

# Effective Research and Innovation Agendas to Tackle Societal Challenges

The Case of the Strategic Energy Technology Plan (SET-Plan)

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## The Case of the Strategic Energy Technology Plan (SET-Plan)

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**Summary:** *The SET-Plan laid down a strategy to use research and innovation (R&I) to green the EU energy sector while ensuring the security of supply and increasing EU competitiveness. If developed further, the SET-Plan would constitute a good blueprint to tackle other societal challenges. The positive features are several: it sets clear objectives and programmatic plans and takes stock of existing initiatives in the energy field; it fosters a cooperative approach to R&I; it introduces a high-level steering group (the SET-Plan Steering Group) to ensure progress; it creates a dedicated information system (SETIS) to fill a void in policy-relevant information; finally, it produces estimates of financial needs over the programming period. Future similar initiatives could do nevertheless more to: clarify the hierarchy of existing objectives and instruments; bring in more concrete instruments to pull the demand of new technologies; strengthen the connection with education and training policies; establish formal linkages with the governance structures of existing initiatives; better integrate financial considerations into the setting of strategic priorities.*

### Introduction

Catastrophic events, like the global financial crisis or the chaotic closure of the EU airspace following a volcanic eruption, have the beneficial side-effect of focusing the minds of policymakers on the need to adopt regulatory changes. Some long-term trends such as climate change or population's ageing, however, have potentially an even bigger impact but their remoteness favours procrastination. In the EU

policy landscape, these are often referred to as “grand” or “societal” challenges. These areas call for efforts that go beyond mere public regulatory intervention: they require a major and sustained effort and their realisation is not possible without major breakthroughs in Research and Innovation (R&I).

The need of establishing new strategic R&I initiatives focused on the solution to societal challenges is leading to the emergence of the

concept of “innovation partnerships”.<sup>1</sup> These should materialise many of the ideal characteristics of an effective R&I agenda, such as strategic coherence, an integrated approach to R&D, innovation and education,<sup>2</sup> the establishment of favourable framework conditions, the promotion of cooperation between all actors, good governance and adequate funding.

The objective of this Policy Brief is to contribute to the definition and design of such partnerships by analysing an existing R&I initiative that was launched to respond to a specific societal challenge. The European Commission presented a plan in 2007 to accelerate the development and deployment of cost-effective low carbon technologies: the European Strategic Energy Technology Plan (SET-Plan). In what follows we highlight the novelties introduced by the SET-Plan, discussing how they fit into the current R&I system, and draw lessons for similar future endeavours. The analysis is illustrated by examples related to specific initiatives and technologies.

## **The SET-Plan as an integrated R&I agenda**

A very wide range of institutions, programmes and committees are involved in policymaking in the energy sector. In the Appendix we show a snapshot of those related to R&I in the energy field and provide both a

glossary and a short definition of the acronyms used in this document. At one end of the spectrum there are initiatives bringing together all the actors and institutionalising the dialogue between them. At the other extreme there are initiatives that are simply vehicles for funding research projects. The SET-Plan puts some order by introducing a strategic framework at European level to organise and align efforts. It is important to pay proper attention to the heterogeneity of the various instruments, given the existence of important differences not only in the hierarchical levels and the type of actors involved, but also at the unequal coverage of different technological areas and the different financial size of implementation initiatives.

Any good strategic exercise sets priorities but avoids picking winners. The SET-Plan strikes a delicate balance by adopting a comprehensive approach. It singles out a number of key technologies based on their technological maturity. To help bring innovations to the market, each of these technologies is targeted by a European Industrial Initiatives (EII), established after consultation of the relevant stakeholders. Research initiatives are nevertheless launched also in technological fields (such as marine or geothermal energy) that had not been identified as priorities for the first phase of implementation because they are not mature enough for a joint research and innovation effort.<sup>3</sup> This

■ Table 1: Technological areas covered by the SET-Plan and other initiatives that are active in the energy field<sup>4</sup>

