



DLR Position

On an

Integrated Energy Union
Research, Innovation and
Competitiveness Strategy



Summary:

DLR emphasises the need for an integrated research, innovation, and competitiveness strategy for the Energy Union. This strategy should be derived from a Vision on the European Energy System of the Future, which still has to be developed.

Based on such a widely approved and accepted vision, new and established European strategy fora like ETPs and ETIPs comprising all related public and private stakeholders (including Member States and European Commission) will have to prepare and maintain dedicated research and innovation strategies and foster their implementation. These will help to prepare further integrated European strategy documents like the integrated Strategy Energy Technology plan or the Strategic Transport Research and Innovation Agenda.

Need for an integrated Energy Union research, innovation, and competitiveness strategy

In 2014 the commission has defined 10 priorities amongst which number 3 is asking for a resilient Energy Union with a forward-looking climate change policy. This priority is closely linked to the societal challenge of decarbonisation (ref. COP21), in which several technological streams like energy, transport, climate, environment and even space with its Copernicus programme will have to be integrated.

In its recent communication on the Energy Union the Commission outlined the following 5 pillars:

- Energy security, solidarity and trust;
- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- Decarbonising the economy, and
- Research, innovation, and competitiveness.

For the 5th pillar an integrated Energy Union research, innovation and competitiveness strategy will form an overarching framework for the specific Integrated Strategic Energy Technology Plan (SET-Plan), the Strategic Transport Research and Innovation Agenda (STRIA) and the strategy for a global technology and innovation leadership of the EU. For "Research, innovation, competitiveness" four core priorities have been defined by the European Commission:

- EU being No. 1 in Renewables,
- Smart EU Energy System with Customer at the Center,
- Efficient Energy Systems,
- Sustainable Transport.

In line with the decarbonisation challenge a key factor for achieving those priorities will be “cleantech” as a cross-cutting element for enhancing the competitiveness of Europe and in particular its EU industry. New technologies and other innovative solutions will contribute to make Europe the world's No. 1 in renewables as well as to maintain and reinforce a strong and high-performing industrial base to maintain and improve European Competitiveness and thus to contribute to Europe being a global player. In contrast to that ambition Europe's once world-beating clean technology industry has fallen into a significant decline over the last years. The currently low energy prices have led to much lower investment in low-carbon energy research and new technologies. The integrated Energy Union research, innovation, and competitiveness strategy needs to address those major issues that stifle the cleantech market in Europe first and then initiate a renaissance of the entire clean technology sectors, in particular energy and transport.

Better technology development is a crucial contributor to revive the cleantech market in Europe and regain a competitive position on the world market. A clear strategy for investment into research and innovation is the cardinal point of the ambition to provide the world market with the most innovative clean technologies.

Europe needs a significant boost in research and innovation in particular in the energy and transport sectors by an **intensified public funding and investment** to overcome the current depression in European investment in that sectors and bring competitive cleantech innovations to the market that underprice conventional technologies without subsidies, such as wind energy in the US.

It seems tempting to assume that many cleantech innovations can be skimmed from existing research and pushing developments to the market. But to ensure long-term benefits through innovations and to provide the European industry with a continuous flow of new technologies the **entire research and innovation chain** has to be an integral part of the strategy. This starts from bright new ideas that emanate from basic research and continues via technology development, technology validation, system demonstration up to the final development of an innovative product, which can be sold successfully on the market, thus covering the entire TRL line from 1 to 9.

Preparation and implementation of an integrated Energy Union research, innovation, and competitiveness strategy.

One of the current deficiencies of the SET-Plan is that it lacks acceptance in key stakeholder groups and hence struggles to pursue its goals. This has been managed better in various other sectors in the past, for example in the research and innovation of European Aviation. This sector has demonstrated a successful process, based on an agreed vision, to derive a strategic research and innovation agenda, which is broadly accepted and used by all European stakeholders in that sector as a guideline for all aviation research and innovation in Europe.

