²⁹ Vivagora. 2012. “Vivagora’s experiment: shaping a ‘nanotrustnet’.” February 24-25. http://www.philso.uni-augsburg.de/lehrstuehle/soziologie/sozio6/partizipative-governance/Download/Presentation_ViVagora.pdf

⁴³⁰ Original text: *«nous travaillons dans cet esprit de l’échange, de la confrontation des points de vue. Nous sommes pour le décloisonnement. Et de ce point de vue, le dossier nano est intéressant»*. E-mail exchange with Gérald Hayotte, in charge of activities on nanotechnologies within CFDT, member of dialogue committee on « Nanos » of ANSES, 14/09/2014

⁴³¹ <http://cpdp.debatpublic.fr/cdpd-nano/documents/liste-cahier-acteurs.html>

Based on the French corpus nano, a scholar draws the following figure to track the discussions on nanotechnologies in France. We could see that CSOs (e.g. PMO, Vivagora) have played an important role in improving the visibility of nano issues. And the national debate organized by CNDP represents the peak of mobilization around nanotechnologies.

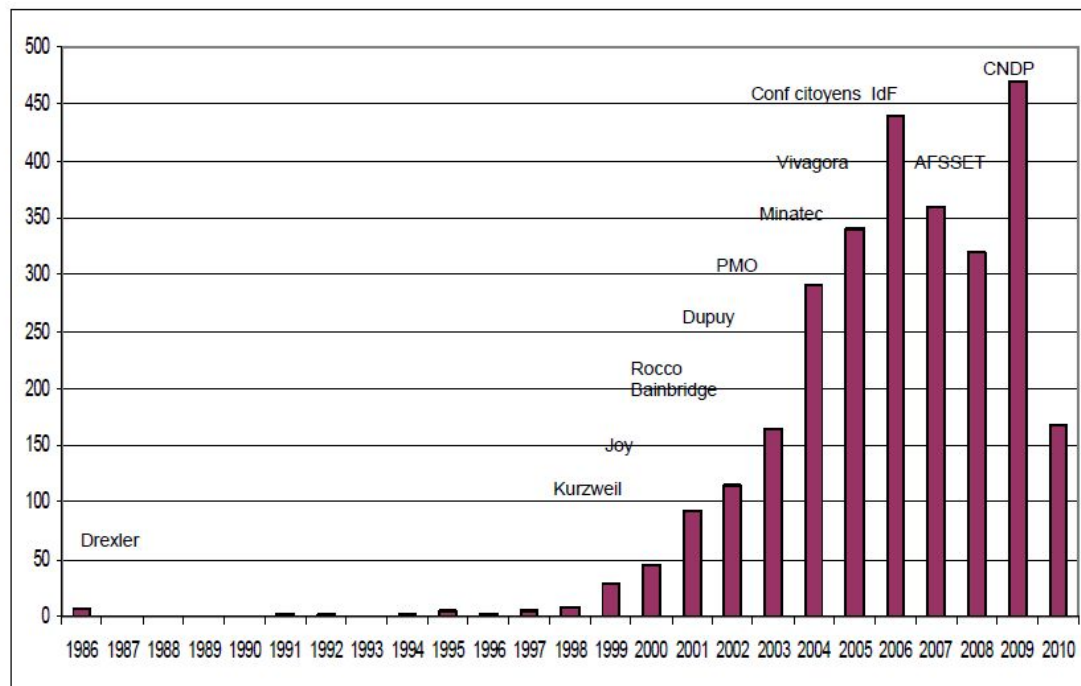


Figure 6: Trajectory of nano issues in public arenas, France

Source: Chateauraynaud 2010

As an interviewed policy officer of CIEL put it, «*CSOs in France have done great education work: all these rich and active civil society movement in France definitely helped define the position of the French government.*»⁴³² The efforts of these CSOs represent valuable attempts to build more socially accountable technology policy in France.

⁴³² Interview with David Azoulay, managing attorney of CIEL, 06/08/2014

1.2. The Netherlands

In the Netherlands, several factors have jointly contributed to the specific governance model on nanomaterials, which distinguish it from other EU Member States. The first factor, according to an interviewed regulatory authority, is its industrial scale of nanotechnologies. As she put it, *«we do not have very large producing industries for nanomaterials like France and Germany. Neither do we have many well-organized small and medium sized enterprises like in the UK.»*⁴³³ Thus, industry lobbying in the Netherlands is likely to be less intense compared with other Member States.

