AUSTRALIAN ALLIANCE TO SAVE ENERGY

The energy productivity roadmap

Doubling energy productivity of the built environment by 2030

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Concepts for discussion

Draft Version 1.0

Executive Summary Only

The full text of this paper, including references, is available at 2xEP.org.au

2XEP
Doubling Australia's Energy Productivity

Thanks

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The views expressed in this text are those of A2SE and are not necessarily those of our supporters and partners. We have taken all care to ensure that data is correct. All responsibility for the text rests with us.

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Executive summary

The Australian Alliance to Save Energy (A2SE) is coordinating the Australian Energy Productivity (2xEP) Roadmap initiative with the support of governments, businesses, industry associations and thought leaders from a range of institutions. “2xEP” (two times energy productivity) refers to the aim of the initiative, which is to double Australia’s energy productivity by 2030.

Energy productivity is a stated policy priority for federal, state and territory governments. Improving energy productivity is about increasing the economic value created per physical, as well as monetary, unit of energy consumed. In a period of rapidly increasing electricity and gas prices in Australia, in addition to volatility in the global oil market, a holistic approach to energy productivity can make a major contribution to Australia’s overall productivity and hence competitiveness.

Other major economies are well ahead of Australia in increasing their energy productivity. Not only is the mean economic value per unit of energy consumed by the Group of 20 (G20) countries higher than for Australia, so too is the G20 mean growth in energy productivity. Australia must act to keep pace so that it avoids entrenching competitive disadvantage whilst G20 peers accelerate away (A2SE, 2014a).

Australia is coming from a relatively low productivity base, coupled with relatively high real energy prices, so the potential contribution of energy productivity improvement to Australia’s overall economic productivity is now at an historic high. This means that energy, as a production input, now has a more material impact on the profitability of businesses and Australia’s economic growth than ever before.

This discussion paper provides an overview of issues that need to be addressed to substantially enhance energy productivity in the built environment, with a focus on the operational stage of the life cycle[1]. It also provides a starting point for discussions with stakeholders and development of a 2xEP Roadmap for the built environment.

Why focus on energy productivity in built environment?

The built environment sector is a pillar of Australia’s economy, providing housing, employment, business spaces, and essential services to all areas of the country. The built environment directly supports employment through construction, design, and maintenance, and indirectly supports the commercial and services sectors and employment more generally. The built environment is financially – and socially – crucial to Australia’s wellbeing, but also consumes a very large share of the country’s end-use energy.

Currently the built environment consumes well over 40% of all Australia’s final energy (excluding petroleum-based products, which are primarily used in transport). In 2012-13, this came to 667 PJ of final energy (Stadler, 2015). Unfortunately, the cost of energy in Australia has increased rapidly and steeply: in the six years from 2007 to 2013, retail prices increased 50% for gas, and 77% for electricity. In such an energy-intensive sector, this is an extraordinary increase in costs, placing a significant burden on the Australian

[1] The construction industry is referenced in regards to the energy profile of buildings, but most of the construction sector remains beyond the scope of this report. Since the construction phase is generally excluded from the scope, we the report also does not consider embodied emissions of materials used during the construction process.

economy.

An energy productive built environment would underpin economic prosperity by optimising the energy performance of infrastructure at all scales. In practice, this would require collaboration from public and private owners of infrastructure to transform the urban landscape, and associated arrangements for energy use and supply.

