Investing in a Low-Carbon Energy Future in the Developing World

Linkages

Finance

Focus Areas

Energy & Climate

Development

World Business Council for
Sustainable Development

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Introduction

The need to address climate change while facilitating continued economic growth and social progress is one of the key challenges facing world leaders today. Energy is critical to continued economic growth and according to the International Energy Agency (IEA); population growth and increasing industrialization will drive demand for energy upwards by more than 50% between now and 2030.[1]

Fossil fuels are expected to be a major contributor to meet these future energy demands. This will lead to a substantial increase in greenhouse gas (GHG) emissions unless cleaner technologies, such as carbon capture and storage (CCS), renewables, and nuclear power, emerge that are commercially competitive and can be implemented at scale.

The demand for energy will rise most rapidly in developing countries as they develop energy services to drive economic growth and social progress. Without convenient and affordable alternatives, these countries are likely to follow a high-carbon pathway, similar to that of the developed world.

In its trilogy of *Energy and Climate* publications, as well as *Powering a Sustainable Future* and *Doing Business with the World*, the WBCSD explores the highly political issues concerning the challenge of meeting energy needs without causing irreversible damage to the Earth's climate.

The solutions lie in creating framework conditions with the right incentives to cause a large scale technological shift toward a lower carbon and more energy efficient economy that also delivers affordable energy solutions for the 2.4 billion people who are currently without basic energy services. This shift relies on scaling up investment flows into the development and deployment of lower carbon technologies, as well as adapting behaviors and lifestyles to favor these technologies across the developed and developing world.

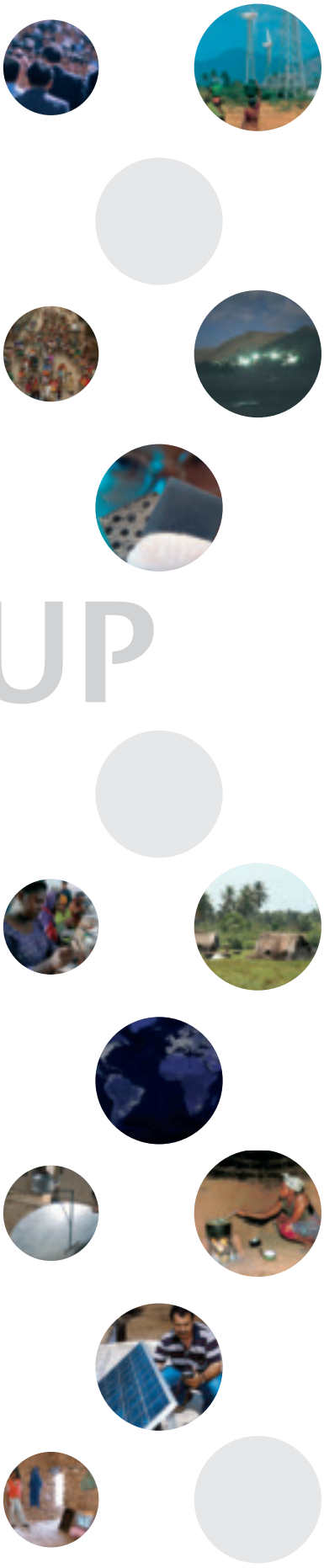
The private sector is a major source of innovation, capital and capacity that, given the right framework, can deliver a low-carbon global economy. For governments to facilitate the release of private sector resources, they need to understand how capital markets and corporate investment strategies can be incentivized to deliver results consistent with sought after goals on carbon mitigation and improved access to energy.

There are however quite different mental models and perceptions among governments and policy-makers of how and why a business might choose to invest in a particular project and/or country. This can result in inefficient policies that hinder rather than support the involvement of the private sector.

In the following pages we explore how governments and business can work together to solve these challenges by aligning policies, mechanisms and tools with the commercial conditions under which a business typically invests. By identifying a few of the critical issues important to business we hope to contribute to the design of efficient policy mechanisms that drive the shift to a low-carbon future, promote investment in new technologies and energy services in developing countries, and contribute to overall sustainable development.

