SOUTH AUSTRALIAN GOVERNMENT CLIMATE CHANGE AND ENERGY SUMMIT

#RossGarnaut
#auspol

Professor Ross Garnaut AC

President of ZEN Energy
Professorial Research Fellow in Economics
The University of Melbourne
Chair of the International Board Australia-Germany Energy Transition Hub

AUSTRALIA IN FOSSIL GLOBAL ENERGY ECONOMY

- Developed country with richest per capita fossil energy resources
- Historical comparative advantage in energy-intensive industry
- Strongest in minerals and food processing with local raw material supply
- Lost competitive advantage in 21st Century with internationalisation of domestic coal and gas markets and errors in policy and regulation
- Opportunity to regain role in energy-intensive industries in low carbon world economy

AUSTRALIA IN LOW CARBON GLOBAL ENERGY ECONOMY

- Developed country most richly endowed with natural resources for renewable energy
- Potentially lowest energy costs in emerging low carbon world economy
- Requires fundamental change in dysfunctional policy and regulation
- Need stable policy, competitive markets for services relating to reliability, security, emissions reductions, network services, retail services
- With reform, the world's natural home for energy-intensive investment
- Unlike fossil energy advantages, renewables advantage sustainable

AUSTRALIA'S DAMAGING CONTEMPORARY ENERGY TRILEMMA

- High perceptions of insecurity
- Close to highest energy costs in developed world
- By far highest total and electricity emissions per person in developing world
- First and second a stark contrast from last century
- Growing awareness since 1990s and high awareness now that the third makes old sources of advantage unsustainable.

BELATED OFFICIAL RECOGNITION OF PROBLEMS SINCE SPRING 2016

- Finkel Review into security and reliability June 2017
- Productivity Commission 5-yearly Productivity Review, August 2017
- AEMO advice to Commonwealth on reliability, September 2017
- ACCC price review September 2017
- Thwaites Review of Victorian prices September 2017
- Energy Security Board letter to Commonwealth recommending NEG, 30 October 2017
- Chief Scientist-ACOLA joint report on Energy Storage in Australia's Energy Mix, November 2017
- Energy Security Board advice to COAG 20 November 2017

THE FINKEL REVIEW

- Focus on security and reliability
- Reliability recommendations accepted by COAG to be implemented by AEMO and new Energy Security Board (ESB)
- Strong emphasis on broadly based agreement on emissions for policy certainty
- This to be built around Clean Energy Target (Emissions Intensity Scheme in December 2016 draft)

THE FINKEL REVIEW RELIED ON AUTHORITATIVE MELBOURNE ENERGY INSTITUTE ANALYSIS OF POWER SYSTEM STABILITY

- Minimum synchronous (thermal, hydro) generation required for security
- Under current technology, generally no issue up to 76 percent intermittent renewables
- Regional differences may vary this
- Consistent with Ireland limit of 75 percent intermittent renewables
- Emerging technology will shift limits

PRODUCTIVITY COMMISSION REVIEW

- Large problems in electricity productivity decline
- Need national agreement on objectives recognising tensions among reliability, price and decarbonisation
- Network regulation has led to overinvestment and high costs to users
- Analysis shows 26-8 percent total emissions reduction requires minus 50 percent electricity emissions
- Economic analysis says broad carbon price needed to reduce emissions at minimum cost

AEMO ADVICE: IMMEDIATE

- A model of clarity and sound analysis
- Short term need 1GW flexible reserves in SA and Victoria for next summer
- AEMO and SA Government action have that in hand
- Long term need to embed markets for grid stability services into the NEM rules

AEMO ADVICE:LONGER TERM

- Need separate markets for range of grid stability services
- Need to create new markets for some services
- New market for forward-looking flexible dispatchable capacity
- Capacity held in reserve and separated from normal energy market
- Flexibility can come from reserve spinning generation, long-distance transmission, other network services (eg batteries), demand response, pumped hydro storage
- 1GW required by closure of Liddell in 2022
- Traditional baseload does not have these characteristics
- Separate requirement for minimum synchronous generation for inertia
- Working on different requirements for different regions.

ACCC REVIEW of PRICES

- More competition required to ease major oligopoly problem and high prices
- Especially severe in SA
- Integration across generation and retailing need not but does exacerbate the problem
- 5 minute in place of 30 minute price settlement (delayed until July 2021) could reduce oligopoly damage
- Network companies continue to charge consumers for historical wasteful investment
- Modelling suggests RET may reduce or increase wholesale prices

THWAITES REVIEW OF VICTORIAN PRICES

- Extraordinary blow-out in retail costs and margins
- Effects most severe on low incomes
- Remedies include simplification and standardisation of offers and honesty in contracting

ECONOMIC SECURITY BOARD LETTER TO COMMONWEALTH ENERGY MINISTER

- Required to advise on
  - Reliability
  - Emissions reduction for international commitments
  - At lowest possible cost

