GREEN BUILDINGS – A GREATER EMPHASIS IN CLIMATE POLICY?

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Unresolved doubts about climate policies in many countries, including doubts about the environmental effectiveness and feasibility of emissions trading schemes, have focussed greater attention on what more practical measures may be available to governments to reduce the risks of climate change. The measures that appear to have the most untapped potential are end-use energy efficiency measures in the building sector. They are affordable now, utilising technologies that already exist.

The environmental gains from energy efficient buildings are potentially huge, especially in China where new construction over the next 10 years is forecast to equal the size of all existing buildings in the United States. There are significant economic benefits as well.

The pathway is clear. Energy efficiency measures in the building sector can be implemented voluntarily and independently by any country, whether developed or developing, with very little delay and without any need for multilateral negotiations.

On 11 December 2009 in Copenhagen, the Executive Director of the United Nations Environmental Programme (UNEP) reported that *"Energy-efficient buildings could significantly contribute to reducing the risks of climate change… [and that] the huge potential of the building sector for combating climate change remains virtually untapped*". He also forecast that new construction in China over the next ten years would equal the size of all existing buildings in the United States.[1] The UNEP has also estimated that by 2020 the number of office buildings in China will be twice the amount currently existing in the US.[2]

The 2009 Copenhagen Accord did not mention the term "energy efficiency", nor even the word "energy", anywhere. However, the UNEP's assessment of the untapped potential of energy efficiency improvements in buildings, if and when it becomes widely known and fully understood, could be quite a revelation. Energy efficiency measures need to be compared with supply-side technologies, such as nuclear power and the liquefaction of natural gas, both of which have opened

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[1] UNEP Press Release, "UNEP Reports Energy-Efficient Buildings Key to Tackling Climate Change", Copenhagen, 11 December 2009 <http://new.unep.org/Documents.Multilingual/Default.asp?DocumentID=606&ArticleID=6412&l=en&t=long> accessed 15 January 2010.

[2] UNEP, "Buildings and Climate Change: Summary for Decision-Makers", Paris, France, 2009, p 9.

up new sources of supply for many energy-importing countries and have significantly improved their energy security.

The Challenge for Global Governance

We believe that the greatest shortcoming of the over 20-year international climate change negotiations has been the failure of policymakers to involve all stakeholders, that is, people everywhere that stand to be materially affected by the predicted effects of climate change.

Communities are entitled to be consulted about, and to participate to an appropriate extent, in the making of decisions that will materially affect their way of life and their economic and social conditions. They do not want their futures determined by theoreticians, experts or politicians at international gatherings; they want a say about it themselves at the community level.

Satisfying community expectations about climate change poses an unprecedented challenge for global governance which is outside the scope of this paper. We content ourselves for the moment with two general observations: First, there is little doubt that communities expect governments to pursue policies of sustainable development and to establish mechanisms and processes to supply them with the cleanest and most affordable energy over time. However, most communities do not yet have a common or full understanding of the extent to which climate change is occurring, its likely future effects and the feasibility of the various options for responding to it. This poses a serious dilemma because governments themselves do not fully understand the feasibility of the various options.

Secondly, the implementation of demand-side measures for emissions reduction is much closer to the reality of everyday life than the pursuit of long-term, large-scale, supply-side measures that have been the main concern of governments to date.

Buildings and Their Appliances Are The Largest User of Energy

It has not been widely appreciated that buildings and their installed appliances are the largest user of energy. Together with installed appliances, buildings account for more than 40% of the world's end use of energy and one third of global greenhouse gas emissions, with a rate of growth between 1971 – 2004 of 2.5% per year for commercial buildings and 1.7% per year for residential buildings.[3] Most of this energy is used within the building envelope for heating, cooling, ventilation and hot water supply. There are many wasteful practices that need to be eliminated.

Most of the world's energy is consumed in cities.[4] Increases in urbanisation through to 2030 are projected to drive up energy use in cities to 73% of the world's energy use (the largest proportion of the increase to come from non-OECD countries).[5]

According to the UNEP, the building sector has the largest potential for significantly reducing greenhouse gas emissions compared to other major emitting sectors.[6] What is more, some of the gains from more efficient energy use in the building sector can be achieved at negative cost.

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[3] UNEP, footnote 2 above, p 9.

