

Small Energy Markets, Scattered Networks and Regulatory Reforms: The Australian Experience

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***PEOPLE, POLICY AND PLACE SEMINAR SERIES
THE NORTHERN INSTITUTE
26 JULY, 2016***

The Underlying Bigger Picture

- Electricity markets globally undergoing introspection on the impacts of more than quarter of a century of liberal energy reforms.
Source: (Nepal, Jamasb and Timilsina, The Energy Journal, forthcoming (2017))
- However, the experiment of introducing market based reforms has recently begun in the Northern Territory
- This provides opportunities to revisit the reform drivers, contexts, steps and future pathways for the NT electricity market.
- Presentation based on *a forthcoming discussion paper* with Professor Flavio Menezes from the School of Economics at the University of Queensland (also the current Deputy Director of the Queensland Competition Authority).
- *Funded by:* Search and Visitors Funding Scheme of the School of Economics at the University of Queensland

Overview

- *Drivers of Reforms*
- *The Australian Response*
- *The NT Context*
- *The Gap in the Literature*
- *Existing Performance and Characteristics*
- *Future Pathways as Policy Options*
- *Conclusions*
- *References*

Drivers of reforms

- *To enhance efficiency and sustainability of the sector*
 - operational efficiency (i.e. reduce losses and improve consumer services; improve system reliability; maintain adequate capacity; increase energy access)
 - economic efficiency (low cost generation; useful and effective investments; remove subsidies (remove price regulation))
- *To enhance environmental sustainability*
 - decarbonise electricity generation and consumption; improvements in energy efficiency
- *To lower the costs of electricity use to consumers*
 - increase energy affordability (for example: rising electricity prices has been a major problem across all Australian jurisdictions)
- Overall aim: to achieve the *energy policy goals* of secure supply of electricity; affordability and environmental sustainability
- *An Impossible Trinity?*

The Australian Response (I): The National Electricity Market (NEM) (QLD, SA, VIC, TAS, NSW, ACT)

- **1994:** operation of the Victorian power exchange
- **1996:** unbundling of transmission from generation and a market was launched in New South Wales
- **1997:** accounting unbundling took place in South Australia following early corporatization efforts in 1995
- **1998:** Queensland mimicked the reforms that took place in New South Wales
- **1998:** Establishment of the world's most transparent energy-only wholesale market in the Eastern jurisdictions (i.e. the National Electricity Market (NEM))
- **2005:** Tasmania joined the NEM

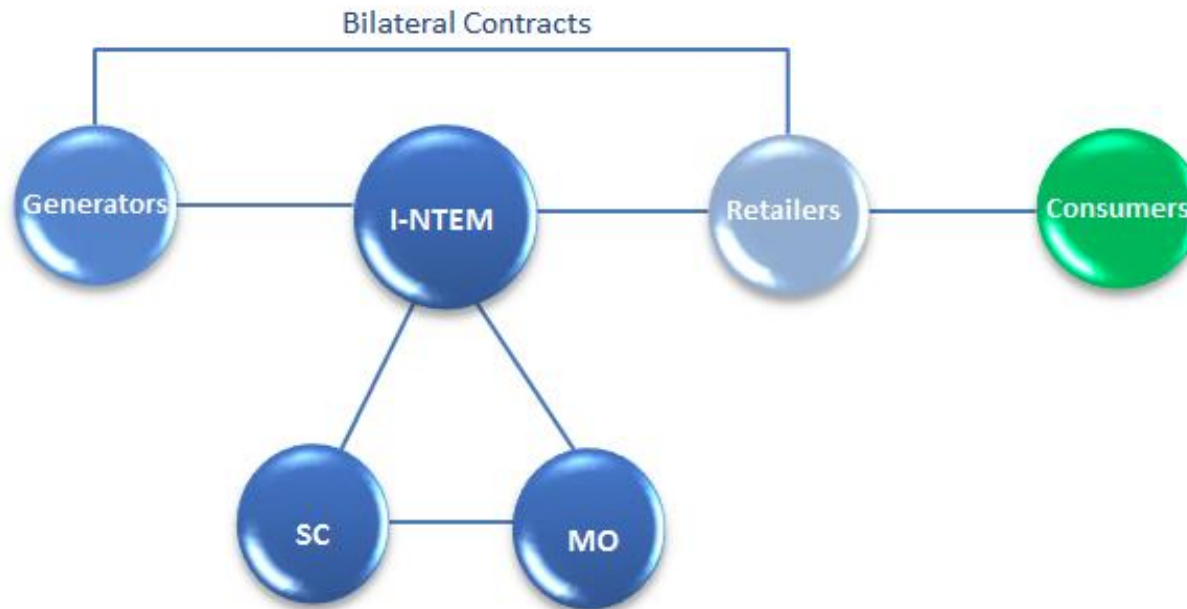
The Australian Response (II): The Wholesale Electricity Market (WEM) (WA)

