



Doing more. Using less.

Towards an Effective National Energy Productivity Plan - NEPP 2.0

Late in 2015 our federal and state governments ¹committed to a National Energy Productivity Plan (NEPP) and targeted a 40% improvement in national energy productivity by 2030. Three years later the Commonwealth Government has neglected the NEPP, energy productivity has flatlined and there is no coherent national energy/carbon policy framework to support the transition of our economy to its future state.

A2EP has long advocated that a positive approach to energy productivity, as an integral and central part of the national energy/carbon strategy, ensures there need be no energy trilemma but, instead, a trifecta. We can have energy for homes, commerce, industry and government that is reliable, affordable and sustainable, and delivers more value. There is no inherent conflict in delivering these objectives simultaneously and harmoniously. The trifecta relies on:

- using energy more effectively and efficiently, and
- at times when it is cheaper to supply from the grid.

Energy productivity improvement is the element that allows systems transformation and carbon mitigation to be achieved simultaneously, harmoniously and economically. Every model for energy system change that fails to put efficiency at its centre eventually fails one of the three trifecta tests. The Germans learned this from experience and realised that they needed to refocus their 'Energiewende' energy plan with energy efficiency as the centrepiece, in order to enable the promised transition. Australia needs its own version of the German vision, with energy productivity at its core.

Energy use costs the Australian economy about 8% of GDP every year and has done consistently for some time. A2EP targets a doubling of energy productivity (2xEP); an ambitious but achievable goal. 2xEP can be done with existing technologies on an economically efficient and effective pathway. The outcome? A significant boost to GDP.

This document builds on sectoral roadmaps for improving energy productivity that were developed by expert working groups of the Alliance and from our innovation working group and Next Wave program. It includes elements missing from the original NEPP – measures for key sectors of the economy, specific deliverables, a budget for each initiative, milestones for delivery and clear allocation of responsibility.

This is a draft for comment and input. We hope that it is the first step towards a meaningful plan to double energy productivity by 2035.

The following section highlights 10 key measures that must be implemented to deliver meaningful energy productivity progress.

¹ COAG Energy Council

NEPP 2.0: Top ten priority measures

1. Establish infrastructure, targets and budgets

Set an annual improvement in energy productivity of 4.5%; for a doubling of energy productivity by 2035. Provide for long-term Commonwealth funding commitment to NEPP 2.0 in forward budgets.

2. Accelerate transformation through innovation

Major focus on accelerating innovation and technology transfer with budgets of at least \$300 million/year for energy productivity innovation

3. Accelerate investment in energy productivity

Rapidly accelerate the rate of investment in energy productivity through tax incentives/accelerated depreciation, improved access to financing, and by revamping retailer obligation (white certificate) schemes and extend to all states with consistent rules.

4. Implement fuel efficiency standards for new light vehicles

Implement performance standards as a matter of priority to gain potential of >\$5 billion in annual fuel savings and significantly reduce the fuel import bill.

5. Accelerated uptake of high efficiency and low emission vehicles

Implement an integrated suite of policies, including government procurement to accelerate purchase of low emission vehicles.

6. Enlighten consumers: Implement an engagement program

Design and implement an extensive, long term information and education campaign on smart energy use for improved comfort and reduced energy costs.

7. Inform choice: Ratings and disclosure for residential property

Develop, implement and promote a standard national system for home ratings and disclosure on sale and lease, to transition to a mandatory scheme.

8. Fix the built legacy: Address pre-Code properties

Develop and implement standards for older buildings to drive increased rate of energy efficient retrofit.

9. Fix the built future: Ensure the Code is fit for purpose

Develop and implement the National Construction Code for 2022 and beyond in line with zero carbon outcomes.

10. Balance energy markets: Empower the demand side

Apply integrated demand management as the first solution to manage supply volatility (before commitment to supply infrastructure). Target at least 15% of peak load to be met by demand management by 2025.

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This version of NEPP 2.0 is a draft for discussion. We will work with others to finalise and formalise a proposal.

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1. Introduction to NEPP 2.0

BACKGROUND: In December 2015 COAG Energy Council released its National Energy Productivity Plan (NEPP) aimed at improving energy productivity (EP) by 40% from 2015 levels by 2030; energy productivity being measured by GDP(\$)/primary energy(PJ). That plan is more a framework than a plan. While it includes some specific actions, it lacks details, deliverables and timing, does not address actions by sector or supply chain, and has little coverage of supply/demand integration (including demand management).

Despite all three major parties supporting energy productivity/efficiency improvements (and both Labor and the Greens favouring a more ambitious EP target, to double EP by 2030), EP has not been part of the ongoing national energy debate, most recently punctuated by the demise of the National Energy Guarantee (NEG) policy proposal. Energy productivity and the demand-side more generally were notably absent from the briefs for the Finkel review into future security of the NEM, the ACCC inquiry into retail electricity prices and development of the NEG.

Inexplicably, EP has not been recognised by the Commonwealth as the one policy lever that can simultaneously address energy reliability and security, affordability and emissions, while enhancing economic growth. And with high prospects of being delivered as non-partisan policy.

JUSTIFICATION for ACTION: A national focus on energy productivity is essential in Australia. The doubling of electricity and gas prices over the last decade (compounded currently by escalating oil prices) has harmed business competitiveness and stressed household budgets. The impact of higher energy prices is exacerbated by poor energy productivity; Australia derives far less value from each unit of energy than our competitors. In fact, we have the lowest EP of OECD countries. And our policies to improve EP were recently rated by the highly regarded American Council for an Energy Efficient Economy (ACEEE) as the least comprehensive in the developed world.

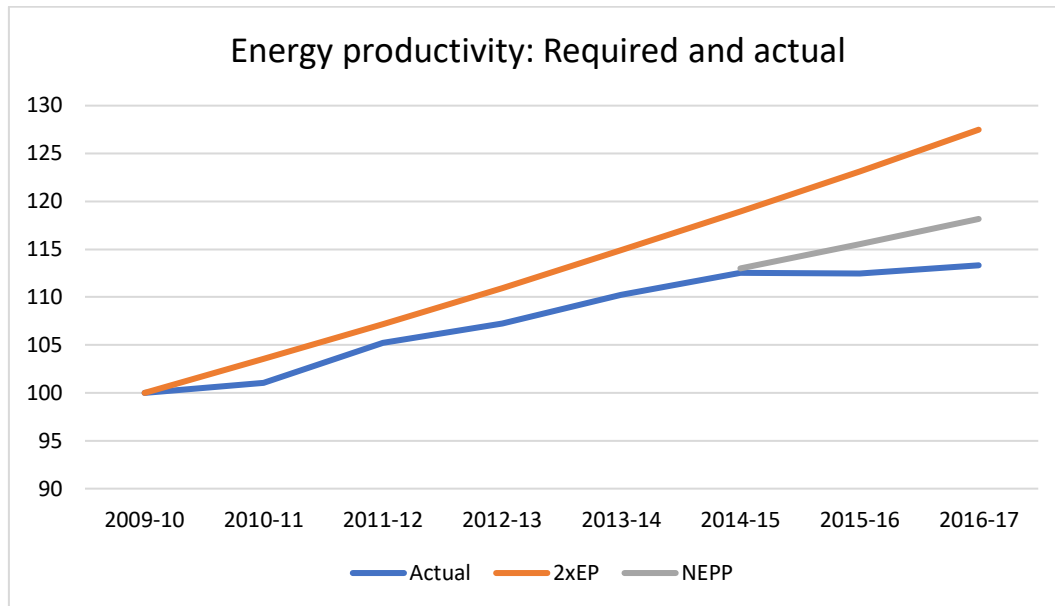
RESOURCING: Following the release of the NEPP the Commonwealth, charged with leading delivery of the Plan, has placed the program on the back burner. It has never been funded in federal budgets and implementation at that level has been grossly under-resourced. The states and territories, particularly the Australian Capital Territory, New South Wales, South Australia and Victoria have been doing their share, but without significant support or apparent leadership from the Commonwealth.

PROGRESS: Following publication of the second NEPP annual report in December 2017, A2EP released a traffic light assessment of NEPP implementation. This assessment of all 34 NEPP measures was dominated by red and orange lights, signalling inadequate progress.

The results are clear from the following graph. The first two reported years of NEPP 'implementation' resulted in almost a flat-lining of EP (-0.1% and +0.9% in the first two years respectively), at a time when competitors are improving EP by well over 2% annually and from better baselines. This outcome is especially disastrous as EP is measured as GDP/primary energy use, and GDP increased 3.2% and 1.6% in these years.

A2EP proposed a doubling of energy productivity (2xEP) by 2030, from a 2010 baseline. That goal was ambitious, but our business-led coalition regarded this rate of improvement as essential to manage the national energy spend (over \$130 billion in 2016-17, nearly 8% of

GDP), to restore business competitiveness, and to meet our climate targets. Given the poor outcomes achieved in the intervening years, our target is now aspirational for 2030, but is achievable by 2035.



Source: Australian Energy Update 2018, Department of the Environment and Energy

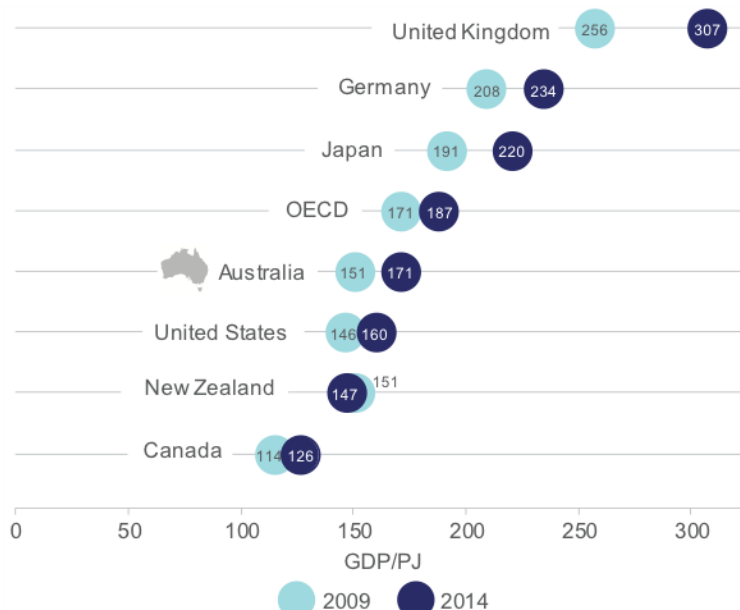
FINDING THE WAY FORWARD – NEPP 2.0

To deliver on the NEPP 40% target and push past there to double energy productivity (2xEP) by 2035, A2EP and its partners have drafted NEPP 2.0, a comprehensive, non-partisan, economy-wide energy productivity plan. NEPP 2.0 is built on the original 2xEP sector roadmaps, put together by working groups of A2EP that include businesses, industry groups and researchers.

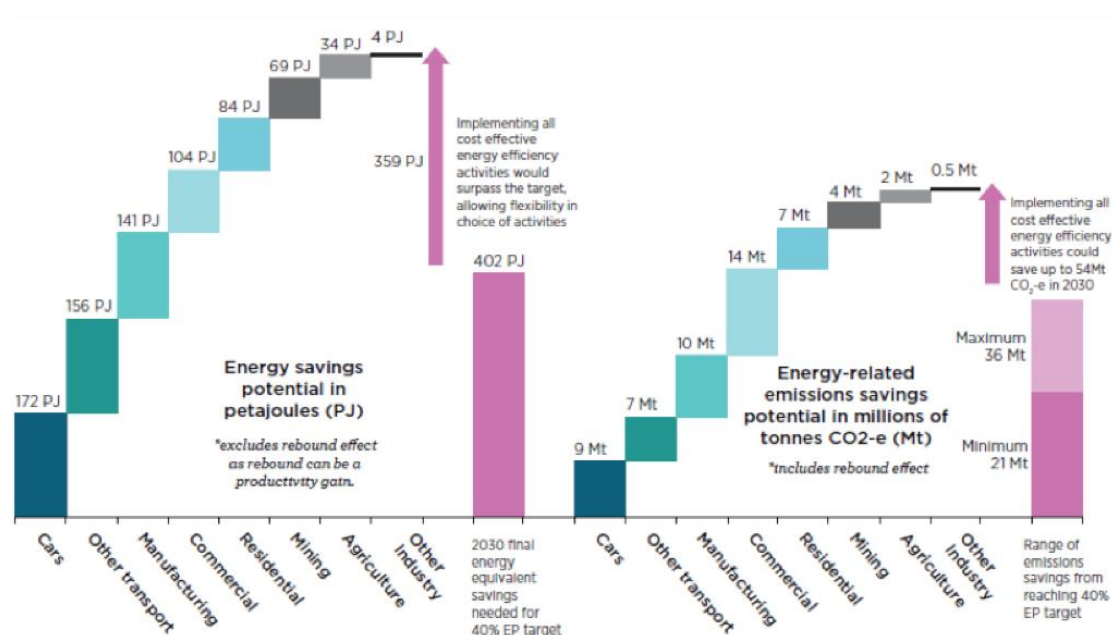
We welcome your input into this draft set of measures to modify/refine them, add measures, and come up with a final package and budget proposal ahead of the forthcoming election.

2. Why is energy productivity important?

The diagram below, reproduced from *Industry Monitor 2016* (Department of Industry, Innovation and Science, 2016a), illustrates the energy productivity of a range of developed countries in 2009 and 2014. While Australia's energy productivity improved over the period, improvements were smaller than those made in many other developed countries, and in both years Australia's energy productivity was lower than the OECD average. In the period from 2014 improvement in Australia has slowed. Accelerating energy productivity improvement provides opportunities to bolster the global competitiveness of the Australian economy.

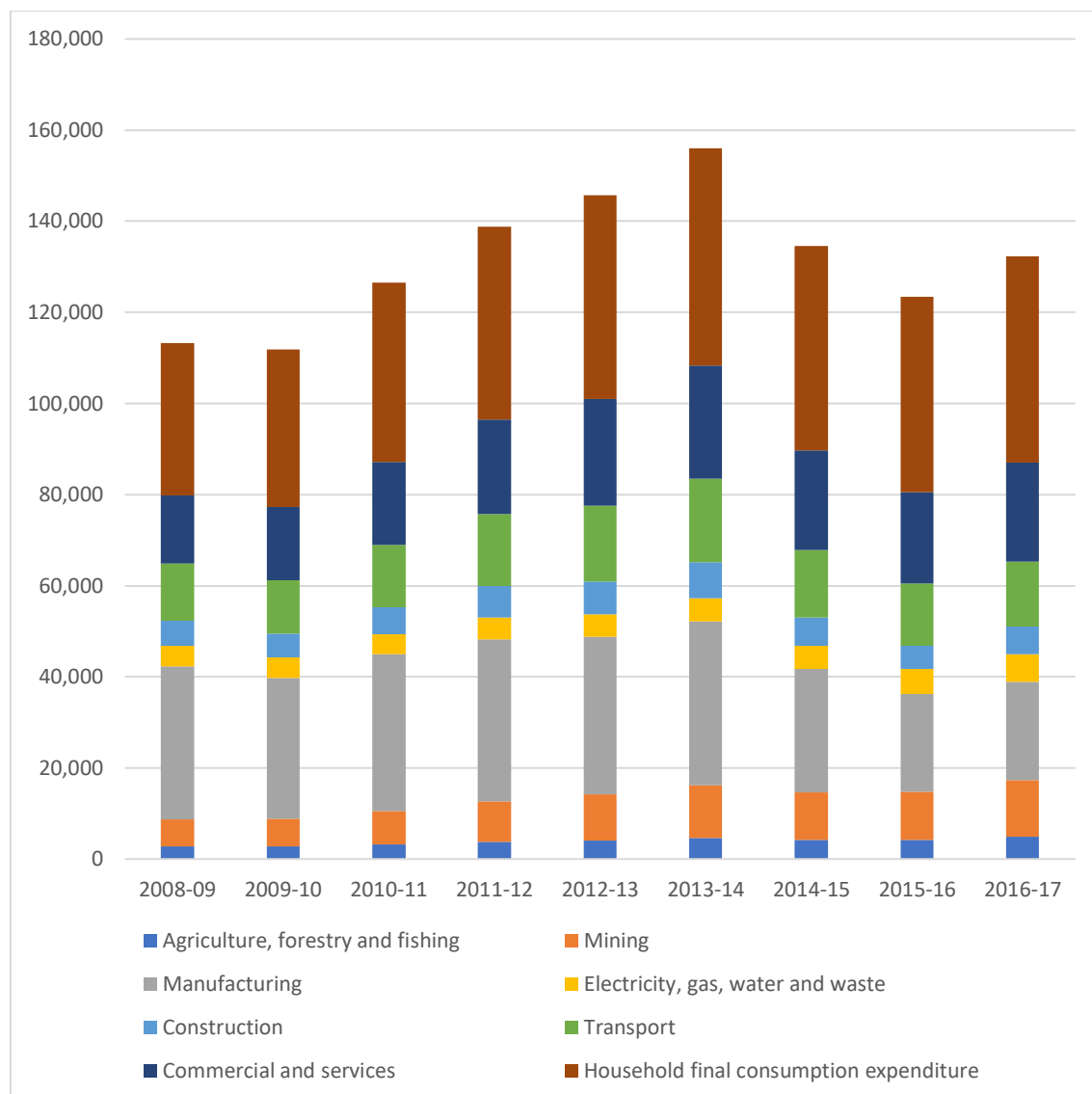


The NEPP included this graphic produced by ClimateWorks Australia that illustrates the potential for energy productivity improvement and, collaterally, emissions reductions in key sectors of the economy. This assessment of potential does not include opportunities from impacts across value chains nor through application of emerging technologies for efficiency, digitalisation and electrification.



