Testing Transformative Energy Scenarios through CLA gaming

Sirkka Heinonen[a], Matti Minkkinen[b] Joni Karjalainen[c] & Sohail Inayatullah[d]

[a] Finland Futures Research Centre, University of Turku, Korkeavuorenkatu 25 A 2, 00130 Helsinki
[b] Finland Futures Research Centre, University of Turku, Rehtorinpellonkatu 3, 20500 Turku
[c] Finland Futures Research Centre, University of Turku, Korkeavuorenkatu 25 A 2, 00130 Helsinki
[d] Tamkang University, Taiwan and University of the Sunshine Coast, Australia

Corresponding author's e-mail address:

sirkka.heinonen@utu.fi

Abstract:

This paper presents the results of an innovative experiment on elaborating transformative energy scenarios by using a causal layered analysis (CLA) game. CLA is a communicative method, using storytelling and narratives to explore and construct possible futures. CLA is based on the "assumption that the way in which one frames a problem changes the policy solution and the actors responsible for creating transformation". CLA consists of four levels: litany (quantitative problems, trends, often exaggerated, often used for political purposes); social cause (interpretation given to quantitative data, e.g. futures tables); discourse/worldview (that supports and legitimates or challenges social structure) and metaphor/myth (deep stories, collective archetypes, images). Typically, CLA workshops are conducted in four tables/groups corresponding to the four layers and communication with each other, back and forth in iterative turns. Instead, the CLA game session as depicted in this paper consists of a dialogue of four scenarios with each scenario group going through the four CLA layers. The game was conducted in June 2015 during the "Futures Studies Tackling Wicked Problems" conference in Finland, and the material for the game was derived from the four transformative scenarios of the Neo-Carbon Energy project. The scenarios used in the game are called "Radical Startups", "Value-based Techemoths", "Green DIY Engineers" and "New Consciousness". These scenarios were "deconstructed" and "reconstructed" through the interactive CLA game process with its four layers. The result was new insights emerging from questioning and digging deeper into the building blocks of the scenarios using the four CLA layers. Key actors in each scenario were played as roles in the game, and their relations are analysed using social network theory and systems thinking to identify leverage points in the systemic layer. The outcomes will be used for elaborating the scenario work. They also

form the basis for making recommendations for further developing this specifically modified combination of scenario construction and CLA game.

Key words:

CLA, action learning, serious gaming, transformative energy scenarios, Neo-Carbon Energy

1. Introduction

This paper presents the process and results of an innovative experiment on elaborating transformative energy scenarios by using a causal layered analysis (CLA) game. This experiment combining scenarios with CLA and gamification took place within the Neo-Carbon Energy Project as a special game session during the International Conference "Futures Studies Tackling Wicked Problems" in Finland in June 2015. The material for the game was derived from the four transformative scenarios of the Neo-Carbon Energy project. The game was planned to be conducted in an interactive and temporally compact form, moderated by a game team responsible for the scenario construction and proposition for a novel application of a CLA game. The aim was to test the existing scenario sketches in order to get new ideas and reflections out-of-the-box of the research project work.

2. Gamification As a Tool and Method in Futures Studies

The field of futures studies is increasingly interested in addressing the topic of gamification and using games as a method. The game applications can be perceived both as a methodological novelty and as used per se. Moreover, they can also be taken as instrumental platforms. Then they act, for example, as tools for testing research results as in the case described in this paper.

In futures studies, gamification is closely related to the concepts of experimental futuring and immersive futuring. Experimental futuring is a niche in futures studies that is increasingly gaining attention. Experimental futuring denotes futures studies with an accentuated characteristic of including experimental elements. Such experimenting can be manifold. Futures studies can experiment with various approaches, one of which is applying methods that are not frequently used. Various combinations of different methods, both qualitative and quantitative, can also be tested. Experimental futuring can also cover invention of a totally new tool, method or concept. Next to connections with testing novel approaches, we define experimental futuring associated with observing through participation and experience. Within futures studies, there is also an area, which can be called "immersive futuring". It means exploring or studying futures in a way that allows multi-sensorial immersion in the depicted future. It is a strong way of "experiencing" the future(s). The analogy goes to virtual reality (VR) where immersive techniques are used to create impressions of real life. For experiencing the future, various immersive tools can be used to create the impression of

being in the future. This may happen through several ways – through films, narratives, physical or digital space etc. Our definition places immersive futuring inside experimental futuring, while game-based futuring lies inside both of them (see Figure 1).

A certain type of experimenting the future(s) can also be achieved through serious gaming. Serious gaming in futures studies means playing a game that has a societally important goal – challenge to be tackled from the futures orientated point of view. Gamification in futures studies constitutes a niche in futures studies that is gaining increasing interest as stated earlier. It can also be called game-based futuring. According to our conceptualisation, most game-based futuring is also immersive and experimental. However, it has to be born in mind that a part of game-based futuring does not necessarily involve elements of experimentality or immersiveness.

The Institute for the Future (IFTF) is a pioneer in serious gaming in the field of futures studies. In 2013 they launched a game "Catalysts for Change" where the goal was no less than "finding the ways out of poverty". Director of Game R&D at IFTF, Jane McGonical applauds a gameful mindset. She claims that gaming channels positive attitude and collaboration in a real world context. McGonical has designed alternate reality games designed to solve huge real life problems such as hunger or climate change. Some games aim to improve the everyday life of players or have positive health impacts. For example, a game she designed called Superbetter builds the self-resilience of the player. Some of the games are live and event or season based and are archived online for future inspiration or gaming. Games are increasingly adapted as tools in the corporate sector as well. They are used in organizations i.e. to improve leadership skills, test key strategies and enhance the ability to adapt to change. One key benefit of gaming for workplaces is stated to be the teaching of complex systems through cause-and-effect realizations. Homo Ludens (Man the Player) is a concept originally coined by Dutch historian Johan Huizinga (1938), who suggested that play is a meaningful activity, free from practical life and its requirements. The concept has been widely adapted in game designing.

