



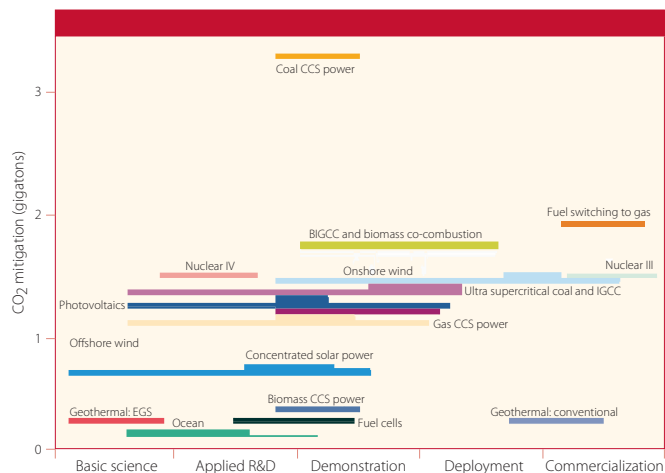
## Stronger industrial policies needed to face the climate and development challenges

Following a period during which policy options in many developing countries were confined to a standardized set of market-friendly measures, there is growing recognition that one size does not fit all development challenges. This is even more the case when those challenges are combined with the climate challenge.

Particularly (though not exclusively) in developing countries, there is a need for policies that foster “strategic development” of new technologies, in view of the advantages to be gained by building up new industries, accelerating learning and raising productivity (hence lowering costs). Strategic development generally requires a range of incentives, regulation and direct public investment.

Figure 1 presents some of the major technologies involved in meeting the climate challenge and how soon they might be ready for large-scale deployment. These technologies include advanced technologies (such as gasification) for generating electricity from coal and biomass; advanced low-energy building technologies; and more advanced primary renewables, notably solar PV and wind energy.

Figure 1. Technology development and CO<sub>2</sub> mitigation for power generation



Source: International Energy Agency (2008).

Abbreviations: CCS, carbon capture and sequestration; IGCC, integrated gasification combined cycle; BIGCC, biomass integrated gasification combined cycle; EGS, enhanced geothermal systems.

Advanced countries have, as part of the development of a service economy, shifted away from old dirtier industries. They have been slow, however, to introduce more active policy measures in support of new cleaner industries. Despite their lagging capacity, developing countries have, in many cases, been quicker out of the starting blocs.

This Policy Brief reviews some successful, home-grown experiences of developing countries that have begun to build a more

climate-friendly energy infrastructure using industrial policies. The review shows that the key to their success has been targeted interventions by the government especially through sector-specific subsidies, sponsorship of research and development, new legislation and regulation, and financing.

### Brazil

The example of the ethanol industry in Brazil demonstrates how critical Government support can be, particularly during the early phase of development and deployment of a new technology, and how it may need to be sustained until it has taken firm root in the marketplace. The Government of Brazil, at both the federal and the State levels, had an essential role to play in providing incentives to scale up production and in setting up a clear institutional framework. This role included setting technical standards, supporting the technologies involved in ethanol production and use, providing financial advantages, and ensuring appropriate market conditions.

Over time, the Government’s reasons for supporting biofuels have expanded to include concerns about greenhouse gas emissions and climate change, rural employment and equity issues, and local air pollution. The use of ethanol as a replacement for gasoline has led to an overall reduction of 9.2 million tons of carbon per year in carbon emissions in Brazil (10 per cent of the total). Evaluations of ethanol’s impact on air quality found that E-10 (gasohol, a fuel mixture of 10 per cent ethanol and 90 per cent gasoline) reduced carbon monoxide, a precursor for ozone formation, by more than 25 per cent. When used as an additive, ethanol also displaces highly toxic and volatile components of gasoline (such as lead, benzene, toluene and xylene).

### China

China has already developed some of the most efficient coal technologies, and more than any other country, it will shape the global approach to the cleaner use of coal, which is urgently needed in order to avert the worst effects of climate change. The three priorities for China in this area are: Government-industry partnerships to develop and demonstrate low-emissions, cleaner coal technologies; technology transfer and deployment of cleaner coal technologies through commercial arrangements that respond to the market demand created in China and elsewhere; successful international accords which create national, regional and global markets for clean, low-emissions technologies. New technologies such as direct coal liquefaction, in whose development China is already a pioneer, and algae-based technologies for reducing emissions will require greater research efforts.

