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Towards a pioneering status?

Assessment of the Foresight Report on Long-term Climate and Energy Policy

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Abstract
This assessment concerns the Government Foresight Report on Long-term Climate and Energy Policy, submitted to Parliament in the autumn of 2009. The assessment characterises the report and its background material as extensive and versatile. By providing a picture of the current state of climate change and the risks it creates, alongside calculations of the emission reduction potential of various sectors, the report serves as a basis for a rational national debate and political decision-making. Various scenarios chart different ways of implementing the model of a low-carbon Finland within the next 40 years. The report thus aims to lay a foundation for Finland's pioneering status in climate and energy policy. Plenty of excellent material is provided to this end. On the other hand, the report could have provided deeper coverage of the climate and energy policy's economic impact, in terms of employment, industrialisation, investments and education policy. The rural development perspective was also somewhat lacking. In addition, the assessment describes administrative divisions' suitability for meeting the strategic challenge posed by climate change. The development of foresight reports should focus on how long-term goals and the related path dependencies can be handled in greater detail by employing a scenario technique. Furthermore, the ministries must show sufficient commitment to the report's implementation.

Keywords
Climate, energy, policy, future

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FOREWORD

The aim of the foresight report on long-term climate and energy policy was to chart Finland's paths towards a low-carbon society. In the foresight report, the Government set the objective of making Finland a global leader in climate protection. Reducing emissions in Finland was placed within a global framework of sustainable development.

In many respects, the foresight report was innovative, even groundbreaking. For the first time, a long-term emissions reduction target was set for Finland and the possibilities of cutting emissions by at least 80 per cent were examined. Scenarios in support of such an examination were drawn up and, for a government report, utilised to an exceptional degree. During the foresight report's preparation, considerable effort was made to ensure a participative process and a comprehensible end result.

The preparation of the foresight report has been assessed in various ways. An online survey of participants has been conducted. In addition, a self-assessment report has been drawn up by the team, at the Prime Minister's office, responsible for the report's preparation. Special attention has been paid to the report by the Committee for the Future, on various positions taken by Parliament.

Written by Markku Wilenius, the enclosed report also forms an integral part of the foresight report's assessment. Here, a seasoned expert in the field of futures studies presents his own, independent view of the foresight report's strengths and weaknesses. Naturally, the views expressed in Wilenius' report are those of the author alone.

An encouraging number of successes and accomplishments are highlighted by Wilenius. He acknowledges the extensive body of facts on which the preparatory work was based and the encouragment of participation, as well as the foresight report's global perspective and comprehensive approach. Wilenius also commends the scenarios outlining alternative paths and the ambition to lead the field.

Wilenius nevertheless identifies shortcomings and issues requiring further work. For instance, he observes that deeper coverage should have been provided of the interconnection between a low-emissions approach and markets, rural areas and education. In addition, the foresight report should have been more closely integrated with the climate and energy strategy and natural resources policy. While the long-term objective is good as such, a broader examination of the various paths and additional concrete measures would be required for its achievement.

We hope that Wilenius' work will provide assistance in evaluating the foresight reporting activities conducted during the current parliamentary term. Additionally, in future parliamentary terms, Wilenius' conclusions are sure to be useful in the development of climate and energy policy and the foresight reporting process. We would like to thank Markku Wilenius for his valuable observations.

February 2011

Oras Tynkkynen
Climate Policy Specialist
Prime Minister's Office

CONTENTS

1 ASSESSMENT OBJECTIVES

This assessment aims to examine the Government foresight report on climate and energy policy, providing advice on aspects requiring attention in the report's further implementation. The assessment's main focus is on how well the report and the process structured around it serve the goal of strategically developing Finland into a low-carbon society. On the basis of the assessment, conclusions and recommendations for further work are given. Rather than a fundamental, in-depth analysis of the report materials and methods applied at different stages, this assessment is a compilation of the writer's observations made in the process.