[4] In the United States, commercial and residential buildings accounted for 38% of greenhouse gas emissions and 70% of electricity consumption in 2007 (more than either the transportation or industrial sectors. In Australia, buildings accounted for 23 per cent of greenhouse gas emissions, split evenly between residential and commercial buildings.

[5] IEA, "World Energy Outlook 2008", Paris, France, p 179.

[6] UNEP, footnote 2 above, p 9.

According to the IPCC, *"Substantial reductions in emissions from energy use in buildings can be achieved over the coming years using mature technologies for energy efficiency that already exist widely and that have been successfully used. A significant portion of these savings can be achieved in ways that reduce life-cycle costs, thus providing reductions in emissions that have a net benefit rather than cost"*.[7]

As described by a leading NGO in the United States, *"Energy efficiency is the fastest, cheapest, and cleanest energy resource we have. Efficiency is not conservation or deprivation; it is getting what you want for less. Efficiency saves consumers and business money on their energy bills [and] reduces [greenhouse gas emissions]*".[8] In 2008, the IEA reported to the G8 that "*energy efficiency in buildings can help consumers save money in the long term."*[9] In 2009, the World Green Building Council reported that "*the building sector can…[provide] some of the most cost-effective and expedient ways to tackle climate change".*[10]

Since 2006, a range of measures to "turn buildings green", to make them more energy efficient, have been under study by a task force established by the Asia-Pacific Partnership on Clean Development and Climate (APP).[11] The APP's actions have been somewhat protracted and appear deserving of greater financial support than the seven participating governments have so far provided.

Improvements in energy efficiency relate to getting more of the services we want out of each unit of energy that we use (that is more warmth and light) or, conversely, using less energy to produce a given level of services.[12] Energy efficiency is calculated by reference to the amount of work done in relation to the energy used.

Countries that have already prioritised energy efficiency measures are those that have not had access to abundant sources of energy and have sought to improve efficiency mainly as an energy security measure. Japan, Denmark and Switzerland are acknowledged as the most energy efficient.[13]

Although energy efficiency as a climate-related policy is now poised to take a greater role in many more countries, there are significant barriers that will need to be overcome. A faster pace of well-enforced polices and programmes will be required for energy efficiency to achieve its low-cost mitigation potential. A diverse range of policy instruments will be required.[14]

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[7] B. Metz et al (eds), Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007 (Chapter 6 - Residential and Commercial Buildings), p 389.

[8] Natural Resources Defense Council, "Energy Facts – Unlocking the Power of Energy Efficiency in Buildings", December 2008, p 1.

[9] IEA, "Making Energy Efficiency in Buildings Happen – Global Strategy for Energy Efficient Buildings – IEA Work for the G8", 2008, slide 3.

[10] World Green Building Council, "Six Continents, One Mission – How Green Building Is Shaping The Global Shift To A Low Carbon Economy", November 2009, p 2.

[11] See the Buildings and Appliances Task Force Action Plan on the APP website: www.asiapacificpartnership.org.

[12] Barry Barton, "The Law of Energy Efficiency" in Donald Zillman et al (eds), *Beyond the Carbon Economy – Energy Law in Transition,* 2008, p 62.

[13] For example, Japan currently has in place a Green Building Program under the Tokyo Metropolitan Environmental Security Ordinance which is aimed at establishing a system for evaluating buildings in the housing market for environment-friendly features, so that owners will be more encouraged to incorporate environmental aspects into building design – a revised program entered into force on 1 January 2010.

[14] B. Metz et al, footnote 7 above, p 390. Mandatory energy efficiency measures may also be coupled with measures to mandate the recycling of building materials to eliminate wastage in new building construction.

The Potential Environmental and Economic Benefits

For some years, the IEA has maintained that the largest contributor to avoided CO_2 emissions by 2030 would be improved energy (end-use) efficiency:

- Under the IEA's Alternative Policy Scenario[15], improved energy efficiency will account for 65 per cent of total savings in emissions as compared with the Reference Scenario[16] (i.e. the business-as-usual scenario)[17]; and

- Under the IEA's 450 Scenario[18], improved energy efficiency will account for more than half of total savings as compared with the Reference Scenario[19].