Expenditure on energy in Australia - Monetary use of energy (\$m)

Australia's total expenditure on energy spend in the 2016-17 financial year was \$132,299 million ². In that same year Australia's GDP was \$1,692,092 million. ³ Expenditure on energy consistently accounts for about 8% of GDP. Australia's reported energy productivity for the 2016-17 year was \$275 million/PJ. In the 15 years to July 2015 GDP increased by an average of 2.95% per annum, energy productivity at 1.78% per annum. For energy productivity to double by 2030 that rate of improvement would need to more than double, to 4.4% per annum.



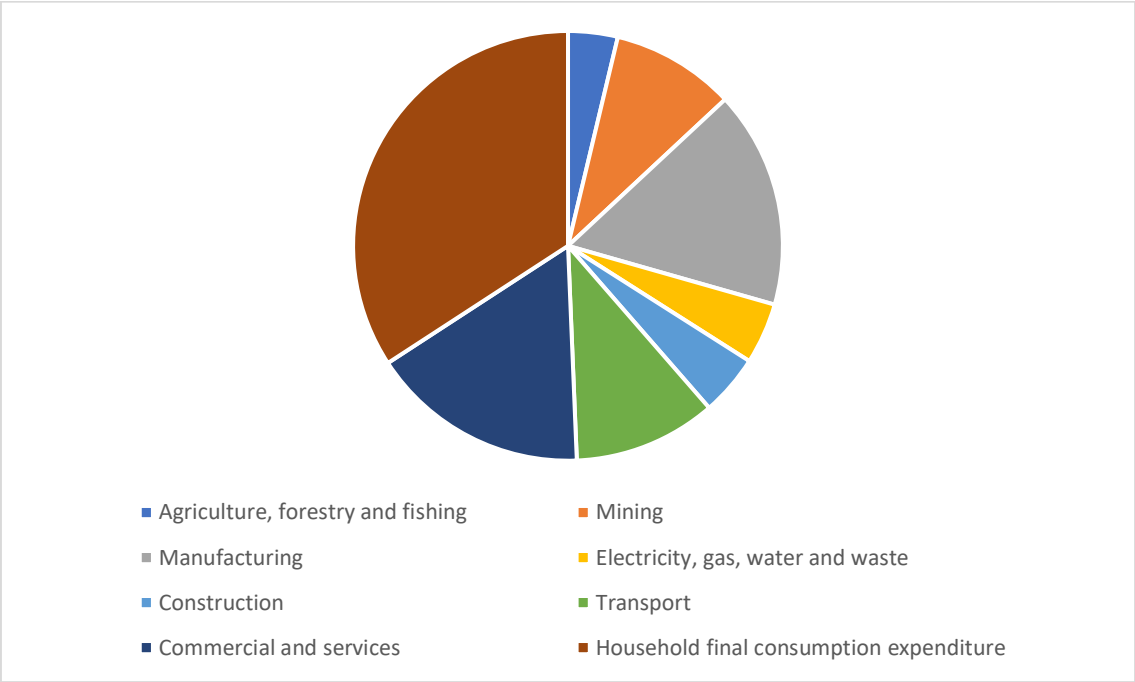
Source: Australian Bureau of Statistics, 4604.0 Energy Account, Australia, 2016-17, February 2019. Table 3 Australian monetary supply and use of energy - 2016-17

* Total energy products, excluding Uranium, excluding Government final consumption expenditure, Gross fixed capital formation, Accumulation

² Australian Bureau of Statistics, 4604.0 Energy Account, Australia, 2016-17, February 2019. Table 3 Australian monetary supply and use of energy - 2016-17

³ Australian Bureau of Statistics, 5204.0 Australian System of National Accounts, 2016-17, October 2017. Table 1 Key National Accounts Aggregates

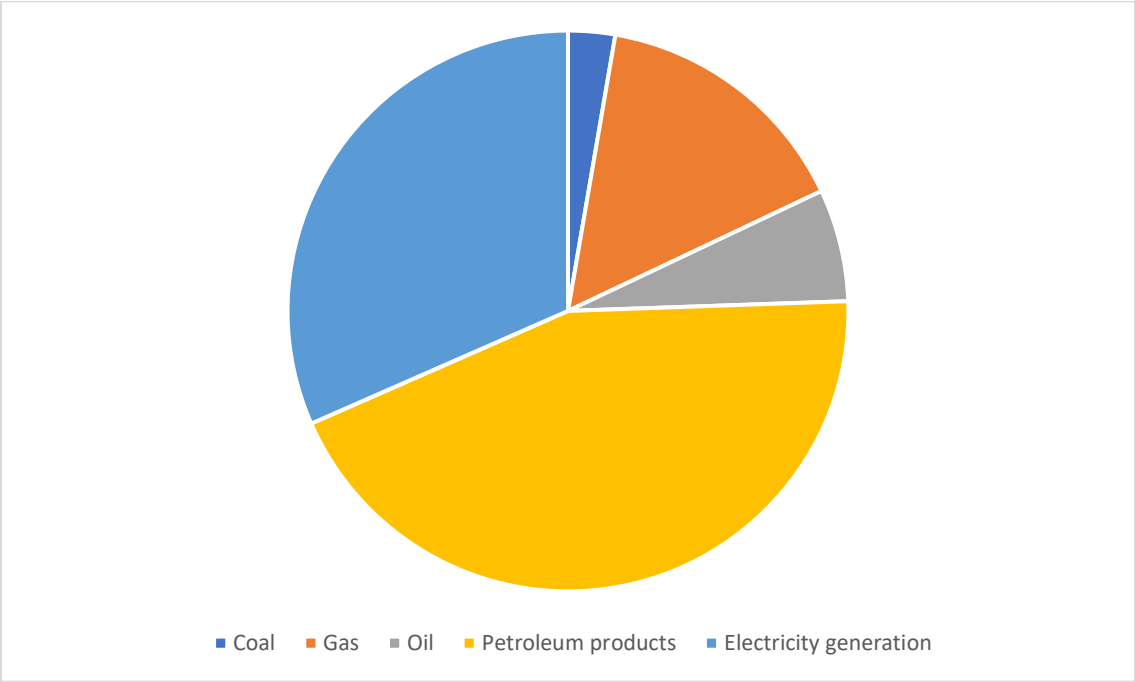
Monetary use of energy - 2016-17: By sector



Source: Australian Bureau of Statistics, 4604.0 Energy Account, Australia, 2016-17, February 2019. Table 3 Australian monetary supply and use of energy - 2016-17

* Total energy products, excluding Uranium, excluding Government final consumption expenditure, Gross fixed capital formation, Accumulation

Monetary use of energy - 2016-17: By fuel type



Source: Australian Bureau of Statistics, 4604.0 Energy Account, Australia, 2016-17, February 2019. Table 3 Australian monetary supply and use of energy - 2016-17

* Total energy products, excluding Uranium, excluding Government final consumption expenditure, Gross fixed capital formation, Accumulation

3. NEPP 2.0 structure and coverage

NEPP 2.0 is a comprehensive plan addressing cross-sectoral and sector-specific issues in the Australian economy.

Cross sectoral measures that are addressed are:

1. Establish energy productivity improvement infrastructure, targets, budgets
2. Transformation through innovation
3. Accelerate energy productive investment
4. Enlighten consumers: Implement an engagement program
5. Support voluntary action/recognise leadership
6. Improve energy productivity information and reporting
7. Balance energy markets: Empower the demand side
8. Fix failing energy markets: Level the field

Two additional measure which have application in all sectors are:

- minimum energy performance standards (MEPS), and
- capacity building

But the specific actions are sufficiently unique to each sector that these measures are addressed in the sector chapters.

Sectoral measures address these sectors:

Manufacturing
Transport
Buildings
Agriculture
Mining

While this is a convenient structure to address measures, there are major opportunities that can only be addressed by looking at value chains in the economy. These opportunities exist between and across sectors. There are some value chain recommendations included in the sectoral summaries. A2EP is working towards identifying energy productivity opportunities in value chains across the economy. There is a program recommended for funding that would accelerate this work.

4. Building stable infrastructure to support change

After the energy/climate policy turmoil of the past decade it is critical to establish stable, long-term frameworks to build the confidence of consumers (business and domestic), investors and financiers, and suppliers of products and services. NEPP 2.0 includes a range of proposed measures including cross-cutting and sectoral measures.

1. Establish infrastructure, targets, budgets

Set and deliver a target for annual improvement in energy productivity of 4.5%, equivalent to doubling energy productivity by 2035. This target is ambitious, but achievable through an aggressive and comprehensive program that harnesses innovation.

- **Establish a National Energy Productivity Authority** with an independent board including strong business and consumer representation to co-ordinate, monitor and report on delivery of the NEPP. This is necessary at this point to restore confidence in long term, arms-length delivery of the Plan and address the limited capacity of the Commonwealth to deliver energy productivity programs.
- **Fund implementation of NEPP measures by long term Commonwealth budget commitments** (ideally across the forward estimates). NEPP 2.0 proposes appropriate funding levels to deliver programs required to achieve the national target.
- **Ensure that NEPP2.0 offers long term, consistent programs over at least a 10 year horizon**, to provide confidence for all stakeholders to invest in building capacity and skills, and investing capital.
- **Work with states and territories to design and support nationally consistent programs** to deliver the NEPP. This consistency greatly aids red tape reduction and supports national organisations to deliver outcomes.
- **Report performance against milestones** for each measure and overall each year at least, and commit to promptly rectifying programs that are not delivering to target.

Attribute	Comments
<i>Type of measure</i>	Policy, program
<i>Current status</i>	Major revamp required
<i>Coverage</i>	National; All sectors
<i>Owner</i>	COAG Energy Council, State ministers and governments
<i>Outcomes</i>	Doubling energy productivity by 2035
<i>Metrics</i>	Annual improvement in energy productivity average 4.5%
<i>Deliverables</i>	<ul style="list-style-type: none"> ▪ Program framework and targets ▪ Establishment of authority ▪ Forward budget funding commitment
<i>Timing</i>	Development commencing June 2019, complete December 2019, Roll-out from July 2019 and ongoing, review progress annually
<i>Budget</i>	Program development allocation \$2 million Ongoing for authority, coordination, monitoring, reporting \$10 million p/a Budgets for NEPP 2.0 programs set out by measure

2. Transformation through innovation

The rapid development of energy using technologies in all sectors offers opportunities for transformative change in the value that can be derived from energy use. Harnessing this change and accelerating its application is critical for the rapid improvement of energy productivity. Investment to accelerate innovation and transfer/replicate global best practice is a central plank of NEPP 2.0, and reliant on these actions:

- **Change the mandate of the Australian Renewable Energy Agency (ARENA)** to make it the Clean Energy Innovation & Transformation Authority (CEITA) and commit additional forward funding of a minimum of \$300 million/year (from 2022 through to 2030) and give it a focus on energy productivity.
- **Fund innovation grants to accelerate adoption of best practice technology** by reducing risk of early adoption, ideally through CEITA. Focus on electrification, digitalisation/AI applications, decarbonisation and supply chain optimisation. Propose funding of \$100 million/year (and if in CEITA, this comes from the above proposed budget. The budget should include funding for fostering energy productivity research, analysis and communications.
- **Establish energy productive technology demonstration centres** in each state with full scale working equipment and training facilities. Propose a capital budget of \$50 million to establish the centres, with states to fund and manage ongoing operations, with a contribution of \$10 million/year from the Commonwealth.
- **Conduct value chain research** to identify the major opportunities for energy productivity improvement across the economy. \$5 million over 2 years.

Attribute	Comments
<i>Type of measure</i>	Policy, program, legislative
<i>Current status</i>	Partially existent
<i>Coverage</i>	National; All sectors
<i>Owner</i>	COAG Energy Council, ARENA,
<i>Outcomes</i>	Increased access to finance for implementation of measures, increased implementation of measures, impact of measures, Improved access to energy service company investments
<i>Metrics</i>	Value of measures funded through mechanism, value of impacts
<i>Deliverables</i>	<ul style="list-style-type: none"> ▪ Legislative change to ARENA mandate ▪ Budget expenditure for ARENA/EITA, innovation fund and centres ▪ Communications campaign ▪ Monitoring and evaluation
<i>Timing</i>	Development commencing July 2019, roll-out ongoing, review every two years
<i>Budget</i>	ARENA/CEITA extension \$300 million/year from 2022-2030 Including energy productivity grants \$100 million year Energy productive technology demonstration centres \$50 million establishment and \$10 million/year operation support. \$5 million for value chain research

3. Accelerate investment

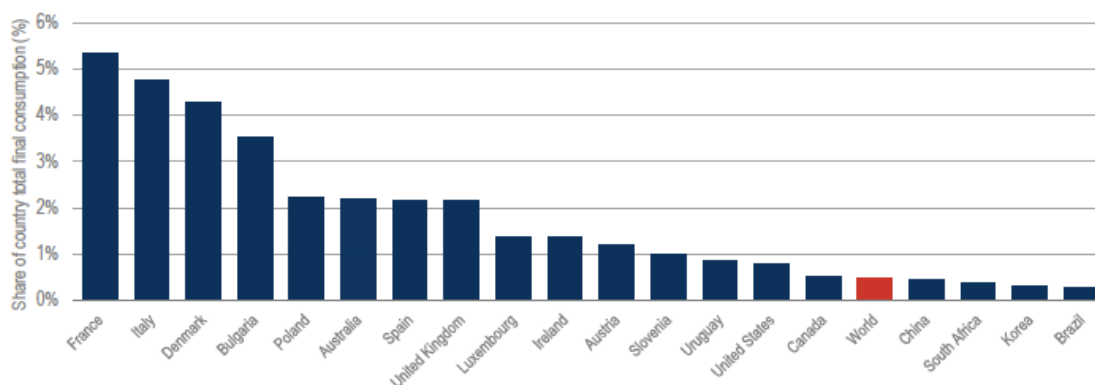
Rationale: A range of barriers to investment in energy productivity has been identified by A2EP working groups. They include access to finance, tax treatment of investments, payback periods, split incentives, lack of information about the availability of effective financing,

disparate treatment of various measures by various regimes (eg the differing treatment of measures by the various state-based white certificate schemes).

Current status: These barriers have been addressed with varying degrees of success by a range of uncoordinated, inconsistent and sometimes contrary actions. There has been little in the way of monitoring or evaluation of many of these measures.

One common market-based mechanism designed to fund energy savings measures is ‘white certificate’ obligation schemes which require retailers to generate (or purchase) certificates relating to the reduction of energy use associated with implemented measures. Such schemes exist in NSW, Victoria, SA and ACT, and all have somewhat different coverage and rules, which is frustrating for retailers, businesses and consumers. The International Energy Agency has reviewed savings generated by such schemes globally and shows how successful they have become.

Energy savings in 2016 from utility obligations in operation since 2005 (% of final energy)



Sources: IEA (2017d), *Market Based Instruments for Energy Efficiency*, www.iea.org/publications/insights/insightpublications/MarketBased_Instruments_for_Energy_Efficiency.pdf; ATEE (2017), *Snapshot of Energy Efficiency Obligation Schemes in Europe: 2017 Update*, http://atee.fr/sites/default/files/part_6_2017_snapshot_of_eeos_in_europe.pdf; ACEEE (2016b), *State and Local Policy Database*, <http://database.aceee.org/state-scorecard-rank>; US EIA (2017), *State Profiles and Energy Estimates*, www.eia.gov/state/seds/; DOIS Australia (2016), *Energy in Australia*, <http://industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Energy-in-Australia.aspx>; Ontario Energy Board and IESO (2017), *Ontario Energy Report*, http://www.ontarioenergyreport.ca/pdfs/5806_IESO_OntarioEnergyReportQ42016_Electricity_EN_FA.pdf.