China has also enacted a series of legislative measures to support renewable energy. Policy measures include, among other

ers, subsidies to assist renewable energy research and development; favourable accounting rules for capitalization of research and development costs within high-tech institutions; use of income tax revenues to support the local development of renewable energy development; and grants and preferential loans for small and medium-sized technical enterprises supporting energy efficiency and renewable energy. Already China is a leading producer of wind energy and is emerging as a leading manufacturer of wind turbines.

## India

India's Renewable Energy Plan 2012, targets a 10 per cent share for renewable energy in incremental power capacity. This should lead to an additional grid-connected 10,000 megawatts (MW) of renewable energy. The central Government also provides financial and fiscal incentives to allow renewable energy to become competitive with other sources of conventional energy in India. These policies feature income tax holidays, accelerated depreciation of investments in renewable energy technologies, duty-free import of renewable energy equipment, concessional rates on customs and excise duties on the import of capital equipment, capital subsidies and concessionary financing from India's Renewable Energy Development Agency, requirements for energy purchases by distribution companies, and exemptions from electricity taxes and sales taxes.

India uses up 3,500 MW of total installed capacity from renewable sources. This is just a fraction of the estimated total economic potential of 100,000 MW. The wind-energy industry has been booming in India over the past few years with a compound annual growth rate of approximately 25 per cent. In order to support this growth, the Ministry of New and Renewable Energy of the Government of India has encouraged State Governments to implement national policy guidelines for wind development. Nonetheless, renewables still account for only less than 1 per cent of all electricity currently produced in the country. This is because many renewable technologies, such as wind turbines, operate intermittently and cannot function at 100 per cent capacity. Correcting this will require an integrated energy policy.

## South Africa

The use of cheap and abundant coal in the primary energy mix in South Africa has provided relatively low-cost electricity and little incentive for greater energy efficiency. Under South Africa's climate policy, there is a political agreement that emissions will have to peak, plateau and decline. The most effective and affordable short-term strategy is an energy-efficiency programme. The next strategy is to reduce the three-quarters share of coal in the total primary energy supply. In the medium term, reduced and non-carbon energy supplies, such as natural gas, hydroelectricity (imported from the region) and solar thermal technologies could be introduced. These measures can achieve significant reductions in greenhouse gas emissions in relation to business-as-usual; but eventually a more aggressive pursuit of the above programmes will be required, possibly with the help of international funding. Additionally, an active industrial policy is required to target the development of less energy-intensive sectors.

The electricity target (through a combination of biomass, solar thermal technologies and wind energy) is in line with the State's

target of achieving 10,000 gigawatt-hours (GWh) of generated electricity by 2014, but current thinking in the Government is that three quarters of this target will eventually be met through biofuels. Evidence indicates that solar water heating (for domestic, commercial and potentially industrial applications) is economically viable, even given current low prices. Developing the promising potential of solar energy in South Africa, would probably require a massive State-driven research project and an investment push similar to the synthetic fuels programme of the 1960s and 1970s.

## Policy implications

The above reviewed developments are promising, and will need to prove their efficacy still on a much large scale to drastically lower emission. The examples show the crucial role that the government has to play in guiding and promoting the process of development of no- or low-emission energy sources. The specific way in which this role can be successfully played and the specific policy instruments to be used depend on the specific circumstances of a country. Such instruments will likely include:

- Investment tax credits to firms that bring a new technology to market which can lower the upfront investment costs of producing a new type of equipment, and can be tied either to costs or to the production level.
- Production tax credits granted for a particular type of electricity generation on a per-unit-of-production basis, making renewables such as wind more competitive with respect to higher-emissions production methods.
- Tax credits or rebates can be granted to purchasers as well as producers, reducing the cost differences between old and new technologies and making the lower-emitting or more efficient new products relatively more attractive.
- Loan guarantees can be used to shift the risk of failure or default to the government and lower the costs of capital for private firms below what would be available on the open market for an unproved but promising technology
- Limited legal liability to the users of a new technology, insulating parties from possible economic damages.

Many countries have the experience required to target and tailor these policies for a big push towards cleaner energy services and more diversified economic activities. Learning from these experiences will be an important part of any climate-sensitive development agenda over the coming decades. ■

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