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# ECO-INNOVATION AND RE-SOURCE EFFICIENCY: GAINS FROM REFORMS

FOUR POLICY PRIORITIES | OCTOBER 2011

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INFORMED DECISIONS



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## | EXECUTIVE SUMMARY

The Europe 2020 Strategy for smart, sustainable and inclusive growth has been adopted as the principle economic strategy for the EU. Key aspects of the strategy are resource efficiency and better management of natural resources.

As the global population grows larger and developing and emerging countries rightfully aspire to higher welfare levels, improved resource efficiency will be the key for the preservation of growth and jobs in Europe. For the EU, the challenges are clearly lined up:

- Achieve sharp reductions of greenhouse emissions in order to deal with climate change.
- Improve water management to stop droughts in particular in southern Europe.
- Transform the increasing piles of waste into future sources of production materials and energy.

As a consequence of the current financial crisis the EU economic management has been focused on the urgent tasks of preventing member states to default due to their increasing debt levels and saving the banking system from the consequences of overconfident lending in the boom years. Now, when the EU economy is slowly starting to recover, the time has come to return to the green growth agenda.

If the right policies to deliver on the green growth agenda are chosen, substantial gains to the citizens of EU could be realised. This economic study provides some ball park estimates of the potential benefits from focused policy reforms in selected areas in terms of higher productivity, welfare and improvement in public finances. In addition to these estimates we also suggest that focused and front loaded policy action can help get the troubled EU economy back on track.

In this context, we define four policy priorities for the EU

- Send the right **price signals**, so that private investors can confidently invest in viable projects.
- Remove artificial barriers to sound resource management in **public procurement**.
- **Break down barriers** to trade in “green” products and services within EU as well as on the global level.
- Boost and reform public green **innovation budgets**.

We conclude that reforms in these areas would create substantial gains, some headline figures:

- Dismantling barriers to cost effective measures to improve energy efficiency may cut European consumer bills up to € 1 000 per household a year in 2020...

- ...and may help create 2 million jobs in time of substantial unemployment.
- A common internal market to comply with EUs renewable energy targets might save around € 8 to 17 billion per year by 2020.
- Going for a 30 rather than a 20 percent cut in green house gases by 2020 would restore incentives to energy efficiency and deployment of low carbon technologies...
- ... while also providing health benefits amounting to € 60 to 80 billion.

## Chapter 1 THE EU GREEN GROWTH AGENDA: CHALLENGES AND OPPORTUNITIES

International studies suggest that action to achieve sustainable development is most urgently needed in four key areas namely, climate change, water scarcity, waste management, and bio diversity.<sup>1</sup> A common requirement for adequate policies in these areas is that they should bring about more resource efficiency. The true costs to the society of using depletable resources that creates negative externalities, such as the use of fossil fuels for energy production, should be incorporated into the price of using these resources.

EU policy targets have been set out to deal with these challenges. Perhaps the most well known is the adopted targets for reduction of GHG gases, achieve energy savings and expanding renewable energy by 2020.<sup>2</sup> More recently, the EU commission has also presented a roadmap for achieving climate and energy objectives in a longer perspective. This roadmap sets out more ambitious reduction targets, with the aim of moving the EU economy to a competitive low carbon economy in 2050.<sup>3</sup>

Reaching these targets represent both challenges and opportunities for the EU in several dimensions: we will focus on three challenges and opportunities below.

### 1.1. REACHING ENVIRONMENTAL TARGETS: THREE CHALLENGES

The first challenge is the very financing of the transformation towards a greener economy. Estimations suggest that the investments needed just for energy technology in the EU power sector, will amount to €60-80 billion per year from today until 2020 and to an even higher amount after 2020.<sup>4</sup> At the same time, governments across the EU find themselves in the need of very substantial financial consolidation. If any doubt had existed about the need to mobilise private investments to help fund a greener economy, the very state of public finances makes it abundantly clear that the bulk of financing will have to come from private firms and institutional investors.

The second challenge comes from the lack of progress in international negotiations on climate changes and the economic crisis. In conjunction, these two factors have weakened the will to implement the policies that can bring EU and other leading regions on a sustainable track for economic growth. This weakened will to implement green policies has for example resulted in a substantial decrease in the price of ETS allowances within the EU. As a consequence, incentives

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<sup>1</sup> OECD(2008)

<sup>2</sup> European Commission (2008)

<sup>3</sup> European Commission (2011a)

<sup>4</sup> See fx EREC (2007)

to save energy have been reduced and the costs of subsidies to renewable energy have increased.

