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**COMMISSION STAFF WORKING DOCUMENT**

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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN  
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL  
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**on Investing in the Development of Low Carbon Technologies  
(SET-Plan)**

**SUMMARY OF THE IMPACT ASSESSMENT**

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## COMMISSION STAFF WORKING DOCUMENT

### SUMMARY OF THE IMPACT ASSESSMENT

#### for the Communication on Investing in the Development of Low Carbon Technologies (Set-Plan)

#### 1. PROBLEM DEFINITION:

Climate change is an international concern that if left unchecked would result in significant and lasting damage on a world wide scale. In response to this the EU (under its Energy and Climate Policy) adopted goals of reducing greenhouse gas emissions by 20%, and increasing the proportion of European Energy which comes from renewable sources to 20% by 2020. Following on from this CO<sub>2</sub> emissions should have fallen by 80% from their current levels by 2050. A variety of initiatives, most prominent amongst which is the European Emissions Trading System have arisen in order to help meet these goals.

One track being pursued is the development of low carbon technologies, essential both to the achievement of the goals set out under the Energy and Climate Policy, but also as a means to ensuring Europe's future competitiveness. The European Strategic Energy Technology (SET) Plan adopted within the Energy and Climate Policy aims to accelerate the development of key low carbon technologies, so as to bring them to the market more quickly than would otherwise be the case.

This impact assessment aims to investigate, outline and recommend the specific measures which should be taken in order to finance the development and deployment of the low carbon technologies identified within the SET-Plan.

#### 2. SUBSIDIARITY

This section will outline the justification for EU intervention in terms of

- Helping to attract needed additional finance
- Helping to co-ordinate a range of fragmented, disparate instruments.

#### Financial Gap

Low carbon technologies emerging into the European Energy market confront many market and regulatory failures. Above all low carbon technologies are beneficial largely because of their lower CO<sub>2</sub> emissions; but reducing emission is a public good suffering from severe environmental externalities that are not accounted for in the energy bill. Similarly basic research produces public benefits far outweighing the private gain to the research institute (spill-over effect). As a result, in neither case will the market provide the socially optimum level of funding; and therefore public intervention is justified. Other critical flaws hindering the development of low carbon technologies include:

- the high technological, regulatory and market risks which lead to sub-optimal investment in low carbon technologies
- a number of failures specific to the energy market, in particular high transaction costs and barriers to entry; as well as limited competition, a fragmented regulatory framework for new infrastructural development, and the inherent inertia of the energy infrastructure.

In order to combat these failures and achieve our climate changes goals, the SET-Plan identified a number of strategic technologies which it aims to promote. An estimate of the additional financing required by each technology in order to attain the goals of the SET-Plan reveals that additional financing of around 50 billion Euros will be necessary.

### **Coordination Failures**

On the other hand, the barriers to achieving the objectives set out in the SET-Plan can be seen not only in terms of financing, but also in terms of the structure and co-ordination of the available instruments. At present a wide array of instruments exist including both Research and Innovation programmes, and financial instruments under the European Investment Bank Group. Yet, in many cases, general co-ordination and funding levels are inadequate; particularly with regards to large scale demonstration projects, and research and innovation programmes.

### **Overall**

The transition to a low carbon economy is both necessary and beneficial for the community. Yet, given the complexity and level of effort required; few Member States have the capacity to bring about the required change. Furthermore, significant EU level synergies exist with regards to the co-ordination of the various support schemes and the consolidation of the currently fragmented market. Action is needed, European level action would produce significant benefits above and beyond that which could be achieved by Member States acting alone, it therefore follows that action at EU level is justified.

## **3. OBJECTIVES**

This impact assessment aims to examine the financial measures which might be taken in order to ensure the delivery of the objectives stated in the SET-Plan. In light of the above these will include the following specific objectives:

- To stimulate a substantial increase in private investment in research, technological development, demonstration, and market replication of SET-Plan technologies.
- To ensure the provision of sufficient, appropriate and efficient financial resources in support of the development of the low carbon technologies identified in the SET-Plan, so as to secure a level of innovation in line with EU policy goals.

Operationally this will involve

- At least a doubling of the financial resources dedicated to the SET-Plan technologies;
- A more flexible and effective use of current instruments;

- The establishment (where appropriate) of new or modified instruments.

#### **4. POLICY OPTIONS**

In order to determine the most effective manner in which these objectives might be achieved it was decided to split the alternatives into four distinct policy options which illustrate and exemplify the full continuum of choices available:

- (1) the continuation of the existing investment vehicles within the current institutional arrangements (BAU – Business as usual)
- (2) increased funding channelled through the existing investment vehicles within the existing institutional arrangements (option 1)
- (3) a strengthening of the existing investment vehicles within modified institutional arrangements (option 2)
- (4) new investment vehicles, taking specific institutional arrangements, filling in gaps and removing recurring weaknesses of the existing portfolio of investment vehicles (option 3).

Each one of these policy options constitutes a specific, practicable way forward; and include suggestions pertaining to research, innovation, debt, equity, and venture capital instruments. The conjunct of all four options together are viewed as sufficient to illustrate and exemplify the alternatives available.