Secondly, the Netherlands has long been dealing with chemical substances and promoting an European regulatory framework —REACH— under the initiative of several determined regulatory authorities (e.g. Dick Jung, Joop Atsma). It also processes knowledge backup provided by research institutes (e.g. RIVM) . These experiences and resources have also been applied into the governance of nanomaterials. For example, in the workshop on the second regulatory review of nanomaterials, Dick Jung, Deputy Director Safety and Risks of the Ministry of Infrastructure and the Environment, called for urgent EU actions, arguing that *«when we do not act properly and timely, the balance will off-balance. The longer we wait, the public distrust will grow.»*⁴³⁴ According to an interviewed official of the Netherlands, *«we still have excellent policymakers who were educated in chemistry and toxicology and were active for a long time in addressing this subject. They have very good network.»*⁴³⁵

Thirdly, Dutch social scientists also play an active role in addressing the societal aspect of nanotechnologies. Their research has contributed to empowering CSOs and

⁴³³ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

⁴³⁴ Workshop on the Second Regulatory Review on Nanomaterials, January 30, 2014.
http://ec.europa.eu/enterprise/sectors/chemicals/reach/events/index_en.htm#h2-10

⁴³⁵ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

shifting the science-technology-society relationship. For example, FP6 funded NanoCap Project and FP7 funded NanoDiode Project have been coordinated by Dutch scholar Pieter van Broekhuizen, a researcher of RIVM. FNV, the largest worker union in the Netherlands, has participated in the NanoCap project and called on the minister to make a strong voice to the EC to amend REACH (FNV 2009). Natuur & Milieu, another participated CSO in the NanoCap project, has commissioned a laboratory to conduct independent research, with the result revealing significant negative effects from nanosilver usage in textiles⁴³⁶. In despite of these efforts, a report indicates that Dutch CSOs' involvement in the governance of nanotechnologies is "in general very modest" (Bennett and Chi 2010, 13).

The final factor is the influence of the 'polder model' in shaping the decision-making style of the Netherlands. This model is characterized by *«the tri-partite cooperation between employers' organizations, labor unions, and the Government»* (Bennett and Chi 2010, 34). Under this mentality, there is a widespread willingness among Dutch stakeholders to have discussions and to find solutions together. As pointed out by an interviewee, *«we always talk with everyone to make things done; that's quite usual in the Netherlands. You need everyone to make a science policy»*⁴³⁷. All these interconnected factors have contributed to the leading role that the Netherlands has played in addressing the issues of nanomaterials, e.g. holding high level conferences, initiating and coordinating joint letters, etc.

1.3. Sweden and Denmark

According to an Eurobarometer survey, in Sweden (75%) and Denmark (77%), public awareness on nanotechnology is much higher than the average level (46%) in Europe (EC 2010c, 33-34). And the two countries have for many years given high priority to address the topic of chemical substances.

⁴³⁶ NIA Press Release. 2012. "Dutch TV reports on impact of nano-Silver on Environment." February 07. <http://www.nanotechia.org/news/news-articles/dutch-tv-reports-impact-nano-silver-environment>

⁴³⁷ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

Sweden has set up the objective of ‘a Non-Toxic Environment’. And a scholar observes that during earlier debates on REACH, *«the major impetus for a new EU chemicals policy came from Sweden»* (Pesendorfer 2006). It is interesting to note that Carl Schlyter, the most active green MEP in pushing forward strict governance of nanomaterials, is a Swedish politician. He is also the rapporteur of the EP’s 2009 resolution on nanomaterials. Sweden Chemicals Agency Kemi noted in a report that *«ten years’ work is needed at EU level to enable Sweden to meet its “milestone” targets on chemicals.»*⁴³⁸ And Sweden has been pushing the EC to enhance REACH in governing nanomaterials.

Denmark established Danish Board of Technology in the 1980s, which altered the format of consensus conference to involve citizens in discussion on technologies. This initiative, regarded as a symbol of Danish participatory democracy, has been internationally acclaimed (Einsiedel, Jelsøe and Breck 2001; Horst 2014). The regulation of nanomaterials has been put high on the agenda of Denmark. For example, Danish Environmental Protection Agency provided additional financial support in 2012 with the aim of reducing potentially hazardous substances in consumer goods, nanomaterials included⁴³⁹. Under the initiative of Danish Environment Minister Kirsten Brosbøl, a joint letter among eight Member States (including Austria, Belgium, Denmark, France, the Netherlands, Germany, Sweden and Norway) was sent to the new EU commissioners, pressing them to expedite the work on the EU’s chemicals policy. They emphasized that *«nanomaterials shall be subject to control so that they are safe to use.»*⁴⁴⁰

⁴³⁸ Chemical Watch. 2015. “Sweden’s vision for REACH.” Global Business Briefing, March.
<https://chemicalwatch.com/23143/swedens-vision-for-reach>

⁴³⁹ Chemiwal Watch. 2011. “Denmark to target hazardous substances, nanomaterials in 2012.” November 24.
<https://chemicalwatch.com/9160/denmark-to-target-hazardous-substances-nanomaterials-in-2012>