The third challenge is that the global competition in the production of green products and services has become tougher. While EU historically has been a leader in the production and exports of key environmentally friendly technologies, this position is increasingly challenged by emerging economies such as China and more “traditional” competitors such as the US. China now accounts for half of global production of PV solar cells and an increasing share of the production of wind turbines<sup>5</sup>, and is fast raising its public budgets for support to innovation.

## 1.2. REACHING ENVIRONMENTAL TARGETS: THREE OPPORTUNITIES

Fortunately, each of the above mentioned challenges also involve opportunities.

First, rather than rueing over the sorry state of public finances, the economic crisis should act as spur to proper pricing of the use of resources and as an incentive for the removal of barriers to an efficient use of resources within the public sector. This would provide net revenues to empty public coffers while at the same time help to deliver on already agreed policy goals in a cost-efficient way.

Second, the economic crisis has led to substantial idle capacity in the EU economy, with high unemployment and reduced interest rates. Such an environment creates the opportunity to roll-out investments to improve resource efficiency, much quicker and to a much lower cost than in times of economic boom.

Third, the increased global competition in green products should remove any complacency about EU having an automatic leadership role in this area. EU has to step up efforts to give EU firms a stronger competitive position in the coming decades.

The question for the EU is how to deal with the challenges and how to make sure that the benefits from the opportunities are captured. We have defined four policy priorities that are crucial for a successful move towards green growth. These policy priorities will be the topic for the next chapter.

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<sup>5</sup> European Commission (2010)

## Chapter 2 | FOUR POLICY PRIORITIES

The four policy priorities are:

- Sending the right price signals (2.1)
- Reform of public procurement (2.2)
- Break down barriers to trade (2.3)
- More and better public support for green innovation (2.4)

### 2.1. SENDING THE RIGHT PRICE SIGNALS

Sending the right price signals to consumers and investors is a key prerequisite for market driven resource efficiency and innovation for two reasons. First, there is a wealth of evidence showing that sending the right price signals to consumers and investors is highly efficient in driving long term resource efficiency and innovation of new processes and technologies.<sup>6</sup> By letting the polluter pay, the real cost become visible to the polluter, thereby making it easier to address the negative externalities from economic activity. Second, new and more resource efficient technologies will only become available after it becomes more expensive to pollute: there is evidence showing that patenting of energy saving technologies are highly depending on higher energy prices/taxes.

For pricing policies to work efficiently, they should be complemented with labelling policies and the development of energy efficiency standards. If consumers do not know the real costs of using energy intensive or pollutive equipment, they will have little inducement to pay a somewhat higher price to get the resource friendly variant of their demanded product. For example an illuminating US study showed that once you combined higher energy prices and improved labelling, consumers were much more willing to buy white goods (freezers etc.) that were energy efficient.<sup>7</sup>

There are substantial fiscal and regulatory barriers that prevent consumers and investors from getting the right price signals. These barriers hamper the deployment and innovation of resource efficient equipment. There are negative externalities in the area of water and waste management typically not reflected in prices facing users. Moreover, the cost of recycling products is typically not included in the sales price of the product. Finally, the price of water does typically only reflect the price of infrastructure and not the price of water as a scarce resource.

Without attempting to be exhaustive, let us recap some main points from a number of recent studies:

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<sup>6</sup> OECD (2011a)

<sup>7</sup> Newell et al. (1998)



#### Pricing barriers to energy efficiency:

- At the global level, there are substantially harmful energy subsidies still in place. These are responsible for 10 per cent of greenhouse gas emissions. These subsidies are most frequently used in developing and emerging countries but also EU has subsidies to energy consumption still in place.<sup>8</sup>
- Within EU, the widespread use of reduced VAT rates for households on the use of heating and electricity is weakening the incentives to save energy: application of normal VAT rates would reduce energy consumption.<sup>9</sup> The same argument applies for the generally low EU tax rates on heating.
- Rigid rent regulation may make it difficult for a landlord to let the tenant pay some of the capital costs associated with financing a replacement of oil boilers with newer and more efficient versions while the tenant gets the full benefits in terms of a lower heating bill.<sup>10</sup>

#### Under pricing of water and waste

- In many countries, the end-of use price of water does not reflect the water resource costs, but only the costs for water management service, such as infrastructure etc. Neither do all households pay for actual consumption.<sup>11</sup>
- The price of recovering resources from waste water is not reflected in the consumption price.<sup>12</sup>
- The cost of handling waste is not incorporated into the sales price.

