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GREEN economy

Buildings

Investing in energy and resource efficiency

Acknowledgements

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ADB	Asian Development Bank
ADEME	French Environment and Energy Management Agency
BAU	Business-as-usual
BCA	Building and Construction Authority (Singapore)
CDM	Clean Development Mechanism
CEDEFOP	European Centre for the Development of Vocational Training
CEU	Central European University
CFL	Compact fluorescent lamp
CHP	Combined heat and power
CO_2	Carbon dioxide
CRC	Carbon Reduction Commitment
CSIR	Council of Scientific and Industrial Research
DVD	Digital versatile disc
EC	European Commission
EEFS	Energy Efficiency Co-Financing Scheme
EPBD	Energy Performance of Buildings Directive (EU)
EPC	Energy performance contracting
ESCO	Energy service company
EU	European Union
FIDE	Fund for Electric Energy Savings (Mexico)
G2	Green Scenario 2
GBC	Green Building Council
GDP	Gross Domestic Product
GER	Green Economy Report
GHG	Greenhouse gas
GRIHA	Green Rating for Integrated Habitat Assessment
HVAC	Heating ventilation and air conditioning
ICT	Information & Communication Technology
IEA	International Energy Agency
ILO	International Labour Organization
INFONAVIT	National Workers' Housing Fund Institute (Mexico)
IOE	International Organisation of Employers
IPCC	Intergovernmental Panel on Climate Change
ITUC	International Trade Union Confederation
KfW	German Development Bank
LCA	Life-cycle assessment
LED	Light emitting diode
LEED	Leadership in Energy and Environmental Design
LPG	Liquefied petroleum gas
LTCR	Lost time case rates
MEPS	Minimum efficiency performance standards
MURE	Mesures d'Utilisation Rationnelle de l'Energie
NPV	Net Present Value
O&M	Operation and management
OECD	Organisation for Economic Co-operation and Development
OSHA	Occupational Safety and Health Administration (USA)
PV	Photovoltaic
PwC	PricewaterhouseCoopers
RIRs	Recordable incident rates
SB	Sustainable Buildings
SEEP	Serbian Energy Efficiency Programme
TBL	Triple bottom line
TCO	Total cost of ownership
UN DESA	United Nations Department of Economic and Social Affairs
UN Habitat	United Nations Human Settlements Programme
UNEP	United Nations Environment Programme
UNEP SBCI	United Nations Environment Programme Sustainable Buildings and Climate Initiative
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WHO	World Health Organization

Key messages

1. The Buildings sector of today has an oversized ecological footprint. The buildings sector is the single largest contributor to global greenhouse gas emissions (GHG), with approximately one third of global energy end use taking place within buildings. Furthermore, the construction sector is responsible for more than a third of global resource consumption, including 12 per cent of all fresh water use and significantly contributes to the generation of solid waste, estimated at 40 per cent of the total volume. Therefore, the building sector is central to any attempt to use resources more efficiently.

2. Constructing new green buildings and retrofitting existing energy- and resource intensive buildings stock can achieve significant savings. There are significant opportunities to improve energy-efficiency in buildings, and the sector has the greatest potential, out of those covered in this report, to reduce global GHG emissions. Various projections indicate that investments, ranging from US$ 300 billion to US$ 1 trillion (depending on assumptions used) per year to 2050, can achieve savings of about one-third in energy consumption in buildings worldwide. In addition, these investments can significantly contribute to the reduction in CO_2 emissions needed to attain the benchmark 450 ppm concentration of GHGs. Emission reductions through increased energy efficiency in buildings can be achieved at an average abatement cost of -US$ 35 per tonne, reflecting energy cost savings, compared to -US$ 10 per tonne costs in the transport sector or positive abatement costs on the power sector of US$ 20 per tonne.

3. Greening buildings also brings significant health and productivity benefits. Greening buildings can also contribute significantly to health, liveability and productivity improvements. The increased productivity of workers in green buildings can yield savings higher than those achieved from energy-efficiency. In residential buildings in many developing countries, indoor pollution from poorly-combusted solid fuels (e.g. coal or biomass), combined with poor ventilation, are a major cause of serious illness and premature death. Lower respiratory infections such as pneumonia and tuberculosis linked to indoor pollution are estimated to cause about 11 per cent of human deaths globally each year. Women and children tend to be most at risk due to their daily exposure. Improved access to water and basic sanitation are other significant benefits that come with green building programmes.

4. Greening the building sector can lead to an increase in jobs. Investments in improved energy-efficiency in buildings could generate additional employment in developed countries where there is little growth in building stock. It is estimated that every US$ 1 million invested in building efficiency

retrofits creates ten to 14 direct jobs and three to four indirect jobs. If the demand for new buildings that exists in developing countries is considered, the potential to increase the number of green jobs in the sector is still higher. Various studies point to job creation through different types of activities, such as new construction and retrofitting, production of resource-efficient materials and appliances, the expansion of renewable energy sources and services such as recycling and waste management. Greening the building industry also provides an opportunity to engage the informal sector and improve working conditions across the industry, by implementing training programmes targeting new skill requirements and improving inspection approaches.

5. Developing countries have the opportunity to lay the foundation of energy-efficient building stocks for decades to come. Significant new construction is expected in the developing world in order to provide adequate housing for over 500 million people, while providing access to electricity for some 1.5 billion people. Urbanisation and economic growth in emerging economies also point to the rapid growth of new building stock. In developing countries, taking into account sustainable building considerations at the time of design and construction makes good economic sense. Green retrofitting at a later stage invariably carries higher costs, both financially and environmentally, than integrating sustainability considerations already at the early stages of design and construction. For developed countries, which account for the majority of the existing building stock, the priority is to put in place measures and incentives that will enable large-scale investments in retrofitting programmes.

6. The role of public policy and leadership by example is vital in triggering the greening of the building sector. A life-cycle approach is required covering the building design, the manufacturing of material supplies, the construction process, buildings operation and maintenance as well as the disposal, recycling and reuse of building, construction and demolition waste. Considering, in particular, the hidden costs and market failures that characterise the building industry, regulatory and control measures are likely to be the most effective and cost-efficient in bringing about a green transformation of the sector. These need to be combined with other pricing instruments for greater impact, given realities such as the level of development of the local market and household income-levels. Additionally, government-owned buildings such as public schools, hospitals and social housing units are ideal locations to begin implementing greener building policies, including