⁴⁴⁰ Danish Ministry of the Environment. 2014. “Brosbøl gathers ministers for the environment in a wake-up call on chemicals to the new commissioners.” November 18.
<http://eng.mim.dk/news-archive/2014/nov/brosboel-gathers-ministers-for-the-environment-in-a-wake-up-call-on-chemicals-to-the-new-commissioners/>

In contrast, CSOs of the two countries are relatively not very active. In Sweden, CSOs are ‘latecomers’ in addressing nano-related issues. For example, it was until 2014 that the Swedish Society for Nature Conservation published its first report entitled *<Managing the unseen-opportunities and challenges with nanotechnology>*. ChemSec, an influential Swedish CSO dedicated to promoting tighter controls on chemicals under REACH, only deals with nanomaterials occasionally. In Denmark, CSOs’ voices were rather weak during the debate with regard to establishing a nano product register. According to an interviewed policy officer, there were only two CSOs—the Danish Consumer Council and the Danish Ecological Council—which worked in this area. And she attributed the government’s proactive action to the strong scientific work in Denmark⁴⁴¹.

According to a scholar, *«timing difference in the development debates in different countries is explained by the presence or absence of actor-carriers from civil society that give a minimum visibility in public sphere»* (Chateauraynaud 2010). The dissertation argues that CSOs’ contribution is only one of the many interconnected factors behind an official position taken by the government. For instance, in the case of Belgium, it was mainly the regulatory authorities that came up with initiatives to enhance the regulatory framework of nanomaterials. According to an interviewed policy officer of IEW,

“I think our action helped but was not a major contribution... (It was because) the Minister of Heath took the lead that we had a nano register. Our lobbying was more ‘reactive’ than ‘proactive’.”⁴⁴²

Thus, we could not draw a direct correlation between CSOs’ activities with Member States’ proactive approach. Among the above Member States, only France has had rich civil society movement. By contrast, in the Netherlands, the involvement

⁴⁴¹ Interview with Lone Mikkelsen, chemicals policy officer of the Danish Ecological Council, 26/09/2014

⁴⁴² Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

of CSOs was of modest level; and in Sweden and Denmark, CSOs' voices were even weaker. As an interviewee of ClientEarth put it, *«it's difficult to say that it depends on the relationship with CSOs. It depends more on their government culture, their political motivation and priorities.»*⁴⁴³ According to this interviewee, the Netherlands has good relationship with CSOs, and it has also taken a lot of initiatives. But the Netherlands seemed to prefer waiting for the EU to make proposals rather than adopt a national registry.

2. Next plans of CSOs

Through interviews with CSOs, many of them have highlighted an accelerated learning process with regard to debates on nanotechnologies. They also envisaged the roles that they could play in the near future. This section explores the opportunities that CSOs, with the support of other influential members of the green alliance and international partners, could have in gaining new momentum in future debates.

According to a policy officer of HCWH Europe, *«the biggest opportunity that we have is the fact that we are trying to do something positive... I think our strongest point is that we are justified and having concerns on health and environment»*⁴⁴⁴. The non-profit nature and their commitment to addressing 'questions of general interest' offer CSOs more normative forces. In envisaging the roles that they could play in future policy debates, most CSOs like CIEL, ANEC, MIO-ECSDE, ECOS are optimistic, while others like ClientEarth hold a modest view.

One of the next important measures in governing nanomaterials at the EU level is to modify REACH Annex. EEB and CIEL will continue to play a coordinating role. Other interviewed CSOs like ECOS and ClientEarth introduce their future actions in addressing this topic. As a policy officer of ECOS puts it, *«I hope we could achieve the decisions on the Annex of REACH... We have enough understanding of how to*

⁴⁴³ Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

⁴⁴⁴ Interview with a policy officer of HCWH Europe, August 2014

improve the current situation. We are well placed to push the Commission to do this. And also we have the backup of the Parliament.»⁴⁴⁵ ClientEarth, which has long been following the enforcement and implementation work of REACH, also pays close attention to this topic, *«there is much to do apart from pushing and lobbying. And we are trying to find new ways to gain a momentum on these issues.»*⁴⁴⁶ A Danish CSO has adapted its approach and shifted its focus from advocating a ‘nano patch’ to the modifications of REACH Annex. As an interviewed policy officer puts it, *«we realized this and we tried to make it as strong as possible.»*⁴⁴⁷ As the signal has been sent out by policymakers that there is no possibility to change the main text of REACH in the short term⁴⁴⁸, CSOs turn to focus more on the modification of REACH annex.

