ENERGETIC STRUCTURATION OF SOCIETY

ENERGY RELATIONS OF SOCIAL ORGANIZATION IN HERBERT SPENCER'S SOCIAL THEORY

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ABSTRACT

How societies are energized is significant for their organization. The present, highly mobile and global social relations are made possible by – and therefore also highly dependent of – massive energy surpluses contained in fossil fuels. Even though global issues, such as peak oil and climate change, question the sustainability of our present mode of living, energy related issues are only slowly starting to make their way to sociological analyses. Existing sociological energy research is also largely lacking theoretical perspectives and orientations.

The thesis suggests that to develop such a theory, it is useful to go back to the work of Herbert Spencer who placed energy at the center of his social theory. The main goal of the thesis is to explore how Spencer treats the energy relations of social organization, and to what extent his ideas and concepts resonate with more recent sociological research on energy and climate change. To pursue this goal, the thesis focuses on Spencer's main work, namely to *The System of Synthetic Philosophy,* which also presents Spencer's analytic-sociological side, and is relatively – or almost completely – free from normative stances.

The main conclusion of thesis is that Spencer offers a comprehensive system theoretical framework which expands the sociological imagination to better discover the energetic constitution of our complex path dependent global organization. In addition, some of the key notions of contemporary authors, such as those having to do with ecosocial vitalism, energy flows and surpluses, sociotechnical systems, and systems thinking and (locked) feedback loops are fruitfully theorized already by Spencer. Therefore, Spencer's concepts have value also to contemporary sociological energy research.

Keywords: Herbert Spencer, energetic social theory, path dependent sociotechnical organization, sociology of climate change

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Yhteiskuntatieteiden tiedekunta

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TIIVISTELMÄ

Tutkielman lähtökohtana on, että käytettävissä olevat energiaresurssit vaikuttavat huomattavasti yhteiskuntien organisoitumiseen. Esimerkiksi nykyinen yhä lisääntyvään liikkeeseen pohjautuva globaali organisoituminen on mahdollista vain fossiilisten polttoaineiden tuottamien energiaylijäämien ansiosta. Yhteiskuntien energiariippuvaisuudesta ja nykyisistä globaaleista energiaan liittyvistä kestävyyshaasteista huolimatta, energiaan liittyvät kysymykset ovat vasta hitaasti saapumassa osaksi sosiologisia ongelmanasetteluja. Yksi suurimmista tutkimuksellisista haasteista liittyy teoreettisten näkökulmien ja viitekehysten puutteeseen.

Tämä tutkielma esittää, että tällaisten teoreettisten työkalujen kehittämisessä on hyödyllistä palata Herbert Spencerin ajatteluun. Spencerin yhteiskuntateoria rakentuu eksplisiittisesti energian käsitteen varaan, ja tutkielman päätavoitteena onkin selvittää miten Spencer käsitteellistää sosiaalisen organisaation energiasuhteita sekä miltä osin nämä klassiset ideat ja konseptit resonoivat energiaa ja ilmastonmuutosta koskevan sosiologisen nykytutkimuksen kanssa. Näiden tavoitteiden saavuttamiseksi tutkielmassa keskitytään Spencerin analyyttista ajattelua edustavaan pääteokseen *The System of Synthetic Philosophy*.

Tutkielman yleinen johtopäätös on, että Spencerin yhteiskuntateoria tarjoaa kokonaisvaltaisen viitekehyksen, joka auttaa sosiologiasta mielikuvitusta havaitsemaan ja jäsentämään yhteiskuntien *energeettisen* rakenteistumisen ehtoja sekä dynamiikkaa. Lisäksi Spencer käsittelee hedelmällisesti nykytutkimuksen ydinteemoja, kuten ekososiaalista vitalismia, energiavirtoja ja -ylijäämiä sekä sosioteknisiä järjestelmiä. Spencer painottaa myös nykytutkimuksen tavoin universaalin systeemiajattelun ja siihen liittyvien (positiivisten) palauteketjujen tarkastelujen tärkeyttä. Näin ollen Spencerin ajattelusta on myös välitöntä arvoa nykytutkimukselle.

Avainsanat: Herbert Spencer, energeettinen yhteiskuntateoria, polkuriippuvainen sosiotekninen organisaatio, ilmastonmuutoksen sosiologia

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1. Introduction: why should energy matter to sociology?

Probably every single generation feels they are living a somehow unique time in human history where massive changes are just about to happen. The possibility for such massive transformation is also present in current discussions on climate change and unsustainable global energy economy which is argued to bring significant changes to how societies will be organized in the near future.

It is argued that the core problem of climate change is rooted in deep structures of societies. These deep structures – social organizations incorporated with complex interdependencies – are locked -into unsustainable trajectories, where enormous flywheels of societies are energized by the fossil energy resources that *enable* but also *oblige* the continuation of current path dependencies (see chapter 5 for more). The extent of the problem[1] has led many to suggest that we need to start to examine these locked-in trajectories comprehensively in order to solve the complex environmental issues that we are facing (Urry 2013, Geels et.al. 2015; Hansen et.al. 2010) and to execute needed energy transitions that guide societal practices and path dependencies to more sustainable development path (see e.g. Urry 2013a, 258; Elzen et.al. 2004; Geels et.al. 2015; Sorell 2015; Cohen et.al. 2013; Cohen et.al. 2017). To succeed in this transition without any bigger problems appears unlikely because history does not know many examples where society has managed to decrease its energy demand (e.g. Suokko & Partanen 2017). And for these reasons, "it is the characteristics and possibilities of a 'post-carbon' theory, society and practice that we should be debating and 'energetically' developing" (Urry 2014, 9).

In my thesis I participate in the development of such a "post-carbon social theory" or sociological energy research, whose tasks would be to explore the energy foundations of modern practices, to demonstrate how energy forms and their extensive scale are significant for the ways that societies are organized, as well as to expose how the present practices are locked-into

[1] Some authors argue that we need 10-20 times improvements to energy efficiency until 2025 (see Geels 2011, 24; Vezzoli et.al. 2008, 391). In addition, to achieve climate change goals set by IPCC, we should improve 'carbon dioxide/dollar' ratio 130 times until 2050 globally (assuming that present 2% economic growth continues and the population will increase to 9 billion as predicted) (Brown & Timmerman 2015, 242).

unsustainable trajectories (Urry 2014, 9). Generally, then, the purpose of my thesis is to seek general theoretical insights that would help to conceptualize sociologically how energization of society affects their organization.

I follow the arguments of McKinnon (2010), Gross and Mautz (2015, 4, 13-16), and Rosa and Machlis (1983, 152) who suggest that to develop this sort of energetic theory, it is useful to go back to the work of Herbert Spencer (1820-1903) who placed energy at the hearth of his social thinking. Indeed, Spencer was the first sociologist to acknowledge the significance of energy to social organization and he argued already in the mid-19th century that "whatever takes place in a society results either from the undirected physical energies around, from these energies as directed by men, or from energies of men themselves" (Spencer 1920, 202). Recently especially McKinnon (2010, 452) has argued for Spencer's topicality by recognizing him as the most valuable classical thinker for sociological energy studies:

> […] Spencer is arguably the most important classical resource for exploring the roles of energy in society and social evolution. Given the challenges that lie ahead for an energy-intensive and energy-dependent global society; the time for reconsideration of his 'energetic sociology' is certainly at hand.

Even though these authors have recognized the value of Spencer's energetic insights, hitherto those ideas have been not analyzed in detail. For example, in their comprehensive review on sociological energy research, Rosa and Machlis (1983) only mention Spencer as one of the first authors who was intrigued by the theme. Gross and Mautz (2015, 13-16), on their part, introduce Spencer's ideas only a more extensively. The most comprehensive treatment has been given by McKinnon (2010), although his paper, too, is more of an introduction than a detailed discussion of the various insights Spencer has to offer. Further reading of Spencer in relation to the question of energy is thus certainly relevant.

Although Spencer was one of the first authors to recognize energy's significance to social organization, many others have followed his lead. For example, Rosa and Machlis (1983) present

13 authors who offer valuable insights to societies' energy foundations[2]. Energy relations were recognized as an essential feature to social development already by other sociological classics, too. Perhaps little surprisingly, even Émile Durkheim proposed that society is nothing more than a continuation of nature (see also Gross & Mautz 2015, 17):

> […] a society is the most powerful combination of physical and moral forces of which nature offers us an example. Nowhere else is an equal richness of different material, carried to such a degree of concentration, to be found. Then it is not surprising that a higher life disengaged itself which, by reacting upon the elements of which it is the product, raises them to a higher place of existence and transforms them (Durkheim 1995, 447)

Karl Marx, too, clearly recognized the modern world's resource-dependency by writing of the "subjection of nature's forces to man, machinery, application of chemistry to industry and agriculture, steam navigation, railway, electric telegraphs, clearing of whole continents for cultivation, canalization of rivers" (Marx & Engels 2008 [1848], 78). But still, probably the most prominent classical author (besides Spencer), who emphasized the energy issues was Max Weber who reminded "that sociologists need to be clear that the physical and chemical energy balance is part of the design of processes of technical and economic development", and he went on arguing that "all causal influences derived from the application of the laws of energy need to be taken carefully into account when seeking to understand social phenomena" (Weber 1909, 596; translated by Gross & Mautz 2015, 21).

Despite these important predecessors' notions on energy's significant to social organizations, discussions and debates on energy are only slowly starting to make their way to sociological analyses[3] (Urry 2013a, 269; see also Beckley 2017, Gross & Mautz 2015; McKinnon 2007). One

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[2] *General energetic theorists:* Herbert Spencer, Patrick Geddes (biologists, sociologist, geographer, city planner), Wilhelm Ostwald (Nobel Prize winner in chemistry), Vladimir Bekhtever (neuropathologist), T.N. Carver (economist), Lewis Mumford (historian, sociologist, philosopher of technology), Leslie White (anthropologists), Richard Adams (anthropologist). Fred Cottrell (sociologists, chemist).
Limits of growth – theorists: Frederic Soddy (Nobel Prize winner in chemist), Nicholas Georgescu-Roegen (economist), Howard T. Odum (economist, ecologist), Amory Lovins (physicist)

[3] However, sociology is not the only social science where debates related to energy has continued to stay as a marginal research agenda. For example, in the field of international politics energy has remained under-studied topic even though "the importance of energy for the world economy can hardly be overstated" (Graaf 2013, 8).

major reason for this slow development of the field is lack of *suitable* theoretical perspectives and orientations (Urry 2014; see also Shove & Walker 2014). This issue was recognized already during the aftermath of the 1970s energy crises where it is possible to observe the first attempt to establish sociological energy research (see Rosa & Machlis 1983; Rosa et al. 1988). Even though this pursuit was eventually not able to build momentum for a wider research program, still general arguments and demands presented over 30 years ago have not lost their timeliness and they are completely identical to the notions presented above. The core challenge of sociological energy research has as well continued to stay the same – existing sociological research on energy suffers from the lack of suitable theoretical concepts and tools: " [a] troublesome feature of this rapidly accumulating body of [energy] research is its atheoretical orientation; researchers have either ignored theory entirely, or have attempted to "gerryrig" energy issues onto traditional sociological concerns" (Rosa & Machlis 1983, 153).

Without a theoretical framework, it is impossible to make any general deductions from fragmented and unattached observations which considerably slows down – or even prevent – accumulation of knowledge and development of the field (Rosa & Machlis 1983, 153, for the role of theory in research see also Heiskala 2015, 364-5). Furthermore, Rosa and Machlis argue in a manner similar to Urry that sociological energy research requires completely different kind of social theory – a social theory which does not attempt to "gerryrig" energy issues onto traditional sociological concepts. Social theory must overcome the chasm between natural and social sciences.

This sort of strong programmatic confrontation between social and natural sciences is useless particularly in the case of energy which "especially shows what we can call the 'hubris of the modern'" (Urry 2014, 7). Indeed, probably the biggest obstacle that prevent the development of such a novel social theory, is that in most of existing social thought "there is [still] presumed to be a chasm between nature and humans, with energy clearly lying within 'nature' and not something having much to do with humans, their activities and their modernity" (Urry 2014, 7).

Major reason to this chasm is that although the most recognized sociological classics – namely Durkheim, Marx, and Weber – mentioned natural or energy foundations of societies, their main sociological interests were focused eventually to more "spiritualistic issues" (Urry 2013a, 68). As it is well known, for example Durkheim eventually argued that the task of sociology is to explain the social by the social similarly to how biology or physics explain natural facts (Urry 2013a, 18). And although Weber recognized that capitalist order does not only depend on the spiritual landscape but also on fossil fuels, and that modern capitalism will last only "until the day that the last ton of fossil fuel has been consumed" (Weber 2001 [1930], 123), still eventually for him it was primary ideal or "physic energy of the Spirit of Capitalism in social relations that is truly the motive power of modernity" (McKinnon 2010, 440; see also Murphy 2002, 80).

For both authors, Durkheim and Weber, there were good disciplinary reasons to eventually emphasize these sociocentric insights because they actively aimed to develop a fully autonomous field for sociological analysis (Urry 2013a, 7). Marx, on the contrary, eventually emphasized the power of labor class as the driving force behind the capitalist development which is understandable considering his political agendas (McKinnon 2010, 440). Thereby in the end, "the central classics have left the discipline of sociology somewhat bereft of conceptual tools for dealing with modern fossil-fuel civilization; and this is one reason for the rather limited attention sociologists have given to questions of energy and society" (*ibid.* 440; see also Urry 2013a, 68).

Together with wider process of 'modernization' (see Latour 2006), these trajectories of sociocentric interpretation of classical ideas led sociology as an academic discipline to take for granted the natural foundations of societies and it specialized in explaining specific and autonomous Durkheimian 'social facts' which were separate from their material (also energy) underpinnings. (Urry 2013a, 18; Gross & Mautz 2015, 27.) But indeed, for example Bruno Latour (e.g. 2006) among others has shown that this separation between society and nature is an illusion. Human ideas, practices, culture, sociality, shortly our whole togetherness is entangled in the world of diverse substances. Material world molds our cultural activities, and our cultural activities molds the material worlds (see also Pyyhtinen 2016; Lehtonen 2014; Lehtonen 2015).

Or, better still, the material and the social mold each other in a hybrid-like manner – there is no one before the other.

Thus, sociology has spent historically "plenty of time studying the nature of modernity and modern society, but it has mostly failed to analyze the carbon foundations of modern societies. Sociology has been blind to the dependency on fossil resources" (Urry 2013a, 269). And if before this separation of ideas and matter in research has been possible due to the plentiful amounts of cheap energy (Salminen & Vadén 2012, 37), the situation is crucially different in our present society:

> […] in the twenty-first century, oil is a huge problem. First, as already discussed, its widespread use generated GHG emissions and hence significantly contributes to climate change… Second, the supply of oil is finite, and many argue that we have reached or are about to reach a peak in the global supply of oil, and hence of petrol and kerosene. Third, in the case of machine-based movement, there is so far no alternative source of energy to oil; there is no Plan B that could begin to replace the oil that accounts for at least 95 per cent of current transportation energy. (Urry 2013a, 129-130.)

Spencer's social theory on the contrary does not establish the same ideological chasm between natural and social realms. His theory thus enables us to build foundations for sociological energy research which break free (or at least take distance) from this dualism of subject and object or society and nature, and hopefully enables us to construct a trajectory where energy is recognized as a relevant force to societal organization, politics and culture (cf. Barry 1999; Dunlap 2008). Indeed, Spencer constructed his whole social theory on energy metaphors, and in my thesis, I demonstrate that he offers a comprehensive theoretical framework and *general system theoretical*[4] concepts which expand the sociological imagination to better discover the role of energy in social structuration and conceptualize the energy demand of complex path dependent global organization.

[4] With *general systems theories*, I refer to theoretical constructions that try to employ universal concepts and propositions with a goal to understand physical, biological, and social universes that seems to reveal systemic properties. (cf. Turner 1985, 30-32).

My reading of Spencer is inspired by the main notions and ideas of John Urry and other recent authors who have contributed to sociological energy and climate change research. Thus, additionally, I am going to discuss Spencer's insight related to this recent sociological research which helps to exemplify the topicality of Spencer's energy concepts. Already over 100 years ago, Spencer analyzed the same issues that contemporary researchers are exposing today, and I will demonstrate that Spencer's empirical insights and especially his theoretical frameworks hold great value for present research. Therefore, I argue following Turner (1985, 73), that great deal of contemporary research kind of rediscovers Spencerian ideas because they may be unaware of his concepts. However, again similarly to Turner (*ibid.,* 73), "I am not saying that these researchers have not added to Spencer's legacy, but I do believe that if they had been aware of Spencer's principles, they could have contributed even more to cumulation of theory in [energetic] sociology".

My thesis is thus ultimately about finding new perspectives and extending the theoretical imagination by connecting old and new sociological thinking together to build a kind of continuum between classical and contemporary thoughts. I find the expansion of the sociological imagination as the most valuable thing in sociology also more generally (Mills, 2015 [1959]; see also Pyyhtinen 2016), and pursuing a better "ability to grasp history and biography and the relations between the two within society and ecology" and "to learn to understand our lives as minute points of the intersections of biography and history within society and ecology"[5] (Bell & Ashwood 2016, 369) will be the primary guiding principle of my thesis.

But still, the question arises why choose exactly Spencer for a more detail reading from all the authors mentioned above? The most important reason for choosing Spencer is his historical position as a sociological classic. The classics play a very special role in sociology, for example, by offering metaphors and ways-to-talk about the topics relevant to the discipline. Consequently, the concepts and authority of the classics have significant effect on what topics are legitimate

[5] Bell & Ashwood have interpreted the famous quote of Mills from environmental sociology point of view.

objects of study in the first place within the discipline. (Aro & Jokivuori 2010, 9-11; Pyyhtinen 2004.) By examining Spencer's ideas on energy, I thus study Spencer also as a sociological classic and via that participate to internal negotiations of the sociological discipline where we continuously define what sociology is as a science and what it is not, and what it can or should research and what not. One goal of the thesis is to argue that sociology should indeed be interested of energy issues.

With this research design I pursue to map a theoretical framework which would help to conceptualize the energy relations of social organization, and via that, I wish to contribute to present sociological research on energy and climate change. The research questions for the thesis are the following:

1. *What role does energy have in Spencer's social theory?*
2. *What kind of perspectives does Spencer offer to the energy relations of social organization?*
3. *How do Spencer's insights relate to the recent sociological energy research?*

The structure of the thesis follows the order of these research questions, and although they are overlapping in some parts, each question will be answered mainly in own main chapters (3, 4 & 5). However, before moving to the analysis, the subchapter 1.1 discusses the research method used in the thesis as well as introduces selected readings. Furthermore, in chapter 2, I introduce Spencer as holistic or system thinker and discuss various controversies related to his reputation and sociological work. The purpose of the chapter is to recognize how Spencer's analytical and philosophical-normative sides are separable depending on which of his extensive works is under the interpretation. In my thesis, I focus fully on the former side and leave aside the latter, more problematic and controversial, side of his production.

Chapter 3 turns to the actual analysis of Spencer's ideas by exploring how the first principles of his general systems theory (subchapter 3.1) and general law of evolution (subchapter 3.2) are built on the concept of energy. In addition that the chapter offers meta-theoretical insights, it

also builds foundations to more sociologically nuanced perspectives on energy relations of social organization discussed in chapter 4.

The structure of chapter 4 is rather straightforward. First, it discusses how the movement and change of social organization are always energized by natural resources, the origin of which is the sun. Furthermore, it discusses how present complex societies harness this energy via interconnected and networked sociotechnical systems, and compares how these sociotechnical systems differs from ecosocial systems of the past that were in direct relation to nature's energy sources. Following subchapter 4.1 introduces the first part of Spencer's social structuration theory which follows his general theory of evolution although with several qualifications. This chapter discusses as well about structural subsystems and functions which are vital to the organization. Subchapter 4.2 finishes the analysis by exploring various feedback-loops between these vital functional subsystems and recognizes essentiality of positive feedback-loops to the social structuration. The chapter concludes in recognition how complex ways different parts of present sociotechnical organizations are interconnected to each other, and especially how this organizational wholeness is entangled to energy resources which continuously energizes their structures and functions.

The analysis part of the thesis ends in chapter 5 in which Spencer's empirical and especially theoretical insights are related to more recent sociological energy research. This chapter introduces four classifications that connect the core ideas of recent authors to Spencer's insights. In all chapters we are able to see remarkable similarities between these authors' thinking as well as the value of Spencer's systematic theoretical construction.

Subchapter 5.1 discusses different meta-theoretical tools or assumptions which help to break the chasm between humans and nature. This chapter compares as well how Spencer's concept of energy relates to more recent theories of general energetics and ecological economics. Subchapter 5.2 turns to discuss one of the key concepts of sociological energy research, namely the role of energy surpluses to social organization. The concept of energy surpluses follows to subchapter 5.3 which discusses how the seamless networks of sociotechnical systems demand

extremely high portions of surpluses to maintain themselves. This section also considers the diverse ways how present global sociotechnical systems are locked-into path dependent trajectories – trajectories that are now causing our present environmental problems such as climate change, as subchapter 5.4 recognizes.

The thesis ends with the conclusions (chapter 6) which answers to the research questions as well as considers the value of sociological energy research to the environmental problem-solving. Generally, I have built my thesis in a way that assumes that the reader should read it at once from the beginning to the end. Because the thesis is eventually all about building one argument, namely that *energy should matter to sociology*, it is essential not to consider Spencer's – many times abstract and general – systems theoretical insights apart from the empirical findings of the contemporary sociological energy research. And vice versa, as it was already discussed above, it is not very helpful to consider only empirical reality without the theory. Hence, the different parts and chapters of the thesis are intended to support each other, and they are meant to read as a one integral argument.