Scale it

Investment needs



Improve energy availability

Energy is a key driver of economic growth and social progress. It is essential to fueling industry, powering infrastructure, connecting goods, people and services to markets, and delivering basic services such as heating, lighting and cooking. For the billions of people without access to modern energy services to escape poverty and enter into productive economic activities, investments in energy infrastructure (on- and off-grid) are needed.

The IEA estimates that developing countries will need annual electricity supply investments of approximately US$ 165 billion through 2010, increasing at about 3% a year through to 2030.[2]

About half of the necessary financing is readily identifiable, leaving an investment gap in the energy sector of about US$ 80 billion per year. The IEA estimates that international financial institutions, aid donors and the private sector can close this gap by approximately US$ 11 billion per year through additional investments using existing financial instruments.

Mitigate climate change

Scientific evidence and economic analysis confirm the need for radical changes in the global energy system to combat climate change and ensure energy security in the future.

The United Nations Framework Convention on Climate Change (UNFCCC) in its 2007 analysis of financial flows estimates that US$ 200-210 billion will be necessary in 2030 to stabilize GHG emissions at today's levels. The incremental costs of low-carbon investments in developing countries are likely to be at least US$ 20-30 billion per year.[3]

Today private sector investments constitute the largest share (86%) of global investment flows and are expected to be essential to addressing climate change. A large additional flow of tens of billions of dollars will also be needed for adaptation.[4]

Key facts and trends

- Today, the one billion people (16% of the global population) living in developed regions consume half of the world's energy supply. In contrast, one billion of the world's poorest people use 4%.[5]
- Underinvestment in energy reduces GDP growth in some countries by as much as 1-3% annually.[6]
- The demand for primary energy is projected to increase globally by a factor of 1.6-3.5 between now and 2050, and in developing countries by a factor of 2.3-5.2.[7]
- Roughly 1.6 billion people worldwide live without electricity.
- In sub-Saharan Africa, 547 million people have no modern energy services, and as low as only 8% of those living in rural areas have access to any electricity.[8]
- Despite the growth of the energy sector, around 2.4 billion people still rely on traditional biomass (wood, straw, dung, etc.) to cover their basic energy needs. In many developing countries, biomass accounts for over 90% of household energy use. The burning of biomass in simple stoves results in indoor air pollution that causes 1.3 million deaths per year, primarily among young children and mothers.[9]
- The share of GHG emissions from developing countries is expected to rise from 39% today to 52% by 2030, with China responsible for 29% of the predicted rise.[10]
- India is already the fifth biggest emitter of CO_2 emissions, yet approximately 45% of its population does not yet have access to electricity and approximately 85% of the population lives on less than US$2 per day.[11]

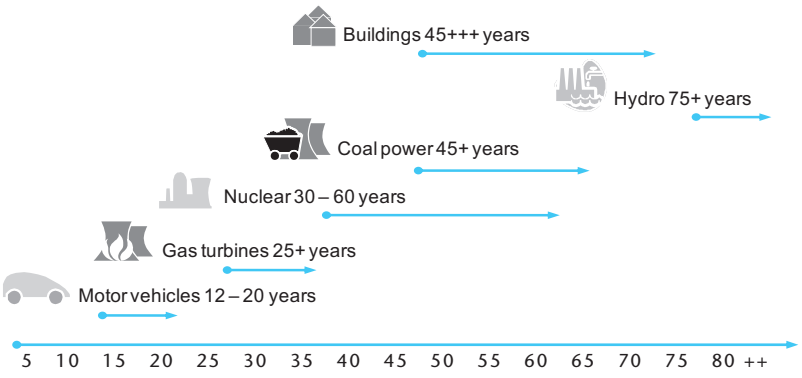


Figure 1: Rate of technological change compared to the lifetime of relevant capital stock and equipment[13]

Unless policies change and ways are found to facilitate investments in lower carbon technologies at all stages of their development and deployment, developing countries are expected to follow the same carbon-intensive development pathways of today's industrialized nations.[12] This would constitute a lost opportunity of immense proportions, as the consequences of carbon- and energy-intensive investment decisions made today lock in those emissions for decades (see Figure 1).

