The IEA’s Renewable Energy Technology Deployment Implementing Agreement - rEtD - has taken on the task of answering this question. rEtD is a technology and market cross-cutting platform for renewable energy, under the framework of the IEA, focusing on deployment.

**ReTD Vision**

Significantly higher utilisation of renewable energy technologies will result from international cooperation, encouraging more effective, efficient and rapid deployment.

**ReTD Mission**

The rEtD will act as a catalyst for an increased rate of renewable energy technologies deployment, by proposing solutions and options to maximize the share of renewable energy technologies in the global, regional, and national energy systems, and to maximize the contribution renewables can make to climate change mitigation, security of energy supply and economic growth; and by providing recommendations on how to overcome barriers and means for significant increased renewable energy deployment.

RENEWABLE ENERGY HAS BECOME MAINSTREAM

“The use of non-hydro modern renewable energy technologies (including wind, solar, geothermal, tide and wave energy, and bio-energy) sees the fastest rate of increase.” (WEO 2009 Reference Scenario).

The question is how to accelerate the deployment of renewable energy technologies in a magnitude that will meet the goal of limiting the temperature rise to 2°C.

**RETD Objectives**

The rEtD objectives are to provide ways and means for an accelerated deployment and commercialization of renewable energy by:

- Empowering energy policy makers and energy market actors through the provision of information and tools:
  - To make transparent and demonstrate the impact of renewable energy action and inaction.
  - To facilitate and show the best practice measures.
  - To provide solutions for leveling the playing field between renewable energy and other energy technologies.
  - To make transparent the market frameworks for renewable energy, including infrastructure and cross-border trade.

- Demonstrating the benefits of involving private and public stakeholders in the accelerated deployment of renewable energy technologies:
  - By enhancing stakeholder dialogue.
  - By implementing effective communication and outreach activities.
Innovative Electricity Markets to Incorporate Variable Production

Conventional electricity markets are not always adapted for renewable variable production. The variability of certain renewable electricity sources is often seen as problematic. This report shows that innovative electricity market products and services can support a better integration of variable electricity generation. This includes developing means for proactive grid planning, and indications on how to prepare markets for dealing with cross-border renewable electricity trade.

Policy Instrument Design to Reduce Financing Costs in Renewable Energy

Investors sometimes consider financing renewable projects too costly due to perceived risks. The key findings discussed in this report are that:
- Well-designed policies can reduce costs of renewable electricity by up to 10-30%.
- Stability, reliability, and predictability are essential for successful policy support schemes; and
- Favorable tax deduction schemes and debt structures can further reduce the cost.

Renewable Energy Technology Deployment - Barriers, Challenges and Opportunities

Despite the obvious opportunities, deployment of renewables still faces important obstacles.

- Some of the main obstacles identified and discussed in the report are: insufficient awareness of the opportunities; the lack of a level playing field; that financing is considered unreasonably costly and risky; and that energy markets are not prepared for large-scale deployment.

Renewable Energy Costs and Benefits for Society – RECaBS

Energy markets do not sufficiently account for the benefits of renewable energy and the costs of conventional technologies.

- The main outcome of this project is a Renewable Energy Calculator – an interactive tool allowing policy makers and others to compare the costs of renewable electricity generating technologies with those of conventional technologies.
- See http://recabs.iea-retd.org/

Renewable Energy for Heating and Cooling

Approximately 40-50% of total global final energy demand is for space heating and cooling. Yet in 2005 only 21% of the gross renewable energy production of OECD countries was for heating.

This joint RETD and IEA report shows that the energy potential of renewables could easily cover demand for heating and cooling and recommends concrete policy measures.

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Renewable Energy in Global Energy Scenarios

Establishing credible and realistic global energy scenarios is crucial for guiding the development of sound energy policies and investment decisions, especially in a carbon constrained world. Modelling the potential contribution of renewable energy (RE) to global energy supplies is complex, driven in part by the dynamic growth of RE markets as well as fundamental differences between traditional and renewable technologies.