Debates on the registry of nanomaterials at the EU level have been brought into a stalemate, as the Commission assumed the proposal as “not an appropriate way” in gathering information⁴⁴⁹. Three CSOs— EEB, CIEL and BUND— have expressed their deep concerns and dissatisfaction in response to this conclusion, arguing that it is *«biased towards industry’s economic interests whilst disregarding environmental health and safety concerns and the public right to know.»*⁴⁵⁰ ETUC has not taken any official response yet, but an interviewee noted that *«it is not a question of increasing the lobbying, because the message has been there... It is now the Commission who needs to take up those views.»*⁴⁵¹ National CSOs like IEW, CFDT, the Danish Ecological Council, will monitor closely the enforcement and implementation work of national nano register. As a policy officer of IEW puts it,

⁴⁴⁵ Interview with Dania CRISTOFARO, Policy Officer of ECOS, 21/10/2014

⁴⁴⁶ Interview with Vito Buonsante, the Health and Environment Lawyer of ClientEarth, 13/09/2014

⁴⁴⁷ Interview with Lone Mikkelsen, chemicals policy officer of the Danish Ecological Council, 26/09/2014

⁴⁴⁸ Chemical Watch. 2014. “REACH nano registration rules coming next year, says Vella.” December 18. <https://chemicalwatch.com/22345/reach-nano-registration-rules-coming-next-year-says-vella>

⁴⁴⁹ Chemical Watch. 2014. “EU nanomaterials register looks unlikely.” December 11. <https://chemicalwatch.com/22241/eu-nanomaterials-register-looks-unlikely>

⁴⁵⁰ EEB, CIEL & BUND. 2015. “NGO comments on Transparency measures for nanomaterials on the market: Working conclusions.” January 12.

<http://www.eeb.org/index.cfm/library/ngo-comments-on-transparency-measures-for-nanomaterials-on-the-market/>

⁴⁵¹ Interview with Doreen Fedrigo-Fazio, NanoDiode project coordinator within ETUI, 16/12/2014

“nanomaterial is well on the political agenda. It is a great opportunity. We have to make sure that the regulators will keep it on the agenda.”⁴⁵²

Consumer associations like ANEC will work to integrate the issue of nanomaterials within more general programs. An interviewed policy officer claims that they will expand their resources to address nanomaterials, as *«nano becomes more embedded in general strategies. What will be in the future is that several environmental action programs talk about a ‘non-toxic environment’»*⁴⁵³. And ANEC is actually developing some concepts with EEB in advocating the goal of ‘non-toxic environment’. This interviewee adds that *«we are now specialized in certain aspects and we try to set activities where we can make a contribution and avoid doing too much work in areas where other CSOs are doing the work.»*⁴⁵⁴ We might see the cooperation further enhanced and the division of labor among CSOs in greater depth in the near future.

CSOs, especially those located in France, believe that the re-opening of discussion on science-technology-society relationship offers opportunities to address nanotechnologies. An interviewee, who has participated in the NanoCap project, argues that *«it is quite an interesting experiment, because this is how science development should be driven. We can’t miss this debate. And this is the chance to contribute towards driving something to the right direction.»*⁴⁵⁵ A scholar observes the emergence of a good number of CSOs in France which address specifically the topic of ‘the politicization of science’, e.g. Fondation Sciences Citoyennes in 2003, Science et Démocratie in 2005, Vivagora in 2003 and Avicenn in 2011 (Suraud 2013). Other CSOs also integrate such a topic into their agenda. For example, CFDT highlights in its report that, *«in our democracy, science is not equal to verity. That’s why it is important to have public debate around the questions of science’ evolution. It*

⁴⁵² Interview with Valérie Xhonneux, Policy Officer of IEW, 10/12/2014

⁴⁵³ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

⁴⁵⁴ Ibid.

⁴⁵⁵ Interview with Dr. Thomais Vlachogianni, Programme Officer of MIO-ECSDE, 02/12/2014

is a political question. We doubt, and we suspect.»⁴⁵⁶

Attention should also be paid to CSOs which are ‘watching’ nanotechnologies but do not have developed an official position yet. For example, although Greenpeace Europe does not address the topic of nanotechnologies at this moment, it doesn’t rule out the possibility that it undertakes an anti-nanotech campaign were any significant contaminating or health accidents occurred in the near future. The earlier incident of Magic Nano has shown that *«if something bad happens to an item that has “nano” in its name, attention will immediately focus on the whole category of nanoproducts»* (Guston 2010, 408). It is worth noting that policy officers of Greenpeace Europe have already been watching the topic of nanomaterials. In an e-mail exchange, Kevin Stairs argues that nanotechnologies should be addressed within an emerging/new technology legal regime, which is characterized by the precautionary principle, absolute and unlimited liability and full assessment of alternatives⁴⁵⁷.

