Backcasting scenarios for Finland 2050 of low emissions

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Abstract

Purpose – *The objective of this paper is to present an example on how futures studies methodologies, especially backcasting, can be used to assist public policy formulation. Backcasting is particularly interesting method in this context, since it allows the key characteristics concerning the state of the future to be fixed according to the goals policymakers have set to achieve.*

Design/methodology/approach – *The paper is a case study presenting the goals, progression and the results of the backcasting exercise of the Finnish Prime Minister's Office.*

Findings – *The backcasting methodology, as applied in the exercise presented in this paper, is a useful tool in public policy formulation. It is important to note, however, that in the way the exercise was carried out in this case, it is only possible to view future development through qualitative arguments. The key element for successful application of the method is the choice of expert group that produces the information.*

Originality/value – *Even though backcasting seems to be very well suited for discussing and designing alternative ways of achieving predetermined policy goals, experiences of using this methodology in the policy context are quite rare in the scientific literature. This paper addresses this deficiency and presents experiences of one such case. These experiences should be of interest to those involved in long-range strategy planning.*

Keywords *Delphi method, Environmental politics, Government policy, Scenario planning, Sustainable development, Strategic planning, Forecasting*

Paper type *Case study*

Introduction

Since the 1990s each new Finnish government has prepared a comprehensive foresight report on major future challenges. Topics of the reports vary according to what is considered to be highly significant to the nation's future at the time. Topics of some previous reports have included issues such as regional development and the effects of ageing of population. Prime Minister's Office is in charge of the work for each government foresight report. The work is carried out in co-operation especially with the Ministries relevant as regards the topic of the foresight report, as well as with other ministries and public organisations. Also a large group of experts from research institutes, private companies, and non-governmental organisations (NGOs) are consulted during this process. In 2008-2009 The Finnish Prime Minister's Office co-ordinated the construction of the government foresight report on climate and energy policy (Prime Minister's Office, 2009).

In the course of the work for the foresight report discussed here, the government commissioned several studies on issues concerning the effects and ways to prevent or adapt to climate change. Among the things investigated were prerequisites for the global limitation of climate change, cost-effectiveness of climate policy and mainstreaming of the climate perspective among the general population. Furthermore, one part of the work done for the foresight report, and the part on which this paper concentrates, was a scenario process aimed at depicting possible end states and paths that would lead Finland to

low-carbon society by the year 2050. The objective of this scenario exercise was to map out four distinctive end states and corresponding development paths that would enable the achievement of a climatically sustainable emission level while retaining the current standard of living. The purpose was to reflect various possibilities to achieve sustainable future and to stimulate discussion on whether some development paths are more desirable than others. The scenario process was facilitated by the Finland Futures Research Centre (FFRC) of the University of Turku in late 2008.

Before and partly simultaneously while preparing the government foresight report on climate and energy policy, the government also decided on a long-term climate and energy strategy for Finland[1]. The time horizon in the climate and energy strategy was 2020, whereas in the foresight report work it was set up for 2050. These two works (foresight report and strategy) supported and complemented each other.

Before FFRC was invited to facilitate the scenario process, the Prime Minister's Office had already identified the desired goal for the year 2050: development that will contribute to limiting the rise in the global average temperature to two degrees Celsius at the most, as well as reducing the emissions of greenhouse gases by at least 80 per cent from 1990 levels. The reduction of at least 80 per cent is at the lower end of the range (80-95 per cent) estimated by the Intergovernmental Panel on Climate Change (IPCC, 2007) for industrialised countries in accordance with the two-degree target. As the aim in the future was set *a priori*, the foresight exercise was about forming different backcasting scenarios to the desired future. The approach of using backcasting was also specifically predetermined. This method fits very well for the use of public decision-makers since it allows comparing and reflecting between different policy alternatives that all are able to produce the determined development goals.