RETD ONGOING PROJECTS

Since 2007, The RETD has been providing input to the development of global scenarios that more accurately reflect the potential of all renewable energy technologies. The RETD has:

- Played an important review role for the two main energy modeling activities of the IEA:
  - Reviewed draft chapters of the IEA’s Energy Technology Perspectives (ETP) 2008
  - Reviewed technology assumptions for the World Energy Outlook (WEO) 2008 and 2009
  - Served as a peer reviewer of the WEO 2009
- Encouraged greater transparency for the IEA’s WEO and ET
- Held three stakeholder workshops between March 2007 and April 2009, covering various topics relevant to the role of RE in global scenarios.
- Developed a RETD RENEWABLE ENERGY SCENARIO for achieving 420 ppm CO2-eq, modelled in collaboration with the IEA ETSAP Implementing Agreement.

Major findings include:

- Low-carbon electricity becomes the largest energy carrier, replacing much of the direct use of fossil fuels.
- Biomass power with carbon capture and sequestration (CCS) appears to be an important technology - it allows the entire energy system to become carbon neutral before 2050 while still allowing the use of some fossil fuels in buildings, industry and transport.
- This climate target can be achieved with minimal impact on global GDP (estimated at about 1.3% through 2100). Importantly, this does not include the indirect benefits of job creation, enhanced global security and a reduction in the potentially vast costs of climate change adaptation.
- Non-energy climate mitigation options are important for achieving the 400 ppm CO2-eq target, and deserve more careful study.

"Wind, geothermal, and solar power output grow very rapidly in the 450 Scenario, but little by as much as 25% per year. Electricity generation from wind grows by 13% per year over the Outlook period, such that wind power accounts for 26% of all the growth in power generation between 2007 and 2030 in the 450 Scenario. The share of renewables in electricity generation jumps from 18% in 2007 to 37% in 2030." - IEA World Energy Outlook 2009
Better Use of Biomass for Energy

The increased demand for biomass by the energy and transport sectors, possibly competing with land use for food production, has fuelled the debate on the sustainability of using biomass for energy purposes and is now one of the key issues on the political agenda. The purpose of this joint IEA-RETD and IEA-Bioenergy project is to contribute to the international debate on sustainable use of biomass for energy.

The main conclusions of the project are:

- Improve efficiency in the use of sustainable biomass resources
  - Increase amount of fossil fuels replaced with biomass.
  - Increase efficiency of traditional stoves and heating (in non-OECD countries) and use of CHP (in OECD countries).
  - Encourage investments in improved energy efficiency.
- Maximize the greenhouse gas reduction achieved
  - Demand minimum GHG reduction over bioenergy life cycles, including land use change emissions.
  - Provide incentives for bioenergy routes that reduce more GHG emissions.
  - Promote the use of waste and residues for bioenergy production.
  - Prevent or at least limit arable land use, and thus land use change emissions.
- Optimize biomass contribution to energy security of supply
  - If a government aims to reduce its dependence on oil, policies should aim to fully utilize the sustainable biomass potential for transport. Focus on the development and market deployment of next generation biofuels and electric vehicles.
  - If security of gas supply is a concern, provide incentives for increasing sustainable biomethane production.
  - Reduce risks and potential impacts of fluctuating biomass prices and availability through attractive trade policies, and market incentives for non-edible biomass feedstocks.
- Avoid competition with food, feed and fiber
  - Promote cultivating biomass on agricultural land set free from significantly increasing agricultural yields.
  - Develop bioenergy strategies together with a strategy for good food security.
  - Reduce possible negative impacts on bio-based industries through promoting cascading use of residues and wastes from biomaterials for energy.

Deployment of Renewable Energy for Heating and Cooling in the Residential Sector

Policymakers need robust, sustainable policies and programs that can overcome the very special and most common barriers that occur in deploying renewable heating and cooling (RHC) in the residential sector.

Outcome: A toolbox offering concrete advice on successful policies and programs, including implementation and evaluation.