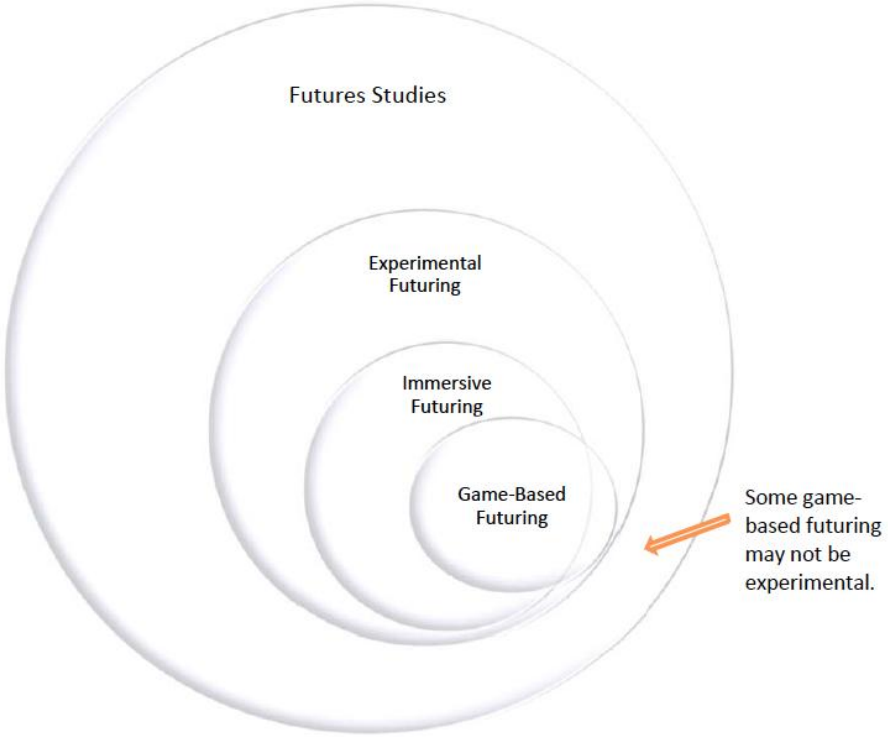

Figure 1. Gamification within the conceptual framework of future studies, experimental and immersive futuring.

3. CLA – a method applicable as a game

In order to fully grasp the Causal Layered Analysis (CLA) game mode and its modifications such as the one presented in this paper, it is important to know the CLA method itself. Causal Layered Analysis (CLA) is a method developed by Sohail Inayatullah (Inayatullah & Milojevic 2015; Inayatullah 2015a; 2015b; 2008; 2004). It is a method of studying various understandings of the future by layering them into four layers: litany, system, worldview and myth/metaphor (Inayatullah, 1998, 2004a, 11−15). The CLA method enables a deeper investigation of alternative futures by studying individuals' socially and culturally influenced beliefs and assumptions.

Causal Layered Analysis (CLA) is a communicative method, using storytelling and narratives to explore and construct possible futures. CLA is based on the "assumption that the way in which one frames a problem changes the policy solution and the actors responsible for creating transformation". Each of the above mentioned four levels opens up connections to a specific element: 1) litany refers to quantitative problems, trends, often exaggerated, often used for political purposes; 2) social cause focuses on the interpretation given to quantitative data, systemic cause-and-effect chains, as presented e.g. in futures tables; 3) discourse/worldview is concerned with status quo that supports and legitimates or challenges

social structure, and 4) metaphor/myth deals with deep stories, collective archetypes, and images.

In Causal Layered Analysis, the studied scenarios or images of the future are divided into these four layers: lit-any, system/social causes, discourse/worldview and myth/metaphor (see Figure 2). The litany level is the surface-level understanding, which takes an issue as given and does not examine its connections with other issues. The system level explores the social, technological, economic and other causes related to the phenomenon. Systemic connections are examined but the larger paradigm is not questioned. On the worldview level, the deeper ideologies and paradigms are examined. On this level, there is also horizontal breadth: various ideologies and stakeholder positions. The final myth level includes the shared stories and metaphors to which individuals are emotionally committed. Myths are the stories which give meaning to disconnected events and structure them into a larger whole. The layers should not be simply analysed separately, but movement back and forth between the layers is crucial in CLA (Inayatullah 2004a, 11−15; Schwartz 1996, 39−43).

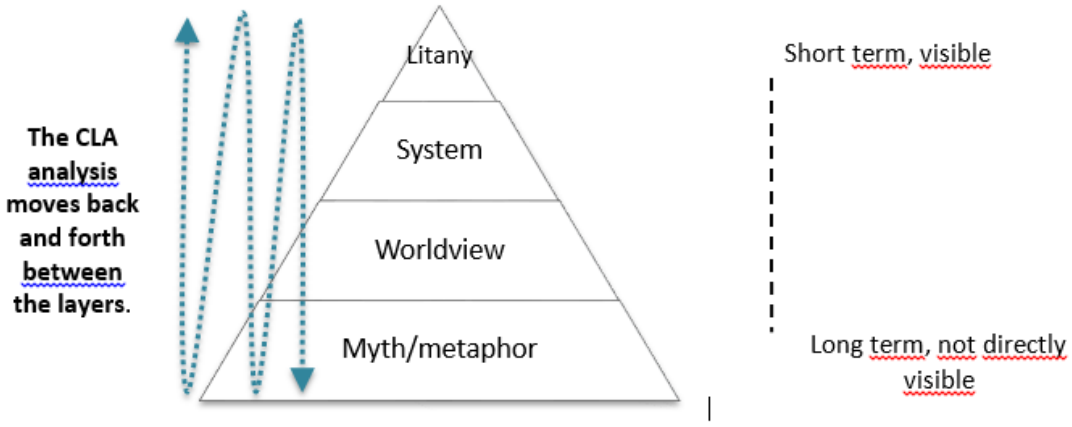

Figure 2. The Causal Layered Analysis pyramid (modified from Inayatullah 2004b).

The figure is shaped as a pyramid to suggest that the bottom layers are more comprehensive and actors are less conscious of them. Therefore, changing them is more difficult and requires more time compared to the upper layers. According to the CLA framework, the deeper layers (myth, worldview and system) frame and construct problems as they are seen on the litany level (Inayatullah 2004a, 3). The pyramid form (Figure 2) symbolises the totality of layers. It could also be illustrated by an iceberg metaphor. There the tip of the iceberg would represent the visible litany level, whereas other layers remain more or less deeper in the dark sea.

Problems are situated and seen as problems within a context that includes social interests, power relations and definitional power (Slaughter 2004, 158). This means that changes on the lower levels are reflected on the upper ones: changing the metaphor leads to changes in the worldview, system and litany.