However, before moving forward I want to emphasize that even though the following pages explore energy relations of social organization and develop theoretical concepts to expose these energy foundations, I do not intend in any of my arguments to reduce the social reality only to energetic phenomena. Human life as well as the constitution of societies include infinite number of various phenomena and plenty of variables, and my *only* purpose and intent is to discover conceptual tools which would allow the sociological community to continue discussion and debates on how energy relations affects this constitution or whether they do so at all.

Furthermore, I recognize that "the approach here used cuts across many of the traditional lines of division of labor among social scientists" (Cottrell 1955, 5). I am indeed exploring the concepts that are truly multi-disciplinary, and that might become a challenge for the reader as well as to myself. However, as already mentioned and as it will be discussed more later on in the thesis, this kind of genuine interdisciplinary work is mandatory for sociological energy studies and for environmental sociology more generally. And most importantly, it is crucial if one seeks to combat

the current global sustainability challenges. With these risks acknowledged, I now turn to discover how the energy available to societies affects their organization.

1.1. Research material and method

Spencer's oeuvre is extremely diverse and far from a unified whole where different parts would support a single perspective or a grand argument (Offer 2010; Turner 1985, 31; McKinnon 2010, 441; Kaaria 1994). As Weinstein argues, "interpreting Spencer is 'an exegetical labyrinth even for the initiated' (quoted by Offer 2010, 161). It is thus impossible to take the whole of Spencer's work as material for my study. In my analysis, I will focus to his main work mentioned above, namely to *The System of Synthetic Philosophy*, which also presents Spencer's analytic-sociological side and is relatively – or almost completely – free from normative stances (see chapter 2).

The goal of his synthetic philosophy was nothing less than to create universal concepts and theories that are able to explain the dynamics and evolution of inorganic, organic as well as super-organic (social) realms of creation. Spencer builds his philosophy book by book and it begins with general systems theory constructed in *First Principles* (published 1862) that builds foundations to all later discussions on biology (*Principles of Biology,* 2 volumes, published 1864-1867), psychology (*Principles of Psychology,* 2 volumes, published 1854), morality (*Principles of Ethics,* 2 volumes, published 1875-1896) and finally on sociology (*Principles of Sociology,* 3 volumes, published 1874-1896*)*.[6] Because my interest is to understand how societies' structuration is entangled to energy resources, I further focus my reading to *First Principles* (Spencer 1920, referred as FP) and to all three volumes of *Principles of Sociology* (Spencer 1975, referred as PS [1], PS [2] & PS [3]). I argue that through a detailed, meticulous reading of these resources,

[6] During his career, Spencer also published various other influential works. For example, his first book, *Social Statics* was published in 1851, and in it Spencer discussed his moral philosophies. Moreover, in *The Man Versus the State* that was first published 1884, Spencer articulated his political theory. Published in 1973, *The Study of Sociology* on the contrary was intended to popularize sociology and work as an introduction to *The Principles of Sociology.* Before Spencer's death, the massive two-volume autobiography was also released. There were also publications of many article and essay collections around the turn of the century from which many were unreleased before. (see e.g. Turner 1985, 9-11.) This list of publications is not however fully complete. In addition, Spencer wrote, for example, also about music and education.

Spencer's ideas on energy can be outlined comprehensively (cf. McKinnon 2010, 445) and it is possible to especially explore interconnections with recent sociological energy research.

It is good to note that my outline is just one way of reading Spencer's energetic insights. His sociology, or more generally the whole *system of synthetic philosophy*, is again a diverse set of perspectives. For example, Werner Stark has found three incompatible sociologies in Spencer's work and Robert Perrin four different kinds of theories of social evolution (see McKinnon 2010, 441). However, although Spencer's oeuvre may not be particularly consistent, still "it does not mean that his work may not be useful, either in whole, in part, or in reconstruction" (*ibid.* 441). In my thesis, I am not interested about the inner coherence of Spencer's theoretical ideas, but the ultimate aim, as already mentioned in the introduction, is to expand the sociological imagination to see how our present societies are energetically constructed.

I have aimed to reconstruct Spencer's ideas in such a way that they would offer insights to sociological energy research as single ideas or observations, and as a whole analysis. This reconstruction of Spencer's energetic sociology is guided notably from Turner's (1985) general introduction to his evolutionary thinking as well as from McKinnon's (2010) introduction to his thoughts. Furthermore, my studies in environmental sociology have played a significant part as well, for in them I have focused mostly on the topic of energy relations of social organization. All these insights have guided me to filter the essential ideas from all the possibilities that Spencer offers and further helped to reconstruct his thoughts in such a way that it was possible to analyze those ideas within the limited space of the thesis.

The method used in the thesis is systematic text analysis. According to Nurmi, the systematic text analysis means a diverse set of methods used to study especially contents of texts. Systematic text analysis is needed – and used – to clarify and study what either past or contemporary thinkers have said and what they have meant by saying so. More precisely, the thesis adopts a historical-reconstructive approach in which the goal is to interpret the original text as closely as possible in its own terms. The reconstructive reading does not bring anything new to the original texts as such, but its' value is to clarify the core messages of these texts as well as highlight certain

surprising perspectives – in my case societal energy relations – by bringing them to the fore. The premise for a successful historical reconstruction of a text is that it tries, as well as possible, to understand what an author under the analysis wanted to say with his or her text. Therefore, my reading of Spencer is more sympathetic than critical. (Nurmi 2014.)

Although the analysis is executed by using historical-constructive approach, at a general level, I build the thesis in a way that it also "emphasizes [Spencer's texts] continuing and covenantal importance to contemporary social and political thought" (Baehr 2017, 94). Thus, I do not read Spencer only to understand his classics texts in their own terms and in their own right (see *ibid.* 95-100) but also to demonstrate the value of his ideas to present research. Consequently, I will argue that this classical author recognized some themes especially essential from which he formulated "convincing accounts… in ways of such enduring significance and authority that they represent nothing less than the jewels in the crown of the sociological imagination" (*ibid.* 94). I recognize that my present orientation may influence the historical-constructive analysis of Spencer, but still I have intended to present Spencer's thoughts and key insights as faithfully as possible and with the similar emphasis that he presents them in his own production.

Nurmi (2014) have also presented a challenge for systemic text analysis and to its scientific value in the form of the following question: "why readers should read, in addition to the original texts, the report written by you?" I recognize two reasons to read my thesis besides Spencer's original texts and other authors' interpretations of Spencer. First, it introduces Spencer's core insights on energy in an accessible way and systematically connects separate insights together in such a form that social organizations' energetic structuration can be understood comprehensively. And, second, it clarifies and complements Spencer's theoretical insights by connecting them to more recent sociological energy and climate change research.

2. Contradictory, misunderstood, and overlooked scholar: many sides of Herbert Spencer

Herbert Spencer was born in 1820 to a middle-class family living in Derby, England. Spencer received his education at home because his teacher father did not want to send the boy to a school. Spencer was introduced mainly to natural, engineering, and social sciences as well as to philosophical questions; the cultural topics such as arts, literature, or music were completely absent in his curriculum. His father's approach to lecturing was empirical, and he demanded that Herbert himself always needs to find the relationships and causalities between different phenomena. Overall, Spencer lacked formal education, and he never received a university degree because he did not find himself suitable to the academic life. (Offer 2010, chapter 1.)

Having a strong background in the natural sciences and engineering, Spencer eventually began his career as a railway engineer. He did well, but his true calling to societal matters guided him from the beginning to develop the skills necessary for a scholar. Indeed, during the ten years of his engineering occupation, Spencer independently studied diverse topics and wrote articles to various magazines. Eventually, in 1848, Spencer started as a journalist at the Economist -magazine, and from that point forward, he dedicated his life to writing. Five years later, with the help of an inheritance Spencer received from his uncle, he quit his job as a journalist and started his lifework as a free writer and researcher. (*ibid*.)

During his lifetime Spencer was recognized as a lonely and secluded character. He did not, indeed, ever hold any academic position, and overall, he was not a traditional scholar. He did not debate with other authors and, for example, he never replied to the criticism that Durkheim presented in *The Division of Labor in Society.* Moreover, Spencer did not reference or extensively quote many prominent thinkers of his time. (Turner 1985, 12.) On many occasions, he reminded readers that his thoughts were only his and nobody else's. Also, in his autobiography, Spencer's own account of his intellectual development "does not sufficiently acknowledge the debt that he owed to provincial scientific culture and its institutions" (see Offer 2010, 28).

However, Spencer listened to and questioned some of the leading scientists and thinkers of his time in his daily visits to various clubs and groups in London (Turner 1985, 12). He associated frequently with other intellectuals, especially those clustered around the journal *Leader* and the circle that met at John Chapman's house to discuss literary and scientific matters (Francis 2007, chapter 7 & 8). Both groups worked as a forum for a movement where Spencer, together with other radical intellectuals, aimed at re-combining religion and science – the movement that was labeled "spiritualism" or "New Reformation". The movement's purpose was to articulate comprehensively philosophies and ideologies for a new kind of faith based on natural or secular ideas but that acknowledged mystical and indefinable characteristics of God (*ibid.,* 123). By doing this, they distinguished themselves from the beliefs of orthodox Christians as well as from the ideas of materialists such as Comte. These groups especially influenced the metaphysical concepts that Spencer formulated in his *First Principles*[7]*.* In addition to these public groups, Spencer also had around him a small band of philosophers who admired him and who helped and encouraged him to work on *System of Synthetic Philosophy.* The most important of these philosophers were Thomas Henry Huxley[8], John Tyndall[9], and Sara Hennell[10].

In his own time, Spencer's works were extremely influential. His works sold approximately 400,000 pieces. According to Timasheff (1955, 41), in Spencer's lifetime, there was no intellectual who could admit having not read Spencer, and although Spencer indeed had many critics,

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[7] One very powerful author who was especially captured by these spiritual ideas was F.W. Newman, who later pioneered the key concepts found in Spencer's *First Principles* (even the title was from Newman) (Francis 2007, 117).
[8] Huxley was a British biologists who was indeed one of the first to appreciate Spencer, and he also played a significant role in the development of *The Principles of Biology.* Later, they became so close that Huxley was the only one who Spencer could speak freely of the many metaphysical themes that are present especially in *First Principles* but also throughout the *System of Synthetic Philosophy* (Huxley is one of the few that Spencer actually footnotes in his works). Huxley was very "materialistic" in his ideas, and later, after the publication of Spencer's synthetic philosophy, Huxley actually publicly rejected Spencer's philosophy and his ideas on spiritualistic religion. (*Ibid.*, 146-148.)
[9] Tyndall was a physicist who especially debated with Spencer about the principles of evolution and about the nature of the "equilibrium" (see chapter 3). He also couraged Spencer to construct such a philosophy that would support the demands of the "New Reformation" movement. (*ibid.*, 148.)
[10] Hennell was also one of the early enthusiastic supporters of Spencer. Hennell was a theologian whose insights aligned well with Spencer's. However, she might have been influenced by Spencer more than Spencer were influenced by her insights. (*ibid.*, 152-154.)

everyone took him into account. For example, in 1933, Crane Brinton noted how difficult it was "to realize how great a stir he made in the world" (see Offer 2010, 20). Spencer enjoyed great popularity, especially in the United States where "virtually all the early founders of American sociology adopted Spencer's vision of evolution" (Turner 2015, 62). In Europe, too, Spencer's ideas had a huge influence. His insights and concepts also affected the works of other sociological classics. For example, Durkheim's[11] work on *The Division of Labor in Society* practically adopted Spencer's view of evolution and differentiation (Turner 1985, 22). Simmel, too, took Spencer's ideas as a starting point for his own analysis. This is especially the case in his early works on the principles of energy saving (Frisby 2002, 11, 59), but it has also been suggested that Spencer inspired Simmel's works throughout his career (Schermer & Jary 2013, 224). Moreover, Turner (1985, 49) argues that Talcott Parsons also rediscovered the structural-functional angle of Spencer's sociology. Turner writes:

> It is not clear to me if Parsons read, initially rejected, forgot, and then remembered Spencer's *Principles of Sociology* or if he simply forgot and then independently rediscovered the ideas in Spencer's work. But there can be little doubt that by the end of his career Parsons' action theory began to look very much like Spencer's synthetic philosophy with its emphasis on diverse realms of the universe and with the analysis of social systems emphasizing the functions of structures for meeting system needs or requisites. Moreover, Parsons returned to the evolutionary theme so evident in Spencer's work – growth, differentiation, integration, and adaptation.

Today Spencer is often a forgotten figure in academic disciplines, but his legacy is not completely lost in sociology because many of his ideas are central to contemporary theorizing. For example, Spencer's "essential theoretical arguments persist in a variety of literature, including the analysis of organizations as they grow and differentiate, communities as they differentiate into sectors and neighborhoods, and macro-level theories of societal evolution" (*ibid.,* 62). However, most sociologists among other scholars, have little knowledge about where these ideas originate because sociologists no longer read Spencer (*ibid.,* 60).

[11] Durkheim himself – while he was also critical of Spencer's individualism and utilitarianism – has in many essays praised Spencer and he recognized that Spencer's sociology had a massive influence on his own works (see Turner 2015, 64).

In essence, Spencer was a system-builder and synthesizer of knowledge and not a researcher of any specific academic field (Offer 2010, 5). As Letwin noted, "Spencer was an engineer who had become convinced that 'the astronomic, geologic, biologic, psychologic and sociologic groups of phenomena form a connected aggregate of phenomena'" (see *ibid.,* 12). Spencer believed that some universal *forces* affect every different realm and the task of specified disciplines is to expose how these universal forces behave in a specific realm (see chapter 3). However, reality "behind *force"* is always present as an ultimate mystery to man. Indeed, according to Spencer, "what reality is, man cannot possibly understand"[12] (Offer 2010, 63).

This characterization of Spencer as a knowledge synthesizer or a system-builder is also a view I was introduced to while reading the selected material for this thesis (S*ystem of Synthetic Philosophy*). I was introduced to Spencer as an analytical and holistic thinker who was – clearly with great enthusiasm – interested in unraveling the mysteries of the universe and unifying the knowledge of different disciplines. The main reason I developed such an analytical view of Spencer is that the synthetic philosophy indeed represents an analytic-sociological angle of his thinking and is relatively – or almost completely – free from his personal political and moral-philosophical ideas (see e.g. Turner 1985; Offer 2010, 155-156). For example, in the conclusions of her thesis, Kaaria (1994) argues that there is not a solid link between Spencer's universal evolutionary theory and his personal political moral-philosophy. The only purpose of Spencer's study of evolution is to find universal principles that lead to the growth of structures and increased complexity of organization (see next chapters). Thus, the study of evolution is neither interested in nor capable of determining whether the direction of change is development or not. As Spencer himself also concluded the final volume of T*he Principles of Sociology*, and thus the entire *System of Synthetic Philosophy*:

> Evolution does not imply a latent tendency to improve, everywhere in operation. There is no uniform ascent from lower to higher, but only an occasional production of a form,

[12] Spencer indeed saw philosophy and religion as a coherent whole (cf. Francis 2007, 111) what becomes clear in the first part of *The First Principles* where he distinguishes the two from each other and shows how the two knowledge-systems create essentially different kind of information about the creation.

> which in virtue of greater fitness for more complex conditions, becomes capable of a longer life of a more varied kind (PS [V3], 599)

However, the analytical side of Spencer is not the only portrayal one can present of him. Indeed, now more than a century after his death, Spencer's works still polarize opinions of contemporary authors (Offer 2010, 1-5), and there are several stereotypical views of him that exhaust most sociologists' knowledge of Spencer:

> He is acknowledged to have developed functional analysis – always to his discredit. We remember that he employed organic analogies, comparing societies and biological organisms. We recall that he was an evolutionist, tracing the development of societies from simple to complex. We never forget that he coined the phrase, "survival of the fittest," and was an apologist for the doctrine of laissez-faire. We have even defined him as a social Darwinist, even though a more accurate view would be to see Darwin as a biological Spencerian. (Turner 1985, 11.)

Considering the topic of my thesis and the work of other authors, delving deeply into the controversies related to Spencer is not necessary. Instead, I would rather consider reasons that might have led to these stereotyped stigmatizations of Spencer's image and work. Turner (1985, 12; 2015, 79) recognized at least five reasons that might have led to this stigmatization of Spencer. They are worth considering in more detail.

(1) The first point is connected to his personal moral philosophy that is most present in his earliest work, *Social Statics*[13], where his idea of survival of the fittest[14] is used to promote a social system based upon free markets and a limited government. Today such a philosophy is politically right-wing whereas sociology is quite often liberal, radical and collectivist. Because of these political biases, most contemporary sociologists now find Spencer's philosophical ideas uncomfortable

[13] It is also good to note that late in his life, Spencer himself complained that too much attention had been paid to these earlier works of him (Turner 1985, 13).

[14] With the phrase "survival of the fittest", Spencer mostly referred to the context and dynamics of geopolitics, especially in the situations where societies are in conflict (see also chapter 4.2). He indeed used the phrase also to mean "selecting out" men, but, according to Offer (2015, 80), less so in his sociology than in other places. With the phrase, Spencer wanted to point out how social units – from organizations to societies – are many times in competition for resources; "and the more organized and productive is a social unit, the more likely will it be able to sustain itself in its environment. Those that cannot survive competition either die or move to a new environment where they can secure resources" (*ibid.*). (see also Kaaria 1994, 57.)

and they reject all his works because of these political and ideological conflicts (see also McKinnon 2010, 444). According to Turner, "the tragedy here is that Spencer's scientific works are [indeed] surprisingly devoid of his ideology". Turner also does not try to assert that Spencer's sociology was completely free of the influence of his ideology, but he is only "pointing to the fact that there are far fewer ideological tracks in his work than in Durkheim's, Weber's, and Marx's works". (Turner 1985*,* 1, 13.)

(2) Moreover, Spencer's functionalism can be seen as another reason for the stigma related to his work, although Durkheim or Marx, too, offered many functional modes of analysis. Turner further argues that Spencer's functionalism – that is, the idea that "structures exist because they meet the needs or survival requisites of a society" – is much less intrusive than, for example, the one Durkheim articulated. Moreover, as again will become clear in my own analysis, Spencer's functional statements are almost always superfluous to the more general analytical point. There are, indeed, major functional elements in his thinking, but these elements do not build the foundations of his general analytics. Thus, it is unfair to stigmatize Spencer more than other 19th century authors for the functional parts of their works. (*Ibid.,* 14.)

(3) The third source of stigma is related to Spencer's evolutionism. Many authors portray Spencer as a naïve, ethnocentric, unilineal evolutionist who saw societies developing toward the Anglo-Saxon ideal. My own reading of Spencer confirms Turner's statement that "nothing could be further from the truth". As the following chapters discuss as well, Spencer's evolutionary perspective is highly sophisticated and nuanced, and it does not take any normative ends. If again compared to Durkheim's and Marx's ideas, or in Turner's words their utopias, "Spencer is downright cold-hearted, pessimistic, and even anarchistic" in his writings. (*ibid.* 14.)

(4) The fourth reason for the modern-day stigma attached to Spencer is that he thought big: "he always looked at the big picture in the sense of comparing simple and complex systems and in the commitment to examining the areas of isomorphism among the various sciences". Specific disciplines often view such a systematic approach suspiciously. This means that to approach Spencer's holistic ideas, one must step out from the institutionalized disciplines if the goal is to

understand what Spencer tried to achieve in his work. Indeed "normal intellectual comfort zones have to be transcended to achieve an adequate understanding of Spencer on any topic; the unique breadth of his odyssey demands nothing less"[15] (Offer 2010, 161). Moreover, although Spencer aimed to construct a universal theory like, for example, Parson's "arm-chair" grand theory, critics fail to notice that Spencer provided literally thousands of pages of ethnographic data to illustrate his points. (Turner 1985, 14-15.)

(5) The last point that might cause possible stigmatization is Spencer's style of using biological language when speaking of social matters. Indeed, "for a hundred years, sociologists have been suspicious of any intellectual activity that makes reference to biology. Such references are seen as reductionistic and scare sociologists into believing that their field will be subsumed under biology" (Turner 2015, 79-80). However, as will be discussed later in this thesis, Spencer's use of biological metaphors does not reduce social reality to biological or physical matters. For Spencer, although every organism shares some features, still social organization – or super-organism – incorporates phenomena specific only to it. Overall, according to Turner, contemporary sociologists should not be fearful of bringing biology into sociology just as Spencer was not: "Spencer's ideas lead the way, I think, back to a more biologically informed sociology, which it is hoped will no longer be so insecure about its place at the table of science" (Turner 2015, 81-82); cf. also Gronow & Kaidesoja 2017).

Connected to these biological matters, clarifying the relationship between Spencer and Darwin may be useful. This might be indeed "the greatest source of popular confusion about Spencer" (Francis 2007, 2). On many occasions, especially after 1944[16], Spencer has been portrayed as a

[15] The fact that Spencer's thinking is not fitting to present disciples, might not be as bad thing as it first seems especially if considered in the light of the thesis. As already mentioned in the introduction, it has been widely argued that sociological energy research (similarly to general environmental sociology) has to overcome the disciplinary borders and even to create some kind of new multidisciplinary theories and approaches in order to expose the energy relations of societies. When one approaches Spencer's work in a sympathetic way, it kind of automatically creates perspective fit for the demands set for the sociological energy studies. As also mentioned before, it is the task of sociological community to evaluate are these perspectives useful, but in principle, Spencer's holistic thinking seems to create foundations that might be useful to the evolving sociological energy studies.