2 BASIS OF THE REPORT

A growing number of countries have come to realise that, alongside operational programmes, key societal challenges require systematic long-term examination and a strategic perspective. This is less a question of systematically steering societies, than of highlighting and forecasting societal themes of future importance. Highlighting this issue as part of the Government programme's implementation is itself an awareness-creating process. Such a process helps politicians, officials, companies, researchers, people in the third sector, and ultimately, all citizens, to understand the broader implications of the phenomenon under discussion.

Prime Minister Matti Vanhanen's second cabinet set itself the goal of preparing a foresight report on climate and energy policy. The selection of such a topic is an apt reflection of how high climate change is on our societal agenda. Indeed, as a theme, climate change now touches upon nearly all sectors of society, from technology policy to social policy. Although climate change still entails many uncertainties, it is clear that curbing and adapting to it represents one of our greatest challenges in the coming decades. Since energy use is a key cause of climate emissions, energy policy in particular plays a crucial role in mitigating climate change.

The report has been given the subtitle "towards a low-carbon Finland". This illustrates the key objective laid out in the report: climate emissions in Finland must be reduced quickly. While the target of an at least 80% reduction from the 1990 level by 2050 may sound ambitious, it should be noted that other countries are setting similar objectives.

In 2010, Great Britain, for instance, has set the same target for its own emissions. The British report, 2050 Pathways, employs scenarios to illustrate opportunities to reduce emissions in various sectors. Germany's current climate strategy does not chart actual packages of measures, nor does it specify long-term emission reduction targets. However, Germany is in the process of preparing a strategic action plan. Norway, for one, had already decided by 2006 on becoming a carbon-neutral country by 2050. Sector by sector, Sweden's climate strategy of 2008 examines opportunities to reduce emissions through various policy measures. However, the Swedish strategy scarcely mentions the year 2050 and the related targets or packages of measures. It also almost entirely lacks policy outlines and recommendations.

When examining similar reports from other countries, it should be noted that Finland's is exceptional in terms of clarity and detail. Many reports extending until 2050 do not set concrete objectives for the time span, nor do they specify measures very far into the future.

Who, then, is in a position to assess the right level of emission cuts? After all, even the target of reducing emissions by at least 80%, now considered tough, could actually turn out to be too modest. With technological development progressing at such a pace, predicting its speed is very difficult. This is evidenced by the development of information technology, for instance. At the same time, we should remember that many industrial infrastructures, such as distribution systems, change rather slowly. Raising the share of renewable energy to a minimum of 60% of energy production would therefore require a major structural change to our energy supply system and the infrastructure on which it is based (see the Sitra report 30/2010 on the topic).

Technological advances and their adaptation to society and the economy is a highly complex issue. Combined with other environmental challenges, climate change is a change factor likely to have a structural, or one could even say paradigmatic, impact. The coming decades will undoubtedly represent a period of fundamental change. This is also the spirit of the report: in the year 2050 society will look very different. Scepticism on this count can be dispelled by considering how different Finland was 40 years ago, in 1970. There are thus good grounds for believing that, due mainly to dramatic developments in technology and wealth, an even more radical transformation will occur within the next 40 years.

Bearing the above in mind, the report focuses on the changes likely to occur in industrialised countries. This involves a shift away from the structural models and thinking underpinning the industrial age ("the fossil economy") towards a post-industrial, partly dispersed, service-centred architecture. Unlike the industrial age, this new economic paradigm will pursue resource efficiency and human-oriented solutions. Finland's competitiveness, and its consequent ability to meet the challenges posed by a changing climate, is crucially linked to how quickly we can understand the demands of the new paradigm. Indeed, this chain of thought seems to form the basis of the report.

