Fact sheet: Why technology is so important

A strengthened international post-2012 climate change regime needs to encompass and to drive technology cooperation and innovation forward in a concerted manner. In addition to that, efforts to boost technology transfer from developed to developing countries are already taking place both within the context the UNFCCC and its Kyoto Protocol. Developing countries' efforts to eradicate poverty and enhance economic growth are set to require vast amounts of energy and huge investments in energy infrastructure – more than half of the around 26 trillion dollars forecast to be invested world-wide in the energy sector by 2030. At the same time, the greatest greenhouse gas mitigation potential – around 70% of what is possible world-wide – is in precisely these parts of the world. Environmentally sound technologies (ESTs) for mitigation and adaptation are central to mitigating climate change and to increase resilience to climate change impacts. ESTs are able to provide win-win solutions, allowing global economic growth and climate change mitigation to proceed hand in hand.

For mitigation

- The utilization of ESTs can enable a transition to a less carbon intensive economy and decouple economic growth from emissions growth.

- The utilization of ESTs and sustainable development approaches can enable developing countries to avoid the development paths taken by certain industrial countries in the past which were taken before the risks were known.

For adaptation

- Most methods of adaptation involve some form of technology:
  - Soft forms, including for example: crop rotation patterns or traditional knowledge
  - Hard forms, including for example: irrigation systems, drought-resistant seeds, or sea-defences
  - A combination of soft and hard forms such as early-warning systems.

How to drive technology

- Voluntary approaches are not contrary to target-based approaches. However, the speed or timeline with which technologies are eventually deployed at a large scale is likely to differ substantially, with binding targets rapidly pushing technologies into the market.

- ESTs need to be rapidly picked up by the private sector, deployed and diffused widely.

- Despite advances made, investments in ESTs are still in their infancy. There is a need to connect the various actors and interests in the climate change arena for this purpose. A four-fold challenge needs to be met:

  1. ESTs are often considered more expensive than existing fossil fuel-based technologies. This problem will diminish as demand for ESTs increases, as approaches that factor in environmental costs are taken up and as current price distortions are addressed. But this process can only begin if:

     - The market is primed effectively by appropriate policies and carbon markets continue to develop.

     - Diverse policy instruments have been developed to achieve this and need to be integrated into a coherent whole.

  2. There are a number of barriers to the wider uptake of ESTs. These range from legal, regulatory, institutional, financial, lack of technical capacity and social such as human behaviour and habits to the need for investment in infrastructure necessary for new energy technologies. A wide range of innovative public policy approaches and capacity building will be needed to overcome these barriers.

  3. A major push on research and development (R&D) in new technologies, such as further research on carbon capture and storage, hydrogen and fuel cells, biofuels, power storage systems and micro-generation, clean energy technologies, early warning systems for extreme weather events and biotechnology will also be required – which will in turn require a range of government support packages.

  4. Technology cooperation between developed and developing countries, and increasingly between developing countries, will be needed on an unprecedented scale. Many developing countries experiencing rapid growth, are making huge investments worth billions of dollars in capital stock, such as infrastructure and power generation, that will be used for thirty years or more. Such investments need to contribute to sustainable development. A well functioning carbon market is likely to be a prominent feature in any future mitigation framework.

The role of governments

- For ESTs to be widely deployed, governments need to concretize and support a market-friendly, clear and predictable playing field for private investors:

  - Government needs to provide business with frameworks and partnerships at the national and international level.

- Business needs to know and understand the direction and the ultimate goal of national and international climate policies in order to invest with confidence.

- Governments can provide companies with incentives that are clear, predictable, long term and robust in order to reduce the perceived risk of the associated investment.

- No one sector or technology can address the entire mitigation challenge. The best approach may be to adopt a diversified portfolio of policies and to address all major sectors and technologies:

  - Some of the cheapest options for reducing emissions involve electricity savings in buildings and fuel savings in vehicles.

  - Policies to promote a shift to less carbon-intensive energy sources are particularly effective.

  - Governments can promote a range of energy production and effective utilisation options, including the encouragement of clean fossil fuels such as clean coal technologies, natural gas, supporting deployment of mature renewable energy technologies using biomass, geothermal, solar, wind and hydro energy to produce electricity heating and/or cooling as well as providing public awareness on efficient utilisation of energy.

The role of business

- The role of business as a source of solutions on global climate change is universally recognized.

- The transition to a low-carbon economy can become a platform for new economic growth, new jobs, new manufacturing and service industries, new markets and new roles for sectors such as agriculture and forestry.

- Business sees enormous opportunities in the development of new ESTs that will help economies advance and grow—without continuing to pose a threat to the global climate.