- **2006:** the wholesale electricity market (WEM) commenced its operation in September
- **2006 :** disaggregation of Western Australia's vertically-integrated electricity utility, **Western Power Corporation**, into four separate state-owned entities – **Verve Energy** (generation), **Western Power** (networks), **Synergy** (retail sales) and **Horizon Power** (the state's regional power supply entity)
- **2006:** creation of an independent market operator and regulator
- **Phase I of electricity market review (EMR) commenced on 6 March, 2014** (reducing costs of production and supply of electricity and electricity related services, without compromising safe and reliable supply)
- **Phase II of EMR commenced on 24 March, 2015** (aims to give effect to Government's preferred reform options to achieve the Electricity Market Review Objectives)

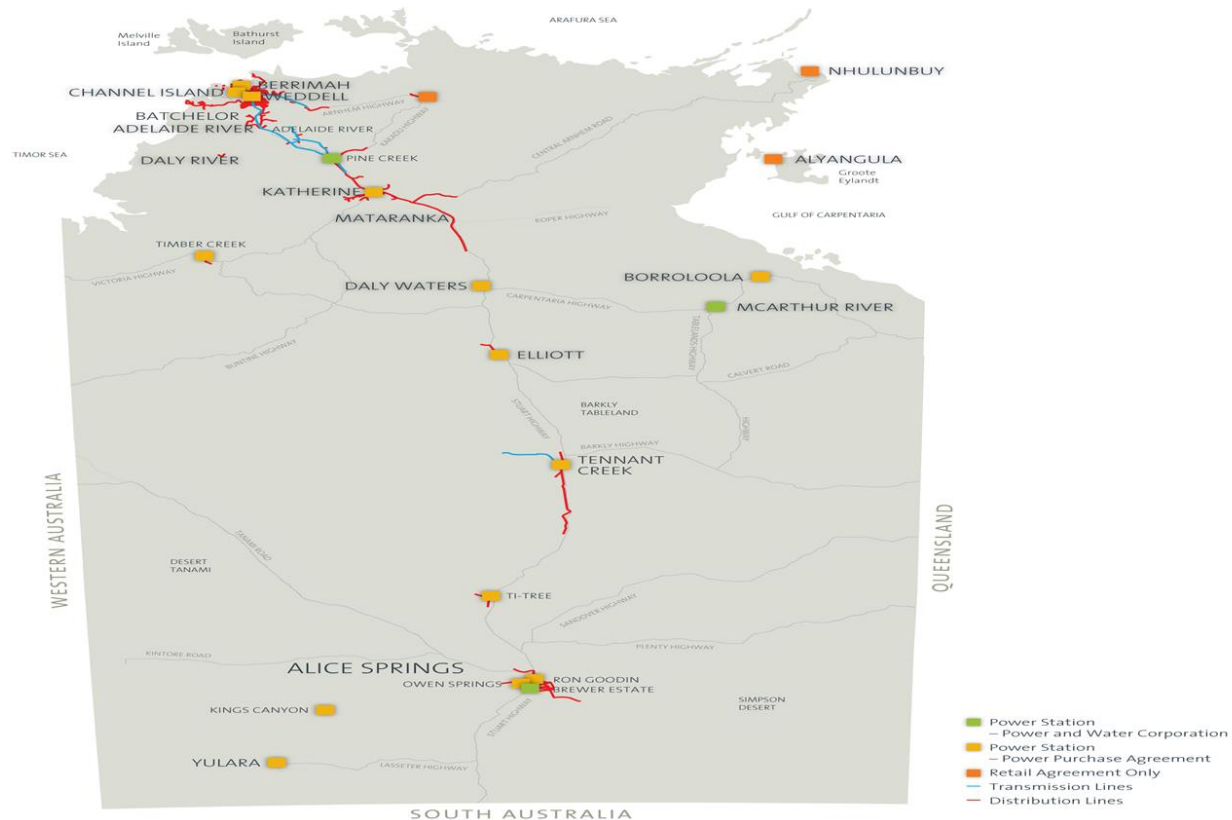
The Australian Response (III): The Interim Northern Territory Electricity Market (I-NTEM)