The realisation of the potential emissions savings will depend on a range of future measures. Caution needs to be exercised in reaching conclusions about the extent, timing and costs of achieving the claimed savings. Nonetheless, the World Green Building Council has stated that "*with proven and commercially available technologies, energy consumption in both new and existing buildings could be cut by an estimated 30-50 per cent without significantly increasing investment costs*".[20] The UNEP has stated that the range of potential reductions is 30-80 per cent.[21]

The potential benefits of energy efficiency measures are not limited to reducing greenhouse gas emissions. Other potential benefits include the creation of employment and business opportunities, increased economic competitiveness and energy security, social welfare for low-income households, increased access to energy services, improved indoor and outdoor air quality, as well as increased quality of life.

The IPCC has acknowledged that: "*In developing countries, safe and high-efficiency cooking devices and high-efficiency electric lighting would not only abate substantial GHG emissions, but would reduce mortality and morbidity due to indoor air pollution by millions of cases worldwide annually*".[22]

A recent study of 150 green buildings in 11 different countries showed that they cost just 2% more than traditional buildings to construct, yet reduce energy use by 33%.[23]

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[15] The Alternative Policy Scenario is the scenario assuming that all energy security and climate change policies and measures that countries were then considering were adopted and implemented.

[16] The Reference Scenario is a baseline scenario based on established trends and policies, without new initiatives by governments on energy security or climate change.

[17] 29 per cent of total savings are projected to be achieved through lower electricity demand from more efficient appliances, industrial motors and buildings. This is to be contrasted with increased use of renewables in power generation and biofuels in transport which are projected to account for only 12 per cent of total savings. See IEA, "World Energy Outlook 2006", Paris, France, p 190.

[18] The 450 Scenario is the scenario in which collective policy action is taken to limit the long-term concentration of greenhouse gases in the atmosphere to 450 parts per million of CO_2 equivalent.

[19] IEA, "World Energy Outlook 2009", Paris, France, 2009, p 8.

[20] Tony Arnel, "World Green Building Council and Market Transformation of the Global Building Sector", Climate Action, 2009, p 198.

[21] UNEP, footnote 2 above, page 6.

[22] B. Metz et al, footnote 7 above, p 390.

[23] Greg Kats, "Greening Our Built World: Costs, Benefits and Strategies", Island Press, Washington, DC, USA, 2009.

Investment Considerations

Energy Prices

Generally, an investor will invest in a project if future returns are likely to exceed the ordinary discount rate (i.e. market interest rates for borrowing or saving). In the case of energy efficiency, these future returns take the form of lower energy costs.[24]

A peculiar feature of investment in energy efficiency is that investors seem to require returns that exceed (in some cases very substantially) the ordinary discount rate.[25] This will be the case where there are:

(i) hidden costs to be taken into account, such as disruption to work/production/manufacture which may occur whilst a commercial building is being renovated to make it more energy efficient;

(ii) a lack of proper incentives, such as between landlords, who would pay for efficiency, and tenants who realise the benefits;

(iii) limitations in accessing finance;

(iv) subsidies on energy prices; and

(v) fragmentation in the building industry and the design process into many professions, trades, work stages and industries.[26]

Any of these features can create what is called the "energy efficiency gap". It reflects that the implicit discount rate used by investors in energy efficiency investments is usually higher than the ordinary discount rate.[27]

Energy prices will usually dictate whether or not future returns exceed this implicit discount rate. However, because energy prices have not traditionally fully reflected non-market externalities, such as the costs of damage to the environment, consumers have lacked an incentive to take such costs into account in their purchasing decisions, which has tended to suppress energy prices. Some additional mechanism, such as a carbon tax or a cap-and-trade scheme, could be used to raise energy prices to a level which ensures that future returns on investments exceed the implicit discount rate, allowing greater improvements in energy efficiency to be realised.

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[24] Barry Barton, footnote 12 above, p 64.

[25] Barry Barton, footnote 12 above, pp 64-65 and Sanstad, Hanemann and Auffhammer, "End-Use Energy Efficiency in a "Post-Carbon" California Economy", pp 6-9, 6-17.

[26] B. Metz et al, footnote 7 above, p 390.

[27] Barry Barton, footnote 12 above, p 74.

