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# TOWARD AN INTERNATIONAL STRATEGY FOR ACCELERATING THE SPREAD OF CLEAN ENERGY TECHNOLOGY



International Energy Agency



# Toward An International Strategy for Accelerating the Spread of Clean Energy Technology

## The context

- There is a growing recognition around the world that the greater diffusion of cleaner, low-carbon technologies, including renewable, nuclear power, carbon capture and storage (CCS) and technologies that enhance end-use energy efficiency, would improve energy security globally, create myriad opportunities for economic growth and promote long-term environmental sustainability through reduced emissions of greenhouse gases. Promoting the development of low-carbon technologies was a major focus of the G8 Environment Ministers Meeting in Siracusa in April.
- Work to facilitate more rapid diffusion of clean technology is currently under way in various international forums. At the behest of the G8, the IEA has been actively involved in work on the Hokkaido Summit goal of launching 20 industrial scale CCS demonstration projects by 2010 and on the creation of an International Partnership for Energy Efficiency Cooperation (IPEEC), as called for by the Aomori Declaration.
- In addition, the G8 has asked the IEA to develop a series of technology roadmaps, which seek to identify essential steps for the development and widespread commercialization of 19 key energy technologies. (The list of technologies is divided roughly equally between energy production and end use.)
- As such work progresses, however, it is becoming ever clearer that to be fully beneficial, roadmaps for a given technology often need to be elaborated at a regional or even national level in order to account sufficiently for local economic, environmental and regulatory differences. In addition, the roadmaps will not be self executing.
- More scope remains, therefore, for turning political statements and analytical work into concrete action through enhanced international collaboration. However, we currently lack tools to design and support effective implementing actions, let alone to assess and monitor implementation.

## *The Need for an International Strategy*

- There is a pressing need for a strategy to enable all countries, developed and developing, to work together, alongside the private sector as appropriate, to:
  - ✓ draw on roadmapping and other analytical exercises to assess and identify clean technology needs at the national level;
  - ✓ assess the individual contribution of such technologies to each nation's energy security at various levels, to its economic development and to reductions in its greenhouse gas emissions;
  - ✓ estimate the development and deployment costs of such technologies in major sectors (power generation and transmission, appliances, buildings, transportation and industry), particularly in developing countries;
  - ✓ identify existing domestic barriers to the adoption of these technologies in important emitters and the most cost-effective policies and measures to overcome or remove them;
  - ✓ devise concrete steps for implementing such policies, including through appropriate international collaboration, and for monitoring progress in implementation.
- Such a strategy should build on the outcomes of the G8 Summit and Meeting of Major Economies on Energy Security and Climate Change held in July 2008, which emphasised the importance of technology roadmaps as a tool to promote continuous investment and cooperation in clean energy research, development, demonstration, and deployment. In effect, we are now calling for a roadmap for accelerating the implementation of roadmaps.
- A guiding principle for a “roadmap-of-roadmaps” strategy would be to maximize the efficient use of available resources by creating synergies among existing activities and avoiding the creation of new bureaucracies. It should also embrace an open philosophy that encourages the participation of all countries and private organizations willing to contribute their fair share to the work.

## *An Arsenal of Existing Institutions*

- As mentioned above, there are a number of existing forums for discussing individual technologies and the strategies for developing and deploying them. The oldest examples are probably the IEA-affiliated technology implementing agreements (IA's), which date to the agency's creation 35 years ago. These independent agreements, which are also open to

IEA non-members and members of the private sector, enable specialists from all around the world to collaborate on developing new energy technologies of interest to their institutions.

