NEO-CARBON ENERGY AT "FUTURES STUDIES TACKLING WICKED PROBLEMS" INTERNATIONAL CONFERENCE

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FINLAND FUTURES RESEARCH CENTRE (FFRC) – AUGUST 2015

NEO CARBON ENERGY

VTT

LUT Lappeenranta University of Technology

Turun yliopisto University of Turku

FINLAND FUTURES RESEARCH CENTRE

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INTRODUCTION

This is a report of the NEO-CARBON Energy project contributions at the "Futures Studies Tackling Wicked Problems Conference" held June 11-12, 2015 at Turku School of Economics in Turku, Finland. The NEO-CARBON Energy project is funded by Tekes new strategic openings programme and carried out in collaboration between Finland Futures Research Centre, University of Turku, Technical Research Centre of Finland VTT Ltd (co-ordinator), and Lappeenranta University of Technology (LUT).[1] The Conference was an annual conference organised by Finland Futures Research Centre (FFRC), University of Turku, in co-operation with the World Futures Studies Federation (WFSF) and the Finnish Society for Futures Studies. The NEO-CARBON Energy project engaged the international futures studies community by way of multiple presentations, chairing of sessions, an experimental foresight game workshop, and a poster. The conference was attended by 260 people from 33 different countries.
The ten instances of NEO-CARBON ENERGY at the conference were:

1. "The Neo-Carbon Energy project: Futures research in engineering future energy system" at the poster session with Pasi Peltoniemi
2. "Conscious Technology: Can we envision the future we want while we still have time to shape it?" by Jerome Glenn & Sirkka Heinonen
3. "Pathways towards long-term sustainability of the Finnish energy system" by Michael Child & Christian Breyer
4. "Futures thinking and strategy transformation, CAUSAL LAYERED ANALYSIS Game Session" by Sohail Inayatullah
5. "A CLA game on neo-carbon energy scenarios in action learning" by Sohail Inayatullah, Sirkka Heinonen & Matti Minkkinen
6. "Practical Guide to Using Causal Layered Analysis in Qualitative Futures Studies" by Matti Minkkinen and Petri Tapio
7. "New consciousness: A societal and energetic vision for rebalancing humankind within the limits of planet earth" by Christian Breyer, Sirkka Heinonen & Juho Ruotsalainen
8. "Reverse engineering the state machinery for low-carbon public policy" by Joni Karjalainen
9. Initial findings of the Millennium Project Future of Work 2050 Real-Time Delphi study at Foresight Friday by Jerome Glenn
10. "New Consciousness in Transformational Neo-Growth Society" keynote speech by Sirkka Heinonen

These appearances of the NEO-CARBON PROJECT at Futures Conference 2015 are briefly described in the following pages.

[1] See www.neocarbonenergy.fi and http://www.utu.fi/en/units/ffrc/research/projects/energy/Pages/neo-fore.aspx

1. "THE NEO-CARBON ENERGY PROJECT: FUTURES RESEARCH IN ENGINEERING FUTURE ENERGY SYSTEM" AT THE POSTER SESSION

PRESENTED BY PASI PELTONIEMI

Figure 1. Pasi Peltoniemi presented the NEO-CARBON ENERGY poster at the conference poster session on Thursday, 11 June 2015. Photo: Nick Balcom Raleigh / FFRC.

CONFERENCE ABSTRACT

The Neo-Carbon Energy project is Finland's so far largest renewable energy project. It incorporates futures research with the technological design and modelling of future energy system. Future energy system is understood as a completely renewable energy system mainly based on solar and wind power. The future system with variable production and energy storages is technologically modelled on system and on process level by energy experts. In futures research the aim is to construct scenarios for the Neo-Carbon Energy world in 2050. Energy solutions, cultures, values and business practices vary from scenario to scenario. Merging the scenarios with engineering visions for the system, technology, policy, market and finance futures development paths can be sketched. These can be used for strategy development and building resilience to the third industrial revolution. Four transformative scenarios were developed: i) Radical start-ups where society is business-oriented, but economy is driven by a multitude of small-scale start-ups known for their radical values and approaches. ii) New consciousness where deep ecological values and distributed models have led to altogether new kind of consciousness and worldview. iii) Value-oriented "Techemoths" where peer-to-peer approaches are common, but they are practiced in more or less traditional organisations. iv) Green DIY Engineers where engineer-oriented citizens have organized themselves as local communities. The scenario sketches have been formed using two axes: Peer-to-peer and Ecological awareness.

Key words: Renewable energy, wind power, solar power, energy storage, energy system

HIGHLIGHTS

- The NEO-CARBON ENERGY poster explains the goals, components, and timeline of the NEO-ENERGY research project.
- It features the logo, the motto "Trust in Renewables," and the program's three key points Emission Free, Cost-Effective, and Affordable.
- The poster indicates wind, solar, and storage are technologies of interest in this project.
- Key figures regarding the research project including number of partners, timeline, and budget.

POSTER DETAIL

Figure 2. The NEO-CARBON ENERGY poster had a prominent placement in the poster session. Photo: FFRC.

VIDEO

Pasi Peltoniemi presenting NEO-CARBON ENERGY
https://sites.google.com/site/futuremediac/videos--presentations

2. CONSCIOUS TECHNOLOGY: CAN WE ENVISION THE FUTURE WE WANT WHILE WE STILL HAVE TIME TO SHAPE IT? AT SESSION 2 - STUDIES ON FUTURES RESEARCH I: TECHNOLOGY AND FORESIGHT

PRESENTED BY JEROME GLENN AND SIRKKA HEINONEN

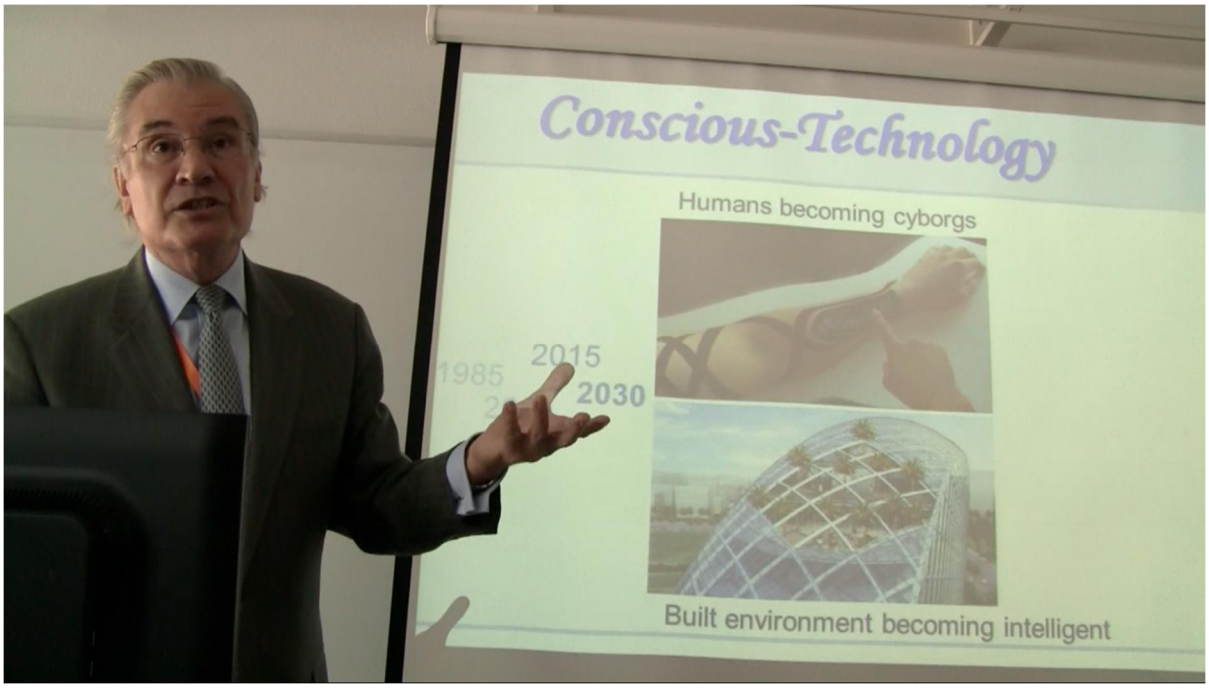

Figure 3. Jerome Glenn, CEO and co-founder of the Millennium Project, described possibilities for the merger of technology with humans. Photo: FFRC