At the same time, the development of the Finnish economy and society will be hugely influenced by population ageing. In the coming decades, ageing will decelerate economic growth, influence service demand and transform the labour market structure. As various studies have proven, people's values are also changing. Curbing climate change is connected to issues affecting the daily life of all Finns. In chapter 7 in particular, the report discusses, to a certain extent, the changes in everyday life necessitated by emission reductions. Bearing in mind factors affecting the realisation of various future paths, it is clear that people's values will play a key role in the path eventually taken by Finland. Current research suggests that benevolence and safety are Finns' primary values. Such benevolence can be thought to extend to nature, while safety includes risk avoidance. Both of these values are therefore central to climate policy.

3 CONCLUSIONS

In the following, I summarise my conclusions on the report:

a. **The report has been carefully prepared and skilfully connects various perspectives**. Like the material on which it is based, the report is fairly extensive and, in many respects, stands up to international comparison. It succeeds fairly well in achieving its goal of providing a comprehensive picture of the key climate and energy policy challenges. Given that the purpose is to outline a view of the future over a 40-year time frame, and the manifold uncertainties involved, the subject matter is among the most difficult imaginable. From this perspective, the outcome can be considered successful: the report presents a multifaceted view of the goal of attaining a low-carbon, energy-efficient society. It is made clear to the reader that, although extremely challenging, the target of substantially reducing emissions is absolutely necessary.

b. **The report and its background documents contain plenty of information, expertise and material.** It should be considered a merit of the report that such a large group of experts, and representatives of various interest groups, contributed to its preparation. On the other hand, it seems that companies, clean technology companies in particular, had a rather limited presence on the report's expert group. Since the report is based on a considerable body of background material, it is natural that only some of this material is brought to the fore. Being well-written and fluent, the report can be understood by laymen. In substance, it is mainly very balanced and fairly extensive, with nearly all key aspects at least receiving a mention.

c. **Three aspects do not receive sufficient attention:**

- **The economic aspect of climate policy could have been given greater prominence**, in other words, the question of the kinds of market and investment prospects implied by a transition towards a low-carbon society. The report notes that the domestic market is in a key role, as it can be used for pilot projects and to obtain references. No concrete estimates of investment needs, or market developments in general, are presented. However, the scenarios given in the appendices include general estimates extending until 2050. Estimates of the potential of greater energy efficiency are also presented in the actual report. It would be important to address the Government policy outline presented in the report, regarding the question of how to substantially increase the share of renewable energy and how various bottlenecks in the electricity grid's capacity, for instance, might be resolved. Sitra, the Finnish Innovation Fund, recently (2010) prepared a preliminary study of the infrastructure impacts of various energy scenarios. This study could be used as a basis for a concrete examination, including the related implementation recommendations.

- **Too little attention is paid to the key issue of how report objectives and impacts relate to rural development.** More coverage of this aspect of the matter is, however, provided by the report Biotalous Suomessa ("Bioeconomy in Finland", Prime Minister's Office 2010), submitted at the end of September. Patently, climate and energy policy should be more closely linked to industrial

policy in the future. It is integral to the vitality of the countryside that bioproduction shift towards further-processed, customer-oriented products. For instance, as benecol and xylitol have shown, it is possible to extract unique, high-quality bioactive substances from Finnish plants, berries and trees. Furthermore, estimates suggest that a manifold increase would be possible in the utilisation of biomass resources for climate and energy policy needs. Strong growth can clearly be forecast in global demand for bioenergy. In a situation where global deforestation is proceeding at a worrying pace, the development and internationalisation of Finnish forest expertise is naturally a broader, bioeconomy-related issue.