		INITIATIVES										
		SET-driven				Other						
		EERA	EII	ETPs	JP	EIT-KICs		COST	JTIs	FP7	CIP	EUREKA
						Energy	Climate					
TECHNOLOGIES	SET-driven	Wind	■	■	■	■	■	■	■	■	■	■
	Solar	■	■	■	■	■	■	■	■	■	■	■
	Smart Grid	■	■	■	■	■	■	■	■	■	■	■
	Bio-energy	■	■	■	■	■	■	■	■	■	■	■
	CCS	■	■	■	■	■	■	■	■	■	■	■
	Nuclear Fission	■	■	■	■	■	■	■	■	■	■	■
	FCH	■	■	■	■	■	■	■	■	■	■	■
	Other	Geothermal	■	■	■	■	■	■	■	■	■	■
	Marine	■	■	■	■	■	■	■	■	■	■	■
	Nuclear Fusion	■	■	■	■	■	■	■	■	■	■	■
RHC	■	■	■	■	■	■	■	■	■	■	■	

Notes: Solar includes both Photovoltaic (PV) and Concentrated Solar Power (CSP); CCS = Carbon Capture and Storage; FCH = Fuel Cells and Hydrogen; RHC = Renewable heating and cooling. The Smart Cities Initiative (SCI) is not included in the table for simplicity; the Seventh Framework Programme of the European Atomic Energy Community (Euratom) for nuclear research and training activities is not included.

delicate balance between the need of focusing efforts on technologies with greater market potential without completely discarding efforts on less mature technologies is very often at the centre of the research policy debate. It is thus important that new R&I initiatives establish adequate links with existing instruments supporting blue-sky research (like the European Research Council). This may involve the establishment of concrete criteria for later inclusion of less mature technologies into the newly-launched R&I plan. To this end, the existing European Technology Platforms are good fora for promoting exchanges between the research community and industry and identify when a technology “comes of age”.

### ***Integrating different policy initiatives***

Table 1 maps technologies and R&I initiatives in the energy domain, highlighting the tools on which the SET-Plan relies and the technologies it considers priorities. While the SET-Plan rightly exploits existing instruments, it also creates dedicated governance tools and launches new initiatives, namely the EII, the Smart Cities Initiative (SCI) and the European Energy Research Alliance (EERA). It does so after exploring different alternative policy options and considering existing initiatives. Future strategic plans could clarify which initiatives can be relied upon and to what extent. Once the need to introduce new instruments is established, a screening of existing

#### **Box 1. Options for further integration of R&I initiatives in the energy sector**

Energy does not appear among the themes selected for a Joint Programming (JP) initiative, but the SET-Plan itself is often seen as a form of joint programming.<sup>5</sup> Similarly, Joint Technology Initiatives (JTIs) – supposed to translate the priorities identified by the European Technology Platforms (ETPs) – have been used just for Fuel Cells and Hydrogen (FCH) technologies, while ETPs have gone on developing their research agendas. Institutional design can be a reason: Joint Undertakings (JUs), on which JTIs are based, are a complex institutional device, whose setting-up requires a lot of time and effort. This could explain why it is currently under-used.

The SET-Plan introduced new instruments, namely the European Industrial Initiatives (EIIs) and the European Energy Research Alliance (EERA) and includes the JTI on FCH among the EIIs. Beyond those recalled in the previous paragraph, a further possibility is to continue to assign an operational role to ETPs that have been rolling out their Strategic Research Agendas (SRAs) and Deployment Documents / Implementation Plans in the energy sector since 2005. Indeed, the ETPs have been involved from the beginning, notably in the definition of the Technology Roadmaps 2010-2020 and Implementation Plans 2010-2012.

ones might evidence the opportunity of absorbing or replacing them in some areas. Box 1 displays some options for further integration of R&I initiatives in the energy sector.

### ***Integrating demand, supply and framework conditions***

The SET-Plan goes beyond sectoral policies, by recognising that R&I do not work in isolation but are sensitive to framework conditions. The energy sector provides a clear example: the need to integrate an increasing supply of renewable energies into the existing network will raise a number of technical issues. So, for instance, electricity supply can be subject to important fluctuations (as for wind and solar energy). The relative importance of different technologies also differs across countries, so that their complementarities can be exploited only provided that they are accompanied by the necessary investment in infrastructure. This is the case, for instance, of spare or excess wind capacity being used to refill a dam, possibly located in another country, thus storing energy to be used to face subsequent periods of peak power load.