Source: International Energy Agency, *Energy Efficiency 2017*, p45

Actions:

1. Work with financial institutions to encourage investment in energy efficiency measures. Structure and promote attractive debt, and ideally also improve access to off balance sheet treatment of third party owned and operated energy productivity projects on business sites.
2. Reform taxation regimes to encourage investment in energy productivity measures. Enable investment in measures by ensuring regimes favour (and act to address measures that actively discourage) energy productivity.
3. Enhance and extend retailer obligations to invest in measures. Revamp existing schemes to make them more effective for market transformation. Then implement a nationally consistent energy retailer obligation scheme.

3.1 Work with financial institutions to encourage investment

Rationale: Improved access to *longer term finance, with a lower risk premium* at favourable terms, and suitably packaged to attract customers due to the overall benefits, to support accelerated investment in energy productive technology.

Status: Accessing debt finance is not as significant an issue for business as it once was, primarily due to the success of CEFC in expanding availability of debt finance, but also in more recent times due to international banks having specific green investment mandates and the advent of green bonds.

A remaining gap is actions to make it easier for third party providers – energy services companies – to own, operate and maintain energy productive plant on host business premises. The challenge is for these investments for the purpose of reducing energy costs to be treated as off balance sheet.

There is significant potential to address financing issues for households, from relatively minor equipment (lighting, heating and cooling, solar and storage) upgrades to major renovations and new builds. Discounted, and otherwise attractively packaged mortgages and loans specifically for energy savings can facilitate this investment. These ‘green mortgage’ products provide benefits for the lender as well, as they increase the capacity for repayment of the loan through energy cost savings. As bank credit is tightening, the ability to extend a loan for energy savings investments could be attractive to home borrowers.

Actions: Research project to be undertaken to explore of tax treatments for different forms of financing, and the best forms of financing to encourage companies to take up financing of energy productivity projects – particularly tax treatment for third party projects on business sites.

Attribute	Comments
<i>Type of measure</i>	Incentive
<i>Current status</i>	Partially existent
<i>Coverage</i>	National; Residential, commercial, industrial
<i>Owner</i>	COAG Energy Council, CEFC, Financial institutions
<i>Outcomes</i>	Increased access to finance for implementation of measures, increased implementation of measures, impact of measures, Improved access to energy service company investments
<i>Metrics</i>	Value of measures funded through mechanism, value of impacts
<i>Deliverables</i>	<ul style="list-style-type: none"> Program framework Liaison with financial institutions, investor sector Communications campaign Monitoring and evaluation
<i>Timing</i>	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
<i>Budget</i>	Program development \$5 million then ongoing funding of \$5m/year to promote and support the products

3.2. *Reform taxation regimes to encourage investment in measures*

Reform taxation regimes to ensure they favour (or do not discourage) energy productivity. See for example the ALP proposal for 20% tax deductions (in the first year) for investment in depreciable assets for energy savings, over \$20,000 in value. This allowance could be increased to 33% for the installation of best practice performance equipment to increase impact, and/or

allow 'double dipping' with white certificate programs. A Private Senator's Bill proposed by Senator Tim Storer would allow expenditure by landlords on approved measures for low rent properties to be treated as 'maintenance' rather than 'improvement' and be deductible from income in the year of expense to a maximum of \$2000 per year for 3 years.

Rationale: Accelerate investment in plant and equipment to improve energy productivity. This is critical as businesses and home owners need to be encouraged to rapidly increase the rate of retrofitting facilities and replacing equipment for energy productivity benefits.

Actions:

Attribute	Comments
<i>Type of measure</i>	Tax incentive for retrofit/replacement
<i>Current status</i>	Minimal existing support
<i>Coverage</i>	National; Residential, commercial, industrial, agriculture, mining
<i>Owner</i>	COAG Energy Council, Commonwealth
<i>Outcomes</i>	Increased implementation of measures, impact of measures
<i>Metrics</i>	Value of measures funded through mechanism, value of impacts
<i>Deliverables</i>	<ul style="list-style-type: none"> Reform of arrangements for negative gearing, asset write off, etc Reform of arrangements for depreciation Communications campaign Monitoring and evaluation
<i>Timing</i>	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
<i>Budget</i>	Program development \$5 million then nil additional to governments Revenue foregone to be estimated in design phase

3.3. *Enhance and extend market incentives to invest in measures*

Improve and extend retailer obligation (white certificate) schemes to boost investment in measures:

Rationale: Low rates of adoption of new technology, a lot of antiquated equipment, and use of incentives designed to transform markets

Actions:

1. Modify existing schemes to make them more effective in transforming markets and driving larger projects with longer paybacks. This would include phasing out incentives for short payback measures which have improving economics and increase incentives for larger impact, 3-5 year payback measures to help transform markets and reduce free riders. Conduct annual market reviews to adjust incentives in line with changing market conditions. Note that to avoid excessive market uncertainty any likely changes should be foreshadowed 2-3 years in advance.
2. Establish programs in all states and territories with harmonised administration to allow simple, efficient, consistent implementation.
3. Include an additional demand management incentive to encourage efficiency investments which create significant value to networks by enhancing DM outcomes.

Attribute	Comments
<i>Type of measure</i>	Incentive
<i>Current status</i>	Partially existent: NSW, Vic, SA

Coverage	National; Residential, commercial, industrial
Owner	COAG Energy Council, States and territories, Energy retailers
Outcomes	Increased implementation of measures, impact of measures, accelerated business investment in energy productive measures, particularly longer payback measures
Metrics	Value of measures funded through mechanism, value of impacts,
Deliverables	<ul style="list-style-type: none"> Program framework including harmonisation of existing schemes Implementation of national scheme Communications campaign Monitoring and evaluation
Timing	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
Budget	Program development \$5 million then nil additional to governments

4. *Enlighten consumers: Implement an engagement program*

Design and implement an extensive, long term information and education campaign on smart energy use for improved comfort and lower bills. Research shows that there is both a high customer appetite to know more about how they can reduce bills and improve quality of life, and a disturbing level of ignorance about best practices and technologies to achieve this. These programs have been run successfully in the past and the results of water smart programs have demonstrated their potential effectiveness.

Rationale: Consumer research reports that energy consumers have a very poor understanding of the potential to reduce their bills by using energy more effectively and lack appropriate tools to support decision-making. Customer knowledge about smart energy use (outside solar) is lower now than at any time since the 1980's. Programs addressing water savings demonstrated that these approaches can be very effective to reduce waste of resources and to support rapid introduction of (subsidised) savings equipment.

Current status: There is no national program to provide information and support action for energy consumers. There is also little happening in the states and territories and through others such as energy retailers.

Actions: Develop a program.

Attribute	Comments
Type of measure	Information
Current status	Largely limited to information on websites
Coverage	National but with regard to regional considerations
Owner	COAG Energy Council and Building Ministers' Forum
Outcomes	Increased awareness, implementation of promoted measures, collateral benefits (amenity etc)
Metrics	Consumer testing
Deliverables	<ul style="list-style-type: none"> Program framework Program elements and delivery Monitoring and evaluation
Timing	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
Budget	\$100 million over four years

5. *Support voluntary action and recognise leadership*

As acknowledged in the NEPP, “business-led voluntary action can boost economic productivity, national competitiveness and employment opportunities”. NEPP 1.0 promised that “government will work cooperatively with the business community on options to support energy productivity improvements”.

This measure proposes the establishment of a voluntary program - the 2xEP Challenge - for organisations that support leadership and commitment to improving energy productivity in own operations and supply chains. The measure relies on voluntary commitments by organisations to double energy productivity with substantial public recognition. The concept of the program:

- Leadership program to light the way for other companies
- Memorandum of Understanding (MoU) between CEO/senior executive and the government
- A “Commitment to the 2xEP Challenge” leads to recognition and support
- Aligns with other voluntary programs including international programs e.g. EP100⁴ and state and territory energy efficiency programs
- Participating companies report annually against their milestones, commercially sensitive information will not be published
- Participation in the program is voluntary

The proposed program will initially focus on companies in the private sector but could extend to the public, education and non-government sectors

Current status: Recommendation, needs to be started

5.1 *Implement the 2xEP Challenge: A voluntary commitment program*

Rationale: Voluntary commitment by businesses to double energy productivity with substantial public recognition. This would be integrated with existing state and territory recognition programs where they exist.

Current status: There are no national programs – something similar was run by the Sustainable Energy Development Authority of NSW (SEDA) in the early 2000’s. Aligned with measure 7 of the NEPP, the Challenge was designed in some detail by A2EP three years ago for the Commonwealth. but it was neither funded nor implemented. The Challenge exactly parallels the international EP100 program. There is a Victorian ‘Take2’ climate commitment program through which individuals or companies can pledge to zero their carbon emissions by 2050.

Actions: The program is designed and all that would be required to implement it is a funding commitment and resolution of any interface issues with other local voluntary programs. Ideally the program would be supported by governments through promotion, case study development, services incentives, and support for a business networking group to exchange experiences and examples of good practices.

⁴ <http://www.theclimategroup.org/what-we-do/programs/ep100/>

Note that the program would be integrated into other existing commitment programs like Victorian Take 2, encouraging commitments on energy productivity, renewables and carbon mitigation. Importantly the program would encourage commitment to deliver against yearly milestones toward the longer term goals.

Development of a formal, credible program with public recognition will provide a clear framework for senior management to measure branding and related benefits as well as the direct energy productivity improvement incentives

Attribute	Comments
Type of measure	Voluntary commitment – public recognition
Current status	Does not currently exist. This program was designed by A2EP three years ago for the Commonwealth. Parallels exactly the international EP100 program. There are other local recognition programs that it could slot into – like Victoria Take2 climate change commitment
Owner	Commonwealth
Outcomes	<ul style="list-style-type: none"> • Leadership by signatory companies • General benefits of improving energy productivity, • Source of relevant and credible case studies • Raise awareness of best practice and systems approaches • Potential for linkages to other international programs over time
Metrics	Participation rates and implementation of committed actions by companies tracking annual milestones, Improvement in performance by participants
Deliverables	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
Timing	Establish pilot in 2019-20 and scale up in following years
Budget	\$1.5 million in year 1 for 30 company pilot. Assuming scale up to 100 companies in year 3, total 3 year budget of \$10 million

6. *Improve energy productivity information and reporting*

There is clear need for relevant, robust, timely and consistent energy productivity related information to inform analysis and decision-making.

The Energy White Paper of 2015 observed that “access to and use of energy productivity data continue to be hindered by fragmentation in its collection and management. A better coordinated platform for energy use data would support better decision-making (planning, policy and market development) by policy makers, researchers, business and individuals. As well as collating existing data, the data platform needs to be maintained by better coordination of data collection, analysis and communication, and the development of advanced analytic tools and modelling”.

And amongst its recommendations [Australian Government activities to increase energy productivity] was this

7. Development of the National Energy Productivity Plan will be aided by early action to address the fragmentation of data and enable more robust analysis. Early action to consolidate lessons from current and past programmes will provide the evidence base for the policy development and target determination in the plan."

The Energy Use Data Model (EUDM), in development through a project funded by the Commonwealth (to a total estimated \$19.4 million) led by CSIRO, should address some elements of this measure. But critical data (and consequent information), including energy use and value add by sector, sub-sector, process, firm and site remain elusive. Furthermore, there is very poor information on the use of energy by process across the economy. This is a fundamental barrier to improving energy performance and designing programs to address energy opportunities. In conducting work on

Energy productivity data should be collected and collated so as to align with the reporting of other productivity-related data including capital and labour productivity. Data should be

collected at national, state and territory, sector and, where appropriate, sub-sector levels. An approach to data collection at the firm or operation level should be developed and made available for use by entities on a voluntary basis. Data should be collected, collated and published having regard to the value of data relative to the costs of collection and processing and, where possible, should draw on established systems. In order to measure and report change in energy productivity over time, baselines should be established at national, state and territory, sector and, where appropriate, sub-sector levels. These baselines should refer to common base year.

Attribute	Comments
<i>Type of measure</i>	Program
<i>Current status</i>	Partially existent
<i>Coverage</i>	National, economy-wide, all sectors
<i>Owner</i>	COAG Energy Council, Commonwealth, ABS & ABARES, OCE DoI
<i>Outcomes</i>	Availability of robust, consistent/comparable, accessible data
<i>Metrics</i>	Consumer testing
<i>Deliverables</i>	<ul style="list-style-type: none"> Program framework Program elements and delivery Monitoring and evaluation Data and information platforms
<i>Timing</i>	Development commencing July 2019, roll-out ongoing from July 2020, review every two years
<i>Budget</i>	\$20 million over four years

7. *Balance energy markets: Empower the demand side*

Rationale: As electricity supply becomes more volatile due to the increased penetration of renewables, the impulse of government and electricity regulators is to invest in supply side infrastructure to reduce supply volatility. But these options generally increase energy costs. Load management/matching provides a much lower cost way to respond to volatile energy supply with more flexible customer demand. This relies on incentives to encourage customers to modify the timing of their energy use and reduces customer electricity costs.

Current status: The only demand management (DM) measure in the NEPP is measure 26, stating the case for AEMC to change its rules to allow DM to participate in the wholesale market. But DM is more than emergency load response – customers can be included as an integral part of the operation of the market to take advantage of their load flexibility; and such rule changes are inadequate to drive change.

Actions:

- Ensure that demand management is treated as the first solution to manage supply volatility by requiring that all cost-effective demand management options be implemented before capital expenditure is allowed for electricity infrastructure investments such as transmission lines and new (publicly funded) generation and storage.
- Set a system-wide target of at least 10% of NEM peak load to be met by demand management by 2020, and 15% by 2025. Develop conducive policies, education and information to make this happen. Incentives should be based on avoided energy supply system cost.

- Allocate \$25 million of ARENA funding to leverage \$200 million of Demand Management Incentive Scheme (DMIS) spending.
- Require clear, consistent annual reporting of DM spending and performance of DNSPs and retailers.
- Establish an information and education program for business electricity users to assist them to identify DM opportunities.
- Conduct demand management trials to demonstrate the extent of business load flexibility, and how it can be best captured.
- Conduct pricing pilots to test the effectiveness of alternative network pricing, and encourage companies with good load flexibility to use wholesale passthrough pricing.
- Design targeted energy efficiency programs to reduce loads in peak periods e.g. evenings on hot summer days.

Attribute	Comments
Type of measure	Energy market reform
Current status	DM is not a focus of NEPP 1.0. Some initial trials funded by ARENA and recently planned in NSW, SA and Victoria. Most are limited to emergency demand response.
Coverage	National but with regard to regional considerations
Owner	COAG Energy Council, ESB, AEMC, AER, AEMO
Outcomes	Better balanced supply and demand, improved reliability, reduced outages, optimised network system costs (opex and capex), lower network tariffs and retail prices, lower bills
Metrics	Establish annual milestones for demand management outcomes, widespread availability of demand response products
Deliverables	<ul style="list-style-type: none"> ▪ Program framework ▪ Program elements and delivery ▪ Monitoring and evaluation ▪ Effective, consistent, accessible systems for demand-side response ▪ 10% maximum peak load reduction in 2020 and 15% in 2030 from cur
Timing	Development commencing July 2019, complete December 2019, roll-out ongoing, review every two years
Budget	Funding for DM incentives from the electricity industry. Allocate \$10 million for small scale pilots and knowledge sharing, and information management. \$25 million of ARENA funding allocated to leverage \$20 million of DMIS funding.

8. ***Fix failing energy markets: Level the field***

Current status: The NEM is demonstrably failing to deliver electricity to consumers in a reliable, affordable and sustainable fashion. It is failing the National Electricity Objective:

“to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- *price, quality, safety and reliability and security of supply of electricity*
- *the reliability, safety and security of the national electricity system.”*

Action:

8.1 *Develop efficient and effective energy markets that serve the interests of consumers, price fairly, facilitate innovation and reward investment*

Attribute	Comments
<i>Type of measure</i>	Energy market reform
<i>Current status</i>	Market failures
<i>Owner</i>	COAG Energy Council, ESB, AEMC, AER, AEMO
<i>Outcomes</i>	Reliable, affordable and sustainable supply of electricity, efficiency and effective markets, alignment with NEO
<i>Metrics</i>	Stable or declining retail prices, clear path for retail price changes, stable or declining prices for other services including metering, connection
<i>Deliverables</i>	As above, retail price reporting through AER for 'small' business users
<i>Timing</i>	Resolve national energy market policy and reform by December 2019
<i>Budget</i>	Nil additional to governments

8.2 *Address perverse incentives deriving from network tariffs*

Rationale:

Elements of electricity network tariff restructuring by supply utilities and a growing tendency of retailers to achieve income stability by increasing fixed [ie daily 'connection'] charges have reduced customer incentives to improve energy productivity. Greater productivity in customer use of the network should also help defer expensive network investment.