- 2000: NT Government initiated the reform process with the establishment of the Utilities Commission 2012: NT government decided to improve efficiency of Power and Water Corporation (PWC)
- 2014, July: PWC split into *Territory Generation* (generation), *Power and Water* (networks), *Jacana Energy* (retail) in accounting and legal terms (operated as a vertically integrated entity from the 1980s till 2014)
- 2015: Responsibility transferred to the AER for network price regulation and oversight of network access.
- 2015: Operation of the interim Northern Territory Electricity Market

The Australian Response (III): The Interim Northern Territory Electricity Market (I-NTEM)



The NT Context (I): Small Market with Scattered Networks



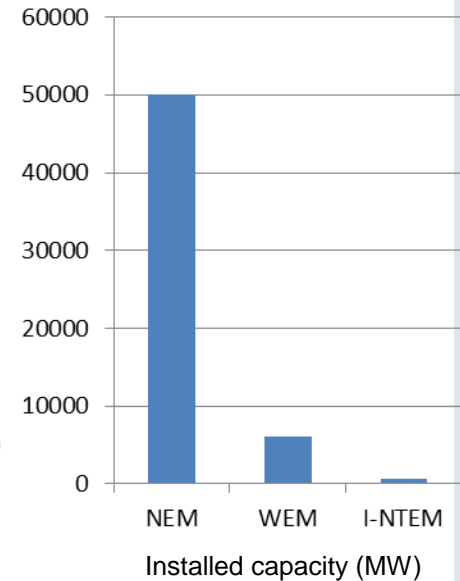
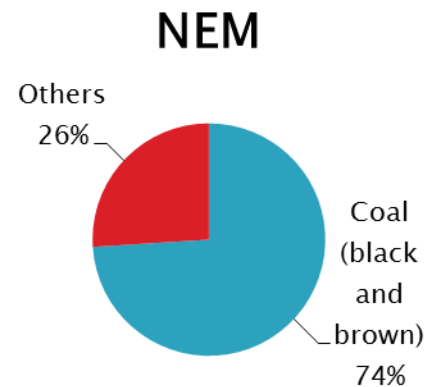
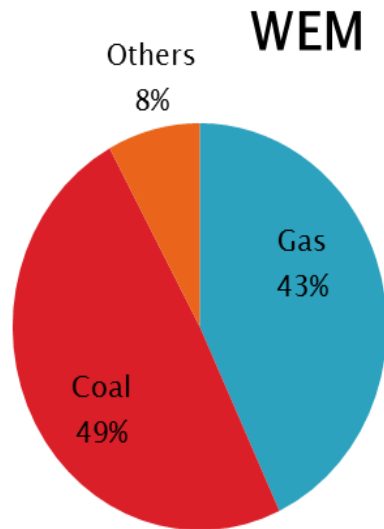
The NT Context (II): Remote and Indigenousness with Abundant Solar Potential

- About 72 remote indigenous communities and 66 homelands in the Territory are served by Essential Services
- By around 177 diesel generators powering around 56 island power stations using over 30 million litres of diesel per year
- Despite, a daily average of *nine hours of sunshine each day of the year*
- Only, *only 4%* of the dwellings (the lowest in Australia) had solar PV installed in NT in 2013 (Sunwiz, 2013).
- Also, *more than 50% of the population* in the Territory is not connected to the grid (reforms will produce minimal effect to these communities at the start)

The Gap in the Energy Economics/Policy Literature ?

