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Australia's energy transition: a blueprint for success

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Overview

Australia's commitment to the Paris Agreement means cutting carbon emissions to near zero over the next 30 years. This must be done at the lowest cost, while ensuring energy supplies remain reliable.

This historic task is a challenge and an opportunity. The reforms and investments required will be unprecedented in their scale and complexity. But Australia has the energy and other resources to flourish in this low-carbon future.

Australia's energy future should be a mix of renewables, batteries, electric vehicles, hydrogen, and possibly novel uses of fossil fuel with carbon storage. It should also be a future of lower prices. It will require collaboration, planning and flexibility by governments, energy agencies and the energy industry over several decades.

To date, the performance of all these parties has been poor. There has been growth in renewable power, but also carbon wars, piecemeal and stop-start policies, power station closures with little notice, needlessly high power and gas prices, compromised reliability, and only slow and partial decarbonisation.

Australia needs new foundations to underpin its energy policy reform agenda.

First, energy policy must be integrated with carbon policy, which must encompass transport, industrial, and export energy. Emissions reduction targets must be accompanied by mechanisms to meet them and to increase them if necessary.

Second, the Council of Australian Governments (COAG) should negotiate a new Australian Energy Agreement (AEA) to drive decarbonisation in stationary, transport, industrial, and export energy. The Agreement should embody a truly national commitment in which jurisdictional proposals for unilateral intervention are subject to a formal impact assessment by the lead independent agency, before any decision to proceed.

Third, the institutional agencies need to be strengthened, so that they can implement the policies determined by governments.

The agencies supervising the electricity and gas systems were not designed to facilitate a rapid, disruptive transformation. They should be reformed so they can focus on this task and better cooperate with each other. To this end:

- The number of agencies should be rationalised.
- The governance of the remaining agencies should be connected, and they should be given a joint statutory obligation to cooperate in pursuit of their common statutory objectives.
- They should be explicitly required to implement government policies on decarbonisation and energy.

These institutional reforms should be completed in the next two years. Australia has no more time to waste in embarking on the largest energy task in its history.

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1 Australia's energy future presents substantial challenges and opportunities

Australia has been an energy superpower for much of the past century, with its abundance of coal, oil, gas, and uranium. But our fossil fuel advantage is at risk, because carbon emissions here and overseas should and will decline to near zero in coming decades. This is our challenge.

Australia could also be an energy superpower in the next century, with its vast solar and wind energy resources, possibly supplemented by new uses of fossil energy with carbon storage. This is our opportunity.

Realising this opportunity will require an unprecedented rate of investment in our sources and uses of energy, and how that energy is stored and moved around the country and the world. This great transition will impact on every Australian household and business – how we build, heat and cool our homes, offices and factories; make and freight our goods; and move ourselves around.

1.1 The future energy system will be very different

Energy technologies have been changing for decades. We now have real options to substantially decarbonise. Concerted action is needed to encourage their use. Further change is certain, so we must be flexible and adaptable.

Australia must cut its carbon emissions from energy to near zero by 2050. Here is a plausible scenario:

Petrol cars and diesel trucks, buses, and trains will be replaced with electric vehicles powered by some combination of batteries, hydrogen fuel cells, and grid supply. Ships will increasingly shift to hydrogen fuel, and aircraft to biofuel. Petrol stations will be phased out, replaced by recharging and hydrogen refuelling stations.

Gas heaters will be replaced with electric heat pumps and with heaters fuelled by hydrogen reticulated through our current natural gas pipes. The use of fossil fuels to make steel, chemicals, and plastics will be phased out in favour of low-carbon energy and hydrogen.

Electricity production will move from large, centralised coal, oil, and gas plants to wind and solar power facilities in numerous locations. These will range in size from rooftop solar panels to large-scale solar and wind farms. Their variable output will be supplemented by large amounts of stored energy – most likely pumped hydro and hydrogen-fuelled generation, as well as batteries and perhaps bioenergy.

Power from natural gas will play a critical role in ensuring constant supply while these low-carbon storages are progressively built, but will then be phased out. The electricity grid will need to be expanded in parts – and reduced in others – to connect these new power sources as coal and gas-fired stations close.

Success in commercialising carbon capture and storage (CCS) may help to accelerate our medium-term emissions reductions and low-carbon exports through the production of hydrogen from coal and gas.

We will export energy to countries with bigger populations and/or fewer energy resources, as hydrogen or ammonia in ships and possibly as electricity via undersea cables.

Removing barriers to making this scenario happen should be a national priority.

But of course, we can't predict the 2050 energy mix with precision. So, we should keep options open rather than make premature choices – between battery and hydrogen-electric vehicles, for example, or

between renewable and fossil-CCS hydrogen. Stable yet adaptive policy, technology development, and competition, should determine the technology mix.

And we should remain open to welcome disruption. Energy sources that have been found wanting so far for reasons such as cost, capacity, or public acceptance – such as small-scale nuclear or geothermal energy – may become viable with further development.

