

Policy briefing

A blueprint for post-2012 technology transfer to developing countries

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Here we set out a blueprint for securing a post-2012 deal on technology transfer between rich and poor nations to fulfil the United Nations Framework Convention on Climate Change (UNFCCC) Bali Action Plan.

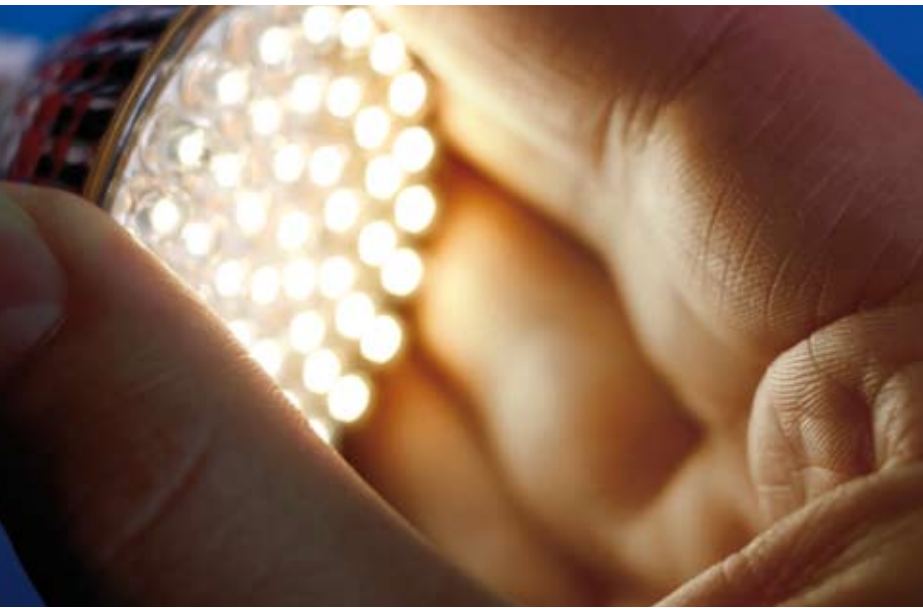
Based on empirical research in India and a comprehensive review of technology transfer projects, we suggest that an annual fund of £10 billion is needed to develop, adapt and deploy low-carbon technologies in developing countries. We propose that £1bn of this fund should support the activities of a new network of low-carbon *'Innovation Centres'*¹ in developing countries.

¹ Low Carbon Technology Innovation and Diffusion Centres: Accelerating low carbon growth in a developing world, The Carbon Trust.



Key messages

1. Currently, most policies overlook the need for *'indigenous innovation capabilities'* – necessary to adapt, develop, deploy and operate low-carbon technologies effectively in developing countries.
2. Developing countries' *'indigenous innovation capabilities'* are important for both deploying existing low carbon technologies and underpinning low-carbon sustainable development.
3. Policy currently emphasises *'hardware'* (e.g. wind turbines, or clean coal plant), but should also emphasise *'software'* – the flows of knowledge that underpin innovation capabilities.
4. Climate change impacts threaten developing country economies. Securing sustainable low-carbon technology transfer can underpin economic development and mitigate against future climate change, whilst opening up new market opportunities for developed and developing country firms.
5. An annual global fund of £10 billion is needed to secure low-carbon technologies in developing countries – this should be allocated legally, and managed under the UNFCCC, via a network of regional and national innovation centres in developing countries.



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Guiding principals:

1. Low-carbon technology transfer can facilitate sustained low-carbon development in developing countries. This can only be achieved by **developing indigenous innovation capabilities** in developing countries – i.e. the capabilities to adapt, develop, deploy and operate low-carbon technologies effectively within specific developing country contexts.

2. Diffusion and development of low-carbon technologies are facilitated by incremental and adaptive innovation processes within developing countries. This requires sufficient innovation capabilities amongst developing country firms, universities and research institutes, and appropriate links with public-sector actors.

These capabilities are essential to allow developing country actors to work with existing low-carbon technologies, identify opportunities to improve and adapt them for application in new contexts, and to develop brand new technologies suited to specific developing country needs. Policy should therefore, not treat the diffusion and development of low-carbon technologies separately.

3. Technology transfer includes: the traditional notion of ‘hardware’ (physical equipment); the often ignored, yet vital, ‘software’ element of technology (knowledge and processes),

including both underlying knowledge (e.g. engineering and manufacturing processes, or new farming techniques) and tacit knowledge (knowledge acquired by doing, e.g. applied engineering & systems integration skills). The software aspect is often most important.

4. As low-carbon innovation capabilities build up in developing countries a snowballing effect takes place where we observe increasingly more rapid uptake and development of low-carbon technological applications. This will yield benefits for developed and developing countries by accelerating development, opening up new market opportunities, and mitigating against future climate change.

5. International technology-leading firms and industrialised countries might have concerns regarding intellectual property protection and their competitive advantage. However, these concerns are likely to be outweighed by the significant economic benefits of accessing new markets via carefully negotiated collaborative initiatives with firms and other institutions within developing countries.

6. The private sector – through investment, research and expertise – will play a pivotal role developing and diffusing low-carbon technologies in developing countries.

7. Policy must be designed to respond to the context-specific social, economic, ecological and technological needs of different regions, countries and areas within countries.