The 2xEP initiative

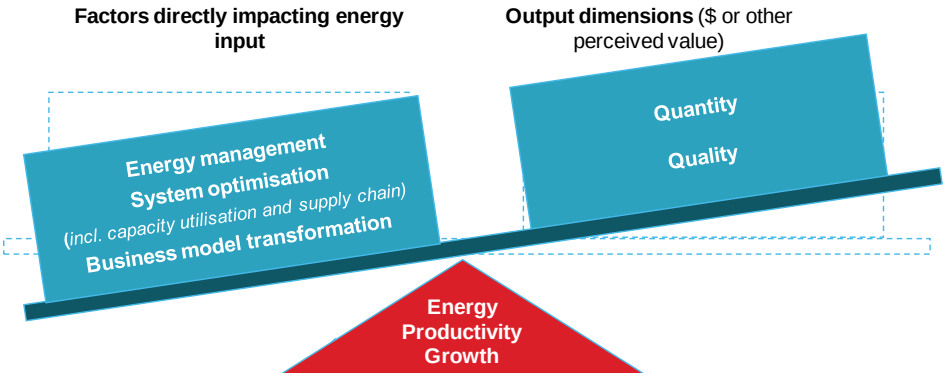
Against this background, the A2SE 2xEP initiative asserts that the built environment can make a major contribution to the general aim of doubling Australia's energy productivity by 2030.

An appropriate and practical 2030 energy productivity target could focus investment by the sector and individual operators on economically efficient opportunities. A2SE proposes to consult with a diverse range of stakeholders about what this target should be, the optimal pathways to follow for different sub-sectors to reach the agreed voluntary target, as well as how improvement in the energy productivity of the built environment could be tracked.

Consultation will canvass collaborative action that the industry could take to support a significant improvement in energy productivity and recommend actions required by governments to reduce or remove barriers to achieving such a target.

Potential strategies for improving energy productivity

Energy productivity is typically expressed as the real economic output per unit of energy (usually primary energy). Consequently, the potential to achieve a voluntary energy productivity target could be influenced by adopting complementary strategies that could either increase economic output or reduce the relative energy consumption per dollar output. Energy productivity is not energy efficiency by a different name. Energy efficiency – which generally focuses on using less energy to deliver the same service – is, however, one of four key strategies, as illustrated below.



The key strategies to enhance energy productivity are summarised below:

- ***Strategy area 1:*** 'Traditional' energy management – improving energy efficiency through better management of energy use, including the implementation of innovative technologies, demand management strategies, best practice data-management and benchmarking energy management to facilitate energy-productivity decision making.

- ***Strategy area 2:*** Systems optimisation – focusing on precinct scale energy-related aspects of the built environment as a system, including integrated urban infrastructure planning and design to optimise asset utilisation. These changes may be implemented for reasons of broader productivity improvement such as urban regeneration, but greater value can be realised by adding a deliberate focus on energy productivity.
- ***Strategy area 3:*** Business model transformation – focusing on the energy-related aspects of fundamental longer-term change in industry norms. This relates to, amongst other factors, the way space is utilised for buildings and infrastructure (e.g. energy supply), the approach to design and building material use, as well as the design and operation of equipment and infrastructure.
- ***Strategy area 4:*** Value creation or preservation – a focus on quantitative, as well as qualitative aspects of the built environment from the perspective of individual property owners and society in general. Consequently, energy productivity is not just about reducing inputs: it is also about increasing the value of assets, as well as the amenity and liveability of the built environment. In some instances, this may lead to *increased* energy consumption at the same time as *improved* energy productivity.

Opportunities to improve energy productivity in the built environment

There have been positive steps in the built environment sector over recent years with regard to energy productivity, particularly through significant investment in large public and private sector office occupants, mostly relating to the efficiency of heating and cooling. However, an energy productive built environment sits at the intersection of urban design, infrastructure investment, technological advances and socio-economic development trends. Isolated investments are therefore unlikely to deliver an energy productive built environment. Productivity improvement in such a complex system will require co-ordinated action. There are many opportunities across the strategic areas highlighted above:

- Lighting-related energy usage makes up a significant percentage of operational energy usage in many buildings. Energy efficient lighting retrofits and behaviour change are relatively easy and quick to implement, but could cut lighting energy usage by more than half.
- Heating, ventilation, and cooling (HVAC) systems can often be made dramatically more efficient through relatively simple measures. A joint study by Melbourne University and the City of Melbourne has found simply painting roofs white can make buildings up to four degrees cooler inside (Levinson, Akbaria, & Reilly, 2007).
- Precinct-scale retrofits can alter the temperature landscape of the urban environment. As HVAC energy consumption is dependent upon temperature, moderating the urban heat-island effect can increase the resilience of urban residents to heat waves while reducing demand for energy (Hatvani-Kovacs & Boland, 2015).
- Integrated urban design results in the co-location of employment opportunities, residences and services within a walkable distance or reach of efficient public transport. If executed with appropriate

consideration to energy productivity, the benefits to individuals and the economy as a whole is likely to be significant – measured in dollars, health and the liveability of cities.

