

This report is the result of an internal project of the unit Policy Studies (PS) at ECN. The unit provides policy makers in various regions of the world with independent, factual information on effects of policy instruments, developments in energy markets and technologies, and scenarios for our future energy system, among others. The idea for this travel guide arose from the observation that, in their work for policy makers, experts at Policy Studies sometimes arrive at broader, more general suggestions for 'sensible energy policy', while lacking space and time in their specific assignments to elaborate these suggestions into fully fledged recommendations.

In the project that yielded this report, we increased the internal discussion about these more general insights, recorded results and ideas, tested these with external parties and, finally, translated them into seven points of advice. We hope that these recommendations offer food for thought for anyone in a policy-making or strategic function who is trying to make our energy economy more sustainable.

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Tracking and Trailblazing

A travel guide to the energy transition

Key messages

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Our energy economy, one of the pillars of Dutch society, will be subjected to drastic changes in the next decades. This will be a laborious and painful process at times. It is up to policy makers to steer these changes with a clear eye for opportunities and threats. This guide intends to provide policy makers with several strategic insights and instruments for this task.

Why these changes in our energy economy? Decreasing stocks of easily extractable fossil energy resources and a globally increasing demand for energy will lead to higher and more volatile prices. Decreasing exports of natural gas and increasing domestic energy demand also imply changes for the Netherlands in their balance of trade and energy dependency. The need to prevent drastic climate change and still secure the affordability and security of energy supply adds an extra dimension and topicality to the question which energy technologies will 'fit' in the future portfolio.



Technology-oriented road maps, visions and scenario studies are shooting up like mushrooms, and make statements about various possible images of the future. Despite their differences, these perspectives show that a supply-secure energy system that emits 80% less CO₂ is both technically feasible and economically viable. Another conclusion is that postponing the required change in direction is sub-optimal for the longer term from an economic point of view: we need to act today. However, the differences between the studies clearly indicate that there are too many unknowns to robustly assess the optimal future mix of energy technologies. Lack of

certainty on the progress of crucial developments in technology, and complex 'system interactions' only allows one to say that energy savings, more renewable energy and deployment of CO₂ capture and storage (CCS) are important building blocks. The policy maker will need to set course with a lack of certainty about the exact destination.

Questions of policy makers are often aimed at obtaining more details about the future energy mix, allowing them to set a better course. However, it remains to be seen whether further detailing is the most important challenge today. To get society in motion, it might be more important for a policy maker to focus on 'how' the transition can take place in practice. Which frameworks, social processes and political forces determine the room to manoeuvre and which role does the policy maker play? Which barriers cannot be removed by the market or by themselves? On these issues, the mentioned studies generally offer little insight.

This travel guide tries to shed light on some of these issues. We are aware that a (Dutch) policy maker has only limited influence on the changes to come. Social developments often have their own dynamics. Much is also determined on the international playing field, where the Dutch voice is only one of many. Ultimately, the reshaping of the energy

system is a complex process in which the historic roots of the present situation, vested interests and the many interdependencies in the energy system render it into a status quo with quite some inertia. Any policy maker in the transition process thus faces a significant share of having to 'go with the flow'. However, where possible, he or she can channel this flow towards the desired direction: we offer several recommendations in this area.

This study analyses and elaborates on a number of practical themes that can help increase a policy maker's grip on the course of the energy transition, regardless of which energy system will eventually be realised. We feel that a policy maker needs to be aware of these issues in shaping transition policy and needs to ensure that sufficient attention is paid to the quality of the various policy elements. Our main recommendations are:

- **Investing requires confidence in an uncertain future** The transition will require significant investments. The larger the uncertainty about the future, the more difficult it will be to attract these. Policy makers can improve the investment climate by safeguarding consistency of policy. Make sure that policy is coherent, over time and throughout (various areas of attention and governmental layers). It is important to remember that 'the market' itself will not start thinking in terms of the (long) time horizons that are needed.
- **Let a thousand flowers bloom, but make sure there's a good gardener who knows how to use his hedge-clippers** Successful innovations are difficult to distinguish when still at the stage of ideas or concepts. It is, however, financially impossible to support all ideas until full market introduction. An effective innovation climate offers plenty of 'playground' for new ideas, but after further development it selects the winning options that will receive 'the big money'.
- **Decades of old and new generations living together, but preferably without the gap** A transition does not happen overnight. In practice, the 'new' will co-exist side-by-side with the 'old' for a period of time, with rates of change varying per sector. Therefore, it helps to make an inventory of possible incompatibilities, align developments in time and ensure fair mechanisms, paying attention to both the 'winners' and the 'losers'. For longer trajectories, arrange for intermediate steps to be celebrated, making progress visible to the public, as well as economically predictable and politically cashable.
- **Seek synergy with society's desires** Developments take place because citizens, consumers and entrepreneurs see their value. Public acceptance and end-user interactions can make or break changes like the introduction of new technologies. Little is known about these practicalities at the policy drawing table; let alone how can they could be steered from the top-down. It is therefore important to explore the wishes of end-users and local stakeholders early, and align the development and implementation of new options accordingly. This means that the policy maker needs to be willing to follow end-users and entrepreneurs on potentially unexpected pathways to unforeseen destinations.