There were also a number of basic assumptions that were set before the scenario work begun. These assumptions were introduced in the Long-term Climate and Energy Strategy and were based on previous research. The assumptions can be understood as best guesses of the operational environment of the coming decades and can thus be considered to provide the building blocks of a baseline scenario. These were not considered as absolutely fixed statements and some of them were challenged during the scenario process. Unless otherwise stated in the depiction of the scenarios introduced in this paper, the following factors were considered to apply behind all development paths:

- Population of Finland is assumed to grow from the current 5.3 million to 5.7 million by 2050.
- Finnish economy will grow markedly by 2050, but the structure of the economy can change.
- Low-carbon technology will improve significantly in all sectors by 2050.
- Prices of fossil fuels will rise and the cost of utilising renewable energy sources will decline.
- Finns' values towards measures for environmental conservation will change to a favourable direction and preparedness to take action to restrict emissions will increase.
- Climate change will alter the conditions in Finland by 2050: the need for heating energy will diminish and the agricultural growing period will become longer.

Prior to FFRC's involvement in the task, the Prime Minister's Office had collected a team of experts who were to be used as panellists in the exercise. The team consisted of more than 140 people who represented a broad spectrum of expertise relevant to climate and energy issues. These included researchers, officials and representatives of various business areas, as well as many NGOs. The project team from FFRC consisted of five researchers, with experience both in methodologies applied in the exercise and in climate and energy issues.

Methodology

The scenario process was carried out as a concise Delphi process which consisted of two rounds of web questionnaires and of two futures workshops, which were closely connected to each other via their phrasing of questions and goals. The Delphi process was adopted to

provide a basis for a group communication process, which is a basic characteristic of the method besides the iteration of the questionnaires and the anonymity of the expert panel's responses (see, e.g. Linstone and Turoff, 1975; Gordon, 2010; Linstone and Turoff, 2011). All stages were conducted within a compelling timeframe of four months. Together these four elements formed an integral process where each stage produced a deeper understanding of different socio-technical interconnections that affect the way the future unfolds, and where a more precise formulation of possible paths toward sustainable futures emerged. Table I presents the progress of the process in a concise form.

The invitations to answer the Delphi questionnaires were sent to the entire expert panellists' group ($n = 140$). Invitations to the two futures workshops were sent to a slightly smaller group (N1 and N2 = about 40). A major reason to run the workshops for a more exclusive group of experts was to enable deeper dialogue within the workshops. The people invited to futures workshops were selected in co-operation with the scenario team of the Prime Minister's Office and the FFRC team so that the participants would reflect insofar as possible all the key questions concerning controlling and restraining climate change: the variety of opinions in society as well as the best possible knowledge of what is technologically feasible, economically affordable and socially acceptable.

Scenarios are manuscripts of the future; they are a meta-technique – not just a single method. Scenario is one of the most basic, yet contested, concepts in futures studies as Börjeson *et al.* (2006) rightly point out. Scenarios cover a whole array of various types of scenarios. Mannermaa (1991) even distinguishes a scenario paradigm. The main purpose in using the scenario approach is not to predict but to construct several different futures and paths leading to them. One specific type of scenarios is backcasting. The backcasting approach, applied in this scenario exercise, is a scenario coming back from the future to the present. A classical predecessor of modern backcasting is Edward Bellamy (1951) with his

Table I Progress of the scenario process

Phase	*Time*	*Method*	*Goal*
Material gathering and final design of the study	September 2008	Literary review, environmental scanning	Review on the background reports commissioned by the Prime Minister's Office, specifying the end future state that the development paths are aiming and based on this material, designing the first questionnaire Defining the expert group involved in the futures workshops together with the Prime Minister's Office's scenario team
1st Delphi round	October 2008	Delphi: online survey targeted for expert group (with Webropol – survey software)	Inviting the expert group to the process and informing them on the work at hand. Presenting the desired end state to the expert group and asking their views on the possibilities and prerequisites for the realisation of this future state. Collecting views on the most important variables to which climate and energy policy should focus
Futures workshop	October 2008	Futures workshop, ACTVOD – futures process	Building alternative scenarios that all fulfil the two-degree target
2nd Delphi round	November 2008	Delphi: online survey targeted for expert group (with Webropol –survey software)	Testing and specifying the development paths constructed in the first futures workshop: what actions and which actors play key roles After this round the preliminary versions of the result of the scenario process, four distinctive scenarios, are constructed
Futures workshop	November 2008	Futures workshop, ACTVOD – futures process	Analysing and specifying the four designed scenarios
Final report	December 2008	Final report in electronic format	Report gathering together the results of the process: four different paths for the desired end state

book *Looking Backward 2000-1887*. Backcasting is considered as an opposite to forecasting, which is a process of predicting the future on the basis of current trend analysis, using trend extrapolation ''from now to then''. Backcasting, instead, envisions futures from the opposite direction – ''from then to now''. Its aim is to illustrate the logical path and development that is required in order to reach a given future state. Backcasting is thus a normative method: it sets a preferred goal (Höjer *et al.* 2011, p. 11).