[16] Before that there has been, according to Thomas Leonard's report, only two references which portray Spencer as a social Darwinist (see Francis 2015, 9).

social Darwinist – as an author who applied the evolutionary concept of *natural* selection to human society (see e.g. Offer 2010, 17-21). However, this confusion was a source of frustration also for Spencer himself (*ibid.,* 18). It is useless to go into too deep discussions on this matter, but briefly, Spencer's theories differ from Darwin's in at least in three ways:

> (1) Spencer's evolutionary theory did not focus on species change; (2) Spencer's faith in progressive evolution did not draw on natural selection or competition; and (3) Spencer did not accept that modern individuals and societies would continue to make progress through struggle for survival (Francis 2007, 2).

It is true that Spencer used the phrase "survival of the fittest", especially in his moral-philosophical works, but such themes are absent in his *evolutionary* theory articulated in *the system of synthetic philosophy* (sociological works included), which focus on how processes of societal growth and differentiation lead to changing degrees of complexity in social organization (see chapter 3 & 4). Today, however, labelling Spencer as a social Darwinist has almost become something of a truism or a tradition, and to continue to do this, "is to partake of such a huge distortion of both the relationship between the two men and the relationship of their ideas that it should no longer be regarded as an available option" (Offer 2010, 18; see also Francis 2007, 2015; Turner 1985).

The main purpose for presenting these characterizations that stigmatize Spencer's image is not to defend the problematic dimensions of his work and thinking. The reason for the discussion above was only to argue, following McKinnon (2010, 444), that the fact "that some of his work is characterized by ethical tendencies we may find unacceptable seems a poor reason for ignoring his richer offerings". Furthermore, more generally, the aim was to demonstrate that Spencer's ideas are more nuanced and richer than most authors have portrayed them. Ultimately, then, the purpose was to detach the following analysis from the stigmatized view of Spencer, and to invite the reader to approach Spencer's ideas from the same "neutral point-of-view" from which I have intended to read his works – a point-of-view from which other sociological classics have also been approached (Turner 1985, 15).

3. General energetic systems theory

Spencer's entire *system of synthetic philosophy*, sociology included, is constructed on energy metaphors. Like any general systems theorist, Spencer sought to define universal principles that governed the relations among organic, inorganic and super-organic (social) realms. These principles Spencer derives by using his main term *force* as well as concepts of *evolution* and *dissolution* (structuration and de-structuration of organizations) which are constructed from the basic laws of *force*. In a nutshell, Spencer's (social) theory is all about finding the principles for social organization's structuration (evolution), and consequently, explore conditions which organization must continuously fulfill to prevent the de-structuration of the organization (dissolution). It is important to note that even though Spencer's insights on biology and physics are fairly outdated (Turner 1985, 43), his "sociological use of 'energetic' principles make a significant, and largely neglected, contribution to sociological thinking" (McKinnon 2010, 445). To illuminate the sociological significance of Spencer's energetic ideas is also the ultimate aim of this chapter. As already mentioned, I am keen to explore how Spencer's insights could expand the energetic sociological imagination, and thus I am not interested in (neither capable of, for that matter) evaluating the correctness of his insights in lights of present-day research on general energetics.

Due to Spencer's style of addressing and handling various phenomena with the same concepts, his notions are inevitably general and abstract in nature. Indeed, Spencer's synthetic philosophy needs to be read as the first general systems theory (Turner 1985, 31), which moves freely between and also above the natural and the social sciences. His work needs to be interpreted in a way from "meta-level", and especially it is necessary to read it as an integral argument and not as a collection of disconnected and fragmentary quotes or insights. Furthermore, although general systems theories are also more generally concerned with dynamics and logics universal to all organizations of the universe, still particular subsystems incorporate dynamics and phenomena specific only to them. This is how Spencer, too, is worth to be interpreted.

Spencer did not indeed comprehend all the different dimensions and phenomena of reality as identical. With the help of his general concepts he seems just to try to find inspiration, perspectives, and frameworks which guide him in his various projects and analyses but do not determine fully the outcome of the single projects (cf. Turner 1985, 43). Furthermore, Spencer's goal was indeed to build a plausible synthetic philosophy which forced him to compare organic and inorganic organism to the development of social organization. However, many times he points out that there exist no *direct* analogies between phenomena of society and other organisms (e.g. FP, 195, 510; PS [1], 436, 580; see also Turner 1985, 43). But still, in the end, the evolution of these separate organisms also develops as a whole:

> While we think of Evolution as divided into astronomic, geologic, biologic, psychologic, sociologic, etc., it may seem to some extent a coincidence that the same law of metamorphosis holds throughout all its divisions. But when we recognize these divisions as mere conventional groupings, made to facilitate the arrangement and acquisition of knowledge – when we remember that the different existences with which they severally deal are component parts of one Cosmos; we see at once that there are not several kinds of Evolution having certain traits in common, but one Evolution going on everywhere after the same manner. (FP, 501)

Most certainly because of the abstract nature of Spencer's ideas, for example Turner (1985, 43) has argued that Spencer's general system theoretical framework does not offer many insights that would be sociologically valuable (see also Offer 2010, 160). Although this can be indeed the case when Spencer's work is perceived from a "traditional" sociological point of view, I argue that in an environmental – especially in *energetic* – sociological reading these ideas offer many fruitful insights. The very premise of environmental sociology is to overcome disciplinary borders and to this task Spencer's system theoretical ideas build excellent foundations. Even though it is impossible to unravel all the possible forms of interaction between different dimensions from organic to social, or end up to a common understanding about causalities of various phenomena by different disciplines (FP, 202), still – especially in environmental sociological research – we cannot close our eyes from information and insights produced by other disciplines. Especially in social scientific research on climate change, such a holistic systemic thinking is an extremely valuable or even necessary starting point (cf. Urry 2013a, 257).

Most generally, Spencer's energetic work could be labeled, following Haila, as ecosocial theorization. The goal of ecosocial research is to unravel dynamic relations between the societal and natural processes. The very premise of such an analysis is that nature is present in every human action to the backbone. This premise is ontological as it is also to Spencer. Nature is not just the external limitation to which human actions must adapt – the connection is much tighter. Societal processes are seen to follow ontologically similar dynamics that exist in the rest of nature. The very purpose of the research is to clarify how ecological processes are affected by societal trajectories, and vice versa. (Haila 2009.) This goal is as at the very heart of Spencer's theorizations, too.

Before moving forward, it is important to notice one more thing in Spencer's thinking and in his energy concepts. Namely, that by interpreting "all phenomena in terms of Matter, Motion, and Force, is nothing more than the reduction of our complex symbols of thought, to the simplest symbols; and when the equation has been brought to its lowest terms the symbols remain symbols still" (FP, 510; see also PS [3], 172). Hence, Spencer did not argue that *all* phenomena or beings are reducible to Matter and Motion (energy); these two are just symbols which only reduce complexity and offer one specific perspective on reality. As mentioned in the introduction, this is also the approach I follow in my thesis; I am interested in bringing energy to the fore of contemporary sociological analysis, but at the same time I share with Spencer the view that social reality is never reducible to these categories alone.

Furthermore, according to Spencer, with the help of these constructed symbols the researchers can only interpret phenomena outside of consciousness and thus they cannot ever say anything about the true nature of force (FP, 57; PS [3], 173). Spencer hence does not support or define any ultimate nature of things, and implications of his reasonings "are no more materialistic than they are spiritualistic; and no more spiritualistic than they are materialistic" (FP, 510; PS [3], 173), and thus he finds one truth "which grows ever clearer":

> the truth that there is an Inscrutable Existence everywhere manifested, to which [men] can neither find nor conceive either beginning or end. Amid the mysteries which become the more mysterious the more they are thought about, there will remain the one

> absolute certainty, that [men are] ever in presence of an Infinite and Eternal Energy, from which all things proceed. (PS [3], 175)

Hence, for Spencer, material and ideal factors interact and influence each other but neither of the two determines the outcome of any action. This premise of Spencer's sociology is fully compatible with the more recent sociological energy research presented later in the thesis.

Overall, in the following analysis I read Spencer's sociology *as part* of his general systems theory, and not apart like many of the existing readings (e.g. Turner 1985[17]), to emphasize the environmental sociological value of Spencer's work. Furthermore, I do not make any pre-assumptions about the nature of force and whether it is a materialistic or spiritualistic concept.

3.1. Laws of the universe: various forms, flows, and cycles of *force*

For Spencer, *force* is a sort of holistic concept by which life can represent itself to humans. Even though the inner qualities of life will always be mysterious for us (FP, 84, 509), the principles of force allow us to define universal laws through which life manifests and operates in our universe. For example, even though "the *law* of gravitation is within our mental grasp, it is impossible to realize it through the force of gravitation" (FP, 89). Similarly philosopher Richard Beardsworth argues that "energy can be interpreted as meaningful only phenomenologically, because it is manifested only in the effects caused by it: energy itself stays an unknown variable and universal abstraction" (see Salminen & Vadén 2013, 32). Thus, by utilizing the principles, Spencer believed he could make some dimensions of the unknowable knowable; indeed, one task of synthetic philosophy or systems theory is to comprehend the universal principles and dynamics of the knowable phenomena.

But then, what is knowable? What is force? Shortly, force is a kind of generic flow of "substances of the life" in which all structures are constituted, and all movement becomes possible. Force thus enables change and novelty, but it also constructs stability and matter. There really is not an

[17] Turner does not exclude Spencer's system theory from his discussions but nevertheless his reconsideration of Spencerian sociology is "socio-centric".

adequate definition for the concept, and personally I prefer to comprehend force as vectors. Vectors are mathematical tools and abstractions that are used generally to illustrate the strength and direction of some power or movement. The vector of this movement is constructed by summing up all individual forces affecting the situation at hand. If the sum is zero, then the situation or the object is stable, but if the sum differs from zero, then the object moves to the direction (with remaining force) defined by this sum. For example, if two persons are pulling each other with the same power, then nothing happens (the sum is zero). But if a new force is introduced into the situation (for example a third person pushing another's back), then a movement occurs in the direction (and again with the introduced force) defined by the sum of all the forces.

Similarly, Spencer stated that matter or stability is due to the equilibrium of force vectors, and movement or change results from the predominance of some vectors over the others (e.g. FP, 170). In any space there is a continuous movement of countless chaotic lines or vectors of force that affect each other, and sometimes these "attractions and repulsions" reach a near equilibrium phase that constitutes a form we experience as of objects or matter (FP, 208-9). Of course, Spencer's use of force differs much from the simple example presented above as well as from precise mathematical vector calculations. Spencer's use of the concept will be clarified later on, but it is important to note from the beginning that force, for Spencer, is not only physical power but something much more abstract and universal.

Nevertheless, from this follows that force represents itself to us via two interrelated forms: matter and motion. Spencer also uses a more familiar concept of the latter, namely energy. Energy is not separable from matter because "as it is impossible to think of motion without something that moves, so it is impossible to think of energy without something possessing the energy" (FP, 171). Therefore, briefly, the matter constituted by the equilibrium of forces fills space which otherwise would be vacuum-like in nature, and energy enables the movement of these "static" force-clusters (matter). But again, both find their origin in force – they are like two sides of the same coin.

From this universal seamless entanglement of matter and motion also follows that the principles of force are also shared by all the dimensions of the life where we observe stability (or structure) or movement (or change). Spencer identified three laws of force, which he drew from the physics of his time: indestructibility of matter, continuity of motion, and the persistence of force (FP, 150-176), by which Spencer meant that ”matter moving in a given direction will continue to do so and that the [energy] behind it will persist in a given direction unless it confronts a resisting force or collides with other matter or until ‘friction’ dissipates the motion” (Turner 1985, 35). There is no need to discuss these general ideas in more depth, because they will be clarified later, and in any case, for the purposes of this thesis the deductions followed by these principles are far more interesting than the actual laws.

The deductions are the following: (1) force is transformable, but all forces need to maintain general equilibrium, (2) energy follows the line of least resistance, and (3) motion is rhythmic. A detailed discussion of these deductions is important not only because they theorize societies’ energy relations and build a foundation for later discussions (especially for the law of evolution) but, through them, it is easier to grasp Spencer’s way of thinking and what he tries to achieve overall with his *system of synthetic philosophy*.

(1) The first deduction is one of the most important insights for the theoretical premises of sociological energy research. It states that the sum of all forces is constant, from which follows, that energy is not ever created or destroyed, but just changes its form (FP, 181-205). For example, the energy contained in nutrients transforms in our bodies to various forces, such as to tissue (matter) or movement and heat (motion). These new forms of force do not “stop” in our bodies, but they again affect the environmental forces of our bodies in such a way that the totality of energy stays constant. As a wider example, Spencer discusses how opposing forces found in plants and animals (roughly the production and consumption of oxygen eliminate each other’s forces) cause the equilibrium of a specific ecosystem (FP, 190).

However, the energy equilibrium is not only a phenomenon of the “natural” world. Spencer also connects the human mind to these universal energy flows, because to him, the human mind is

not floating in a vacuum-like space detached from our bodies. On the contrary, human feelings, senses, ideas, motivations, etc. are also seamlessly entangled to universal force:

> Hence, if we regard the changes of relative positions, of aggregation, or of chemical union, thus arising, as being transformed manifestations of certain energies, so, too, must we regard the sensations which such energies produce in us (FP, 193)
>
> Besides the correlation and equivalence between external physical forces and the mental forces generated by them under the form of sensations, there appears to be a correlation and equivalence between sensations and those physical forces which, in the shape of bodily actions, results from them (FP, 194)
>
> If we take emotions instead of sensations, we find the correlation and equivalence similarly suggested… But as the emotions rise in strength, the muscles of the face, body, and limbs, begin to move (FP, 194)

Thus, according to Spencer, material forces always influence our immaterial minds, and similarly, immaterial minds influence the material world in ways that the totality of different forces stays constant. However, Spencer himself does not create this dualism of material and immaterial because his concept of force incorporates principally all the realms of creation (organic, inorganic and super-organic). Hence, force is transformable: force penetrates physical energies as well as "mind energies", connecting the dynamics of one realm to the evolution of others.

However, it is extremely crucial to note what Spencer tried to argue and what he did not when he discussed these seamless inter-connections of mind and matter. Spencer clearly recognized that the chances of misinterpreting his insights were high and he noted various times that he was not attempting to state any *causal* relations between material and immaterial dimensions:

> But now, reverting to the caution which preceded these two paragraphs, we have to note, first, that the facts do not prove transformation of feeling into motion but only a certain constant ratio between feeling and motion, and then we have further to note that what seems a direct quantitative correlation is illusory" (FP, 195)
>
> Even still more manifest becomes the lack of direct relation, either qualitative or quantitative, between outer stimuli and inner feeling, or between such inner feelings and muscular motions, when we contemplate the complex kind of mental processes." (FP, 196)

Therefore, Spencer does not argue for any direct or causal relation between matter and mind, but the relations are *always* indirect (see also FP, 197). Practically he just argues, like Salminen and Vadén (2013, 32-4) have suggested much more recently, that although "energy itself remains an unknown variable and universal abstraction", still "energy is not a completely alien thing to humans, because whatever man is, he is also partly energy and it is possible to experience it".

And, if it is accepted that our minds are part of our bodies which again are embedded in ecological energies, then "the general law of transformation and equivalence [which holds to] the forces we class as vital or mental, must hold also of those which we class as social", because social is just a name for "the effects which can be achieved only by the joint actions of many" (FP, 202). The social is thus part of the same energy flows where material and immaterial forces act and react, and during the history of societies where primitive societies have grown ever more complex, these kinds of social forces have caused societies to develop characteristics distinct from the qualities of individuals:

> At first these are obviously due to accumulated individual efforts, but as fast as societies become large and highly organized, they acquire such separateness from individual efforts as to give them a character of their own (FP, 202).

These distinct characteristics of societies are considered more comprehensive in later chapters of this thesis but it is important to notice already here that for Spencer "the social" (similar to "mind") is not separable from the physical world and its energies. Social movements and actions need to be energized the same in way as any other forces in the universe.

To summarize the discussion so far, force is hence a generic universal power that connects everything – organic, inorganic, mental-psychological, and social – to the seamlessly entangled web of matter and energetic motion. Individuals' mental-psychological sense, feelings, ideas, etc. are embedded via their bodies to these energy flows from which follows that the cooperation of individuals (society) has foundations in the universal energy flow as well. Energy moves seamlessly and uninterruptedly from material to immaterial and from immaterial to material in the continuous flow of force. Furthermore, the sum of all various forces must be equal because

otherwise something should be born from nothingness and something should transform to nothingness:

> From the proposition that force can neither come into existence nor cease to exist, the several foregoing conclusions inevitably follow. Each manifestation of force can be interpreted only as the effect of some antecedent force: no matter whether it be an inorganic action, an animal movement, a thought, or a feeling… Either bodily and mental energies, as well as inorganic ones, are quantitatively correlated to certain energies expended in their production, and to certain other energies which they initiate; or else nothing must become something and something must become nothing. (FP, 205)

(2) The next deduction states that motion or energy always follows the line of least resistance (FP, 210). The main idea of this deduction is rather simple. If there is a predominant force (energy) that will effect change or movement of other forces or force clusters (matter), then this movement or change will follow the line where it experiences the least resistance. This also means that movement will not occur if a force cannot create enough power to overcome the sum of other forces.

Nevertheless, it is crucial to pay attention to the complexity of Spencer's concept of resistance. The analysis must note physical as well as mental resistances included in the action (cf. how Weber's analysis on the spirit of capitalism focuses almost solely on the mental dimension). In general, things are done where they can be done with the least effort, and they are not done at all if the output energies do not overcome the input energies; in other words, if any energy surpluses cannot be created. For example, a barter only begins when its outcome better satisfies men's desires compared to the original arrangement of forces:

> The practice of barter begins as soon as it facilitates the fulfilment of men's desires, by diminishing the exertion needed to reach the objects of those desires. When instead of growing his own corn, weaving his own cloth, sewing his own shoes, each man began to confine himself to farming, or weaving, or shoemaking; it was because each found it more laborious to make everything he wanted, than to make a great quantity of one thing and barter the surplus for other things. (FP, 222)

The principle also holds in the case of division of labor which "spontaneously arises" (PS [3], 335) where the resistance to manufacture each commodity is the lowest (notice how energy contained in coal changed the social organization):

> Even a change in the topical division of labour, such as migration of most of the woollen manufacture from Gloucestrehire to Yorkshrine, illustrates the same influence: since, by the proximity to a wool-importing place, and by the presence of abundant coal, serving as a better source of power than water, the resistance to the production of cloths as measure in cost of freight, labour, and fuel is less than it was in the original seat of the industry (PS [3], 354)

Societies also develop more generally by following the line of least resistance. Again, it is crucial to recognize how resistance can be ideal, such as political or military resistance, or material, such as ecological resistance. The overall direction of societal evolution is determined by the sum of these separate factors (and, of course, there are many other factors as well):

> The growth of a society as a whole takes place most over regions where the obstacles to be overcome are least. Along one frontier hostile tribes exist, while in another direction there are no enemies; hence population spreads there. On this side lies a fertile tract while on that a barren tract lies; and the resistances to living beings in these directions relatively great or relatively small, the social mass increases where it is relatively small. (PS [3], 353)

Even though these topics will be discussed more deeply in the coming chapters, it is already possible to recognize the importance of fossil fuels when societies have overcome these diverse obstacles of environmental resistance. Massive energy resources included in fossil fuels have decreased the resistance of global movement to a level that is almost incomparable to preceding times. This has massive effects, for example, on the organization of economy when supply chains are not locked into specific localities and objects and people can move even longer distances relatively freely because of the lack of resistances. Our constant need for surplus creation and ever-increasing need to produce and consume new commodities has been relatively easy to adjust to environmental forces when the commodity supply chains can be organized without the limitations of natural forces. Fossil fuels do not still determine the line of movement flows and the shape of organizations because other resistances should also be considered (e.g. political or

religious opposition), but they have enabled us to overcome the resistances nature offers to our bodies' movement. But as noted, these insights will be discussed more in the following chapters.

(3) The last deduction states that the behavior of force is rhythmic or cyclical. As mentioned before, forces everywhere indeed affect each other, but Spencer clarifies that this interaction of forces is rhythmic in nature. The rhythm results "wherever there is a conflict of forces not in equilibrium" which is the case when whatever aggregate is under transformation or movement. As described above, when things move, a predominant force always affects other force vectors in a way that causes transformation. However, Spencer recognizes that in situations such as this, two or more identical force vectors cannot exist, which means that the force transformations are never perfect, and any interaction of forces causes "secondary" or "compound" forces in their environment. Although the basic tendency in the universe is that different forces seek balance with each other, these compound forces interfere with finding stability and cause forces to interact in a cyclical manner; they act and react, and act and react in a process of continuously finding equilibrium. (FP, 232-233.) Furthermore, the more forces affect any situation, the more complex the sum of the forces will become:

> To generate a perfectly circular rhythm, the two forces concerned must be exactly at right angles to each other, and must have exactly a certain ratio; and against this the probabilities are likewise infinitely great… And when, as always happens, above two forces are engaged, the curve described must be more complex, and cannot exactly repeat itself. So that throughout nature, this action and re-action of forces never brings about a complete return to a previous state (FP, 233)

However, there are situations where different forces find – or start to resonate with – each other. In these cases, the balance of the forces is near constant, and order arises in an otherwise chaotic environment of rhythmic force factors (FP, 234). As mentioned before, this situation appears to us as matter. Nevertheless, this matter, or cluster of forces, is constantly part of universal energy flows and needs to constantly find balance with the cyclical forces of its environment.