In order to prepare an integrated Energy Union research, innovation, and competitiveness strategy DLR sees the need to first develop a **vision on the European Energy System of the Future** from which detailed strategies for the various energy and transport sectors will be derived. Similar to previous successful experiences the European Commission could invite a small group of personalities in order to develop such a vision.

In order to prepare detailed strategies on energy, transport and other related technologies, existing and new **strategic fora like European Technology Platforms (ETPs) or European Technology and Innovation Platforms (ETIPs)** should bring together all involved European public and private stakeholders in order to

- (i) develop, approve and maintain European Research and Innovation Agendas, which will become integrated part of e.g. the integrated SET-Plan and/or the currently prepared Strategic Transport Research and Innovation Agenda (STRIA),
- (ii) foster accelerated implementation of measures to pursue the European high level goals as set-out e.g. by COP21 and related vision documents,
- (iii) strengthen cooperation among all stakeholders within the different technology sectors,
- (iv) help to faster eliminate innovation barriers,
- (v) monitor the degree of implementation of strategic agendas (like SET-Plan, STRIA, and those from specific sectors) on national and European levels.

As a core of such strategic fora (e.g. ETPs, ETIPs) **research institutions and industry** have to work in close cooperation with all stakeholders (including Member States and the European Commission) in order to give consolidated input to policy makers on e.g. needed solutions and missing technologies. Successful examples for these kind of fora are **ESTELA** (European Solar Thermal Electricity Association), **FCH** (fuel cells and hydrogen), **EGVI** (European Green Vehicle Initiative) and **ACARE** (Advisory Council for Aviation Research and innovation in Europe), which could act as role models for the implementation of new strategic fora.

Established and well functioning **stakeholder organisations** like EERA, European industrial initiatives, EREA, ECTRI, ... will have to play an active role in contributing to these strategic fora.

To ensure an **integrated approach** besides these specific technology platforms an **umbrella platform** on top is needed, where

- (i) multidisciplinary research and innovation activities across sectors can be orchestrated, e.g. liaise transport and energy sector,
- (ii) specific research and innovation agendas are integrated, supported by dedicated system analysis activities, into a systemic integrated heuristic view on which
- (iii) priorities in the short, medium and long term, can be identified.

Technology paths within the integrated Energy Union research, innovation, and competitiveness strategy