Raising finance is not necessarily the main problem, implementing framework conditions that direct financial flows toward the development, demonstration and deployment of commercially viable low- and zero-carbon energy technologies is the key.

Addressing the

The track record

If investment in the different stages of technology development is the answer, how is the world doing? The track record is not good. Between 1988 and 2004 total public research and development (R&D) spending increased by nearly 50%, while public spending on energy-related R&D declined by nearly 20%. The rise and fall of public spending on energy R&D correlates directly with the oil price peak and collapse in the 1970s and 1980s respectively. R&D spending by the private sector has also been declining largely due to relatively low energy prices and a lack of market incentives to develop lower carbon technologies. While the future price for oil is unclear, the power of the market to incentivize investment is indisputable.

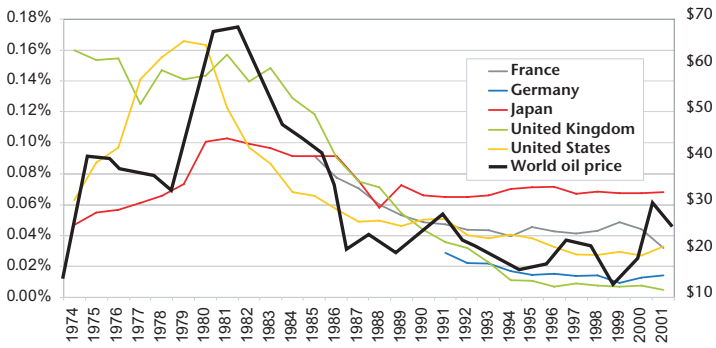


Figure 2: Public energy R&D investments as a share of GDP

A new energy technology often faces a number of technical and cost barriers, and requires a substantial time period to progress from the initial R&D stage to full commercial deployment. This significantly increases the risk to investors compared with investments in established energy technologies.[15]

Although large investments in the R&D phase of technology development is much needed, many technologies have made it through and yet failed to overcome barriers in the demonstration phase. Technologies such as CCS and coal gasification (IGCC) are examples of key technologies needing further direct support in this demonstration stage to assist in technology development, accelerate cost reductions and ensure long-term commercial viability.[16]

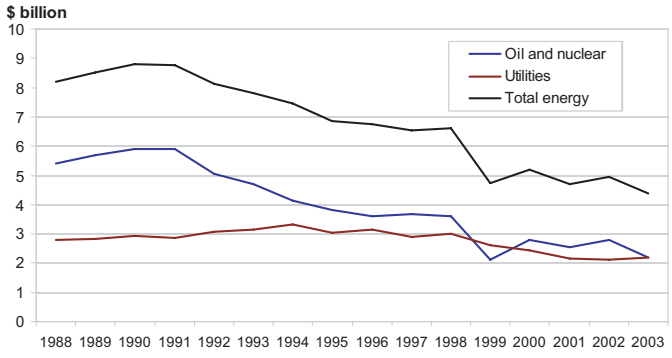


Figure 3: Trends in private sector energy R&D[14]

investment gap

The track record tells us that in the absence of strong policy support mechanisms and incentives, and while fossil fuels are cheap and readily available, public and private funds are unlikely to deliver the necessary technologies at a cost and scale necessary to address climate change unless there are major changes in investment frameworks.