As opposite to traditional forecasting, backasting suits well in the study and solving of highly complex, long-term problems where trend-breaking futures are required: they call for creative and radical solutions (Hickman and Banister, 2007, p. 378). As today's conditions and thinking patterns often narrow possible solutions and prevent change, backcasting aims to liberate images of the future from today's mental fixations and dominating trends. Backcasting scenarios can thus be called ''transforming normative scenarios''. (Höjer *et al.* 2011, pp. 11-12.) Instead of continuities they build on possible discontinuities to reach the solution desired and try to break the trend of business-as-usual. Backcasting scenarios are usually relatively long-term (20-100 years) (Robinson, 1990, p. 820), which in itself helps thinking outside current trends and conditions and solving obstructions caused by them. Due to its focus on alternative futures, discontinuities and long-term perspective, backcasting suits especially well for solving of environmental issues, as they deal with deeply habitual behaviour and complex connections between social, political, environmental and economic factors.

The backcasting process can be roughly divided into two basic phases. First, a desirable future end state is imagined and visualised, not as a continuation of present trends, but rather as a giant leap directly to the future. Then a subsequent link of logical steps preceding it is formulated. Although backcasting tries to break free from the constraints of today, in formulating the path from the future to present external factors need to be taken account (Robinson, 1990, pp. 830-831). Some factors enable the changes thrived for, while others deter it and need to be resolved. The factors considered in this study are listed in the introduction.

A recent current in backcasting theory and practices has been adding participatory elements in the backasting process. Participatory elements enhance the ability to explore highly complex and uncertain, value-laden issues, increase social learning and in themselves advance social change (Robinson *et al.* 2011, p. 757). In this scenario task the participatory process was carried out as futures workshops (see chapters 2.2 and 2.4).

Here, as mentioned earlier, the desired future state is accomplishing the two-degree target without significant loss in welfare. The preordained backcasting scenario approach was notable in this foresight process in two senses:

1. by their nature backcasting scenarios are typically normative (target orientated), i.e. they are adopted in search for prerequisites for preferred futures (Robinson, 1982); and
2. growing interest towards backcasting scenarios had been shown in Finland, but very few exercises have actually been carried out.

The backcasting approach has frequently been used in countries like The Netherlands, Canada, Australia (e.g. Dunlop, 2009), and Sweden (e.g. Åkerman 2011). Backcasting has been applied especially for climate, energy and transport scenarios (see, e.g. Börjeson *et al.* 2006).

First round of Delphi questionnaire

The process was kicked off with the first round of a Delphi questionnaire. The first questionnaire was aimed at collecting views of the expert group to provide a basis for the scenario work. Most important questions dealt with the estimations on the importance and possibilities of the most vital energy consuming sectors (transport, housing and industry) in cutting down the GHG's. Other background questions related to societal conditions that affect the way different aspects of climate policy would be received in the Finnish society. Experts' views on questions, such as how much inconvenience the Finns are ready to accept in exchange for more sustainable future, were asked. Since the aim of this first questionnaire was to form a view on how the expert group envisions the operational environment in the future, most of the questions were open questions where the respondents were encouraged, in their own words, to explain how and through what kind of mechanisms the future unfolds.

First futures workshop

The goal of the first futures workshop soon following the first Delphi round was to collect views and visions on the ways to achieve the desired low-emissions future. The participants represented various fields of societal expertise such as government administration, NGOs, energy business and researchers of various fields, as well as representatives from various business areas. The results of the first questionnaire were sent in advance to those who had confirmed their participation to the workshop. For the workshop, people were divided into groups of eight to ten persons, and each group had the same task to solve. The workshop took up an entire working day and consisted of three consecutive elements as well as application of subsequent methods: the imaginary phase (futures wheel), systematic phase (futures table) and explanatory phase (drafting an array of scenarios for sustainable Finland 2050). This sequence of three main phases in the workshop was a modification of Jungk's (1987) workshop formula, where six phases are used in a participatory bottom-up social innovation process. Jungk emphasises that ordinary citizens should be invited to participate in futures workshops to elaborate issues that affect their lives. In government foresight process, the majority of participants were experts but the results of the on-going foresight and scenario work were communicated to the general public via the internet for comments and discussion. The workshop produced a considerable amount of material concerning the workings of the Finnish society, regarding to climate change mitigation as well as a variety of futures visions of sustainable Finland. This material was used as building blocks for the next phase of the exercise, in addition to providing the background for the four scenarios that were the final result of the whole foresight process.