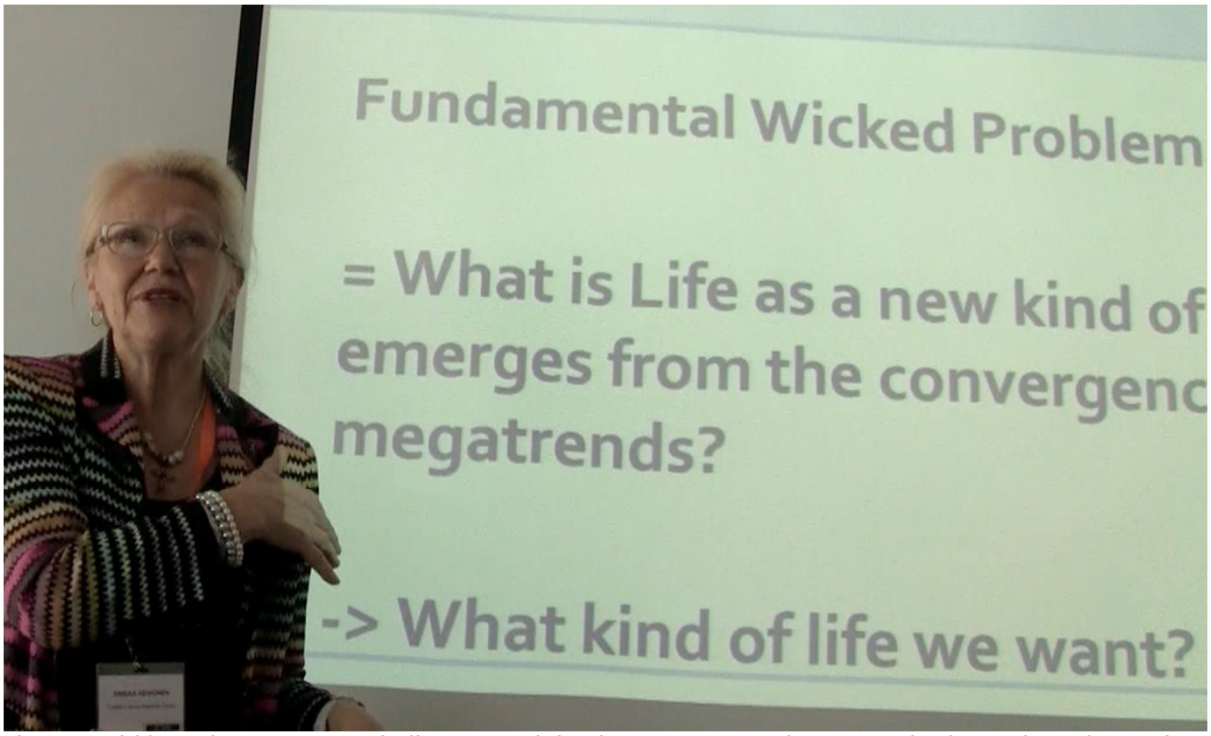

Figure 4. Sirkka Heinonen, research director at Finland Futures Research Centre raised questions about what will life be like and what kind of life do we want in a future of conscious technology. Photo: FFRC

CONFERENCE ABSTRACT

We are moving from the Information Age into the Conscious-Technology Age, which will force us to con-front fundamental questions about life as a new kind of civilization emerges from the convergence of two mega-trends. First, humans will become cyborgs, as our biology becomes increasingly integrated with technology. Second, our built environment will be digitized and incorporate more artificial intelligence (AI). The Internet of Things (IoT) and Big Data will accelerate this phenomenon. With the fast speed of technological developments, technology foresight should be more highlighted as regards emerging societal impacts and wicked problems. Conscious-technology also raises profound dangers, including AI rap-idly outstripping human intelligence when it becomes able to rewrite its own code, and individuals be-coming able to make and deploy weapons of mass destruction. Minimising these dangers and maximising opportunities – such as improving governance with the use of collective intelligence systems, making it easier to prevent and detect crime, and matching needs and resources more efficiently – will require actively shaping the evolution of conscious-technology. The preferred vision of the future world permeated by conscious-technology must include transparent value premises and ethical considerations.

Key words: Conscious technology, collective intelligence, Information Age, cyborgs, artificial intelligence (AI), Internet of Things (IoT), Big Data, digitalized built environment, technology foresight, values

HIGHLIGHTS

- When general AI arrives, humanity will face a species we can't outthink—so if you can't beat them, join them!
- Comparing Mystic to Technocratic approaches to futures—the mystic goes to shared consciousness as the first strategy while the technocratic goes to technology.
- Conscious technology merges mystic attitude with a technocratic way of organizing.
- Glenn sees the convergence of technology leading to a blurring of consciousness.
- How can we know conscious technology will develop in a good way?
- Sirkka asked what is life as a new kind of species?
- When AI can rewrite itself, there is a huge span of dark sides in terms of risks.
- We have history of using technology to master nature—humanity will need to learn to use technology to live in harmony with nature.
- The focal question asked by the presenters is, "What is the preferred vision of the future of conscious technology?"

ABOUT JEROME GLENN, CEO OF THE MILLENNIUM PROJECT

Jerome Glenn is co-founder of the Millennium Project and has over 35 years of futures research experience working for governments, international organizations, and private industry. He has co-authored the State of the Future report, tracking 15 global challenges, for last 12 years and published hundreds of papers in distinguished journals.
Sirkka Heinonen from Finland Futures Research Centre has been Co-Chair of the Helsinki Node ever since its beginning in 2001 (then at VTT).

Figure 5. Sirkka Heinonen, Co-Chair of the MP Helsinki Node and Jerome Glenn. Photo: Anne Arvonen / FFRC.

SLIDES AND VIDEO

"Conscious-Technology as Post-Information Age: Can We Envision the Future We Want While We Still Have Time to Shape It?"
https://futuresconference2015.files.wordpress.com/2015/06/glenn_heinonen.pdf

"Interview of Jerome Glenn on Millennium Project and Collective Intelligence" (video)
https://sites.google.com/site/futuremediac/videos--presentations

Millennium Project website
http://www.millennium-project.org/

Helsinki node activities of 2015
https://sites.google.com/site/futuremediac/videos--presentations

Jerome Glenn was also special guest for Foresight Friday (see below), article forthcoming in conference edition of *Futuuri* newsletter.

3. VISION AND INITIAL FEASIBILITY ANALYSIS OF A RECARBONISED FINNISH ENERGY SYSTEM: RESULTS FOR ENERGYPLAN SIMULATIONS OF 2050 FINLAND AT SESSION 2 - STUDIES ON FUTURES RESEARCH: CASES ON ENERGY SYSTEMS