### ***Integrating research, investment and education policies***

The widespread adoption of new technologies will require an adequate supply of professionals, technicians and workers to guarantee a rapid

and cost-effective deployment and proper maintenance. This strengthens the case for a thorough integration of education into R&I activities, in order to realise the so-called Knowledge Triangle (research, innovation and education). The SET-Plan rightly considers research and innovation as closely interwoven and recognises the need to further add education policies to the picture. Even if this served as guidance for other initiatives<sup>6</sup>, those launched by the very same SET-Plan have not yet attached a great weight to education and training policies.

The structural transformation of the energy sector will require a radical technological shift. The regulatory framework will have to adapt as well in order to avoid bottlenecks, with new productive capacity not being brought on stream, for instance, because of unforeseen planning obstacles. Also, given the long lead times associated with investment in the energy sector, it is important that the regulatory framework remains stable and predictable.

The widespread use of feed-in tariffs as a support tool requires a properly functioning Internal Market for Energy. Although the SET-Plan correctly mentions the usefulness of an integrated research agenda, it still focuses mainly on supply factors. Demand factors and framework conditions are largely absent when it comes to identifying concrete measures. However, the

first communication on the SET-Plan (2007) mentioned the “lead markets” approach (the establishment of coherent packages covering public procurement, regulation, standardisation, labelling, certification and intellectual property rights) and the lead market initiative (LMI) explicitly identified renewables as one of six key markets.<sup>7</sup>

Another major component of framework conditions is finance. Facing societal challenges implies mobilising large sums to finance innovation (see the section “Addressing the financial challenge” in this policy brief) and leveraging private sector investment. This further adds to the uncertainty surrounding all innovation processes. Although it is outside the remit of strategic documents such as the SET-Plan to legislate on financial matters, it is important that regulation does not raise needless obstacles to R&I financing. This is currently of particular relevance, given the extensive regulatory intervention under way at the national and European level on financial, accounting and fiscal issues.

## **The role of partnerships in the SET-Plan**

Action at the European level should catalyse and align Member States’ and regions’ efforts towards the agreed strategic objectives. This collaborative approach must

be further extended beyond public authorities, to involve all relevant actors of the R&I systems in the field of energy. The SET-Plan shifts the focus from cooperation on specific projects – characteristic of the European Framework Programmes in the past – to joint design and execution of whole research programmes. It emphasises the role of Member States that come together on a voluntary basis and jointly define research agendas and implementation plans. In this sense, the SET-Plan could provide the necessary momentum to stimulate further cooperation in other areas. On the other hand, the SET-Plan refers to the possibility to resort to different forms of cooperation only in general terms, although it pinpoints key technologies and outlines the associated financial aspects. The further natural step – currently under way – is to identify more precise criteria to determine the most adequate form of cooperation for each technological field.

### ***Partnerships between the Commission, Member States and Regions***

The European Energy Research Alliance (EERA) well illustrates the partnership approach. Its joint research programmes are set up after recognising for which topics there is a common interest in aligning research programmes. Participation is open to all research organisations willing to contribute their own R&D capacities and resources



(financial, human and organisational), with a particular focus on those allowing to achieve critical mass. Involvement in an EERA joint programme can then be used to attract additional funding at the national and Community level. The interests of founding partners and programme participants are addressed through an executive committee, whose membership will be based on the selection of the most active EERA members.

### ***Partnerships between public and private actors***

The SET-Plan explicitly mentions the role of public-private partnerships as a way to accelerate the deployment to the market of new or improved technologies. Together with Joint Programming and Joint Technology Initiatives, these are one of the forms that European Industrial Initiatives (EIs) may take but no precise criterion for choice is specified.