Causal Layered Analysis has been described as a meta-method rather than a method because it is compatible with many different futures research methods (Wright 2002, 534). In academic research, CLA is rooted in the notion that language and ways of speaking constitute social reality rather than simply reflecting reality (Inayatullah 2004a, 7). CLA uses the conceptual tools of deconstruction, genealogy, distance, alternative pasts and futures, and reordering knowledge. In particular, deconstruction is a central tool. It is a method of 'unpacking' a way of thinking and studying its internal logic, contradictions and assumptions (Derrida 1997; Foucault 2002; Inayatullah 2004a, 14). In Inayatullah's view, CLA does not privilege certain ways of knowing such as scientific knowledge (Inayatullah 2004a, 14). Instead, many different perspectives are taken into account in discussing plans or images of the future (Minkkinen, 2013).

CLA is not only an academic research method but also a workshop method, which aims at promoting collective learning through investigating issues in depth. According to Inayatullah (2004a, 6), the CLA process "must be communicative: the categories need to be derived through doing in interaction with the real world of others − how they see, think, and create the future". What they say about the future is the litany layer connected to the other three, providing fertile soil for constant questioning (= critical thinking). CLA should thus be used in a context where participants can interact and contribute their insights regarding the layers of an issue. In-teraction with the real world requires attempts to dig deeper into the issues, structures and decision-making.

CLA is compatible with the dominant idea or principle in futures studies of "alternative futures". There is not just one future, but many alternative ones. CLA can be seen as belonging to the "critical futures" tradition, and it also shares many traits with the "integral futures" approach. Both traditions are often used in Australia.

The CLA game is one application of CLA in a workshop context. Typically, CLA workshops are conducted in four tables or groups corresponding to the four layers respectively. Communication flows between all layers, back and forth in iterative turns (Inayatullah 2015). This "original" CLA game model proceeds from choosing a topic to the headline provided by the litany group as a result of their discussions. Then the back-and-forth interaction takes place between groups, formed from the three other layers: system view, stakeholder viewpoint/worldviews, and metaphors. The outcome from such a game session is a new litany based on the discussion in and between the groups. Our novel use of CLA game method will be discussed in the next chapter.

4. Testing and elaborating scenarios through serious gaming

4.1 Neo-Carbon Energy project and transformative energy scenarios 2050

The aim of the CLA game was to elaborate on and experiment with four transformational scenarios that are being developed in Neo-Carbon Energy research project, by applying particular methods within Inayatullah's causal layered analysis approach. The research project proposes a new emission-free energy solution based on renewable energy technologies, mainly solar and wind energy. In the future energy system, solar and wind

technologies produce electricity that – in combination with carbon dioxide (CO_2) and hydrogen (H_2) – could also be used as feedstock to produce synthetic chemicals and materials. The society as a whole would be affected by a new, increasingly distributed production system. Furthermore, fossil fuel based materials could be replaced with materials that are created from renewable energy.

In the futures-oriented part ("Neo-Carbon Enabling Neo-Growth Society – Transformative Scenarios 2050") of the project, conducted at Finland Futures Research Centre, CLA Game is one of several foresight methods used to explore potential economic, political, cultural and social changes that might result from a new energy world. The aim is not to predict, but to explore different types of energy worlds and pathways towards them. As part of the project, four *transformative scenarios* (Dator 2009) until the year 2050 were sketched – to explore changes potentially radical in their magnitude. Such ethos includes taking into account the views of different actors and stakeholders. Therefore, the gaming session was designed to test the scenarios so that insights from participants as results could be used to add depth to the scenarios. A similar type of approach has been conducted by Miller et al. (2015) who showcase the potential of scenario narratives and storytelling in their study of Arizona energy futures over a two-day workshop.

Each of these scenarios depicts energy futures in the year 2050, in different types of possible societies. In a transformed world that uses mainly distributed renewable energy, society has re-organised into peer-to-peer networks instead of past hierarchies – either within or outside existing organisations. Ecological awareness is manifested either in the spirit of deep ecology – or in more pragmatic fashion. *Figure 1* illustrates the two axes of the scenarios as a basis this of these future worlds.

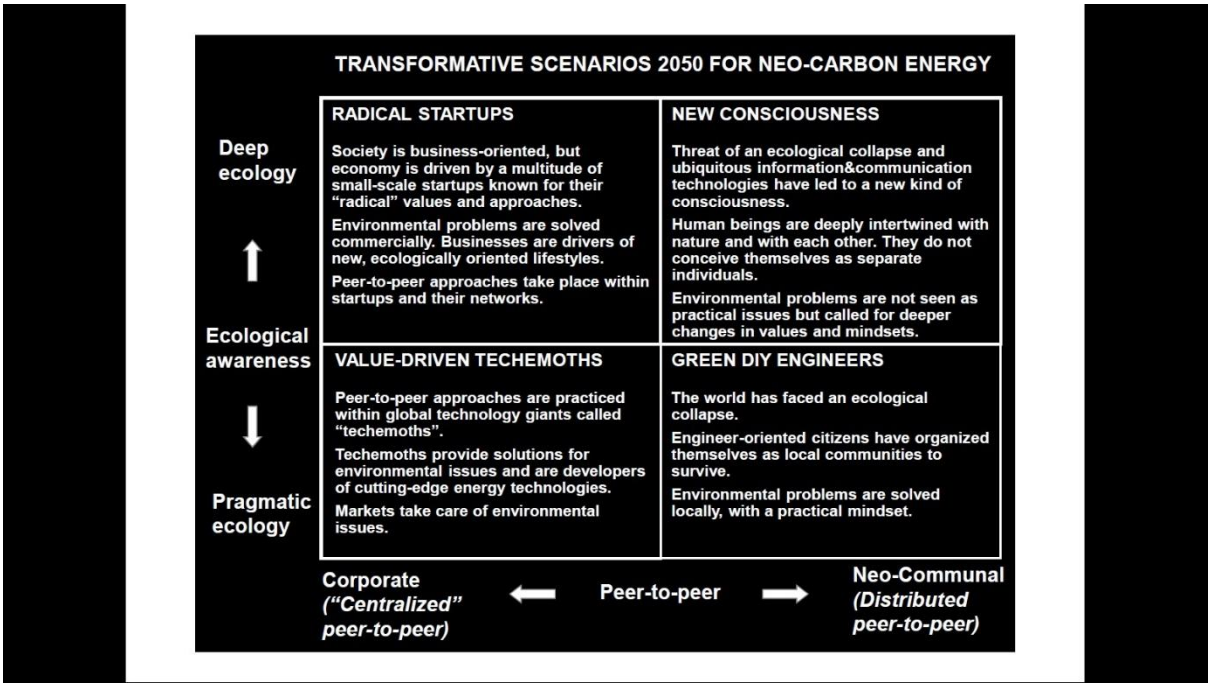

Figure 3: Four transformative scenarios 2050 of the Neo-Carbon Energy project. KORVAA TÄMÄ KUVAAJA

Scenario 1: "Radical Startups" (deep ecology, a corporate-driven peer-to-peer society)

In the Radical Startups scenario, the economy is driven by a multitude of small-scale startups known for their "radical" values and approaches. Businesses are drivers of new, deep-ecologically oriented lifestyles as well as new work practices that emphasise bottom-up approaches and self-expression. Environmental problems are solved first and foremost commercially. Society is business-oriented, but the selling point of startups to the society is their promise to do societal and environmental good.