A2EP recommends COAG Energy Council, in conjunction with the Energy Security Board, market institutions and market participants, prohibit network tariff structures that unnecessarily inhibit the ability of consumers to reduce their energy bills by improving their energy productivity (e.g. high fixed charges as a proportion of total costs).

Governments and the Australian Energy Regulator should also ensure that appropriate information and advice are readily available ahead of significant tariff structure changes to encourage consumers to respond to cost-reflective price signals.

Current status: Under development

Actions:

Attribute	Comment
<i>Type of measure</i>	Energy market reform
<i>Current status</i>	Initial activities
<i>Coverage</i>	All consumers and sectors notably households, agriculture and mining
<i>Owner</i>	COAG Energy Council, ESB, AEMC, AER, AEMO
<i>Outcomes</i>	Benefits: <ul style="list-style-type: none"> • General benefits of improving energy productivity • Remove barriers related to energy pricing structures that impede uptake of energy productivity initiatives.
<i>Metrics</i>	Improved understanding of performance of the sector, ability to quantify the direct potential of energy productivity for the sector
<i>Deliverables</i>	Policy, legislative, regulatory and/or procedural measures as required
<i>Timing</i>	Resolve national energy market policy and reform by December 2019

Attribute	Comment
Budget	<ul style="list-style-type: none"> Potential increase in regulation of energy suppliers.

5. NEPP 2.0: Manufacturing sector

Measures proposed specifically for manufacturing sector:

- 1. Support continuous improvement and performance monitoring**
 - ISO 50001 reporting program
 - Incentives for energy metering/monitoring/data analytics
 - Require open access to data from monitoring and energy management systems
- 2. Build industry capacity**
 - Energy management short course training
 - Graduate placement program
- 3. Accelerate innovation - Technology development and deployment**
 - Electrification of process heating
 - Digitisation and AI for energy productivity - Industry 4.0 training and development
- 4. MEPS and performance assurance**
 - Mandatory metering on new equipment
 - Expand E3 Standards
 - Testing of energy efficiency claims
- 5. Encourage energy efficient replacement of refrigerants**

9. Improve energy productivity in manufacturing

9.1 Support continuous improvement and performance monitoring

Rationale: Monitoring and management systems are essential to drive continuous improvement in energy productivity. Where pilots have been run, 10-20%+ savings have been demonstrated (e.g. US DOE). Most Australian companies have inadequate metering and don't have a formal continuous improvement system for energy.

Actions:

- 1.1 Market to companies taking up ISO 50001 (or include specific energy reporting in their ISO 14001) through a promotion program, funded case studies, a consulting incentive for the establishment costs and staff training on continuous improvement.
- 1.2 Financial incentives for energy metering and data collection + analytics are available if they sign onto these programs.
- 1.3 Require (client-approved) open access to data from monitoring and energy management systems

Attribute	Comments
Type of measure	Information/education, demonstration and incentive
Coverage	All business sectors
Current status	Very few Australian companies use ISO 50001, or specifically report energy under 140001. Most companies have grossly inadequate energy metering.

Owner	Commonwealth funding, state implementation
Outcomes	Uptake of continuous improvement programs and increased levels of site metering.
Metrics	Uptake of ISO standards and meter installations
Deliverables	Target 250 companies taking up ISO and the metering incentives over the first 3 years
Timing	Target 50 companies in year 1, 100 in 2 and 150 in 3.
Budget	Assume 300 companies receive \$10,000 consulting incentive, and \$50,000 metering incentive (up to 50% of the cost of metering, monitoring and reporting systems), and 20 companies receive \$50,000 case study development incentives, plus \$5 million for information sharing and outreach = \$25 million

9.2. Capacity building: Energy management training and placement program

Rationale: Australian businesses suffer from a lack of specialist skills in this space. We have gone backwards as we had TAFE courses on energy management in past as well as an energy managers association. Australia lacks a professional base in energy productivity, and no specific training courses, except for Energy Efficiency Council building upgrade qualification.

The aim of this proposed program is to build business capacity in energy productivity and management – i.e. how to use energy as an enabler to drive increased business value. These courses would be management courses for energy managers, not energy auditing or technically focused.

Current status: There is a lack of capacity in business to deal with energy matters due to a lack of trained people in industry.

Actions:

Graduates and people in existing business roles trained in energy, (and water, resource and material management).

Provide incentive for graduates to attending training, and 50% salary subsidy to max \$30k for placement of trained energy manager graduates into businesses for 12 months solely on energy projects.

Establish funding to resource an energy manager association

Establish TAFE trades courses in energy and water management

Attribute	Comments
Type of measure	Training/capacity building
Current status	Poor capacity and limited training
Coverage	All sectors
Owner	Funding from Commonwealth, delivery by states except for national energy managers association
Outcomes	Improved business capacity to improve energy productivity
Metrics	Students trained, placed and thence permanently employed
Deliverables	Program running by July 1 2019, first 50 placements by end 2019.
Timing	Development commencing July 2019, complete December 2019, roll-out ongoing, review every two years
Budget	Develop and deliver graduate training: \$1.5 million

	Graduate placement program - \$30k*450 people over 3 years = \$13.5 million Establish and fund energy/resource managers association = \$3 million Establish and run TAFE courses = \$2.5 million \$20.5 million
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9.3 Accelerate technology transfer with an innovation fund and knowledge sharing

Rationale: Accelerate innovation. Improve business competitiveness through application of best practice technology. Reduce risk for early adopters of new technologies and practices for improving energy productivity. This is seen as particularly important for manufacturing.

Current status: We have very slow rates of technology adoption currently. Australian businesses are risk averse, somewhat insulated from international technology markets, and underinvesting in new technology. Many countries provide incentives to accelerate introduction of new technologies into business. There is no existing support for demonstration and accelerating replication of EP technologies, except ARENA which is restricted to funding of projects which directly increase renewable energy penetration. States have very limited funding to accelerate end user EP innovation and technology transfer, so the Commonwealth has a key role here.

9.3.1 Digitisation - Industry 4.0 for training and product development grants.

Rationale: Digitalisation holds out great opportunities for business to improve overall productivity and quality and A2EP has demonstrated in our Industry 4.0 for business [report](#) that it also can substantially boost EP but only if mindfully implemented, and with adequate energy metering in place. There is also need to replace centralised energy systems like boiler and compressed air systems to get the maximum benefits. See the A2EP Transforming Manufacturing report.

Current status: Limited application and very poor general understanding of the opportunities to use these technologies, and particular for their use for improving energy productivity.

Actions: Implement a suite of measures as follows:

- Training course development – multi-disciplinary – covering both overall digitalisation opportunities and particular energy applications
- Conduct information sessions and sponsored education on industry 4.0 for energy productivity benefits
- Provide specific funding for pilot demonstrations of use of industry 4 to drive energy savings – this will allow a number of case projects to be conducted for companies implementing digitalisation projects to incorporate energy productivity improvements specifically.
- Fund a study on feasibility of displacing compressed air systems with direct acting servo motors, and also replacing central refrigeration systems with more closely coupled systems.
- Provide product development funding for new energy technologies using AI – e.g. metering using AI.

Type of measure	Package of measures to drive EP savings using Industry 4.0
Current status	Very limited understanding of the scale of opportunities
Owner	Commonwealth
Outcomes	Boost in EP through accelerated application of Industry 4.0 technologies
Metrics	Energy productivity improvement, site by site
Deliverables	Deliver pilot projects and training, and product development projects
Timing	Implement in 2019/20 and review further needs for funding during this period
Budget	\$5 million for training and product development incentives plus \$10 million for pilots

9.3.2 Electrification of process heating

Rationale: Replacement of inefficient and ageing boilers and steam reticulation systems with local heat pumps and other technologies with high energy productivity or renewable-based heating.

Current status: Low efficiency boilers and steam systems are commonplace in industry and there is very low penetration of high EP heat pumps and other electric technologies. A2EP has undertaken feasibility studies with business stakeholder groups which proved the potential of these technologies to replace steam and is now undertaking a pilot program with ARENA support.

Actions: Provide incentives, knowledge sharing/capacity building, and gather improved data on process heating needs by application and temperature. Also consider establishment of a heat pump demonstration centre and join international research efforts on heat pumps.

Attribute	Comments
Type of measure	Integrated package of measures to displace fossil fuel process heating.
Current status	Pilot about to begin to demonstrate the opportunity. Otherwise, poor penetration of alternative process heating options.
Coverage	Industrial and commercial sectors
Owner	Commonwealth
Outcomes	Accelerating replacement of these technologies
Metrics	Track the mix of technologies used in process heating
Deliverables	Program of information, engagement and demonstration
Timing	Implement program by July 2019
Budget	\$6 million plus capital incentives – see new technology investment program proposal.

9.4 Energy performance standards for industrial energy efficient equipment

9.4.1 Install performance monitoring capability on all energy-intensive equipment.

All new energy intensive equipment sold should be required by regulation to include energy performance monitoring capability (energy use vs utility output) as standard. Currently it is difficult for companies to determine the promised energy efficiency of equipment prior to purchase as well as its actual energy performance once installed. This requirement should be developed in close consultation with suppliers and users and in cooperation with initiatives to implement and regularise Internet of Things (IoT) technologies in Australia. To minimise regulatory costs, the standards applied to embedded performance monitoring devices should be aligned with international standards such as the EU Measuring Instruments Directive (2004/22/EC).

9.4.2 Commonwealth to expand the Equipment Energy Efficiency (E3) program

Include a greater range of industrial equipment, improving the required efficiency standards of existing equipment. To minimise costs, standards should be developed, agreed and applied in close consultation with suppliers and users, and should be in line with trusted international frameworks (for instance, EU Ecodesign). The program should be expanded to include other equipment whose minimum performance is regulated in competitor economies, such as (but not limited to) air compressors, boilers, blowers and pumps. A review of air conditioning MEPS should also be conducted as a priority given the contribution of air conditioning to peak summer loads.

9.4.3 Testing energy savings claims

It is recommended that the Commonwealth fund a program for testing the performance of new energy saving equipment entering the market against promotional claims. This is important to protect consumers and the credibility of the energy management industry, in light of many new products being introduced in recent years carrying dubious savings claims. We propose that this be initiated with a feasibility study to design and cost this program.

Attribute	Comments
Type of measure	Regulation
Coverage	Industrial equipment
Current status	Currently some lighting, three phase cage induction motors (with output power from 0.73 kW up to, but not including, 185 kW, with rated voltages up to 1100 V, alternating current (AC)), commercial chillers and non-domestic fans are covered by the E3 Program.
Owner	Commonwealth
Outcomes	Improved equipment efficiency
Metrics	Track change in performance of regulated equipment
Deliverables	As above
Timing	Implement in the next 3 year period
Budget	\$20 million for supporting the establishment and monitoring and control of these program and testing activities.

9.5 Encourage energy efficient replacement of refrigerants

Rationale: Australia commenced a phase down of HFC refrigerants in January 2018 that will be completed by 2036. The phase down provides an opportunity to encourage owners of refrigeration plant that are seeking to replace this with plant using low global warming potential (GWP) refrigerants to choose high efficiency equipment instead of seeking to modify existing plant to use lower GWP refrigerants (often reducing plant efficiency).

Current Status: Many companies are seeking to conduct least cost change-overs and energy efficiency is often not a focus.

Actions:

1. Information and education program with AIRAH

2. Provide incentives for replacing high GWP potential refrigeration plant with very high efficiency units.

Attribute	Comments
Type of measure	Incentive
Coverage	Refrigeration equipment with high GWP
Current status	Very commonly equipment is modified and loses further efficiency when refrigerants are changed out
Owner	Commonwealth
Outcomes	Lower GWP new refrigeration equipment with high COP
Metrics	Track sales of new high efficiency equipment
Deliverables	Set targets for proportion of equipment replaced vs converted
Timing	Implement in the next 3 year period
Budget	\$1 million for education in info program. Incentive program to be designed

6. NEPP 2.0: Transport sector (Passenger and Freight)

Five priority areas

Transport uses almost as much energy as electricity generation, but most “energy” discussions only focus on electricity. However, unlike electricity and other sectors, almost all transport energy comes from just one source: oil. Households and fleet operators also already spend more on transport fuel than they do on electricity and gas combined. This situation will likely become acute as oil prices rise, which is already happening.

Drawing from the 2xEP roadmaps and subsequent developments, we recommend five priority areas needing urgent action if the NEPP is to achieve anything near its 40% by 2030 target (or the doubling of energy productivity proposed by 2xEP). These priority areas can be summarised as follows:

1. **Lead and coordinate integrated strategy for transport energy, fuels, vehicles and emissions**
2. **Implement efficiency requirements for all new vehicles**
3. **Build energy productivity skills, capacity and data in industry**
4. **Remove barriers to high productivity freight vehicles**
5. **Create incentives to support highly efficient or low emission vehicles and fuels.**

Each of these is discussed in more detail below, along with supporting actions and implementation considerations.

An area for further investigation, but not currently in the roadmaps, could also accelerate energy productivity as it has been the primary driver of low emission vehicle markets overseas.

Establish urban clean air zones / congestion pricing.

10. Improve energy productivity in transport

10.1 Develop a strategic vision for transport (energy, fuels and emissions)

Rationale: The market share of alternative fuel and low emission vehicles is declining in every fleet segment (passenger car, light commercial vehicle, truck and buses). The number of models available to consumers and businesses has also decreased in recent years. Australia is being left behind and the situation will not change without targeted and integrated policies and incentives. Overseas (e.g. UK), governments have been more visionary and strategic in shaping the future development and impacts of the transport sector.

Current status: Some states have uncoordinated biofuel mandates that won’t be met with current levels of production. Market share of alternative fuel vehicles is declining in every segment. Ministerial Forum on Vehicles Emissions was convened in 2015 to coordinate action on vehicle emissions and fuel policy. However, there is still no strategy to diversify the fuel mix: no targets for low emission vehicles; few real incentives for LEVs; no fuel efficiency standards; insufficient oil reserves to meet IEA 90-day obligation; and no plan to reduce emissions from transport. In February 2019 the Commonwealth [announced](#) its intention to develop a National Strategy for Electric Vehicles.

Actions:

1. **Develop a strategic vision for future transport in Australia** – combining energy, emissions, connected and intelligent transport (& possibly advanced manufacturing?).

Attribute	Comments
<i>Type of measure</i>	Policy
<i>Current status</i>	Only fuel quality standards and pollution emissions are currently being addressed
<i>Owner</i>	Commonwealth (Ministerial Forum on Vehicle Emissions; DoEE; DIRD; NTC); and COAG (Transport & Infrastructure Council)
<i>Outcomes</i>	Policy certainty for investors/industry; clear vision for supporting measures; leading to greater choice and cost savings for motorists and business. Progress toward meeting IEA reserve requirement.
<i>Metrics</i>	Diversification of fuel mix; sales of low emission vehicles
<i>Deliverables</i>	<ul style="list-style-type: none"> ▪ Eligibility criteria and definitions 2018-early 2019 ▪ Discussion paper drafted and released: April 2019 ▪ Industry and public consultation: May-June 2019 ▪ Modelling and targets set late-2019. ▪ Strategic vision and plan released: late 2019
<i>Budget</i>	Likely <\$500k comprising ~\$200k on expert advice/analysis and \$300k on internal resource costs and consultation.

Examples:

- UK Road to Zero strategy (zero emissions)
- European Strategy for low-emission mobility
- US Transportation Energy Futures program
- China sustainable transport plan (SUTP)
- Japanese 70% target by 2030 for next-generation vehicles (EV, FCEV, PHEV, NGV, etc)

10.2 Introduce efficiency requirements for new vehicles

Rationale: Australia has one of the oldest vehicle fleets of any OECD country, despite having one of the most competitive new car markets. It is also one of just two countries in the G20 (along with Russia) that does not require new vehicles to meet minimum efficiency or CO2 requirements, despite more than three quarters of vehicles globally being subject to such standards. All new cars are now imported from overseas markets (i.e. there is no local car industry to protect), so Australia risks becoming a dumping ground for inefficient models.

Current status: The Ministerial Forum on Vehicles Emissions was convened in 2015 to coordinate action on vehicle emissions and fuel policy. However, there is still no strategy to diversify the fuel mix: no targets for low emission vehicles; few real incentives for LEVs; no fuel efficiency standards; insufficient oil reserves to meet IEA 90-day obligation; and no plan to reduce emissions from transport. In February 2019 the Commonwealth announced its intention to develop a National Strategy for Electric Vehicles.