International partners also continue to address the topic of nanotechnologies. FoE Australia has expanded the scope of its Nanotechnology Project in 2014, taking other emerging technologies (e.g. synthetic biology and geo-engineering) into consideration⁴⁵⁸. *As You Sow*, in light of its success in pressing *Dunkin’ Donuts* to remove nanomaterials from its powdered donuts, will continue to monitor the use of nanotechnologies in food and to increase corporate responsibility. As an interviewed advisor to green MEP put it, *«I think nanomaterials have very interesting potential. But if we do not propose necessary amendments, it is a matter of time that we will have something happen that should not happen.»*⁴⁵⁹ It remains uncertain whether the positive space of interaction between ‘system’ and ‘civil society’ at this moment, marked by CSOs’ non-confrontational approaches, could be an enduring one. The

⁴⁵⁶ Original text: «la science, dans nos démocraties, ne fait pas la vérité. C’est pour cela que le débat public autour des questions relatives à l’évolution de la science est important. C’est un enjeu politique. On se méfie, on doute» . CFDT. 2014. “Nanotechnologies: l’exigence d’un développement responsable.” http://www.cfdt.fr/upload/docs/application/pdf/2014-01/cs_nanothek-bd.pdf

⁴⁵⁷ E-mail exchanges with Kevin Stairs, chemicals policy director of Greenpeace Europe, 29/08/2014

⁴⁵⁸ See the introduction of Emerging Tech Project. <http://emergingtech.foe.org.au/about-us/>

⁴⁵⁹ Interview with an advisor to green MEPs, 22/06/2014

present dissertation represents a starting point in understanding the stances that CSOs hold towards nanotechnologies. It is valuable to keep a close eye on how their positions evolve with new developments over the coming years or decades.

B. Regulators' emphasis on mutual understanding

Habermas underlines the 'self-limitation' of CSOs, noting that «*within the boundaries of the public sphere... actors can acquire only influence, not political power*» (Habermas 1996, 371). The influences that CSOs have in the public spheres must pass through institutionalized procedures to coalesce into communicative power. According to Habermas, «*political influence supported by public opinion is converted into political power...only when it affects the beliefs and decisions of authorized members of the political system and determines the behavior of voters, legislators, officials, and so forth*» (Habermas 1996, 363).

Based on interviews with EU regulatory authorities, it is remarkable to see that some of them, regardless of the difficulties, hold strong commitment of promoting mutual understanding and dialogue with other stakeholders in dealing with risk controversies around emerging technologies. An interviewed DG SANCO points out that the current situation is marked by a mismatch between scientific, technical languages and political, ideological, philosophical and ethical languages:

“On the one hand, you may have arguments which have technical nature; on the other side, a group may say privacy should be respected. These are some important but much more general and ideological questions... It is not something that is good or bad, but something that we have to work with. Everybody really needs education about the topic and about the other stakeholders' views and understandings of the issues.”⁴⁶⁰

⁴⁶⁰ Interview with a DG SANCO, 20/06/2014

Another interviewee shares with this view by noting that *«if the two languages do not cross, then there is no communication.»*⁴⁶¹ A scholar observes that there are few CSOs who “speak science” and few scientists who “speak society” (Osgood 2001). How to cultivate constructive and meaningful communication among different stakeholders? The two interviewees believe that the way forward is to help enhance the understanding among different parties: on the one hand, to help CSOs understand better what the scientific issues are; on the other hand, to help scientists and regulators improve their knowledge about public concerns and values. An interviewee of the Dutch government also points out that *«what’s most important is mutual trust and understanding of differences and interests and open discussion about an issue.»*⁴⁶² She also stresses the importance to support their own counterforces (e.g. CSOs) so as to “keep policymakers sharp”. These arguments testify to an accelerated learning process among regulatory authorities, representing a kind of shift from ‘deficit model’ towards ‘dialogue and engagement’.

In the Horizon 2020 Work Programme 2014-2015, societal engagement based on the concept of *Mobilization & Mutual Learning Platforms*⁴⁶³ is proposed. And the EU will allocate between 500, 000 and 1 million euro to fulfill this goal (EC 2013b, 48). The editorial of *Nature* points out that *«embracing societal concerns represents a great shift in thinking of H2020»* (Nature materials 2012). Against this background, CSOs have reasons for hope.

C. Conclusion

Chapter VI analyzes several favorable factors for CSOs’ involvement in future debates. As noted by Börzel, *«Member States have an incentive to ‘upload’ their policies to the European level to minimize the costs in ‘downloading’ them at the*

⁴⁶¹ Interview with a DG SANCO, 28/06/2014

⁴⁶² Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

⁴⁶³ A Mobilisation and Mutual Learning (MML) Action Plan or Platform is a mechanism to bring together a wide range of actors and pool their knowledge and experience, and to facilitate mutual understanding and develop joint solutions and research agendas to address societal challenges (EC 2013, 48).

domestic level» (Börzel 2002). We could see several ‘pace-setters’ (the Netherlands, France, Denmark, Belgium, Sweden) , with the support of other countries (Austria, Croatia, Finland, etc.), hold a strong commitment to pushing forward more stringent measures on nanomaterials. This situation provides a chance to study civil society movement within differing political contexts.