Scenario 2: "Value-driven Techemoths" (pragmatic ecology, a corporate-driven peer-to-peer society)

The peer-to-peer ethos is manifested in particular within large technology giants that are also coined as "techemoths". Techemoths invest in ambitious energy & technology projects and markets are assumed to resolve environmental issues. Value-driven techemoths represent the Silicon Valley values of emancipation, creativity and open source. Their vision is, however, somewhat self-contradictory. Techemoths cherish the "libertarian" hacker mentality, but at the same time confine their employees tightly inside corporate walls. Others in the society could be left outside.

Scenario 3: "Green DIY Engineers" (pragmatic ecology, a neo-communal society)

In the Green DIY Engineers scenario, the world has faced an ecological collapse. Therefore, engineer-oriented citizens have organized themselves as local communities to survive. Environmental problems are solved locally, with a practical mindset. Nation-states and national cultures have more or less withered away. Because global trade has plummeted, communities have to cope with mostly low-tech solutions.

Scenario 4: "New Consciousness" (deep ecology, a neo-communal society)

An ecological crisis, "World War III" and ubiquitous information and communication technologies have given birth to an entirely new kind of consciousness and worldview. Values of deep ecology have become the norm. People do not conceive themselves as separate individuals. Instead, they are deeply intertwined with other humans and conceive themselves as parts of nature. Societal issues and phenomena are understood from a systems-oriented worldview, in which "everything connected to everything else". As parts of a single, global system, society is organised as an open global collaboration through the sharing of resources and information.

4.2 CLA Game – Causal Layered Analysis on energy futures

In practical terms, the CLA Game session advanced through seven phases: *i)* forming of groups, introductory phase and practical briefing, *ii)* analysis of litany level, *iii)* analysis of systemic level and social causes, *iv)* identification of an ally and an enemy *v)* formulation of metaphors, and *vii)* a debriefing in large group. The course of the game was thus considerably more consecutive than Inayatullah's model where there is continuous moving back and forth between the CLA layers (Inayatullah 2015a).

I. Introductory phase and practical briefing.

The session started with a short presentation of the CLA method to the participants, followed by an introduction to this particular CLA game and the project's scenarios. In this exercise, the participants – who represented diverse age groups, nationalities, cultures and organizations – were speakers and participants at an academic conference on futures studies. Therefore many, although not all, of them were familiar with the CLA method. This is different from Debbie Terranova's (2015, 374) application of CLA, where participants were not informed of the CLA methodology. The fact that participants were familiar with futures research methods was beneficial because they could start the process quicker without having to learn all of the basics. A potential downside is that participants familiar with different futures methodologies may have strong views and even prejudices about them.

The participants were divided into five groups according to the four transformative scenarios (*"Radical Startups", "Value-based Techemoths", "Green DIY Engineers"* and *"New Consciousness"*). As an outcome of the high number of participants, two groups were formed for the "New Consciousness" scenario and one group for each of the other three other scenarios (Radical Startups, Value-Driven Techemoths and Green DIY Engineers). This is where this gaming set up was different from typical CLA Gaming exercises, where participants would have been divided into groups according to the four CLA layers.

As preparations to the Causal Layered Analysis (CLA) Game, each group was given three items, in accordance with Inayatullah's CLA logic. A *litany* for their scenario was given in the form of a front page of a future newspaper, *a large sheet of paper* with a PESTEC Table (Political, Economic, Social, Technological, Ecological, Cultural/Customer/Citizen) that had one item added for each row beforehand to analyse the systemic causes in a scenario, and *a stack of role cards*, where each card depicted a different type of a character who might exist in the scenario to represent the worldview and the metaphor layers.

II. Litany level.

The situation in the scenarios was located in the future, and so were the participants. The litany of their scenario was presented as a concise newspaper article from the future. Unique for each scenario, for example the journal headline for the Green DIY Engineers group was "DIY Engineers Fix It" and the one for New Consciousness group was "We the Post-Humans".

Figure 4: Litany level – Front pages of a future newspaper for each of the each scenario 2050 were prepared prior to the gaming session as material to the participants.

III. Systemic level and social causes.

The systemic level in the scenario was analysed with the help of a PESTEC table. In PESTEC, the group members generate elements to a PESTEC table to explain what political, economic, social, technological, ecological or cultural factors prevail in the future scenario in the year 2050, or could have enabled achieving such a societal state. One cause was pre-written into each group's scenario PESTEC to help the groups' work as an example, after which the participants were asked to individually create new systemic causes on all the six PESTEC dimensions. For example Terranova (2015, 375) has used a similar type of an approach.

With the help of writing individually on post-it notes, the group members are forced to justify and explain their reasoning. As a positive factor, this creates social interaction in the process between the group members. Problematically, this phase is prone to group psychology and caveats of group thinking. If other group members' explanations in the PESTEC begin to shape a systemic logic, certain participants may implicitly drop out some alternative suggestions that nonetheless could have been interesting. It is beneficial to instruct each participant to contribute a minimum number of causes to the table. It is equally important for the players to write sentences as a whole – otherwise their contributions will be difficult – if not impossible – to interpret after the game.

ADD HERE SAMPLE

Figure 5: Systemic level and social causes – PESTEC Table. Example of

IV. Assuming roles – and identifying an ally and an enemy

The participants in each group can choose from a set of pre-defined roles for the scenario (Figure 6) or invent a role they prefer to play. The pre-defined roles were designed to include actors that at first glance are likely to view the Neo-Carbon scenarios either positively or negatively, but participants are ultimately free to choose how they enact those roles based on their own imaginings of what the overall scenario is like and how their role would interact with it. The role cards of the CLA game serve as a key element through which participants become investigators of the underlying dynamics and metaphors of the given scenarios.

Figure 6: Role cards for the group New Consciousness.

In games with roles, players may choose the one most similar to themselves or a role very different from who they are in real life. The CLA game offers participants a similar opportunity. Playing as these roles, participants investigate latent conflicts between their roles and the overall scenario as well as between their roles and the other roles of the group members.