Actions:

10.2.1 Establish fuel efficiency standards for light vehicles

Attribute	Comments
Type of measure	Policy and regulations
Current status	Ministerial Forum established. Discussion paper and <u>draft</u> Regulation Impact Statement released for fuel efficiency/CO2 standards. Three targets were tested all of which resulted in net benefits. Consultation ongoing. But implementation is not certain or committed.
Owner	Commonwealth (DIRD)
Outcomes	<ul style="list-style-type: none"> • More than \$5 billion in fuel savings • Reduction in fuel/oil imports (currently >\$20 billion) • Greater resilience in the transport and logistics sector • Progress toward meeting IEA 90-day reserve requirement.
Metrics	LDV standards legislated
Deliverables	Introduce LDV standards asap (2022 latest as per original discussion paper). Simultaneously introduce complementary measures (see action 2 below).
Budget	Costs to governments are not known. The draft RIS assessed 'average annual regulatory costs' [the Regulatory Burden Measurement ie without regard to benefits] in range \$743 million to \$2,006 million .

10.2.2 Complementary measures to support light vehicle standards

Attribute	Comments
Type of measure	Policies, information and financial incentives
Current status	Fuel efficiency standards alone are not enough. Best practice policy combines fuel taxes, rebates, access restrictions (e.g. low emission zones), tax breaks (e.g. accelerated depreciation), and information programs. Apart from fuel excise, few of these are currently used in Australia (or not linked to efficiency/CO2).
Owner	Commonwealth (DoEE and DIRD), states and territories, and COAG TIC
Outcomes	<ul style="list-style-type: none"> • Better-informed consumers, who can make more effective purchasing choices.

	<ul style="list-style-type: none"> • More than \$5 billion in fuel savings (in conjunction with CO2 standards) • Reduction in fuel/oil imports (currently >\$20B) • Progress toward meeting IEA 90-day reserve requirement.
Metrics	<ul style="list-style-type: none"> • Suite of measures implemented • Reduction in average CO2 intensity per vehicle (reported by NTC) • Reduction in annual energy used in transport
Deliverables	<ul style="list-style-type: none"> • ASAP or ~2022: Introduce LDV standards (as per original discussion paper) • Early-mid 2019: Scoping study to identify best combination of complementary measures for Australia (e.g. renewable energy target for transport fuels, congestion or low emission zones, tax breaks or incentives). • Late 2019: Stakeholder consultation and review • 2020: begin introduction of specific measures • Ongoing: Work with states to trial and evaluate access zones
Budget	Depends on number and type of measures adopted, initial estimates \$65 million over four years

10.2.3 Efficiency ratings or standards for heavy vehicles

Attribute	Comments
Type of measure	Policy and regulations
Current status	No standards planned. MOV3MENT has proposed a trial of a voluntary truck rating scheme for new trucks. This could later be expanded to a mandatory scheme, to used vehicles; and even trailers and diesel equipment.
Owner	Commonwealth (DIRD or DoEE NEPP team)
Outcomes	<ul style="list-style-type: none"> • Reduction in fuel/oil imports requirements (currently >\$20 billion) • Up to \$2 billion in fuel savings to fleet operators by 2030 • Greater resilience in the transport and logistics sector • Cost savings across the economy (transport is integral to all supply chains) • Progress toward meeting IEA 90-day reserve requirement.
Metrics	HDV rating scheme trialed or introduced; pilot extended to market roll-out.
Deliverables	<ul style="list-style-type: none"> • 2018-19: Trial HDV rating scheme • End 2019: Evaluate pilot to identify information gaps. • 2019-2020: Additional research and consultation • Late 2019-2020: industry education and awareness campaign. • Full-scale roll-out of HDV rating scheme 2020.
Budget	A pilot can be conducted for less than \$200k, and a scheme with full market coverage may be possible for less than \$500k.

Examples:

- EU, Japan, US and China fuel efficiency / CO₂ standards and complementary measures
- SmartWay (US), and UK Low CVP, both certify fuel-saving equipment.

10.3 *Build capacity and recognise best practice in energy productivity*

Rationale: Even when there is a good business case, energy productivity opportunities are often not adopted in freight transport due to a complex mix of barriers and market failures. Lack of good data is one common reason, and complexity in analysing freight productivity is another – both of these make benchmarking difficult. Visibility and recognition of exemplary emissions performance are also issues. Many countries have addressed this with a ‘green freight’ program. The aim of these programs is to promote real-world, market-based performance improvements that can be tracked through standardised and verifiable reporting mechanisms. Put simply, these programs support decision making by:

- providing information to freight shippers about emissions intensity of different carriers;
- support freight carriers with advice about energy savings; and
- generally make supply chain emissions more transparent.

Current status: Australia has in the past had many of the elements required for an integrated green freight program – but individual initiatives were not national, connected or aligned. Past work in this area by different states can be leveraged and combined with the remaining active programs (NSW Green Truck Partnership and Tasmanian Smarter Fleets) to create a simple but effective program for Australia. The G20 Energy Efficiency Action Plan, to which Australia is a signatory, commits members to exploring green freight programs.

An A2EP representative attended the global green freight workshop in Brussels in 2017 and has started to evaluate more than a dozen overseas programs to identify suitable elements for Australia. Our freight working group and our network of businesses and industry associations provides an active foundation for establishing such a program.

Actions:

10.3.1 *Establish a green freight program*

Attribute	Comments
<i>Type of measure</i>	New program
<i>Current status</i>	Disconnected state-based programs. Extensive data and knowledge in past transport programs. G20 commitment to evaluate and implement.
<i>Owner</i>	DoEE or COAG TIC, in partnership with A2EP
<i>Outcomes</i>	<ul style="list-style-type: none"> • Cost savings for fleet operators • Greater transparency in supply chain emissions • Emission reductions from the freight sector • Link to international programs • Meeting G20 commitment • Re-establish Green Truck Partnership (ceased 2017)
<i>Metrics</i>	Program elements established
<i>Deliverables</i>	<ul style="list-style-type: none"> • Early 2019: scoping study (A2EP) • Mid-late 2019: program design and industry consultation/engagement • Late 2019: small-scale trial with foundation industry group • 2020: Launch program
<i>Budget</i>	Depends on level of industry buy-in and ownership, but likely ~\$250k - \$500k p.a.

Examples:

- SmartWay in USA and Canada
- Objectif CO2 in France
- Lean and Green Europe
- EcoStars UK
- Green Freight Asia

10.4 Removing barriers to high productivity freight vehicles

Rationale: Australia has one of the most productive truck fleets in the world. A major factor in that success is the suite of enabling regulations, programs and standards allowing trucks with demonstrated infrastructure and safety compatibility to operate at higher payload limits than “standard” vehicles. For example, the ubiquitous B-Double began as one such vehicle, requiring approval under the Performance Based Standards (PBS) scheme, before becoming an accepted standard (and much more efficient) configuration than semi-trailers.

High productivity freight vehicles (HPFVs) are most beneficial where a particular vehicle or operator is either weight-constrained or volume constrained. Small increases in mass limits or length/volume can greatly reduce the number of trips required for a specific freight task, while simultaneously reducing impacts on roads, reducing accident risks, and cutting fuel consumption and emissions per unit of freight or passenger. This is energy productivity at work.

Current status: The introduction of each vehicle involves assessment and approval of the vehicle itself as well as the road network/route on which it is to be used. This requires cooperation and coordination between national agencies (e.g. National Heavy Vehicle Regulator), state government transport authorities, local councils (who may own affected roads), the transport industry, vehicle manufacturers, suppliers and certifiers. This complexity can make the approvals process slow, creates delays, and often involves considerable uncertainty and commercial risk. Vehicle makers and fleet operators would like to see a faster, smoother and more certain approvals process – especially for roads that restrict first- and last-mile access. This could lead to wider use of HPVs, improving energy productivity by reducing energy requirements per unit of freight moved.

Actions:

1. **Remove barriers to the use of higher productivity vehicles** – for example, by reducing assessment times, access restrictions, and improving first/last mile access. New vehicle combinations could be introduced to major routes (e.g. A-doubles or B-triples) if the full benefits are explained (fewer trucks on the road, lower emissions/pollution, reduced accident risk, less road wear, etc)
2. **Allow HPVs to be eligible for financial incentives and other benefits available to low emission vehicles** (linked to section below).

10.5 Create incentives to support highly efficient or low emission vehicles and fuels

Rationale: Best-practice policies to improve vehicle efficiency and reduce transport-related emissions include a combination of regulations and standards, information programs, financial

incentives for cleaner/more efficient vehicles, and disincentives for poor performing vehicles. This integrated approach can be unpalatable for governments and/or politicians that like to focus on single issues, operate in silos, or are reluctant to correct market distortions. The reality is that a combination of measures has proven to be effective in accelerating introduction of new energy vehicles and alternative fuels in many markets around the world.

Current status: In Australia, connection of state and federal transport initiatives related to energy and emissions has been absent since the National Strategy on Energy Efficiency. The Ministerial Forum on Vehicle Emissions has certainly been a step in the right direction, but it has not yet implemented any actions beyond studies and consultations, despite being active for over three years. In February 2019 the Commonwealth [announced](#) its intention to develop a National Strategy for Electric Vehicles. Some states have introduced a range of mildly supportive policies for low emission vehicles (e.g. registration or stamp duty discounts for EVs), as well as co-funding limited recharging or refuelling infrastructure for electric, Hydrogen and natural gas vehicles (albeit on a small scale). CEFC provides discounted financing for green vehicle purchases (limited criteria for heavy vehicles).

More needs to be done to improve the business case for low emission vehicles and alternative fuels. The lack of any meaningful support measures (among other factors) has resulted in a significant decline in the use of alternative fuels in every vehicle segment over the last decade.

Actions:

1. **Set target for alternative fuels or low emission vehicle sales** (could also be in 2.1 above).
2. **Create (and coordinate) incentives across agencies & levels of government, to improve LEV business case**

Attribute	Comments	
<i>Type of measure</i>	Financial Incentives	
<i>Current status</i>	Uncoordinated state-based programs, and limited uptake of CEFC/ERF State-based biofuel mandates in NSW and Qld Truck Industry Council has a National Truck Plan ready to go	
<i>Owner</i>	All governments (DoEE, ATO, COAG TIC, NHVR, CEFC)	
<i>Expected outcomes</i>	<ul style="list-style-type: none"> Fuel diversification Growing market for new vehicle technologies Cost savings for fleet operators 	<ul style="list-style-type: none"> Reduced fuel import bill Transport emission reductions Improved urban air quality
<i>How measured</i>	Increased sales of alternative energy vehicles Number of models available for sale	
<i>Deliverables</i>	<ul style="list-style-type: none"> Mid 2019: Establish eligibility criteria for vehicle/fuel types Mid-late 2019: Create incentive framework to cover all elements (purchase, operation, access, retirement, infrastructure) 2019-2020: Inter-agency collaboration to assign and coordinate incentives Late 2019: Information programs Late 2019/2020: Introduce incentives schemes via multiple agencies 2020: Rollout of recharging and refuelling infrastructure 	
<i>Estimated cost</i>	Highly variable depending on initiatives adopted, but many elements could be made cost-neutral - for example: <ul style="list-style-type: none"> Differentiated registration (and stamp duty) fees can be revenue-neutral Recharging/refuelling infrastructure could be co-funded through PPP 	

	<ul style="list-style-type: none"> Truck Industry Council's 2013 proposed incentive package provided a <u>net gain</u> to the Commonwealth budget of \$47 million. TIC has since developed revised plan.
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Examples from Australia:

- LPG vehicle conversion grants scheme
- Accelerated depreciation scheme like the Small Business and General Business Tax Break (SBGBTB) during GFC

Examples from overseas

- Federal and state subsidies for EV purchase in the US
- Port of LA *Technology Advancement Program* for heavy vehicles
- US EPA *Clean School Bus* program
- US alternative fuel programs, including *Alternative Fuel Infrastructure Tax Credits* and *National Alternative Fuels Corridor Program*
- Norway's electric vehicle grants
- CO₂-based Bonus/malus registration scheme in France (& similar in UK, Germany and other countries)

Creating a new market driver

An area for further investigation, but not included in the current 2xEP roadmaps, is the introduction of congestion zones or low emission vehicle ones in urban areas. Restricted access zones have the potential to significantly increase energy productivity through multiple channels including reduced congestion (fuel savings), better air quality (reduced adverse health costs), carbon emissions reductions, and road safety improvements.

This measure could also be used across multiple transport modes, such as for locomotives or construction equipment operating in urban areas (neither of which are currently subject to any pollution standards, unlike road vehicles).

10.6 Establish urban clean air zones and congestion pricing

Rationale: Air quality, not carbon emissions, is the primary driver for cleaner vehicle policies in most overseas markets. Restricted access zones have been used successfully as one way to improve pollution levels in urban areas, as well as reducing congestion.

Congestion and air pollution are currently hidden (or accepted) costs of urban road travel. Yet the true cost is very real, representing ~\$30 billion hit to the economy, and a significant social impact on the community. Both these issues could be reduced with a road pricing scheme and/or access rules that better distribute traffic volumes, price externalities, and favour the use of cleaner vehicles.

Current status: Congestion alone is costing Australia more than \$16 billion each year. Around \$6 billion of that is in Sydney, but the issue affects most of the capital cities and costs are projected to increase. Meanwhile, air pollution (to which motor vehicles contribute substantially) is estimated to cause around 3,000 deaths each year (more than double the road toll). This represents 28,000 years of life lost and at least \$11 billion annual cost to the economy. Despite success with congestion pricing and clean air zones in overseas cities, there is currently little in the way of similar plans for Australian cities.

Actions:**1. Coordinated strategy to reduce urban congestion and air pollution**

Attribute	Comments
<i>Type of measure</i>	Infrastructure access rules
<i>Current status</i>	No emission or congestion zones currently used in Australia
<i>Owner</i>	State and local governments
<i>Expected outcomes</i>	<ul style="list-style-type: none"> • Congestion-busting road pricing introduced in peak times • Incentives/access priority for higher vehicle occupancy • Improvements to public transport • Active transport programs and incentives • Access and road pricing incentives for cleaner vehicles • Trial or implement a low emission zone
<i>How measured</i>	Reductions in congestion and travel times; improved urban air quality
<i>Deliverables</i>	To be discussed and structured depending on the city/location
<i>Estimated cost</i>	Program research and development \$2 million then depends on measures agreed

Examples:

- Congestion or low-emission zones in Singapore, London, Beijing, Oslo, Stockholm, & over 100 cities in Europe
- Hong Kong vehicle retirement scheme
- Paris/China urban vehicle restrictions
- Numerous cities globally planning to outlaw diesel or internal combustion vehicles.

7. NEPP 2.0: Buildings sector

The built environment sector is critical to the energy productivity improvement project for several reasons:

The sector is responsible for ~40% of final energy consumption and about a quarter of greenhouse gas emissions.

The sector has contributed significantly over recent years with improvements in energy use-efficiency and energy productivity, the application of distributed renewable energy sources and storage, the collection and use of data, the facilitation of standards and benchmarks. These contributions result from developments in siting, design, materials, construction, equipment, operation and maintenance. These efforts have been rewarded on a benefit/cost basis and in other dimensions. There are significant further opportunities across the residential, commercial and industrial sectors. They will be realised more quickly and consistently if supported by policy, incentives and, where necessary, regulation.

The sector is at the leading edge of the energy trilemma or trifecta; the provision of affordable, reliable and sustainable energy. Most consumers of electricity and gas for buildings are 'small' retail customers and exposed to market forces that have seen prices double in recent years.

The costs of delaying action are high. Buildings are long lasting assets. New builds lock in energy and emissions outcomes for decades. Old builds have immediate and continuing impacts on occupants, owners and others.

The sector impacts on the development and cost of energy supply systems, particularly electricity distribution networks. Recent research suggests that cutting peak demand by one kilowatt can save almost \$1000 in investment in electricity system infrastructure.⁵

There have been significant positive developments in energy productivity in buildings over recent years, notably for new buildings and for the efficiency of appliances and equipment used in buildings. Steep increases in energy prices have offset these gains to an extent. And there is a great legacy of inefficient stock - residential, commercial and industrial - with enormous potential for improvement using currently available, readily accessible and cost-effective technologies.

Energy productivity in the built environment is driven by a range of factors including: the urban form and mix of building types; the design, construction and thermal efficiency of building envelopes; the efficiency of appliances and equipment used within the envelope; and the behaviour of occupants. Related to these variables are others including fuel mix (principally electricity and gas), retail tariffs (structure and pricing), the availability of onsite generation and storage, access to data and the effectiveness of control systems.

Given that the useful life of assets typically extends over decades, the pace with which initiatives are adopted will have a significant impact on the contribution of the sector towards a goal of doubling Australia's energy productivity by 2030. Poor decisions can lock in unnecessarily expensive and energy-intensive outcomes for generations. Smart decisions lay foundations for long-term benefits for building owners and occupants and for the community more generally.

