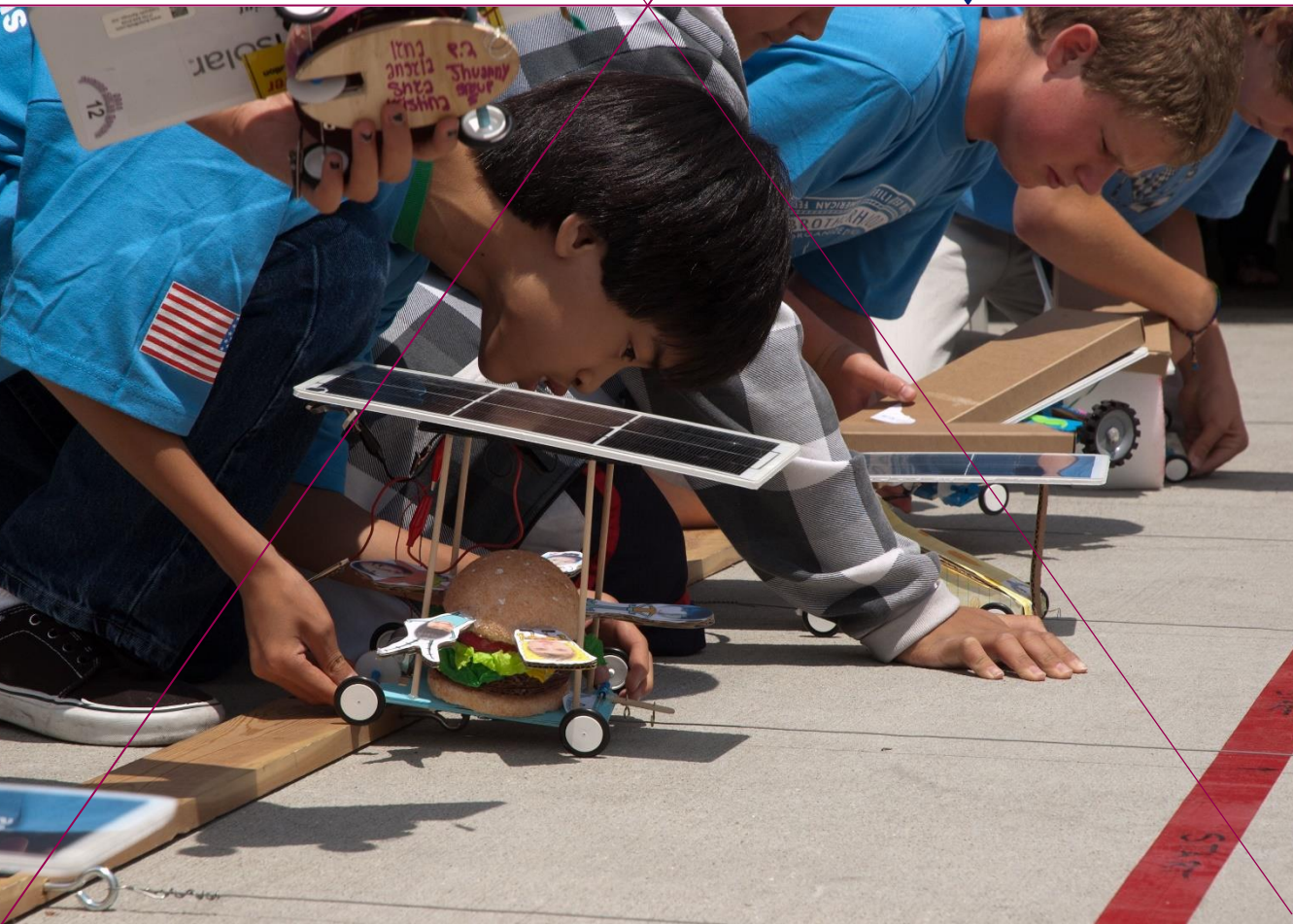


SUMMARY

GRASP THE CHALLENGE

DARING TO GO FOR ENERGY INNOVATION



The Advisory council for science, technology and innovation (AWTI) advises the Dutch government and parliament on policy in the areas of scientific research, technological development and innovation. The AWTI provides advice when it is applied for or when the council deems it necessary. It enjoys an independent position towards the Ministers and their Departments, as well as towards other parties involved. The advisory council consists of a maximum of 10 members, each originating from different sectors of society, such as research institutes and trade and industry. The members do not represent any special interests.