Stages in technology development

R&D
⬇
Demonstration
⬇
Deployment
⬇
Competing technology

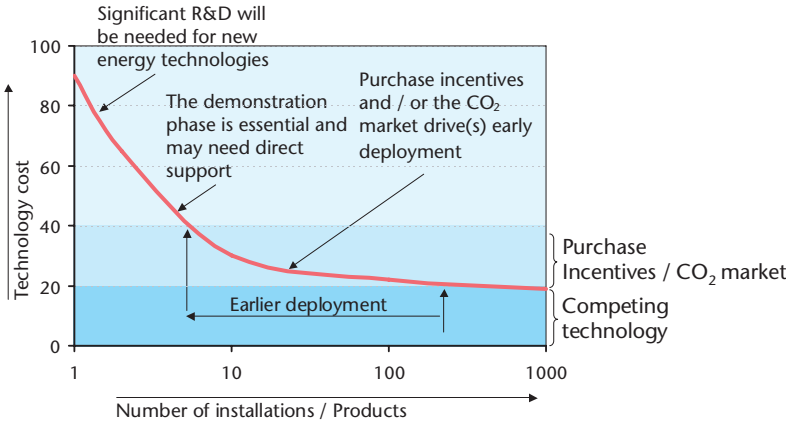


Figure 4: Technology development and deployment

Understanding how and why business invests

Many factors come into play to encourage a business to invest in low-GHG energy solutions, not least the strategy of the company and its ability to attract capital to implement this strategy. For policy-makers to encourage business to invest, they must understand what might incentivize a business to do so. Commercial investments are almost always made in dynamic, highly differentiated, competitive environments, both internal and external to the company.

Each project requires a detailed evaluation of the prospective rates of return, investment and technological risks, as well as sources of competitive advantage.

Companies, financial institutions and investors almost always employ different processes and screening criteria to evaluate the investment.

Risk

Money normally flows to where the highest and quickest returns can be made. Key questions include: How to most efficiently allocate private capital? How long before there is a positive cash flow? What risks are associated with the investment? How, where and when to enter new markets?

Project-based investments in emerging and lower GHG energy technologies are some of the more complex and risky forms of investment. They are normally highly capital intensive and play into a world where the average consumer is unwilling to pay a premium for low GHG energy services.

Some common appraisal criteria include: net present value (NPV), internal rate of return (IRR), capital efficiency, payback period, return on average capital employed, impact on operating cash flows and budgets, risk assessment and sensitivity analysis, option evaluation and other company-specific performance criteria.

The outcome of the analysis is a forecast of the investment's ability to deliver returns evaluated against a host of risks and other possible uses of that same capital. Every decision relies heavily on the expected commercial return.

Much can depend on market and cost assumptions, as well as perceptions of risk. The basis for such assumptions influences how these are accounted for and will vary from company to company, sector to sector, and country to country. A great opportunity for one company or investor may be a step too far for another.

An absence of incentives, poorly defined investment and regulatory frameworks, uncertain policy signals, and market uncertainty, are just some of the factors that affect overall risk profiles and possible returns.





Reward

In practice there are many examples where theoretically advantageous projects fail to make it past the idea stage. Structural obstacles (anti-competitive practices of existing monopolies), rigidities (e.g., reimbursement and reward systems, subsidies, tax policies), overly complex regulation, legislation based on obsolete technology, and perceptions of consumers and companies driven by “upfront” rather than “life cycle cost” are just some of the factors that can kill a project.

Despite these commercial realities and the fact that a business primarily exists to create value and returns for its shareholders, the way business chooses to invest is changing. A new attribute of competitive advantage is emerging – that of the business approach to sustainable development.

This is where companies look beyond products and services with predictable commercial returns in established markets to invest in resources, competencies and technologies that will give them a competitive edge in new and emerging markets.

Transforming energy services

in the developing world

Ghana's government has set an economic growth target of 6% per annum to achieve middle-income country status by 2020 on the basis of its Poverty Reduction Strategy. This scenario would require annual electricity generating capacity of approx. 27,000 GWh by 2020, or almost four times the electricity supply of 2006. The Strategic National Energy Plan has proposed projects that would increase electricity generation to approx. 13,000 GWh, a capacity that would fall far short of the requirement to achieve middle income status.[17]

Most low- and zero-GHG energy technologies will not be cost competitive at scale without some combination of investment support mechanisms, technological advances or regulatory regime improvements. An abundance of potential projects, technologies or investment opportunities will not in itself necessarily translate into the mobilization of capital flows for implementation. Many energy efficiency projects and Clean Development Mechanism (CDM) proposals have faced this problem, yet they have tremendous potential for reducing emissions, managing energy demand challenges, and optimizing value in the long term. Some of the world's poorest countries may be at a further disadvantage because of limited institutional and commercial capacity, not to mention high-risk ratings that affect the ability to attract, develop and manage substantial project-based investments.