- The needs of the rural-poor differ greatly from those of urban populations.
- Rapidly-emerging economies’ needs are very different from those of least-developed countries.
- Countries reliant on hydropower face different climate challenges to those dependent on coal-fired power.
- Individual technologies raise context-specific issues: this may relate to their stage of commercial development (e.g. investor risk is higher at earlier stages of technology

development), or to hardware and software components involved (e.g. Carbon Capture and Storage (CCS) involves more complex systems management requirements than small scale solar photovoltaics). Policy must take account of context specific issues.

8. Sussex's work in India shows that access to Intellectual Property Rights (IPRs) do not ensure developing country access to low-carbon technologies. Access to other knowledge, particularly tacit knowledge, is often a more important barrier. In some cases, lack of access to IPRs slows the rate at which developing country firms can produce low-carbon technologies and also prevents firms producing at the cutting edge. Policy should therefore include provision for international arbitration in such cases.

Policy mechanisms

9. There is a need for specific support for new institutions as well as low-carbon projects and programmes. Of all the mechanisms currently under discussion at the international level, the most potential to deliver this is the Carbon Trust's proposal for a network of internationally collaborative *Low Carbon Technology Diffusion and Innovation Centres*. This resonates with Sussex's empirical findings on the potential efficacy of collaborative research, development, demonstration and deployment (RDD&D) initiatives.

10. An international hub oversees the funding and establishment of Regional Centres. Where sufficient technological and institutional capabilities exist in a country, Regional Centres will then establish National Centres. Where a country's capabilities are limited, national initiatives will be guided via the respective Regional Centre – perhaps establishing National Centres at a later stage.

11. 'Innovation Centres' will identify relevant international innovations and establish appropriate public-private partnerships to adapt and diffuse these innovations within the developing country. Centres will run capacity building activities. These include: placement schemes

At least £1bn per year is required to support the core activities of 'Low Carbon Innovation Centres' which will maximise the chances of successful low-carbon technology transfer



for developing country engineers and designers within technology leading firms; offering seed funding for new start-ups, and establishing appropriate R&D facilities where adaptive innovation applies existing technologies in new contexts.

12. Pursuing not-for-profit public-private business models will make National Centres financially self-sustaining in the long term; initially investing in partnerships with private-sector actors, then selling shares on once appropriate innovations have been successfully and commercially demonstrated and then reinvesting in new innovations. This public-private basis also maximises potential for leveraging private-sector funding. Imports of existing technologies will require using host country suppliers & parts manufacturers, use and training of host country engineers, designers, building contractors etc., and include knowledge sharing and training agreements. This will maximise impacts on indigenous innovation capabilities.

Too many well-meaning projects ignore the need to transfer the skills and know-how that underpin indigenous innovation capabilities

Institutional structure and financing

13. As indicated by the British Government, public and private funding in the order of US \$100bn (£60bn) per year is required to assist developing countries fight climate change through both adaptation and mitigation measures². The European Commission has put forward a higher figure of 100bn Euros (£90bn). This should be available annually by 2020, but includes some domestic action³.

14. We believe that the EU figure is a good basis to start from. According to the EU proposal, 22-50% of the total funding (£20-45bn) is expected to be required from public funding. Within this public contribution, a maximum of around £10bn per year has been suggested by the EU to support low-carbon technologies, including support for R&D (research and development) and capacity building. All of the £10bn annual funding for low-carbon technologies should be funnelled through the National and Regional Centres. The majority for projects to deploy low-carbon technologies in developing countries – or for research, development and demonstration (RD&D) of these technologies.

15. It is vital that this funding for low-carbon technologies does not just support mitigation projects in developing countries (e.g. for renewable energy, energy efficiency etc). At least £1bn per year is required to support the core activities of the Centres. These include: capacity building initiatives; funding of low-carbon technology start ups; technology acceleration programmes and training. This will maximise the chances of successful low-carbon innovation by firms and institutions within those countries.

16. The split between spending on R&D, demonstration and deployment should be decided at the local level by Centres, host governments and other stakeholders. Fundacion Chile's (a Chilean not-for-profit organisation practicing technology transfer) successful model was implemented in this way, based on in-country, bottom-up analysis of areas of high potential and specific needs. Identifying at what point along the RDD&D spectrum particular funding initiatives should focus, and considering other context-specific issues. Centres will then be able to focus investment in areas with maximum potential leverage.

17. Funding should be managed as a multilateral fund by the UNFCCC. Donors will be given flexibility to develop other, bilateral arrangements for specific projects or programmes. In cases where such flexibility is required, it is essential that UNFCCC mechanisms are in place to monitor and evaluate bilateral arrangements to ensure they genuinely add to the funding proposal.

18. This fund will be more politically feasible if the means of revenue raising and basis for contributions were left to the negotiation process. Key criteria for guiding these processes are levels of relative wealth and current and historical per capita emissions.

19. Contributing nations – as well as all beneficiaries – would have a role in the governance structure. Decision making would be devolved to as local a level as possible, with the support of the Regional Centres. Our research highlights that local level actors (particularly private-sector actors) are often best placed to identify the areas of technology and expertise from which they would benefit from international collaboration, and at what stage of the research, development, demonstration and deployment (RDD&D) spectrum such collaborations would be best targeted.

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² Friday 26 June 2009, 'Roadmap to Copenhagen speech': The Prime Minister delivered a speech on the Roadmap to Copenhagen manifesto on the challenge of climate change and development in London'

³ See recent European Commission Communication 'Stepping up international climate finance: A European blueprint for the Copenhagen deal':



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