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Grasp the challenge

Daring to go for energy innovation

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Summary

The energy transition poses a major challenge which impinges on many aspects of the economy and society. This certainly applies for the Netherlands, with its energy-intensive economy and relatively limited potential of sustainable energy sources. Creating a sustainable energy supply will rely heavily on innovation and technological development, comprising both many small ('incremental') improvements and radical breakthroughs.

The Dutch Minister for Economic Affairs asked the Advisory Council for Science, Technology and Innovation (AWTI) to provide an answer to the following question:

What policy does the government need to pursue in order to stimulate energy innovation sufficiently to facilitate an efficient, effective and socially acceptable transition to a sustainable energy supply in the Netherlands by 2050, in such a way that optimum use is made of the economic opportunities offered by the global energy transition?

In answering this question, AWTI aligned as far as possible with the recent report by the Dutch Council for the Environment and Infrastructure (Rli) *'Rijk zonder CO₂, naar een duurzame energievoorziening in 2050'* ('Thriving without CO₂: towards a sustainable energy supply in 2050').

Government

AWTI concludes that government has a key role to play in energy innovation, if only because the challenge (being carbon-neutral by 2050) has been set by the government, and because the government as legislator and (co-)owner of infrastructure and networks is an important player within the energy system. Moreover, the energy system is so complex and the uncertainties in the market so great that, without some form of coordination, individual market operators are unlikely to succeed in making the transition to a low or even zero-carbon energy supply.

Energy innovation lagging behind

The Netherlands has great opportunities to play a role in global energy innovation. It is in a good starting position with its businesses and knowledge institutes and the experience gained in cooperation, including in the Top Sector Energy. Nonetheless, our analysis suggests that energy innovation in the Netherlands is failing to keep up with what is possible and necessary. This can be attributed to the following factors:

► ***The energy innovation system needs further reinforcement***

Whilst there is a great deal of knowledge present in the Netherlands, it is dispersed and fragmented. There are also some missing links in the innovation chains, and the

connections between links could be strengthened further, although the Top Sector Energy has brought major improvements here. There is also a lack of clarity about the shape of the envisaged energy system, due to the absence of a broadly shared vision for the long term.

▶ *Too little attention for innovation within energy policy*

Although money is available for the roll-out of sustainable energy (targeting the cheapest currently available technologies), the present energy policy provides virtually no incentives to improve existing or develop new technologies, or to limit emissions in other ways (e.g. through energy-saving).

▶ *Too little encouragement of radical energy innovation and its implementation*

The present policy that specifically focuses on energy innovation mainly provides incentives for incremental innovations. Instruments such as the Energy Innovation Demonstration scheme or the Top Sector Energy are mainly aimed at incremental improvements and are inadequately equipped to bring about radical (system) changes. There is no nationwide agenda to promote radical innovation. Moreover, compared with other OECD countries, the Netherlands invests little in research, development and demonstration of new energy technologies.

Sharper focus on energy innovation

Grasping the opportunities around energy innovation would enable the Netherlands to contribute to the envisaged energy transition. AWTI believes that this requires more leadership from government, for example by formulating a clear vision for the future energy supply and by taking responsibility; that will also help society and business in making their choices. Innovation also needs to be given greater attention within the general energy policy. This would provide a greater stimulus to mostly *incremental* energy innovations. The costs of this to the government would be limited. It could be achieved, for example, by setting clear frameworks and creating more certainty in the market. Finally, the government needs to develop a specific policy for energy *innovation*. AWTI believes that priority in this area should be given to targeted stimulation of *radical* innovation. It is crucial to select a limited number of energy options and associated innovation challenges where the Netherlands can play a role. International and European cooperation is of great importance in this regard.

AWTI makes a number recommendations, which are briefly summarised below.