CSOs from pace-setting countries could seize the opportunities and contribute to keep the issue on the national policy agenda and promote the discussions at the EU level. Besides, for CSOs which are located in foot-dragging or fence-sitting Member States, they could enhance cooperation with other partners to trigger domestic pressures and to advocate change. It is important for CSOs to examine which roles that different countries play (pace-setting, foot-dragging or fence-sitting) in nano debates and to adopt corresponding strategies and approaches so as to make their lobbying more effective.

At the EU level, green MEPs (Satu HASSI, Michele Rivasi, Christa Klaß, José Bové, etc.) and several DGs ENV are more in favor of adopting precautionary measures on nanomaterials. For example, Green MEP José Bové called for boycotting M & M’s candies and Hollywood chewing gums, in which nanoparticles of titanium dioxide are added to turn the products whiter and brighter⁴⁶⁴. As an interviewee of ANEC put it, *«it is quite clear who have the power, and the power distribution is changing. With cooperation, more and more would happen.»*⁴⁶⁵ With the forming of a green coalition, CSOs have the potentials to further contribute to the power distribution in debates on nanomaterials and contribute to the policy-making process. As a policy officer of BEUC put it, *«the opportunity is networking.»*⁴⁶⁶

⁴⁶⁴ BFMTV. 2015. “José Bové s'en prend aux M&M's: ‘Vous n’avez pas besoin de bouffer cette merde!’.” March 17. <http://www.bfmtv.com/politique/quand-jose-bove-s-en-prend-aux-mm-s-vous-n-avez-pas-besoin-de-bouffer-cette-merde-869592.html>

⁴⁶⁵ Interview with Franz Fiala, the chair of ANEC Nanotechnologies Project Team, 27/08/2014

⁴⁶⁶ Interview with Sylvia Maurer, head of BEUC Sustainability and Safety, 14/07/2014

Apart from coalition building, we could also observe a shift towards a more precaution-oriented culture in governing new technologies. This is another favorable factor for CSOs' advocacy. As a Dutch regulatory authority puts it, *«we try to learn now from the nanomaterials dossiers, how we handle that, and try to find out the way of treating other new uncertain and complex risks.»*⁴⁶⁷ In this sense, nanotechnologies act as an interesting site in experimenting with novel initiatives in addressing risks around new and emerging technologies.

⁴⁶⁷ Interview with Monique Bosman, the Dutch Ministry of Infrastructure and the Environment, national coordinator of the NANoREG Project, 22/12/2014

Conclusion

The research chronically examines the interaction between European policy-makers and CSOs around the risk governance of nanotechnologies. From a Habermasian perspective, this dissertation investigates specifically whether and how ‘upstream public engagement’ could add vibrancy to the public spheres and facilitate the formation of communicative power.

One tempting conclusion here is that ‘upstream public engagement’ represents encouraging attempts towards more democratic governance of emerging technologies, as the imbalance in information, resources, access to policy makers is corrected somehow. By accommodating diverse voices from the early stage of the R&D process, ‘upstream public engagement’ actually facilitates and enables a more positive interaction space between CSOs and the political system. As demonstrated in Chapter II, despite the surge of activism led by ETC Group, the momentum against nanotech abated rather than intensified in the EU. Chapter III also illustrates how EU-funded project NanoCap, together with other participatory exercises and deliberation activities, contributes to the direct involvement of EU-level CSOs in nanotech debates. CSOs have engaged in a cooperative, argumentative and expertise-based manner.

Ideally, a shift in science-technology-society relationship allows for greater maneuvering space for CSOs. Discussions in Chapter IV show that ‘upstream public engagement’ is not a magic cure for everything, especially when we take into account the dynamics of the wider world. Here lie what appeared to be some barriers which hamper CSOs and the public to achieve further democratic impetus: the pro-technology belief system, the inertia of administrative power, asymmetrical access to expertise, etc. An ambiguous context, marked by a blend of inclusiveness and scientism, gave rise to two different approaches of CSOs: while some of them took advantage of the existing windows of political opportunities and addressed nanotechnologies in an cooperative manner, others withdrew from this field in frustration at the tokenistic engagement and out of fatigue after the intense lobbying

battle for REACH. ‘Upstream public engagement’ can be ‘boost’ for certain CSOs, while proved to be ‘unattractive’ or ‘irrelevant’ for others. Understanding the factors behind CSOs’ approaches and strategies could serve as a first step to better formulate the structures and arrangement of engagement activities in the future.

Chapter V centers around the question with regard to whether, how, and to what extent the considerations of EU level CSOs, as kind of counter-knowledge, have been incorporated into the institutionalized procedures. Whereas much policy and scholarly attention has been paid to the eventual policy uptake in evaluating CSOs’ political leverage (Miller and Scrinis 2010), the dissertation suggests that CSOs’ capacity to *«catalyze the growth of autonomous public spheres»* (Habermas 1996, 488) should not be ignored. This requires a more ‘dynamic’ approach, that’s to say, to consider CSOs’ impact on formal decision-making as flexible and subject to renewal.

