IGES Submission to ADP Workstream 2

Technical inputs on the promotion of energy efficiency and renewable energy

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Based upon the discussion at the International Research Network for Low Carbon Societies (LCS-RNet) and the Low Carbon Asia Research Network (LoCARNet), this submission aims to provide technical inputs on the promotion of energy efficiency and renewable energy with the view to raising the level of mitigation ambition by 2020 and beyond. LCS-RNet and LoCARNet is a practical platform of researchers/research organisations that are making close contributions to individual countries' low-carbon policy-making processes. The basic nature of the both networks is a platform to support and encourage information sharing and voluntary cooperation among research institutions, specifically in the field of LCS research. LCS-RNet and LoCARNet also facilitates interactions between researchers and various stakeholders and delivers its findings to policy-makers to assist in science-based policy making during transitions to low-carbon societies. Secretariats of both the LCS-RNet and LoCARNet are located in IGES[1].

ENERGY EFFICIENCY

Mitigation potentials

- Since 1973, energy efficiency and structural change have met about 58% of the new demand for energy services in industrialised countries (UN-Energy, 2009; IEA, 2008).
- Technical bottom-up models as well as IAM-models in IPCC (2007) report and other modelling analysis see energy conservation and efficiency as major strategy.
- IEA analysis (2008) suggests that energy efficiency would constitute more than half of all industry's contribution to a scenario which envisages global CO2 emissions halving by 2050. 90% of this potential, most of which would come from energy efficiency improvements, could be achieved at less than USD 50/tCO2 saved. The remaining 10% could be achieved at between USD 50 and USD 100/tCO2 saved (IPCC, 2007). 80% of the potential is in developing countries and transition economies (UN-Energy, 2009).

Implementations and best practices

Policy-Regulation

- Energy performance, standards and labels for appliances, equipment, and lighting are instruments that offer a large opportunity to improve energy efficiency.
- According to the UNEP emission gap report (2012), best practice policies including standards and labels are adopted worldwide, standards and labels could result in emission reductions of

[1] For further information on LCS-RNet and LoCARNet: http://lcs-rnet.org/about_lcsrnet/

approximately 0.7 GtCO2e in 2020. The strengths of current energy efficiency policies include the provision of information to consumers through, for example, appliance labels, and the regular updating of building regulations with comparatively strict requirements.

- Energy efficiency improvement is a main driver to achieve climate target also in Germany. The success are strong vision on the policy level, strong use of the information provided by appliance labels by the population and regular updates of the building regulation with comparatively strict requirements.
- The level of energy efficiency or consumption is set to minimize the lifecycle energy cost to end-users, while also taking into account other environmental impacts. The Top Runner approaches have led to residential energy savings of 11% in Japan (Siderius and Nakagami, 2012).

Policy-Market

- Innovative, 'win-win' policies can help people pay for improvements such as insulation through savings on their energy bills. Market-based policies (e.g. white certificates in Italy) have been shown to be effective, while regulatory policy measures (e.g. performance standards) have also played an important role.

Policy-Incentives

- UK Green Deal policy helps people pay for improvement like insulation through savings on their energy bills. To realize win-win strategy is a key to have energy efficiency improvement.

Integrated policies

- To realize demand reduction are related to investment, innovation, supply chain capacity and equity, standards, evidence base, empowering people to act and informing front line profession. It is important to have portfolio of energy efficiency strategies.

Barriers and solutions

Policy

- The magnitude of possible rebound effects, whereby people increase their demand for energy services as energy efficiency increases, can be estimated. These effects appear to be limited and can be mitigated by careful policy design.
- Markets for energy efficiency technologies are still embryonic. The government intervention is necessary to lower barriers, e.g. limited information, split incentives, undervaluing energy efficiency.

Practice

- Challenges are a lack of coordination and vision among the different bodies.
- There is unrealised potential for energy efficiency in transport and infrastructure. Lock-in effects represent a challenge to realising the potential in these sectors.
- Most global and national low-carbon scenario studies "assume" an acceleration of the rate of improvement of energy efficiency. However, they demonstrate the need for a decoupling of economic growth and final energy demand that by far exceeds historical rates. This accelerated decoupling requires, at the global scale, more radical change than that implied by energy efficiency alone. One

possible mechanism relates to the ‘dematerialisation’ of productive processes through, for example, the obsolescence of products, recycling of materials, and a lower transport content of production.

- Mechanism relates to changes in household consumption patterns particularly apply to the transport sector since higher energy efficiency may increase the use of cars for commuting, freight and tourism.
- Reduction of the cost of energy-efficient appliances in the residential and commercial sectors is also an important challenge in order to achieve a low carbon society. To overcome these barriers, it is important for building designers, owners, and others involved to share information with each other and form a consensus on the benefits of energy-efficient buildings, and to establish institutional and political incentives as well as international support for the installation of energy-efficient appliances (NIES, 2012).