Second round of Delphi questionnaire

The second questionnaire was based on the material of the previous two stages (i.e. the first Delphi round and the first futures workshop) which was refined to form four distinctive scenario drafts by the FFRC team. The FFRC team's key task was to arrange the material into four development paths not sharing too many common features. Drafts of the four scenarios were introduced in the questionnaire to the respondents, who were asked to study the scenarios and assess their qualities: credibility, desirability, as well as obstacles and drivers for realisation of each scenario. Along with improving the drafted scenarios, the goal of the second questionnaire was to fill in the gaps in the information required to form a solid general view of the future. Hence the most important information needs concerned possible development paths in key energy consuming sectors (transport, housing and industry), the additional questions concentrated on these issues. The questionnaire was semi-structured, with questions concerning development paths having limited options on future development to choose from, whereas questions concerning the scenario drafts were open questions.

Second futures workshop

By the second futures workshop, the FFRC team had taken into account the results of the second round questionnaire and, based on this new data, rewritten the four scenario drafts each depicting one possible path to the desired sustainable future (no higher rise than two Celsius degree in average earth temperature). In this second workshop, the task was to envision the necessary steps and actions leading to these futures – to come back to the present from the future and go back to the future again. The goal of the second workshop was to view, assess, and complete the scenarios. As with the first workshop, the results so far were sent beforehand to those who had confirmed their participation in the workshop. This way the participants were able to assess the pros and cons of the constructed scenarios before the workshop, thus making work in the futures workshop more effective.

Results and policy implications

The final results of the foresight process were four scenarios that all fulfil the targets of reducing GHG emissions by at least 80 per cent from the 1990's levels and thus for their part influence that the expected rise in global temperature does not exceed two degrees Celsius.

The four finalised scenarios were labelled as[2]:

1. Efficiency revolution (concentration on diminishing energy consumption).
2. Sustainable daily mile (concentration on restraining urban sprawl).
3. Be self-sufficient (concentration on self-sufficiency).
4. Technology is the key (business-as-usual scenario, solutions relying on decentralised energy production and increased use of nuclear power).

The main characteristics of all scenarios are collectively illustrated in Table II. Elements belonging to each of the four scenarios are displayed in their own columns. In the left column that displays the most important variables, the most discussed topics were the structure and energy use of industry, heating of buildings and transport. These three sectors constitute the majority of the energy use in Finland: industry (50 per cent), heating of buildings (21 per cent), transport (17 per cent) and miscellaneous uses (13 per cent) (Statistics Finland, 2009). During the scenario process no significant new energy uses outside these sectors were thought to emerge by 2050.

Along with producing the scenarios factors affecting the attainment of the set targets were also inquired after. The basic message from the expert group regarding this question was that in order to achieve the set targets, considerable changes in attitudes and habits of both the citizens as well as different industries are required. The areas that will face the biggest pressure to change are energy intensive industry, polluting energy industry (especially peat energy), transport and logistics, construction, meat production and travelling.

As for the public's approval for the actions needed to prevent the unwanted effects of climate change, most often mentioned hindrances in public opinion were cynicism (what a small country such as Finland does, has no effect on the global problem; therefore it does not make sense to burden oneself with trying), scattered community structure, motoring as every man's right, one family houses being viewed as the best possible means of residing, acclimatisation to inexpensive energy and huge sunk investments in the existing energy infrastructure.

There were also positive factors in the Finnish society that favour the attainment of the climate policy goals. These included the Finn's close relationship to nature and a genuine will of most members of society to work for the environment, obedience of the law, good technological know-how, abundant resources of biofuels and the infrastructure from forest to industry already in place (as a heritage from paper and pulp industry), as well as the fact that Finns are already accustomed to recycling their waste.