## **The SET-Plan and good governance**

### ***Steering and coordination***

A strong steering instrument enhances coordination, ensures coherence, and tracks progress, ultimately ensuring transparency and accountability. The SET-Plan instituted a steering group (the SET-Plan Steering Group) to ensure the joint planning and implementation of

its initiatives.<sup>8</sup> At the same time, the SET-Plan explicitly mentions the need of exploiting existing instruments and involving stakeholders. To what extent the SET-Plan Steering Group will be able to connect with the governance structures of pre-existing initiatives remains to be checked, given that its mandate was originally defined only with respect to initiatives introduced by the same SET-Plan (in particular the EIs and the EERA). Even though the different steering bodies will informally establish contacts and exchange information, the absence of formal links and clear hierarchies could lead to potential frictions and duplications, thus hindering the coherence of R&I initiatives in the energy domain. Nevertheless, it is the task of the SET-Plan Steering Group to ensure this global coherence, avoid unnecessary duplication and create potential synergies.

The uncertainty surrounding coordination between initiatives also affects the links with demand policies and framework conditions. For instance, the SET-Plan Steering Group and the European Industrial Initiatives should act as “contact groups” for the Lead Market Initiative on renewable energies<sup>9</sup>, but it is not clear yet how such contacts are working in practice.

### ***Information***

Effective governance depends not only on the institutional design but also on the availability of timely

and reliable information. The SET-Plan put in place a dedicated information system, the SET-Plan Information System (SETIS), with the goal of supporting planning, monitoring and assessment within the SET-Plan. This is to be achieved through the establishment of an open-access information system and the development of an integrated approach for information exchange on energy technologies and capacities for innovation.

The SETIS is managed by the European Commission through its Joint Research Centre (JRC), in close cooperation with a broad range of stakeholders.<sup>10</sup> The fact that the system is operated by an independent scientific body facilitates its acceptance by all the players. The SETIS thus works as a transparent information platform both between the actors involved and towards the broader public.

The SETIS has proven useful in determining the technical, regulatory and financial steps to be taken. Through its mapping of technologies and capacities, it provided information and data on the status and perspectives of energy technologies. This allowed identifying those to be included in the SET-Plan on one hand, and to gauge the current R&I effort of all the actors involved on the other.<sup>11</sup> The SETIS will also prove essential in the implementation phase, in order to

monitor progress: Key Performance Indicators (KPIs) quantify the progress against the strategic objectives for each technological area for the year 2020 (see Box 2 for an example). Intermediate targets and milestones are currently being defined.

When further complemented by a barometer tracking year-by-year progress, the KPIs will provide an effective steering instrument. Also, given their encompassing nature, strategic documents as the SET-Plan should provide more information on the way the quantitative targets it puts forward relate to those previously foreseen by existing initiatives. For instance, the Wind European Technology Platform's vision implied that wind energy could cover 12-14% of the EU's electricity consumption by 2020 (25% by 2030), while following the adoption of the SET-Plan, the Wind EII should lead to a share of up to 20% by 2020 (and as much as 33% by 2030).<sup>12</sup>

## **Addressing the financial challenge**

The information provided by SETIS allowed for the first time to have an estimation of the financial effort needed, also thanks to a close collaboration with industry. SETIS determined in the first place the amounts currently being invested, including the relative contribution

## Box 2. Key performance indicators for wind technology

To achieve the objective of 20% of EU electricity to be produced by wind in 2020, the following KPIs were initially established:<sup>13</sup>

- A reduction of production costs by 20%. This strategic objective summarizes a number of more detailed ones: the reduction by 20% of manufacturing, transport and erection costs for all turbines, of installation and maintenance costs for offshore ones; the attainment of a virtual capacity of wind farms of 80%; the prediction of wind resources and condition predicted with an uncertainty of less than 3%.
- A number of objectives – currently being defined – on the budget, the number of programmes, scientists, research institutes, patents, cooperative schemes and activities with international partners.

of the public and private sectors (Columns 2 and 3 in Table 2).<sup>14</sup> Comparing these figures with what is needed to achieve the objectives of the SET-Plan allows determining

the share of financing being already covered. This varies considerably, being as low as 13% and 18% for Carbon Capture and Storage (CCS) and Solar, respectively, and being