The following approaches can help overcome these barriers and tap various financing sources.

Government policies

Integrate energy, climate change and development strategies – energy and climate policies should be integrated into national development strategies. Without energy there are no means to cook food, heat and light homes, maintain schools and hospitals, drive industry and connect people and goods to markets. For the 1.6 billion people who currently lack access to electricity, energy services are critical to achieving the Millennium Development Goals (MDGs.)

Improving energy transmission - Public policies should focus on improving grid transmission and energy storage systems. This is particularly important for renewable energy because it can be less predictable than fossil fuel-based power generation. The IEA estimates that some US$ 5.2 trillion is required in generation investments, and an additional US$ 6.1 trillion for transmission and distribution networks from now until 2030.[18]

Subsidies and other incentives – Many countries subsidize their energy sectors– estimated at around US$ 162 billion per year between 1995 and 1999.[19] Governments can encourage a long-term shift to low-GHG technologies through appropriate tax incentives and/or subsidies that would be phased out over time.

Private sector participation

The role of large companies – National and multinational companies can develop and deliver large scale investments in energy technologies that reduce GHG emissions and/or improve energy efficiency. In so doing these companies can create new markets and associated revenue streams for energy-related products and services for currently underserved populations in developing countries.

The role of small and medium enterprises (SMEs) – SMEs can play a key role in providing energy services where their in-depth knowledge of local needs and spending patterns can be used to tailor energy solutions and ensure broad-based impact.

Funding models

Multilateral or mutual funds – These funds bring together private sector, financial intermediaries, countries, development banks and other entities to develop project portfolios. This model benefits from risk diversification, specialization and economies of scale by reducing the transaction costs associated with individual project investments as different investors expect different returns. Examples include World Bank Carbon Funds.

Bilateral deals - Joint ventures between companies have the advantage of flexibility and can mobilize private sector funds and technology for larger projects and areas of new market potential by spreading risks and capital among the partners. Multinational companies are increasingly willing to invest in projects, not only to receive commercial returns or manage a carbon compliance position but also to gain long-term strategic market advantage. This can come through the development and testing of new technologies or positioning a company as pursuing a sustainable business model in a rapidly emerging market.

Less developed countries will typically need a more innovative spectrum of private and public sector finance (e.g., World Bank or International Finance Corporation), concessionary finance, and a variety of guarantees and insurance mechanisms to lower the risk profile of a project within parameters acceptable to external investors.

Capacity building

Access to finance for energy projects is not in itself sufficient. Developing countries also require substantial capacity building and related funding from public and private sector investors. Capacity building needs to be tackled at two levels: for large-scale infrastructure projects as well as for small-scale solutions, driven and implemented by local entrepreneurs. For large-scale projects, it is crucial to strengthen the strategic planning capabilities and project management skills of both regulatory authorities and project developers. For small-scale solutions, knowledge of the local market is crucial and needs to be complemented with strengthening of business skills and adapting technologies to local needs.