After the work assigned for the FFRC was finished as agreed, the Prime Minister's Office took the scenario process further and commissioned detailed descriptions of the development paths towards the described end states that would fulfil the two-degree target, along with calculations that would further illustrate the effects and needed changes for current practises caused by each scenario. The results of these calculations are presented in the Government Foresight Report (Prime Minister's Office, 2009,pp. 160-184).

Regarding the calculations, there was much discussion among the FFRC team and the staff of the Prime Minister's Office on whether or not attaching numerical values to scenarios stretching all the way to year 2050 is advisable. The FFRC team stressed that due to the nature of long-reaching scenarios to hold a great variety of unknown uncertainties, the reliability and information value of calculations made using the kind of information that was available at the time of the task, would be relatively vague. Further refinement in the changes in the operational environment that affect the possibilities to reach the emission goals of 2050 would have been needed to make the foundation for attaching numerical information more solid. Moreover, a cross-impact analysis to see the possible implications that changes in major elements of each of the scenarios might bring, would most likely have been useful.

The desire to have numerical values to compare different future paths is understandable. In a political process there is a need for practical and easily digestible information, such as clear figures. The decision-makers have a huge variety of issues to deal with and one cannot expect the politicians or public officials to have the time to learn and master all aspects of the decisions they make. Here, however, lies a hidden risk in using numerical values to describe possible future events. Calculations often oversimplify possible development paths, the

Table II Attributes of the constructed scenarios

Scenario/variable	*A Efficiency revolution*	*B Sustainable daily mile*	*C Be self-sufficient*	*D Technology is the key*
Leading idea	Eco-efficiency, diminishing energy consumption	Restraining urban sprawl and diminishing personal transport needs	Self-sufficiency, relying on home-grown renewable materials	Business as usual, relying on heavy industry
Economic growth	Stable growth	Stable growth	Slow growth	Stable growth
Basis of economic structure (industry)	Energy scarce service sector, high-tech products and high skill-level services most important sources of income, no energy intensive industry	Demand and supply of small-scale local products and ''at-home'' services has increased significantly. Infrastructure planning and ecological wood building booming areas. Domestic demand for mass-consumption goods has fallen, some export of these goods (and jobs in these industries) still exist	Strong agriculture- and forest industry with many innovative high-value products (not just grain and paper)	Both knowledge- and resource as well as energy-intensive businesses; knowledge intensive services highly concentrated in the south of the country. Middle- and northern parts of the country live from agriculture, forest industry and mining
Buildings	Very strict norms on energy consumption for both old and new buildings, all new buildings are plus-energy buildings	Tight energy norms. Wood used extensively in building. Versatile communal spaces (baths, recreation spaces) in buildings make apartment buildings a real option for detached houses	Tight energy norms. Buildings made from wood and other domestically available materials. All suitable buildings produce energy (solar, geothermal, biomass, wind). Gardens and greenhouses in residential areas	Some development in energy norms. Average living space and total area of heated buildings has increased significantly. People commonly own more than one property (typically a city apartment or a town house and a holiday residence or cottage in the countryside)
Transport	Hugely increased telework, telepresence and virtual travel has lowered the need for personal transportation considerably	Passenger and industry transport needs diminished. Everyday personal traffic increasingly by foot, by bike or by improved public transport systems. With goods transport rapid development of intelligent logistic chains has lowered the demand	Passenger transport with electrical vehicles	Transport needs grown, both passenger and freight traffic increased
Energy consumption	Consumption halved from 2008 level. Dramatic improvements in energy efficiency and elastic price system the main reasons behind decreased consumption	Decreased by $\frac{1}{4}$ from 2008 level. Transportation and buildings require significantly less energy than in 2008	Decreased by 1/3 from 2008 level. New houses and buildings in rural areas either passive or plus-energy houses and/or relying on renewables	At the 2008 level or slightly higher
Energy production	All energy produced with renewable sources	50 per cent renewable, 50 per cent nuclear energy (use of nuclear power has increased slightly from 2008)	75 per cent renewable, rest with nuclear energy	Share of renewables less than 50 per cent, use of nuclear energy has increased clearly, CCS technologies in use

(*continued*)