Table 2: Yearly investment in SET-Plan technologies

	Current		Needed	
	Total (€ mln)	Private (%)	Total (€ mln) <sup>15</sup>	Coverage (%) <sup>16</sup>
<b>FCH</b>	620	61	500	74
<b>Wind</b>	380	76	600	38
<b>Solar</b>	470	57	1600	18
<b>CCS</b>	290	79	1300	13
<b>Bio-fuels</b>	350	77	900	23
<b>Smart grids</b>	270	78	200	81
<b>Nucl. Fission</b>	460	45	700	39
<b>EERA</b>	-	-	500	n.a.
<b>Smart cities</b>	-	-	1100	n.a.
<b>Total</b>	<b>2840</b>	<b>65</b>	<b>7400</b>	<b>36</b>

Notes: Solar includes both Photovoltaic (PV) and Concentrated Solar Power (CSP); CCS = Carbon Capture and Storage. EERA = European Energy Research Alliance. Data on current investment refer to 2007 (latest year available).

Source: European Commission (2009a, c). Authors' calculations.

much closer to what is needed as in the case of Smart Grids (Columns 4 and 5 in Table 2).

Another difference between technologies is the different stage of maturity and the relevance of market failures, which influences the degree of private sector involvement. Table 2 shows how private sector involvement is in general similar across the different renewables, being within a band between roughly 60% and 80%. For nuclear fission, this is considerably lower (45%).<sup>17</sup> This information is useful to determine how much leverage should be expected from different support mechanisms and to establish the degree of co-financing required. In areas characterised by more mature technologies or having lower exposure to market failures it should be relatively easier to attain a high degree of co-financing.

The very fact that such data were not previously available in a harmonised way confirms the important role played by the SET-Plan as a planning instrument.<sup>18</sup>

Determining financial needs and resources is essential also beyond the planning phase. Future estimates should be more publicised, in order to give more visibility to the whole process, increase transparency and track progress. Moreover, the share of needs being covered should be considered together with the share of financing by private investors. This yields a fuller picture, thus allowing to better gear the various policy instruments. Table 3 classifies the technologies mentioned in the SET Plan according to these two criteria, using as reference point the overall averages.

Financial information becomes useful when considering the efforts under way to fill the gap through recent, dedicated initiatives and new sources of Community financing. The SET-Plan indeed indicates the sources to be tapped to increase investment, even if it does not contribute fresh funds. The European Energy Recovery Plan (EERP) has allocated around € 1.6 bn to CCS demonstration projects (€ 1050 million) and off-shore wind innovation activities (€ 565 million). In addition, within

■ *Table 3: Share of private financing and coverage of needs*

		Degree of coverage of needs	
		Low	High
Share of corporate funding	Low	Solar	FCH Nuclear fission
	High	CCS Bio-fuels	Wind Smart grids

the Emission Trading System (ETS) 300 million allowances, representing around € 4.5 bn at current prices, have been allocated to large-scale demonstration projects for CCS and innovative renewables.<sup>19</sup> The coverage of different technologies is thus differentiated; the prominent role of CCS technologies is positive in that, as evidenced above, it is one of the areas where the need for additional funding is higher.<sup>20</sup> The contrary could be said for wind energy, since this technology is apparently already attracting considerable investment. Even if short-term stimulus considerations (such as the availability of a number of shovel-ready projects) may have partly influenced the choice, future SETIS estimates should be used – together with other criteria – to guide the allocation of additional funding.

The measures mentioned in the previous paragraph will make approximately € 6 bn available over the next 10 years.<sup>21</sup> Even so, available estimates point towards the need of stepping-up efforts by around € 50 bn over the same period.<sup>22</sup> A number of caveats notwithstanding – namely, the great deal of uncertainty surrounding not only the resources needed but also the very extent of the current financial effort – this still means almost tripling current efforts. This is an ambitious objective that will require a major effort by all the actors involved. At the EU level, discussions on the 8<sup>th</sup> Framework Programme, which will cover the

crucial period 2014-2020, will have to take into account the financing gap still to be filled. This is the more important given the predominance of the FP as source of EU funding. Other possible sources of financing, such as funding from cohesion policy, will have nevertheless to be explored.