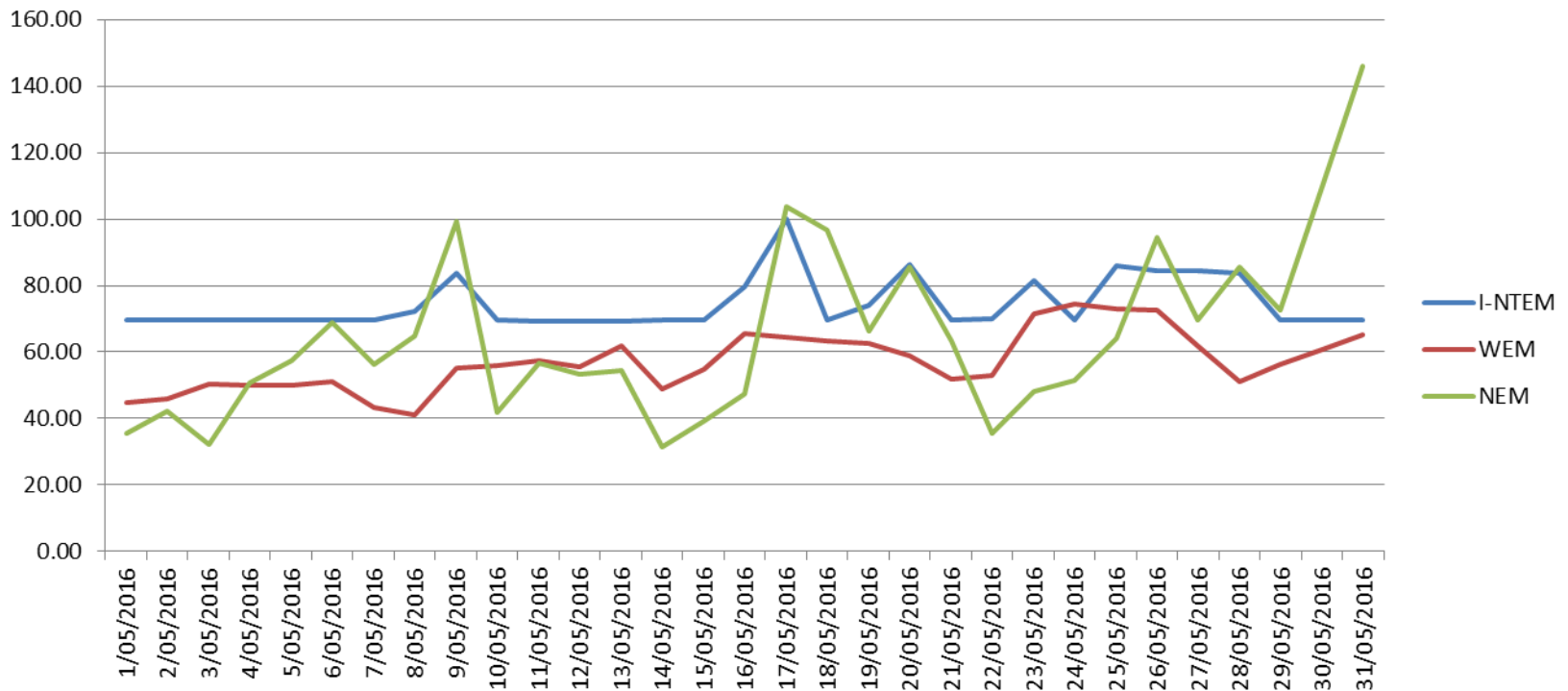
- *Studies on small electricity systems very limited*
- *Bacon (1995)*: suggested the need for intermediate reform options for countries with too small power systems
- *Millan and Vives (2001)* : the implementation of competitive reforms in small power markets are difficult and hence focus should be towards an integrated market (i.e. bigger markets)
- *Perez and Ramos-Real (2008)*: vertical industry structure and the design of the grid operator and its attributes are key features for the efficient operation of any electrical system
- *Nepal and Jamasb (2012)* : creation of an independent regulatory authority is more important than vertical unbundling
- This study (*Nepal and Menezes, 2016*) : advances knowledge and policy gap in small markets with scattered networks and remoteness
- *Globally Relevant*: such the small island economies in the Asia Pacific, South East Asia and the Caribbean where reforms are ongoing and there is a need to decarbonize their economies