It is also important for the EU to get a real discussion on climate policies post 2020 started. Many investment projects in the area of energy have lifetimes that run into decades. Hence, EU should introduce a rolling commitment programme for GHG reductions. This commitment programme should always run more than a decade into the future: this should start already in 2012 with targets for 2022 or even better 2025. The revision of target should take into account actions in other countries as well as the development of the ETS allowance price: weakening of prices provides a case for a larger cut and vice versa. The guiding aim is to have continuous adjustments consistent with a long term trajectory towards credible 2050 targets. In this context, EU should consider to increase its reduction com-

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<sup>8</sup> IEA, OPEC, OECD and World Bank (2010)

<sup>9</sup> Copenhagen Economics(2009)

<sup>10</sup> IEA (2007)

<sup>11</sup> OECD(2011b)

<sup>12</sup> OECD (2009c)

mitment from 20 to 30 per cent: this would bring the price of allowances back to the level assumed when the original energy and climate agreement was adopted in 2009.

#### Box 2.1. Policy proposal: Sending the right price signals

- Remove all existing subsidies focusing on energy, water and waste management. These are both costly for tax payers and the environment.
- Put a positive price on resource use where clear externalities and scarcity exist.
- Introduce a rolling commitment programme for GHG reductions consistent with a credible trajectory towards agreed 2050 goals.
- In this context, EU should also consider to increase its reduction commitment from 20 to 30 per cent.

## 2.2. REFORM OF PUBLIC MANAGEMENT AND PUBLIC PROCUREMENT

The public sector is an important actor when it comes to both the production and the consumption of services. Public sector institutions' share in energy consumption is significant (app. 3-4 pct of total energy consumption in EU).<sup>13</sup> This is primarily because the government typically produce key welfare services, such as education, health and social services. Furthermore, the public sector owns key utility functions of significant importance for resource management, primarily in waste management (47,6 pct. in EU, with substantial variation across countries).<sup>14</sup>

The present configuration of incentives within the public sector presents substantial barriers to resource efficiency and innovation. It is relatively well documented that public sector institutions operate with very short pay back periods. This implies that investment costs needs to be recuperated within 3-4 years in many countries. This is often motivated by a perceived need to hold back public spending. Public institutions are often also prevented from taking loans to finance investments in potentially viable projects such as renovating the building stock.

Public procurement, that is the process by which government departments purchase goods and services from the private sector, may also focus too much on getting the lowest up front purchase price as opposed to minimising user costs of a building over its life time, thus under pricing the value of energy efficient new hospitals, schools etc.

<sup>13</sup> Calculations based on figures from The Danish Energy Agency and Eurostat

<sup>14</sup> Copenhagen Economics (2011c). Calculations are based on GTAP data and Amadeus data

Furthermore, the public ownership may in itself impede the development of viable companies that can compete on a wider market. If the company is restrained from competing on a wider market, it may have implications for its efforts to innovate. If a public company or entity can only provide services within a small region or country, its cost of innovation cannot be spread over a sufficiently large sales volume.

Finally, current VAT legislation distorts competition in areas of key importance to the realisation of the green innovation agenda.

#### Box 2.2. Policy proposal: reforms of public management and public procurement

- Within the area of energy management, public-private partnerships has been highlighted as potentially very important, leading to major potential energy and costs savings at present energy prices. In many countries such partnerships would require reform of (local) government financial control systems.
- We would also recommend reviewing required rates of return on public investments in EU countries in view of the substantial decline of interest rates in recent years which has lowered the real financial costs on such projects.
- To avoid the problem of under valuing energy efficient proposals in the public procurement process, we recommend that green requirements are incorporated into the public procurement rules.

### 2.3. BREAK DOWN BARRIERS TO TRADE

The economic success story of the EU is essentially about breaking down barriers to trade. Available studies indicate that there have been significant gains over the last three to four decades from moving towards a common market for goods, services, capital and labour.<sup>15</sup> The same logic that explains the benefits of an internal market also applies to the whole green innovation agenda. However, widespread barriers to trade that prevent the potential gains from being realised are prevailing.

We would like to address four priority areas:

First, a common carbon price could help ensure low cost implementation of climate and energy policy. The EU Commission's impact assessments of the costs of attaining climate and energy policy objectives are based upon this assumption. Yet, carbon prices vary substantially between countries and sectors within the EU, undermining cost efficiency. The ETS system has helped establish a common price within the power generation sector but tax rates on fossil fuels for transportation and heating show large fluctuations. The EU Commission has recently

<sup>15</sup> See for example DG ECFIN(2007) which suggest that internal market reforms have provide a + 2 per cent boost to EU GDP over the 1992 to 2006 period.

proposed a revised energy tax directive, in which minimum rates for taxes on fossil fuels are established. If this directive were to be adopted it may help reduce internal differences, however, major differences would still prevail. Longer term options include the extension of the ETS to more sectors, such as transportation, something that has been on the table before.