Using the role cards was used to shed light on some of the potential tensions that might prevail in different kinds of future worlds. This can be used to highlight power shifts related to transformative change. In a certain type of a future and on the way towards it, certain actors might thrive, while others might feel threatened by a certain course of action.

The CLA game could be defined as mixed-motive multi-person game (Kelly 2003, 1−2; 151), since the mutuality of the interests between different pairings of participants/ players vary a lot according to the identified enemies and allies. Through the observation of these positions and relationships, the balance of power and the dynamics of decision-making as a factor defining the alternative futures could be employed.

illustrates the social network analysis. In the chosen example, Figure 5 showcases the allies and enemies of a group that worked on the scenario "Radical Startups". A green arrow signifies an ally chosen by a player in the game, while a red arrow refers to an identified enemy. Grey boxes illustrate allies or enemies that were identified outside of the group member roles.

VI. Metaphors.

The final and fourth layer of causal layered analysis is a consideration of the significance of metaphors. The players invented metaphors that were meant to illustrate how their character would perceive the scenario. This was explored visited by participants in their roles. This step was taken after reflections and discussions on what is motivating or threatening to their roles and who in the scenario is best ally or worst enemy. Groups were also asked to work together to select or create a metaphor that best described the entire scenario. Through these two processes, both a plurality of differing perspectives and a dominant metaphor were generated by the participants for their assigned scenarios.

Figure 7: Metaphors of Group 2 Value-Driven Techemoths. Photo: http://www.designeruncovered.com/penthouse-pads-luxury-sky-living/

VII. Debriefing and cross-fertilization. The cross-fertilizing phase of the game is important for learning and evaluation of the gaming process. When each group presented their work, they did so as vividly as possible to describe their future from their characters' point of view, and to 'sell' their scenarios to the other groups. Other groups would comment each other's scenarios and the presentation, often staying in their respective characters of their own scenario. At this stage, already immersed to the gaming and inside their roles, this wrap up phase can be highly interactive. This led to a back-and-forth discussion between the scenarios, which can reveal additional and unexpected insights.

4.3 Results

The importance of narrative for energy systems transformation has been argued (see e.g. Miller et al. 2015), but more rarely in conjunction to gaming. In our case, the context of this particular CLA game was using it as a module embedded in a broader research framework, which made it motivating and educative for the organisers as well as participants alike.

Scenario description and litanies gave the platform for players to become immersed into the future. An analysis of systemic causes enables The role play illustrated the aspect of

worldviews and how a future world might look and feel like for a particular type of a character, different of today, and personal metaphors are a useful tool to epitomize these sentiments.

Together, this enables the examination of an entire scenario logic and opens up perspectives towards better understanding a system.

In terms of the systemic causes, social network analysis allows the identification of leverage points (Meadows 2008). For instance, the enemies and allies that were identified in the CLA Game can be illustrated as partnership dynamic schemas, as described in Figure 8.

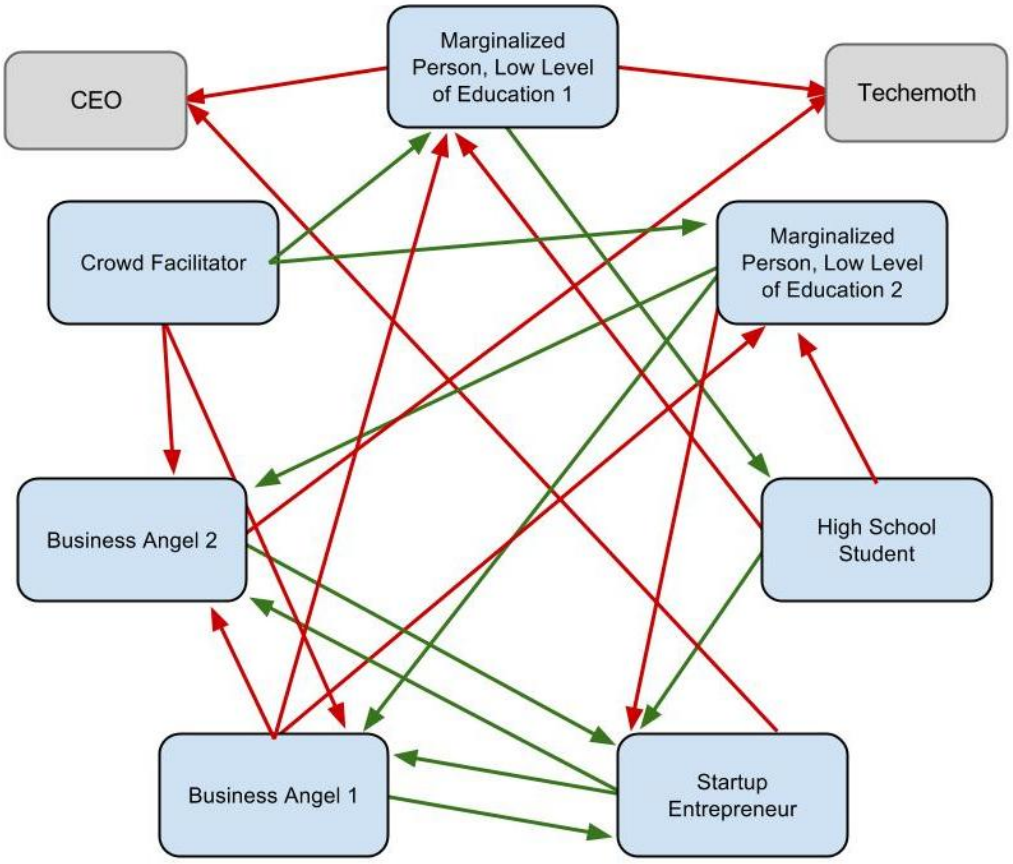

Figure 8: Social network analysis. Green arrows are pointing to allies, red arrows toward enemies the participants identified during the Game. Group 1 worked with the Radical Startups scenario.

The strength of this type of a CLA game is that participants enter a state of play to find insights into what is occurring in a foresight effort, and explore its assumptions deeply. Their findings may reveal, for instance, if strategy contradicts the underlying metaphor or if some stakeholders resist a particular image of the future (Inayatullah 2015b, 232).

Through the interactive CLA game process across its four layers, these scenarios were "deconstructed" and "reconstructed".

Our particular approach had some evident limitations. Time is always a constraint, and in this case a three-and-half-hour conference workshop was a strict schedule. Because the purpose of the gaming was to deepen and examine the scenarios, the main insights generated were related to the dynamics of how the dynamics of a future society might be, the assumptions and the logic of the energy futures were not questioned. In a multicultural setting such as ours, specific attention and facilitation needs to be paid to culture and language that can be overcome with careful instructions and preparation.