Existing Performance (I) : Fuel Mix



In NT, gas has been the dominant source (large reserves both onshore and offshore) since 1986. This is likely to further increase once a carbon price increases the relative cost of diesel and coal.

Existing Performance (II) : Wholesale Electricity Prices



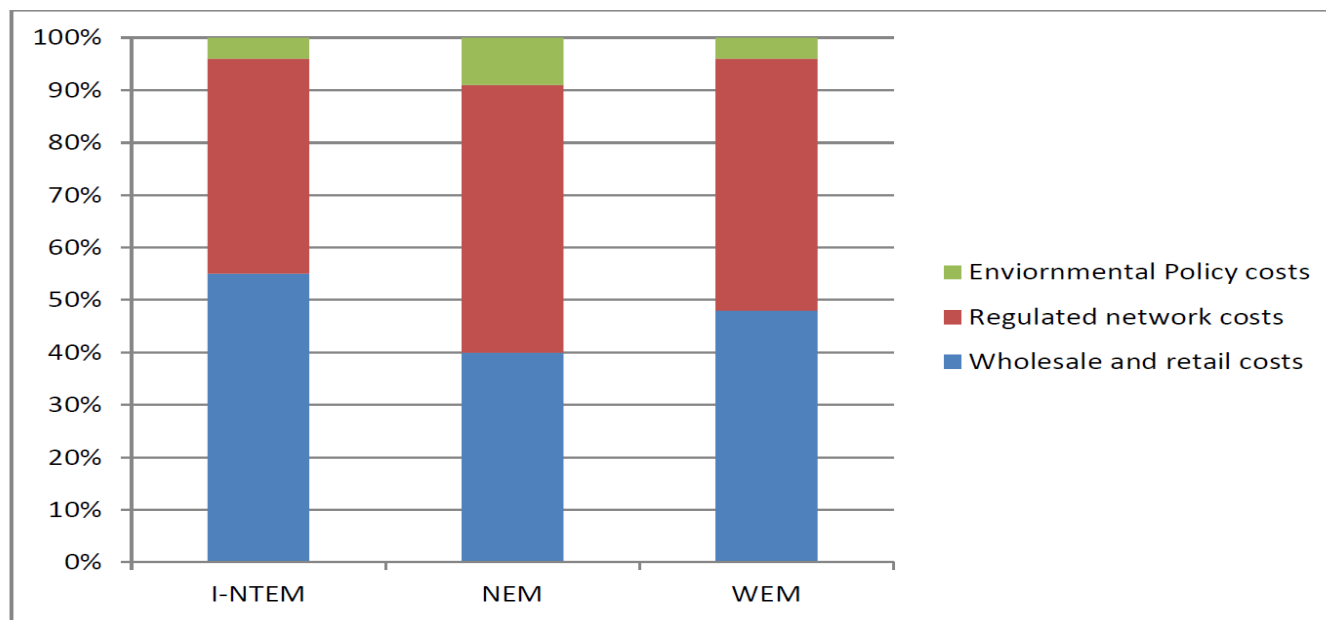
Averaged daily wholesale electricity prices for the month of May, 2016

Price volatility seems similar between the INTEM and WEM

NEM highly volatile (large price movements can be observed)

Average prices highest in NT followed by WEM and the NEM

Existing Performance (III) : Components of Residential Electricity Prices



Source: AEMC (2015)

Household prices have increased by 61 percent between 2008-2014 despite drop in energy usage (ABS, 2016).