ENERGY SECURITY BOARD LETTER: THE NEG

- Would require separate obligations for Reliability and Emissions: the NEG (National Energy Guarantee)
- Obligation on retailer or large user to comply
- Regulator inspects forward contracts to assess mix of dispatchable power and emissions
- No emissions or reliability services markets with competitive, transparent price discovery but “under the counter” trade OK
- Recommendation to be considered by COAG in November
- Implemented 2019 for Emissions and 2020 for Reliability
- Implemented by SA regulation followed by others
- Possible earlier implementation in SA

ESB LETTER: NEG RELIABILITY

- Requirement for amount of *"dispatchable"* energy
- To cover specified proportion of estimated peak load
- At some points *"flexible dispatchable*" said to be required and at others dispatchable conflated with Baseload
- No recognition of range of differentiated stability services identified by AEMO

NEG EMISSIONS REDUCTIONS

- Letter mentions no target
- Low target implicit in low renewables share
- Domestic and international carbon credits allowed

JOINT REPORT OF CHIEF SCIENTIST AND LEARNED ACADEMIES (ACOLA)

- Distinguished between power security and power reliability
- Security to avoid blackouts: matching demand and supply each fraction of a second to keep frequency within acceptable band
- Reliability to match supply and demand over longer periods, so power available in quantities required

SECURITY (FREQUENCY CONTROL)

- Requirement is power (Mw)
- Frequency control historically provided by thermal and hydro: mechanical inertia
- Can now be provided as well by batteries and other new technologies with appropriate control settings as well as by demand response
- Both grid level and distributed
- Lots of power required in short bursts
- 7.3 percent of generation for low intermittent renewables (35 percent)
- 19.8 percent for middle intermittent renewables (50 percent)
- 34.5 percent for high intermittent renewables (75 percent)
- When new capacity required, most cost effectively by batteries

RELIABILITY (BALANCING SUPPLY AND DEMAND OVER LONGER PERIODS)

- Requirement is energy (Mwh)
- big fluctuations in demand (normal change through day) or supply (machine failure; intermittency) historically provided by thermal spinning reserve or hydro
- Now also provided by new technologies
- Batteries (incremental costs can be low if power already provided for frequency)
- Pumped hydro storage (costs low at good sites)
- High temperature thermal storage (salts, graphite, silicon)
- Demand response
- Requirement 0.5 percent of generation with low renewables (35 percent)
- 2.4 percent with medium renewables (50 percent)
- 9.8 percent with high renewables 75 percent)

ESB ADVICE 20 NOVEMBER

- Clear from modelling instructions that reliability requirement is for a proportion of thermal plus hydro ignoring other technologies
- No separate requirements for reliability and security
- Emissions Target for electricity is minus 26 percent by 2030
- Proposal is an Emissions Intensity Scheme with under the counter but not open market trade
- Acknowledges problem of exacerbating oligopoly
- Notes oligopoly problem most severe in SA which requires special measures
- Modelling says current expansion of renewables will stop
- All wholesale price reductions happen before 2022 under influence of RET and growing renewables and stop after that
- No modelling of how stronger emissions targets and more renewables would lead to lower wholesale prices as well as lower emissions

NEW WORK SUGGESTED FOR ESB ON EMISSIONS REDUCTIONS NEG

- Emissions Intensity Scheme as proposed Is suitable
- Need transparent trade in emissions intensity credits to avoid problems of market inefficiency and exacerbating oligopoly and therefore raising electricity prices
- Need to acknowledge that emissions reductions must come disproportionately from electricity sector to minimise costs
- Minimum target of 50 percent emissions reduction in electricity required to meet Paris objective
- If lower targets necessary to meet political constraints, inconsistent in reality with minus 26-8 percent of total emissions

NEW WORK SUGGESTED ON POWER STABILITY

- Can only achieve stability at reasonable cost with separate markets for security and reliability
- Multiple markets required for frequency control, including new markets with fast (less than a second) response
- New capacity market required for reliability, with capacity separated from daily energy market
- Need competitive access to these separate markets
- Bundling multiple markets together will greatly increase cost of security and reliability
- Exclusion of new technologies including demand response will greatly increase cost of reliability and security
- Desirable for costs of security and reliability services to be met by generators or users causing instability (as with AEMO Frequency Control and Ancillary Services markets)

SPECIAL PROBLEM OF OLIGOPOLY AND INEFFICIENT MARKETS

- What is proposed would hugely disrupt established and successful energy market
- Far more disruptive than 5 minute pricing which was delayed for disruption
- Bundling energy, security, reliability and emissions intensity requirements reduces competition and market efficiency
- Incidentally favours incumbents with coal and gas generation which is assumed to simultaneously meet energy and multiple stability objectives
- Therefore exacerbating oligopoly and raising prices
- NEG objectives could be achieved with separate competitive markets

CONSTRUCTIVE WAY FORWARD

- Good for ESB to continue work on ways to meet power stability and emissions reductions
- Recognise that this requires separate markets for Energy, Security (Capacity), Reliability (multiple frequency markets) and Emissions Intensity
- Seek transparency and competition in each of these markets

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Thank you for listening