PRESENTED BY MICHAEL CHILD

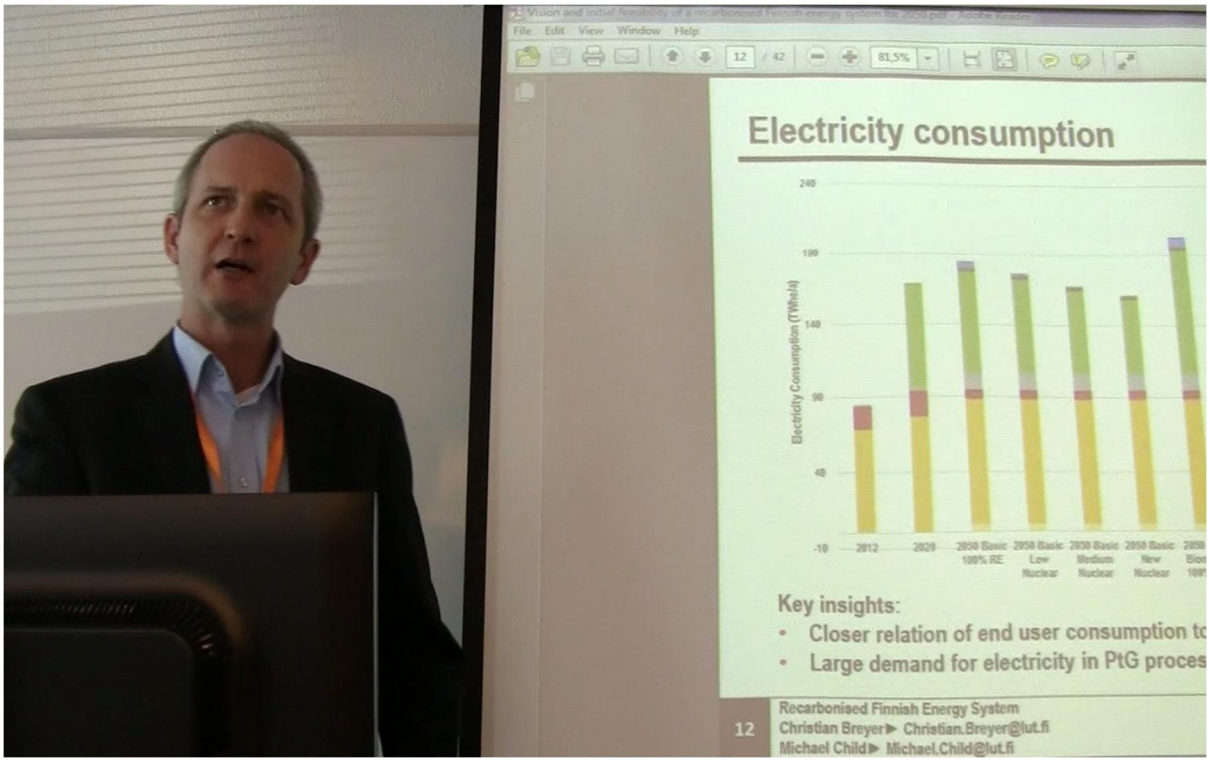

Figure 6. Michael Child presented his modelling research which included a scenario in which Finland is running on 100% renewable energy. Photo: FFRC.

CONFERENCE ABSTRACT

The Finnish energy system is at a crossroads due to an aging system of power generation, opinions about different modes of low-carbon energy generation, responsibilities to mitigate climate change, worries of fluctuating energy prices, goals regarding national energy security and a wish to both retain a competitive industrial sector and meet the needs of a future society. The purpose of this research is to examine the components of a fully sustainable energy sector for Finland in 2050. A key motivation is to examine the benefits of Power-to-Gas (P2G) and energy storage systems. Naturally, there are several potential pathways towards the future. At the same time, there are a number of technological decisions related to energy use and production that are made years in advance and influence future possibilities for decades to come. Among these are the roles of renewable energy technologies, nuclear power, energy system infrastructure, and storage systems. Several scenarios were analysed in order to determine cost optimal solutions that meet the needs of future Finnish society. Our research concludes that a 100% renewable energy scenario including P2G and energy storage is the least cost solution for Finland in 2050 when compared to scenarios that include nuclear power generation. Unique amongst other modelling of the Finnish energy system, we incorporated the power, heating/cooling and mobility sectors. As well, we offer complete transparency of all technological and economic assumptions. Results assure the reliability and sustainability of a 100% renewable energy system at an hourly resolution.

Key words: Renewable energy, sustainability, Power-to-Gas, energy storage

HIGHLIGHTS

- Michael Child presented work he did with his doctoral dissertation supervisor Christian Breyer in modelling 100% renewable energy futures for Finland in the year 2050. The 100% renewable energy futures were calculated alongside scenarios featuring other mixes of energy sources.
- A key connection to NEO-CARBON ENERGY project is to explore the roles different storage technologies could play to address intermittency.
- The project's aims were to look beyond the horizon to the recarbonization of the Finnish Energy System, to present plausible future images from which to work backwards, and to broaden the conversation regarding energy matters.
- Recarbonization means that carbon-based gas is still a fuel source, but instead of coming from fossil fuels, it comes from BioEnergy or synthetic gas produced from renewable energy.
- The scenarios were produced using EnergyPlan simulation tool.
- The research team has placed great emphasis on transparency in publishing their assumptions and data sources.
- The numbers for wind and solar are huge compared to today's levels, but within theoretical and economically feasible limits.
- The scenarios show the costs for business as usual (BAU) and scenarios with more nuclear power go into fuels, whereas primary costs for renewable energy go into infrastructure investments.
- Child pointed out how PV has lower Levelized Cost of Energy (LCOE) than wind, but produces most of its energy during summer months requiring more storage than wind would.
- So far, the results say: 100% renewable energy futures are cost competitive with other energy mixes.
- A high level of energy independence seems achievable, but questions remain about how future Finns will see security as cooperating with neighbours or doing everything themselves.
- Renewable energy should play a prominent role in future modelling projects.
- Further study is needed regarding how people will choose to live, perceive risk, and see the role of energy in their lives. This is where the four transformational NEO-CARBON ENERGY scenarios come into play.
- Markku Wilenius asked what it will take to reach a 100% renewable scenario. Child gave a qualitative answer: it depends upon what energy infrastructure projects people will accept
- Christian Breyer chimed in from the audience to answer from the quantitative perspective: it would take roughly $5M per year of investments.

SLIDES

"Vision and Initial Feasibility Analysis of a Recarbonised Finnish Energy System: Results for EnergyPLAN simulations of 2050 Finland" by Michael Child and Christian Breyer
https://futuresconference2015.files.wordpress.com/2015/06/michael-child.pdf

4. INTRODUCTIONS TO THE CAUSAL LAYERED ANALYSIS GAME SESSION AT SESSION 4 - RESEARCH TOOLS: CAUSAL LAYERED ANALYSIS (CLA)

PRESENTED BY SOHAIL INAYATULLAH & SIRKKA HEINONEN

Figure 7. Creator of futures research method Causal Layered Analysis, Sohail Inayatullah presented about the method. Sirkka Heinonen introduced him, described the purpose the game, and chaired the first Session on CLA. Photo: FFRC.

HIGHLIGHTS

- Sohail Inayatullah presented about Causal Layered Analysis including some of his insights from developing and applying the method in his consulting work.
- Causal Layered Analysis (CLA) is a futures research method that investigates the layers of a given future image or scenario:
- The top layer is Litany and focuses on “what is said”, the second layer is System and focuses on “what happens” and “causes and effects”.
- The third layer is Worldview and focuses on “what is believed,” and the fourth, deepest layer is Metaphor/Myth—the larger narratives that inform the other layers.
- The general premise of CLA is that changes in deeper layers appear in upper layers.
- Sirkka Heinonen presented the four NEO-CARBON ENERGY scenarios, described the launch of this game experiment and provided general instructions for the game.
- More details in next section, “A CLA Game on NEO-CARBON ENERGY scenarios in action learning” (a complete report on the game session forthcoming as eBook)

SLIDES & RESOURCES

"A CLA game on neo-carbon energy scenarios in action learning"
by Sohail Inayatullah, Matti Minkkinen & Sirkka Heinonen
https://futuresconference2015.files.wordpress.com/2015/06/inayatullah_minkkinen_heinonen1.pdf

"Experimental Futuring through Serious Gaming" by Sirkka Heinonen
Blog post on Futures Studies Tackling Wicked Problems website
https://futuresconference2015.wordpress.com/2015/06/08/experimental-futuring-through-serious-gaming/

What Works: Case Studies in the Practice of Foresight (forthcoming)
By Sohail Inayatullah

Books by Sohail Inayatullah including *CLA 2.0* (2015)
http://metafuture.org/books/

5. A CLA GAME ON NEO-CARBON ENERGY SCENARIOS IN ACTION LEARNING AT SESSION 4 - RESEARCH TOOLS: CAUSAL LAYERED ANALYSIS (CLA)

SOHAIL INAYATULLAH, SIRKKA HEINONEN & MATTI MINKKINEN

Figure 8. It required a team effort to create the CLA Game session. From left to right, Sofi Kurki, Sirkka Heinonen, Sohail Inayatullah, Marjukka Parkkinen, Joni Karjalainen, Juho Ruotsalainen, Matti Minkkinen, and Nick Balcom Raleigh. [2]

Figure 9. Juho Ruotsalainen (standing, left) and Joni Karjalainen (standing, right) moderating Groups 4 and Group 5.