⁵ ASBEC & ClimateWorks Australia, Built to perform: An industry led pathway to a zero carbon ready building code, July 2018, citing CSIRO and the Energy Network Transformation Roadmap

Recent research by ClimateWorks Australia estimates that an investment of \$8.2 billion in energy productivity improvement over the period to 2030 could result in net financial savings of nearly \$20 billion over the same period, a return on investment of better than two dollars for every dollar spent.

Doubling the energy productivity of Australia's built environment will require at least three key ingredients:

- The *joint leadership* of governments and industry with other stakeholders, collaborating to craft and implement a winning strategy
- The *technical strategies*, designs, technologies and know-how to deliver more productive and energy efficient buildings cost effectively; and
- The *policy strategies* that have a proven track record, in Australia and elsewhere, to deliver the market transformations required.

1. Priority areas for action

Drawing from the 2xEP Built environment roadmap and more recent work by the Australian Sustainable Built Environment Council (ASBEC), ClimateWorks Australia and their collaborators, we recommend four priority areas needing urgent action if the NEPP is to achieve anything near its 40% by 2030 target (or the doubling of energy productivity proposed by 2xEP). These priority areas can be summarised as follows:

1. Develop a national action plan with medium- and long-term targets
2. Fix the legacy: Introduce standards for homes, improve commercial buildings
3. Fix the future: Align the National Construction Code with the plan; enforce the Code
4. Ratings and disclosure: Introduce a system for homes, lower commercial thresholds

Each of these is discussed in more detail below, along with supporting actions and implementation considerations.

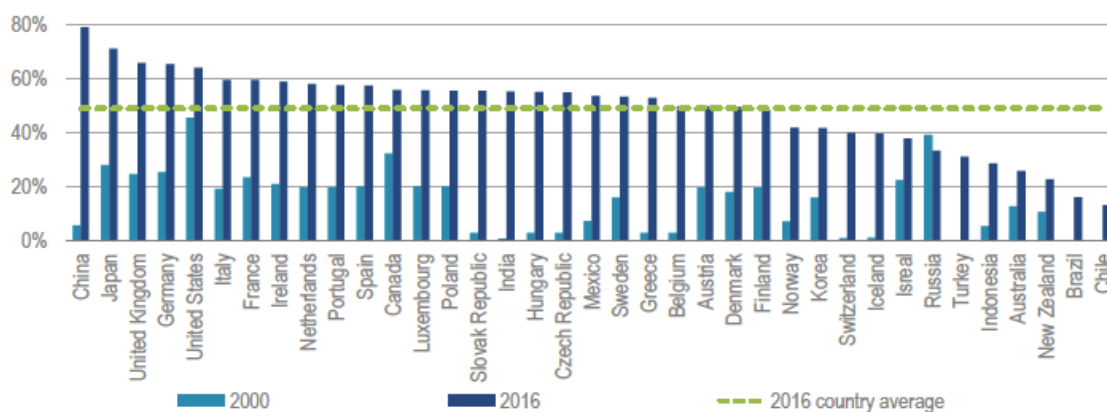
11. Improve energy productivity in buildings

11.1 Develop a national action plan with targets

Rationale: A national plan for the built environment sector would allow for coordination of policy, programs, regulation and monitoring of progress while allowing for jurisdictional derogation.

Australia continues to lag behind other IEA members with regard to coverage of policy, codes and standards.

Coverage potential of existing mandatory codes and standards



Note: The dotted green line in the chart is the arithmetic (unweighted) country average (mean) of coverage potential across the 37 countries.

Source: International Energy Agency, *Energy Efficiency 2017*, p40

Current status: There is no national plan or framework for energy consumption and production in the built environment.

Actions: Develop a plan.

1. Develop a national action plan with targets

Attribute	Comments
<i>Type of measure</i>	Policy
<i>Current status</i>	Non-existent
<i>Coverage</i>	National; Residential, commercial, industrial, government
<i>Owner</i>	COAG Energy Council and Building Ministers' Forum
<i>Outcomes</i>	Co-ordinated, staged, measured approach to action
<i>Metrics</i>	Energy consumed/produced, emissions, collateral benefits
<i>Deliverables</i>	<ul style="list-style-type: none"> National action plan
<i>Timing</i>	Phased development commencing July 2019, complete 2021
<i>Budget</i>	\$5 million

11.2 Fix the legacy: Standards for homes, commercial improvement

Rationale: At Census date in 2016 there were 8.2 million occupied dwellings in Australia. In 2006 there were 7.1 million. The One Million Homes Alliance estimates that, on average, homes built before 2005 perform to 2 Star NatHERS standards. Homes built between 2006 and 2011 should perform to 5 stars and those built since 2011 should perform to 6 stars. By way of example of the impact of higher standards, the table below quantifies the impact on space conditioning alone (energy demand, MJ/m2). ⁶

⁶ Knauf Insulation & pitt+sherry, Cost optimal insulation levels for Australian and New Zealand Houses, July 2016

City	5-star	6-star	7-star	8-star	9-star	10-star
Sydney	112	87	66	44	23	7
Melbourne	165	125	91	58	27	1
Brisbane	55	43	34	25	17	10
Adelaide	125	96	70	46	22	3
Perth	89	70	52	34	17	4
Canberra	216	165	120	77	35	2
Darwin	413	349	285	22	140	119
Hobart	202	155	113	71	31	0

A significant majority of non-premium commercial property was likewise built before current standards became effective and performs well below economically efficient potential.

It is estimated that there are around 360 million square metres of floor space of commercial buildings in Australia which consumes about 231 PJ of energy in 2016, accounting for three quarters of total energy consumption in the commercial industry or nearly 4 per cent of total net energy consumption in Australia. Commercial buildings are therefore an important part of the nation's energy efficiency policy. Minimum energy efficiency standards for commercial buildings were first introduced in 2006 into the Building Code of Australia (BCA), which now forms part of the National Construction Code (NCC). The stringency of the minimum energy efficiency standards were subsequently increased in 2010.⁷

Current status: There are currently no standards for residential property built before the 2006 Code was introduced. There are currently no standards for commercial property built before the 2006 Code was introduced. The Commercial Building Disclosure (CBD) Program is a regulatory program that requires energy efficiency information to be provided in most cases when commercial office space of 1000 square metres or more is offered for sale or lease. The CBD rates and discloses in accord with the NABERS scheme.

Actions: Standards frameworks for both residential and commercial buildings that were constructed before 2006 should be developed and implemented with a view to bringing all occupied buildings to an agreed minimum standard over time.

1. Develop and implement standards for pre-Code buildings

Attribute	Comments
Type of measure	Regulation
Current status	Non-existent but models exist
Coverage	National
Owner	COAG Energy Council and Building Ministers' Forum
Outcomes	Increased implementation of measures, impact of measures
Metrics	Value of impacts
Deliverables	<ul style="list-style-type: none"> Program framework Liaison with property sector Communications campaign Monitoring and evaluation
Timing	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
Budget	Program development \$10 million

⁷ Australian Building Codes Board, NCC 2019 Consultation Regulation Impact Statement, Energy efficiency of commercial buildings

11.3 *Fix the future: Ensure the NCC is fit for a zero carbon future*

Rationale: Recent research by ASBEC and ClimateWorks Australia details how “a zero carbon ready [National Construction Code] would maximise the potential for new construction to cost-effectively contribute to achieving the overarching zero carbon goal, and prepare buildings for the 2050 zero carbon environment in which they will ultimately be operating”.⁸

Current status: The NCC is reviewed on a triennial basis. The most recent review will lead to change from 2019. The next review will set in place measures for the following triennium and, possibly, beyond. The Australian Building Codes Board should be instructed to develop future iterations of the Code in line with a trajectory and targets towards zero carbon.

Actions: Review and reiterate Code for 2022 and beyond in line with zero carbon outcomes by 2050.

1. Develop and implement Code 2022 and beyond in line with zero carbon outcomes

Attribute	Comments
Type of measure	Policy, Regulation
Current status	In train, accelerate
Coverage	National
Owner	COAG Energy Council and Building Ministers' Forum
Outcomes	Zero carbon ready code
Metrics	Achievement of targets
Deliverables	<ul style="list-style-type: none"> ▪ Code review framework ▪ Consultation as required ▪ Set trajectory and targets ▪ Finalise code 2022 and beyond
Timing	Development commencing 2019, complete July 2021, roll-out from 2022, review and enhance every three years
Budget	Within scope and budget for ABCB.

11.4 *Ratings and disclosure of residential property*

Rationale: In most Australian jurisdictions prospective purchasers and tenants of residential property are unable to compare properties on the basis of energy efficiency performance. A trusted and consistent system of ratings and disclosure has proven successful in the commercial property market, encouraging understanding of the benefits and costs of higher efficiency property and driving the market for performance improvement. Over time the market should come to understand and express the value of higher performance property in terms of lower costs to occupy and operate.

Current status: The ACT mandates mandatory ratings of residential buildings and disclosure at lease or sale. Jurisdictions including NSW and Victoria are developing and testing ratings tools.

Actions: Develop and implement a standard national system for ratings and disclosure

1. Develop and implement a standard national system for ratings and disclosure

⁸ ASBEC & ClimateWorks Australia, Built to perform: An industry led pathway to a zero carbon ready building code, July 2018

Attribute	Comments
Type of measure	Information, Regulation
Current status	Partially existent
Coverage	National
Owner	COAG Energy Council
Outcomes	Increased implementation of measures, impact of measures
Metrics	Benchmark: All property transactions informed by ratings
Deliverables	<ul style="list-style-type: none"> ▪ Program framework ▪ Program delivery ▪ Communications campaign ▪ Data collection, monitoring and evaluation
Timing	Development commencing July 2019, complete July 2020, roll-out ongoing, review every two years
Budget	Program development \$25 million then nil additional to governments

8. NEPP 2.0: Agriculture sector

Energy is a critical enabler of economic activity in agriculture. In order to operate competitively, agriculture is dependent on the reliable and economical supply of energy and effective use of that energy. Improvements in energy productivity are achieved by through increasing the value of output per unit delivered of primary energy input deployed. This can be achieved by utilising energy more effectively to derive greater value and reduce energy waste, by generating on-site energy from wastes or renewable energy sources to reduce primary fossil energy consumed. Commercial benefits for farmers can also be gained by improving energy productivity of the energy supply system through managing the timing of consumption and utilising energy storage. Energy efficiency is an important consideration, but only one element of the available opportunities.

Given prevailing margins in Australian agriculture, energy cost is equal to about a third of pre-tax profit in the sector. Energy cost is growing, due to the steep escalation of energy prices over the last decade and the historic under-investment in farm energy demand management, use efficiency and self-sufficiency. Energy cost is now regarded by farmers as a priority issue and bodies such as NSW Farmers, Dairy Australia, Australian Pork Limited and Apple & Pear Australia have moved to implement farm energy efficiency programs.

At the same time, technology and business model development now offers farmers increasing potential to take control of energy costs, reducing cost volatility and increases. And investment in energy productivity improvement through technologies, practices and smarts can be integrated with other investments needed to maintain competitiveness, license to operate and capture of 'points of difference' for marketing.

For most dairy and broadacre sub-sectors tracked through the ABARES Farm Survey (which includes less controllable costs such as seed) aggregate energy cost ranges between 7% and 10% of total cash cost⁹. This is in line with more detailed studies of grain producers, which estimate that energy cost constitutes between 8% and 10% of total cash cost¹⁰. Energy cost for vegetable growers is also estimated at 10% of total cash cost¹¹.

The cost for individual farms and farmers can be higher, however, with variation resulting from factors including farm location and farming practice, the age and efficiency of equipment. Relatively higher energy spend may be warranted to exploit favourable climatic, locational and pricing conditions. Farmers across all sectors surveyed by NSW Farmers reported that energy cost can account for 6–30%¹² of the cost of production, with heavy vehicles and irrigation

⁹ Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). (2014). Surveys: Summary of AAGIS and DDIS data tables (broadacre and dairy). Canberra: Author. Retrieved from <http://www.agriculture.gov.au/abares/surveys>; Valle, H. (2014). Australian vegetable growing farms: An economic survey 2012–13 and 2013–14. Canberra: ABARES. Retrieved from <http://data.daff.gov.au/data/warehouse/9aab/9aabf/2014/avfesd9absf20141114/>

¹⁰ Australian Farm Institute. (2011). The impact of a carbon price on Australian farm businesses: Grain production. Surry Hills, NSW: Author; Australian Farm Institute. (2011). The impact of a carbon price on Australian farm businesses: Rice farming. Surry Hills, NSW: Author.

¹¹ Valle, H. (2014). Australian vegetable growing farms: An economic survey 2012–13 and 2013–14. Canberra: ABARES. Retrieved from <http://data.daff.gov.au/data/warehouse/9aab/9aabf/2014/avfesd9absf20141114/>

¹² NSW Farmers notes that caution is needed when interpreting the upper range since some farmers undervalue or exclude the value of their own labour when reporting input costs.

pumping generally being the main energy sinks for extensive farmers and heating, ventilation and air-conditioning (HVAC) being the main energy sink for intensive producers¹³.

Energy savings of 20% or more are achievable in many instances, including farm vehicle fuel efficiency, electricity use in intensive farm operations such as dairy, as well as irrigation systems. There are also significant opportunities for the strategic deployment of renewable energy technologies. Equally important, farm energy efficiency goes hand in hand with the deployment of broader efficiency technologies that enable gains in water, soil, fertiliser and agrichemical productivity. For example, automated sensor-driven irrigation control systems enable optimisation of water application while minimising energy used for pumping.

Agriculture stands to gain significantly from an energy productivity agenda. This is further evident when considering the food and fibre value chain. While many farm enterprises already include processing, packing, distribution and marketing functions, a more pro-active approach by the agriculture sector can unlock further business opportunities along the value chain, up- and downstream in areas such as waste management, transport logistics and demand side response.

Consequently, the extent to which the agriculture sector embraces productivity improvement, including energy productivity, will shape both its future international competitiveness and the extent to which it remains the anchor of Australia's rural economy.

Summary of measures for agriculture sector

1. Build on-farm awareness and capacity
2. Apply digital technologies
3. Accelerate action to improve energy productivity in agriculture
4. Trial and promote value chains and precincts for better productivity
5. Address the energy and water nexus

12. Improve energy productivity in agriculture

12.1 Build on-farm awareness and capacity

Rationale: Farmers generally work in high pressure environments with little time for research and development around their energy consumption. Research, decisions and investments are generally prioritised to immediate and sometimes unpredictable needs. While acknowledging that every farm environment is unique it is (demonstrably) possible through expanded energy management education to provide information and examples that are accessible, action-oriented and facilitate development of business cases and cases for financing.

Current status: Information about energy efficiency improvement has been prepared and delivered previously including through the likes of the Energy Efficiency Information Grants (EEIG) program that ran from 2011 to 2014. While that program was (sensibly) targeted to specific sub-sectors of agriculture, not all sub-sectors were included, and the information is in need of update and refresh. As an energy efficiency program, it didn't provide for

¹³ NSW Farmers Association. (2014). Research and development initiatives. St Leonards, NSW: Author. Retrieved from <http://www.nswfarmers.org.au/r-and-d>

measurements of the economic benefit to farms or sub-sectors from an energy productivity perspective. Energy is still usually understood as a cost impost to the farm business rather than a “raw material” input to produce a measurable output.

The most effective forms of communication and education to build on-farm awareness and capacity include the promotion of relevant examples of demonstrable projects and results, peer to peer and industry-delivered material that establishes a culture of best practice within a specific agriculture sub-sector. There is also a place for passive or static resources such as subsector websites to ensure information is available to all stakeholders.

To date no nationally co-ordinated and structured program of on-farm capability building has been rolled out across the agricultural division or subsectors that supports understanding by the farmer of their energy use, by process, so they can effectively manage and optimise it.