Recommendation 1:

Innovate in policy; take it on, but also take it forward.

Start from a clear vision of the future energy system and the corresponding innovation system; implement appropriate policy and so create greater clarity and certainty in the market for the long term. Align with the agendas and vision of neighbouring countries and the EU. Adopt an active, adaptive and responsive approach to realising this vision. Invest in knowledge within government and make use of the knowledge and experience present within the business community and knowledge institutes. Ensure that international cooperation in the field of energy innovation is seen as natural by businesses and knowledge institutes. Encourage both incremental and radical innovation and devote attention to societal and economic anchoring of new technologies. Around 300 million euros per year is needed for new policy aimed at the specific stimulation of radical energy innovation (see Recommendations 4 and 5). Seek the necessary commitment and support for this in society, the business community and knowledge institutes. Reappraise the existing schemes and budgets in relation to energy innovation in the light of new and modified policy (see Recommendations below). A total annual budget for energy innovation of between 400 and 450 million euros is reasonable in comparison with other countries and in view of the major challenge facing the Netherlands.

Do all of this along the following lines:

Recommendation 2:

Focus more specifically on innovation in the implementation of existing European and Dutch policy on making the energy sector and other energy-related policy more sustainable. Include innovation as an explicit goal and focal point of this policy.

Use the Stimulation of Sustainable Energy Production grant scheme (SDE+) more innovatively, for example by encouraging cost reductions or setting escalating requirements for awarding grants. Aim for better CO₂ emission pricing by improving the Emissions Trading System (ETS) and reforming energy taxes. This will create a better market for low-carbon energy. This could be done in a way that is cost-neutral for the government.

Recommendation 3:

Focus the existing generic innovation policy more closely on energy innovation.

Consider using the budget for the generic promotion of innovation more emphatically to encourage socially desirable innovations. To this end, focus on supporting sustainable innovations and exclude R&D programmes that are focused on non-sustainable options from eligibility for support, by applying a light, non-bureaucratic screening test.

Recommendation 4:

Establish an energy innovation portfolio for radical innovation covering the options that are appropriate for the Netherlands and that reflect the unique opportunities open to the Netherlands, and ensure that it is properly embedded by setting up an 'Energy Innovation Task Force'.

Choose around six mission-driven innovation programmes which are characterised by their long term, planned approach and strong internal cohesion. Use the appraisal framework as set out in this report for this, first to select the options that fit well with the Netherlands and subsequently the specific innovation tasks relevant to those options for which it is interesting and promising for the Netherlands to include specifically in the innovation programmes. Express commitment for the entire operation (all innovation phases, including roll-out or implementation) and be prepared to take it forward. Reserve a total amount of 180 million euros per year for these mission-driven programmes, plus a further 40 million euros to contribute to future roll-out or infrastructure. Ensure good governance and bring the mission-driven programmes together under one roof, in the form of an 'Energy Innovation Task Force' which is responsible for ensuring coherence. Align with or build on the cooperation that has been achieved between businesses and knowledge institutes within the Top Sector Energy. The Top Sector Energy could itself go through a process of innovation in its approach, administrative design and international focus and thus grow into an organisation that is able to accommodate the radical innovation programmes described in this report and also to lead them as the Task Force, under government and international oversight. This creates the opportunity to bring the Top Consortia for Knowledge and Innovation (TKIs), the mission-driven programmes and the high-impact/high-risk programme (see Recommendation 5) as far as possible under one administrative umbrella, thus preventing fragmentation.

Recommendation 5:

Ensure that the broad knowledge base is properly equipped and effective for energy innovation.

Provide ample resources for new ideas across the entire breadth of the energy field. Launch a high-impact/high-risk programme for this purpose. Set aside 60 million euros per year for this programme to fund around ten potentially promising ideas/projects 'from the field' with a runtime of between two and five years. Allocate the resources through open competition. Place the high-impact/high-risk programme under the aegis of the Energy Innovation Task Force to ensure optimum cohesion and prevent fragmentation. Reserve an additional 20 million euros per year to enable (potentially) successful projects to develop into fully fledged innovation programmes.