- **Scant attention was paid to the role of education and competence development in making Finland a trendsetter.** If we wish to attain a low-carbon Finland, much more education and expertise is required, particularly in order to substantially increase the use of new energy technology in the coming decades, alongside greater material and energy efficiency. The report mentions the Government policy of reinforcing the climate perspective in education at all levels. However, there is little analysis and no recommendation for concrete measures in this regard. Such a situation can be regarded as nowhere near satisfactory: only recently have universities awoken to the need for more education in the field of new energy technology. One reason for these deficiencies in high-level education probably lies in the underdeveloped Finnish domestic market. This is particularly apparent with regard to wind power. The figures speak for themselves: at the beginning of 2010, Finland had 147 MW of built wind power capacity, while in Sweden the existing capacity was 1,021 MW, and even Austria had a capacity of 995 MW. In Germany, the capacity is already 25,030 MW. Finland is therefore simply lagging behind in the utilisation of wind power. This is one reason for the failure of high-level education in the sector to develop to the level that might be expected of a country with a positive stance towards education and technology.

d. The report introduces genuinely distinct alternatives as to how Finland might attain a low-carbon society by 2050. Four scenarios, serving as a basis for estimates and calculations, illustrate the alternative opportunities and risks for Finland. In sum, these scenarios reveal the importance of Finnish decision-makers having a long-term understanding of the direction in which society is moving. It would be unfortunate if such strategic considerations were completely overshadowed by topical, operational issues. At the same time, while it is clear that well-grounded, differing views on future visions are possible, this should not prevent constructive discussion and outlining of operational entities. From this perspective, it is certainly a pity that the scenarios themselves are only included as appendices to the report. The problem may lie in the nature and role of such scenarios being rarely understood. They are not intended to set a specific future vision in stone, but to open our eyes to various, alternative views of the possible outcomes of certain policies and developments within the operating environment. In this sense, their significance lies specifically in creating the prerequisites for an evaluation of the kind of future we want to build.

In this context, it is natural to ask whether constructing scenarios is a suitable tool for foresight reporting in general. I think that it is, provided that scenarios are treated in the same way as a sculptor treats his mould: they are tools for achieving one's goal. The use of scenarios is entirely justified, if the foresight reports aim to help people understand the relationships between various objectives, measures and time frames. An effort could have been made to enrich the scenario descriptions included as an appendix to this report. Each scenario could thereby have been depicted separately, after which key challenges from the perspective of the current situation could have been presented. This might have helped to foster a more direct discussion of the factors preventing or supporting the realisation of each scenario. In turn, this would help achieve the objective of the entire report: prompting a social debate on how Finland might transform itself into a low-carbon society.

e. **After the report's publication, advice on implementing the report was obtained from various interest groups, through so-called future forums**. At these forums, themes central to climate and energy policy were brought to the fore and a large group of experts was heard. The resulting documentation demonstrates that strong efforts were made to disseminate and implement the report and its message, both within the administration and among various groups of citizens. These important dissemination efforts should be extended to companies. Furthermore, it might be wise to involve various NGOs in the implementation efforts. Nowadays, social media are an effective channel, of which we should take full advantage. I could see little indication of the report's message and the related discussions appearing in such media. Further action should also include benefiting from the materials and views brought forth at the future forums.

f. **The report is placed in a global framework and successfully frames the "question of Finland," set within a global agenda**. The report describes the challenges that humankind as a whole will face in its fight against, and adaptation to, climate change. In addition, it provides a view of other countries' efforts in the field of climate policy. The material contains descriptions of similar foresight reports drawn up in other countries, especially in Great Britain, Germany and Sweden.

g. **The report strongly supports the implementation of sustainable development in Finland**. It convincingly argues that, in practice, sustainable development signifies the construction of a new kind of economy and technological infrastructure. This also means adopting new values and ways of living. Indeed, achieving a minimum 80% reduction in greenhouse emissions within 40 years will pose an unprecedented challenge to current modes of production and consumption. In the future, energy use and consumption must be more closely connected to the entire material cycle of the economy and society: in the long term, western societies must increase their energy efficiency tenfold.