- There are currently 42 IA's, several of which relate to low-carbon technologies. Each IA provides an annual report of its activities to the IEA's Committee on Energy Research and Technology, which brings important developments to the attention of energy policymakers in IEA Member-countries. Depending on the topic, other IEA committees and working parties also benefit from IA technology work. In fact, the IEA's work on technology roadmaps relies heavily on input from IA's.
- Beside the IA's, there are a number of forums outside of the IEA framework devoted to promoting various low-carbon technologies. The IEA often participates in such forums, e.g., the Carbon Sequestration Leadership Forum (CSLF), the Global Bio-Energy Partnership (GBEP) and the Global Fuel Economy Initiative (GFEI). Although not dedicated exclusively to low-carbon technologies, there are also several existing forums which allow the private sector to provide input on energy issues, such as the IEA's Industry Advisory Board, its Coal Industry Advisory Board and its recently established Energy Business Council. Outside the IEA framework, there is the World Business Council for Sustainable Development (WBCSD).
- In addition, 2009 has already witnessed the creation of two new enterprises dedicated to promoting the spread of specific low-carbon technologies and two more initiatives are expected to be launched before the end of the year. The former are the International Renewable Energy Agency (IRENA) and the Global CCS Institute (GCCSI), whereas the latter are IPEEC and the Sustainable Buildings Network (SBN). Even as these initiatives were being planned, another specialized agency, the Nuclear Energy Agency (NEA), celebrated its 50<sup>th</sup> anniversary.
- This profusion of forums suggests that any delays in the dissemination of new low-carbon technologies will likely not stem from a lack of interest or resources, but more likely from a lack of coordination among independent efforts competing with one another for attention and resources. To prevent this we need a rational division of labour.

### *Building a Strategy*

- Notwithstanding the large number of groups working in this area, there are some grounds for optimism on developing a coherent strategy to create synergies among them while

avoiding duplication of effort. There is growing international understanding of the likely consequences of failing to develop new technologies in time. Perhaps even more important, there is a high degree of overlap among the groups' participants. If policy officials from several of the governments involved can reach an accord, they should be able to exert considerable influence on the direction of the groups' work.

- Of course, reaching accord on a strategy encompassing the development and commercialization of all 19 technologies now being explored for the G8 by the IEA would be a daunting task. Starting with a smaller group of five or six key technologies would have a much better chance of succeeding.
- The G8 has already singled out CCS and energy efficiency in buildings for special efforts, which are already gearing up. The next step might be to agree on criteria for choosing the other three or four starting technologies. One such criterion should be the existence of current efforts that could be expanded or built upon to obtain results quickly. Another should be the expected importance of the technology for GHG mitigation. A third could be the impact of the technology on the success of other valuable technologies.
- Once the criteria and the five or six target technologies have been chosen (perhaps at a meeting of the Major Economies Forum later this year), the IEA could work with interested governments and the various groups active in those areas to organize a conference on clean energy technology development (CCETD, pronounced "seed") to decide on a division of labour among them. Such a conference could take place during the latter half of the second quarter of 2010. This would give some time for governments to prepare their positions (and to digest the results of the Copenhagen negotiations). In addition, the results of IEA's roadmap work mandated by the Hokkaido Summit should be available by then.

### *Goals of a Conference on Clean Energy Technology Development*

- In addition to deciding on strategies for accelerating the development of the target technologies, the CCETD should consider how best to monitor the implementation of these strategies. For example, a permanent monitoring committee (PMC) with one or more subcommittees could be established among the countries and entities taking part in CCETD. This committee, which would ideally include representatives from developed and developing countries as well as key institutions and the private sector, could be established using the same flexible structures utilized by for the IEA's various IA's.

- If requested by the committee and approved by the IEA's Governing Board, the IEA secretariat could provide support for PMC activities. Or, as is planned for the new International Partnership on Energy Efficiency Cooperation (IPEEC), a special staff for the committee could be created and hosted by the IEA upon the approval of its Governing Board. A third possibility would be for the participants to hire an independent implementing agent, as is the practice for IEA IA's. In any of these cases, the support staff would be recruited in a non-discriminatory manner based on expertise.
- Whatever structure is chosen must also provide for the active involvement of the private sector, without which no progress can be made in actual technology diffusion. (To ensure that involvement, there would need to be adequate provisions for licensing and protection of intellectual property.) There is a rich history of private sector collaboration with the IEA, including participation in its IA's. The IEA has also collaborated successfully with the WBCSD in the past.

