



August 2022

National Innovation Pathway Round-up

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National Innovation Pathway Round up – Germany

Introduction

Mission Innovation members agreed to develop **National Innovation Pathways (NIPs)** to describe and build collective understanding on how each member plans to pioneer clean energy technologies to meet their climate and energy goals.

Each member has their own approach to developing and identifying innovation needs and priorities, with some already having undertaken extensive strategy development. The Roundup provides a **single location of summary information on countries' innovation priorities** utilizing existing sources of information so members and interested stakeholders can easily find key information of interest.

All MI members were asked to provide answers to a survey (Annex A) providing as much information as possible, with some questions being optional. The survey asked questions relevant to each element of the National Innovation Pathway described in the Joint Launch Statement:

1. Energy transition scenarios and priority national-level energy innovation needs / priorities until at least 2030;
2. Strategies or national-level plans to address these energy innovation needs / priorities, including institutional design and working internationally
3. Information on how Members will measure innovation outcomes and innovation ecosystem developments;
4. Members' preferred modes and methods of collaboration; and
5. Any further supporting evidence that was used to identify the energy innovation needs / priorities, such as analysis of domestic competitiveness, economic opportunities or national level climate and clean energy plans.

Members will be asked to refresh this document annually if significant changes to national policy have taken place.

1. Clean Energy Innovation Strategy

1.1 Summary

German government's Energy Concept and the decisions of the Bundestag serve as the compass for steering the energy transition. The German government has tightened climate protection targets and anchored the goal of greenhouse gas neutrality by 2045. The German Federal Ministry for Economic Affairs and Climate Action (BMWK) sets the course for this in its energy research policy. The higher ambitions also affect the CO₂ reduction targets by 2030 in the individual sectors: energy, industry, transport, buildings and agriculture. Emissions are to be reduced by 65 % by 2030 compared with 1990. Germany is one of the few countries to phase out coal-fired power generation in addition to nuclear power, while at the same time massively driving forward the restructuring of the energy industry, the expansion of renewable energies and, for example, the expansion of the hydrogen economy along the entire value chain with a total of nine billion euros.

By 2030 at least 80% of German gross electricity consumption is to be covered by renewables. The expansion of renewable energy on land and at sea will be raised to an entirely new level. The ministry funds more than 1,300 new, application-oriented research projects each year that support the energy and climate policy goals: from photovoltaic systems on lakes to sustainable heat supply for entire city districts. The German government has agreed on a substantial expansion of photovoltaic plants by 200 GW up to 2023.

At the international level, the focus is on close cooperation in climate policy. Climate change is expected to have a particular impact on supply chains, infrastructures, value creation models and sales markets. The Federal Ministry for Economic Affairs and Climate Action (BMWK) therefore plans to intensify dialog with companies and associations in order to face the new challenges within German companies and to address the necessary adaptation strategies in this context.

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1.2 Methodology

The Federal Government's 7th Energy Research Programme supports German companies in further developing their competitive edge on modern energy technologies.

Since 2014, the German Federal Ministry for Economic Affairs and Climate Action has been engaged in initiating energy research networks in important areas of energy research involving intensive technical exchange with research institutions, universities and research-based industry. In addition to promoting participation and transparency, the aim of the networks is to accelerate the transfer of results and ensure the quality of research findings. There are currently ten networks on central topics of the energy transition, such as hydrogen, renewable energies or climate-neutral buildings and neighbourhoods. In these networks experts discuss, agree on technical positions and make recommendations on funding strategies. The results of the networks' activities are incorporated into the ministry's strategic considerations for future energy research policy. The open expert networks bring together more than 4,000 experts (as of October 2021). Through their exchange, they help to transfer the results of energy research directly to the stakeholders of the energy transition, to discuss practical funding strategies in a topic-focused manner and to propose new measures.

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Table 1: RELEVANT DOCUMENTS AND POLICIES

Document or policy name	Description of the document or policy	Specific outcomes, goals or targets identified in the document or policy	Year	Web Link(s)
7th Energy Research Programme	Innovations for the energy transition	Focus on technology and innovation transfer, in particular through the Living Labs of the Energy Transition as a new funding pillar for preparing innovative solutions for the market on an industrial scale.	2021	https://www.bmwk.de/Redaktion/EN/Dossier/energy-research-and-innovation.html
National Hydrogen Strategy	Coherent framework for the generation, transport and use of hydrogen, encouraging the relevant innovations and investment. The Strategy sets out the steps that are needed to meet the German climate targets, create new value chains for the German economy and foster energy policy cooperation at international level.	The Federal Government expects that around 90 to 110 TWh of hydrogen will be needed by 2030. In order to cover part of this demand, Germany plans to establish up to 10 GW of generation capacity including the offshore and onshore energy generation facilities needed for this. This corresponds to 14 TWh of green hydrogen production.	2020	https://www.bmwk.de/Redaktion/EN/Publikationen/Energie/the-national-hydrogen-strategy.html

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2. Clean Energy Innovation Priorities