The result was new insights that emerged from guided questioning in a set scene and an immersing of into the building blocks of the scenarios and energy futures. Key actors in each scenario were played as roles in the game, and their relations are analysed using social network theory and systems thinking to identify leverage points in the systemic layer. The outcomes will be used for elaborating the scenario work. They also form the basis for making recommendations for further developing this specifically modified combination of scenario construction and CLA game.

5. Discussion and suggestions for further steps in developing CLA Game

The aim of the novel modification of the CLA game was to use the method as a testbed for elaborating and deepening the scenarios of the Neo-Carbon Energy project. The focus in our CLA Game was in the actors who may enable transformative changes. We wanted to lay out a more vivid picture of some of the actors in each scenario, their social relations and positions in the scenario world − to depict different worldviews within scenarios. Moreover, the game was an effort to work out the scenarios by collectively mapping out social causes behind each scenario. Finally, each participant came up with a metaphor that captures the essence of the given scenarios − to illuminate the mythic layers of the scenarios. The metaphors were a powerful element in the narratives.

The game was conducted on a very tight schedule, during two workshop sessions with an overall duration of three hours only. This time slot included the introductory presentation as well as the debriefing. Due to the short timeframe and because the intention was to elaborate on existing scenario drafts, litany headlines were written in advance by the organizing team. The fact that the scenarios and the litany were pre-given somewhat limited the freedom of the participants to imagine alternative futures, but it also provided the session with more focus and it was justified given the tight schedule.

While drawing on the idea and descriptions of the CLA game in the literature (Inayatullah, 2015a; Terranova, 2015), the conduct of the game was largely adapted and modified by the organizing team at FFRC. Therefore, the CLA game session acted as a real pilot: according to our knowledge, this form of CLA game had not been attempted before.

The justification for having groups according to scenarios rather than CLA layers was the following. First of all, the number of participants was too large to function as one collective game group. Consequently, it was deemed as appropriate and necessary to form small groups, the number of participants not exceeding seven as has been found out to be the optimal size

of work group (Heinonen & Ruotsalainen 2013). The organizing team first considered having one small group for each CLA layer, and then each group would cover all the scenarios. This was deemed undesirable because then the linkages between the different CLA layers could not be discussed within the small groups. Another possibility would have been to include small groups per scenario with one or two participants representing one CLA layer. However, this would have made the structure overly complicated. Moreover, in both of the mentioned solutions, the roleplaying aspect would have been lost. The final structure was seen as a good compromise, especially since one of the aims was to produce more material for the system layer by using PESTEC tables. The game also benefited from the final stage where the scenarios could 'discuss' with each other through the group presentations and the comments that were made in character roles. This added argumentation from various points of views and actor background to the original scenario descriptions.

The CLA game session confirmed the fact that Causal Layered Analysis is a versatile method that can be adapted to different practical aims, even in the form of a game. A key question for analysis is what kind of added value is achieved through the game. In this case, it was used to elaborate on existing scenario drafts by incorporating points of view that emerge from a game session. Thus, CLA is proven to allow for methodological innovation, i.e. it is a structured by an emergent methodology. The value in this game came from stakeholders embodying the worldviews of core archetypes within the scenarios. This allowed the scenario process to identify disowned perspectives (scenarios as deconstructed pointed to the disowned).

The benefit of the CLA Game is that the groups' interactions reveal certain implicit causalities or conflicting goals that otherwise might be difficult to conceptualise with the use of more conventional analytical tools such as a scenario-building within futures studies or policy analysis for the typical purpose of supporting decision-making. Therefore, based on our experience in the developing team, it may be stated that CLA Game can be used as one tool to analyse the quality of the scenario work. Because all the four Neo-Carbon Energy scenarios are purposed to be transformative by nature, the CLA Game is an evaluative tool to test their quality – are they really transformative or transformative enough − and the ability to achieve their stated objective.

In this particular case, the research to which the game participants were contributing to, investigates what different pathways might enable future societies to run on renewable energies. What is more, the futures research part of the Neo-Carbon Energy research project seeks to identify and better understand how such pathways could be attained. Now, by looking at some of the findings of the game, it can be observed how certain scenarios seem to be able to grasp a more serious level of transformation than other scenarios. Or at least they evoke different types of reactions in the game participants, when they are attempting to envision their future world.

Accordingly, in Group 1 on "Radical Startups" the view from big capital − control and dominate − was challenging the entrepreneurs and the community values group. In Group 2 on "Value-Driven Techemoths" the view from the underground anti-corporate hacker, the criminal came out − how to defend against those who seek to undermine a neo-growth system. In Group 3 on "Green DIY Engineers" the view from efficiency − economies of scale

with the community scenario and the entrepreneur scenario − are they able to scale. In Group 4 on "New Consciousness" somewhat surprisingly the new consciousness groups did not challenge big capital, seeing them as the norm. In Group 5 on "New Consciousness" the integrated view was that of consciousness interwoven with technology and resource-based sharing economy.

Two scenarios assume a worldview of pragmatic ecology, and in these scenarios it seemed that the participants have some doubts about the ability of corporations to actually push for the envisioned change when they operate solely under the market logic. This was true especially for the Value-Driven Techemoths scenario that envisions market-driven solutions for an energy transformation. Related questions were posed of how states may assume a balanced role in supporting large companies in their endeavours while securing the well-being and flourishing of their citizens. In turn, the group that analysed the Radical Startups scenario recognized the old large companies as potential enemies that represent the old economy. Finally, the Green DIY Engineers group imagined that the actions of corporations will drive a climate change disaster.

This would suggest at least two things. Firstly, in order for companies to champion transformative change, they may have to do a lot more than what many people currently perceive them being capable of. Secondly, the role of alternative approaches and new business models, such as impact investing or social entrepreneurship, could prove interesting mediating tools to mitigate at least some of the mismatches between the expectations of citizens and the reality of how the world currently works. What is more, such examples could actually motivate certain companies to aspire to prove their true value.

The New Consciousness scenario, as interpreted by the groups, seems to have evoked sentiments of a transformation, which is either driven by a mindset and value shift for consciousness and/or fueled by the increasing omnipresence of technologies.

It could also be emphasized that a profound transformation seems increasingly attainable, when the standards for ecological thinking are high. What the groups did not have time to further elaborate, was an examination of what models can support the coexistence of an ecologically and socially motivated consciousness as well as ubiquitous information and communication technologies (ICTs). For example, if a virtual economy or a sharing economy characterised the economic relations of our future societies, it should be known what the impacts of such an economic system are to the ecology. Therefore, the game also revealed that a study of the role of the so-called rebound effect deserves further study for all of the four scenarios.