Financial Incentives and Regulation

The price of energy on its own could need to rise to an unaffordable level for many consumers in order to achieve the desired level of energy efficiency in buildings. This may necessitate balancing measures to curb the required increase in energy prices. These could take the form of:

(i) increased subsidies for the uptake of energy efficiency improvements and innovation[28]; or

(ii) regulations requiring certain entities to undertake energy efficiency improvements[29].

Care must be taken that balancing measures are not indiscriminately applied. This is particularly so in the case of regulation, which must be directed towards those stages in the lifetime of buildings where the most cost-effective energy efficiency improvements may be achieved. This is usually at the construction stage.

Energy efficiency requirements in building codes and energy standards for the construction of new buildings are likely to be the most important measures for achieving energy efficiency improvements in buildings.[30] They are already being introduced or tightened in many countries. Energy efficiency requirements will also act as best practice benchmarks for all buildings, making buildings that comply with the regulations more attractive investments.

Decisions made in the design and construction of a building will determine its energy consumption over most of its lifetime. Some improvements may be very cost-effective, or perhaps even at negative cost, if implemented during construction or major refurbishment, but may be unaffordable at later stages.

Apart from environmental benefits, regulations obliging developers of new buildings to adhere to energy efficiency requirements can also provide owners with financial benefits. Lower energy costs in the operation of the building is likely to result in a permanent real increase in net return over the building's life, which in turn will add value to the development, given the method that the property industry uses to value property.[31]

A recent study has found that, in the United States, buildings with "green ratings" command substantially higher rents and selling prices than otherwise identical buildings and that this is systematically related to their energy-saving characteristics. A substantial increase in selling price is linked to the increase in the energy efficiency of a green building.[32]

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[28] Such as the Australian Green Building Fund which aims to provide $90 million in grants across five years, from 2008-09 to 2012-13, to owners of existing commercial office buildings to assist them in reducing their energy consumption by retro-fitting or retro-commissioning projects.

[29] For example, such regulation could obligate certain developers of new buildings and existing buildings undergoing major refurbishment to comply with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, which provides a suite of standards for environmentally sustainable construction. The average LEED certified building uses 32% less electricity and saves 350 metric tons of greenhouse gas emission annually (see US Green Building Council, "Building Design Leaders Collaborating on Carbon-Neutral Buildings by 2030 – Goal to Meet Specific Energy Reduction Targets", May 2007, p 1 <http://www.usgbc.org/News/PressReleaseDetails.aspx?ID=3124> accessed 15 January 2010).

[30] See IEA, "Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings – IEA Information Paper", Paris, France, March 2008, pp 7-8.

[31] This method involves applying a capitalisation rate against the recurring net income of the property.

[32] Piet Eichholtz, Nils Kok and John M Quigley, "Doing Well By Doing Good? Green Office Buildings", Institute of Business and Economic Research, University of California, Berkeley, USA, August 2009.

CASE STUDY: AUSTRALIA

In Australia, it has already been concluded by the Commonwealth Government that *"there is a significant body of evidence to suggest that some of the largest and most cost effective greenhouse gas abatement opportunities reside in commercial buildings"*.[33] Legislation is anticipated during 2010.

Until December 2009, the idea of significantly reducing greenhouse gas emissions in Australia by energy efficiency measures had been overshadowed by the proposed Carbon Pollution Reduction Scheme ("CPRS") under which a ceiling would be imposed on the level of emissions across the entire economy. The purpose of the CPRS was to indirectly make investment in energy efficiency more attractive by creating a price signal to encourage the use of less carbon-intensive energy. Measures to directly promote investment in energy efficiency were seen as merely ancillary to the CPRS.[34]

At the time of writing, it was uncertain when, or even whether, the CPRS would come into force. Further delays would be a setback for the principal element of the government's climate change strategy.

It might reasonably be predicted that mandatory energy efficiency obligations in Australia will become more stringent and onerous than previously contemplated.

Sustainability Declarations

In the State of Queensland, the recently amended *Building Act 1975 and Property Agents and Motor Dealers Act 2000*, obliges vendors and real estate agents as of 1 January 2010, to disclose a property's energy efficiency details by preparing and signing a sustainability declaration prior to marketing the property for sale. Failure to do so attracts penalties up to $2,000 for vendors and $10,000 for agents. Any false or misleading information provided on the declaration can also invite compensation claims from aggrieved buyers.