This means, for example, that no social organization is ever completely stable, and their structures are constantly affected by inner and outer cyclical forces. Considering for example, a specific

industrial structure, we can see that the rhythms of production and consumption can never reach equilibrium but can only attempt to find order in the endless cycles: “in production and consumption there are undulations almost equally obvious. Supply and demand are never completely adjusted, but each, from time to time in excess, leads presently to excess of the other” (FP, 243).

These ideas might not directly offer the most valuable insights to sociological energy research, but in addition to fruitfully illuminating Spencer’s way of thinking about the world as an evolving mix of chaos and order or stability and change as well as being important for the understanding of his evolutionary theory, the ideas are important in at least three additional ways.

First, Spencer has been accused many times of teleological or linear explanations where things are always developing in some direction and always the same way (see also chapter 4). But here he emphasizes the unpredictability and chaotic nature of reality; different phenomena are in constant transformation and the direction of change is impossible for anyone to fully control or predict. Spencer indeed discussed how any energy transformation or collision leads to the creation of various non-linear “counter forces” and new rhythmical energy vectors in which other forces are obliged to react and act ever more complex ways:

> Rhythm is very generally not simple but compound. There are usually at work various forces, causing undulations differing in rapidity; and hence besides the primary rhythms there arise secondary rhythms, produces by the periodic coincidence and opposition of the primary ones. Double, triple, and even quadruple rhythms, are thus generated. (FP, 231)

Second, the cyclical nature of force offers insights into the dilemma of order and change. Compared to how the confrontation of routine and creativity of action is discussed in sociology, we can see how these concepts or perspectives are blended to each other in Spencer’s theory; cycles are routines, but the “imperfectness” of cycles gives way or even requires creative movement. These are not two separate phenomena because both are part of every situation. Thus, even the most stable structures are under constant interaction with the forces of their environment, and they must continuously synchronize their inner force rhythms with the cycles

of the environment. Indeed, reproducing any structure, from micro to macro, is a process of continuous cyclical interactions with all the other aggregates and forces around it. And because these interactions are never repeated identically, there is always creativity in action – new forces are always in creation.

Third, these observations are crucial if one wants to understand Spencer's universal law of evolution, which is discussed in the next chapter. Insights about complex cycles and compound rhythms of interacting forces build foundations that help to understand why, in the course of evolution (building of structure), organizations are not only growing but they are becoming more complex and differentiated as well.

Considering the topic of my thesis at the most general level, I can end this chapter with the following example that utilizes these insights. Over the ages, the energy cycles of the sun, together with other natural rhythms, created the matter called oil (oil is dead organisms). The oil has transformed the ecological energies to extremely stable matter (equivalence of force vectors), and because the oil's environmental forces are rhythmically stable as well, these ancient energies were in "peace" under the earth's crust (see FP, 204). This stability was exploded back to high speed movement and energies by the industrial societies that transformed these outer forces to the inner forces of their own structures (e.g. social and material welfare) (see FP, 419-420). Compared with pre-industrial societies whose movements were dependent on the cycles of nature (FP, 242), industrial societies created their own rhythms (see also chapter 4.1).

However, now these long natural cycles are completely un-synchronized with the global social-energy-rhythms that appear to us, for example, in the form of climate change (see also chapter 4.4). By releasing ancient forces of oil, the rhythms of social structures un-synchronized the stability of natural cycles where the balance of oxygen and carbon-dioxide cycles existed in harmony (see FP, 190). This un-balance of *force* now requires social forces to react in a creative way if societies want to continue their historical rhythmic motion into the future because "on these set of conditions, inorganic and organic, characterizing the environment, primarily depends the possibility of social evolution" (PS [1], 9).

3.2. Evolution through energy surpluses

These principles and deductions discussed above offer valuable meta-theoretical insights for sociological energy research by closing the chasm between society and nature. Furthermore, they also build the foundations of Spencer's theory of evolution that define general laws on how organizations form their structures. Indeed, after "having seen that matter is indestructible, motion continuous, and force persistent – having seen that forces perpetually undergo transformations, and that motion, following the line of least resistance, is always rhythmic", Spencer combines these separated principles together and deduces that the universal law of evolution "must be the law of the continuous re-distribution of matter and motion" (FP, 252). After supplementary analysis where Spencer recognizes "the instability of homogeneous masses" (FP, chapter 19), "the multiplication of effects" (FP, chapter 20) and "effects of segregation" (FP, chapter 21), Spencer constructs his law of evolution in the following form:

> Evolution is an integration of matter and concomitant dissipation of motion; during which the matter passes from a relatively indefinite, incoherent homogeneity to a relatively definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation. (FP, 367)

Spencer's style of using system theoretical language makes his vocabulary sounds extremely abstract. However, the basic idea of this law might not be as complicated as it first seems. In order for evolution to happen, or if an organization wants to build its structure, it needs continuously to distribute matter and retained motion – that is, energy – through it. And the greater the amount of these forces rises, the greater the complexity of the organization that distribute them needs to get. This is due to fact that more heterogeneous and differentiated organizations are more resilient to handle ever-increasing force "collisions" compared to homogeneous aggregates that are usually very vulnerable to the effects of complex forces (see also the last chapter). This is the case because the differentiated aggregates are integrated by mutual interdependencies and functions, and together with these diverse sets of units and "seamless network" they interact more resilient and sustainable way with their environmental forces. Thus, it follows that if some organization want to grow in size and distribute increasing amounts of matter and motion

through it, then it also needs to be able to increase its complexity – that is, to differentiate its parts and then to integrate them together with mutually dependent links. Therefore, the evolution consists always of two complementary parts: primary (integration) and secondary (differentiation) evolution (PS [1], 459), and most generally the overall course of evolution is to increase complexity in the world.

Hence, evolution is a process where any single organization always evolves mutually with its environment. It is a process where neither "inner forces" nor "external forces" of organization fully determine the outcome of evolution, but both types of forces are indeed constantly affecting the process:

> After recognizing the truth that the phenomena of social evolution are determined partly by the external actions to which the social aggregate is exposed, and partly by the natures of its units; and after observing that these two sets of factors are themselves progressively changed as the society evolves; we glanced at these two sets of factors in their original forms. (PS [1], 425.)

These general evolutionary principles offer important insights for sociological energy research. Indeed, the principles also state that during the process of evolution, organizations kind of absorb environmental energies to their own structures – any single organization thus maintain its structures by utilizing energies from its environment. And as it has been discussed already several times, the energies absorbed from the environment (outer forces) need to be in constant equilibrium with the inner forces of the organization. Turner (1985, 40) applies this insight to societal evolution in the following way: "sociocultural equilibrium depends upon a constant infusion of energy from the environment to sustain a given structure in that environment". And if organization intends to grow in size, the amount of absorbed energies need to increase so that they exceed the inner forces of societies. In other words, the *energy surpluses* are needed.

The law of evolution offers indeed one of the most essential insights to sociological energy research: the essentiality of energy surpluses to structuration. Energy surpluses are also essential part of Spencer's own analysis. For example, when Spencer discusses about "original external factors" at the beginning of his *Principles of sociology,* he put great emphasis on fact that energy

surpluses are the very premise of whole social evolution (PS [1], 18). Furthermore, in more practical settings, Spencer discusses for example how the domestication of animals created such amounts of energy surpluses compared to the muscle power of humans that eventually changed the course of whole human history:

> Only when the numbers reared yielded their owners a subsistence better than that obtained by catching wild creatures and gathering wild fruits, could there arise that form of social aggregation which has so widely prevailed in Asia, and which has been so influential in initiating the structures and habits of most civilized societies. (PS [3], 323)

However, as the reader also might already anticipate, not all structures can just continue to grow in size and complexity and absorb ever-greater amounts of energies from their environments. Spencer indeed discussed also structural dissolutions. Structural dissolution commences in the case where the organization cannot maintain the input of energy surpluses on which it depends. In these cases, organizational complexity decreases, and stability and integration of organization starts to disrupt because the created links between differentiated parts of the organizations cannot be maintained (FP, 474). Spencer was indeed aware of possible limits of evolution when he asks

> towards what do these changes tend? Will they go on for ever? Or will there be an end to them? Can things increase in heterogeneity through all future time? Or must there be a degree which the differentiation and integration of Matter and Motion cannot pass?... Whether we watch concrete processes, or whether we consider the question in the abstract, we are alike taught that Evolution has an impassable limit. (FP, 446)

Thus, contrary to Rosa's and Machlis' (1983) notion, in my reading it is obvious that Spencer recognized the possible "limits-of-growth". Although his analysis clearly focuses on evolution and structuration, still the dissolution is always present possibility for the societies if they cannot maintain their energy economies.

4. Children of the sun: energy in society

According to Spencer, social organizations (similarly to any other kind of organisms) are thus energetically constituted. But now the question arises as from where all these energies eventually originates, and how social organization is constituted as part of these energy flows? These questions guide the analysis in this chapter. First, the discussion below and in subchapter 4.1 tracks together with Spencer the origins of (social) energies. Furthermore, it will be discussed how energy harnessing abilities of societies have changed over the time, and what is the impact of these abilities or techniques to social evolution. These discussions build foundations on which Spencer's more nuanced descriptions of energetic social structuration can be finally considered in subchapters 4.2 and 4.3. The two sections illuminate complex ways in which the structure of social organization is formed as part of nature's energy flows via various feedback loops among different societal subsystems. But first, let's trace where all the energy comes from.

To track the origin of power which energizes all the societies, it is helpful to look back to indigenous societies. These societies or tribes were dependent from the nature's own rhythmic energy flows which gave them the energy the tribes needed to sustain themselves (FP, 242). The life of these societies' (like many of those in our time) was based on animal and vegetal products, and because these are dependent on "the light and heat of the Sun, it follows that the changes wrought men as socially organized, are effects of forces having a common origin with those which produce all the other orders of changes" (FP, 203). Thus, according to Spencer, all social action is eventually energized by the sun. This is rather simple to recognize in the case of indigenous tribes where the sun directly grows plants that again end up energizing the muscles of human bodies and animals. And it is these muscle powers that energize humans' personal and social life in "technology-free" societies. However, the case is the same as well in our present industrialized societies although the energy converting process is getting more complex and undirect.

Let's consider, for example, the case of steam power which in Spencer's time mainly powered up various industrial processes and economic supply chains. The following quote about locomotive

fruitfully describes how its power originally emanates from the Sun (additionally, in the quote, we can again recognize the essentiality of energy surpluses for the growth of structure):

> Step by step we go back – from the motion of the piston to the evaporation of the water; thence to the heat evolved during the burning of coal; thence to the assimilation of carbon by the plants of whose imbedded products coal consists; thence to the carbon di-oxide which their carbon was obtained; and thence to the rays of light which effected the de-oxidation. Solar forces millions of years ago expended on the Earth's vegetation, and since locked up in deep-seated strata, now smelt the metals required for our machines, turn the lathes by which the machines are shaped, work them when put together, and distribute the fabrics they produce. And since economy of labour makes possible a larger population, gives a surplus of human power that would else be absorbed in manual occupations, and thus facilitates the development of higher kinds of activity; these social forces which are directly correlated with physical forces anciently derived from the Sun, are only less important than those of which the correlates are the vital forces recently derived from it. (FP, 204)

Hence, the locomotive utilizes solar energies in the form of a coal burning and it directs these forces to energize the industrial processes that were before performed only by the aid of muscular effort. Nevertheless, the origin of energy remains the same. What Spencer clearly wants to state is that even though it could be sometimes difficult to track the way back to nature, still the social forces are always embedded in nature's energy flows. it is only the technology (be it e.g. digestion or the steam engine) used to transform the energy that differs.

4.1. From ecosocial societies to sociotechnical ones

Hence, according to Spencer, the whole life, and movement, and change in *every* society are *always* energized by the Sun, and therefore, every society is constantly part of nature's own energy flows and cycles. However, the fundamental difference between our present organizations compared to the organizations of the past is that they are not anymore ecosocial systems but sociotechnical ones[18]. Both systems are part of nature's energy flows but the relationship to these flows and their cycles are fundamentally different. It is good to note, that

[18] Spencer himself do not use these metaphors but the division is easily read from his production.

the goal here is not to suggest that there were no technologies in use in "ecosocial" societies. Muscles of humans and animals or tools such as axes and hammers are, of course, already one types of technologies. The distinction between ecosocial and sociotechnical society is only meant to help the examination of this section and its purpose is just to highlight the effects that the ever-more complex (and ever-more energy intensive) technical structures have had (and still have) to social evolution and to the relationship between social organization and natural processes.

The ecosocial systems are what Spencer calls Savages or Primitive Men societies; their social forces were energized mainly by the muscular power of humans and animals which again got their needed energies from the plants as discussed above. These limited energy surpluses restrained significantly how these societies were able to organize themselves. And many times they did not only restrained but also defined what was the shape of the organization. For example, only "where a fruitful soil affords much food, and where a more settled life, leading to agriculture, again increases the supply of food", it was possible to "meet larger social aggregates" (PS [1], 452). Furthermore, these ecosocial societies were directly affected by the original cycles of Nature (night/day, summer/winter, hot/cold etc.), and together these various forces created complex environments in which societies needed to respond:

> We have climate; hot, cold, or temperate, moist or dry, constant or variable. We have surface; mush or little of which is available, and the available part of which is fertile in greater or less degree; and we have configuration of surface, as uniform or multiform. Next we have the vegetal productions; here abundant in quantities and kinds, and there deficient in one or both. And besides the Flora of the region we have its Fauna, which is influential in many ways; not only by the numbers of its species and individuals, but by the proportion between those that are useful and those that are injurious. On these set of conditions, inorganic and organic, characterizing the environment, primarily depends the possibility of social evolution. (PS [1], 9)

Thus, according to Spencer, the ecosocial systems were significantly affected by the outer forces of their environment. Furthermore, here it is also worth to note that Spencer argued that to comprehend the totality of social activities,

> we must include not only those most highly vitalized units, the human beings, who chiefly determine its phenomena, but also the various kinds of domestic animals… which, under

> the control of man, co-operate with him, and even those far inferior structures, the plants, which, propagated by human agency, supply materials (energy) for animal and human activities. (PS [1], 446)

These factors that "co-exist with men in societies" are not only restraining the physical limits of societies, but they also "affect the structures and activities of the societies" by changing "physical characters, mental natures, and daily doings of the human units" (PS [1], 446). They have "enter so much into social life" that they "cannot rightly be excluded from the conception of the social organism" (PS [1], 447). These insights are crucial to sociological energy research or to environmental sociology also more generally: there never exist *any* organizations without the environment and the environment always affect to values, practices, and habits of social organization. And if one's goal is to understand what forces affect to social organization, he or she must take into account also other than human factors. Indeed, "the characters of the environment co-operate with the character of human beings in determining social phenomena" (PS [1], 35).

Generally put, the ecosocial societies were thus under a very strong grip of nature's outer forces that significantly affected its inner forces, and if their environing forces changed, the organization and its inner forces (habits, practices, goals etc.) needed to change until organization re-equilibrated its activities in balance with their new environment (PS [1], 93). Even if this is also the case in our present societies, various technological systems have brought massive changes to the ways in which we can control the balance or equilibrium among inner and outer forces of societies. As we will see, the sociotechnical systems have in a sense created a new dimension between "nature" and "humans" – one which *continuously adjusts* the ever-growing inner forces of humans in equilibrium with the rhythms of nature's outer forces. According to Spencer, these sociotechnical systems have created "channels" that direct nature's energies to every part of the social structure:

> Entire class of men engaged in buying and selling commodities of all kinds, on large and small scales, and in sending them along gradually-formed channels to all districts, towns, and individuals, so enabling them to make good the waste caused by action, is, along with those channels, fulfilling an office essentially like that fulfilled in a living body by the

> vascular system; which, to every structure and every unit of it, brings a current of nutritive matters proportionate to its activity. (PS [1], 484)

Technical structures are, for Spencer, therefore always part of social life which means also that the outcome of the use of technology varies culturally (PS [3], 325-6). Indeed, during the evolutionary process these technological structures entangle as part of ever-more complex organizations as they keep "channeling" ever-growing amounts of energies to all activities of the organizations. From this follows as well, that the general principle of technical development, similarly to any evolution, is that they are moving from simple homogeneous objects to more complex integrated appliances and to clusters of appliances:

> At first 'the mechanical powers' as they are called – lever, inclined plane, wedge, screw, wheel-and-axle, pulley – were used only separately; but in course of time there arose, by combinations of them, what we distinguish as machines. For a machine – say a water-mill, a loom, a steam-engine, a printing press – combines these various mechanical powers in special ways for special purposes. Comparison of early machines with late machines shows that, by increases in complexity, they have been adjusted to increasingly complex acts of production. (PS [3], 398)

> A further stage, characteristic of modern days, is to be noted. Beyond the cooperation of many appliances integrated in the same machine, we have now the cooperation of several machines. Newspaper-printing supplies an instance. (PS [3], 399)

Although Spencer theorizes that these technological developments affect immensely the activities of societies, he still recognizes that the impacts are often so massive and complex that they are almost impossible to track comprehensively. This is the case, for example, in steam-power which "manifold applications to mining, navigation, and manufactures, would carry us into unmanageable detail" (FP, 419). It is easy to understand why this is the case; steam power offers the energy surpluses to the whole organization and it entangles practically to all parts of it. Nevertheless, in the next long but extremely rich quote, Spencer tracks the social effects of one steam-power application, namely the locomotive engine, and demonstrates how it "has changed the face of the country, the course of trade, and the habits of the people" (FP, 419):

> Consider, first, the complicated sets of changes that precede the making of every railway – the provisional arrangements, the meetings, the registration, the trial-section, the

> parliamentary survey, the lithographed plans, the books of reference, the local deposits and notices, the applications to Parliament, the passing Standing-Orders Committee, the first, second, and third readings: each of which brief heads indicates a multiplicity of transactions, and a further development of sundry occupations, (as those of engineers, surveyors, lithographers, parliamentary agents, share-brokers) and the creation of sundry others (as those of traffic-takers, reference-makers). Consider, next, the yet more marked changes implied in railway construction – the cuttings, embanking, diversions of roads; the buildings of bridges, viaducts, and stations; the laying down of ballast, sleepers, and rails; the makings of engineers, tenders, carriages, and wagons: which processes, acting upon numerous trades, increase the important of timber, the quarrying of stone, the manufacture of iron, the mining of coal, the burning of bricks; institute a variety of special manufactures weekly advertised in the *Railway Times*; and call into being some new classes of workers – drivers, stokers, cleaners, plate-layers, signal-men. Then come the changes, more numerous and involved still, which railways in action produce on the community large. The organization of every business is modified. Ease of communication makes it better to do directly what was before done by proxy; agencies are established where previously they would not have paid; goods are obtained from remote wholesale houses instead of near retail ones; and commodities are used which distance once rendered inaccessible. Rapidity and economy of carriage tend to specialize more than even the industries of different districts - to confine each manufacture to the parts in which, form local advantages, it can be best carried on. Cheap distribution equalized prices, and also, on the average, lower prices: thus bringing divers articles within the reach of those before unable to buy them. At the same time the practice of travelling is immensely extended. People who before could not afford it, take annual trips to the sea, visit their distant relations, make tours, and so are benefited in body, feeling, and intellect. The prompter transmission of letters and of news produces further changes – makes the pulse of the nation faster. Yet more, there arises a wide dissemination of cheap literature through railway book-stalls, and of advertisement in railway carriages: both of the aiding ulterior progress. So that beyond imagination are the changes, thus briefly indicated, consequent on the invention of the locomotive engine. (FP, 419-420)

These interconnected technical networks or sociotechnical systems have enabled humans to guide massive amounts of nature's ancient preserved energies to social activities. According to Spencer, together with specific kind of inner forces (such as Weber's Spirit of Capitalism), these immense energy surpluses have led to the birth of ever-more complex societies[19]. Indeed, here it

[19] Murphy (2002, 80) describes these ideas in the following way: "Machines consist of the redeployment of the forces and materials of nature and hence embody those forces and materials… Machines, and technology in general, are

is extremely crucial to note that Spencer did not "mean that the energy thus resulting determines, of itself, higher social development" (PS [1], 23). He just argues that the greater energy resources are only making easier "the usurpation of [other societies'] richer and more varied habitants" and they "also make possible a better utilization of such habitants" (*ibid.*). It is up to *inner* forces of societies to guide the direction of the technological development, and to decide what to do with all the energy surpluses created by the novel technologies (see e.g. PS [3], 326, 332).

It is important to note as well that Spencer did not see this kind of energetic transformations of societies as linear or teleological process, and the overall "transition [from ecosocial to sociotechnical system] is slow because among other requirements human nature has to be re-moulded, and the re-moulding cannot be done quickly" (PS [3], 356). The transition is not only about technical apparatuses or ecological processes. Social forces, too, are in the very core of such the transformation. Indeed, "when studying the social metamorphoses that follow altered social activities", we must consider various change inertias or "resistances to change which the inherited social type offers, and also those resistances to change caused by partial continuance of old conditions" (PS [1], 567). Especially it is important to consider "the great changes of habits, beliefs and sentiments" which characterize all major social transformations (PS [1], 70, 567-575) as well as political institutions and regulators that try to keep status-quo order on as long as they can so that they would not lose the power they have achieved (PS [2], 255).