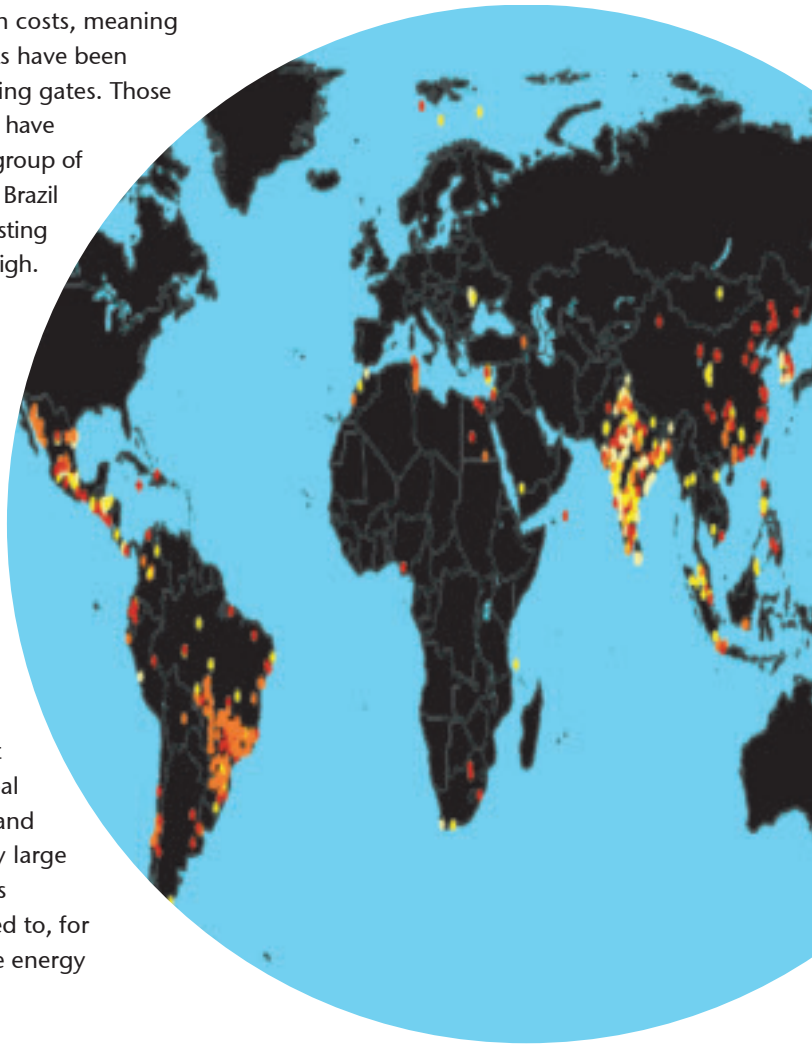
Clean Development Mechanism

The Clean Development Mechanism (CDM) is one of the Kyoto Protocol's flexible instruments and is designed to mitigate climate change by encouraging investments in low-GHG technologies in developing countries. The CDM has succeeded in bringing clean energy technology to some countries in the developing world. Yet many projects have been weighed down by lengthy approval processes and high transaction costs, meaning hundreds of projects have been stopped at the starting gates. Those that have succeeded have focused on a select group of countries like China, Brazil and India, where existing market potential is high. Only 3% of all CDM projects are located on the African continent and primarily within South Africa (see Figure 5).[20]

Around 35% of CDM credits in the pipeline come from just 15 projects for industrial gases that have very high global warming potential and thus generate a very large volume of emissions reductions compared to, for example, renewable energy projects.[21]

Pricing for certified emission reductions (CERs) created from CDM projects have generally been low, on the back of low-cost, end-of-pipe solutions that have satisfied market demand for CERs. Projects in Africa are further disadvantaged because CERs have historically been priced 20% lower than the global average.[22]

Low-cost solutions are not likely to trigger technology transfer in the early stages of technology development. Major technology investments in the near term will require substantial additional support and incentives to both scale up the investment amounts and reduce costs. Policy certainty regarding the mechanism's role and design in a post-2012 international climate framework could also provide much needed clarity for project-based investments.



- = CDM project, large scale, one location
- = CDM project, large scale, several locations
- = CDM project, small scale, one location
- = CDM project, small scale, several locations

Figure 5: Map of CDM project locations worldwide (Source: UNFCCC)

Harnessing capital markets

An important feature of the financial markets is their ability to set current values for future outputs. After accounting for attendant risks, a market puts a price on an asset according to expectations of the asset's ability to deliver future returns.

In markets and with investments, confidence is important. Political and regulatory risks, legal frameworks, business and investment infrastructures, and sustainable business models can either accelerate or diminish the nature and pace of investment or market liquidity. Such factors will determine the number of participants and potential scope of investment capital. Well-designed market frameworks can reduce project risks and maximize access to the greatest number of investors.

The business case for scaling up low- and zero-GHG technology projects in emerging economies, where energy needs are greatest, must draw upon mainstream institutional investors, the international development community, international money markets and speculators. Investment structures need to match the various investment appetites of potential investors, their different needs and interests, and connect or align these with clean energy projects and portfolios.