Table II

Scenario/variable	*A Efficiency revolution*	*B Sustainable daily mile*	*C Be self-sufficient*	*D Technology is the key*
Urban structure	Cohesive, in urban areas people move closer to central cities, in the countryside villages grow	Highly cohesive around local town centres where residential areas are located densely within a walking distance from the local centre	Dispersed across the country. Aim for as extensive self-sufficiency as possible guides the structural development	Dispersed in urban areas, current trend where people move further away from city centres in search of larger houses, continues
Change in values	Not a great change, the biggest change is the increased willingness to adapt and take advantage of solutions produced by the development in ICT	Transformation away from culture of mass-consumption. Wasteful behaviour in both the private consumers and industry (especially retail) is considered undesirable	Environmental values and understanding of nature's processes highly valued. Responsibility for one's own welfare and actions has increased	Very little change: preserving equal rights for everyone to choose one's own way of living (where and how to live, what, how and how much to consume, etc.) the most important value
Relation towards environment	Nature as the most important asset. Pre-emptive nature conservation	Nature as a source of admiration and recreation	Nature as a partner	Cleaning up the mess made as much as possible
Relation towards technology	New technology as a lever and enabler	Reshaping old; finding new intelligent ways to use old technologies	New technology as a lever and enabler, mimicking nature, industrial ecology	Search for innovations to boost economic growth and improve the state of the environment

numbers can also easily be considered as neutral and to have a high information value, without too much deliberation given on how one arrived at these numbers. If the user of the resulting numerical information concerning the scenarios is not aware of the uncertainties behind scenarios, and thus how these numbers should be interpreted, available information might lead to hasty decisions. Some alternatives might be disregarded altogether and the decision-makers might be tempted to focus on a particular scenario. Another risk of this approach is that calculations and assessment of, for example, energy use of some industrial processes, are made according to what we know to be possible today and in the near future.

Using numerical values to support decision-making is a preferred procedure but it has to be noted that the longer the reviewed time horizon gets, the more uncertain the results become. If these kinds of calculations are not carried out in a conscious way, the basic idea of scenarios as describing alternative possibilities, not predicted certainties, is lost. The best way to avoid this trap would be to repeat the scenario process regularly to refine the results. Using scenarios in decision-making is ideally a continuous process rather than a one-time exercise.

External and internal evaluations

The Government Foresight Report on Long-term Climate and Energy Policy was completed and approved in the government and by Parliament in October 2009. A year after that, the government commissioned an evaluation on the effectiveness of the preparation process that would comment on the general progress of the process as well as the usability of this kind of foresight work in policy planning. This internal evaluation was conducted by the Prime Minister's office.

One has to bear in mind that the evaluation concerned the whole foresight report, of which the FFRC's scenario work represented only one part. The Prime Minister's Office also wanted to publish the scenario process as such (Lauttamäki and Heinonen, 2010), since a lot of public interest was directed towards it and the full scenarios were only published as attachments in the completed foresight report. All in all, three evaluations of the government futures report were conducted where the scenario process was also discussed: one internal evaluation as mentioned above, and two external evaluations – one being the official statement given by the Committee for the Future in Parliament (2011), and another one by an expert (Wilenius, 2011).

The Committee for the Future (2011) supported the government foresight report. The Committee had its own analyses of the Finnish climate policy made on three aspects:

1. forest, food, water and biopolitics;
2. innovations, courage and pioneering; and
3. economy, employment, entrepreneurship and wellbeing.

The Committee also paid attention in its statement to the fact that the government foresight report chose as its only starting point the success of the Copenhagen Climate Agreement. A special note was given on green growth, as well as on possibilities to promote wood production and exports, to increase competence in wood construction and create jobs in that field.

In the evaluation of government foresight report by Wilenius (2011), attention was drawn to the fact that the government foresight report could have dug deeper into the economic implications of climate and energy policy, i.e. employment, industrialisation, investments, and education policy. Bottlenecks hindering the growth of new business opportunities for low-emission technology and applications should be analysed and removed. The extent of constructing scenarios in the government foresight report was defined as unique and pioneering. Wilenius (2011) recommends the application of scenarios in the future as well, and proposes that the focus in developing foresight reports should be, e.g. on how scenario techniques could deal with long-term goals and path dependences to a more detailed degree. Establishing of the position of Minister of Climate and Energy for the next government was also proposed.