Building Code Requirements

The Commonwealth and State Governments have developed a National Strategy on Energy Efficiency to accelerate energy efficiency efforts. The energy efficiency requirements of the 2010 edition of the Building Code of Australia ("the Building Code") are to be tightened, expanded and increased and, for the first time, owners of residential, commercial and government buildings will be required to disclose energy efficiency information to prospective buyers and tenants.

The increased Building Code requirements have the potential to reduce greenhouse gas emissions from commercial buildings by 30 per cent by 2030[35] and from residential buildings by 600,000 tonnes every year by 2020[36].

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[33] Department of the Environment, Water, Heritage and the Arts, "Mandatory Disclosure of Commercial Office Building Energy Efficiency", Canberra, Australia, 2009, p vii.

[34] Carbon Pollution Reduction Scheme: Australia's Low Pollution Future – White Paper Volume 2, December 2008, Canberra, Australia, pp 19-3, 19-5 – 19-6.

[35] Department of the Environment, Water, Heritage and the Arts, "Commercial Buildings in Australia; <http://www.environment.gov.au/settlements/energyefficiency/buildings/commercial/index.html> accessed 3 December 2009

[36] Department of the Environment, Water, Heritage and the Arts, "Energy Efficient Buildings& Homes; <http://www.environment.gov.au/settlements/energyefficiency/buildings/homes/index.html> accessed 3 December 2009.

Mandatory Disclosure Obligations

To support the Building Code amendments relating to commercial buildings, new national legislation is expected by the second half of 2010 for the mandatory disclosure of commercial office building energy efficiency at the time of sale and lease.[37]

The central requirement of the scheme will be that, when any part of a commercial office building with greater than 2,000 m^2 net lettable area is to be sold, leased or sub-leased, the following must be disclosed:

(i) in any advertisement, the building's star rating[38]; and

(ii) to prospective buyers and tenants, a building energy efficiency certificate .

Although the contents of the efficiency certificates will be prescribed by regulation, they will include the star rating, details about the energy efficiency of tenancy lighting, and a list of opportunities for improving the energy efficiency of the building and applicable tenancies.

The scheme will eventually cover the largest range of commercial buildings that is feasible, although it will initially cover only office buildings.[39]

Non-disclosure under the scheme will incur court-ordered civil penalties up to $100,000 per breach. This may be supplemented by a 'publicity' mechanism, under which the name of any person or entity which has not complied with the disclosure requirements is published on a publicly accessible website.

The implementation of a similar scheme in relation to *residential* buildings is currently being developed and is expected to start by May 2011. A mandatory disclosure scheme will also be investigated for *shopping centres* in 2012.

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[37] Department of the Environment, Water, Heritage and the Arts, "Mandatory Disclosure of Commercial Office Building Energy Efficiency", November 2009 (prepared on behalf of the government jurisdictions and key stakeholders that were parties to the National Framework for Energy Efficiency). The Australian Capital Territory commenced a mandatory disclosure scheme in 1999.

[38] The star rating scheme benchmarks the actual operational energy use of existing commercial office buildings, measuring the energy use per m^2 of the net lettable area.

[39] These are office buildings used for professional or commercial purposes (but excluding buildings in retail, car parks, storage and production).

Conclusions

This paper has sought to show that significant potential reductions in greenhouse gas emissions should not be confined to longer-term supply-side measures, such as switching from fossil fuels to nuclear power, natural gas and renewable forms of energy in power generation; they should be available, at considerably lower cost, and probably much earlier, from demand-side measures, such as the elimination of wasteful practices and the introduction of other energy efficiency measures in buildings.

The most cost-effective emissions reduction measures appear likely to come from energy-efficiency measures in commercial buildings. They will bring a range of economic benefits as well. The pathway to achieving them is already clear, unlike the unclear pathways for many supply-side measures.

Emissions trading schemes are unnecessary to achieve energy efficiency gains in the building sector.

Energy efficiency measures are suitable for both developed and developing countries and do not involve the need for multilateral negotiations.

Finally, the need for stakeholder participation in all significant decisions about climate policy measures remains a major challenge to be addressed by policymakers. An urgent priority should be to develop a wider understanding of the feasibility of all of the options for responding to climate change, including of course energy efficiency measures.

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