Using the markets to drive capital flows in clean technologies for developed and developing countries can only reach its full potential – in improving energy services while reducing emissions – if mainstream investors recognize the market potential of the energy underserved and the associated value in technologies, activities and infrastructure that reduces the carbon intensity of the global economy.

Key Messages

Engaging the private sector

WBCSD members recognize the societal need to significantly scale up investments in lower GHG technologies. They also see opportunities, for example:

- Establishing new markets for low GHG technologies and services
- Gaining competitive advantage through technological innovation
- Reducing costs through energy efficiency.

However, the members also recognize that a project's ability to attract investment also depends heavily on the prospect of a commercial rate of return. A lack of certainty over policies related to carbon pricing and GHG reduction targets increases the risk of achieving a commercial return for low-GHG technology projects. While this uncertainty prevails, the bulk of potential private capital available will probably flow to traditional energy sources, or remain uncommitted until definitive policies, which underpin a pragmatic approach, begin to emerge.

International policy efforts must align with the investment cycle that can last for decades, from initial R&D through to actual deployment at scale. A broad and efficient mix of policies and programs targeted at mitigation and adaptation and backed by supportive regulation and governance frameworks will reduce investment uncertainty and encourage business to invest for the long term.

Governments are engaging with business through instruments like the CDM and public-private technology partnerships. These are forming new areas of collaboration and new business opportunities.

However, in its current form the CDM will fail to achieve investment at scale and will not help solve the dire energy needs in regions such as sub-Saharan Africa.

Policies to change the world

Most stakeholders agree it will take a combination of financial mechanisms, including the carbon markets and official development assistance (ODA), to guarantee the energy demands of the future are met in a way that mitigates climate change. In order for business and private capital to play its role in delivering low- and zero-GHG technologies, key considerations in the design elements of future frameworks include the following.

Create robust and integrated policy frameworks

- Develop **policy frameworks that create predictable future demand** for new technologies and reward innovation
- Establish a **clear and strong expectation of a carbon price** in the near and long-term future to encourage investment
- Incorporate energy and climate strategies into national **development plans**
- Develop approaches that **expand or aggregate projects** through programs or portfolios to standardize and streamline the transaction process
- Establish **stable and transparent regulatory regimes** to help reduce corruption and improve country risk profiles.

Address all stages in the technology development cycle

- **Invest in public and private energy R&D** with the support of international financial institutions to help low-GHG technologies such as CCS, renewables and nuclear power through the various stages of development
- Ensure the commercial viability of technologies such as CCS and IGCC through direct **support and incentives in the demonstration phase**
- Adopt pragmatic and inclusive approaches that create **fast-track approval processes** to accelerate deployment of these new technologies
- Set an example for other sectors by acting **as an early adopter**, buying new, advanced technology products for government fleets and operations.

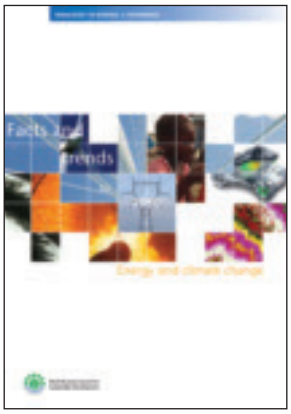
Encourage technology cooperation to developing countries

- Enhance growth and competitiveness in developing countries through technology cooperation by establishing a **competitive business-to-business framework** for transactions
- **Dismantle trade barriers** affecting the diffusion of technologies to encourage investment and business participation
- Manage the **intellectual property rights regime** to balance the need to incentivize innovation and the dissemination of technologies to support investment in new technologies.

Build capacity

- **Build institutional capacity** to translate policies into robust and integrated development plans
- Support **investment in SMEs**, particularly in capacity building, so they can own and/or operate small-scale energy projects in order to help ensure deployment of technologies
- **Influence public behavior and acceptance** of new technologies through awareness raising and education to help ensure future demand for low-GHG energy services.

Energy and Climate Trilogy



Facts and Trends to 2050

Presents key facts and trends related to energy and climate change and outlines corresponding dilemmas. Primarily designed for business, the issues are presented succinctly and illustrated by graphs and projections.