Second, EU should move towards an internal market for compliance with RE targets. EU has adopted a policy where each member state has to reach a minimum target for the share of renewable energy in their total energy consumption. The present approach is de facto based upon 27 constantly changing national support schemes instead of one predictable common framework for compliance. The consequence of this is too limited roll out of mature technologies in good locations and too much roll out of immature technologies in the wrong places. Studies suggest that joint implementation of national targets could save the consumers in the EU of € 8 to 17 billion annually by 2020.<sup>16</sup>

Third, there is too weak and non-uniform enforcement of environmental standards. This leads to distortions across Member States. In the few cases where there may be standardised requirements, lack of real enforcement of current legislation may create distortions between public and private actors. This may be the case for example with respect to fulfilling EU common environmental standards of e.g. landfill stations etc. Current EU legislation on common environmental standards is a step forward, but due to uncertainty regarding enforcement and availability of statistical data to qualify the problem and provide benchmarking (which is the case e.g. in water management) current levels of legislation may not be enough. To be successful, policy reform must include the main actors in the EU Commission (e.g. DG Environment, Enterprise, Services and TAXUD) and also the key industries involved at the national level.

A fourth problem is that the global market for environmental goods is restricted. Surveys show that energy oriented companies increasingly see markets outside the EU as the growth markets for their products.<sup>17</sup> Yet, access to such markets for environmental goods are impeded by “buy local” provisions, technical barriers to trade and the traditional tariff barriers, which are typically higher for environmental goods<sup>18</sup>. The particular focus must depend on the degree to which environmental goods can be defined in a trade policy context as well as the size of the identified trade distortions.

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<sup>16</sup> Copenhagen Economics (2011b), p.7. Examples of studies estimating the benefits: Eurelectric (2008), EWI (2010), European Commission (2008b)

<sup>17</sup> See fx Brøndum & Fliess (2009)

<sup>18</sup> OECD(2009b)

**Box 2.3. Policy proposals: Breaking down barriers to trade**

- Review the options to create more uniform carbon pricing within the EU. The longer term perspective is to include more sectors in the ETS.
- The EU commission should actively support the use of the so-called co-operation mechanisms with the renewable energy directive that allows for joint implementation of national targets. The upcoming review of the directive in 2014 should be used to achieve further integrated market for renewable energy.
- More stringent and uniform enforcement of environmental standards in water and waste management. Start a broad ranging internal market review with involvement of key stakeholders.
- The EU should include market access for environmental goods as a priority in WTO and in the short term focus must be given to this issue at bilateral trade negotiations and it must be a topic of discussion at economic summits with key trading partners i.e. EU, China, India and Japan.

**2.4. MORE FOCUSED PUBLIC GREEN BUDGETS**

Sending the right price signals could be an effective way of promoting eco-innovation, but this strategy have to be supplemented with more direct technology support. Removing subsidies and increasing taxes can deal with environmental externalities but not with innovation externalities. Public innovation budget for energy research may need to go up with perhaps 3 times according to recent analysis.<sup>19</sup> Most of the resources are likely to be redirected from other budget posts because of strong budget constraints.

Targeted support for innovation is the appropriate way to boost the competitiveness of EU firms. EU is still at the forefront when it comes to green energy technologies but China, USA and others are catching up and possible passing by. EU needs to move from a model where innovation is pushed by large scale subsidies to deployment of “green” technologies to intelligent support for basic research, test centers and demonstration and pilot projects. We should be much better at nursing innovation from government laboratories all the way to the market place by a proper mix of instruments geared to the maturity of the product: basic research funding for hydrogen technologies and demonstration funding for second generation bio fuels.

**Box 2.4. Policy proposals: more focused public green budgets**

- National budgets for the development of new green technologies, notably renewably technologies, should be shifted from support to deployment of renewable energy to programmes that nurture the development of technologies. Higher carbon taxes and prices of ETS allowances will facilitate this transformation

<sup>19</sup> OECD (2009a).

- EU funding for basic research and innovation should be substantially increased in the post 2013 budget. This budget increase should mainly be financed from savings on agricultural spending.
- A substantial part of structural funds for less affluent regions should be earmarked in order to help these regions speed up compliance with EU standards in the area of water and waste management. Among other things this would provide funding to the much needed infrastructure investments.

## Chapter 3 SOME GAINS FROM REFORMS

Reform efforts should focus on productivity gains that can increase real incomes for EU citizens over the coming decades while also bringing EU economies back on an economically and environmentally friendly growth track. At the same time, we suggest that pushing green growth objectives in the coming years given the substantially idle capacity could be a smart move from both a cost and employment perspective. We will provide some examples of the gains that could result from such moves under the headings of productivity, welfare, public finances and green jobs.