Network costs have more than doubled since 2007.

Existing Performance (IV) : Energy Losses

	Transmission (kms)		Distribution (kms)		Energy lost during transmission and distribution	
	Overhead	Underground	Overhead	Underground	Transmission	Distribution
I-NTM	721	39	4981	2931	3.71%	4.96%
WEM	7732	70	68332	24169	6.7%	
NEM	43309		730642		10%	

Underground cables more secure than overhead cables from extreme weather events. However, they are costly since capital intensive.

Energy losses in NT is relatively higher compared to a much larger market like NEM which exhibits a 10% loss.

Policy Options (I) : Promoting Entry in Electricity Generation and Retail

- ***Economic Theory***: Wholesale prices will be closer to competitive levels under sufficient number of competing generators and adequate spare capacity.
- However, the NT generation is dominated by ***Territory Generation*** (also contracted 114.5 MW of electricity from Independent Power producers)
- ***Jacana Energy*** is the dominant supplier(retailer) across for all consumption levels
- ***Retail price regulation*** for small consumers ceased in Darwin-Katherine market on 1 august, 205 and in the Alice Springs and Tennant Creek market on 1 January 2016, with a declining subsidy
- How about for ***Large Consumers*** despite implementing Full retail Contestability in 2010?
 - ***How to also promote entry in the electricity generation segment ?***

Policy Options (I) : Promoting Entry in Electricity Generation and Retail

By changes in market rules

- a) Reduce the complexity in trading arrangements: for e.g. allow the IPPs to sign long-term contracts directly with retailers***
- b) Provide incentives to participate in the market: for e.g. paying generators for making their capacity available (i.e. capacity payments)***
- c) Encouraging non-discriminatory access to the grid: for e.g. replacing the system controller role of Power and Water with an independent system controller***

Policy Options (II) : Need for Intraregional Market Expansion

- **Theory:** market integration desirable for enhancing competition and improve security of supply in smaller electricity markets
- The I-NTEM is looking at the NEM as a successful model and is aiming for harmonising the market rules and principles
- However, intraregional market expansion is preferable to cross-state interconnection as demand grows.
- Expanding markets within NT will maximise the benefits of competitive reforms
- Long term goal should be to connect urban centres of Darwin, Katherine, Tennant Creek and Alice Springs.

Policy Options (III) : Effective Network Regulation

- **Theory:** “competition where feasible, regulation where not” across network industries
- Effective regulation necessary to bring the network costs down
- Reforms signal a shift of this effective regulation burden from the NT Utilities Commission to the Australian Energy Regulator (AER)
- However, the AER is not free of problems: lack of greater independence, lack of good coordination among regulatory institutions, etc. (*Nepal, Menezes and Jamasb, 2014*)
- International evidence: efficiency gains to consumers in liberalised markets depends on the underlying regulatory regime

Policy Options (IV) : Promoting Solar, but How?

- Hiking the regulated feed-in-tariff (to reflect higher value of solar versus diesel including its environmental benefits and potential savings by postponing costly network expansions)
- Minimizing costs of PV installation such as building permits (current costs in AUD, 1000)
- Overcoming financial barriers to renewable energy in remote communities (such as microfinance, cooperatives etc.)
- Establishing formal climate policies, emissions-reduction targets, or specific plans to harness renewable sources
- ***After all***, costs of diesel generation with a carbon price (lets say \$23) is still expected to be higher than solar with small diesel backup but needs estimating

Reforms do not address the renewable energy agenda and may mean missing the opportunity of becoming a world leader in providing green energy in remote areas.

Conclusion

***In liberalised electricity markets, consumer is the boss
but the regulator
is the king.***

Thank you

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