h. **The content and message of the report strongly advocate leading the way.** It paints a picture of a Finland determined to lead the way among nations, towards an economically, ecologically and socially sustainable society. But whether Finland is ready for this is another question. A host of conflicts and thorny issues could have been given more prominence in the report: how will substantial, additional construction of nuclear power, now enabled through permits granted by Parliament, affect the development and implementation of renewable energy technology? How to create demand for new energy

technology on the markets, if energy prices continue to be held unusually low in Finland? Can we learn from Germany? As a result of resolute policy, in which feed-in tariffs have played a key role, a clean-tech industry has emerged, generating at least 100,000 new jobs in the last five years. We must therefore accept that the emergence of a new industry requires strong support measures and perhaps higher energy prices. The package of obligations concerning renewable energy, agreed on by the Government's ministerial working group on climate and energy policy in the spring of 2010, is an important step in this direction. In practice, the pioneering status postulated by the report would require a strong industrial and employment policy, based on developing renewable forms of energy production. Naturally, this would also require a more resolute focus on resource and energy efficiency. Although progress has been made in this regard, Finland cannot as yet be considered a trendsetter.

4 RECOMMENDATIONS

The following highlights some perspectives that I consider particularly important to further implementation:

a. **A closer, properly aligned connection must be created between the foresight reports and strategies produced by the administration.** For instance, there is little merit in the government first preparing a climate and energy strategy, which is then followed by the creation of a strategic, long-term framework, i.e. the foresight report. In the future, we must therefore ensure that the correct order is followed in handling the theme of the report.

b. **Climate and energy policy should henceforth be outlined in tandem with a natural resource policy.** Once the report on natural resources is completed, it should be combined with the climate and energy report into a uniform, long-term strategy for a "Sustainable Finland". This strategy would combine novel, renewable, more efficient and low-emission energy technology and service development, with the construction of a new bioeconomy and enhancement of the material cycle. Finland can only take the lead in climate protection if we have fully mainstreamed and moved towards utilising a new bio-based production and service model. On the whole, a climate and energy policy perspective which aims "merely" to curb climate emissions (mainly carbon dioxide) would form too narrow a guiding principle for sustainable development. The evaluation of emission reduction should therefore be extended to cover the overall use of natural resources, materials and energy. The division of decision-making on climate and energy policy between several ministries has probably affected the current report process. In this respect, it is a virtue that the foresight report attempts a horizontal examination, this being supported by its compilation at the Prime Minister's Office.

c. **The target should be clarified.** In principle, the quantitative reduction target of at least 80% from the current level is a positive development. But the most important goal, of defining the sense in which Finland can be a genuine trendsetter, is not properly addressed. As I see it, this boils down to the question of how to create an "ecosystem" in Finland in which environmentally efficient, climate friendly innovations and operating

models gain more ground. This requires a carrot and stick approach, as well as radical solutions on occasions. For instance, since better alternatives are available, Finland could simply ban the installation of new oil boilers in single-family houses. The report also includes the excellent suggestion of allowing companies to deduct energy efficiency investments, for taxation and bookkeeping purposes, during the year of investment. It is precisely these somewhat radical, and probably highly efficient, ways of increasing the attractiveness of investments in efficiency measures that one hopes to see in policy recommendations. Furthermore, Finland could switch to the Dutch model of compulsorily applying environmental criteria, on as extensive a basis as possible, to government procurement**.** This model should also be extended to the municipal sector.

d. **Currently available material should be complemented by an extensive review of the opportunities offered by a new and renewable climate and energy economy, including from the technology, service provider and investor perspective**. The cost perspective remains too dominant over the way we view efforts to control climate change; they are not regarded as an investment, an industrial and employment policy or a generator of wealth. Moreover, a comprehensive vision should be included of the development of the clean tech market and the opportunities it offers Finland, particularly in terms of the investment perspective. In order to provide an extensive picture of the economic opportunities, risks and bottlenecks involved in clean tech, as many clean-tech actors as possible should be included in the process. In this way, information on the foresight report and its objectives could be disseminated, while collecting additional views from the field and suggestions on how to facilitate the report's implementation. A study should be launched immediately of climate economy bottlenecks and opportunities in Finland.

