FINANCING OF LOW-CARBON ENERGY TECHNOLOGIES

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Outline

1. Background
2. The EIB energy strategy
3. Renewable energy
4. Energy efficiency
5. Carbon capture and storage
6. Conclusions
1.1. Background: World energy scenarios

• World energy scenario:
  • High energy prices
  • Higher security of supply risks
  • Intensification of efforts to fight climate change
• Bottlenecks in energy equipment supply result in high costs
  • E.g. oil/gas developments costs, up 100%
• Acceleration technological progress, particularly of low-carbon technologies
1.2. Background: EU energy policy

- The EU policy defines a transition path to a more sustainable, competitive and secure energy system
  - 20% reduction of GHG emissions by 2020
  - 20% renewables (RE) in energy consumption
  - 20% increase of energy efficiency (EE) in relation to projections
- Substantial energy investments up to 2020:
  - Renovate/replace existing energy infrastructures
  - Renewable energy (around EUR 600-800 bn)
  - Energy efficiency investments probably larger than for RE
  - Cost declines may reduce investment needs
- Policy uncertainties can impede the realisation of these investments
Background: World oil production

Oil price in constant 2006 USD

- World Oil Demand (right hand axis)
- Brent Crude Price

Prices and production levels have significantly increased over the past decades.
Shell energy scenarios to 2050
Scenario « Blueprints » challenges are addressed
Cost decline of low-carbon technologies, the PV example

Expected developments of PV costs and PV capacity in the EU

Source: SET Plan
2.1. The EIB energy strategy

- EIB has a strong expertise in energy (finances close to 5% of EU energy investments)
- Integration of energy as a new priority objective in the Corporate Plan
- Energy lending targets in 2007:
  - Energy lending: EUR 6.8 bn (5.4 in the EU and 1.4 outside
  - Lending to RE, 2 bn EUR (1.5 in the EU and 0.5 outside
2.2. Five priority lending areas

1. Renewable energy
2. Energy efficiency
3. RDI in energy
4. Security and diversification of internal supply, including Trans-European Energy Networks
5. External energy security and economic development (Neighbour and Partner countries)
3.1. Renewable energy in the EU: Issues

- Key: a clear and stable market expansion support, linked to long-term objectives
- Financing and R&D support to innovative RE manufactures
- Obstacles related to administrative procedures
- Electricity grid capacity and generation flexibility (e.g. pumping stations) to handle RE variability is increasingly an issue
- Trading mechanisms
3.2. Renewable energy: Issues

Tight RE markets at present because of fast expansion: 25% p.a. for wind and 35% p.a. for PV since 2000

RE in different stage of development:
- Mature RE technologies (mainly biomass, on-shore wind and hydro)
- Emerging RE technologies (PV, Concentrated solar power, off-shore wind, etc). Cost of emerging RE expect to decrease fast, as the market expands (mainly from learning-by-doing)
- Some RE still at R&D or demonstration stage, such as 2nd generation biofuels, wave power
Fast expansion of wind and PV markets worldwide

**Annual wind capacity in GW**
Source: New Energy Finance 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>6.9</td>
</tr>
<tr>
<td>2002</td>
<td>6.7</td>
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<tr>
<td>2003</td>
<td>9.3</td>
</tr>
<tr>
<td>2004</td>
<td>8.5</td>
</tr>
<tr>
<td>2005</td>
<td>11.5</td>
</tr>
<tr>
<td>2006</td>
<td>14.6</td>
</tr>
<tr>
<td>2007</td>
<td>20.6</td>
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</table>

**Annual PV capacity in MW**
Source: New Energy Finance 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (MW)</th>
</tr>
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<tbody>
<tr>
<td>2001</td>
<td>270</td>
</tr>
<tr>
<td>2002</td>
<td>322</td>
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<tr>
<td>2003</td>
<td>487</td>
</tr>
<tr>
<td>2004</td>
<td>776</td>
</tr>
<tr>
<td>2005</td>
<td>1400</td>
</tr>
<tr>
<td>2006</td>
<td>1742</td>
</tr>
<tr>
<td>2007</td>
<td>2573</td>
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</tbody>
</table>
Energy scenarios for EU27
Combined high renewables and efficiency case
(RE close to 20% by 2020 and EE 20% by 2020)
in Ktoe