Thus, apart from analyzing the concrete results that CSOs have achieved (e.g. nano-specific provisions in sectoral legislation, several Member States’ initiatives of national nano register, the EC’ decision to modify REACH annex) , I also investigate how CSOs, against the backdrop of increasing divergence between the ‘pro-industry alliance’ and the ‘green alliance’, contributed to shifting the power distribution among the EU governing institutions and member states. CSOs have been instrumental in putting forward concrete proposals, inspiring and mobilizing a good number of regulators, especially members of the ‘green alliance’ who share similar policy beliefs, to support their advocacy. Accordingly, I draw the conclusion that CSOs, with their closer proximity to the grassroots constituencies and higher sensibility to societal problems, could build up a modest level of counter-expertise against the powerful industries.

Similarly, we should not bear a too narrow view on the effectiveness and value of engagement exercises, which is not confined to direct output on short-term policy

results. Indirect ones, such as its contribution in cultivating a culture of external scrutiny in governing emerging technologies, should also be taken into consideration. According to an interviewed DG SANCO,

“there is a shift towards an interconnected paradigm. It is a change just like a young tree, needs to grow roots, depends on soil to grow and to really live a long life.”⁴⁶⁸

The realization of such a shift requires a sustainable process marked by long-term commitment, genuine openness and mutual learning of all stakeholders. This goal appears to be unrealistic at this moment, as I’ve discussed the struggle of poorly funded CSOs against the predominant interests. In despite of the difficulties, there also exist several favorable factors for CSOs’ involvement in future debates, as discussed in Chapter VI.

Focusing on CSOs, the “carriers” of the public spheres, the dissertation represents the starting point in the critical task of understanding how engagement practices could be linked to the political system. The rich empirical interview materials and the way it has been used in quotations create a kind of ‘thick description’ of complex EU politics. Research on this relatively unexplored terrain is expected to contribute to the literature on STS and S&T policy-making. Findings from the research may also have implications for CSOs that actively seek to access and embed themselves in the policy network relating emerging technologies so as to enhance the effectiveness of their involvement. They may also help policy-makers to design, implement, and revise socially accountable S&T policy through engaging various stakeholders.

⁴⁶⁸ Interview with a DG SANCO, 20/06/2014

I acknowledge the limitations of my research, and I'd like to demonstrate some approaches—both theoretical and political—that can guide future actions. Firstly, focusing narrowly on CSOs, no contribution explicitly examines the role of other important stakeholders (e.g. research community, newspapers and journals, international organizations like OECD and ISO) in regulating nanotechnologies. Additional research in consideration of CSOs' interaction with these stakeholders is thus required to complement the findings of this study.

Furthermore, this dissertation focuses mainly on the debates on regulatory issues of nanotechnologies, which are more or less about the conditions of product marketization which have not per se a strong relation to R&D activities as the central place and time for upstream engagement. Voluntary self-regulation initiatives may be more 'upstream' than ex-post evaluations of or debates on existing hard regulations related to nanomaterials. Examples are the code of conduct for responsible nanosciences and nanotechnology research, voluntary reporting schemes, or voluntary risk and safety frameworks. It once again brought to the fore the paradox of participation: a learning process is usually needed for CSOs to firstly understand, and then to influence. In many cases, their influence does not take shape immediately. How to tackle this dilemma is an important question uncovered in this dissertation that requires further research.

Findings from this study also have limitations in terms of being generalized to other places and cases. According to Habermas, a robust civil society can develop and blossom only in the context of a liberal political culture and an already rationalized lifeworld (Habermas 1996, 371). Comparative studies between Europe and other countries (e.g. China) could be an interesting topic to follow. In China, there is still no CSOs that are concerned with nanotechnologies issues. Some questions are worth pondering: how could the experiments of 'upstream public engagement' and the wider reflections on science-technology-society relationship inform and influence the practices of the Chinese government in governing emerging technologies? Is an

energetic civil society a precondition for conducting ‘upstream public engagement’? What are the prospects for the emergence of green activism in China towards emerging technologies? In this regard, some extended studies could be valuable.

There also exists other transformative, platform technologies such as synthetic biology, which pose similar ethical and governance challenges. It would be interesting to investigate the lessons from nanotechnologies for other fieldwork.