   In the long term, extensive implementation of wind power constitutes an important tool for putting Finland's energy production, electricity production in particular, on a more sustainable basis. The report pays scant attention to the problems which have seen wind power utilisation remain in its infancy in Finland. Despite the fact that now, after the publication of the report, we have finally made a decision in principle on a feed-in tariff system, we should also ponder how the implementation of wind power might be facilitated, by simplifying permit procedures and land-use planning, for instance. The promotion of bioenergy is just as important, as it should play a considerably larger role in Finland's energy future. How to promote dispersed bioenergy production is a question of particular importance. In principle, strong support for the implementation of renewables is provided by the target set by the EU, to raise the share of renewables to 38% of Finland's energy consumption by 2020.

e. **Scenario work, including the more specific examination of paths, should certainly be continued.** This should be done in such a way as to engage a large group of experts and citizens, in order to generate a far more specific description of the various visions. At the outset of this phase, on the basis of feedback received, the question should be re-evaluated of whether the current four scenarios are successful, in terms of illustrating various outcomes and goals, or whether their mutual relations and assumptions should be changed. In my view, the report's implementation would significantly gain from a thorough discussion within Government of the long-term goals, in the wake of further work on the scenarios. On the basis of such a prioritisation

discussion, a road map would be drawn up for moving the long-term evaluation advocated by the report towards strategy steering. Measures and areas necessary to meeting this objective should be included in the roadmap and linked to the relevant years/decades. As I see it, at least the following themes should be included:

- Renewal of the fiscal system, shifting from taxing labour towards taxing the use of natural resources, environmental load and emissions.
- Changes required in administrative practices
- Changes in people's values, and the related consumer policy
- Use of resources and recycling, intelligent systems.

Furthermore, as stated in the report, the current scenarios already have several elements in common, such as energy efficiency, technology leaps, the growing role of renewable energy, new traffic systems and waste recycling.

f. **In the next government, we should have a minister for climate and energy affairs, in order to expedite the foresight report's implementation.** This minister could also be responsible for science and research. In time, climate, energy and natural resources affairs must be combined under one ministry. Otherwise, I believe that we will simply lack the prerequisites for becoming a trendsetter.

g. As part of the foresight report implementation, **an ambitious, university-level education module on renewable energy technologies and energy efficiency should be created in Finland.** To achieve this, cooperation between the current technical universities must be fostered. An in-depth study should be conducted of education needs in the sector.

CONCLUSION

- Because the report concerned climate change, it is clear that its perspective had to be global. In my view, the report examines the development of the international climate change agenda with a fair degree of success and objectivity. Questions of how the burden should be fairly distributed remain extremely relevant to international agreement negotiations; no solution has been reached that would satisfy all parties. Again, the report views Finland's role as that of a trendsetter. However, this is not properly defined, but it is merely stated that "Finland has all the prerequisites for becoming a leader". At the same time, it is stated that the benefits of being such a trendsetter would be obvious, as it would improve Finland's international standing and confer advantages in the market for low-emission technology.

- But what does being a trendsetter mean? **Finland could genuinely profile itself as a country that will begin to systematically and comprehensively orientate towards a sustainable model of production and consumption, in practice as**

the first to do so among the developed, industrial countries. This could generate the kind of added value likely to cover many times the cost of investing in cleaner technology and energy efficiency. Given that Finland is already known as a country of high technology and education, this would provide an opportunity to significantly extend and deepen this image.

- According to a recent study by the consulting company Roland Berger, in the field of clean technology Finland is profiled in the insulation industry only, where we rank second in the world after Denmark, measured in relation to GDP. In the field of wind power, solar or biofuel technologies, we are not among the top nations[1].

- If we wish to lead the field globally, there is clearly room for improvement. The report wants us to contemplate the possibility of Finland actually rising to a leading position. In the follow-up work on the report, a key challenge would be to define Finland's trendsetting status, so as to form a guiding principle for the work of the next government. This could be realised through a method of engaging citizens, so that their views are genuinely heard.

