

Technology: the key to a Copenhagen agreement?

ECN-IVM Symposium, 18th September 2009, Amsterdam

Introduction

The Energy Centre of the Netherlands (ECN) and IVM jointly organised a symposium on 18th September 2009 on the role of technology in the upcoming Copenhagen climate agreement, in conjunction with Heleen de Coninck's PhD defence. Among the speakers were: Ruud Lubbers (formerly Prime Minister of The Netherlands), Robert Socolow (Princeton), Tom Brewer (Georgetown), Bert Metz (formerly head of IPCC WG3), Andrew Higham (UNFCCC), Bas Eickhout (European Parliament) and David Hone (Shell). Below are some reflections on the discussions.

Technology in the international climate change regime

Technology plays a fundamental role in the climate debate. For a start, the use (and abuse) of technologies is a principal cause of the climate problem – without technologies, social and economic activity would not have pumped 3000 billion tonnes of CO₂ into the atmosphere. But more energy-efficient and renewable energy technologies also promise more sustainable patterns of economic growth in future. Now 'technology' has become a key component of the negotiations towards the Copenhagen COP. Besides mitigation, adaptation and financing, technology was one of the four elements of the 'Bali Action Plan' agreed in 2007. Since then there has been much discussion in UNFCCC circles about whether and how provisions related to technological innovation and diffusion could be added to a Copenhagen agreement.

Until Bali, these discussions tended to focus on the narrow issue of 'technology transfer'. After Bali, the technology discussions generated proposals for baroque institutional arrangements intended to promote such transfers. Simply put, the argument is that one way of getting non-Annex 1 countries to begin to set emissions targets was to offer them low-carbon technologies.

The symposium showed that this is not only a very limited framing of the 'technology' problem, but that in many ways this picture does not correspond with economic and political realities. **Robert Socolow**, for instance, argued that we need to move to a post-post-colonial climate policy in which conventional North-South dichotomies that still underpin the international climate regime are set aside. Technology has the potential to build trust between developed and developing countries – by stimulating a discussion on solutions, so moving beyond a debate about climate risks and costs of mitigation Socolow argues that the future climate will be determined by countries in the South, because they have a right to occupy what's left of the atmospheric headroom and because they will become collectively the largest emitters. Developed countries should therefore take developing country views seriously.

Remaking the international climate regime: the role of reciprocity

Because international agreements, like the UNFCCC, cannot be enforced directly, the theory says they need to be self-reinforcing. That is, state parties that agree to them need to perceive that the benefits and costs of participating balance out. The fundamental asymmetry in the international climate regime is that rich countries with relatively little to gain from mitigation in the short term – because they are less vulnerable and can afford to adapt – nevertheless have to do most of the hard work of emissions reduction. Less developed countries are more vulnerable, but can only bring pressure on rich countries to mitigate (the

problem of poor and weak victims) by refusing to mitigate themselves. We see that many of the largest rich polluters (the United States, Canada, Japan) will not achieve their Kyoto targets, while industrialising countries will tend to refuse to cross the line while these large rich countries do not meet their treaty obligations. The result is an impasse.

One way through the impasse is to increase the perceived benefits of low carbon growth by encouraging the development and diffusion of new technologies. New and renewable energy and low-carbon technologies are already creating new industries, offering the potential for investment, trade and employment, while reducing emissions. These new industries are growing in the North and the South, the technology-holders are firms in rich as well as less wealthy countries, and the future economic potential holds as much in industrialised as in industrialising countries. **Heleen de Coninck** argued that the international climate regime can play a role in encouraging international flows of knowledge, capabilities and technology (in all directions, not just North-South), thereby boosting reciprocity and helping to ensure that the regime becomes self-reinforcing. Technology, by holding up a promise, also works to smooth negotiations between countries. There are therefore *process* as well as *outcome* advantages to taking technology seriously in the climate negotiations.

Perspectives on technology

Getting to a broader, more purposeful discussion on technology and the climate regime requires clarity about some basic features of the problem.

1. *Technology is many things*: The word technology conjures up for most people an image of an artefact – a computer or a wind turbine. But we need to understand that these technological artefacts are always set within a much broader economic, institutional and behavioural context. A computer does not exist without a producer and a user. Both have skills and preferences, and both are subject to regulations and norms of behaviour. The computer and its use is also based on all sorts of knowledge; formal, practical and tacit, which brings meaning and utility to the artefact. So, when we talk about technology and policy, we are also talking about the knowledge, capabilities, behaviours and expectations of the social actors who are part of a socio-technical system. In other words, institutions matter.
2. *Firms are technology holders*: **Thomas Brewer** drew attention to the obvious point that Governments tend not to hold technologies or to have technological capabilities, firms do. This also means that most trade in knowledge and technology happens either within firms (those operating internationally), between firms, or in the market. Governments have an influence on the generation and diffusion of technology – through public investments in science and technology, through industrial and trade policies, through policies related to intellectual property, through safety and environmental regulation and so on – but they remain at one remove from most of the action. This also demonstrates that many of the policy instruments that could be considered in relation to low-carbon technology flows already exist. You do not have to reinvent the wheel, and it will be important to draw on existing policy instruments.
3. *The world is flat*: For many important new and renewable energy-producing and using technologies the world is increasingly flat (the largest manufacturer of solar photovoltaic cells is Chinese). In 2010 China is expected to become the largest market for wind turbines, overtaking the United States. New technologies are not only being deployed rapidly in the South, firms in these countries are significant technology holders (Brazilian companies are world leaders in ethanol) and they increasingly have the innovative capabilities to set the technological frontier. It is too simple therefore to frame technology and climate as a classical overseas development assistance (ODA) problem in which technology-holding firms in the North transfer technologies to the technology-poor South.