Action: Build on-farm capacity to deliver energy productivity improvements including thorough assessments of on-farm processes **and** the implementation of demonstration projects with long term measurement and verification of energy productivity and benchmarking improvements i.e. energy input per economic unit of output

Attribute	Comments
<i>Type of measure</i>	Benchmarking best practice, Information, Education, Acknowledgement
<i>Current status</i>	Inconsistent, incomplete, out of date, not sub-sector specific
<i>Owner</i>	Commonwealth funding, states and territories for delivery including through relevant industry associations as appropriate
<i>Outcomes</i>	<ul style="list-style-type: none"> • Informed decision-making leading to implementation of measures • The establishment of a energy productivity benchmark per subsector based on farm size • Improving energy management practices and process productivity • Driving economic benefit
<i>Metrics</i>	Points of contact, satisfaction surveys, Establishment of sub-sector best practice benchmarks against which farmers can self-measure.
<i>Deliverables</i>	Initially, demonstration by strategic subsector for each state and territory
<i>Timing</i>	Consultation and development to July 2019 Development and delivery to July 2022
<i>Budget</i>	\$50 million over four years

12.2 Apply digital technologies

Rationale: Australian farmers are considered to be innovative and technology savvy however there is presently a lack of granular data available regarding energy consumption in sub-sectors of the [ANZIC] agriculture classification. Farmers have little accurate data as to when, how much and by what asset their energy is being used across their businesses and on-farm processes. Access to visible, meaningful, real-time energy use-data would allow farmers greater visibility of consumption (and generation or storage) and potential to optimise their on-farm processes; the ability to manage consumption to reduce costs or free up network capacity in times of constraint. Having access to that data would also allow:

- 1) Understanding and quantification of factors that drive farm energy productivity
- 2) Benchmarking of yields against inputs including energy but also fertiliser, labour

- 3) Monitoring to report outcomes from pilots and trial
- 4) Improved understanding of the relationship between energy and water for irrigation

Current status: Whilst electricity monitoring technology has been in the market for some time and is advanced and now cost effective, sub-metering options for other fuels such as gas and diesel and have not in focus. This is changing and the technology exists to effectively measure all fuel types as well as incorporating water use when associated with energy consumption. The agricultural sector uptake, however has been lagging due to lack of engagement, inconsistent and untimely (ie not real time) data and poor conversion of data into information useful for consumers.

Action:

Establish a demonstration program to implement on-farm energy sub-metering for up to 15 farms per subsector per state/territory in the agriculture ANZSIC Division at a cost of \$10,000 per farm including education for the farmer on how to identify energy improvement opportunities and measure their resulting energy productivity.

Attribute	Comments
<i>Type of measure</i>	Information, Program
<i>Current status</i>	Inconsistent
<i>Owner</i>	COAG Energy Council, Commonwealth funding, CSIRO re data
<i>Outcomes</i>	<ul style="list-style-type: none"> Granular visibility of when, where and by what asset the energy is being used regardless of fuel type Process optimisation through an energy lens Optimisation of consumption, generation and storage (where applicable) Improved use efficiency and productivity Network benefits
<i>Metrics</i>	Test site benchmarking by industry sub-sector, energy consumption vis yield
<i>Deliverables</i>	Information campaign and resources, funding program for demonstration
<i>Timing</i>	Consultation and development to July 2019 Development and delivery to July 2022
<i>Budget</i>	\$10 million

12.3 Accelerate action to improve energy productivity in agriculture

Rationale: The Australian agricultural business is today under pressure from myriad external sources. Some of these exist in the supply chains of imported product exposing local farmers to compete with lower foreign cost structures or through trade agreements. Others exist in downstream supply chains of the domestic market where price driven consumers are unwittingly applying production cost pressures to the all important agricultural sector. Adding to these pressures are the concerns of energy costs and the lack of effective investment in energy and process productivity improvements. These pressures result in market uncertainty and curtail investment.

A2EP believes insufficient incentive for investment in energy productivity improvements exists in the current market place and the pace of change needs to be accelerated.

Current status: The farm sector under-invests energy productivity measures and it is crucial to improve energy productivity that investment is encouraged through readily accessible, incentives. Whilst some state-based white certificate programs for energy efficiency incentives

exist, these are not agriculture specific and become complex when more than one fuel type is at issue. Our consultations indicate that farm businesses and service providers seek national frameworks with consistent rules. The current level of investment in advanced farming technologies in Australia is low despite maturity overseas.

Action: Establish an agriculture -specific funding program to accelerate investment in the adoption of new and advancing technologies. Funding would be provided on a net benefit basis where an improvement in energy productivity is demonstrated. These innovative technologies would include: electrification of stationary diesel consumption, the adaptation of bio-gas capture and re-use, concentrated solar thermal etc. A critical element of the measure would be documentation and knowledge sharing.

Opportunities include optimising energy supply (both grid-delivered and distributed), the production and use of biogas from wastes, increasing value adding on farms, cold chain optimisation beginning on-farm.

Attribute	Comments
<i>Type of measure</i>	Information, Incentives, Program
<i>Current status</i>	Inconsistent
<i>Owner</i>	Commonwealth for funding, states and territories for delivery
<i>Outcomes</i>	<ul style="list-style-type: none"> • Uptake of technologies • Optimisation of consumption, generation and storage (where applicable) • Optimisation of supply (power factor etc)? • Improved use efficiency and productivity • Network benefits
<i>Metrics</i>	Value of investment generated
<i>Deliverables</i>	Information campaign and resources, incentive and
<i>Timing</i>	Consultation and development to July 2019 Development and delivery to July 2022
<i>Budget</i>	\$50 million over three years

12.4 Trial and promote value chain and precinct approaches for better productivity

Rationale: While the majority of energy use in agriculture is currently in the broadacre sectors (primarily diesel for irrigation and vehicles), we expect to see significant growth in the intensive agriculture sectors, with attendant increases in energy demand (primarily electricity for pumping, heating, cooling, lighting, processing). Much of this growth will occur in urban and peri-urban environments. Improving energy productivity in agriculture entails re-visioning the sector as a data driven, knowledge industry deploying advanced sustainability technologies. A program to establish a network of high tech ‘food and fibre precincts’ in regional and peri-urban centres would be a practical way to focus the strands of innovation and converging technologies necessary to bring this about.

Current status: A2EP has worked in conjunction with partners including Food Innovation Australia Limited (FIAL) and a major retailer to pilot technologies for cold food chain monitoring and control with encouraging results in terms of energy use-efficiency but also, significantly reduced food wastage along the chain, improved quality and longevity. Energy value precincts have been part-trialled but not with a view to agricultural productivity including distributed solar, waste to energy (biogas), storage and demand management.

Action: Develop and pilot value chain (ie farm to retail/export) models including value chain precincts

Attribute	Comments
<i>Type of measure</i>	Information
<i>Current status</i>	Non-existent
<i>Owner</i>	Commonwealth funding, states and territories for delivery
<i>Outcomes</i>	<ul style="list-style-type: none"> • Optimisation of consumption, generation and storage (where applicable) • Improved use efficiency and productivity • Waste minimisation and monetisation • Network benefits
<i>Metrics</i>	Test site benchmarking, local generation, waste to energy PJ
<i>Deliverables</i>	Research and design, funding program for demonstration
<i>Timing</i>	Consultation and development to July 2019 Development and delivery to July 2022
<i>Budget</i>	\$25 million

12.5 Address the energy and water nexus

Rationale: The water/energy nexus is well documented globally. Optimal water use-efficiency for irrigation can only be achieved by considering the relationship between water and energy use.

Current status: State and federal governments have invested significantly in water buy-back and water efficiency programs without addressing the energy part of the water equation. A national irrigation energy productivity program is needed to develop and incentivise adoption of irrigation systems that optimise both energy and water usage. In addition to increasing energy and broader agricultural productivity, the program would help reduce pressure on national bulk water resources, and in so doing may reduce water allocation conflict in the Murray Darling Basin and other irrigation catchments.

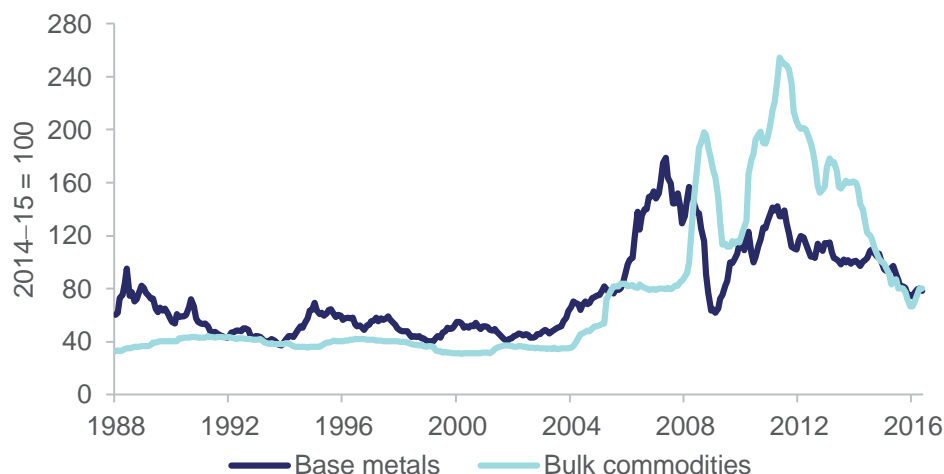
Action: Develop an integrated approach to energy and water productivity

Attribute	Comments
<i>Type of measure</i>	Information, policy, program
<i>Current status</i>	Nil
<i>Owner</i>	Commonwealth funding, National Irrigators' Council for delivery
<i>Expected outcomes</i>	<ul style="list-style-type: none"> • Boosting productivity and competitiveness through showcasing energy productivity options in irrigation efficiency while improving water use efficiency; • Improved investment certainty – as an industry / government partnership this initiative can showcase the performance of irrigation systems; and • Contributing towards Australia's emissions reduction by enhancing energy productivity while improving water use efficiency
<i>How measured</i>	Test site benchmarking, water/energy consumption vis yield
<i>Deliverables</i>	Information campaign and resources, policy development and implementation, funding program for demonstration Optimised water/energy consumption, improved yield
<i>Milestones and timing</i>	Consultation and development to July 2019 Development and delivery to July 2022
<i>Estimated cost</i>	\$10 million

9. NEPP 2.0: Mining sector

Energy productivity in the Australian mining sector has been adversely impacted in recent years by factors such as: volatile prices, particularly for bulk commodities; increased energy cost per unit of production; and increased energy intensity of production for base and precious metals. Declining ore grades have been a major contributor to increasing energy intensity of production of base and precious metals. Initiatives to improve energy productivity in the Australian mining sector present an opportunity to enhance economic productivity and lock in long-term competitive advantage.

Initiatives to improve energy productivity can embed permanent reductions in mine operating costs and increase operating profit margins, building the resilience of the sector to withstand price volatility and periods of cyclical downturn. The graph below, reproduced from *Resources and Energy Quarterly June 2016* (Department of Industry, Innovation and Science, 2016c), illustrates the historical volatility of commodity prices, particularly over the last decade. Minimising operating costs is particularly crucial in the latter years of mining operations in order to maximise the economically viable life of a mine. As noted above, initiatives to improve energy productivity also often result in co-benefits, such as more productive deployment of labour and materials, lower materials costs and reduced carbon emissions.



Many opportunities to improve the energy productivity of mining operations exist. Examples of aspects of mining operations that provide significant opportunities to improve energy productivity include: intelligent blasting; comminution processes; haulage; and optimised ventilation in underground mines. An integrated approach to energy productivity is necessary to optimise the energy productivity of a mine operation as a whole.

Where the capital costs can be justified, deployment of on-site renewable energy generation and storage to supplement traditional power sources may enhance energy productivity initiatives by reducing exposure to future energy price increases and embedding permanent reductions in operating costs. In addition, renewable energy provides other benefits such as reduced exposure to the risk of interruptions to diesel supplies, a reduced carbon footprint of mine operations and potential social license benefits. A2EP supports the deployment of renewable energy as being in alignment with the goals of 2xEP where decisions to deploy

renewables are made on the basis of a thorough assessment of the relative risks and rewards associated with energy source options.

The objective of the recommendations is to support and facilitate exploitation of cost-effective energy productivity opportunities that will boost the economic productivity and competitiveness of Australian mining sector into the future.

13. Improve energy productivity in mining

13.1 Encourage and support industry associations in providing information

Rationale: A2EP recommends industry associations in providing information to businesses working in and with the mining sector to improve energy productivity. For example:

- Raise decision-makers' awareness of the benefits of improved energy productivity and its co-benefits, such as more productive deployment of labour and materials and lower maintenance costs. These benefits can contribute to improving overall mine productivity, competitiveness and economic mine life. Where energy productivity initiatives are assessed to be cost-effective on a whole of business basis, decision makers are encouraged to sanction implementation of these initiatives.
- Provide information regarding appropriate energy productivity-related KPIs for staff and mine contractors, cognisant of existing contractual obligations and agreements. Note, an integrated view of energy productivity is required to incentivise decision making in each part of the process that contributes to the enhancement of energy productivity of the operation as a whole.

Current status: Recommendation, needs to be started

Actions:

1. Identify and initiate discussions with relevant associations
2. Develop information/collateral and information dissemination processes
3. Check on how information is being used and what needs to be improved

Attribute	Comment
<i>Type of measure</i>	Industry initiative
<i>Current status</i>	Initial activities
<i>Coverage</i>	Mining sector
<i>Owner</i>	Commonwealth and industry associations
<i>Outcomes</i>	<p>Benefits:</p> <ul style="list-style-type: none"> • General benefits of improving energy productivity. • Leveraging established networks to share knowledge will likely accelerate the development of a cohesive approach to energy productivity for the sector. <p>The unique challenges in measuring and improving energy productivity in the mining sector will be well understood by industry groups. This strong subject matter knowledge will result in more relevant and effective content in the materials developed and communicated.</p>
<i>Metrics</i>	Usefulness of information available and information sent out as determined by survey or similar

Attribute	Comment
Deliverables	Information and collateral for sharing with relevant industry players Improvements in understanding by relevant industry players
Timing	Australia wide scheme, by 2020
Budget	TBC

13.2 Build business capability to scope, identify and deliver improvement

Rationale:

Energy productivity first and foremost must come from corporate and mine-site leadership, reinforced by an organisational culture of continuous development of competence and excellence in execution. Energy productivity is a cross-functional metric and accountabilities must be assigned accordingly.

This initiative supports building internal business capability to understand, develop, implement, measure and verify energy productivity opportunities.

Many energy productivity-related training resources are currently available but are not fully utilised. Repackaging of existing resources or tailoring of general productivity training to emphasise energy productivity issues could improve energy productivity capability. For example, the LEAN Six Sigma program in place on many mine sites could be enhanced to emphasis energy productivity.

Where appropriate, investment in research and development through collaborative innovation should be encouraged. Government funding, e.g. ARENA grant funding for demonstration of next generation mining technology, could be utilised to accelerate investment in R&D.

A2EP recommends the Commonwealth fund the development where applicable (a good deal of this course material already exists), and to half fund the cost to business of attending short course training that covers the different functions and steps within energy productivity including, but not limited to:

- Link between energy productivity, plant performance, reliability and mine life
- Updates on technological advancements applicable to the industry that have an energy productivity benefit (e.g., digitisation, digital twins, automation, alternative energy, etc.)
- Certified energy manager training (CEM)
- Continuous improvement and productivity including ISO50001
- Building the business case – training for engineers and commercial managers including procurement managers on business benefits of energy productivity
- Energy productivity scanning for managers – focus on how to improve overall mine productivity with an energy focus
- Training of trades and engineering management on improving energy productivity through improved maintenance and understanding impact of plant specification.

Training aims to link into existing educational institutions including universities, TAFE institutes and other registered training organisations, as well as engaging relevant industry skills councils.

Current status: Recommendation, needs to be started

Actions:

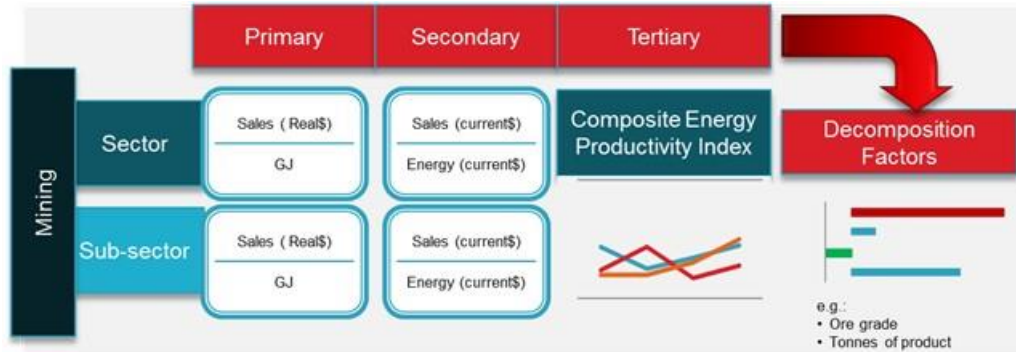
1. Develop list of training opportunities, identifying gaps if these are identified
2. Develop scholarship funding processes if deemed necessary
3. Advertise courses and monitor progress

Attribute	Comment
Type of measure	Joint industry and government initiative
Current status	Initial activities
Coverage	Economy wide
Owner	
Outcomes	<p>Benefits:</p> <ul style="list-style-type: none"> • General benefits of improving energy productivity • Increase business capability to identify and implement energy productivity initiatives. • Improved investment certainty – by participating in collaborative innovation ventures, mining companies can reduce their exposure to the risk of investing in R&D. • Leverage existing domestic and international innovation and knowledge hubs. • Identification and highlighting of examples of good practice. Many examples of collaborative innovation already exist - however the information is not widely disseminated. • Benefits to Mining Equipment, Technology and Services (METS) companies with regard to technology or other solutions that may be possible
Metrics	<p>Training is readily available</p> <p>Training programs are attended by mining industry personnel and considered to be useful</p>
Deliverables	Improvement in company performance
Timing	In line with other activities in this space, a function of A2EP resources
Budget	<ul style="list-style-type: none"> • Government funding/support - an estimate of the cost of preparing/updating short course materials would be less than \$200,000, as most of the materials already exist. The cost of attending a short course would be in the order of \$5,000 if delivered by a commercial organisation. Based on a 50 percent subsidy, the cost to the government for 1,000 participants /year, would be \$2.5 million/year. • Increased company resources - companies would pay the unsubsidised 50 percent of short course fees. Participation in short courses will also result in staff unavailability for the duration of the course (say approximately 5-7 days). • Companies may also incur costs by participation in collaborative innovation ventures. This may be by way of financial and/or human resource contributions.