[1] http://www.rolandberger.com/expertise/publications/2009-11-30-rbsc-pub-Clean_Economy_Living_Planet.html

APPENDIX

The report is based on a fairly extensive body of various studies, commissioned by the Prime Minister's Office from various experts. Background material for the report includes studies on:

Agents of change in climate attitudes, or matters influencing the values of citizens. This study reveals that Finns are almost unanimously concerned about climate change (even 9 out of 10 Finns are concerned about this). The significance of communal factors in changing attitudes is highlighted in the study. If some people are viewed as free riders in curbing emissions, people's motivation to change their own lives could be weakened.

Mainstreaming climate policy, discussing attitudes related to the growing political weight of climate change across various administrative sectors. The study brings forth the growing need to found a coordinating climate policy expert unit connected with the Prime Minister's Office, for instance, and to establish a permanent climate ombudsman.

Wind leakage, or how emission reductions in Finland can act as a catalyst for emission reductions in other countries. Tools such as emissions trading may also facilitate learning across national or regional borders. These benefits should be counted in when evaluating the effectiveness of various measures.

Application of Great Britain's climate legislation to Finnish conditions. The legislation in question is a particularly forceful way of attempting to influence emissions in England. The law specifies emission targets until 2050, as well as steering methods for reaching these targets. The report states that, in principle, there are no obstacles to tailoring this law to Finnish conditions.

The connection between **climate policy and income distribution**. The report shows that the impacts of climate policy also have a deep social dimension. For instance, a rise in energy prices poses a challenge, particularly to people with small incomes. Thus, climate and energy policy solutions chart a way to achieving different social models.

Climate policy and the regional development perspective. The report examines the change in regional structure and its connection to climate policy, demonstrating the connection between optimal utilisation of the regions and dispersed energy production.

Climate policy steering methods and their effectiveness. The report shows that different steering methods vary greatly in terms of efficiency. On the other hand, the cost efficiency of energy, fuel and carbon dioxide taxes varies from study to study. Improved efficiency can be achieved through means other than general taxes, that is, better targeted steering methods, such as carefully targeted tax cuts. This ultimately entails deliberately creating a combined effect, based on decreasing emissions through various steering methods.

Labels for indicating the climate impact of products. The report reveals that people would be willing to compare the qualities of products with regard to their climate impact, but establishing standards and a system of comparability will require great effort. The report suggests that authorities cooperate with the parties developing such systems.

Emission reductions to meet the two-degree climate target. The report provides an idea of the kinds of risks that might be averted through a dramatic reduction in emissions. It also estimates that, while concentrations can be limited to the extent that warming is confined to two degrees in comparison to the pre-industrial era, this will require efficient emission reduction and perhaps even radical solutions.

Use of scenarios in climate policy development. The report provides an overview of how scenarios have been used in examining long-term developments. It states that scenarios can be applied to discussions of alternative future visions and the related uncertainties. In this way, they can be used to illustrate the outcomes of different strategic climate policy choices.

An assessment of the foresight reports' significance and possibilities for their development. The first foresight report was submitted to Parliament in 1993 ("The future of Finland and alternative courses of action"), the currently evaluated foresight report being the fifth. Throughout their history, these reports have faced the key challenge of attracting sufficient attention, prompting discussion and, in this sense, having an impact on societal decision-making.

The reports can be found at:

http://www.vnk.fi/hankkeet/tulevaisuusselonteko/aineistot/fi.jsp (in Finnish)

Material used in the preparation and calculation of scenarios: reporting on the scenario workshops which provided the basis for drawing up and calculating scenarios. The material includes calculations on energy consumption and greenhouse gas emissions, the results of an online survey on scenarios, and impact assessments of the scenarios, incl. a qualitative assessment of economic impacts.

http://www.vnk.fi/hankkeet/tulevaisuusselonteko/lisatietoa/skenaariot-fi.jsp (in Finnish)

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