## Conclusions

Our analysis of EU R&I policies in the energy sector allowed us to identify a number of relevant aspects valid beyond the specific sectoral boundaries. When considering the options for future strategic R&I initiatives addressing major societal challenges, decision makers at EU and Member State levels could benefit from considering the following orientations:

### 1. Integration

**Setting clear priorities and defining the contribution of existing instruments.** It is important to provide a broad strategic framework to tackle a societal challenge. This includes taking stock of R&I activities in the field and stressing the importance of relying on existing instruments. Identifying key technologies, based on the consultation of stakeholders, is an important contribution. Even if these technologies are considered priorities, R&I initiatives may

be launched in other fields as well, reflecting different stages of maturity, provided that the criteria used to determine when and how a technology becomes eligible for inclusion in an integrated R&I plan are sufficiently transparent.

**Reducing, reusing and recycling policy instruments.** If (and to the extent that) existing policy instruments do not provide an ideal mix, new ones can be introduced. Even in such a case, the possibility of absorbing or replacing existing instruments can be considered. Restraint in the adoption of new initiatives also allows avoiding a top-heavy governance structure or a too frequent re-focus of the EU's initiatives.

**Ensuring that R&I efforts do not remain isolated** is especially important when the needs of integration with other policies in the field have already been identified. This concerns in particular the contribution of education and training policies, the design of the regulatory framework and the development of lead markets.

## 2. Partnerships

**Clarifying the criteria for cooperation.** Complex technologies, differing distances to market and financial requirements, heterogeneous

national interests and comparative advantages in R&I all impede the adoption of a one-size-fits-all cooperation scheme and argue instead for flexible modes of collaboration based on variable geometry.

## 3. Governance

**Clarifying the governance of policy instruments and establishing formal links between them.** The introduction of a steering group to oversee progress enhances the accountability of the whole process. Another useful step is to clarify the hierarchy of existing R&I initiatives by establishing solid links between such a group and its counterparts in other programmes and organisations.

**Relying on a system of indicators and reconciling pre-existing targets with it.** The creation of a dedicated information system – if not already in place – helps establish the extent of the technical, regulatory and financial challenges in the planning phase. This is particularly important when a transversal, interdisciplinary approach is required and when an information system is previously non-existing. To increase transparency when economic interests are at stake, an independent body with the necessary scientific credibility



can be put in charge of its operation. In the implementation phase, then, tracking progress enhances accountability. Key performance indicators can provide the necessary milestones and quantification of targets for different technologies. A further additional option is to provide also information on the way possible existing targets fit into the broader picture.

#### **4. Financing**

**Defining the financial contour of the challenge and standing up to it.** Sometimes even basic information on R&I activities

can be very difficult to come by. It is important to identify the financial means being invested in R&I and their characteristics (such as the composition of funding) and to compare them with reliable estimates of financial needs over the programming period. On the implementation side, it is then important to ensure that financial commitments are in line with the needs identified. This information helps raise the awareness of decision-makers during budgetary discussions and assists them in allocating scarce resources according to priorities and specific needs.

## Appendix – Initiatives affecting the energy sector

		ACTORS		
		Public		With industry involvement
		European Union	Member States	
<b>LEVEL</b>	 Strategic	JP		ETPs
		ERA Net Art. 169		
	 Implementation	<b>EERA</b>		KICs
		COST		JTI
		FP CIP	EUREKA	

## Appendix – Initiatives affecting the energy sector

### *Existing Initiatives*

JP – Joint Programming: since 2008 an intergovernmental approach to design and implement Strategic Research Agendas (SRAs) related to societal challenges; currently nothing on energy but climate should figure among the next JPs.

ETPs – European Technology Platforms: since 2004 dialogues between all stakeholders to define SRAs in fields requiring critical mass and supportive framework conditions; Funded by the Framework Programme (FP, see below).