Another powerful part in the CLA game process was the metaphors that were generated in each group, reflecting the scenarios given, but created from the point of view of adopted roles that were played. The use of metaphors is part of a narrative approach, which can provide insights that inform policy questions (Strachan & Foxon 2012, 75). Metaphors are both informative and revealing by their influential nature. If metaphors indeed influence the worldview, systems, and litanies of our world, the metaphor selections of the participants indicate how various types of actors would engage in the scenarios. It should be noted that these metaphors were developed by individuals who are almost inevitably influenced by their

own frames of reference and mental models that are presently available. The actual people of the year 2050 may have completely new metaphors to draw upon as they try to comprehend and thrive in their worlds. Despite their present-cast limitations, the metaphors generated during the CLA game offer valuable insight to the Neo-Carbon Energy scenarios, especially when inverted with an aim of heightening the transformative qualities of the scenarios. For example, the Secular Dissident in "New Consciousness" can become an agent of transformation, if his metaphor is changed from "[Downward] Spiral" to a positive and aspirational image such as "All Earth's Species United". Another example can be found in the Techemoth Employee in "Value-Driven Techemoths" whose "Luxury Isolation in a Penthouse Skyscraper" becomes a contributor to transformation, if it is changed to "All of Society Sharing in Abundance".

These inversions of metaphors may be a key toward modeling how the anticipated actors in the Neo-Carbon scenarios shape changes required to make their transformational futures possible. The process of metaphor inversion can also be applied to present day actors such as company employees, teachers, government officials, startup founders, investors, and others. The key question is: "How the metaphors of individual actors could be changed so that these actors help shape a transformational Neo-Carbon Energy future for Finland and our world?"

6. Conclusions

As Henrichs (2007) and Wodek & Neale (2015) point out it is difficult not only to find a standard recipe for success in developing scenarios, but equally hard to measure success in terms of results. Here, we might conclude that the CLA game experiment was successful in testing the transformational scenarios at least in two ways. First, the participants were able to generate relevant and thought-provoking metaphors and causal dynamics for the neo-carbon energy scenarios. They made the scenarios interact with each other. Second, the game aroused a lot of interest in advance and also generated interest in the results. The game form for testing scenarios was proven useful and fun at the same time. With a critical note it can be asked whether the efforts invested in the game experimentation are worthwhile. Constructing scenarios is a demanding process, making a CLA analysis of scenarios is time consuming, and the game experiment with scenarios and CLA is a triple effort.

In assessing the outcome of the game experiment we must bear in mind that this gaming session was organised in a futures research conference and most participants were already familiar with the CLA method and futures research. A gaming session similar to the one described in this article could be adapted to deliberate energy futures with a number of other target groups from citizens whose localities could be affected by technological development to students, business leaders or policy-makers.

Miller et al. (2015) express their worry of the deep unclarity regarding the emissions-levels of future energy systems. By combining CLA as a qualitative method with quantitative assessments about emissions pathways, policy relevance of such gaming exercises could be increased. Another type of gaming session could specifically focus on alternative viewpoints such as assess related environmental impacts and risks.

In future adaptations of the CLA game, the process could be improved by increasing the immersion of participants in the alternative futures. For instance, the facilitator could read the litany out loud as a news report to highlight the vivid details that evoke the core of a particular scenario. If time permits, participants could instead perform the litany as a newscast.

The CLA game reported here was an experimental process. It is in our intention to pursue developing the concept according to the analysis and results. The game is planned to be continued virtually together with those participants of this experimental CLA game session who are willing to collaborate and thus will be regarded as co-developers of the game. A similar CLA game session, as documented in this report, can be conducted on some appropriate occasion in the future by using the same structure or varying it with some new modifications, to go deeper into the interaction between different CLA layers.

Finally, the notion was accentuated that scenarios are not just an analytic exercise but they need to convince others of why their future is the most compelling. This relates experimental and game-based futuring to Bell's and Flechtheim's normative approach in futures studies. According to Amara's third principle we can have an impact on the future; while based on Bell's view, we can advocate a specific future. These two lines of thinking combined reflect the claim by Dator that the main task of futures studies is to empower social change. (Amara 1981; Bell 1997; Dator 2009; Flechtheim 1970.) Serious gaming, such as this experiment with CLA game modification on Neo-Carbon Energy scenarios may contribute to this task by liberating our thinking about alternative futures. From deconstructing we can get energy for making a quantum leap towards the reconstruction of preferred futures. In its ideal form this kind of a scenario game experiment and dissemination of its results can be a vehicle for supporting decision-making in energy transition both in the public and private sector. As Miller et al 2015 point out a scenario workshop provides a learning experience in envisioning and deliberating energy futures – this is ultimately the case with our CLA game experiment as well.

REFERENCES

Amara, Roy (1981). The futures field: searching for definitions and boundaries The Futurist, 15(1), 25-29.

Bell, Wendell (1997). Foundations of Futures Studies. Human Science for a New Era. Volume 1: History, Purposes, and Knowledge. London.

Cornish, Edward (2004). Futuring: The Exploration of the Future. Bethesda, Maryland: World Futures Society.

Dator, James (2009). Alternative futures at the Manoa School. Journal of Futures Studies, 14:1−18.

Derrida, Jacques (1997). Of Grammatology. Baltimore: Johns Hopkins University Press.

Flechtheim Ossip K. (1970). Futurologie − Der Kampf um die Zukunft. Köln: Wissenschaft und Politik.

Foucault, Michel (2002). Archaeology of Knowledge. Routledge classics. London: Routledge.

Glenn, Jerome & Gordon, Theodore (2009). Futures Research Methodology V. 3.0. Millennium Project, CD. Washington D.C. http://www.millennium-project.org/millennium/FRM-V3.html

Heinonen, Sirkka (2000) Prometheus Revisited – Human Interaction with Nature through Technology in Seneca. Doctoral dissertation. Helsinki University. Commentationes Humanarum Litterarum Vol. 115, the Finnish Society of Sciences and Letters, 232 C

Heinonen, Sirkka & Balcom Raleigh, Nicolas (2015). Continuous Transformation and Neo-Carbon Energy Scenarios. FFRC eBOOK 10/2015. Finland Futures Research Centre, University of Turku, Turku, 69 p. https://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Sivut/home.aspx

Heinonen, S. and Ruotsalainen, J. (2013a). Energy Futures 2030: Towards the Neo-Growth Paradigm of the Sixth-Wave Era. FFRC e-Book 1/2013, Finland Futures Research Cen-tre, http://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Documents/eBook_2013-1.pdf

Heinonen, S. & Ruotsalainen, J. Futures Clinique − method for promoting futures learning and provoking radical futures. European Journal of Futures Research (2013) 15:7, DOI 10.1007/s40309-013-0007-4, 11 p.