#### **5. ASSESSMENT OF IMPACTS**

Importantly, although measures sufficient to obtain the objectives outlined above are considered necessary, it is acknowledged that the overall Energy Policy (of which these actions form a part) may well come at a slight overall cost to society in terms of GDP growth. These costs might be mitigated, however, or even reduced through full use of the complementarities which exist between the good implementation of these policies and the already existing emissions reduction mechanisms, particularly the Emissions Trading Scheme.

It should be noted that, in terms of economic or social benefits, while all policy options analysed are clearly superior to the BAU option, the main difference between the policy options lies in the timing of the impacts rather than their ultimate magnitude. The pace at which the expected environmental benefits may come to pass is linked to the speed of implementation of the SET-Plan. The different policy options will impact on the speed with which low carbon technologies are adopted, and therefore also on total European CO<sub>2</sub> emissions.

## 6. COMPARISON OF POLICY OPTIONS

### Technology Grouping

In order to perform a satisfactory analysis the SET Plan technologies were divided into three groups, so as to better cater for the specificities and needs of each technology segment. These technology groups were:

- (1) Group I: Close to market competitiveness<sup>1</sup>
- (2) Group II: Emerging technologies on the verge of mass market penetration<sup>2</sup>
- (3) Group III: New technologies<sup>3</sup>

### Assessment Criterion

With regards to the specific policies to be adopted, each of the four policy options identified was analysed under a specific criterion, examining their characteristics in terms of:

- Mobilisation- ability to mobilise sufficient finance
- Suitability- the degree to which the envisaged arrangements correspond to the requirements of the technologies concerned.
- Flexibility- degree to which the envisaged arrangements are able to respond to changing situations.
- Effectiveness- degree to which the envisaged arrangements impact on the European energy sector.

### Analysis and Conclusions

In our analysis we (i) examined each of the four policy options individually in terms of their overall strengths and weaknesses with respect to each of the four criteria (without making any effort to compare the options directly or taking any account of the technology groupings); before (ii) separating the technologies into their three technology groups, and rating all of the policy options individually, under each of the four criteria listed above.

Our conclusion was that:

- Policy option two, which included "a strengthening of the existing investment vehicles within modified institutional arrangements" was appropriate for all technology groups, and would constitute a strong way forward.

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<sup>1</sup> On-shore wind, solar heating, solar photovoltaics (c-Si), 1<sup>st</sup> generation biofuels, electricity networks (transmission), nuclear fission (G III+), combined heat and power (CHP), energy efficiency in buildings, transport and industry.

<sup>2</sup> Offshore wind, solar photovoltaics (thin film), concentrated solar power generation, carbon capture and storage, 2<sup>nd</sup> generation biofuels, electricity networks (distribution).

<sup>3</sup> Nuclear fission - G IV, hydrogen and fuel cells, ocean energy, geothermal.

- Policy option one, which included increased funding but little institutional change, could (due to its flexibility and immediate effectiveness) be considered as a serious candidate; but was generally only adequate to support those technologies which were close to market competitiveness.
- Policy option three would be suitable (due to its increased mobilisation of funding, and ability to effectively co-ordinate instruments) for group three technologies.
- The Business as Usual option would be severely inappropriate for all technology groups.

It should be noted that these conclusions do not rule out any hybrids of the different policy options groups; neither do they make any comments with respect to the manner or speed with which an implement might be introduced.

## **Recommendations**

As a result it is our recommendation that resources be increased to the necessary levels and that the appropriate avenues for institutional change be explored. That being said, the need for urgent action would suggest a rapid implementation of policy option 1 across the board, with a phased and targeted introduction of the appropriate actions under policy options 2 and 3 being introduced as and when appropriate.

When formulating a strategy the following should be taken into account:

- In many cases it might be appropriate to pursue a hybrid strategy borrowing alternatives from different policy options.
- Many of the Group 1 technologies, and particularly energy efficiency contain a short term potential, which might argue for an expedited full introduction of policy option 2.
- With regards to Group 3 technologies, it should be noted that many of them already benefit from the kind of alternatives proposed under policy option 2.

## **7. MONITORING AND EVALUATION**

The proposed financing effort will benefit from the SET-Plan monitoring and evaluation information system (SETIS), which has recently been established. SETIS is operated by the EU's Joint Research Centre (JRC), which secures its independence and objectivity. In particular, the monitoring of financial research investment in low carbon energy technologies will be done continuously and reported annually in the Capacities Map published by SETIS.

The impact of research financing on technology development and deployment will be also closely monitored by SETIS on a continuous basis, with its analysis published bi-annually in the Technology Map. Accompanying this will be a review by SETIS of the specific technology developments performed under the SET-Plan umbrella, whether through the European Industrial Initiatives or other programmes in the context of the European Energy Research Alliance. This review will take place periodically and will be on the basis of Key Performance Indicators (KPIs), devised jointly by SETIS and stakeholders as part of the process for the conception and definition of corresponding SET-Plan activities, which will address both the technology and the sector. Typically, KPIs will focus on both the costs and relative performance of technologies.