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Appendix: Interview questions

With policymakers:

1. Since when and how did nanomaterials become a policy concern for you?
2. EU official documents (e.g. the 2005-2009 action plan) have highlighted the importance of integrating the societal considerations “at an early stage”. What factors contributed to this commitment to acting proactively?
3. Several programs under FP6 and FP7 (e.g. NanoCap project, NanoDiode project) have been funded to promote the involvement of CSOs in policy debates. How would you evaluate the effectiveness of these programs? What lessons have been learned with regard to public engagement in nano debates?
4. CSOs propose a ‘nano patch’ to address the loopholes of REACH. They also call for the establishment of an EU nanomaterials register. How would you evaluate the roles that CSOs (e.g. worker unions, environmental organizations, consumer associations) have played in the policy-making of nanotechnologies?
5. In the case of nanotechnologies, what do you think are the challenges as well as opportunities in achieving constructive dialogue among different stakeholders?
6. The Netherlands plays a leading role in debates on nanomaterials, for example through holding conferences, initiating joint letters with other Member States. What factors contribute to this proactive role of the Netherlands?

With CSOs:

1. When and under what context did your team decide to put the topic of nanotechnologies on the agenda?

2. Could you please briefly introduce the main activities on nanotechnologies? How does your team lobby and mobilize the European regulatory authorities to regulate nanomaterials?

3. What are the opportunities as well as difficulties for CSOs in dealing with nanotechnologies? How to make your advocacy more effective?

4. EU official documents highlight the importance of integrating the societal considerations ‘at an early stage’. Scholars also call for ‘upstream public engagement’. What sort of democratic space, if any, is opened by such a commitment to public engagement? Against this backdrop, could CSOs have more opportunities to influence the policy-making process?

5. The proposal of ‘nano patch’ has won the support of several Member States; green MEP Satu Hassi also called for a ‘mini-REACH’. How would you consider the influences of ‘nano patch’ on the European authorities’ further action on regulatory aspects of nanomaterials?

6. Several CSOs like Greenpeace UK have withdrawn from this field. In your opinion, what may be the reasons that some CSOs no longer have interest in addressing nanotechnologies?

7. I observe that EU level CSOs have taken several joint action by releasing joint letters, contributing to public consultation, etc. Could you please introduce the cooperation among CSOs?

**Revisiter “l’engagement public en amont” envers les nanotechnologies:
ouvrir une perspective communicationnelle**

Cette thèse contribue aux discussions sur la notion “d’engagement du public en amont”, qui a été défendue par des chercheurs pour traiter des nanotechnologies au début du XXIème siècle. Cette notion a été critiquée pour l’absence de lien avec les décisions fonctionnelles. En utilisant l’outil théorique envisagé par Habermas, cette thèse tente d’étudier ce lien, avec une attention particulière portée sur la capacité des Organisations de la Société Civile à accueillir, condenser et répercuter sur la sphère publique les préoccupations sociétales tout en les amplifiant. Alors que la littérature antérieure est plus axée sur la réflexion théorique ou l’étude de cas isolés, la recherche soutenue par des observations sur le long terme est en grande partie absente.

Sur la base de l’analyse du contenu et des entretiens, cette thèse mène un travail sur deux questions: si et dans quelle mesure “l’engagement public en amont” envers les nanos pourrait contribuer à un espace public plus vivace; et comment l’influence que les OSC ont acquis dans l’espace public pourrait se transformer en pouvoir communicationnel. La réponse à ces questions est double: d’une part, “l’engagement du public en amont” permet à la société civile d’être mieux informée et de lui permettre plus tôt de prendre part au débat. Si l’implication de la plupart des OSC prend la forme d’une coopération ou d’une argumentation parfois basée sur des rapports d’expertise. D’autre part, quelques OSC se sont retirées de ce domaine compte tenu de la faible portée de leurs propres actions sur les décisions fonctionnelles.

Mots clés : espace public, nanotechnologies, risques, REACH

**Revisiting ‘upstream public engagement’ in nanotechnologies:
from the perspective of the public sphere**

This dissertation contributes to the discussions of the notion ‘upstream public engagement’, which has been actively advocated by STS scholars in addressing nanotechnologies since the beginning of the twenty-first century. One of the major criticisms of ‘upstream public engagement’ is its lack of a link with the political system. Drawing on theoretical tools provided by Habermas, this dissertation seeks to examine such a ‘link’ with a specific focus on the capacity of civil society organizations (CSOs) to distill, raise and transmit societal concerns in an amplified form to the public spheres. Previous literature has mostly included theoretical reflection or one-off case studies, and research based on long-term observations is scant.

Based on content analysis and semi-structured interviews with relevant actors, this dissertation investigates whether and how upstream public engagement could contribute to more vibrant public spheres and facilitate the formation of communicative power. The answer to these questions is twofold: on the one hand, moving public engagement ‘upstream’ enables CSOs to be better informed and to become part of the debates more quickly. Most CSOs employ cooperative, argumentative, and expertise-based forms of involvement. On the other hand, ‘upstream public engagement’ has turned out to be unsuccessful in generating substantial and sustained interest, as some CSOs have quit this field in frustration at the tokenistic engagement.

Key words: nanotechnologies, public sphere, risks, REACH