[2] The Futures Clinique concept includes moderators' training by the leader of the Clinique. Each moderator gets training and detailed instructions for moderating his or her own group and documenting and commenting the results.

Figure 10. Marjukka Parkkinen moderates Group 2. Two of the four groups are in the background. Photos: FFRC

HIGHLIGHTS

- The participants split into five groups, each assigned one of the four NEO-CARBON ENERGY scenarios—two groups worked on "New Consciousness."
- Groups completed the following tasks in relation to each CLA layer:
    - Litany: The group reviewed a "newspaper" from the year 2035 in their scenario;
    - Systems: Brainstormed possible causes that led to that future in terms of political, economic, social, technological, environmental, and cultural dimensions and placed these causes on a PESTEC Futures Table;
    - Worldview: Each participant selected a role and considered what would be motivating and threatening about the scenario from the role's perspective, and who were allies or enemies among the other roles.
    - Metaphor/Myth: Each participant comes up with a "metaphor" or "myth" for the scenario from the role's point of view.
- All groups reported back to a larger session chaired by Sohail Inayatullah. He encouraged groups to "sell their scenarios." Groups responded by presenting their scenarios in character, each participant describing the scenario from their role's perspective.

FOUR SCENARIOS

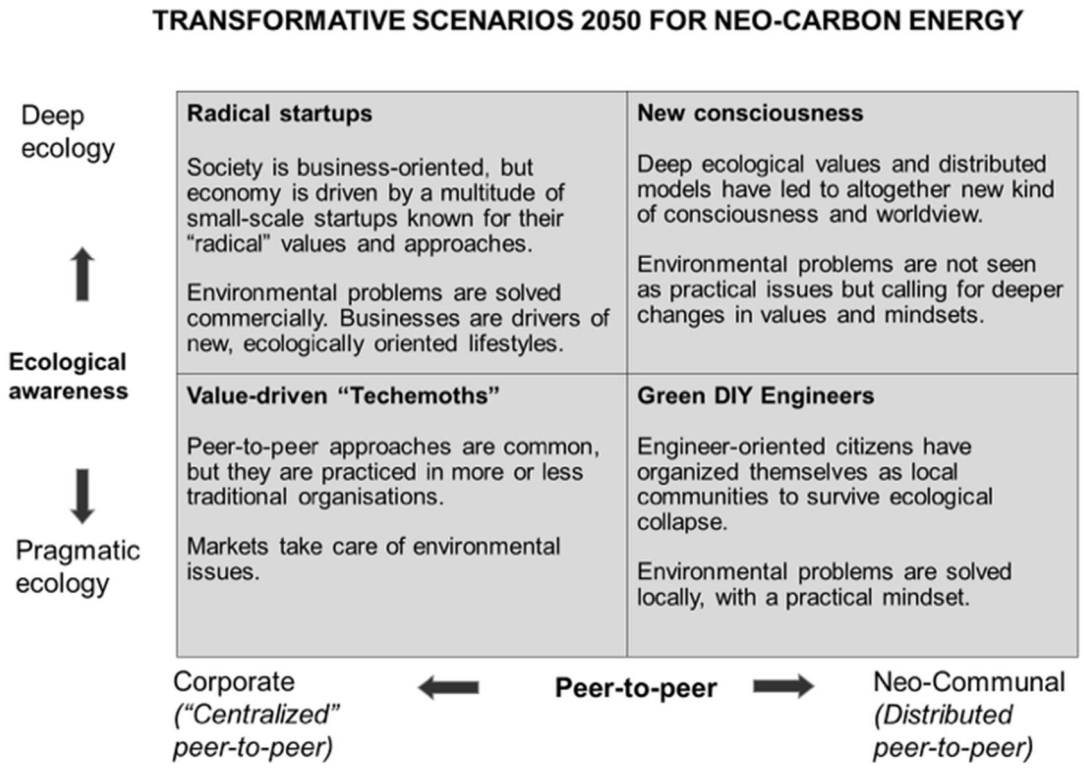

Figure 11. The four scenarios for NEO-CARBON ENERGY all start from the premise of a 100% Renewable Energy system. They are drawn from the quadrants made by the axes of Peer-to-Peer and Ecological Awareness.

GROUP 1: RADICAL STARTUPS,

*Moderated by **Sofi Kurki, doctoral student at FFRC***

Figure 12. Group 1 working on the first task, identifying systemic causes for the future image presented in the news article. Futures Method used to do so was PESTEC Future Table. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Entrepreneurship pervades the whole society in this scenario **(Economical)**: the social security number issued to citizens also functions as the VAT identification code of their eventual business(es). Instead of a traditional democratic process, there is a **marketplace of ideas**, where **startups post their ideas** for developing the community, and the **citizens can vote** for the ones that they want to see implemented **(Political)**. S**chooling is completely intertwined, if not merged, with work and play**, and is constructed on the concept of **lifelong learning (Social)**. Smart cities with their ubiquitous ICT's are like the second nature around the people of this scenario, and functions as a **network of competing but compatible apps (Technological)**. This also enables the environmental sustainability, which is based on **digital monitoring the use of natural resources (Environmental)**. Fitting to the general mentality of this scenario, also bio-capacity of the ecosystem is conceived as a service: each individual is allotted their limit, but there is a possibility to pay for additional services.

METAPHORS

For a startup entrepreneur the metaphor of the world is **"win-win-win"**, as earning money and saving the planet happens by having fun. Another startup entrepreneur asks if s/he has died and gone to heaven, since the world appears to be a **"utopia"** to him/her. Business angel number one considers the world as **"New York"**, and angel number two refers to **"lottery"**, where only few win, many loses and all are hopeful. High school student feels that s/he is **"Tired of entrepreneuring"**. Marginalized person number one uses **"entrepreneur of your life"** as a metaphor. The marginalized person number states that **"everybody has value"**, because being born as an entrepreneur will give him/ her a chance, and s/he has learned to find her/ his power. Marginalized person number three uses **"Reversed Truman Show"** as a metaphor, as without technology s/he has no access, and s/he remains invisible and excluded, outside looking in. For the crowd facilitator the world is **"fruit of the poisonous tree"**.

GROUP 2: VALUE-DRIVEN "TECHEMOTHS"

*Moderated by **Marjukka Parkkinen, student at Master's Programme in Futures Studies.***

Figure 13. Having selected game roles, Group 2 members discuss and review their PESTEC of causes to write what is motivating and threatening to them about this scenario. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

In this scenario **governments have failed at producing welfare. Large companies have replaced governments in many tasks** that have traditionally been considered to belong to the government. **(Political)** One of these examples is the protection of economic sustainability. Although **"techemoths" have taken responsibility to protect the environment,** it is done because **environment has market value (Environmental).** As **cities have been built around the "techemoths",** people who **are not working for these companies are also excluded from various other aspects of life**. The power status of "techemoths" thus **creates isolation of groups of people (Social)**. Among the "techemoths" there is a **hard competition for talent (Economic)**, and it can be said, that **talent will make you an insider.** Any **occurring resistance against the centralized power is appropriated by the centralized power itself (Cultural)**. The **Neo-Carbon state** of society has been made possible by **breakthroughs in carbon capture and geo engineering.**