Concerning the application of foresight methodologies used in this kind of work, the statements of evaluation are encouraging. In the evaluation, especially the scenario work is

acknowledged for bringing forward genuinely varied possibilities to achieve the emission targets. Another mention concerning FFRC's input speaks of the role of expert workshops which in the evaluation are thought to be a very effective tool to find the right questions and seek possible answers to these questions.

Prime Minister's Office organised a gathering on March 29, 2011 for those involved in the foresight report work to discuss retrospectively the process and reflect on the impacts of the foresight report. Government Climate Policy Specialist Oras Tynkkynen, who was responsible for the preparation of the report in the Prime Minister's Office[3], remarked on that occasion that it was a major breakthrough achievement to have Finland committed to reducing its emissions to a sustainable level – by at least 80 per cent from the 1990 level by 2050.

Conclusions

The backcasting process depicted in this article produced four different scenarios for climatically sustainable emission level while retaining the current standard of living. While, in line with the idea of backcasting method, all the scenarios are against current trends, they are still quite predictable (energy efficiency, restraining urban sprawl, self-sufficiency, and new technologies). However, the implications of the scenarios include somewhat radical elements. These include, e.g. significant fall in mass consumption and rise of small-scale local production and consumption instead, hugely increased telepresence and virtual travel and consequently considerably lowered need for personal transportation, highly cohesive urban structure, and nature as an intrinsic value and a source of admiration. The scenario implications show that by encouraging participants to think of discontinuities the backcasting process can help imaging alternative futures which are also plausible. Further developing of participatory elements in backcasting processes could increase their potential for enabling alternative futures thinking even more.

Backcasting is often used in policy planning owing to its normative nature. This case shows some of the problems caused by connections to the decision making apparatus. Firstly, the task was challenging because the time allocated for such an all-embracing work was very tight. The scenario team had collected a very impressive and insightful group of people to act as expert panellists for the Delphi and the scenario process to balance out the time constraints.

It is interesting to note that the results produced in the FFRC's process were slightly altered as they were presented in the final publication by the Prime Minister's Office. The most important deviation from the original results was the change made to scenario B. In the original material produced by the scenario process facilitated by FFRC, possibility of degrowth economy (since wellbeing was considered to be at least on the present levels, this would mean that in the future wellbeing is defined in a different fashion from today) was presented in scenario B. In the final publication of the results of the scenario process this notion was replaced with stable growth. Presumably the original result was politically too difficult an issue to consider at the time. Modification of results in order to make them more digestible, especially in a political context, is understandable. However, it somewhat undermines the very thing one is trying to achieve by futures research methods, namely encouraging creativity and a wide variety of options and weak emerging issues. Seen from the present situation in particular after the global financial crises, the anticipated possibility of degrowth economy is not an insignificant option but indeed a development alternative to be taken seriously.

An open question remains how various ministries will connect themselves in implementing the recommendations and conclusions in Government Foresight Report. Publication of the report launched a wide public discussion on low emissions communities and low-carbon society, thus increasing awareness of these concepts and related issues. This may be partly seen as a result of the scenario approach which provided concise narratives of long term futures with one robust national goal: Finland of low emissions 2050. The measures and steps for reaching that goal will continue to be under debate. Such a transition is all the more challenging since it is not supposed to undermine wellbeing in our society.

All in all, one can conclude that using futures studies methods in public policy formulation have promising possibilities. Especially participatory methods where views of various different

experts are considered are highly recommended. Taking the participatory aspect further and also incorporating citizens in the process could increase the scope of different views and help in implementing the results. In the pallet of the methods of futures studies catering many different approaches to different needs can be found. Regardless the choice of the methods, ample time to carry out the given foresight process so that it can best serve the needs of the client, should be guaranteed. Emphasis should also be given on interpreting the results, even the odd ones that various methods of futures studies produce. The results, in most cases, do not portray accurate projections or action plans, but rather an array of possibilities and alternative visions on the future development, as cognitive food for different policy options.

Notes

1. Summary of the strategy is available on the web site of the Ministry of Employment and the Economy: www.tem.fi/index.phtml?l = en&s = 2658 (accessed 20 December 2011).
2. The scenario titles are here in the form that they are presented in Government Foresight Report (Prime Minister's Office, 2009). In the original scenario work the titles were rather similar, except for the scenario D. Its tentative title ''Power from Decentralisation'' was transformed into ''Technology is the Key''.
3. The work for the foresight report was supervised by a ministerial working group.

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