Recommendations

- While acknowledging barriers to energy efficiency improvement, many countries have promoted energy demand reduction and developed energy efficiency strategies with the aim of smoothing the deployment of more efficient technologies. Government intervention is needed to lower barriers associated with, for example, transaction costs and high up-front expenditure.
- As mobility depends not only on the price of fuels but also on indirect factors such as housing costs (for example the “gentrification” of downtown areas indirectly creates energy poverty traps for commuters in the suburbs) and infrastructure (for example access to transport services or interconnection between road and rail), policies should be specifically designed to tackle these issues.
- The decarbonisation of supply chains and changes in industrial structure are also making key contributions. However, further efforts are needed in energy efficiency and supply chain management.
- The co-benefits of investment in low-carbon technologies such as employment creation, economic growth and cost reduction need to be emphasised.
- Performance evaluation criteria for buildings should be introduced, and the wide use of the criteria at the building planning stage should be promoted.
- Building codes that promote energy efficiency to make the use of energy efficient appliances & energy efficient design as requirement for construction approval should be introduced.
- To ensure the use of efficient energy appliances, incentive packages for energy consumers with financial support of expensive but efficient appliances should be introduced.
- Energy efficiency as major criteria in rating of industrial environmental compliance should be introduced.
- Capacity of government officials and constructing a framework to evaluate and inspect the efficiency of energy systems and energy audit document reported by industry/building sector should be strengthened.
- The capacity development and raising awareness in energy efficiency of government officials are not limited to energy ministry but also to officers at other ministry that deals with energy related issues such as ministry of environment, ministry of public works, ministry of industry, ministry of finance etc.

- Energy pricing policy that promotes energy efficiency and gradual removal electricity and oil subsidies should be introduced.

RENEWABLE ENERGY

Mitigation potentials

- Close to 80 percent of the world‘s energy supply could be met by renewables by mid-century if backed by the right enabling public policies (IPCC, 2011).
- The findings from the IPCC also indicate that the rising penetration of renewable energies could lead to cumulative greenhouse gas savings equivalent to 220 to 560 Gigatonnes of carbon dioxide (GtC02eq) between 2010 and 2050.
- According to IRENA report (2013b), the feasibility of doubling the renewable share in the global energy mix by 2030 is achievable with currently available and new renewable energy technologies, but requires an accelerated rate of deployment as current and planned policies will only increase the renewable share from at most 18% in 2010 to around 21% in 2030.

Implementations and best practices

Policy

- Feed in tariff was introduced in July 2012 in Japan. Japan saw investment in renewable energy (excluding research and development) surge 73% to $16 billion in the solar market in 2012 (Frankfurt School-UNEP Centre/BNEF. 2013). Although Japan needs to examine whether the current structure and framework of FIT is feasible and sustainable and brings benefits in long term, the number of household and small scale solar power has steadily increased so far.

Technology and cost improvement

- Continuing cost reductions in existing enable energy technologies will help achieve energy access and system improvement. In the case of improving energy access globally, the significant cost and complexity of building out conventional electrical grids may slow the adoption of those renewable energy technology systems which reply on grid connection (IRENA, 2013a)
- The potential of technology options for an energy transition including renewables such as bioenergy, wind and solar, has been examined in many countries. A key finding is that accelerated innovation, cost reduction, appropriate arrangements for risk sharing and the enhancement of local benefits will be key factors in public acceptance and successful deployment.

Barriers and solutions

Policy

- At the national and sub-national level, responsibility for the development of renewable energy innovation policy is typically distributed across multiple stakeholders with diverse interest, and policy options are constrained by existing economic, institutional and social factors. (IRENA, 2013a)

Practice

- In case of achieving low carbon energy systems, systematic economic analysis suggests that, even with significant cost reductions, widespread deployment of currently available renewable energy technologies will not be sufficient. Rapid deployment of current technologies, along with continuous technological innovation and commercialisation, will be required (IRENA, 2013a)
- Renewables are less mature technologies and there are controversies and high levels of uncertainty associated with social acceptance, cost effectiveness and environmental impact. These uncertainties relate to the sourcing and availability of new materials needed for components, currency exchange fluctuations, geopolitical factors and supply chain constraints. Further research, development and demonstration is needed.

Recommendations

- Transforming the electricity sector will require upgrades and modernized extensions of old grid systems and at the same time, will provide opportunities for new innovative solutions to be implemented (e.g. energy storage systems, smart grids, monitoring of energy flows and harmonised regulations) (IRENA 2013a)
- The deep transformation in the way that electricity and heat will be generated as the result of the transition to a low-carbon society will also help to build a more resilient energy system. The transition will require a diverse and decentralised energy supply including the development of more flexible, locally-sited renewable, the development of smart grids and greater regional interconnections.
- The regular and timely provision of scientific evidence is needed to support pilot plants and demonstration schemes. For instance, recent research on offshore wind suggests that significant capital cost reductions can be expected by the mid-2020s

BEYOND ENERGY EFFICIENCY AND RENEWABLE ENERGY

- Common patterns are emerging in decarbonisation policies across a number of different countries. Fundamental system change is being sought through large improvements in energy efficiency and high shares of low-carbon (particularly renewable) energy.
- Decarbonising energy supply is not sufficient in itself if ambitious climate targets are to be met. A transformation of the energy system is needed which must include effective strategies to promote energy efficiency and savings, as well as innovative approaches that integrate energy supply and demand.
- Well-designed legislation can create a coherent framework for policy implementation comprising identification of technology options and emission reduction potential, target setting, independent review and systems of monitoring and evaluation. In the UK, for example, a carbon budget system has been developed to allow a longer-term perspective while maintaining flexibility in policy-making and implementation. Evidence-based advisory groups, drawing on government, industry, NGOs and academic researchers, can also systematically assess uncertainties and disagreements in energy policy.

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