These more social characteristics are discussed more in the following chapter but already now it is useful to note how they are entangled to the technological structures that energize them. In Spencerian analysis, there is not existing separated categories for "technology" and "social" because the both are always evolving together – "social" change always changes "technology", and vice versa, "technological" development always changes the "social". As discussed above,

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the means by which humans manipulate the processes of nature in the course of their purposive action, often disrupting the self-regulating mechanisms nature has constructed, thereby unleashing unexpected processes of nature. Machines do not imply nature mastered. Their development can, if it disrupts the ecological equilibrium constructed by nature, lead to the iron cage of a degraded ecosystem incapable of sustaining human society. Machines and technology shape the way humans interact with the processes of nature, creating new possibilities and dangers."

evolution proceeds in the cyclical manner and here again different forms of force are just interacting together. This also means that to transform "technology" one has to be able to change also the "social". And because of this, for example, the transformation from ecosocial to sociotechnical systems is such a fundamental process that affects all the parts of societies. However, where this transition is successful, sociotechnical systems have created a whole new kind of environment for societies which separates them from the original or the "primary" one:

> These various orders of super-organic [technological] products, each developing within itself new genera and species while growing into a larger whole, and each acting on the other orders while reacted on by them, constitute an immensely-voluminous, immensely-complicated, and immensely-powerful set of influences. During social evolution they are ever modifying individuals and modifying society, while being modified by both. They gradually form what we may consider either as non-vital part of the society itself, or else as a secondary environment, which eventually becomes more important than the primary environments – so much more important that there arises the possibility of carrying on a high kind of social life under inorganic and organic conditions which originally would have prevented it. (PS [1], 14)

And thus, during the history, as a concomitant to the utilization of ever more complex technologies and machines, "the power of dealing with Nature having step by step increased while the resistance offered by Nature have step by step decreased" (PS [3], 331). Humans have created themselves a kind of new environment that helps them to escape from the limits and resistances of the ecological cycles and flows. Now it is not anymore nature's outer forces that determine the shape of our organizations, but, with the help of great energy surpluses, we are now relatively free to organize our societies how we just socially and politically decide.

Spencer laid indeed a great emphasis on organizations' ability to utilize machines and technologies to harness energies from their environment. He even argued that the whole "human progress… is measured by the degree in which simple acquisition is replaced by production; achieved first by manual power, then by animal power, and finally by machine power" (PS [3], 356). However, "the progress" must be understood in the light of Spencer's general evolutionary theory in which he is interested about how structures are able to grow and increase their complexity. In this evolutionary progress, the ability to utilize technology becomes indeed a

matter whose "potency can scarcely be over-estimated" (PS [1], 12) because they offer a way to direct energy or motion to the aggregate.

In contrast to McKinnon's (2010, 450) statement that "unfortunately, [Spencer] does not develop this trajectory from manual power to animal power to machine power, or elaborate its implications for his energetic theory of social evolution", in my reading this whole trajectory is indeed continuously present in Spencer's synthetic philosophy. True, Spencer does not isolate technological development to any separate analysis which might make it more difficult to recognize these implications. However, from my point of view, Spencer's style of keeping technology as part of his general energetic theorizations offers much more fruitful insights to the role of technologies in the evolution of organizations. Technology is ultimately just a name for the ever-growing ability of organizations to create increasing amounts of energy surpluses which are crucial to their structuration. Furthermore, as technologies get embodied as part of structures and characteristics of organizations, they also become dependent of the energy surpluses that they offer.

4.2. Social structuration I: vital sub-systemic functions

As already mentioned, Spencer's way of using organic metaphors when speaking of societies is connected to his overall aim to formulate universal principles of evolution. To describe the evolution of societies, Spencer thus finds inspiration from the organizational principles of organic and inorganic realms. However, Spencer never argued that social-organisms are in *every way* analogous to other organisms, and for him, "between a society and anything else, the only conceivable resemblance [is] one due to parallelism of principle in the arrangement of components" (PS [1], 436). Therefore, before moving forward to discuss more specifically the energetic structuration of societies, some insights about the specific features of social evolution must be considered (for a more detailed discussion of these differences, see PS [1], part 2).

Most generally, the difference between super-organism and other organizations is that the latter "form a concrete whole" when "a society from a whole which is discrete" (PS [1], 445). For

example, one major difference between organic and super-organic organizations is the usage of language which "fill up the space" between the parts of social organizations and enables an integration between the differentiated parts of the society:

> Not in contact, they nevertheless affect one another through intervening spaces, both by emotional language and by the language, oral and written, of the intellect. For carrying on mutually dependent actions, it is requisite that impulses, adjusted in their kinds, amounts, and times, shall be conveyed from part to part. (PS [1], 448)

However, Spencer's sociology does not put extra emphasis on the role of language or it does not focus on issues such as how semantic meaning is created inside organization. He interestingly kind of leaves open the ways how we humans can be together – language is indeed only one way of integrating the "discrete" structures. There are many other kinds of forces out there, and additionally to many other tasks, the goal of sociology is also to unravel the diverse forms of "the social" and not to take them as granted (see PS [1], chapter 27).

Other characteristic distinguishing the super-organic realm from the other organizations is its political, ideological and ethical nature (see e.g. PS [1], 431, 448-450, 524; complete discussion, see PS [2], part 4 & 5). Indeed, although at the first hand the evolution seems to have quite a determined direction and it does not appear to include much social options or choices, still this is however not the case at all. True, the most general principles of evolution do state that the inner forces of societies need to be in the equilibrium with the external forces. However, these principles (nor Spencer himself) do not ever define what actually are the characteristics of these inner forces. For example, the ethical dimension of societies varies always by culture and "the kind of behavior which each kind of regime necessitates," finds its justification from these ethical inner forces of some specific society (PS [1], 431; see also PS [2], 6). To put simply: the theory of evolution does not ever define what society ought to achieve as a whole. But what Spencer does argue is that if the goal of society is to grow, then he has some fascinating things to say about the universal principles of this process.

Furthermore, as Turner also (1985, 107) argues, Spencer saw that all evolutionary processes and institutional arrangements proceed always by "conflict, conquest, and retention" (e.g. wars,

conflicts or competitions with other societies). According to Spencer, conflicts and competitions have been crucial forces in the creation of present civilizations because "without universal conflict there would have been no development of the active powers" (PS [2], 240) that thrive societies to grow and to increase their resources:

> We must recognize the truth that the struggle for existence between societies have been instrumental to their evolution. Neither their consolidation and re-consolidation of small groups into large ones; nor the organization of such compound and doubly compound groups; nor the concomitant developments of those aids to a higher life which civilization has brought; would have been possible without inter-tribal and inter-national conflicts. (PS [2], 240-241)

Spencer demands that we need to acknowledge the role conflicts have had in the past (and in the present) for the evolution and growth of societies. However, he *does not* take any stance whether these conflicts have produced "better" societies and he recognizes that there is high possibility that societies which are "relatively advanced in organization and culture, may yet be inhuman in their ideas, sentiments, and usages" (PS [2], 236). But again, if one is interested in exposing the forces that are crucial to social evolution, then he or she must admit that without these "inconceivable […] horrors caused by this universal antagonism […], world would still have been inhabited only by men of feeble types, sheltering in caves and living on wild food" (PS [2], 241).

Yet another qualification related to the super-organic evolution is connected to the inequality of societal processes and to power structures that follows from these differences. For example, the inequality of resources (e.g. unequal distribution of resources because of geological differences or due to military control, or differences in territorial technological advancements) and the "timing" of global evolutionary processes have led to the creation of tertiary societies:

> In both organic and super-organic growths, we see a process of compounding and re-compounding carried to various states. In both cases, after some consolidation of the smaller aggregates there comes the process of forming larger aggregates by union of them; and in both cases repetition of this process makes secondary aggregates into tertiary ones (PS [1], 457).

Therefore, in addition to the fact that Spencer recognized the cultural variations of evolution, he also acknowledged organizations have unequal chances to maintain their own specific structures

and characteristics as part of world organization. These tertiary societies are indeed in unequal power relations to the "core" countries – they do not have similar energy resources to control the forces of their environments (both social and ecological). And Spencer also recognized that the development of every society is increasingly bounded to the forces of other organizations further the global evolutionary process proceeds. From this follows as well, that globally there are no equal chances to execute transformations of larger scale (e.g. global transformations discussed in chapter 5) and it seems that the "core" structures" has to lead the change.

Thus, evolution is not at all a linear process or a process which replicates similarly in different places (cf. the discussions on transition from ecosocial to sociotechnical systems in the last chapter). The dynamics of the social evolution follows the general principles of force that were discussed in section 3.1 – the evolution is always pinned to some specific place where the unique set of forces are reaching to find an equilibrium through the never-ending rhythmical and cyclical interaction process:

> Like other kinds of progress, social progress is not linear but divergent and re-divergent. Each differentiated product gives origin to a new set of differentiated products. While spreading over the Earth mankind have found environments of various characters, and in each case the social life fallen into, partly determined by the social life previously led, has been partly determined by the influences of the new environment. (PS [3], 325)

And, last, Spencer's *evolutionary theory* does not take a stance on whether development is "progress" or not (see also the discussion in chapter 2 and section 4.1). As already mentioned earlier, Spencer's goal is just to construct the principles and laws that explain the (energetic) structuration of organizations. Overall, then, it is important to note that Spencer's theorization is not as linear or teleological as it is accused to be by many interlocutors[20] (see also Turner 1985; Offer 2010, 2015; Carneiro & Perrin 2002).

[20] For example, in the opening of his *Structure of Social action,* Talcott Parsons portrays Spencer in such a linear way – as an author who "believed that man stood near the culminating point of a long linear process extending back unbroken, without essential changes of direction, to the dawn of primitive man" (Parsons 1949, 4). However, as I have argued above, this side of Spencer presents more his personal political philosophies and it is easily detachable from his analytic-sociological side.

Hence, when analyzing social evolution, one must consider several unique features that belongs only to the super-organic realm. Nevertheless, the universal *first principles* discussed in the previous chapter are still setting the foundations on which Spencer builds his theory of societal development. The same goes also for the general insights related to the evolutionary process. Thus, the principles which state that organizations harness environmental energies to build their own structures and via this process becomes more differentiated and integrated, apply indeed to the development of societies, too.

With these premises and qualifications in mind, the following discussion on the social structuration and evolution can be understood more complete. As already stated before, Spencer constructed his theory of society by comparing organic, inorganic, and super-organic realms together, which eventually led him to find three main sub systemic functions that social organization needs to fulfill in order for evolution to be successful: (1) operations (economy, production of welfare), (2) distribution (movement and transportation of knowledge, humans and objects), and (3) regulation (control, politics). Next, I will introduce the unique characteristics of all these sub-systems in a more detailed manner, and the following chapter wraps up the discussion on social evolution by connecting these separated functional systems together as a whole "system of organs" (PS [1], 479).

(1) Operative or sustaining subsystems maintain the welfare of society and satisfy ever-growing needs of the members of society (PS [3], 358). Economy develops in cyclical interaction of demand and supply (FP, 243), and "as a means of satisfying the desires, production increases as the desires multiply and become stronger; and the order in which the different kinds of production develop, is determined by the relative strengths of the desires" (PS [3], 358). It is important to note though, that not all economic action serves directly "the satisfaction of desires", but as societies have grown in complexity also their auxiliary production has increased in size and in complexity:

> How large a part auxiliary production now plays, we are shown by the numerous implements used by the farmer. In addition to the plough, harrow, scythe, rake, fork, and flail; he employs the steam-plough, scuffler, mechanical drill, horse-hoe, mowing machine, reaping and binding machine, elevator, threshing machine, as well as sundry

> new dairy appliances. Whole towns are no devoted to auxiliary production… But the most striking development remains. The making of appliances to facilitate production has been followed by the making of appliances for the making of appliances. (PS [3], 365)

Through their economic organization, societies are also connected to the material energies of nature (PS [1], 492, 583) whereof it follows that "industrial organization of a society is mainly determined by its inorganic and organic environments" (PS [1], 12) (cf. political organization below which connects organizations to other societies). Technological development and the ability of sociotechnical systems to utilize energies is thus extremely important in overcoming various resistances offered by the nature and in determining "where the obstacles to overcome are least" (PS [3], 353). However, to really understand how this affects the economic organization we must also take a look to the distribution systems that are a "necessary concomitant of division of labour" (PS [3], 367).

(2) Distributive systems are indeed an inseparable part of the economic organization of societies, or more generally of the whole organization of society. Distributive systems develop as part of the entire organization's needs and demands for integration. They work as a kind of vascular systems that distribute vital flows among differentiated parts of organization:

> Lying between the two original [operational and regulative] systems, which carry on respectively the outer dealings with surrounding existences, and the inner dealings with material required for sustentations, its structure becomes adapted to the requirements of this carrying function between the two great systems as wholes, and between the sub-division of each. (PS [1], 506)

As we saw in section 3.1, social organization is always developing in the direction that offers the least resistance. It is therefore crucial to take into account how societies have arranged their distributions and how these systems are energized, because these factors affect immensely to the possibilities of the economic organization. To define what the overall resistance of some action is, one must consider the resistances what follows from geographical conditions. And the more powerful the distributive systems are (e.g. are goods distributed by horse or by trains), less the resistances of nature matter to economic organization.

Especially in our present industrial societies, the distributive systems and "intermediate agencies [involved to] bring producers and consumers into relation" (PS [3], 372; see also PS [1], 500) have become extremely important for maintaining the integration among the differentiated parts of the organization. Like any other structures, distributive systems have as well increased their complexity over time, and to these means for conveying growing amounts of "people, goods, and intelligence", new kind of "inanimate appliances" have accompanied beside the original "animate appliances" (PS [3], 377). Indeed, the technological development has improved the distribution functions by opening up "better channels" between the parts of society, "and better channels have caused further increase of distribution" (PS [3], 377) which enabled transition "from feeble, slow, irregular movements to rapid, regular, and powerful pulses" (PS [1], 500).

It is straightforward to see the effects that the high-energy distributive systems have on social organization: the local circumstances do not affect anymore so much to the industrial organization (PS [1], 582) because the organization can overcome the environmental resistances with the help of new energy surpluses that are created by novel distribution appliances. The improved distributive channels have indeed decreased the resistances of transportation and movement between the differentiated parts of the society, and this affects immensely, for example, where some goods are produced and where they are consumed. For example, during the time of imperfect means of distributive channels, the production of woolen fabrics began in locations where raw materials used in the production were easy to obtain (PS [3], 344). But later, the availability of "power, here obtained from coal and there from water", has indeed affected to the division of fabric labour (PS [3], 344) among other industries.

(3) Contrary to sustaining system, which "evolved by converse with the organic and inorganic environments", the regulating system "is evolved by converse, offensive and defensive, with environing societies" (PS [1], 583). Regulative structures have thus eventually born from the need of common protection toward the forces of other societies (PS [1], 513). Therefore, through these structures, different societies are also connected to each other. However, the regulative systems have other tasks to fulfill as well, and generally these structures co-ordinate social actions

(political, military, commercial etc.) by influencing and controlling mainly the ideal factors of organization (PS [1], 524). For the accomplishment of these tasks, increasingly developing communication methods, from money (see PS [3], chapter 19) to telecommunication technologies (see PS [1], 524), have become essential. Indeed, for Spencer, "the mere gathering of individuals into a group does not [yet] constitute them as society" and the members of the organization must be able to "combine their energies to achieve some common end or ends" if they want to keep maintaining the order in society (PS [2], 244).

Spencer divides control or regulation into two ideal forms. First, there is spontaneous or unconscious cooperation in which the members of society pursue their private ends, and second, there is a coercive conscious control which regulates essential public interests or common goods (PS [2], 245). Together these forms of control work as an instrument to control welfare of society: "it is a combined action which directly seeks and subserves the welfare of the society as a whole, and indirectly subserves the welfares of individuals by protecting society" (PS [2], 247). Of course, in the real world these both ideal types co-exist together "and they are more or less interfused". Nevertheless, Spencer still argues that it is important to note that the two ideals have different origins and characteristics, and depending of the forces of some specific time and place, usually one of them is getting more emphasized (PS [2], 245).

Spencer further develops this ideal separation by identifying that there exist universally, and again ideally, two opposite types of societies: militant and industrial (see PS [2], chapters 17 & 18). This separation tries to identify kind of opposite political cultures that are able to maintain overall control in society. The militant type of control refers to more centralized and hierarchical power structures (not only military control). In this type of control, a coercive power is used extensively to control means and ends of the organization. These types of actions are needed especially in the time of military action or when the organization co-exist next to some hostile societies (PS [2], 606).

Industrial type, on the contrary, is the organization of "peace time". This organization is based on limited public control and it gives freedom for members of societies to achieve their private ends

as freely as possible. Thus, it has more decentralized power structures. Furthermore, this control type leads to weaker national borders because, for example, a national self-sufficiency that is crucial in times of hostile international relations, is not necessary anymore in more peaceful times (PS [2], 614). And "so even the great nations themselves, at present forced in large measures to maintain their economic autonomies, will become less forced to do this as was decreased, and will gradually become necessary to one another" (PS [2], 614). Hence, according to Spencer, the organizational dependencies are increased during the industrial type of political control. This also means that Spencer did not see organizations as homogeneous aggregates. On the contrary, every complex organization is an assemble of many local actors that form the characteristics of the whole through mutually dependent connections and actions (see also PS [3], 397) (cf. Sassen 2007). Therefore, during the industrial type of control, this wholeness is not fully controlled by any institution but evolves through "spontaneous" interaction of its parts (PS [3], 355).

4.3. Social structuration II: systemic feedback loops and the momentum of social change

Spencer thus saw social evolution as a process of growth, differentiation, and integration along these three subsystems presented in the previous chapter. As the social organization grows, these subsystems must differentiate according to the general law of evolution. An organizational body can grow via increased birth-rate or through an invasion of other societies, or need for the differentiation can also be caused by increased "inner forces" of society, for example, due to escalating needs and desires.

However, as it has come already clear in previous chapters, that although all the societies arrange these subsystems in their own cultural way, there need to exist a balance between all the subsystems as well as between the whole "system of organs" and its environmental forces. Hence, to understand fully the process of social structuration, we need to consider various feedback loops which are constituted between different subsystems as well as between the whole system and its environment. Turner has summarized fruitfully what Spencer meant when

he talked about these feedback-loops. In the following quote, Turner considers these loops from the point of view of "differentiation problem" of the evolution:

> Differentiation always escalates problems of coordination and control that can cause further differentiation of regulatory structures; or potentially, these problems can also cause the dissolution of the system if such further differentiation does not occur. If differentiation of distinctive distribution processes develop, then this allows for further differentiation of regulatory and operative processes; and conversely, if separate distributive processes (markets, generalized media such as money, communication networks, transport systems, etc.) cannot emerge, then further differentiation and aggregation will be difficult. Also, differentiation of operative, regulatory, and distributive structures increases reliance upon mutual interdependence, which, in turn encourages further differentiation of these structures. At any point, of course, the system can dissolve if growth creates problems of production, coordination, control, and distribution that cannot be resolved. *Thus social evolution involves a situation where these feedback loops are all positive.* (Turner 1985, 70; italics added.)

One of the most essential insights related to social evolution is indeed that every part of the organization is playing a part in the process; the outcome of social evolution results from the interaction of every part of the organization. These differentiation challenges are never a concern of any single subsystem, but the different parts of a society must be able to collaborate and evolve together. And these interactions must take into account also forces of their environment and include them in the process. As Turner summarized above: "social evolution involves a situation where these feedback loops are all positive". The very main process of this social evolution can be seen in figure 1.

Such feedback loops mean that organizations develop *always* as systemic wholes (see also PS [1], 431). Furthermore, it also follows that after such a system has developed, then the built-in positive feedback loops create massive change inertias and path dependencies at the societal level. Moreover, in addition to functional interdependencies described above, the organization creates various kinds of practices that further increase the stability of the organization and raise the momentum for social change. According to Spencer, for example, peoples' various kinds of routines and habits, tastes, know-hows and intelligences, identities and wishes, and practices of governance develop as part of these systemic wholes and their systemic feedback-loops. And

furthermore, we must take also into account different kinds of infrastructures and technologies in which is embedded massive amounts of materials and resources as well as financial sunk-costs. (FP, 415-420; PS [1], 12-13; PS [2], 256; PS [3], 379.)