METAPHORS

For the CEO of a "techemoth" the world appeared as a **"playground and cornucopia of resources"**. The employee of a "techemoth" stated that the situation reminded her of **"luxury isolation"**, although the world was not the highest positioned **"penthouse"** for her/him, it is at least a **"skyscraper"**. For a marginalized person the world reminded a **"luxury jail"**. For an underground anti-corporate hacker number 1 the metaphor was **"Closed door"**, where as the second hacker stated the world to be like a **"dark cave/ evening with a light in the end of the tunnel"**. The second hacker stated, that although the world is dystopian and ruled by

the elite, resistance provides hope for the eventual radical change in the society. Transhumanist saw himself as a **"warrior"** and **Don Draper of the 21st Century**, who is **willing to sacrifice everything to win.** Out of the two small entrepreneurs, the other already felt like winning, as the metaphor was "**lottery"**. Another small entrepreneur also felt like the world was beneficial for him/her, as s/he felt like **"the beetle in the anthill"**. Even though a beetle is a parasite of the anthill, **ants believe that the beetle is an ant and they feed it.**

GROUP 3: GREEN DIY ENGINEERS

Moderated by Matti Minkkinen, doctoral student, and Nick Balcom Raleigh, student at Master's Programme in Futures Studies

Figure 14. Group 3 showing each other the roles they selected to select an ally and an enemy. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Because **nobody has stepped up to challenge multinational corporations** in their pursuit of short-term profits over sustainability, the **overconsumption of energy skyrocketed** which led to the **collapse of global markets and exchanges** (**E**conomic). This chain of causes and effects **led to a prevailing attitude among people — "If *they* won't fix it, *we* will"** (Political). The new attitude fed the development of a **new global economic system and economic order** (Economic, again). The **emphasis on local and practical life** within **dispersed and relatively closed local communities** has **brought families and relatives closer together** and family bonds are strong (Social). After the old world economic order collapsed, there is **little to no money for high-tech investments**—only low-tech and highly practical solutions are viable in the market. **Technology primarily takes the form of products instead of services.** (Technological.) The dispersed and **local communities are sustainable and in harmony with nature** (Environmental). **Redevelopment of localities in**

a grassroots way has led to a stronger sense of pride in community—for instance, people are proud to live in Alvar Aalto Organic Otaniemi (Culture/Consumer/Citizen).

METAPHORS

Two participants chose to be Retired University Teachers—one expressed some unease in her metaphor **"The kids have taken over"**, while the other expressed a similar sentiment with **"Sleeping on the edge."** The Retired Civil Servant said her metaphor was **"Harmony inside the fences,"** aside from a shortage on certain wines, life is pretty good inside Alvar Aalto Organic Otaniemi. The Synthetic Biologist had the metaphor of **"Thriving Creativity"** imagining there would be plenty of opportunities to generate new life forms to solve various problems (food, lack of ecological diversity) after the collapse. The Artist saw this DIY Green Engineers future as **"Automaton (Beautiful Machine)"** and the locality as an **"Oasis in the Desert"** for creative people like him. The Retired Employee of a Multinational Corporation saw her role's metaphor as **"Passion never ends. Continue what you are happy with. New Entrepreneur,"** identifying the end of her company's hold on her life within the context of the DIY spirit as a thrilling new path. The Con Man, a role invented by a participant, identifies his metaphor as **"Trust me, this is a new type of water purifier"** as an example of the type of con his role would sell to the other roles. The Religious Extremist sees this future **"Post-Doomsday,"** after a great collapse predicted by her religion. The Deep Ecologist sees this future as closely aligned with the values she's been advocating all along with a metaphor of **"Back to Basics."** The group found one of the ideas from their PESTEC to be the unifying metaphor for the scenario, **"If they won't fix it, we will."**

GROUP 4: NEW CONSCIOUSNESS

*Moderated by **Joni Karjalainen, project researcher at FFRC***

Figure 15. Group 4 presenting their work. Encouraged by Sohail to "sell their scenarios", the groups created impromptu skits in which their roles presented their future. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Wrong useless public policies and the failure of national governments had enabled the forming of new global consciousness (**Political**), for which a prosperous, efficient economy was the main prerequisite, using singular, digital currency (**Economic**). In such a world, diversity and even new family structures (e.g. man/woman, woman/woman, human/machine, real-virtual etc.) would be possible (**Social**). **Technology** would be **omnipresent and implanted in body at birth**, and would **help overcome linguistic barriers** in real time. An **inherent love for nature would** have to prevail in order for ecological problems to be solved (**Environmental**). **Culturally,** there seemed to be **two lines of thinking** – one envisioning technophilia where **technology is adopted intimately without questions.** However, **new consciousness might also require religion(s) as enablers.**

METAPHORS

The child saw this world as **"one river"** since everyone's education would be more or less uniform, and all people would be connected. The representative of the world government seemed content of envisioning such a **symbiotic system (of technology and governance),** and also a retired civil servant envisioned a **systematic world.** For a retired employee of an oil company, this world was **a wild torrent** beyond his/hers control. For the spiritual guru, the world of **ubiquitous technology** for "flower power" was *a black hol**e***, **undermining traditional spirituality**, and still likely **too focused on the techno-economic nexus.** For the secularist dissident, **global governance represented threatening collective pressure**. The

robot perhaps stood out from the rest viewing **this world as a new frontier, where (s)he/it is the cowboy.** The hippie stated **“gay dance”.**

GROUP 5: NEW CONSCIOUSNESS

*Moderated by **Juho Ruotsalainen, project researcher at FFRC***

Figure 16. Group 5 presented by performing they were in a TV news story, the news anchor (right) miming she was holding a microphone. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Group 5 identified systemic in the **political** row as **”global governance but also less government”**. Resource-based **economy with no money**, a new economic concept **not based on consumption**, and **dominance of sharing economy** (**Economic**). Border between ”me” and ”group” in conflict (**Social**). Technology and consciousness combine into a ”techno-consciousness” and transhumanism, the idea that humans are enhanced by technology, becomes dominant (**Technological**). **Biophilia**—humanity’s inherent love of nature, a growing demand of equity of all life forms, and the **realization that humans and nature are on the same level** (**Environmental**). Post-individualism, **greater awareness of interconnectedness due to the ecological collapse**, and the four intelligences of humans (**Cultural**).

METAPHORS

From the perspectives their various roles, the Citizen Activist had chosen the metaphor of **”Butterfly,”** the Secular Dissidents (there were two) chose the metaphors of **”Spiral,”** and **”Ying & Yang”**, the Representatives of World Government chose **”Youthful Governance”** and **”All is the Same”,** the Retired Civil Servant chose **”We”** and the Artist chose **”Age of Love.”**

FURTHER INFORMATION

CLA Game Report eBook (forthcoming):
https://www.utu.fi/en/units/ffrc/publications/Pages/FFRC-eBooks.aspx

“New ideas for a novel energy system sparked at Futures Clinique”
Sitra Blog post by Sirkka Heinonen
http://www.sitra.fi/en/blog/carbon-neutral-industry/new-ideas-for-novel-energy-system-sparked-futures-clinique

The CLA Game on NEO-CARBON Energy project will be developed further at FFRC.

6. PRACTICAL GUIDE TO USING CAUSAL LAYERED ANALYSIS IN QUALITATIVE FUTURES STUDIES AT SESSION 4 - RESEARCH TOOLS: CAUSAL LAYERED ANALYSIS (CLA)

PRESENTED BY MATTI MINKKINEN

Figure 17. Matti Minkkinen, a doctoral candidate in futures studies at Turku School of Economics, presents research he and Professor Petri Tapio co-authored regarding practical matters related to using CLA in research. Photo: FFRC

CONFERENCE ABSTRACT

Causal Layered Analysis (CLA) is a qualitative futures studies method for analysing the layers of meaning in qualitative research material in order to identify and build images of the future. Typical materials are texts, visual material (pictures, videos) or tape-recorded speech, e.g. from a workshop, individual inter-views or focus groups. With the CLA process the researcher analyses and interprets the material to four layers: 1) litany, 2) system, 3) worldview and 4) myth. The layers make sense and bear an important lesson to be learned in foresight processes, but in practice placing aspects of the research material to the four layers has proven difficult and less clear. In this paper, we examine the intersections between CLA and standard qualitative research methods. We offer a solution to the problem by showing how reflexive interpretation and the key concepts of qualitative content analysis (QCA) help in the analysis and interpretation process as well as in the identification of the future images. The contribution of the paper is twofold. On the one hand, CLA is interpreted as an extension of qualitative methods, and futures re-searchers can thus draw on the extensive qualitative research literature. On the other hand, standard social scientific methods do not work directly for futures studies, but they must be reframed to study images of the future. We argue that, once reframed, qualitative social scientific methods can offer powerful tools to futurists and increase the validity of creative and heuristic futures studies.

