



Multilateral collaborative innovation: Enabling a sustainable energy transition

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Thanks to the previous intervention, we all understand that R&D has multiple benefits and needs to be supported. I will focus on why international cooperation is so useful in maximising knowledge spillovers and the benefits of research. In that context, we first need to understand the impacts on the environment, on economics and on social development – the famous Energy Trilemma. Second, we know that innovation is much more than invention. In order to move from invention to innovation, it is necessary to have the right markets, regulatory frameworks and capacity with which to deploy the new technologies.

The IEA has been active in highlighting the importance of the energy sector in meeting the challenge of climate change. It has demonstrated that the trends have changed in recent decades and how the INDCs are helping to change the link between the energy sector and increases in CO₂ emissions. We are starting to see real pledges from governments, although we are still far from what needs to be done. To increase that ambition, last year, the IEA's bridge scenario set out 5 easy to implement actions that could help peak CO₂ emissions.

The IEA's Energy Technology Policy Division tries to provide further details of the policies that are necessary to encourage Research, Development, Demonstration and Deployment. We firmly believe that the energy sector has always been and will continue to be a technology sector, and we have to ensure that that technology is driven towards meeting our multiple energy policy objectives. There are multiple technologies already today that can allow us to do that, such as renewables and energy efficiency. We have solutions that would help us bridge the gap, for example, fuel switching, which would allow us to keep the emissions pathway open while we bring new technologies to market to meet our future objectives. There is more than one way to meet our climate objectives, but we are trying to link all of these technologies and options together in the most cost-effective manner. In this, it is important to keep in mind affordability, energy security and sustainability.

But when we track the rate of change, we see a disturbing trend. For the first time last year, none of the technologies we track was on time in reaching its full potential. That is, progress was occurring, but not at the necessary pace. We are fortunate in that a COP21 pledge was made to increase R&D spending. However, the percentage of R&D dedicated to the energy sector is in fact declining. We therefore need to review our priorities in order to ensure that our R&D priorities are properly aligned with our overall sustainability goals.

1) The right policy at the right time

The right policies to support energy technology innovation depends on the maturity of the technology and the degree of market uptake. I will focus on one important aspect of that process: international collaboration. In this, it is necessary to note that approximately 70% of decarbonisation actions need to take place in non-OECD countries. However, one solution does not fit all, and national circumstances and resources will drive different technology portfolios and pathways – in this, local users are best placed to understand their own requirements. Emerging countries have a different starting point, different pathways and different end solutions to meet climate goals. That variety of solutions is good news for emerging countries as it means they can develop decarbonisation strategies that also give them a competitive advantage.

Local innovation capacity is a key concept here, as the sustainability of any technology solution depends on the capacity of the local population to install, maintain and use that technology. Cooperation between industrial and emerging economies could therefore create a win-win situation, and we see this is already

happening: emerging economies are starting to focus on those technologies that are important to their specific circumstances and resources.

2) Focus on China

Last year, the IEA worked specifically with China to understand how it saw innovation as a key driver in its economic growth. China is drastically increasing its R&D spend as a percentage of GDP. In 2012, China's R&D intensity – its R&D funding as a proportion of GDP – matched that of the European Union (EU) for the first time. If this continues, China is poised to become global leader in R&D spending by 2020. In addition, China is succeeding in transforming and taking a leadership role in the deployment of technologies. It is doing that by building on both its local and external markets. For example, the National Fund for Technology Transfer and Commercialisation is an innovative initiative targeted at stimulating the public and private financing of innovation and commercialisation by SMEs.

One of the strengths of China's innovation system is its central and focused government strategy. Clean energy technologies are highly capital intensive but have low operational and maintenance costs. It is therefore necessary to address the issue of the cost of capital – financing is the main impediment to the roll out of these technologies. That financing is affected by the political risk relating to the returns on that investment. In China, that political risk is very low. On the negative side, China's inadequate protection of intellectual property is a weakness, as is its high level of regional protectionism.

Overall, China's innovation landscape is focused on transforming the Chinese economy from “Made in China” to “Produced in China” to “Designed and Invented in China”.

3) Technology roadmaps

It is important for developed countries to understand the opportunities and threats to existing business models. We need to understand the feedback loops between different innovation stages, and between innovations in different sectors. Most importantly, we need to understand the feedbacks between innovations in different parts of the world. Technology roadmaps allow us to map the interfaces between policy innovation, regulatory innovation and technology innovation. We bring together different stakeholders from different parts of the world from industry, academia and government to explore the goals to be achieved, the milestones to be met, and the gaps to be filled. In this, we are moving from a global roadmap programme to one that is regionally focused.

The IEA's technology collaboration programmes bring together over 6,000 experts, and 310 public and private organisations from 51 countries to push the agenda forward. Our next edition of the Energy Technology Perspectives 2016 will focus on urban energy systems, and will include a country analysis of Mexico.