- New technologies in building construction can deliver buildings faster and cheaper than traditional methods. The new modular building industry offers a construction speed 30-40% faster than conventional buildings, and at lower overall cost (Low Carbon Living CRC, 2015a).
- Buildings that obtain high NABERS Energy ratings (and therefore have relatively high energy productivity) obtain stronger investment returns than buildings that are poorly rated. The “green premium” for green buildings is evident on several different environmental ratings systems, and reflects a consistently higher basic rent, net operating income, and occupancy rate (Investment Property Databank (IPD), 2014).

Exploiting the above opportunities requires a proactive and long-term perspective to yield the benefits on an economy wide basis. Measures are needed across the spectrum of policy, investment decision-making, technology, infrastructure and urban planning.

Urgent action is required as the useful life of most built assets (e.g. buildings and equipment) is more than 20 years. Today’s design decisions could lock in unproductive energy options for decades. However, not all actions are capital intensive. This transition can be facilitated by a range of strategies, including:

- Differentiated property rates based on environmental ratings, e.g. NABERS/GreenStar Rating.
- Differentiated stamp duty on property to incentivise energy smart upgrades.
- Quicker building permit review and processing for projects that are designed to achieve high NABERS/GreenStar Ratings
- Extended and more stringent minimum standards and efficiency labelling requirements.
- Land use planning and spatial development practices that reduce the demand for energy and travel.
- Removal of tax incentives and employee benefits that may be desirable in isolation, but can contribute to unintended, negative outcomes, when viewed within the context of an energy productive built environment system.
- Incentivising more energy efficient construction and equipment through preferential stamp duty.

Benefits from 2xEP for built environment

The benefits of a significant improvement in energy productivity in the built environment will depend on new regulations, and the voluntary target and actions agreed by the sector, but could include:

- Energy efficiency improvements and cost savings for users through new technologies and practices in commercial and residential sub-sectors. This will reduce public and private costs, and could also reduce

greenhouse gas emissions in a cost-effective manner.

- Avoided and reduced energy use through a careful analysis of pre-existing energy consumption, and targeted removal of unnecessary components.
- Optimisation of built environment systems (i.e. through capacity utilisation) and acquiring agglomeration impacts of increased opportunities for economic exchange. Using precinct-scale renewable power could provide many residents or commercial areas with a substantial amount of extra power, relatively subsidised by the economies of scale.
- Multiple dividends in terms of increased employment, more affordable housing, reduced household and business costs, reduced health costs, and improved accessibility, amenity and equity.

Built environment program objectives

A successful outcome from the A2SE 2xEP Roadmap process will be a realistic but challenging energy productivity target and a plan developed by the sector, supported by a broad range of industry constituents, to lead changes in the sector and their individual businesses to achieve the target. It is envisaged that outcomes of the A2SE 2xEP Roadmap may include:

- A definition of pathways to significantly enhance energy productivity, with reference to sub-sectors and varying scales of operations.
- Mechanisms to create greater awareness and uptake of emerging innovations that can help built environment sub-sectors achieve a step change in energy efficiency.
- Strategies to overcome barriers to the adoption of new, more efficient technologies.
- Strategies to overcome barriers to integrated urban planning.
- Prioritisation of cost-effective measures to achieve 2xEP in the sector.
- New programs, or the strengthening of existing programs, to support the built environment to achieve 2xEP.
- Recommendations to federal, state, territory and local governments for policy changes to facilitate these activities and support 2xEP in built environment.

Such changes could be achieved through a collaborative process, involving built environment businesses and providers, researchers and industry associations, with government engagement to accelerate innovation, transformation and value-adding in the sector.