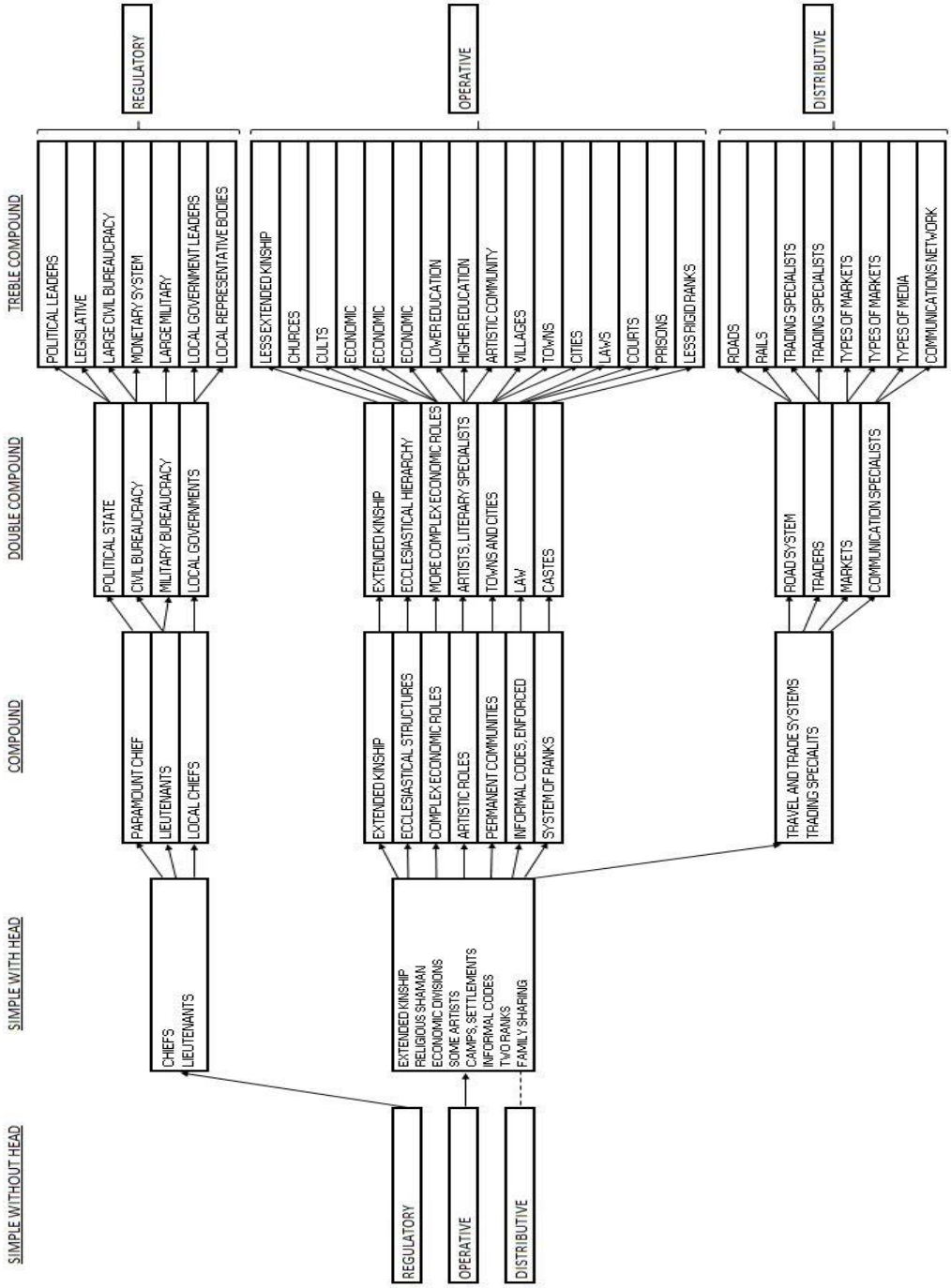

Figure 1 Simplified diagram of the societal evolutionary process (Spencer PS [1], 537-63; Turner 1985 90-1).

It is indeed also important to note again how this totality is embedded as part of the complex technical networks that were discussed in previous chapters. The evolutionary process of sustaining, distributive and regulative structures would not be possible without the energy surpluses that the advanced technological appliances offer. These technical systems play indeed a crucial role in the social evolution because they harness the needed energy surpluses and guide them to different parts of society through the sociotechnical channels – they energize all the cyclical flows of society. As Spencer noted: our lifestyles, habits, financial sunk-costs etc. are now involved in "a plexus having centers everywhere and sending threads everywhere" (PS [3], 402). And once this kind of total sociotechnical system has developed, it "comes to be looked as natural" as "the ideas and sentiments of a community as a whole, adapts themselves to the *regime* familiar from childhood" (PS [2], 256). In the end, this institutionalization process might be the most major factor that cause societal path dependencies.

Spencer's analysis on the inter-dependent systemic wholes and their feedback-loops, offers probably the most important insights to the energy relations of sociotechnical organizations. As we have seen several times, societies must continuously organize their actions as part of nature's energy flows in such a way that absorbed energy surpluses meet or exceed the inner forces of societies. However, once they have succeeded to create needed positive feedback-loops inside the organization as well as between the organization and its environment (nature and other societies), then the organization *depends* on continues input of these energy surpluses. If the surpluses cannot be created, then organization will face some level of structural dissolutions. McKinnon (2010, 451) recognized this line of thought in Spencer's production as well when he wrote that,

> the primary point is that the growing social integration of larger populations over larger distances was, as Spencer would argue, organized by the logic of energy and different levels of energy that encourages such integration. But the ever-larger areas of social and economic integration have been heavily dependent on increasingly energy intensive means of transport. A truly global market, such as emerged over the course of the twentieth century, has emerged on the back of even more energy-intensive (and also more energy-efficient) systems of transportation powered not just by coal and steam, but subsequently also by petroleum and the internal combustion engine.

In the next chapter these Spencerian ideas are analysed through the lenses of contemporary sociological energy and climate change research. However, through the analysis of systemic feedback loops, we can already start to comprehend why the present mitigation efforts on climate change seems so meaningless and why needed political actions are so difficult to execute; almost all positive feedback loops which constitute the *present form* of social organization are based on fossil energy resources. And because, according to Spencer, positive feedback loops always support and prompt the growth of the status-quo order, the present trajectories possibly continues "until the day that the last ton of fossil fuel has been consumed" (Weber 2001 [1930], 123).

> *The momentum of social change, like every other momentum, must work out effects proportionate to its amount, minus the resistance offered by it. (PS [3], 595).*

5. Spencerian insights confront sociological energy research

The fact that John Urry is the most prominent recent author who has contributed in the development of sociological energy research is not the only reason to choose him as an entrance point to introduce Spencer's ideas to contemporary research. In addition, in this chapter I argue that Urry's observations follow in many ways Spencer's thinking and the two authors could, at its best, supplement each other's ideas (cf. Offer (2015). However, Urry (2000, 23) himself have totally rejected Spencer's theoretical perspectives in his own sociology of flows, even though with completely false claims:

> Urry quickly eliminates Spencer from any attempt to rescue from 'redundancy' the concept of society for the entirely spurious reason, that his social organism defines the workings of the social body as 'analogous to those of the human body'. The rejection turns ironic, however, once what is Spencer's lexicon resurfaces in Urry's own interpretation of the 'new' world order: 'regulation', 'functional requirement', 'flow' and 'disequilibrium'. Moreover, Spencer's social organism was not only about structure, morphology and equilibria but also about mobility, mutability, porosity, inosculation and unplanned ordering. Nemesis thus confronts Urry: his analysis of the global whole and the allied refocusing of sociology could be framed, perhaps more expressively, in the spirit of Spencer's scaffolding, the social organism. *Sympathetic critical engagement with the historical rather than a mythical Spencer would have fortified Urry's analysis.* (Offer 2015, 352; emphasis added.)

Thus, the underlying aim of this chapter is to relate Spencer's insights to Urry's research and to exemplify the value that *"the historical"* Spencer holds to the contemporary research – the purpose is indeed to further un-mystify Spencer and also highlight the deficiencies of Urry's critical statements. In addition to Urry's work, the chapter discusses some ideas of other recent authors as well to whom Urry has referred in his research. Especially contributions of Fred Cottrell, who is one of the few sociologists who have been interested of energy related issues, have been recognized as vital for understanding the relations between society and energy (see e.g. Urry 2014, 4) and his insights are discussed in chapter 5.2. These insights, among others, help to clarify Urry's own empirical notions which are discussed in chapters 5.3 and 5.4. Before going into these topics, chapter 5.1 examines what kind of metatheoretical consistencies there is

between Urry and Spencer. This chapter also clarifies Spencer's ideas on energy by exploring how recent research on general energetics and ecological economics understand the concept.

It is important to note that the aim of this chapter is not to argue that Spencer's ideas are superior in every way. The purpose is only to build foundations on which the value of Spencer's insights can be evaluated more objective or un-biased way. Overall, the goal of the following critical evaluations is not to undermine the present insights but to push them forward.

Another remark is that the following discussions are created to serve the end of this thesis which is to illustrate the value of Spencer's works. Hence, the chapter does not reach to examine all nuances of present authors, and the focus is on the main insights that they offer in relation to Spencerian ideas. However, these main concepts are not forcibly created, and consequently I argue, that they present the very core insights of the contemporary research. Therefore, one of the main goals of this chapter is to show how Spencer analyzed already over 150 years ago the same issues – with very similar concepts and emphasis – as the present authors do now.

5.1. Ecosocial theorization: breaking chasm between human and natural worlds

As mentioned shortly already in the introduction, bridging the separation between physical and social realms is a significant theoretical goal and preliminary principle in sociological energy research and in environmental sociology also more generally (see e.g. Barry 1999; Dunlap 2008). This is a crucial aspect in Urry's research as well. He indeed is arguing that we need a completely new kind of sociology which is connected to natural and environmental sciences (e.g. Urry 2013a, 64).

According to him, social and material worlds are fully intertwined, and a research that do not recognize this fact, fails to deliver any fruitful analysis on social organizations' energy relations (Urry 2003; 2013a, 18; 2014, 7). Perspectives from vitalism and complexity theory[21] in which

[21] Urry (e.g. 2003, 10) especially refers to Fritjof Capra's (1996) work on *Web of Life.*

"social and cultural phenomena are characterized by notions of process, by energy rather than fixity, by becoming rather than being, and by movement rather than stasis", help to overcome this human-nature divide (Urry 2014, 8). In these complex vital processes various kinds of non-linear and chaotic flows – flows of people, objects, information, habits, images, chemicals etc., and indeed flows of energy – entangle together to constitute (social) orders which arise out of chaos (for further discussion of complexity theory see Urry 2003; 2013a, 69-73).

With metaphors of vital flows and process, Urry seems to try to understand how order has come to exist and how it changes. The concept of flows emphasizes the processual nature of organizations' structuration and, for example, globalization is still in the process of making, not a finished project (Urry 2003, 10). Overall, he opposes static perspectives on organizations and his emphasis is indeed on the processes of structuration: "either a house can be viewed as stable and immovable with stark, cold and rigid outlines. Or we can see any such house as 'permeated from every direction by streams of energy which run in and out of it by every imaginable route'" (Urry 2000, 20).

Spencer's meta-theoretical principles are resonating in many ways with these notions. Spencer based his whole *system of synthetic philosophy* on a processual world-view where all the structures and organizations are continuously part of the universal re-distribution of matter and energy. Energy or movement is needed to constitute and maintain any organizational structures (matter), and there is an ever-present possibility of structural dissolution if the energy flows interrupt for some reason. Furthermore, Spencer did not define what the ultimate nature of energy or force is. According to him, energetic flows travel seamlessly from material to ideal and ideal to material, and every kind of energy form will create rebound effects to which other kinds of forces are needed to react. The concept of flow was indeed at the very core of both authors' thinking.

However, a major difference between Spencer's and Urry's theories is that Spencer laid equal emphasis on stability and order of organizations instead of emphasizing change and mobility more. Both authors did recognize that there are dynamic and "chaotic" flows that penetrate all

the parts of social organization, but Spencer further recognized that the rhythmical nature of these energy flows create a stability if some organization is able to arrange its vital functions (sustaining, distributive, regulative) in balance with the environmental forces that affects to it. Spencer thus also saw that organizations are "permeated from every direction by streams of energy which run in and out of it by every imaginable route", but, in contrast to Urry, he did theorize the principles of social structuration. In my knowledge, Urry indeed did not theorize systematically how stability and order come to be in social organization. Mostly he just referred to very abstract (more abstract than Spencer's theories) general chaos theories. This is peculiar especially because in his later production on energy and society, he mostly utilizes the concepts of stability, locked-in systems, and massive path dependent sociotechnical structures (see below). Truly, in these later works he hardly utilizes his own theoretical frameworks or at least he does not use them in a systematic way.

It might be easy just to demand research that would break the chasm between nature and humans, but maybe Urry's research demonstrates how difficult the task is when there is no *mutual* and *simultaneous* development in theoretical as well as in empirical dimensions of the scientific work. Perhaps still the main problem of recent sociological energy research is, as Rosa and Machlis (1987, 153) mentioned, that it continues "to 'gerryrig' energy issues onto traditional sociological concerns" and it keeps ignoring already developed theories almost entirely. Spencer, on the contrary, truly built his sociological (and also other -logics) observations on his energetic systems theory, and therefore, practically all his insights were based on the concept of force and derived first principles.

Before moving forward, I see it as important to clarify Spencer's concept of energy a bit more and relate his use of the concept to more recent views of it. Energy is quite an abstract concept in recent research, too. Usually it is interpreted as an ability to make work, although according to Smil (2008, 12-13), this definition does not reach comprehensively energy's characteristics and it is too reductionist: "defining energy as the ability to transform a system, a process that can involve any kind of energy, is thus much more helpful". This definition favored by Smil, exceeds

generalized views about "the work" and reminds better about the diversity of energy transformations between nature and culture (cf. Lähde 2013, 46). Moreover, it helps us to recognize that in addition to social power (in traditional sociological meaning) there also exist other powers that have the ability to transform the societal systems.

The latter definition also reminds extensively Spencer's energetic theorizations. Energy is indeed seen as force which is needed whenever some object, substance, element, or any system is moving or transforming its state or form. It is this system or substance itself or some systems or substances in its environment which must contain the needed energies that enable transformations – this is due to the nature of energy. Energy follows the rules of thermodynamics which define that the total amount of energy cannot increase or decrease but it is just changing its form[22]. Consequently, this means that humans never create or destroy energy, they just transform its form to a state which serves their agendas. (Smil 2006, 5-7; see also Cottrell 1955, 4).

Not surprisingly, contemporary energetics also follows Spencer's recognition of how this energy available to humans originates (only with insignificant exceptions) from the sun (Smil 2006, 22-53; see also Crosby 2006). In addition to energizing the growth of the plants and vegetables through the process of photosynthesis, the sun has also originally created the energies that are embedded now in the fossil resources: "uranium and other possible sources of atomic energy were created as the gases from which the earth was derived combined to form solids. Coal and oil, peat and gas are accumulations stored in the earth's crust from past operations of plant and animal life that have converted the radiant energy of the sun into energy-laden substances" (Cottrell 1955, 15). The energy usage of humanity is thus *continuously* part of the universal energy flows of nature and humans just transform "raw" energies (e.g. nutrients, wind, ocean currents, solar rays, fossil resources) with technologies or "energy converters" (e.g. plants, animals, humans' own digestion system, sails, floating structures, solar panels, combustion engines and

[22] There are total three laws of thermodynamics (see e.g. Smil 2006, 5-7) but for the purposes of this chapter's discussions this first law is the most important.

energy turbines) to meet personal and social needs and goals (e.g. need for transportation and food and heat, overall economic production and consumption) (Urry 2014; Cottrell 1955; Crosby 2006).

These social goals and needs are nothing but historically or biologically fixed. Indeed, "there are few, if any, societies in which men choose to exert no more energy than is required to maintain a supply of food, protection from elements, and procreation" (Cottrell 1955, 5). Rather, throughout the social history, there has been a wide range of different value systems which have induced societies to pursue various goals, which again, usually have meant increased energy demand (*ibid.*; Urry 2013b). One thing is however always constant: the sum of input and output energies used by societies (see figure 2).

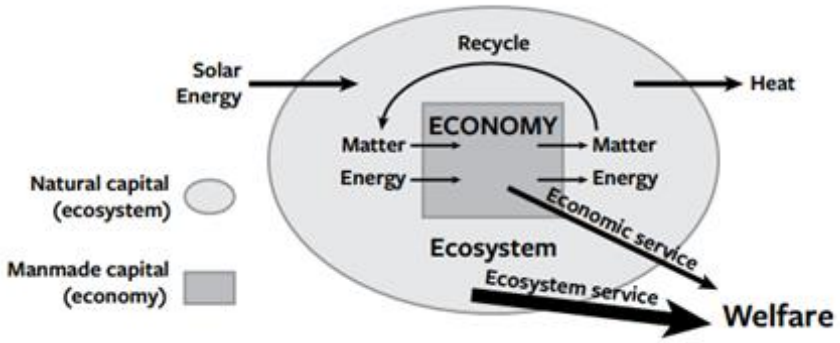

Figure 2 Embeddedness of socio-economic system to ecological economy. (Czech 2013)

Spencer analyzed indeed similarly how, via economic action, social organizations are embedded in ecological energy flows. Through continuous re-distribution of matter and energy, economic organization is aiming to constitute its inner forces (e.g. welfare, consumption practices) in equilibrium with outer forces. However, Spencer extended this process to include the whole society when he connected the evolution of economic actions to dynamics of political and distributive subsystems. For Spencer, technological development plays a major part in this energy metabolism because through the ever-more advanced energy harnessing techniques, social systems are able to transform ever-created amounts of ecological energies for the welfare creation. Moreover, when the technologies are embedded to the most parts of the societal

actions, as they now have according to Spencer, they create a kind of new dimension between men and nature – an dimension that continuously adjust societies' inner forces to nature's outer ones. Thus, following Spencer, it would be useful to add frames of "technology" around the "economy" box in figure 2. It is also important to note that Spencer argued that societal inner forces are transforming during the time, and therefore, the energy demand of any particular kind of society does not have to be taken as inevitable. Hence, the equilibrium with inner and outer forces of social organization can be reached also by adjusting the energy demand of societies, technological advancements are not indeed the only way to maintain these ecosocial balances.

5.2. Co-evolution of social organization and energy surpluses

> Energy available to man limits what he can do and influences what he will do.
> - Fred Cottrell (1955, 2)

The previous chapter concluded with the general notion of how "[the preservation of any social system] requires a continuous supply of energy equal to the demands imposed by that system of values" (Cottrell 1955, 5). But these value systems are not purely social constructions. Indeed, Fred Cottrell (*ibid.*), among others, argues that especially quantitative and qualitative changes in energy resources tends to affect the values and form of social organization. According to him, an especially significant factor that needs to be taken into account is energy surpluses or EROEI[23] ratios (Energy Returned On Energy Invested) that are available to social organization (*ibid.*; see also Urry 2014). To explore these concomitants of increased energy surpluses, Cottrell focuses his analysis to the most significant transformation in societies' energetic history – to the transition from low-energy to high-energy societies.

Low-energy societies were energized mostly by human and animal muscle power. Muscles receive their energies through the process of digestion that converts nutrients' energies to the movement of limbs (and of course to overall upkeep of the body). These transformations in turn

[23] EROEI value presents the amount of extra energy which is attained when one unit of energy is invested. For example, if coal's EROEI is 10:1, then one receives 10 units of energy by the loss of 1 unit.

enable humans again to gather more energy resources to further to energize their actions. However, a "problem" of this energy converting technology is in their inability to harness and preserve high amounts of energy. And because of this, the energy economies (production and consumption cycles of energy) were locally organized especially in the communities of hunter-gatherers but also in the agricultural[24] societies. Energy was used where it was produced – nutrients were gathered near shelters where they were consumed. Hence, the reason for this locality was the lack of energy surpluses in societies. The technologies that were used in these societies forced the energy economy to function only in hand-to-mouth principle; local work produced energy only to the self-maintenance of social organization. (Cottrell 1955; see also Smil 2006, 54-75; Urry 2014.)

Most obvious concomitant to this energy locality is indeed the short spatial organization of societies (more comprehensive discussion on energy and social organization, see Cottrell, 1955). Because the available surpluses are moving human and animal bodies only limited distances, the communities were local and tightly closed. Over time social meanings were constituted as part of these local practices and the whole social matrix (e.g. different roles, classes, cultures, and institutions) entangled to local doings which usually sanctioned novel, border-braking high-energy practices. And if in the low-energy societies "almost all factors involved in the lives of the people interacted in the local community, within a very limited geographic area" and the "[energetic] equilibrium was a result of a stable set of [moral] claims on the recurring sources of energy", in the high-energy society the story is very different. (Cottrell 1955, 54-5.)

According to Cottrell (1955), this locality changed *first time* dramatically after the invention of the sailing ship. This technological innovation created massive amounts of new energy surpluses for social organizations. The energy technologies that are used in the sailing ships enable mutually supportive utilization of kinetic powers of wind and currents of seas. This energy cluster had

[24] Agriculture, of course, made it possible to conserve and pack food more efficient which again allowed wider spatial organization and more flexible practices. But still the surpluses that were available to the societies, enabled them to organize themselves mostly to some local settings (Cottrell 1955).

indeed remarkable affect to the social organization – it enabled the transformation of which social effects Cottrell emphasizes more than effects followed by the steam technologies. New level of surplus energies created novel global trading activities that again started to create pressures, for example, for institutional (e.g. private property and usage, universal currency, job roles and statuses) and cultural (e.g. traditional habits, beliefs, values) transformations. And in the end, the interaction of these material and ideal factors eventually led to the creation of high-energy societies. (*ibid.*) The current societies thus

> waited on the appearance of these energy surpluses. As Childe says, civilization meant 'the aggregation of large populations in cities; the differentiation within these of primary producers…, full-time specialists artisans, merchants, officials, priests, and rulers; and effective concentration of economic and political power; the use of conventional symbols for recording and transmitting information (writing), and equally conventional standards of weights and of measures of time and space leading to some mathematical and calendrical science'. *All of which are impossible except where surplus energy exists in considerable quantities* (*ibid.* 32).

Cottrell's conceptualization of the transition reminds much the transformation from ecosocial to sociotechnical societies that was discussed in section 4.1. However, compared to Cottrell, Spencer offers a much more mature theoretical construction that conceptualizes the transition from low-energy to high-energy societies. Cottrell (1955, 2-14) builds his approach on a more or less un-theoretical perspective, his work completely lacks a unifying theoretical framework, and it is also more historical in nature. However, still the preceding short introduction to Cottrell's work complements fruitfully Spencer's insights on the role of energy surpluses in social evolution, and more specifically, Cottrell offers detailed empirical observations about the affects the different energy technologies have had to social organization.