1.2 Consumers and communities have been poorly served over the past decade

For more than a decade, energy consumers have been promised lower prices. It hasn't happened. Instead, electricity and gas prices have risen sharply, and in some parts of Australia the reliability of power supplies has been compromised. The pain has been felt most by vulnerable families and businesses, and the gulf between the promise and the reality has damaged consumers' trust in governments and energy providers.

Future policies and investments must be designed to meet emissions reduction targets at lowest cost, while maintaining reliable electricity supplies.

Australia's challenge will continue to grow. An investment program to reach near zero emissions will result in big changes for regional communities with higher-carbon industries. The vulnerability of those communities is often compounded by low incomes.

Detailed plans and programs will be needed to minimise community impacts and create new job opportunities for people who currently live in regions which host coal-fired power stations (such as the Hunter Valley in NSW and the Latrobe Valley in Victoria) and possibly in towns which host the most energy-intensive industries (such as aluminium smelters).

1.3 Australia has failed to plan for success

Our national energy predicament has been caused by inadequate government policy, rising input costs, market concentration, poor pricing practices by retailers, power station closures with too little notice, and weak economic regulation of transmission and distribution network prices.

The carbon policy war has stymied coherent government policy. Instead, governments have intervened in a disjointed and stop-start way through direct investments, renewable targets, capacity underwriting, and retail price re-regulation. There's been too much debate about whether to act, and not enough on comprehensive and coordinated solutions.

Government actions should reinforce the innovation and capital provision of the private sector to earn the goodwill of communities and consumers. Disconnected policies and initiatives are a recipe for high prices, unreliable supply, and a failure to decarbonise.

Australia needs vigorous competition on policy proposals, technologies, and investments, but also stronger collaboration across government, business, and households, and ideally across political parties.

1.4 Energy policies and governance were designed for a different era

Our current supervisory framework over the electricity and gas systems was designed for the energy challenges of the 1990s, an era of microeconomic reform, privatisation, competition, and regulation of natural monopolies. The aims were to constrain inefficient capital spending, improve productivity in power stations and energy networks, provide better customer service, and free-up government balance sheets.

An underpinning principle was that governments should set policy and governance, and well-regulated markets should deliver reliable energy at lowest prices. Governments would otherwise intervene only to address market failures or remove barriers.

An underpinning assumption was that a modest rate of investment was needed to meet growing demand and replace ageing plant. A high rate of capital spending to transform the system to low-carbon energy was not envisaged.

That supervisory framework – designed for large, stable, centralised fossil-fuel generation and natural gas production, and focused exclusively on domestic production – is no longer fit for purpose. The physical energy system is changing in ways that were not envisaged when current policy and regulation was developed. For example:

- Variable renewable energy sources with near zero marginal costs of supply have expanded rapidly. This adds complexity to system operation and may suppress price signals for new investment.
- Distributed energy supply has increased, challenging transmission system planning and undermining the stability of distribution networks.
- Distributed energy storage has expanded. This requires electricity and gas networks to be reconfigured, so they can be more agile.
- Interest in electric cars and in large-scale production of hydrogen for various uses is increasing. Both developments require more creative thinking from policy makers.

Continued failure to understand and respond to the implications of these changes will only add to public concern about the security, reliability and cost of energy.

2 The path to success

2.1 A policy framework for a very different future

Australia needs new foundations to underpin its energy policy reform agenda.

Carbon policy must encompass transport, industrial, and export energy if we are to meet our international emissions reduction commitments. Until now, those sectors have escaped serious attention. Emissions cannot be cut to near zero unless all energy-using sectors decarbonise.

Integrated energy and carbon policy across these sectors must have clear targets, with mechanisms to meet them that can adapt to changes in global policy and technology.

The Commonwealth Government should work with the states to forge cohesive national policy which can be swiftly implemented by independent and expert energy agencies, in concert with government departments and agencies with relevant roles such as land-use planning, transport and industry policy, export facilitation, and regional development.

2.2 A new Australian Energy Agreement

COAG should produce and implement a comprehensive energy plan that meets national decarbonisation and reliability goals at the lowest cost. It should periodically review, extend, and adapt that plan over coming decades, in response to changing domestic and international circumstances.

COAG should negotiate a new Australian Energy Agreement to replace the existing Australian Energy Market Agreement and encompass all major energy-using sectors. It should codify the plan.

The Agreement should cover stationary, transport, industrial, and export energy. Governments should develop policies and regulations to ensure decarbonisation across these energy-using sectors. This would involve input from energy, environment, transport, industry, and economic ministries.

Market-based and regulatory mechanisms should be implemented to incorporate the emissions reduction task into the energy system. They should have the support of stakeholders in achieving emissions reduction at lowest cost while ensuring energy supplies remain reliable. The policy implications of the forthcoming National Hydrogen Strategy will need to be considered.

The Agreement would set out the responsibilities of the respective governments: the Commonwealth for national climate and carbon policy, interstate commerce, international trade, foreign investment, aviation, and certain environmental-approval powers; the states and territories for land-use planning and approvals, transport, industry, regional development, and local government; and the collective COAG jurisdictions for energy policy, innovation, and investment and trade facilitation.