Risk Quantification and Risk Management in Renewable Energy Projects

To obtain a more transparent understanding between the different stakeholders in the market, a benchmark methodology for quantification and incorporation of risks into financial calculations is needed.

Outcome: The project will identify the main challenges for the market introduction and the deployment of offshore renewable energy and it will provide guidelines for policies and project development.

Accelerating the Deployment of Offshore Renewable Energy Technologies

Policymakers need robust, sustainable policies and programs that can overcome the very special and most common barriers that occur in deploying renewable heating and cooling (RHC) in the residential sector.

Outcome: The project will provide reproducible and transparent techniques to assess the risk/return profiles of renewable energy investments and transactions.

Offshore wind, wave and tidal energy are at different stages of technology development and deployment. Nevertheless, these technologies face common challenges.

Outcome: The project will identify the main challenges for the market introduction and the deployment of offshore renewable energy and it will provide guidelines for policies and project development.

"Today, Europe imports 54% of its energy. At 2008’s energy prices, these imports represented an estimated €350 bn, or around €700 per year for every EU citizen."

The Transport Sector represents a major challenge in achieving the goals of reducing greenhouse gas emissions and a reduction in fossil fuel dependency. The project focuses on road traffic – especially electric and hybrid vehicles in combination with renewable electricity.

**Outcome:**
- State of art of the most mature technologies – biofuel, fuel cells, hybrid and electrical vehicles.
- To stimulate the large scale introduction of electric vehicles (EV) and the co-evolution with renewable electricity, a two-phased long term policy is needed.

**PHASE 1:** Preparation for EVs through pilots and standardization
- Prepare infrastructure.
- Ensure widespread use of standards.
- Pilot fleets to enable learning effects to decrease costs.

**PHASE 2:** Increase EV and renewable electricity deployment
- Increase system integration.
- Introduce smart grids.
- Enable co-evolution of transport and energy sectors.

Various so called non-technical and non-economic barriers impede the deployment of renewables in many countries.

**Outcome:**
A handbook that will explain the various barriers, provide solutions, facilitate good policy design and facilitate knowledge sharing through examples.

Renewable energy technology deployment is a great opportunity to create new jobs, but transparency on the overall impact of renewables on employment and innovation is needed.

**Outcome:**
Methodology, indicators and a framework for sustained data collection and monitoring to document and inform about the impact of renewables on employment and innovation.

Synergies between EVs and RE electricity technologies may improve the business case for electric vehicles and increase the uptake of renewable energy in the electricity sector.

“Forward-thinking governments can act now to maximize employment and investment opportunities as we move to a renewable energy future.”


Large scale deployment of renewable energy in order to meet the challenges of reducing climate change, securing energy supply and economical development calls for involvement of all relevant sectors and a broad combination of policy instruments. The RETD will in 2010 screen and identify opportunities for sector integrated approaches with the purpose to enable larger scale of renewable energy deployment.

**Renewable Energy and Education** – where the purpose is to define the requirements to the educational sector to support a rapid and increased deployment of renewable energies.

**Energy and Water** – where the multi-purpose is to screen the opportunities of ensuring access to water and renewable electricity in regions where it is scarce and at the same time optimizing the possible uptake of variable renewable electricity by co-production of electricity and (sweet) water.

“With appropriate policies, universal electricity access could be achieved with […] just 6% of the power-sector investment projected in the Reference Scenario. […] Only by taking advantage of integration potential in all sectors and regions can the necessary ambition reductions be delivered.”

WEO 2009.
The RETD is comprised of ten countries: Canada, Denmark, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, and the United Kingdom. Invited observers: Sweden.

Hans Jørgen Koch, Deputy State Secretary, Danish Energy Agency, Ministry of Climate and Energy serves as Chair of the RETD. The RETD Implementing Agreement is one of a number of Implementing Agreements on renewable energy under the framework of the International Energy Agency (IEA). The creation of the RETD Implementing Agreement was announced at the International Renewable Energy Conference in Bonn, 2004.

The IEA Implementing Agreement functions within a framework created by the International Energy Agency.

Visit the website www.iea-retd.org

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