Heinonen, Sirkka & Hiltunen, Elina (2012). Creative Foresight Space and the Futures Window: Using Visual Weak Signals to Enhance Anticipation and Innovation. Futures, vol. 44, 248−256.

Heinonen, Sirkka, Karjalainen, Joni & Ruotsalainen, Juho (2015). Towards the third industrial revolution. Neo-Carbon Energy Project Futures Clinique I "Creating the third industrial revolution". FFRC eBook 6/2015. Finland Futures Research Centre, University of Turku, 74 p. https://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Sivut/home.aspx

Henrichs, T. (2007). Environmental scenario analysis: course book. Roskilde: Partnership for European Environmental Research.

Inayatullah, S. (2015a). The Continued Evolution of the Use of CLA: Using practice to trans-form in S. Inayatullah & I. Milojevic (eds.) CLA 2.0: Transformative research in theory and practice (pp. 13–21). Tamkang University Press.

Inayatullah, Sohail (2015b). What Works: Case Studies in the Practice of Foresight. Tamsui: Tamkang University Press, 249 p.

Inayatullah, Sohail (2008). Six pillars: Futures thinking for transforming. Foresight, 10(1), 4−21.

Inayatullah, Sohail (2004a). Causal Layered Analysis: Theory, historical context, and case stud-ies. In S. Inayatullah (Ed.). The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Integrative and Transformative Methodology (pp. 1−52). Tamsui: Tamkang University Press.

Inayatullah, Sohail (2004b). Appendix: The causal layered analysis pyramid. In S. Inayatullah (Ed.). The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Inte-grative and Transformative Methodology (p. 543). Tamsui: Tamkang University Press.

Inayatullah, Sohail (1998). Causal layered analysis: poststructuralism as method. Futures, 30(8), 815–829. Retrieved from http://www.sciencedirect.com/science/article/

pii/S001632879800086X

Inayatullah, Sohail & Milojevic, I (eds.) (2015). CLA 2.0: Transformative Research in Theory and Practice, Tamsui: Tamkang University Press.

Karjalainen, Joni, Käkönen, Mira, Luukkanen, Jyrki and Vehmas, Jarmo (2014). Energy scenarios in the climate change era, FFRC eBook 3/2014, University of Turku: Finland Fu-tures Research Centre.

Kelly, A. (2003). Decision Making using Game Theory: An Introduction to Managers. West Nyack, NY: Cambridge University Press. ProQuest ebrary. Web. 14 October 2015.

Leponiemi, Lauri, Taylor, Amos and Heinonen, Sirkka (2014). Beware of the Used Futures − Sohail Inayatullah Highlighting the Best Foresight Practices. Special Conference Edition of the Finland Futures Research Centre's Newsletter, p. 6.
http://www.utu.fi/en/units/ffrc/Documents/Futuuri_special-issue_2014-web.pdf

Lombardo, Thomas (2008). Contemporary Futurist Thought. Bloomington, IN: AuthorHouse.

Lund, Henrik (2014). Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions, Academic Press 2nd Edition.

Malaska, Pentti (2010). A More Innovative Direction Has Been Ignored. In: Understanding Ne-ogrowth − An Invitation to Sustainable Productivity. TeliaSonera Finland Plc. Helsinki, p. 200-210.
http://www.sonera.fi/media/13069ab55806de22e8955bc2a3f1afeab17b28bd/Understanding_Neogrowth.pdf

Meadows, Donella (2008). Thinking in Systems. White River Junction, Vermont: Chelsea Green Publishing.

Miller Clark A., Jason O'Leary, Elisabeth Graffy, Ellen B. Stechel, Gary Dirks, Narrative futures and the governance of energy transitions, Futures, Volume 70, June 2015, Pages 65-74, ISSN 0016-3287, http://dx.doi.org/10.1016/j.futures.2014.12.001.

Minkkinen, Matti (2013). Images of the future of privacy: A privacy dynamics framework and a causal layered analysis of ideal types. Master's thesis in Futures Studies. University of Turku, Turku School of Economics. Retrieved 15 January 2016 from http://urn.fi/URN:NBN:fi-fe2014091644724

Myerson, R.B. (1991). Game Theory: Analysis of Conflict. Cambridge, Massachusetts: Harvard University Press.

Rifkin, Jeremy (2011). Third Industrial Revolution: How Lateral Power Is Transforming Energy, the Economy, and the World. New York: Palgrave MacMillan

Schwartz, Peter (1996). The Art of the Long View: Paths to Strategic Insight for Yourself and Your Company. New York: Currency Doubleday.

Slaughter, Richard (2008). What difference does 'integral' make? Futures, 40(2), 120–137.

Slaughter, Richard (2004). Beyond the Mundane: Reconciling Breadth and Depth in Futures Enquiry. In S. Inayatullah (Ed.). The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Integrative and Transformative Methodology (pp. 147–161). Tamsui: Tamkang University Press.

Slaughter, R. (2002). Critical futures study as an educational strategy. In R. Slaughter (Ed.) New Thinking for a New Millennium: The Knowledge Base of Futures Studies (pp. 137–154). London: Routledge.

Strachan, Neil & Foxon, Timothy J. (2012). A Low-Carbon Transition. In: Herring, H. (ed.). Liv-ing in A low-Carbon Society 2050. Energy, Climate and the Environment Series. Lon-don, 75−81.

Terranova, D. (2015). Causal Layered Analysis in Action: Case studies from an HR practition-er's perspective. In S. Inayatullah & I. Milojevic (Eds.), CLA 2.0: Transformative re-search in theory and practice (pp. 371−384). Tamsui: Tamkang University Press.

Wangel, Josephine (2011). Change by whom? Four ways of adding actors and governance in backcasting studies. Futures 43(8): 880−889.

Wodak, Josh & Nealy, Timothy (2015). A Critical Review of the Application of environmental scenario exercises. Technological Forecasting & Social Change. Futures 73 (2015) 176-186.

Wright, D. L. (2002). Applying Foucault to a future-oriented layered analysis in a post-bubble Japanese community. Futures, 34(6), 523−534. Retrieved from http://www.sciencedirect.com/science/article/pii/S0016328701000787