Key words: Causal layered analysis, qualitative content analysis, images of the future

HIGHLIGHTS

- Matti Minkkinen presented practical issues in conducting scientific futures research using Causal Layered Analysis.
- He walked through an example of labelling segments in texts to analyse themes as as a means to generate metaphors.
- Inayatullah responded to Minkkinen's remarks.

SLIDES

"Practical Guide to Using Causal Layered Analysis in Qualitative Futures Studies"
by Matti Minkkinen and Petri Tapio
https://futuresconference2015.files.wordpress.com/2015/06/matti-minkkinen_petri-tapio.pdf

7. NEW CONSCIOUSNESS: A SOCIETAL AND ENERGETIC VISION FOR REBALANCING HUMANKIND WITHIN THE LIMITS OF PLANET EARTH AT SESSION 11 - TOWARD A FUTURES MOVEMENT: RESEARCH COLLABORATION ON CLIMATE CHANGE AS AN OPPORTUNITY TO BUILD A FUTURES CONSCIOUSNESS FOR GLOBAL SUSTAINABILITY

PRESENTED BY SIRKKA HEINONEN AND CHRISTIAN BREYER

Figure 18. Sirkka Heinonen presented the four transformational scenarios of NEO-CARBON Energy project and asked "Is [the New Consciousness scenario] a preferred future?" Photo: Nick Balcom Raleigh / FFRC

Figure 19. Christian Breyer described reasons for urgency for switching to renewable energy. Photo: Nick Balcom Raleigh / FFRC

Humankind has reached a level of ongoing crises, which is mainly due to an unsustainable energy system and the non-acceptance of planetary boundaries. On a more fundamental level the crisis is caused by the prevailing worldview and values. Universally accepted values of today emphasize material wellbeing and growth, consider nature only as resources to be exploited by humans, and neglect the notion that humans are connected to each other and to nature on a very fundamental basis.

Currently, 140% of the resource and absorption capacity of planet earth is required for human activities and the trend is against rebalancing. The dire consequence will be a collapse of the hosting capacity of our planet, as a simple matter of fundamental environmental facts. There is a sense of urgency to tackle this wicked problem of growing unsustainability and breaking the planetary boundaries. Futures research should focus its major efforts on addressing it. From the framework of 15 Global Challenges by the Millennium Project, four challenges are directly dealing with this issue and the rest 11 challenges are indirectly concerned as well.

We would like to draw a world, which is mentally, ethically and spiritually aware of the fundamental limits and the requirement to live in harmony with 'mother earth'. This describes nothing else than a new level of evolutionary development of humans and can be called 'New Consciousness'. The two major drivers in that new world beyond the limits of today's economic, societal and governmental limits are a very deep ecological orientation of humans, which goes hand in hand with a global, technology-enabled peer-to-peer interaction. Everything is part of the global network but as much as possible is organised on a local level and the final goal is to optimise the attitude of thinking global and acting local.

Such a fully sustainable society is sketched and on that basis a very first estimate is given on the requirements and consequence for a fully sustainable energy supply in the second half of the 21st century. Negative environmental impacts have to be reduced close to zero: energy has to be harvested in a highly sustainable way, CO_2 needs to be removed from the atmosphere, nuclear waste needs to be neutralised and standards of living in respect to energy services have to be guaranteed for the whole humankind at least on the level of today's developed world.

Based on the qualitative sketch of the 'New Consciousness' society created in the Neo-Carbon Energy project, a very first preliminary quantitative estimate is presented. It remains unclear and from today's perspective even improbable whether humankind is able to go for that evolutionary transition in the future, however, nearly all other options might end in a collapse scenario in the dimension of geological history.

Key words: Sustainability, new consciousness, renewable energy, peer-to-peer

HIGHLIGHTS

- Climate Change is a wicked problem, or even a super wicked problem. In this age of crisis, Neo-Growth is a solution.
- Wicked problems such as climate change require long time horizons and solutions built on strong visions in order to be tackled, yet time is running out.
- The universalization of energy is a global trend as living standards converge.
- Our utilization of renewable energy in minimal while we keep building nuclear, even with its higher costs and higher risks.
- Today, more subsidies go to fossil energy than renewable energy.
- A 100% renewable energy world is possible—all the technology we need is available.
- Power-to-Gas is a storage technology that can address intermittence.
- New Consciousness is a radical, transformative scenario in a Neo-Growth world.
- The project combines foresight of societal change, energy perspectives and quantified data. It's a combination of qualitative and quantitative research.
- By 2050, a zero emission energy system has to be in place if global warming is to be limited to an increase of 2 degrees Celsius. It is critically important.
- The goal is a completely new renewable energy system where energy is emission free, also cost effective and independent.
- This foresight project explores societal implications of this new energy system.
- The whole modern era, about from 18th century to late 20th century was fundamentally based on the idea of progress.
- There are four theses that modern progress is based on:
    1. Societies progress when individuals are given freedom to follow their inherent rationality. Many key authorities, such as for example religions, are questioned.
    2. Knowledge is accumulated through rational sciences.
    3. Democracy is a rational form of governance. Nation states are dominant and representative democracy is the prevailing type of democracy.
    4. Material prosperity has been achieved through natural sciences, technology, and industrial production.
- On the other hand, this progress has certainly many shortcomings:
    - Modern progress has led to unprecedented prosperity and standards of living, but it is not evenly distributed and it has caused a lot of environmental problems based on wasteful use of energy and material. Modern progress has caused the environmental crisis.
    - High emphasis on individuality hinders and prevents cooperation.
    - Growth is narrowed down to mere economic growth.
    - Energy is needed for progress, but for example the question of population growth on our planet–but how can we accommodate 10 billion people within planetary boundaries? It's becoming more and more an impossibility in environmental terms and also from the social aspect.

    - Emphasis on rationality and scientificity undermined other areas of cognition such as artistic creativity. We just heard the presentation where Heal Being emphasizes this kind of artistic creativity—there is growing need for that.
    - Modern progress has emphasized representative democracy. It is a good, of course, but this emphasis has caused us to neglect other forms of democracy, such as direct democracy.
- Neo-growth is unlike de-growth. Neo-growth does not reject growth, but emphasizes new kind of growth that is environmentally sustainable and merges economic growth with cultural, social, and "spiritual growth."
- In this model, politics should be global and technology must be planetary.
- Jim Dator, futures studies professor from University of Hawaii describes four categories of future scenarios: Grow, Collapse, Discipline, Transform.
- All four of the NEO-CARBON Scenarios are transformational scenarios—and are all based on renewable energy.
- The four transformational scenarios are:
    - Radical Startups
    - Value-Driven "Techemoths"
    - Green DIY Engineers
    - New Consciousness, the most transformational of the four
- In the New Consciousness scenario, human relationships to nature, to each other, and to themselves had to be completely rethought leading to values of deep ecology becoming the norm.
- Preceding this scenario, there is an ecological crisis and World War III.
- It's emissions-free, least cost model, and independent. But it a preferred future?
- The most important thing is our willingness as a species to survive.
- We are the last generation that can make this conversion.