### 3.1. PRODUCTIVITY, WELFARE AND PUBLIC FINANCES

Breaking down barriers to trade in “green” products is likely to bring sizeable benefits. Bringing about a full internal market to comply with EUs renewable energy targets might alone save around € 8 to 17 billion per year by 2020,<sup>20</sup> this is essentially an improvement of productivity: the same amount of renewable energy produced by much less resources. Substantial benefits are also likely to follow from a joint carbon pricing within EU, reduced compliance costs and attaining better market access to growing non-EU markets for low carbon technologies.

There are also wider welfare gains. In addition to reaching environmental goals in a cost effective way, energy efficiency could cut European consumer bills up to € 1 000 per household a year in 2020.<sup>21</sup> It has also been estimated that a 30 per cent reduction target in 2020 for greenhouse gas could provide improved health benefits amounting to between € 60 to 80 billion.<sup>22</sup>

While helping to reach resource efficiency in a cost efficient way, a number of actions suggested in this study could also help improve public finances directly. A 30 per cent reduction target for the ETS sector alone brings in revenues of 2 per cent of GDP (before allowing for free allowances to energy intensive industries).<sup>23</sup> That will at the same time reduce the needed subsidies to reach renewable energy targets by sizable amounts.<sup>24</sup> More generally, carbon taxing outside the ETS sector should help increase member state revenues in the coming years.

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<sup>20</sup> Copenhagen Economics (2011b) page 7. Examples of studies estimating the benefits: Eurelectric (2008), EWI (2010), European Commission (2008b). Effects on grid investments are uncertain: slower development of high cost on-shore wind will save grid investments, in other cases more investments will be needed.

<sup>21</sup> EU Commission (2011d) page 12. Another study made by Ecofys (Ecofys 2010, page 5) suggest that reaching the 2020 targets in a cost-efficient way by realising the end-use savings potential, could lower EU energy bills by € 78 billion annually in 2020.

<sup>22</sup> Holland (2010). Benefits of similar order of magnitude for global regions have been estimated by OECD(2011d)

<sup>23</sup> OECD(2010a)

<sup>24</sup> A higher price of ETS allowance will imply a higher price of electricity and distinct heating in whole sale markets and hence narrow the gap between the generation costs of renewable energy and energy from gas/coal fired energy plants.

### 3.2. GREEN JOBS

Green growth is not about creating specific green jobs but to ensure that we can have growth and job creation while delivering on environmental objectives. Indeed, smart green growth is about resource efficiency and mainstreaming environmental objectives into the core functioning of an increasing number of firms. However, “green jobs” are almost impossible to measure and should not be an objective in itself: indeed mainstreaming implies that what is “green” today is standard practice tomorrow<sup>25</sup>. However, we should ensure that EU firms can compete, win market shares and support viable employment opportunities. The key here is policies that enhance productivity and external competitiveness.

However, in the light of the still severe economic crisis, any policy package that stimulates private jobs is highly valuable. EU countries are producing at levels well below capacity and studies suggest that it will take at least 5 years until the economies are back on trend level.<sup>26</sup>

In this study, we have identified a number of barriers that hampers private activities to “green” the economies. Distortions to competition and an uncertain investment climate that increases the risk premium are two examples of barriers that hold back green investment activities. Moreover, there is substantial potential for bringing forward viable infrastructure investments in the area of energy and water management. Such investments should serve to improve quality and security of supply to customers and they are also completely or partly financed by the households and firms benefitting from higher quality and security of supply and hence they are not burdening public finances.

Thus, Europe needs macroeconomic policies that improve framework conditions and boost economic activities. Such initiatives may in fact improve rather than worsen public finances by helping reducing the substantial slack in the EU economies and helping the public sector realise efficiency gains. Studies commissioned for the European Commission suggest that a vigorous energy efficiency policy recapturing many of the elements described in this study could create/save many jobs. For example the European Commission has estimated that the increased industrial competitiveness in Europe, resulting from the energy efficiency targets, could create up to 2 million jobs by 2020.<sup>27</sup>

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<sup>25</sup> Martinex-Fernandez et al(2010)

<sup>26</sup> Copenhagen Economics (2010)

<sup>27</sup> European Commission(2011d) page 12.



Investments will stimulate economic activity and boost employment, but the actual level of job creation is highly dependent on sector-specific issues such as e.g. how labour-intensive an industry is. The construction sector is particularly interesting with respect to infrastructure investments and energy efficiency measures targeting the existing building stock. These are both low-skilled and labour intensive activities.

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