Source: Commission (DG TREN) 2006

<table>
<thead>
<tr>
<th>Energy source</th>
<th>2000</th>
<th>2020</th>
<th>2030</th>
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</thead>
<tbody>
<tr>
<td>Hydropower</td>
<td>30.483</td>
<td>35.898</td>
<td>36.634</td>
</tr>
<tr>
<td>Biomass and waste</td>
<td>65.264</td>
<td>233.752</td>
<td>283.697</td>
</tr>
<tr>
<td>Wind energy</td>
<td>1.913</td>
<td>39.305</td>
<td>51.504</td>
</tr>
<tr>
<td>Solar and others</td>
<td>416</td>
<td>4.667</td>
<td>9.011</td>
</tr>
<tr>
<td>Geothermal</td>
<td>3.329</td>
<td>21.738</td>
<td>25076</td>
</tr>
<tr>
<td>Total Renewable energy</td>
<td>101.405</td>
<td>335.361</td>
<td>405.922</td>
</tr>
</tbody>
</table>
3.3. Renewable energy: Issues for the financial sector

- Equity and debt financing needs expanding fast
- Small and medium sized projects: higher transaction costs
- Financing often based on project finance techniques:
  - Understanding and measuring risks
- Financial intermediaries’ capacity to assess project risks
- Innovative entreprises often undercapitalised and underfunded
- Raw material risks for biomass projects
- Securing carbon credits or green certificates revenues
3.4. Renewable energy: EIB actions in the EU

- Increase lending targets for renewable energy in the COP
- Adapt our lending criteria: mature and emerging RE
- Keep strong technical, economic and financial expertise
- Financing up to 75% of project cost, under certain conditions
- Develop a battery of instruments, covering all levels of risk up to equity type risks
- Instruments for small projects (frameworks, dedicated credit lines, etc)
- Specific instruments for RDI projects: RSFF
- Carbon funds
- Jaspers, Jessica and Jeremie supporting RE
4.1. Energy efficiency (EE): Issues

• EE often part of other investments or cannot be physically separated from other objectives (production increase, quality, etc.)
• EE investments generally small
• Substantial barriers to develop the EE potential:
  - Limited information on EE possibilities
  - High transaction costs, notably costs of access to information
  - Market failures, particularly split incentives e.g. house rental
  - Access to financing e.g. low incomes
Potential energy savings in the EU by 2020+ (in MToe)
Source: Green Paper on Energy Efficiency

- Buildings: 70 MToe
- Electrical appliances: 35 MToe
- Industry: 30 MToe
- Transport: 90 MToe
- CHP: 60 MToe
- Energy transfer: 75 MToe
4.2. Energy efficiency (EE): Issues for the financial sector

- Unclear market potential for lending, except for some sub-sectors, notably CHP
- Often very small projects: high transaction costs
- Subsidies often play a role in developing EE potential, by overcoming barriers or long pay backs (e.g. for building envelopes)
- Difficulties to develop specific financial instruments: Identification of the energy efficiency “revenues”
- Risk related to measuring EE gains
- Energy price risks
- Often it is necessary to combine financing with advisory services
4.3. Energy efficiency: EIB actions in the EU

- Better define EE projects to focus activities in this area
- Mainstream EE considerations in all projects
- Financing up to 75% of project costs, under certain conditions
- Develop specific financial instruments (often including energy audits):
  - Combination of grants with loans
  - Public private energy funds
  - PPP structures to attract funding for debt financing
  - Local revolving funds
- Partnerships with institutions related to EE, such as EE agencies or ESCOs
- Jaspers, Jessica and Jeremie supporting EE
5. Carbon capture and storage (CCS)

- Coal is the fastest expanding fossil-fuel at present
- CCS technologies not demonstrated at full scale yet
- Cost expected to decline with development of CCS
- A small number of full scale CCS installations expected to be operational by 2020
- EU supports development of CCS demonstration plants
6. Conclusions

✓ Low-carbon technologies are expanding fast in the EU and worldwide
✓ Investing in these technologies in the medium term will bring substantial benefits in the long term: cheap, clean energy and business opportunities
✓ Financing for low-carbon technologies will be available, if policy and regulatory frameworks are clear and stable
✓ The financial sector is developing specific instruments for these projects to facilitate financing