Especially useful in Cottrell's work is its ability to demonstrate how these novel energy technologies have not deterministically caused the changes in the societies. Ever-more advanced energy technologies have just made it possible to start experiencing the world in a different way than before; to start interacting with the societies and organize the social action in ways that were impossible before the needed energy surpluses. In Spencerian language, the novel energy technologies decreased resistances of nature and enabled the integration between more

differentiated organizational parts. It was, and it is after that up to social negotiations (or inner forces again in Spencer's terms) which define how each society utilizes the available energies and what goals to pursue with the power they offer (Cottrell 1955, 110-115).

Indeed, Cottrell (1955, 110) follows Spencer by arguing that causal effects are in this matter impossible to define, and thus in the energetic evolution of societies "the emergence of complex institutions depends upon the development of a surplus, so too the development of a surplus depends upon the existence of such institutions" (*ibid.* 32). From the perspective of Spencer, societal transformations (like any change in the universe) evolve always through cyclical interaction of complex – economic, technical, political, cultural etc. – processes. In these processes, one force collision always creates several un-linear counter forces, and thus to trace all the force transformations or determine what force is the most original one, is indeed an impossible task (e.g. FP, 195). Social organizations just evolve rhythmically with the flows of energy that are penetrating it; the institutions affect the energy demand and the produced energies affect the institutions. And finally, one thing is also very clear for both authors, which is also repeated many times in the thesis, that "once the balance [of external and internal energy] is attained, it is difficult to upset" (Cottrell 1955, 33). Figure 3 summarizes these insights.

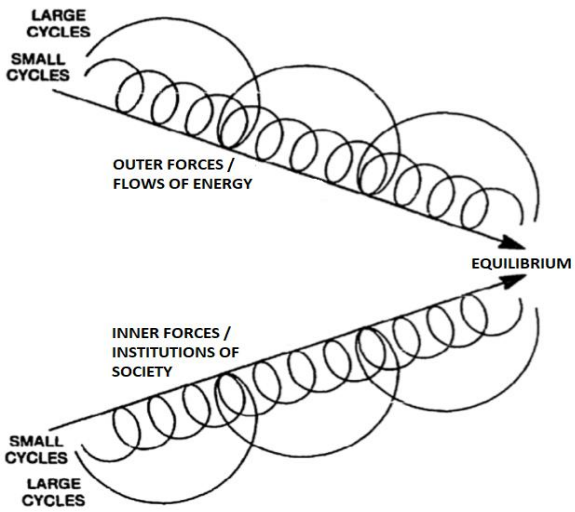

Figure 3 Co-evolution of social organization and its energy usage (adapted from Geels et.al 2018, 25).

5.3. Path dependent seamless webs of fossil organization

Later, as it is well known, utilization of steam, coal, and especially oil resources (Urry 2013b) enabled societies to transform to so-called industrial societies which demands to function approximate EROEI ratio of 5:1-10:1. For comparison, the EROEI value of oil production was in USA more than 100:1 in the beginning of 20th century. However, as mentioned already in the introduction, nowadays this ration is declining fast and in the USA the value is not anymore more than 15:1. (Partanen et.al 2013, 46-9.) According to Urry, the most significant parts and factors that affect the energy demand of this industrial society are the following:

- the development of the system of electric power generation (especially by coal and gas) and of national electricity grids, so ensuring that more or less all homes in the global North are lit, heated and populated with electric-based consumer goods.
- the spreading of the steel-and petroleum car (with now over 650 million cars and 1 billion vehicles worldwide) and associated roads, and a widely distributed, sprawling infrastructure linking most places of residence, work and leisure.
- the development of suburban housing distant from places of work, which was then commuted to by car/bus and filled with household production goods, including especially radio and TV, which were powered by electricity and produced elsewhere in new Fordist-type factories.
- the emergence of various electricity-based technologies, stand-alone telephones, computers, laptops, networked computers, mobile phones, Blackberries and so on, that networked colleagues, friends and families who could then be more geographically dispersed.
- the proliferation, especially through the private sector, of many specialized leisure sites, supermarkets, fast food outlets, national parks, sport stadia, theme parks, most necessitating travel from home and neighborhood, especially by car and, later, by new systems of air travel; they also normally involved the long-distance movements of objects, food and water. (Urry 2013a, 87-8).

Each of these five systems support the activities and functioning of other systems and mutually they depend heavily on the fossil fuels. This industrial cluster is also entangled to powerful interest network of so-called “carbon capital” (businesses and political interests, military powers) which had (and have) significant impact to the development of these modern sociotechnical structures (Urry 2013b, 75-96; see also Podobnik 2006). When historically constructed taken for granted practices, jointly with the mentioned carbon sunk-costs, connect these sociotechnical

systems together, the outcome is an organization that has locked societies into fossil fuel dependent – very unsustainable – trajectories. (Urry 2013a; Urry 2013b.)

If, for Urry, the various flows from natural cycles to global movements of people (see chapter 5.1) are those factors that keeps constituting the present organizations, then the sociotechnical systems are the structures which guide the currents of these flows; "these systems make possible movement: they provide 'spaces of anticipation' that the journey can be made, that the message will get through, that the parcel will arrive. Systems permit predictable and relatively risk-free repetition of the movement in question" (Urry 2007, 13). Sociotechnical systems connect humans' social and personal lives together and enable, for example, the global industrial order that is shortly discussed above. Furthermore, via these systems, the human world is connected also to the rest of "natural" world. (Urry 2013a, 85-91.) It is important to note, that these structures are not (only) "social structures" in traditional sociological meaning. As the name of the systems already indicates, they are hybrids by their nature; they "consist of complex, enduring and predictable networked connections between peoples, objects and technologies stretching across multiple and distant spaces and times" (Urry 2003, 56-7).

Indeed, these energy-intensive flows or practices molds dimensions of time and space by moving ever-increasing amounts of people and object ever greater distances with ever increasing velocities between homes, work, and consumption places (see also Urry 2007). According to Urry, these flows have increased their cycles and the sociotechnical systems have further grown in their complexity during the time of "unorganized capitalism" or "neoliberalism". Neoliberalism has worked as a kind of umbrella term for all the actions that have aimed to re-structure economic and social life to follow the logics of "the market". The commodification of almost everything is at the very core of such the logic because the very premise of the neoliberalism is the belief to extensive private ownership and to freedom-to-choose. And this proliferation of choices demands the availability of diverse set of commodities and very long, fast and flexible global supply chains that enable and sustain the flows of such global mobilities. (e.g. Urry 2013a, 100-106.)

Thus “the market” was recognized as the most efficient way to organize our economies, and the sociotechnical systems that were energized by the fossil fuels ensured that the creation of this global market of increasing choice was possible to execute. Urry further argues that also neo-liberalism’s ability to scale up the future-oriented debt-financed economy was significant, as it, for example, created massive financial sunk-costs to the fossil fuel based industrial structures. Easiness of the debt also boosted – together with the proliferation of choice – affluent, addictive (see also Giddens 2007) and conspicuous status consumerism. (Urry 2013a, 100-5, 179-182.) For a reproduction of these consuming practices there now exist plenty of global actors that create new “needs” to be satisfied, which again, reinforce present practices and keep societies’ wheels rotating in a current fossil fuel dependent trajectory (Urry 2013a, 92; see also Miller & Rose 2010; Joutsenvirta et.al 2016, 142; Brown & Vergragt 2016; Lähde 2013, 99-101).

Therefore, it is the massive EROEI ratios of fossil energy resources which enabled the construction of modern societies in the ways that we experience them today. Especially the present fast global movements and massive industrial productions would not be impossible without the fossil fuels and their energy surpluses (Urry 2013a; 2013b). Indeed, “the most fundamental attribute of modern society is simply this: ours is a high-energy civilization based largely on combustion of fossil fuels” (Smil 2003, 1). The key-point is that additionally to the massive energy densities and surpluses the fossil energy resources (especially oil) offered, the novel ways to transform energy (especially electrical converters and combustion engine) increased significantly the flexibility of storing, transporting and utilizing these energy resources (Urry 2013b; Smil 2006, 85-90). There was no more reason to produce energy where it was needed – massive surpluses together with flexible logistics made possible to create a whole different kind of organization compared to the low-energy societies: “new kind of power generated novel workplaces, new industries and products, huge factories, new cities, and machine-based movement, the railway, which transformed also much of the physical world” (Urry 2013b, 3).

Compared to members of the low-energy societies, the actions of every individual in our present societies are energized by the work of tens of hidden “energy slaves” – that is the energy that the

high EROEI resources and advanced technical appliances offer compared to the muscle powers of humans and animals that energized the low-energy communities. For example, considering global inequality, every Finn has approximately 60 energy slaves at work only to substitute the energy created by the oil. (Partanen et.al 2013, 16.)

And because the organization is made possible by the fossils, it consequently *demands* continuous input of high-energy resources and thus "burning mobile fossil fuels became central to the modern energizing of societies"[25] (Urry 2013a, 4). It is these resources and especially oil, "which makes possible today's world friendship, business life, professions and much family life... Oil also transports components, commodities and food around the world in trucks, planes and vast container ships. Almost all activities that presuppose movement now rely upon oil; and there are few activities that are significant in the modern world that do not entail movement of some kind" (Urry 2013b, 6-7). Thus, for Urry, this ability of the fossil fuels to energize and enable present sociotechnical systems and the global flows which distribute objects and people inside the systems is essential – if not the most essential – feature of modern society (see also Urry 2013a, 86).

As already mentioned above, theoretically Urry applies complexity theory and systems thinking to conceptualize these diverse and multi-disciplinary phenomena. Especially he seems to seek such a framework that helps him to analyze the systems as comprehensive entities (see e.g. Urry 2013a, 70). According to him, the focus on feedback loops (especially positive) are particularly helpful and useful for such comprehensive research on the complex systems (Urry 2003; see also Grimes 2017). In a nutshell, by utilizing these concepts Urry theorizes that although most systems move toward non-equilibrium, still sometimes with the correct non-linear positive feedback loops, usually chaotic flows of materials and ideas can be balanced for a long time in the state of

[25] For example, oil energize followed dimensions of society: 95% of transportation by powering cars, trucks, planes, ships and some trains. 95% of manufactured goods (including packaging and bottling) are oil based. 95% of food production and distribution is dependent on oil to provide power for irrigation/drainage, for pesticides and fertilizers and moving food to market. Oil is also used much domestic and office heating, especially in oil-rich societies. (Urry 2013b, 6-7.)

equilibrium. This is exactly what has happened in the history of fossil fuel dependent industrial organization that has locked itself to the path-dependent trajectory (Urry 2013a, 71-83).

These metaphors and perspectives that Urry has developed resonates in many ways with Spencer's insights and observations. Already from the theoretical point of view, both authors speak about the equilibrium of different (energetic) flows and how they construct structures and (sociotechnical) organizations. Spencer used the concept of force to speak about these hybrid flows, and he as well discussed how the flows constitute order when they travel through the ever-more complex sociotechnical systems. To develop these insights, both authors are hugely influenced by chaos and systems theories that help to connect natural energy flows to the more immaterial flows of social organizations. Different feedback-loops are the essence of systems thinking and it is not surprising, that they are also in the very core of authors' works. However, as already said before, Urry does not build any theoretical frameworks from these premises and he kind of stops his theory-building to these general observations that the system and chaos theories offer. In a nutshell, he seems to satisfy to the explanation that defines reality as a process where different chaotic flows are all just part of a seamless web of life and sometimes this chaos just happens to create some order with the help of appropriate feedback-loops. In my reading, Spencer seems to take one step forward from this point and connects his own systems theoretical notions as part of his evolutionary theory of social organizations.

Indeed, Spencer's theory of social structuration conceptualizes how different subsystems (economy, distribution, and regulation) evolve by creating, guiding, controlling and transporting various kinds of force flows that continuously energizes the social actions. The sociotechnical systems guide these flows to the rights parts of the subsystems of society through the "channels" they create, and the whole society indeed evolve as a whole via ever-more complex *positive* feedback loops along the three subsystems and between this "system of organs" and its environment. Furthermore, Spencer's theories help also to conceptualize the different types of flows that travels through social organizations. For example, economic and distributive subsystems consist mostly of material ecological energy flows that are needed to create goods

and to distribute objects and people. Regulative subsystems, on the contrary, includes more immaterial flows such as information. However, Spencer still handled all these different types of flows with one concept, namely with force – for him, in the end, everything was always connected to each other. Thus, Spencer sees reality also as "seamless web of life" but still he is able to construct a comprehensive theoretical framework out of it.

Spencer's theoretical frameworks may come in handy, for example, when one explores the origins of the societal energy demands. Indeed, although Urry also analyzed extensively how ever-greater amounts of the fossil fuels are needed to energize the ever-faster pulses of objects and humans that move ever-longer distances, still due to lack of the theoretical framework, it is difficult to comprise what factors have originally led to this situation and what are the main feedback-loops that keep maintaining the status quo? According to Urry, this escalation of global movement and energy flows have happened especially in the era of so-called neo-liberalism, so it gets to be our entrance point to Spencer's insights.

We can begin with Spencer's observation that the escalating desires and needs which drives the economy, are increased during the time of neoliberalism or, in Spencer's own words, during the time of industrial political control[26]. This type of control also decreases societal powers that are trying to achieve common ends or public goods and it indeed increases economic activities on the private side. And if the distributive system can handle the growing flows of object and people, then the division of labor spontaneously creates organizational inter-dependencies even at the global level in order to maximize the economic returns. This was indeed the case during the 20th century when the development of combustion engine technologies (among other technologies) enabled the utilization of fossil fuels in the transportation systems (cars, airplanes etc.) which again enabled or even prompted new economic differentiations and supported further growth of the industrial organization. Different feedback loops were in positive relations to each other (low

[26] In my reading, neo-liberalism sounds indeed extremely similar to Spencer's ideas of the industrial type of society. With this ideal categorization, Spencer aimed also to describe sociopolitical characteristics of such a society that relies heavily on extended private ownership and limited public control.

centralized control ↔ increased economic desires and actions ↔ development of distributive system), and thus the economic actions exploded. The industrial organizations were indeed able to grow exponentially when the natural resistances (via technological advancements), the political resistances (via free-trade and free-movement policies) and the social resistances ("keeping touch" with people even far away became all the time easier) were approaching the zero. And because, as Spencer observed, through economic actions societies are connected to nature's material energy flows, it is possible to start to see reasons and feedback-loops that lead to massive societal energy demands.

One of the most – or probably the most – essential finding of my thesis is related to these insights, namely the role of energy surpluses in social evolution. Energy surpluses and technological appliances that create them truly seem to be at the very core of both Spencer's and Urry's energetic sociology. Both of them demonstrated clearly how the fossil energy resources have enabled the creation of our present societies and they also pointed out how these immense energy surpluses have changed practically everything in our societies from material practices to mental states. Moreover, it was obvious for both authors that it is not purely the social practices that define the needed energy surpluses, but the practices are also affected by the available surpluses. And last, because in every particular moment of history these social practices, lifestyles, and goals are constructed as a part of the energy flows of that specific time, the energy demand of societies appears always as "natural".

In addition to these notions, in my reading, Spencer's terms and concepts also fruitfully complements Urry's notions on "locked-in" or path dependent sociotechnical systems. Above all, Spencer's framework helps to organize and systematize Urry's rich empirical notions. It guides analysts to see "the big picture" and recognize different links and interdependencies among different parts of the societies as well as between societies and nature, and to comprehend how this totality is "locked" to current trajectories. Indeed, regardless of many similarities that there seems to be between the authors, the major difference between them is that Spencer offers a theoretical framework and uniform terms that helps to conceptualize these complex insights.

Recent authors' observations are complementing richly Spencerian insights and they kind of updates his more than 150 years old ideas to present time, but indeed, the main issue is that the contemporary authors do not have any mature theoretical framework that could help to systemize and structure their empirical notions. Their analyses see the world as a kind of "seamless webs of life" where everything is connected to everything (which is true according to Spencer as well) which makes his research challenging to follow, or at least, it is difficult to construct any "big picture" out of it. These theoretical frameworks are indeed guiding empirical reading and help to create connections between complex parts. And finally, maybe the most importantly, Spencer constructs all these notions on energetic metatheoretical foundations that recognizes energy surpluses as essential to the constitution of society. True, energy was also the most essential concept for Urry's later research (and unfortunately it was also his last), but it was – at its best – only implicitly present in his other works.

• • • •

Before moving to the last chapter, it is important to clarify one possible pitfall that might lead to misinterpretations of the discussions above and what possible could misguide overall the sociological energy research. Although Spencer discussed that societies "inner forces" need to be in balance with the "outer forces", still it is important to note, that the universal energetic principles of the universe that Spencer studied, do not define the outcomes of social evolution in a deterministic fashion. Even social change seems to follow these universal laws of energy up to a certain limit, still, sociological energy research cannot neglect the role of more ideal factors in societal change and how they contribute to energy demand of society. As Smil (2008, 344) argues, that "this approach [of universal energetics] is clearly inappropriate in a world where geophysical, biophysical, technical, social, and moral concerns are intertwined. Management of a civilization is far from being merely a matter of energy conversions". Indeed, societies are more than just parts of nature's processes. Laws of thermodynamics do not explain all the phenomena of life.

Of course, as we saw in previous chapters, Spencer did not either argue for such a strong energetic program. For Spencer, the concept of energy or force was a much more flexible concept than it is

for general energetics. However, it is important to note this again especially because there have been some influential theories of energetic cultural evolution which limit the human agency almost to zero (see especially White 1943).

Therefore, it is crucial to note that it is originally "life's intrinsic properties that determine how energy flows, not the other way around" (Smil 2008, 342). Societies values and goals (inner forces in Spencer's language) determine how much energy social organizations need, not the other way around. However, as we have seen many times, this does not mean that the material world, such as energy surpluses, would not affect the ideal world. It is indeed important further to remark that these societal goals through the process where material and ideal factors are fully entangled together – where the members of society are interacting with each other and simultaneously with their material structure.

However, sometimes material factors can have huge power over the ideal ones determining the outcome of the evolution. This might be the case especially with energy surpluses. For example, Salminen and Vadén (2012, 100) argue that "the industrial societies do not use oil as a prime mover, but the industrial societies are in use of oil". According to them, the energies released from oil has affected the social structures in a way that has not been fully in societal control. Similarly Harari (2016, chapter 5) argues that in the agricultural revolution, humankind did not domesticate grain seeds but the seeds domesticated societies. For him, there was no social need that led to this revolutionary happening and mostly, although novel agricultural technologies created new energy surpluses to societies, "the agricultural revolution left farmers with lives generally more difficult and less satisfying than those of foragers" (*ibid.*). Podobnik's (2006, 49) observations are further supporting these insights. He noted that when the oil arrived to "markets", societies did not have any social need for a new energy source or for extra energy surpluses. During the time the new energy resources thus created new social needs which now depends on these energy surpluses.

Hence, to adjust energy flows needed in social organization, the starting point is that it is needed to change goals and values in society but as Lähde (2013, 150) argues, "the social transformation

cannot happen so that first humans' world views are changed and after that the transformation in society's material order follows. Our values are not our intrinsic programming which can be realized in any environment, but we need to create societies in which values can be materialized". Social transformation is a complex process where material and ideal interacts and neither determine alone the outcome of societies' energy consumption. Indeed, this was the way how Spencer comprehended the social evolution, too.

5.4. Un-synchronized forces causing climate change

As already hinted in the introduction, the present societies would need to be able to execute such a complex social transformation because their energy economies are now causing various "wicked" problems (see also Lähde 2013; Harris 2013). Additionally to oil peak issue, *the cumulatively increasing usage of fossil energy resources* threatens the carrying capacity and renewal abilities of natural cycles (Hoffrén 2006, 38). The complex and path dependent sociotechnical systems that were described above, have indeed led to the serious environmental problems. In addition that they are causing the climate change (IPCC 2014; Urry 2013a, 34-62), the over-usage of the natural resources causes, for example, declining of biodiversity (Gustafsson & Juslin 2010, 47). Because of these massive ecological effects of the human activities, many geologists now argue that the globe has moved to a whole new era, anthropocene, where the humankind has become first time a remarkable geological power (see figure 4) (see Dirzo et. al 2014).

Although Spencer, of course, did not discuss the issues such as climate change, he nevertheless recognized how the social systems depend on natural resources and how any organization's inner force cycles need to be in equilibrium with the cycles of their outer forces. Now our global inner forces are clearly not in balance with our environment, and as I discussed in one example in chapter 3.1, this un-balance of *force* now obliges social forces to react in creative way if the societies want to continue their historical rhythmic motion to the future because "on these set of

conditions, inorganic and organic, characterizing the environment, primarily depends the possibility of social evolution" (PS [1], 9).