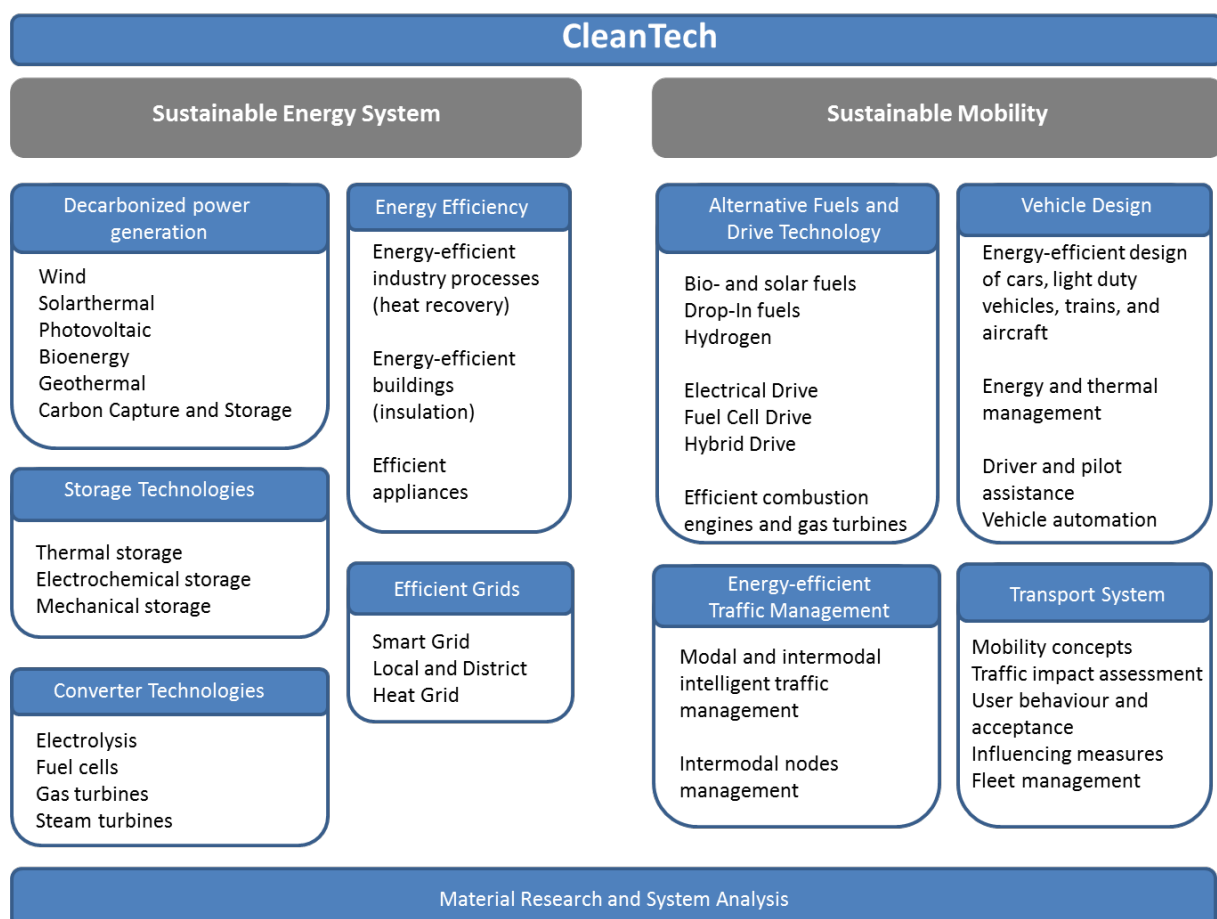
Form the top down perspective of a combined and harmonized vision of **European Energy System of the Future** that is well agreed upon by the stakeholders it is mandatory to identify the different technology paths that proved a sustainable energy future for Europe and strengthen the position of EU cleantech companies on the world market.

From the current point of view some technologies on which DLR is working seem particularly promising from both ecological and economical perspectives:

- Sustainable Energy System:
 - o energy conversion from **renewable sources** (wind and solar),
 - o energy-efficient / smart cities,
 - o energy storage in **batteries** and heat storage to realize adjustable, flexible power supply and zero-emission mobility,
 - o **high temperature heat storage** applications for enhancing energy efficiency in industrial processes and increasing the efficiency of solarthermal power plants,
 - o efficient and low emission energy converters such as **fuel cells, gas turbines**, free-piston linear generators, or jet engines,
 - o **electrolysis** to realize Power-to-X concepts.
- Sustainable Mobility
 - o generation and use of sustainable **alternative fuels** including hydrogen,
 - o zero emission mobility through full electrical or fuel cells drives for passenger cars, public transport, light duty vehicles, and airplanes as well as energy-efficient traffic management,

- autonomous movement of vehicles, which would allow better and more energy efficient planning and execution of transport and would increase safety and security,
 - energy-efficient **design** of cars, light-duty vehicles, trains and aircraft
- Crosscutting issues
 - **novel materials**, e.g. composite materials or aerogels for thermal insulation in buildings,
 - **novel solutions** for interlinking energy and transport planning and management,
 - **system analysis** studies to ensure an integrated view, in particular including the view of users.

A graphic , which classify these topics in a broader context, is shown below.



DLR at a glance

DLR is the national aeronautics and space research centre of the Federal Republic of Germany. Its extensive research and development work in aeronautics, space, energy, transport and security is integrated into national and international cooperative ventures. In addition to its own research, as Germany's space agency, DLR has been given responsibility by the federal government for the planning and implementation of the German space programme. DLR is also the umbrella organisation for the nation's largest project management agency.

DLR has approximately 8000 employees at 16 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Goettingen, Hamburg, Juelich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen, and Weilheim. DLR also has offices in Brussels, Paris, Tokyo and Washington D.C.

Registered in the EU Transparency-Register under No. 21280626733-05

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