Technology cooperation under the UNFCCC - present and future

- Under the Convention all Parties are to promote and cooperate in the development, deployment and diffusion, as well as transfer of technologies, practices and processes that control, reduce or prevent certain anthropogenic emissions of GHGs in all relevant sectors.

- Under the UNFCCC, industrialized countries are urged to take all practicable steps to promote, facilitate and finance the transfer of, or access to, ESTs and know-how to developing countries to enable them to implement the provisions of the Convention. The UNFCCC's Expert Group on Technology Transfer (EGTT) is tasked to identify ways to advance technology transfer activities under the Convention.

- The Global Environment Facility (GEF) allocates and disburses about USD 250 million per year in grants for enhancing the development of markets related to climate change and for technology transfer projects, including support for energy efficiency, renewable energies and sustainable transportation.

- The Kyoto Protocol's clean development mechanism (CDM) also provides a number of opportunities for technology diffusion by offering a legal framework and a marketplace for Parties that are required to reduce greenhouse gas emissions. The carbon market has an important role to play in bridging the technology and investment challenge, while addressing climate change concerns.

Annex

- Examples of existing clean technologies for carbon dioxide (CO2) that are marketable or close to marketability, include:

  - Energy efficiency

  - Renewable energy technologies, including solar panels, wind turbines, biomass and hydro-power generation. (marketable)

    - Biomass: Agriculture and forestry residues, and in particular residues from paper mills, are the most common biomass resources used for generating electricity, and industrial process heat and steam and for a variety of bio-based products.
      - Ethanol and biodiesel are made from plant matter instead of petroleum

    - Hydropower is the capture of the energy of moving water for electriticy generation

  - Carbon capture and storage, which involves capturing carbon dioxide before it can be emitted into the atmosphere, transporting it to a secure location, and isolating it from the atmosphere, for example by storing it in a geological formation. (close to marketability)

- Hybrid vehicles, for example those that switch between electric and combustion engines. (marketable)
- Nuclear power

- Examples of existing clean technologies for methane that are marketable:
  - Animal waste management: Methane released from liquid manure management systems can be captured and used to meet a portion of a farm's energy requirements or simply flared. Captured methane can be used as a clean energy source to produce electricity or as fuel for equipment such as engines, boilers or chillers.
  - Livestock: Improved nutrition and grazing management has been identified as effective in increasing efficiency and reducing methane emissions. Digestive improvements of livestock can reduce livestock methane emissions by 25 – 75%
  - Landfills: The principal approach to reducing methane emissions from landfills involves the collection and combustion or use of landfill gas. Landfill gas utilization technologies focus on electricity generation and direct gas use.
  - Natural gas and oil systems: Current opportunities for reducing methane emissions include both procedural and hardware improvements, such as technology or equipment upgrades.

- Examples of existing clean technologies for nitrous oxide (N2O):
  - Coal-fired power plants:
    - Clean Coal Technologies involving selective catalytic reduction
  - Agriculture:
    - Matching nitrogen supply with crop demand, tightening nitrogen flow cycles, and optimising tillage, irrigation and drainage could reduce nitrous oxide emissions from fertiliser use by 19%
    - Fertiliser: Nitrogenous fertilizers play an important role in increasing crop yields. Reducing N2O emissions can include the use of low N2O-emitting fertilizer or the use of slow-release fertilizers and nitrification inhibitors
    - Keeping cattle on feed-pads during the wet autumn/winter period, so that excreta can be collected and utilised as fertiliser later in the year. Nitrous oxide emission from dairy excreta could be reduced by 25% and nitrate leaching by 40%

- Examples of existing technologies for hydrofluorocarbons (HFCs):
  - Refrigeration, air conditioning, and heat pumps are the largest source of emissions of HFCs.
  - Improved design, tighter components, and recovery and recycling during servicing and disposal can reduce lifetime HFC emissions at moderate to low costs.
- Examples of existing technologies for perfluorocarbons (PFCs):
  - Perfluorocarbons are emitted primarily during aluminium smelting.
  - Perfluorocarbon emissions are formed as intermittent byproducts within the aluminum smelting pot as the result of operational disturbances called anode effects. Perfluorocarbon reduction potential varies by smelter technology.
  - Currently available perfluorocarbon mitigation technologies and practices include computerized controls, as well as improved operating practices that minimize the frequency and duration of anode effects and associated emissions
  - Currently in the research and development phase, involves replacing the carbon anode with an inert anode. Doing so would completely eliminate process-related perfluorocarbon and CO2 emissions.
- Existing technologies for sulphur hexafluoride (SF6):
- Sulphur hexafluoride is emitted primarily in electricity distribution, magnesium production, semiconductor manufacturing, noise isolating
- Currently available mitigation options include:
  - Better installations/ materials, preventive maintenance
  - Development of modified (components of) installations, using less or no SF6
  - Recycling/reuse of discarded agents