2.1 Overview of Clean Energy Innovation Priorities

Table 2: CLEAN ENERGY INNOVATION PRIORITIES

Innovation priority	Focus of innovation activity (tick all that apply)	Targets/Goals (if applicable)	Technologies or topics of interest	Total RD&D funding allocated, (include budget years where applicable)	Planned demonstration Investments (include budget years and indicate if domestic or international spending where possible)	Links to relevant reports or plans
7th Energy Research Programme	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input type="checkbox"/> Commercialisation Other:	Contribution to the federal government's energy policy goals	Various technologies for energy conversion, transport and distribution and end-use	1.3 billion € (2021)	Investments not an independent part of this programme	https://www.bmwk.de/Redaktion/DE/Publikationen/Energie/bundesbericht-energieforschung-2022.html (English version will be available in Autumn 2022)
National Hydrogen Strategy	<input type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration	Increase generation capacity by 10 GW until 2030	Electrolysers Alternative processes: Photoelectrochemical/	7 billion € (national) 2 billion € (international)	The focus is on private investment for the production, transportation and use of hydrogen	https://www.bmwk.de/Redaktion/EN/Publikationen/Energie/the-national-hydrogen-strategy.html

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	<input type="checkbox"/> Commercialisation Other:		Photocatalytic, Solar Thermochemical, Photobiological. Use of biomass and biogenic residues: Fermentation, Reforming, Gasification, Plasmalysis.			
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Germany intends to be climate neutral by 2050, in line with the wider European ambition to become the first climate neutral continent. Innovation plays an important role in reaching this goal. In June 2020 Germany launched its National Hydrogen Strategy (<https://www.bmwk.de/Redaktion/EN/Publikationen/Energie/the-national-hydrogen-strategy.html>). The National stimulus package for the COVID-recovery provides 7 billion euros for the implementation of the National Hydrogen Strategy domestically, and another 2 billion euros for fostering international cooperation in the field of hydrogen. Under the scope of the National Hydrogen Strategy Germany established the National Hydrogen Council as well as the Innovation Commissioner for Green Hydrogen at the Federal Ministry of Education and Research (BMBF).

2.2 Tracking Progress (Optional)

The 7th Energy Research Programme is subjected to an external evaluation accompanying the programme as well as an ex-post evaluation after the end of the programme. Aspects of the evaluation are e.g. the contribution of the programme to the higher-order goals of the energy transition, the impact on companies and the economic efficiency of the measures. The evaluation process includes the development of a set of indicators to monitor success as well as an analysis of the funding budget, for example according to the type of funding recipient.

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3. Private Sector Engagement (Optional)

A cross-departmental and theme-oriented programme structure was chosen for the 7th Energy Research Programme. The departmental responsibilities are assigned in project funding based on the Technology Readiness Level. The Federal Ministry for Economic Affairs and Climate Action (BMWK) is responsible for project funding in the application-oriented field of energy research. The so-called Living Labs of the Energy Transition located here address primarily the private sector. The majority of research, development and demonstration of energy and efficiency technologies is supported by companies. In the area of project funding alone, companies provided a total of 744 million euros for their own funding in 2021.

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4. International Collaboration (Optional)

The Federal Ministry for Economic Affairs and Climate Action (BMWK) promotes energy research at national as well as European and international level. Germany is committed to fostering innovation for a climate-friendly energy supply worldwide and contributes to the European Union's goal of making Europe the world's first climate-neutral continent by 2050. The importance of international research cooperation is increasing constantly. The research cooperation the Federal Ministry for Economic Affairs and Climate Action engages in is based on three pillars: i) Energy research in the European Union, ii) Energy research in the International Energy Agency, and iii) Multilateral energy research initiatives.

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Annex A – National Innovation Pathway Roundup Survey Questions

1.1 Summary: Please provide a summary of your national clean energy innovation strategy i.e. the overall policies, framework and/or goals that help to define the innovation priorities you will describe in Section 2. We recommend including information about your national climate or energy targets (such as NDCs or renewable energy targets) as well as national innovation strategies and policies. You can share links to relevant documents in Table 1.

1.2 Methodology: Please describe the methodology to develop your national clean energy innovation strategy such as analysis, modelling or stakeholder engagement and include any links to relevant documents in Table 1. This will be used to help share learning between members.

2.1 Overview of Clean Energy Innovation Priorities: Please provide a list of your national clean energy innovation priorities (i.e. specific technologies, sectors or needs). Please complete Table 2 to provide information about where you are focusing in the innovation cycle for each priority; any targets or goals; RD&D interests; current allocated budgets (including specific demonstration funding) and links to relevant strategies or reports. In the text box following please provide a brief description of how you plan to respond to each innovation priority in the coming years, such as through future plans over the next 3-10 years to mobilise further investments for innovation, launch new major programmes and timelines for major demonstration projects.

2.2 Tracking Progress: Please describe how you plan to measure progress towards addressing your identified energy innovation priorities. Please describe any governance processes to manage and review energy innovation efforts and, where able, please list

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tracking indicators that are commonly used (e.g. such as patents, publications, rates of company formation, follow-on capital and private co-investment, technology performance upgrades).

3. Private Sector Engagement: Please can you describe your strategic approach and priorities to engagement with the private sector to address the clean energy innovation priorities identified in section 2. This could include for instance prioritising co-funding of RD&D initiatives; incubator/accelerator programs that are funded (in part or fully) by the private sector; tax credits and other fiscal incentives; initiatives that the private sector can engage with, grants, de-risking instruments such as loan guarantees etc.

4. International Collaborations: Please describe your strategic approach to international collaboration to tackle your clean energy innovation priorities (e.g. do you have an international strategy, or particular types of collaboration you are prioritising).

5. National Energy innovation Ecosystem: Please provide an overview of your national institutions, funders and organisations and describe how they contribute to tackling the innovation priorities identified in Section 2. Please either provide this information in the box or complete Table 3.

6. Further Supporting Information: Please add below any further information about your national energy innovation needs or approaches to tackling these that has not been covered above.



Mission Innovation – Catalysing Clean Energy Solutions For All