Collaborate to innovate

New approaches to collaboration between private and public sectors can speed up innovation, but greater coordination is required to make even greater gains.

Reliable and affordable low-carbon energy technologies need to be deployed widely and rapidly to achieve global emission reduction goals. Many research, development and demonstration (RD&D) activities in energy technology require large and sometimes risky investments, in particular when they relate to physical devices and infrastructures. Indeed, the sheer scale of many energy installations, such as wind turbines or tidal lagoons, requires significant upfront capital investments. Economic and policy uncertainties add risks for investors, especially in the case of projects that rely on long-term returns on investment. Intellectual property (IP) tools, such as patents and trade secrets, are a way to better secure a return on these investments and to amortize them. In sectors where massive upfront RD&D effort is needed, traditional IP tools such as patenting and licensing protect investments while enabling more open sharing of information than in the case of trade secrets. However, one can also argue that the rules and time scales involved in patenting and licensing set a slow pace for technology transfers and therefore limit the percolation of energy technologies through industries and continents[1].

In the case of public–private partnerships, where RD&D is co-funded by the public sector, there is a difficult tension between encouraging efficient and rapid technology diffusion and encouraging the involvement of the private sector in the energy transition, for example by adequately protecting their investments. Thus, innovative approaches to IP management are being developed to increase the rate of technology transfer.

The cluster approach is one such case. For example, Wave Energy Scotland (http://go.nature.com/2y3y9Uu), a Scottish public funding body for wave energy-conversion R&D, asks that companies or institutions that develop IP through their public-funded projects make it available to other organisations via commercial licensing. If the IP owner does not attempt to exploit the IP within three or four years, IP rights are transferred to Wave Energy Scotland. This 'use it or lose it' approach aims to avoid duplication of R&D projects.

Elsewhere, the consortium approach brings partners into tighter collaboration. For example, in some consortium agreements, the IP rights are owned by the partner who generated the new results, or are jointly owned by the several partners whose contributions are interdependent. Each partner grants to the other partners a royalty-free license to use its results for carrying out the project tasks. After or beyond the project, each partner is entitled to obtain rights to use the project results for commercial exploitation from the owning partner, but this is subject to additional agreements between the partners concerned. The idea is to boost the consortium's global innovation capability and the partners' future activities in the field of the project.

International coordination can facilitate cross-border collaborations, including with respect to IP. In this regard, the US–China Clean Energy Research Center, which seeks to accelerate the pace of innovation in clean energy technologies, has for example adopted IP management plans to clarify the licensing rules between partners and the joint ownership of IP resulting from collaborative activity, such as co-patenting. It has also established guidelines for dispute resolution[2].

International coordination to increase the rate of technology transfers of course extends beyond IP management agreements and templates. Sharing data[3] is one of the first steps towards coordinated RD&D and is of paramount importance to promote data-driven innovation. This is one of the goals of publically accessible and curated databases, such as the Marine and Hydrokinetic Data Repository from the US Department of Energy (http://go.nature.com/2lcFgZX). This repository gathers data from DOE-funded marine energy projects, including data on resource characterisation and on device development and demonstration. Which data to include in databases, and how to present and classify that data in order to make it accessible and useful to users, are on-going challenges being embraced by funders and researchers. Another aspect that requires international coordination is the choice of adequate metrics to evaluate the merits of different designs or technologies for specific energy applications.

In the last two years, Mission Innovation has taken big principle steps in coordinating global RD&D for clean energy. Its Innovation Challenges[4] bring together several countries with interests and expertise in specific areas such as carbon capture or off-grid electricity access. Each Innovation Challenge focuses on identifying common goals, quantifiable targets and key research gaps. They seek to promote the engagement and collaboration of various stakeholders (for example, by planning Innovation prizes) and coordinate with external agencies such as the International Energy Agency to avoid duplication of research.

These collaborative innovation approaches can be considered part of a broader shift in approach, called open innovation. The motivation behind open innovation is two-fold. First, firms integrate external knowledge and know-how in order to promote their own growth. Second, they strategize that sharing ideas between organizations, rather than locking down innovations within a single entity, eventually creates value, including for them. Open innovation tools include online innovation challenges and smart IP management, where the knowledge peripheral to the main protected product is more openly shared. While the open innovation approach has yet to be more fully explored in the energy sector, and its potential benefits or drawbacks have yet to be analysed, a recent study identified likely drivers of open innovation adoption in the energy sector[5]. These drivers could include economic slow-down and risk aversion. Indeed, open innovation also means sharing the costs and risks of innovation.

Altogether, many exciting collaborative innovation tools are being introduced in the energy sector, including IP management, international coordination, data sharing and metrics setting, amongst others. They will need to be assessed, adapted, and adopted in order to improve technology transfer rates and to build a real energy innovation ecosystem. ❐

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