SLIDES

"New consciousness: A societal and energetic vision for rebalancing humankind within the limits of planet earth" by Christian Breyer, Sirkka Heinonen and Juho Ruotsalainen
https://futuresconference2015.files.wordpress.com/2015/06/breyer-heinonen-ruotsalainen.pdf

8. REVERSE ENGINEERING THE STATE MACHINERY FOR LOW-CARBON PUBLIC POLICY AT SESSION 11 - TOWARD A FUTURES MOVEMENT: RESEARCH COLLABORATION ON CLIMATE CHANGE AS AN OPPORTUNITY TO BUILD A FUTURES CONSCIOUSNESS FOR GLOBAL SUSTAINABILITY

PRESENTED BY JONI KARJALAINEN

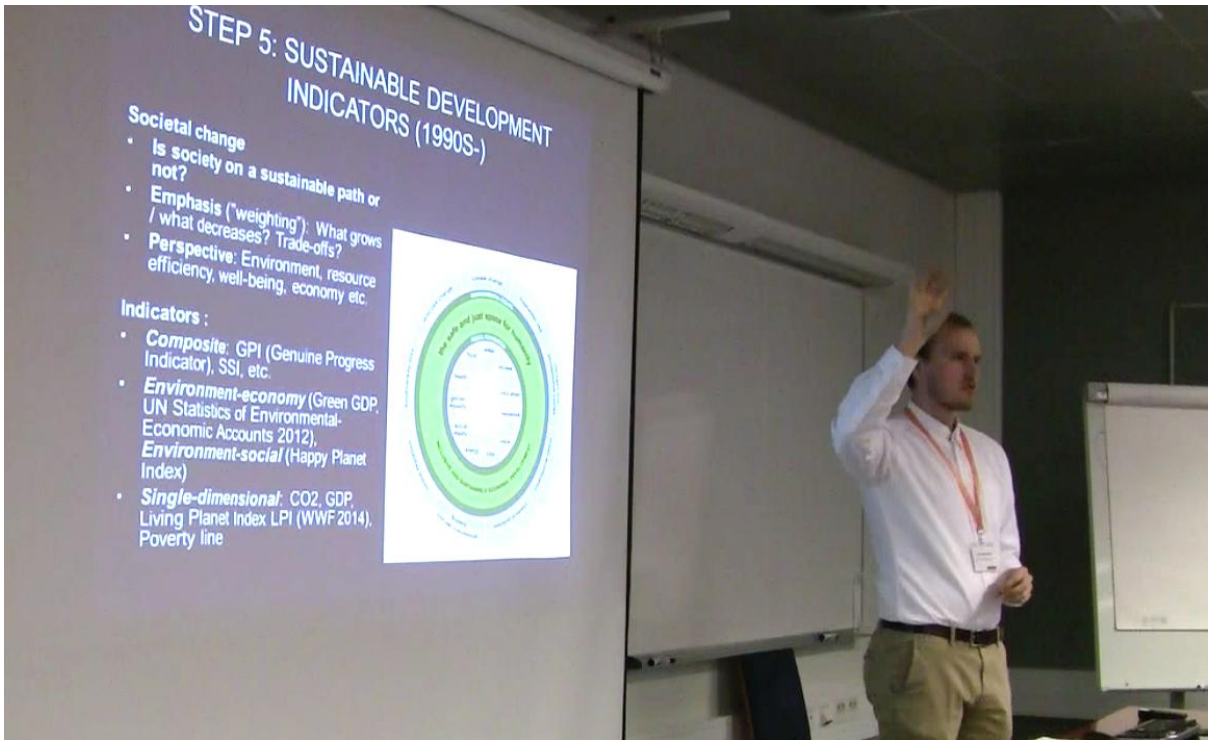

Figure 20. Joni Karjalainen described the steps in the evolution of indicators. Photo: FFRC

CONFERENCE ABSTRACT

Remaining within the planetary boundaries and the urgency of moving towards a low-carbon future are recognized challenges of the 21st century. Problematically, the ideological context of conducting public policy has been detached from these biophysical limits.

As a result of the historic origins of the nation-state (wealth maximization, only later well-being and environmental governance), the key indicators used by the state as technologies of governance adhere to standard economic theory. In the 1940s, states took into use the gross domestic product (GDP) to measure the accumulation of material well-being, which also greatly helped the post-Second World War re-construction. However, in this historical process, states paid little attention to the future implications of their energy choices. Today, the world energy system is over 80-percent reliant on fossil fuels. In the 20th century, energy consumption grew 10-fold, and various energy forecasts expect high future energy demand. In order to resolve this tension, the state machinery may need to be "reverse engineered". This implies the design, experimentation and institutionalisation of new frameworks and technologies of governance.

In order to resolve this tension, the state machinery may need to be "reverse engineered". This implies the design, experimentation and institutionalisation of new frameworks and

technologies of governance in both developed and developing countries. Several countries have already taken initial steps. Alternative indicators for tracking sustainable development have been developed, states have set policies and strategies, taken up legal measures such as climate change acts, as well as shifted budgetary allocations to move away from environmentally harmful subsidies. Making ecological or low-carbon indicators visible across inter-governmental platforms (e.g. post-2015 framework and UN statistical database) is also receiving increasing attention.

This paper discusses how the premises of scientific enquiry yield power and influence evidence-based policy-making. The work builds on findings in sociology of science and modelling studies in order to contextualise the epistemological and ontological premises of measurement and valuation. Institutionalist theories have traditionally been unable to explain institutional change, but discursive institutionalism suggests that agents themselves are able to renew institutions. The work summarizes initial findings from the Neo-Carbon Energy project, research about development futures and energy scenarios, as well as a master's thesis work about the role of indicators of sustainable development by the writer.

Key words: Planetary boundaries, low-carbon, indicators, technologies of governance, public policy

HIGHLIGHTS

- The future that is emerging will be different than what we have now, yet governance systems are based on past institutional and historical arrangements. This tension needs to be addressed.
- Indicators are evidence-based autonomous models that inform policy-makers and have increasing prominence in policy debates.
- Indicators shape perception and can be conceived of as a technology of governance.
- In developing sustainable development indicators, what are the institutional pre-requisites for these indicators to have an impact?
- Karjalainen presented two explanations for the power of indicators: 1) Science as an institution with various approaches and branches compared to 2) historical institutionalization of indicators for actual policy-making
- Economic indicators are more frequently discussed than other indicators. Neo-Classical Theory steers public discussion on economics instead of the broader reality.
- Energy often gets left out as an indicator. Why are we still dependent on fossil fuels?
- If we're abstracting the wrong way, we might be focusing on the wrong issues.
- What indicators should we have to best anticipate the needs of future emission-free society?

SLIDES

"Reverse engineering the state machinery for low-carbon public policy" by Joni Karjalainen
https://futuresconference2015.files.wordpress.com/2015/06/joni-karjalainen.pdf

9. FUTURE DYNAMICS OF WORK & TECHNOLOGY ALTERNATIVES TO 2050— FORESIGHT FRIDAY WITH PRIME MINISTER'S OFFICE AND FINNISH SOCIETY FOR FUTURES STUDIES

PRESENTED BY ULLA ROSENSTRÖM AND JEROME GLENN

Figure 21. Jerome Glenn explains how the convergence of technologies will change work in 2050. Photo: Marjukka Parkkinen / FFRC

ABSTRACT

Stephen Hawkins, Elon Musk, and Bill Gates are warning the world about the potential dangers of artificial intelligence growing beyond human control. Whether AI does or does not, it is certain that it and other future technologies will have fundamental impacts on the nature of work and economics. A growing body of AI experts believes that if socio-political-economic systems stay the same, and technological acceleration, integration, and globalization continue, then half the world could be unemployed by 2050.We need to think seriously about this now, because it may take a generation or more to make changes necessary to improve our work-technology future prospects.

The results of the Future Work/Technology 20150 Real-Time Delphi conducted by The Millennium Project will be presented and discussed in this session. These results will also be used as input to the construction of alternative scenarios and road maps. These drafts will be made available for comment prior to final versions. Strategies will be drawn from these final scenarios and used as inputs to national planning work-shops. The workshops will be initiated by Millennium Project Node Chairs and others who express interest during this process.

The results of the planning workshops will be integrated, distilled, and made available in a variety of media for public discussion. The audience will be invited to comment on this process as well as the results from the Future Work/Technology 20150 Real-Time Delphi study.