Governments have a key role to encourage and sometimes fund research, development, and pre-commercial investment in infrastructure, though university research and agencies such as a climate change authority and the Australian Renewable Energy Agency. Government should facilitate commercial investment by the private sector, while reserving the right to intervene – preferably through independent agencies but directly if necessary – to achieve agreed policy goals. The criteria for such intervention should be codified in the new AEA and the energy system rules.

The independent energy agencies should be reformed and strengthened so they can better advise on and implement policy, and develop, operate, and regulate the system and its markets. The COAG Energy Council should hold the agencies accountable for agreed outcomes. The reformed agencies should integrate and facilitate governments' policy goals in decarbonisation, economic management, industry and regional development, land use, and export facilitation. Where integration is not possible due to cost or incompatibility of competing policies, the impasse should be referred to governments for collective resolution.

Consistent with a recommendation of the 2017 Finkel Review, governments that propose to take unilateral action within the scope of the AEA would first be required to seek a formal assessment from the lead independent market agency on the impact of their proposed intervention. The assessment should be against the National Energy Objectives, and the process should be transparent and include submissions and recommendations.

Governments should work with agencies and energy companies to identify consumers, regional communities, and industries that will be substantially affected by the energy transition. They should develop and implement transition plans to mitigate those impacts through direct assistance and alternative economic opportunities. In some cases, new industries or government infrastructure projects may provide an economic boost and alternative employment for some retrenched workers. Government-funded adjustment schemes could help affected workers and businesses to find new jobs and markets.

The AEA should be negotiated by federal, state and territory governments, informed by consultation with community and industry stakeholders. It would consolidate the current suite of *ad hoc* energy and climate-change interventions into a comprehensive and coherent energy policy linked with climate-change policy. It would provide direction to the agencies and industry, encouraging efficient investments to support the transition.

Governments will have to direct more resources to non-energy functions such as environment and land-use approvals, and industry and trade, to ensure Australia can deal with the scale and pace of the transformation and seize the global and local economic opportunities that will arise.

2.3 Creating a positive investment climate

Australia's energy transition requires the mobilisation of private capital. Governments need to respond to several specific developments to ensure the return of a positive investment climate.

The rapid increase in variable, zero-marginal-cost supply, closure of coal and gas generators, electricity storage, and more active demand response make it harder for the current market to provide the price signals for new investment.

Introduction of the Retailer Reliability Obligation and enhancements to the Reliability and Reserve Trader Mechanism should help. And the Energy Security Board (ESB) is working on the post-2025 design of the National Electricity Market. That review will provide advice on how to adjust the market framework to ensure it is fit for purpose. The review should consider the need for complementary policies such as strengthening the Australian Energy Market Operator's reserve powers through capacity auctions or other means.

Transmission arrangements need to be adjusted to suit a system with more distributed energy supply, as do the regulations covering treatment of stranded network assets.

The requirement for power station operators to provide notice of closure is useful but not enough to mitigate the impact of closures on price and reliability. AEMO's Statement of Opportunities should include more

explicit information on likely closures as risk scenarios. Together with the Retailer Reliability Obligation, this should increase the incentive for investment in reliable post-closure operations.

2.4 Reforming governance arrangements

The current governance model of separate and independent agencies – the Australian Energy Market Commission (AEMC) as policy adviser and rule-maker, the Australian Energy Regulator (AER) as economic regulator, and AEMO as market and system operator – has run its course. Good work has been done and is continuing, but the energy transition has rendered the model unfit for purpose. The creation of the ESB is a necessary but insufficient response.

Problems with the current arrangements include:

- The rule-change process tends to respond to problems, not anticipate them.
- The differing positions of the AEMC and AEMO on significant issues, which reflect unclear carbon objectives and the lack of a formal avenue for resolution.
- The three agencies have different funding, ownership, and oversight arrangements, and the differences cause confusion.
- The ESB is doing good work, but its market development work clashes with the statutory role of the AEMC.

The roles, structure, and funding of the market agencies and ESB should be overhauled. The number of agencies should be rationalised, and their role and responsibilities made clear. They should be explicitly required to implement government policies. They should be required to identify emerging issues and challenges and advise governments accordingly. They should be given a joint statutory obligation to collaborate in pursuit of their common statutory objectives, and their governance should be connected.

The entry into the energy system of new sources and technologies should be anticipated in the revised statutory remits of the energy bodies. Subject to the outcome of the National Hydrogen Strategy, the development of a hydrogen system that is integrated into the electricity and gas networks should be an explicit role conferred on the bodies.

3 Conclusion

The proposals in this paper to establish an AEA and reform energy governance should be completed in the next two years. Australia has lost valuable time in starting the decarbonisation task in earnest.

There will be no refuge in not acting. Jobs will still be lost as old plants close, but we will under-invest in replacement supplies that are vital to our economy and communities. We will all be worse off.

While we need to get moving, the full journey to near zero emissions will take decades of adaptive and strategic action by governments and industry. Throughout, the interest of the public and regional communities in low energy prices, reliable supplies and jobs must be managed with skill and care.

This may seem like an ambitious program of reform. Relative to the inaction of the past decade, it is. But each additional year of prevarication increases the need for significant, urgent reform so that the energy system can adapt to meet the needs of all Australians.