13.3 Develop energy productivity metrics for the mining sector

Rationale:

Develop appropriate metrics for site, commodity and sector levels utilising the conceptual integrated measurement framework (see figure below).



Current status: Initial work completed, data gaps identified

Actions:

1. Review current bench marking tools and identify a set of recommended metrics
2. Review with industry and policy makers, adjust and refine
3. Enable industry to report in these indicators for a set period of time
4. Assess whether they are tracking improvements and can be used to drive change forward

Attribute	Comment
Type of measure	Industry initiative
Current status	Initial activities
Coverage	Mining sector
Owner	Commonwealth government and industry associations
Outcomes	Benefits: <ul style="list-style-type: none"> • General benefits of improving energy productivity, as listed in the introduction to section 7. • Developing robust metrics will lay the critical groundwork for measurement and improvement of energy productivity across the sector. This is particularly important for the mining industry due to the range of factors that affect the energy profile of different mine types in different ways. • Collation and analysis of effective metrics will provide valuable information and overarching context to justify energy projects that contribute to facility-wide energy productivity programs.
Metrics	Uptake of usage of these metrics Percentage improvement in performance
Deliverables	Productivity metrics agreed with industry Companies reporting using these metrics
Timing	In line with other activities in this space, a function of A2EP resources
Budget	<ul style="list-style-type: none"> • Increased company resources – human resources involved in development of metrics.

Attribute	Comment
	<ul style="list-style-type: none"> Government outlays – time of staff involved in development of metrics Work conducted by commodities on emissions intensive and trade exposed activity under Clean Energy Regulations would suggest a cost of \$200,000 to \$500,000 per commodity; this excludes costs to industry of people taking part in workshops and cost of making information available for analysis.

13.4 Develop a data mapping pilot program to identify areas of focus

Rationale:

More accurate tracking of data through improved metering of energy use is necessary to understand and improve energy productivity performance, and to justify investment in energy saving projects. For example, tracking of diesel consumption has great potential to provide companies with data that can be utilised to drive energy productivity improvements in diesel usage.

Currently energy data collection processes are only scrutinised at the facility level (and in some cases down to broad end-use categories only) for National Greenhouse and Energy Reporting (NGER) compliance requirements, which can be met by reconciling overall purchased fuel records. Tracking fuel and energy consumption to individual sections of a mine site's operations or to individual pieces of equipment is done in a variety of ways for a variety of purposes, without necessarily a strong focus on granularity or a high level of accuracy.

Industry and government support for initiatives to drive common communications and data exchange protocols and standards will become increasingly important to ensure that the benefits of 'big data' are available to miners of all sizes in the years to come, e.g. use in autonomous trucks.

A2EP recommends the development of a data mapping pilot program to identify areas of focus for energy productivity. The pilot program would comprise of a data 'mapping' exercise across an illustrative range of representative mine sites (or potentially sub-sections of mine sites). This would be to identify where current energy data collection processes are most effective, and where they are least effective. The intent would be to identify high priority opportunities on a 'typical' mine site to invest in improved energy data collection. High priority opportunities would be those where improved data would directly result in improved decision-making capabilities for management to identify, assess and execute optimal energy productivity projects or operational activities for the site.

These data mapping case studies would be documented and successful examples used to build the business case for investment. A guiding principle for the pilot program will be acquiring information to support decision making, as opposed to gathering information for the sake of gathering information.

Current status: Infrastructure in place, need to use it better

Actions:

1. Recruit a required number of mine sites, ten or more would likely be required

2. Map energy use and identify areas of concern

Attribute	Comment
<i>Type of measure</i>	Joint industry and government initiative
<i>Current status</i>	Initial activities
<i>Coverage</i>	Mining sector
<i>Owner</i>	Commonwealth, CSIRO, industry associations
<i>Outcomes</i>	<p>Benefits:</p> <ul style="list-style-type: none"> • General benefits of improving energy productivity. • Improved investment certainty - pilot program reduces risks to broader mining industry in adopting data management processes demonstrated to be of value through case studies. • The case study approach recognises the variability in data collection approaches and standards across the sector and for different fuel types and areas within a mine site (e.g. diesel fuel logs versus electricity smart meters). It takes a bottom up approach to assess where increased accuracy of information will demonstrably add value to the operation over time through testing the linkages to energy productivity-related decision making.
<i>Metrics</i>	<p>Improved understanding of performance of the sector</p> <p>Ability to quantify the direct potential of energy productivity for the sector</p>
<i>Deliverables</i>	Industry maps and complete data sets for the participating sites
<i>Timing</i>	In line with other activities in this space, a function of A2EP resources
<i>Budget</i>	<ul style="list-style-type: none"> • Government outlays - development, implementation and assessment the pilot program. • Company resources related to participation in the pilot program. • Cost of the data mapping exercise between approximately \$1 million and \$2 million to start, noting cost would be a strong function of the project brief. • Typical project costs are in the region of \$1 million to \$5 million to install site-wide metering and monitoring; though can be as little as \$20,000 to install a single meter on one piece of equipment.

13.5 Maintain incentives for research and development for more efficient mining**Rationale:**

The R&D tax incentive is an effective, economy-wide, market-driven measure that should be maintained in its current form. A stable policy framework will encourage future additional investment in R&D and innovation.

- The R&D tax incentive is an effective means of encouraging additional business R&D expenditure in Australia. As a market driven measure, the R&D tax incentive is efficient in that only innovating firms will seek to gain access to it. It does not involve governments 'picking winners'.
- The R&D tax incentive also encourages collaborations – both within industry and between industry and researchers.

- There have been a large number of changes and mooted change to the incentive in recent years. It is important that Australian businesses now be afforded a stable policy framework in this area to encourage future additional investment in R&D and innovation.
- Increasing the ability of the mining industry to access these rebates has the potential to enhance their innovation and address the “fast follower” approach.

Current status: Part of current tax law

Actions:

1. Review the potential for changes to the structure of the R&D tax to better support implementation of improvement projects

Attribute	Comment
<i>Type of measure</i>	Government initiative (Commonwealth)
<i>Current status</i>	Initial activities
<i>Coverage</i>	Economy wide
<i>Owner</i>	Commonwealth, ATO
<i>Outcomes</i>	Benefits: <ul style="list-style-type: none"> • General benefits of improving energy productivity, as listed in the introduction to section 7. • Improved investment certainty - policy uncertainty regarding the R&D tax incentive system may lead to companies becoming more risk averse towards investment in R&D and innovation. • Reduced company resources - maintaining the current R&D tax incentive system will avoid the need for mining company staff and service providers to learn changes in the rules of the R&D tax incentive system.
<i>Metrics</i>	Increased investment in productivity improvement projects
<i>Deliverables</i>	Changes to tax law
<i>Timing</i>	TBC
<i>Budget</i>	<ul style="list-style-type: none"> • Additional government outlays - time of government staff involved in reversing action to make changes to the R&D tax incentive system.

10. NEPP 2.0: Proposed measures - Summary

1. **Establish infrastructure, targets, budgets**
2. **Transformation through innovation**
3. **Accelerate investment**
 - 3.1 Work with financial institutions to encourage investment
 - 3.2. Reform taxation regimes to encourage investment in measures
 - 3.3. Enhance and extend market incentives to invest in measures
4. **Enlighten consumers: Implement an engagement program**
5. **Support voluntary action and recognise leadership**
 - 5.1 Implement the 2xEP challenge: A voluntary commitment program
6. **Improve energy productivity information and reporting**
7. **Balance energy markets: Empower the demand side**
8. **Fix failing energy markets: Level the field**
 - 8.1 Develop efficient and effective energy markets
 - 8.2. Address perverse incentives deriving from network tariffs
10. **Improve energy productivity in manufacturing**
 - 9.1 Support continuous improvement and performance monitoring
 - 9.3. Capacity building: Energy management training and placement program
 - 9.3 Accelerate technology transfer with an innovation fund and knowledge sharing
 - 9.3.1 Digitisation - Industry 4.0 for training and product development grants.
 - 9.3.2 Electrification of process heating
 - 9.4 Energy performance standards for industrial energy efficient equipment
 - 9.4.1 Install performance monitoring capability on all energy-intensive equipment.
 - 9.4.2 Commonwealth to expand the Equipment Energy Efficiency (E3) program
 - 9.4.3 Testing energy savings claims
 - 9.5 Encourage energy efficient replacement of refrigerants
10. **Improve energy productivity in transport**
 - 10.1 Develop a strategic vision for transport (energy, fuels and emissions)
 - 10.2 Introduce efficiency requirements for new vehicles
 - 10.2.1 Establish fuel efficiency standards for light vehicles
 - 10.2.2 Complementary measures to support light vehicle standards
 - 10.2.3 Efficiency ratings or standards for heavy vehicles
 - 10.3 Build capacity and recognise best practice in energy productivity
 - 10.3.1 Establish a green freight program
 - 10.4 Removing barriers to high productivity freight vehicles
 - 10.5 Create incentives to support highly efficient or low emission vehicles and fuels
 - 10.6 Establish urban clean air zones / congestion pricing
11. **Improve energy productivity in buildings**
 - 11.1 Develop a national action plan with targets
 - 11.2 Fix the legacy: Standards for homes, commercial improvement
 - 11.3 Fix the future: Ensure the NCC is fit for a zero-carbon future
 - 11.4 Ratings and disclosure of residential property

12. Improve energy productivity in agriculture

- 12.1 Build on-farm awareness and capacity
- 12.2 Apply digital technologies
- 12.3 Accelerate action to improve energy productivity in agriculture
- 12.4 Trial and promote value chain and precinct approaches for better productivity
- 12.5 Address the energy and water nexus

13. Improve energy productivity in mining

- 13.1 Encourage and support industry associations in providing information
- 13.2 Build business capability to scope, identify and deliver improvement
- 13.3 Develop energy productivity metrics for the mining sector
- 13.4 Develop a data mapping pilot program to identify areas of focus
- 13.5 Maintain incentives for research and development for more efficient mining

11. NEPP 2.0: Proposed measures - Costing

		Initiation or one-off FY20 \$m	Recurrent FY20 \$m	FY21 \$m	FY22 \$m	FY23 \$m	Total > 23 \$m
1	Establish infrastructure, targets, budgets	2.0	10.0	10.0	10.0	10.0	42.0
2	Transformation through innovation						
	ARENA/CEITA extension	0.0	100.0	100.0	100.0	100.0	400.0
	Demonstration centres	55.0	10.0	10.0	10.0	10.0	95.0
3	Accelerate investment						
3.1	Work with financial institutions to encourage investment	5.0	5.0	5.0	5.0	5.0	25.0
3.2.	Reform taxation regimes to encourage investment in measures *	5.0	0.0	0.0	0.0	0.0	5.0
3.3.	Enhance and extend market incentives to invest in measures	5.0	0.0	0.0	0.0	0.0	5.0
4	Enlighten consumers: Implement an engagement program	0.0	25.0	25.0	25.0	25.0	100.0
5	Support voluntary action and recognise leadership						
5.1	Implement the 2xEP challenge: A voluntary commitment program	1.5	2.0	3.0	3.5	5.0	15.0
6	Improve energy productivity information and reporting	0.0	5.0	5.0	5.0	5.0	20.0
7	Balance energy markets: Empower demand side	0.0	0.0	0.0	0.0	0.0	0.0
8	Fix failing energy markets: Level the field						
8.1	Develop efficient and effective energy markets	0.0	0.0	0.0	0.0	0.0	0.0
8.2	Address perverse incentives deriving from network tariffs **	0.0	0.0	0.0	0.0	0.0	0.0
9	Improve energy productivity in manufacturing						
9.1	Support continuous improvement and performance monitoring	5.0	5.0	5.0	5.0	5.0	25.0
9.2	Capacity building: Energy management training and placement program	7.0	4.5	4.5	4.5	0.0	20.5
9.3	Accelerate technology transfer with an innovation fund and knowledge sharing						
9.3.1	Digitisation - Industry 4.0 for training and product development grants	5.0	2.5	2.5	2.5	2.5	15.0
9.3.2	Electrification of process heating	6.0	0.0	0.0	0.0	0.0	6.0
9.4	Energy performance standards for industrial energy efficient equipment						
9.4.1	Install performance monitoring capability on all energy-intensive equipment	5.0	2.0	2.0	2.0	2.0	13.0
9.4.2	Commonwealth to expand the Equipment Energy Efficiency (E3) program	0.0	0.0	0.0	0.0	0.0	0.0
9.4.3	Testing energy savings claims	5.0	5.0	5.0	5.0	0.0	20.0
9.5	Encourage energy efficient replacement of refrigerants	2.5	0.0	2.5	2.5	2.5	10.0

10	Improve energy productivity in transport						
10.1	Develop a strategic vision for transport (energy, fuels and emissions)	0.5	0.0	0.0	0.0	0.0	0.5
10.2	Introduce efficiency requirements for new vehicles						
10.2.1	Establish fuel efficiency standards for light vehicles	0.0	0.0	0.0	0.0	0.0	0.0
10.2.2	Complementary measures to support light vehicle standards ***	5.0	20.0	20.0	10.0	10.0	65.0
10.2.3	Efficiency ratings or standards for heavy vehicles	0.7	0.0	0.0	0.0	0.0	0.7
10.3	Build capacity and recognise best practice in energy productivity						
10.3.1	Establish a green freight program	0.3	0.5	0.5	0.5	0.5	2.3
10.4	Removing barriers to high productivity freight vehicles	1.0	0.0	0.0	0.0	0.0	1.0
10.5	Create incentives to support highly efficient or low emission vehicles, fuels ***	0.0	0.0	0.0	0.0	0.0	0.0
10.6	Establish urban clean air zones / congestion pricing ***	2.0	0.0	0.0	0.0	0.0	2.0
11	Improve energy productivity in buildings						
11.1	Develop a national action plan with targets	5.0	0.0	0.0	0.0	0.0	5.0
11.2	Fix the legacy: Standards for homes, commercial improvement	10.0	0.0	0.0	0.0	0.0	10.0
11.3	Fix the future: Ensure the NCC is fit for a zero-carbon future ****	0.0	0.0	0.0	0.0	0.0	0.0
11.4	Ratings and disclosure of residential property	25.0	0.0	0.0	0.0	0.0	25.0
12	Improve energy productivity in agriculture						
12.1	Build on-farm awareness and capacity	5.0	0.0	15.0	15.0	15.0	50.0
12.2	Apply digital technologies	2.0	2.0	2.0	2.0	2.0	10.0
12.3	Accelerate action to improve energy productivity in agriculture	5.0	0.0	15.0	15.0	15.0	50.0
12.4	Trial and promote value chain and precinct approaches for better productivity	5.0	5.0	5.0	5.0	5.0	25.0
12.5	Address the energy and water nexus	2.0	2.0	2.0	2.0	2.0	10.0
13	Improve energy productivity in mining						
13.1	Encourage and support industry associations in providing information ***	0.0	0.0	0.0	0.0	0.0	0.0
13.2	Build business capability to scope, identify and deliver improvement	0.2	2.5	2.5	2.5	2.5	10.2
13.3	Develop energy productivity metrics for the mining sector	5.0	0.0	0.0	0.0	0.0	5.0
13.4	Develop a data mapping pilot program to identify areas of focus	2.0	2.0	2.0	2.0	2.0	10.0
13.5	Maintain incentives for research and development for more efficient mining ***	0.0	0.0	0.0	0.0	0.0	0.0
Totals		184.70	210.00	243.50	234.00	226.00	1098.20

* Plus revenue foregone, to be assessed. ** This is a policy and regulatory measure.

*** Depends on detail of measures agreed. **** Within scope and budget of ABCB.