HIGHLIGHTS

- Jerome Glenn presented early findings from the Millennium Project's Future of Work and Technology 2050 study
- The study has gathered input from hundreds of futures researchers and practitioners via a first-round Real-Time Delphi questionnaire.
- Glenn presented key ideas from from the study including:
- The convergence of radical technologies such as 3D/4D printing, General Artificial Intelligence, robotics, synthetic biology and other fields will lead to 25 percent global persistent unemployment.
- A guaranteed income may become common, liberating people to pursue creative interests.
- Drawing analogy to the "Leisurely Priestly Class" of ancient Egypt, Glenn imagines an integration of technology into humans will lead to the risks and rewards of billions of augmented super geniuses.
- This special Foresight Friday was organized through the cooperation of the Prime Minister's Office, the Helsinki Node of the Millennium Project, and the Finnish Society for Futures Studies.

SLIDES AND VIDEO

"Future Dynamics of Work & Technology Alternatives to 2050"
https://futuresconference2015.files.wordpress.com/2015/06/jerome-glenn-foresight-friday.pdf

Video archive of Foresight Friday featuring Jerome Glenn
https://onedrive.live.com/redir?resid=6BEC141404E29746!2067&authkey=!ACo3UCzZvc0DhIo&ithint=video%2cmp4

Press release of the Future Work/Technology 2050 study by the Millennium project
http://www.prweb.com/releases/2015/04/prweb12672038.htm

"Interview of Jerome Glenn on Millennium Project and Collective Intelligence" (video)
https://sites.google.com/site/futuremediac/videos--presentations

Interview with Ulla Rosenström about Foresight in Prime Minister's office (text)
Link forthcoming, request copies from Sirkka Heinonen.

10. NEW CONSCIOUSNESS IN TRANSFORMATIONAL NEO-GROWTH SOCIETY AT FINAL SESSION - KEYNOTE SPEAKERS

PRESENTED BY SIRKKA HEINONEN

Figure 22. Sirkka Heinonen presented the futures studies basis for the NEO-CARBON ENERGY scenarios in her keynote presentation. Photo: Marjukka Parkkinen / FFRC

CONFERENCE ABSTRACT

The concept of futures consciousness is pivotal in creating the futures mindset, capable of tackling wicked problems. It originates from futures thinking, futures planning, futures studies, creating futures literacy – the capacity to "read" signals and streams for emerging futures in order to gain futures intelligence. Futures research is not just exploring alternative futures, but also proactively making the preferred futures happen.

Future is about Change. Change has many colours, though: it can be incremental, systematic, radical, fundamental or transformational. The "Grand Theory of Futures" is concerned with the theories of change and transformation processes. If traditional social sciences see change caused by economy and culture, futures studies relies on systems theory – change occurs from a complex interplay of a multitude of different factors. Futures studies sees change not as incremental but transformational. Transformation means systemic, fundamental, radical and profound change, affecting the total system, not just its parts. It is also a quantum leap – transition – to another level of thinking and consciousness, in our society, on our planet, but essentially in our intertwined relation between humans, nature and technology.

Does change always imply growth? In our growth-orientated thinking growth is often synonymous to economic and technological growth – "More is Merrier". However, the

growth that wastes energy and resources, also endangers species on earth, including us humans. Growth is much broader a concept than mere economic growth – it encompasses all things human, even beyond that – all living forms on earth.

Unsustainable growth is not a preferred future, but progress should be adjusted to the Limits to Growth and seen as covering all spheres of life. On the other hand, there are No Limits to Learning, increasing futures consciousness. The growing change in our values and lifestyles towards immaterial renewal and wealth is a desirable future. This kind of societal Neo-Growth model à la Malaska may also yield new techno-economic innovations, while basing its foundation in deep cultural and ethical pursuits.

In my keynote I will briefly present a transformational scenario "New Consciousness" that we constructed in an ongoing Tekes Project "Neo-Carbon Energy". In total, we sketched four scenarios, which all are transformational. The most extreme scenario probes the boundaries and potentials of our futures consciousness and willingness to adopt a profound change of thinking and lifestyles, and to renew ourselves, not just our energy system towards renewables. Does this kind of transformation require a preceding massive catastrophe to be a possible and preferable future, instead of remaining a ubiquitous utopia?

HIGHLIGHTS

- We need futures consciousness/futures mindset to tackle wicked problems.
- Futures mindset originates from futures thinking, futures planning, futures studies, creating futures literacy, and the capacity to "read" signals.
- Ethical and emotional dimensions of futures consciousness are also important. We also need capacity to feel futures, to experience futures.
- The attempted "grand theory of futures" is concerned with change and transformation.
- Futures Studies relies more on systems theory—change is seen to occur from complex interplay of a multitude of different factors and their interconnected implications.
- Transformation here means systemic, fundamental, radical and profound change, affecting the total system, not just its parts.
- Of the four transformational NEO-CARBON ENERGY scenarios, New Consciousness is the most transformational because, in it, ecological thinking has been deeply internalized culturally.
- One of the challenges is for Futures Studies is to suggest and propose new approaches for creating, gathering, and analysing futures oriented information.
- The Gilles Deleuze and Félix Guattari's rhizomatic model of knowledge creation based on non-hierarchical sharing and creation can be useful in explaining and anticipating unexpected outcomes.
- In this rhizomatic model of knowledge sharing and creation, the knowledge is not disseminated systematically or logically based on a very hierarchic binary tree

model—but rather, it is following an organic way of rhizomes—to grow in all directions. It can be seen as a map with multiple entry ways.

- Pentti Malaska's concept of Neo-Growth, in which progress should be adjusted to the limits of growth, we can merge economy with social, cultural, and spiritual growth. There are no limits on learning or increasing our futures consciousness.
- Growth that wastes energy and resources, [especially fossil] energy and material resources, also endangers species on Earth, including us humans.
- The growing change in our values and lifestyles towards immaterial renewal and wealth is a desirable future.
- The Neo-Growth model may also generate new techno-economic innovations, while basing its foundations that in deep cultural and ethical ethos.
- Developing futures consciousness can be combined with experimenting with new futures research methods, as happened in the CLA Game session at the conference.
- The pathway to the "New Consciousness" scenario include collapse in the form of World War III—but is it required? Or, can the scenario be reached through consciousness transformation?
- Business as Usual (BAU) is the most dangerous thing.
- If futures consciousness is meaning to make transformation happen, perhaps Buckminster Fuller was very practical when he said "You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."

SLIDES

"New Consciousness in Transformational Neo-Growth Society" by Sirkka Heinonen
https://futuresconference2015.files.wordpress.com/2015/06/sirkka-heinonen.pdf

CONCLUSION

NEO-CARBON ENERGY project had a higher number of appearances at this international conference than is usually the case with a single research project. This is because the project had an excellent opportunity to present itself for the international foresight community representing various other disciplines, and internationalisation is one the project's strategic focuses. For the next similar conferences the NEO-CARBON Energy project is planned to have the capacity to present – besides the scenarios as elaborated – NEO-CARBON case studies from Argentina, China, and Africa. Overall, these appearances contribute to the internationalisation goal of the overall project by disseminating information and some tentative results, exploring possible applications, as well as inviting comments and perspectives from beyond the project team. NEO-CARBON ENERGY project team members also made new contacts within the futures research and foresight community, growing the project's international network. These global networks, notably the Club of Rome and the Millennium Project, would play a key role if the world's energy economy is to be transformed into an emission-free NEO-CARBON system. We do this work not only for Finland's future, but for the well-being of all of Earth's inhabitants.

The NEO-CARBON ENERGY scenarios, under development at the time this report was prepared, will be published when completed. Several brainstorming sessions and compact Futures Cliniques are planned in the coming years to gather more response from various types of participants. Your feedback is also valuable. Professor Sirkka Heinonen and her project team at Finland Futures Research Centre (FFRC) from the futures-oriented WP of the NEO-CARBON Energy project invite readers of this report to share their own thoughts and perspectives in the spirit of shaping a bold new vision for renewable and emission-free energy in Finland and the world.