ERA Net: Since 2002 fosters the integration of the ERA by supporting the coordination of national and regional research programmes using FP funding.

Art. 169: Since 2003 fosters the integration of the European Research Area (ERA) by providing Community funding –through the FP– to research projects jointly programmed by Member States.

KICs – Knowledge and Innovation Communities: public-private partnerships between actors located in different Member States covering research, innovation and education activities launched at the end of 2009 by the European Institute of Technology. Two of them relate to the energy sector: KIC InnoEnergy and Climate-KIC.

COST – European Cooperation in Science and Technology: intergovernmental tool directing funds from the FP to support cooperation between nationally-funded research projects.

JTI – Joint Technology Initiative: mechanism introduced under the 7<sup>th</sup> FP with the aim of implementing the SRAs of some ETPs. There is one JTI in the energy field, the Fuel Cells and Hydrogen Initiative.

FP – Framework Programme for Research and Technological Development: the main funding mechanism at the Community level, its current run (the 7<sup>th</sup>, from 2007 to 2013) has a budget of more than € 50 bn, disbursed directly (mainly through the Cooperation programme) or through other FP-funded initiatives (see above).

CIP – Competitiveness and Innovation Framework Programme: running from 2007 to 2013, it targets mainly small and medium-sized enterprises (SMEs). The initiative related to the energy sector is the Intelligent Energy Europe Programme (IEE).



EUREKA: Since 1985 supports trans-national, market-oriented R&I projects; after it grants its label to a project, national research funding agencies release funds to their respective participants.

## ***New Initiatives***

EERA – European Energy Research Alliance: Foreseen by the SET-Plan, it was founded in 2008 with the aim of bringing together on a voluntary basis and with variable geometry public research institutes of EU Member States.

EII – European Industrial Initiatives: technology programmes instituted by the SET-Plan in 2007. They have clear quantitative objectives to be met by 2020.

## **Endnotes**

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- 1 This is related to the broader context of the European economic recovery strategy. See European Commission (2010). Europe 2020. A strategy for smart, sustainable and inclusive growth. COM(2010) 2020. Brussels, 3 March 2010.
- 2 As we highlighted in a previous policy brief, an integrated approach to knowledge policies and well-honed governance mechanisms are indeed essential. See Hervás Soriano, Fernando and Mulatero, Fulvio (2009). Connecting the Dots. How to Strengthen the EU Knowledge Economy. European Commission – Joint Research Centre / Directorate General Research. JRC 55672 EN.
- 3 For the criteria used to assess the potential of the various energy technologies, see European Commission (2009a). Impact assessment. Commission Staff Working Document. SEC(2009) 1297. Brussels, 7 October 2009.
- 4 For simplicity, Art. 169 and ERA Net have been considered together with the Framework Programme (to which they belong).
- 5 It is however possible that the energy field will be touched in the near future by initiatives related to climate change. A JP on “Neurodegenerative diseases, in particular Alzheimer’s” has already been launched. Three other themes have been identified so far: Agriculture, food security and climate change; Health, food and prevention of diet-related diseases; Cultural heritage, climate change and security. See Council of the European Union (2009). Conclusions on research joint programming: initiative on combating neurodegenerative diseases (Alzheimer’s). 2982nd Competitiveness (Internal market, Industry and Research) Council meeting, Brussels, 3 December 2009.
- 6 Namely, this has been the case for establishing KICs in the energy field.
- 7 The European Commission uses the concept of “lead market” to indicate the market for a product or service in a given geographical area where an innovation (technological or non-technological) initially took off before spreading internationally. The Lead Market Initiative launched by the Commission in December 2007 identifies a first set of markets with the potential to become “lead markets”. See European Commission (2007). A lead market initiative for Europe. COM(2007) 860 final. Brussels, 21 December 2007.
- 8 Chaired by the Commission, the SET-Group gathers national representatives at high level. Its mandate involves steering the implementation of the SET-Plan actions and related initiatives, reinforcing coherence between actions at the Community, national and international level; to foster European joint actions and measures and to identify sources for their financing; to monitor and review progress.