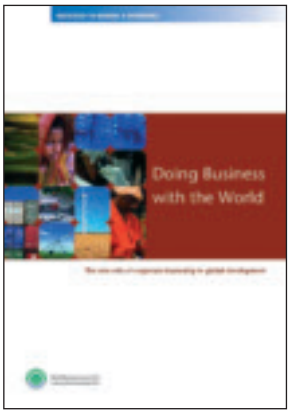
Pathways to 2050

Builds on *Facts and Trends to 2050* and provides a more detailed overview of potential pathways to reducing CO_2 emissions.

Policy Directions to 2050

Explores potential policy approaches and mechanisms that might be deployed to introduce the required changes in the energy system.

Development



"Doing Business with the World" - The new role of corporate leadership in global development

Shows how companies can contribute to global sustainable development through their core businesses. It offers a business perspective on key challenges and opportunities for the development of poor countries, as well as key messages for companies and governments on how to promote sustainable business solutions that benefit the poor and the societies and environments in which they live.

Electricity Utilities

Powering a Sustainable Future

A collaborative effort driven by the eight international companies that comprise the WBCSD's Electricity Utilities Sector Project. The report highlights the huge potential for end-use energy efficiency, which can provide more energy, more securely and sustainably, and at a lower price.

Promoting Small and Medium Enterprises for Sustainable Development

In collaboration with SNV Netherlands Development Organization, explains how governments can help alleviate poverty by focusing on small and medium enterprises (SMEs) and how larger corporations can help themselves by including SMEs in their value chains.

About

WBCSD

The World Business Council for Sustainable Development (WBCSD) brings together some 200 international companies in a shared commitment to sustainable development through economic growth, ecological balance and social progress. Our members are drawn from more than 30 countries and 20 major industrial sectors. We also benefit from a global network of about 60 national and regional business councils and partner organizations.

Our **mission** is to provide business leadership as a catalyst for change toward sustainable development, and to support the business license to operate, innovate and grow in a world increasingly shaped by sustainable development issues.

Our objectives include:

Business Leadership – to be a leading business advocate on sustainable development;

Policy Development - to help develop policies that create framework conditions for the business contribution to sustainable development;

The Business Case - to develop and promote the business case for sustainable development;

Best Practice - to demonstrate the business contribution to sustainable development and share best practices among members;

Global Outreach – to contribute to a sustainable future for developing nations and nations in transition.

Disclaimer

This report is released in the name of the WBCSD. Like other WBCSD reports, it is the result of a collaborative effort by members of the secretariat and executives from several member companies. A wide range of members reviewed drafts, thereby ensuring that the document broadly represents the majority view of the WBCSD membership. It does not mean, however, that every member company agrees with every word.

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Footnotes

[1] IEA. *World Energy Outlook*. 2006.

[2] World Bank. "Investment Framework for Clean Energy and Development: a platform for convergence of public and private investments".

[3] UNFCCC. "Report on the analysis of existing and potential investment and financial flows relevant to the development of an effective and appropriate international response to climate change". 2007.

[4] Ibid.

[5] *WBCSD. Energy and Climate: Facts and Trends to 2050*. 2007.

[6] See note 2.

[7] See note 2.

[8] See note 1.

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[11] UNDP Human Development Index. 2006.

[12] See note 2.

[13] WBCSD. *Policy Directions to 2050*. 2007.

[14] Stern, N. *Stern Review: The Economics of Climate Change*. 2007.

[15] IEA and OECD. *Energy Technology Perspectives: Scenarios and Strategies to 2050*. 2006.

[16] See note 1.

[17] Energy Commission of Ghana.

[18] See note 1.

[19] See note 14.

[20] Source: www.unfccc.org (accessed November 2007).

[21] See note 14.

[22] Reuters. "World Bank urges CO_2 markets to invest in Africa." 16 November 2006.

"Governments are asking us two key questions on climate change. How far can business go on its own, based on normal operations and investments? How can governments facilitate and enhance further action and investment by business? As the leading business voice on sustainable development we at the WBCSD recognize we owe governments answers to these questions."

WBCSD President Björn Stigson

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