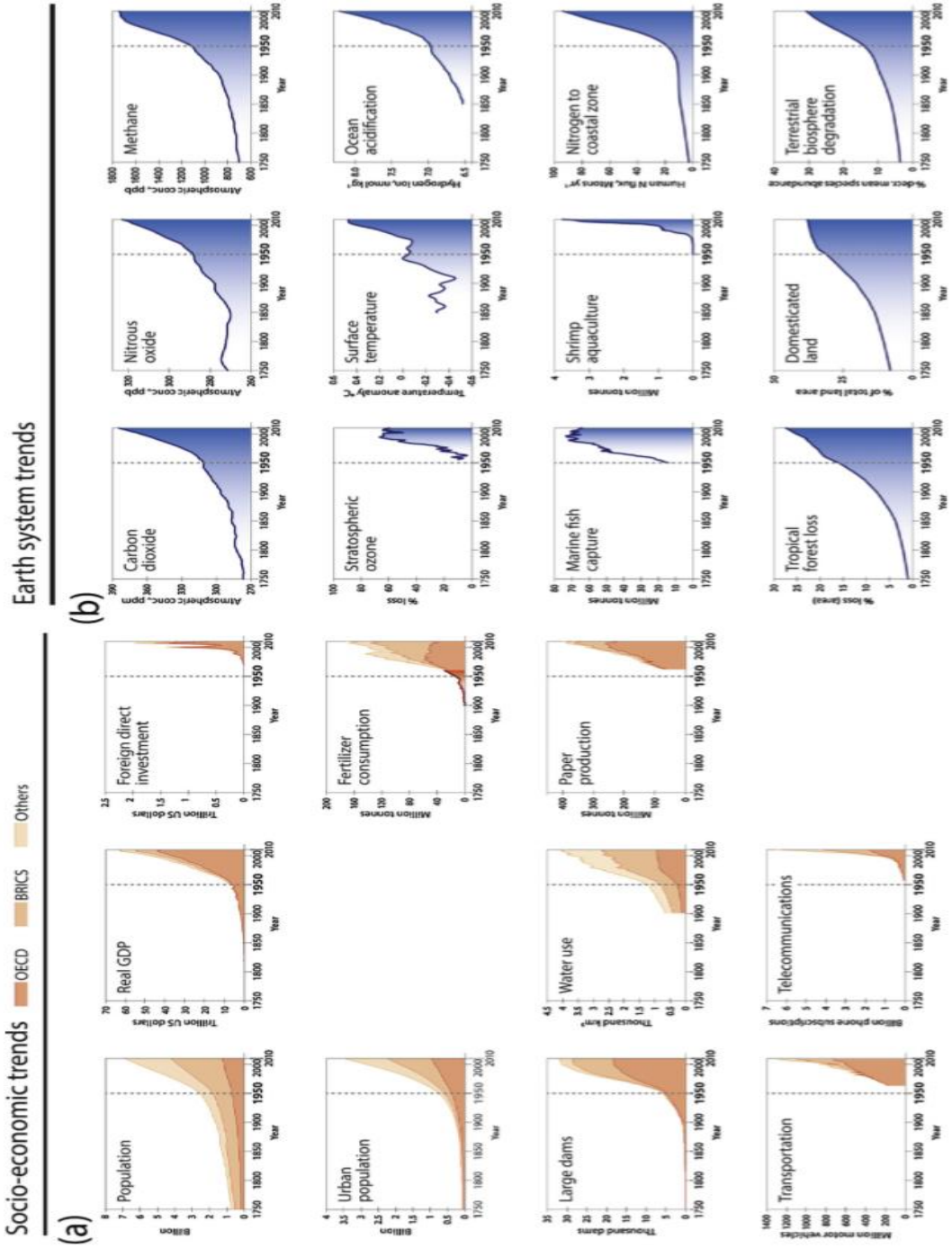

Figure 4: Illustration of how socio-economic systems develop side by side with the ecological economic systems. (Bai et.al 2016, 356)

Figure 4 also illustrates Spencer's the most general notions on global and even cosmic evolution. For him, the evolution is a universal process where practically every substance of the creation is more or less connected to each other's evolving. Moreover, when there is one force so powerful that overcome the sum of forces of its environment, then the direction and power of this superior force start to move and transform mightily its environmental forces (see also. PS [1], 425). Indeed figure 4 demonstrates the extreme energies that are embedded to present global sociotechnical systems and shows their capability to change the equilibriums of natural forces. The industrial sociotechnical systems have been truly able to absorb such immense powers inside their structures that their "power of dealing with Nature having step by step increased", and consequently, "the resistances offered by Nature have step by step decreased" (PS [3], 331).

And now, from all the discussions presented in this thesis, it can be deduced that it is the totality of present global industrial organization that cause the unsustainable consumption of energy resources and the environmental threats which follows from them (see also Urry 2013a; Jokinen & Järvikoski 2006, 6; Borg & Joutsenvirta 2015; Shove et.al. 2012, 140). The accelerated usage of the resources is not caused by individual choices, values or goals of "atomistic" actors but rather the unsustainable trajectory is created by the clusters of interdependent and mutually supportive sociotechnical systems. The core of the problems is that the deep structures of this sociotechnical organization are locked-in and the renewal of its feedback loops are presently energized by the fossil resources. The insights founded in this thesis support such statements that suggest that to understand and to solve the present environmental problems, we need to start to explore and to expose comprehensively these energy lock-ins (see e.g. Urry 2013a; Geels et.al. 2015; Hansen et.al. 2010). It will not be enough to make the present organization more efficient, for example through the technological advancement, but we need to execute "deep sociotechnical transitions" (Schot 2018) to break the present societal trajectories and to guide social evoltution towards more sustainable path dependencies.

Furthermore, only these short explorations to locked-in sociotechnical systems help us to understand reasons why, for example, present global organizations are so difficult to transform

even when they face catastrophic issues like the climate change: oil is truly entangled to all most essential systemic feedback loops of global organization (see also Suokko & Partanen 2017; Partanen et.al 2013; Tammilehto 2012). Likewise, we can begin to observe how massive transformation waits for us when the energy foundation of our immensely EROEI dependent organization disappears. Indeed, we "live in the world which is entirely hooked to oil. Without it nothing moves. The economy will collapse. Food production will collapse. Other energy production will collapse. Industrial society, *in its present form,* will collapse" (Partanen et.al 2013, 3. italics added). In Spencer's words, due to lack of needed energy surpluses, the structural dissolution inevitably waits for our present global organization. Similarly to the massive changes followed by the transition from low-energy to high-energy society, the transition from high-energy to "sustainable-energy" society will be followed by at least equally massive changes: "the twenty-first century will be very different from the previous century" (Urry 2013b, 12; see also Klein 2014).

6. Conclusions: ”Who now reads Spencer”?

> We should look at Spencer because we have not used his ideas to develop theory to the extent that we have employed the ideas of other historical figures. We have spent, indeed wasted, a great deal of time rediscovering Spencerian sociology; it would be more efficient to examine it first-hand and profit from it to the same degree as we have for Marx, Weber, and Durkheim.
>
> - Turner (1985, 153)

In this thesis, I have explored Herbert Spencer's theoretical insights to better understand the energy relations of social organizations. However, the main motivation for my theoretical thesis did not arise from interest in Spencer's thinking *per se*. It was rather the concerns related to climate change that were the primary catalyst for my work. Thus, from the start of the thesis process, I took an instrumental approach to everything that was included in this work. I wanted to explore a research direction that aims to comprehensively understand societal processes and dynamics that have led (and indeed still lead) to climate change. This approach also led me to frequently ask myself questions such as "why", "how", "so what", or "what then"? Why read Spencer? Even if Spencer has something fascinating to say, so what? How does this matter to the sociological understanding of energy usage and how it helps to conceptualize the processes that lead to climate change? How does this expand the energetic sociological imagination and what is its worth to contemporary research?

The starting point for the analysis was the observation that the core problem of climate change is rooted in deep structures of societies. These deep structures – that is, social organizations incorporated within complex interdependencies – are seen as "locked-in" to unsustainable trajectories, where enormous flywheels of societies are energized by the fossil energy resources that *enable* but also *oblige* the continuation of current path dependencies. It was also recognized that despite these massive global issues, energy-related questions are only slowly starting to make their way to sociological analyses. My thesis, at its core, is a contribution to the emerging field of sociological energy studies.

A further preliminary observation or starting point for this thesis was that the existing sociological energy research largely lacks theoretical perspectives and orientations; there is only a limited number of conceptual tools and theoretical frameworks that can help to comprehensively explain why and how social organizations depend on energy resources. This lack of theoretical frameworks has troubled me extensively during my studies because without the conceptual tools, it has been difficult to get "the big picture" of the present global sustainability issues. Without frameworks, it is also impossible to make any general deductions from fragmented and unattached observations, which considerably slows down – or even prevents – accumulation of knowledge and development of sociological energy research. Furthermore, as was argued in the introduction, sociological energy research requires a completely different kind of social theory – a social theory that does not attempt to "gerryrig" energy issues onto traditional sociological concepts. Social theory must overcome the chasm between the natural and social sciences.

From these premises I became interested in exploring Spencer's work. Indeed, Spencer's insights on energy aroused my interest: would his concepts help to conceptualize societies' energy relations and explain why the present climate change mitigation efforts seem so ineffective? In developing this approach, I owe much to Andrew McKinnon (2010) who introduced the value of Spencer's energetic thoughts.

However, during the research process, I also developed additional motivations to write about Spencer. I became extremely interested in the historical development of sociological thinking. Indeed, the study of the classical era also revealed to me that we cannot take for granted what sociology in the essence is, which issues sociology should be interested in, and what it should study and what not study. The fact, that the sociology of the 20th century (at least in Europe) mainly adopted the Durkheimian style of practicing sociology does not mean that this kind of sociology of the "social" is the only way to approach societal issues. For example, the findings of my thesis support the argument that energy has an enormous impact on societal dynamics, and therefore, energy should matter to sociology, and sociology should be able to study energy processes and dynamics. Thus, from one point of view, my thesis can be considered as a

statement by which I participate to the internal negotiations of the sociological discipline where we continuously define what sociology is as a science and what it is not.

It would be interesting to picture how sociology would look if Spencer's *sociology* (not his moral philosophy) had played a more significant role in the development of the discipline. It could be possible, at least, that environmental sociology would have had a more significant role in our discipline's institutionalization. Spencer shared many strategies and approaches with present environmental sociology and sociological energy research, and from the point of view of contemporary research, he is hardly as controversial and radical as the mainstreamed stereotypes portray him.

A another complementary motivation to study Spencer and write about his work is related to his stereotyped reputation, which tends to present him only as a founder of social Darwinism or as a supporter of extreme *laissez-faire* political philosophies. Indeed, although possibly not as dramatic, during the research process I noticed, similarly to Turner (1985, 7), that there seems to be some injustice in how Spencer has been treated (see also McKinnon 2010; Offer 2010):

> At a time when social theorists genuflect at the sacred works of St. Marx, St. Durkheim, and St. Weber, we split on the grave of Spencer because he held a moral philosophy repugnant to the political biases of many contemporary theorists… [And now] there are so many misconceptions about Spencer that someone needs to set the record straight.

True, Spencer's works also had very problematic dimensions, but again, my goal has neither been to defend these angles of his thinking nor to ignore them. The purpose was only to give more voice to the analytical side of his work – the side I was introduced to during the research process and that has been marginalized under heavy and many times unjustified criticism. Thus, in the end, I have aimed to point out that although some of Spencer's ideas are characterized by unacceptable ethical tendencies, this seems a poor reason for ignoring his richer offerings (cf. McKinnon 2010, 444). I believe that through the recognizing Spencer's richer offering, his contributions can be evaluated in a more balanced and justified.

Straightening the record becomes even more important when we consider the fact that many contemporary sociological perspectives are based on Spencer's insights. Indeed, because many core sociological perspectives developed during the 20th century originate from Spencer's insights (as was discussed in chapter 2), it would be fairer to pay more attention to the founder of these important ideas – how else can the development of our scientific field can be just and fair? Moreover, as I have also demonstrated in this thesis, Spencer's insights are still useful and relevant to contemporary research. However, ignorance of what Spencer really said has led to the need for contemporary sociology (energetic and "general") to rediscover Spencer's ideas because the discipline is not aware of his ideas (cf. also Turner 1985, 7).

In the opening of his work *The Structure of Social Action,* Talcott Parsons (1949, 3) asks "Who now reads Spencer?" In my thesis, I have aimed to demonstrate that Spencer's energetic conceptual tools and theoretical insights make a rich contribution to the contemporary sociological imagination and research that aims to expose energy's role in social organization. In the following discussion, I summarize Spencer's insights by answering the three research questions of this thesis. The chapter ends with the considerations of the promise of sociological energy research.

1. What role does energy have in Spencer's theory?

Energy is at the very core of Spencer's evolutionary theory. Spencer used interrelated concepts of *energy* and *matter* to constitute his main term *force.* By observing the relational dynamics of energy (or motion) and matter in the universe – that is, the dynamics and laws of force – Spencer constructed the first principles that explain the structuration – that is, the evolution – of any organization in inorganic, organic, and super-organic realms. To summarize from the energy point of view of the thesis, Spencer theorized in his highly nuanced evolutionary theory that the structuration of organization always depends on *continuous* input of outer energies equal to the inner energies of the organization. If the outer energies exceed the inner energies, structural growth occurs, and the organization increases its complexity. If the outer energies are exactly equal to the inner energies, the organization maintains itself in its present environment. If the

outer energies cannot meet the energy demands of the organization, then structural dissolution commences.

Spencer's whole *System of Synthetic Philosophy* uses these main principles and laws, and thus also the concept of energy (or force) carries throughout his works from the first words of *The First Principles* to the last pages of *The Principles of Sociology.* However, an important thing to note is that Spencer's use of the concept is much more flexible than in today's general energetics research. Even though there are some similarities between Spencer and general energetics research (for example, the recognition of the laws of thermodynamics), still Spencer used energy concepts and derived laws in a way that general energetics would not. For example, Spencer used the same concepts to discuss about the material energies in nature as he used for immaterial "inner" energies or forces of societies. Indeed, according to him, force flows everywhere in existence, which makes it an extremely abstract concept; so abstract that it is almost impossible for any specific science to use it precisely.

However, one might also see advantages in the abstract nature of force. Spencer's use of the concept allowed him to synthesize knowledge and observations among a diverse set of fields. With strict conceptual tools, this task could be impossible, and consequently, with precisely defined terms it might also be impossible to study the topics that sociological energy research aims to expose. It was further argued in this thesis, that sociological energy research needs a novel kind of theory that does not attempt to only "gerryrig" traditional sociological concepts to the subject of energy. Spencer's concept of force or *energy,* and *The System of Synthetic Philosophy* derived from these concepts, indeed offers flexible and rich theoretical tools to build such an energetic social theory.

2. What kind of perspectives does Spencer offer to the energy relations of social organization?

Arguably, the most important insight Spencer offers to sociological energy research are those related to energy surpluses. The principle of energy surplus to the structuration is indeed at the very core of his structuration theory, and these insights carry throughout his works. As mentioned above, energy surpluses are always needed for structuration to happen. Moreover, Spencer

analyzed richly how ever-accelerating technological development has massively increased the amount of the surpluses available to humankind. Such technical networks have created completely new kinds of relations between social organizations and their environment that have further detached the social actions from the limitations and constraining grip of the energy cycles of nature.

According to Spencer, these energies available to society originate from the sun, and via their sustaining subsystem (economy), societies are connected to these universal energy flows of nature. However, the economic subsystem – that is, the system that mainly functions to satisfy the ever-growing needs of societies – is connected to the distributive and political subsystems whose characteristics further affect the energy needs of the whole organization, together with the various feedback loops among the three subsystems. There is no need to repeat the detailed discussions of these characteristics and feedback loops (see chapters 4 & 5), but the main conclusion from these discussions is that once the carious "locked-in" feedback loops are created among the diverse parts of societies, as well as between societies and nature, this specific organization as a whole continuously depends on nature's energies.

These observations also offer rich insights into sociological climate change research. Although Spencer did not predict climate change, he recognized ecological power relations and dynamics among different kinds of organizations (inorganic, organic, and super-organic) through which it is possible to theorize the origins of climate change. For him, evolution is a general process where every substance of creation is more or less connected to each other's development, and when there is one force so powerful that it overcome the forces of its environment, the power of this particular force begins to move and change its environment. Spencer indeed recognized how the present complex sociotechnical systems have increased their power to deal with natural forces; our present global societies have absorbed "inside" them such massive amounts of energies that they have started to affect natural cycles and they have imbalanced the equilibrium of global ecological forces. And because social systems' inner forces must be in balance with the forces of

their environment, we must now somehow creatively adjust our organizations as part of new environments.

However, according to Spencer's theorizations, this adjustment might not be an easy task. Indeed, through his insights, it is also possible to begin to observe the reasons for the ineffectiveness of the present climate change mitigation efforts and why needed actions are so difficult to execute on a grand scale – the energy surpluses created by fossil fuels are truly entangled with all most essential systemic feedback loops as well as everyday practices of the global mobile organization.

3. How do Spencer's insights relate to the recent sociological energy research?

The findings of this thesis suggest that there are many similarities between Spencer and contemporary authors. More theoretically, Spencer preceded recent research by emphasizing the importance of energetic concepts that expose vital and uninterruptible relations between nature and society. Spencer also recognized and theorized the entanglements of ideal and physical structures of organizations and exposed how organizations depend on continuous input of various ideal as well as material flows. Perhaps most importantly, all the authors – Spencer and contemporary ones – also recognized the essentiality of energy surpluses in social structuration.

Moreover, chapter 5 discussed extensively of the seamless interconnected sociotechnical networks and flows, and different sunk-costs and political interests embedded in these networks. Functional relationships and positive feedback loops among the subsystems of an aggregate were also at the core of every author's analysis. According to Spencer and contemporary authors, all these structures that societies take for granted continue to maintain the *status-quo* that is constructed on massive energy flows. Hence, there exists a need for sociological energy studies that expose these taken-for-granted structures and shows how social organizations depends on energy surpluses. And finally, the authors, especially Urry and Spencer, argue that the grandest achievement of sociology is to analyze systemic wholes and its diverse feedback loops: "sociology shows the importance of the systems…", as Urry (2013a, 257) states, and he continues "… and systems do not change often. They are locked-in". Spencer presented the same statement:

> Finally we have to consider the inter-dependence of structures, and functions, and products, taken in their totality. Among these many groups of phenomena there is *consensus*; and the highest achievement in Sociology is so to grasp the vast heterogeneous aggregate, as to see how the character of each group at each state is determined partly by its own antecedents and party by the past and present actions of the rest upon it. (Spencer PS [1], 431)

Regardless of many of these similarities, this thesis suggests that the major difference between them is that Spencer offers a comprehensive theoretical framework that helps to conceptualize these complex insights. Spencer takes one step further from the contemporary research that comprehends the world only as kind of "seamless webs of life" where everything is connected to everything, and he systematically theorizes how order arises from this chaos. True, Urry also theorized this by referring to different chaos theories, but the challenge with his work, in my reading, is that he did not utilize these theoretical insights systematically in his empirical works. This is the case especially in his work on sociological energy research that rarely – or almost never – refers to his theoretical frameworks.

Thus, briefly, Spencer theorized fruitfully recent authors' key ideas of ecosocial vitalism, energy flows and surpluses, sociotechnical systems, and (locked) feedback loops; and therefore I argue, that his concepts also have value to contemporary sociological energy research. Above all, these theoretical frameworks guide reader to connect complex pieces together and to perceive comprehensive reasons for societal energy demand. Indeed, Spencer constructs all these ideas on metatheoretical foundations that bring the concept of energy to the fore of sociological analysis. Again, the goal is not to argue that Spencer is superior in every way compared to contemporary authors. In essence, the purpose of this thesis has only been to show that Spencer would have much to offer to present research and could perhaps push contemporary thought even further.

However, it is also possible to recognize potential pitfalls or challenges related to Spencerian ideas. The first point is connected to the analytical scale of these ideas. Perhaps the main challenge of the Spencerian kind of grand-scale thinking is that the unit of the analysis rises to a very abstract and common level. As a concomitant, the dynamics of local single decisions and

choices made in the present moment – exactly here and now in practical everyday settings – becomes difficult for the analysis to handle. However, it is in these single localized settings and happenings where the meaningful societal-ecological relations are eventually created as well as contested (Lähde 2013, 46-54; Haila 2009, 283), and indeed, these actions and conflicts hardly find their legitimization from such the grand level processes (processes of the second or higher order) as I have considered in this thesis. Thus, one of the major challenges for sociological energy research is related to how to produce the kind of information that is useful to problem solving.

Furthermore, the second source of criticism stems from the applicability of Spencer's theory. As mentioned in chapter 3, Spencer's insights could be labeled as an ecosocial theorization (see also Haila 2009). Generally, the goal of ecosocial research is to unravel dynamic relations among the societal and natural processes, and to expose how societal processes are embedded into universal processes found in nature. Haila (2009) warns that to pursue such goals, the theorization should not aim to build any detailed grand theories that are applicable universally to every domain of the universe (see also Lähde 2013, 46). Utilized in such a way, any theory – Spencer's included – is pretty much inapplicable and useless. Rather, according to Haila (*ibid.*), theoretical and conceptual tools should work as strategic approaches or research designs to ecosocial matters – as a flexible research toolkit that helps researchers to be aware of the fact that many societal processes follow logic that can also be found in nature. Related to this, it is again important to notice that although societal processes seem to follow similar processes to natural ones, such as the laws of thermodynamics, it is always *originally* the inner forces (or actions) of societies that determine its energy demand and not the other way around.

I argue that it is from these premises that contemporary researchers should approach Spencer's insights. His insights may not be most valuable when directly applied to present everyday decision-making or the creation of a grand level socio-ecological theoretical construct, or they may not be useful as a universal evolutionary theory that is strictly used to explain the dynamics of different realms of the universe. Above all, Spencer's insights hold the greatest value as the

flexible strategic approach that helps to highlight the energy relations of our complex path-dependent global organization.

Indeed, here lies the timely value of Spencer's energetic theories and conceptual tools to the emerging field of sociological energy studies. With the authority of the classic, they help to further expand the *energetic* sociological imagination to better recognize the role energy plays in structuration of social organization; they help to build foundations for the sociologically nuanced concept of energy and they help to institutionalize the concept as part of the sociological analyses from where it has been widely absent even today when massive global problems, such as climate change and the peak oil, questions the sustainability of our present organization. Future sociological energy research must continue to construct theories that can be applied to the practical setting (see e.g. Shove & Walker 2014), but the core value of Spencerian grand-scale analytics is in its ability to conceptualize the diverse ways by which complex societies are locked into energy intensive trajectories.

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