- 9 See European Commission (2009b). Lead Market Initiative for Europe – Mid-term progress report. Commission Staff Working Document. SEC (2009) 1198 final. Brussels, 9 September 2009.
- 10 For more information and references, see <http://setis.ec.europa.eu/setis-main>.
- 11 JRC's Institute for Prospective Technological Studies (IPTS) provided a major contribution in this respect. See, in particular, Wiesenthal, Tobias; Leduc, Guillaume; Schwarz, Hans-Günther; Haegeman, Karel (2009). R&D Investment in the priority technologies of the European Strategic Energy Technology Plan. Joint Research Centre Reference Reports.
- 12 See, respectively, European Wind Energy Technology Platform (2008). Strategic Research Agenda – Market Deployment Strategy. From 2008 to 2030 and European Commission (2009c). Investing in the Development of Low Carbon Technology (SET-Plan). COM(2009) 519 final. Brussels, 7 October 2009.
- 13 As reported on SETIS' website (<http://setis.ec.europa.eu/initiatives/technology-roadmap/european-industrial-initiative-on-wind-energy-1> and <http://setis.ec.europa.eu/initiatives/technology-roadmap/european-energy-research-alliance-eera>, respectively), accessed on June 21 2010. The KPIs should however be considered as preliminary given that they are currently being revised.
- 14 This essential information could only be determined after considerable analytical efforts and with sizeable error margins. These have been estimated by the SETIS as being up to  $\pm 30\%$  for corporate R&D investments,  $\pm 19\%$  for public national investments and  $\pm 5\%$  for EU funds. This yields a cumulative error of up to  $\pm 25\%$  of the total. For more information on methodological issues, see European Commission (2009a), op. cit.
- 15 Based on European Commission (2009c), op. cit., divided by ten to get the yearly figure. For FCH the figure refers to the period 2013-2020. The Impact Assessment accompanying the communication provides intervals, rather than point estimates, for some technologies, namely CCS (€ bn 10.5-16.5), Nuclear fission (5-10) and Smart cities (10-12). The total oscillates in the range € bn 67.5-80.5. The figures mentioned in the communication are thus the middle points. See European Commission (2009a), op.cit.
- 16 According to the European Commission (2009a), op. cit., only 50-70% of the current investment can be considered as contributing towards the goals of the SET-Plan. For this reason, to compute the percentage of financial needs covered for each technology, the total investment of 2007 has been first multiplied by 60% (the middle value of the interval) and then related to the total yearly financial needs. For wind technology, for example, investment was estimated in 2007 to be € 380 millions and financial needs to be 600 € millions. This gives:  $(380 \times 0.6)/600 = 38\%$ .
- 17 A great deal of uncertainty still surrounds these figures; the European Commission (2009a), op.cit., estimates an overall error margin of 25% (rising to 30% for corporate investments).
- 18 We chose to focus here only on the quantitative aspects of R&D investment. This is not to deny the importance of qualitative aspects, such as the degree of trans-national cooperation, for instance through ERA-Nets in the fields of the SET-Plan. See Wiesenthal et al. (2009) for a discussion.
- 19 Assuming a market price of CO<sub>2</sub> of 15 €/ton. The precise breakdown between CCS and other renewables is not known.
- 20 This is in turn due to the nature of the technology (e.g. costly demonstration facilities) and to the fact that several technological pathways are still being considered.
- 21 The budgets for the Cooperation and for the Capacities programmes of FP7 already include Joint Technology Initiatives and the contribution to the European Investment Bank for the Risk-Sharing Finance Facility (RSFF). The latter will receive up to € 500 million from FP7 over the period 2010-2013. See European Parliament (2006). Decision No 1982/2006/EC of the European Parliament and of the Council of 18 December 2006 concerning the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007-2013). Official Journal of the European Union L 412/1.
- 22 See European Commission (2009c), op. cit. This total includes the € 11 bn foreseen for the Smart Cities Initiative. Also, according to the SET-Plan the EERA should manage additional public investment – both at Community and national level – of € 5 bn over 10 years (although there is no clear indication yet on the distinction between EERA members' contributions and competitive funding).