### *Benefits of a Permanent Monitoring Committee*

- Creating a PMC would provide a light-weight structure that would foster essential involvement of the private sector, specialized bodies and major developing countries in efforts to refine and implement clean energy technology roadmaps. Having such a policy body overseeing their work would encourage existing bodies, including IEA IA's, to renew their missions and revitalise their functioning.
- The PMC would serve to coordinate the efforts of specialized bodies (including GCCSI, IRENA, IPEEC, NEA, SBN, GBEP and GFEL) to help developing countries identify and deploy low-carbon technologies. It would also work with international financial institutions to provide them effective assistance for doing so.
- By making the selection and transfer of clean energy technologies to developing countries more efficient, the PMC should increase dramatically their capabilities to meet agreed undertakings on emissions reductions without compromising growth objectives. This could help move the climate/technology debate forward.

### *The IEA's expertise*

- The IEA has considerable expertise that could be drawn on in support of the CCETD and the PMC:
  - ✓ The IEA is the only international agency that concentrates on the full range of energy markets and issues. It is also the main international repository of energy data, including policy data. This gives it a unique capability to devise and assess policy strategies.
  - ✓ As mentioned above, the IEA is already developing technology roadmaps. The CCETD/PMC could ask the IEA to build on this work to identify key national barriers to technologies (existing as well as new) and their impact on marginal costs.
  - ✓ The new IEA database of marginal mitigation cost estimates (now being prepared for the World Energy Outlook 2009) could be used to identify the most promising clean energy technologies and the economic barriers to their diffusion.
  - ✓ The IEA already has an extensive database of IEA Member-country climate mitigation policies, which could be used to assist developing countries in preparing objective assessments of policies to address identified barriers.
  - ✓ The IEA is experienced at soliciting advice from public and private experts worldwide. Doing this for specific technologies in several important sectors would serve to identify further mitigation actions under the UNFCCC process and help each technology to achieve its full potential for emissions reduction. In this regard, the advice of private-sector energy experts will be essential.
  - ✓ IEA also has a good track record of successfully engaging experts from governments and the private sector in the development and promulgation of new sectoral indicators, such as on energy efficiency. The availability of advanced sectoral indicators would help countries to assess the mitigation effect of existing support policies and ultimately to design and implement more effective mitigation strategies at lower cost.

### *The Choice of Technologies*

- As noted above, the G8 has already singled out CCS and energy efficiency in buildings as two key technologies whose diffusion should be accelerated. The new GCCSI and the soon-to-be-launched SBN will serve these objectives.
- Additional technologies that might be worthy of special attention at the CCETD include: electrified vehicles (all electric as well as hybrids and plug-in hybrids), flex-

fuel vehicles, nuclear power, smart electrical grids, cogeneration, and concentrated solar power.

- Vehicles constitute a major component of worldwide oil demand. Reducing this demand would have important energy-security, economic and environmental benefits. This is the rationale behind the GFEI whose goal is to increase the efficiency of the world's vehicle fleet by 50% by 2050. To achieve this goal, will require significant amounts of fuel switching – either to electricity or bio-fuels. Both electric and flex-fuel technologies (which could be of particular benefit to some developing countries) therefore seem worthy of international support.
- IEA analysis shows that nuclear power should play a significant role in any successful strategy to reduce emissions to sustainable levels. An increasing number of countries around the world, including in developing countries, are now exploring the nuclear option. However, the industry's global capacity has deteriorated in recent years due to the prolonged slowdown in construction of new plants. Reversing this trend in a cost-effective manner will require the development and promulgation of improved technologies, which could also help overcome safety concerns.
- Smart electrical grids are an important enabling technology that will help reduce the need for increased generation capacity and assist efforts to increase the share of renewable energy sources in electrical generation all over the world. Smart grids could also contribute to the spread of all-electric vehicles and other clean technologies requiring electricity at lower cost and with a reduced need for new generation capacity.
- Cogeneration is an important supply-side energy efficiency technology that captures waste heat from industrial processes and converts it into electricity. Like smart grids, it can reduce demand for increases in traditional generating capacity. In that sense, it is an enabling technology that can help accelerate the world's transition to cleaner technologies powered by electricity.
- Although capital intensive, concentrated solar power promises to be particularly beneficial for poor developing countries with desert climates. In Africa, it could be an important enabling technology for the development of energy corridors and the alleviation of energy poverty. The export of electricity under the Mediterranean to Europe would create a source of foreign exchange for African countries while increasing energy security in Europe.