International agreements about technology?

If institutions matter, technology flows are mainly in markets and between firms, and technological asymmetries are smaller than often supposed, what do we need international agreements on technology for? One way of breaking this down is to talk about the adoption and diffusion of commercialised technologies and the innovation of new technologies.

Adoption and diffusion

Building enabling environments: The widespread adoption and efficient use of low-carbon goods and services requires a set of well-known capabilities, market conditions and infrastructures. It is obvious that a new mass transit system anywhere involves the creation of a complex socio-technical system requiring high levels of skills and effective governance. But as we know, even the diffusion of energy-efficient light bulbs requires the creation of 'lead markets', learning and awareness-raising, and the slow adjustment of prices and consumer expectations over time. Governments play a critical role in this process of market transformation. But even in the EU they rarely coordinate their policies. Greater international coordination would encourage the faster diffusion of climate-friendly technologies.

Regulating climate-intensive goods and services: A clear role for Government is in incentivising and regulating goods and services through subsidies, standards and bans. Within the EU such rules are applied evenly across the member states, but there is an opportunity for such regulation to have an international scope. Standard-setting is the strongest form of international agreement and has a long history in a number of technology fields, including aviation, telecoms and IT. Such measures, applied to low carbon technologies, would need to comply with WTO rules on free trade.

Diffusion to the poor: Technology asymmetries no longer have a markedly North-South character alone. There are poor and disadvantaged groups and regions in all countries. Government, separately or together, can play a role in making low-carbon- or climate-resilient technologies available to these people. Such measures could be developed as part of national social and environmental policies, or as an element of ODA. The point is that they could be more effective if they were joined-up.

Innovation

Intellectual property rights: The returns on investments in innovation are highly uncertain and this may lead to an under-investment in new technology. Governments can create incentives to invest by firms by giving them temporary monopoly rights to exploit the technology through patent or copyright protection. But there are trade-offs. Granting monopoly rights to one firm may also slow diffusion of a socially-desirable technology because learning and lower prices are achieved through competition. IPR has become a major issue in international trade policy, especially in sectors like software in which the response has been to seek to tighten protections. But there are also countervailing trends, such as in the debate about generic drugs for common diseases like malaria and HIV-AIDS, for which patent protection have been partially suspended. Similar dilemmas will face discussions about IPR as they come to affect potentially large-scale transfers of knowledge and technology related to low carbon goods and services. Again, these are not new problems and they need to be addressed in a mature way.

Big and risky technologies: While most policy attention has been focused on small, distributed energy systems as an alternative to large, centralised fossil-based energy systems, it is also clear that big technological options will continue to play an important role in the climate debate. Examples include nuclear power, carbon capture and storage (CCS) and geo-engineering. Enabling fair and safe use of such technological responses to climate change would require international agreements on development, deployment and regulation. This is partly because of their scale, but also because the risks they carry with them are global in scope. A mature, but evolving international regime exists for nuclear power (with the Nuclear Non-Proliferation Treaty at its core), but similar regimes would need to be developed for other big and risky responses to climate change.

The state of play

The current discussions in the climate regime are still at an impasse, most recently demonstrated by interventions at the 2009 UN Summit on Climate Change in New York. Chances that the Kyoto Protocol will be renewed, this time with participation of the United States and China, are slim. The climate regime needs a new form and shape. Current discussions emphasise national pledges of climate-friendly measures and actions, with a registry of actions at a central level. Many countries, however, will need support for their policies. Depending on their technology needs – whether they relate to innovation, an enabling environment or to diffusion– the international regime could provide such support. International technology-oriented agreements, inside or outside the UNFCCC, could be a

means for that, but are in their infancy. Current proposals are oblivious of private sector needs, or attempt to formulate a one-size-fits-all regime on the great diversity of low-carbon technologies. There is an urgent need for creative ideas in the emerging technology regime and for learning from other policy fields. Because there is still so much to learn, Copenhagen may come too early. The technology discussions need to evolve further before they can really become a key to a new climate regime.

Frans Berkhout and Heleen de Coninck, Amsterdam, September 2009.