Changing Dynamics in the Global Seaborne Thermal Coal Markets and Stranded Asset Risk

Tim Buckley, Director of Energy Finance Studies, Australasia

Institute for Energy Economics and Financial Analysis
IEEFA.org

Sydney, August 2015

AGENDA

The Global Electricity Market Transformation

1. **Global seaborne thermal coal demand is in structural decline**
   - China
   - India
   - America
2. **Equity Markets show coal companies are increasingly pricing in structural decline risks**
3. **Renewables are deflationary**
   - Technology gains and economies of scale
   - Batteries will transform distributed solar on rooftops from 2018.
4. **Stranded Assets Risk is Increasing**

IEEFA

1. A long cyclical downturn or structural decline?

China, India and the US are the three largest coal import nations globally.

Each are undergoing a massive transformation away from imported coal.

1.1 China's Electricity Sector

China's thermal coal's share of electricity generation:

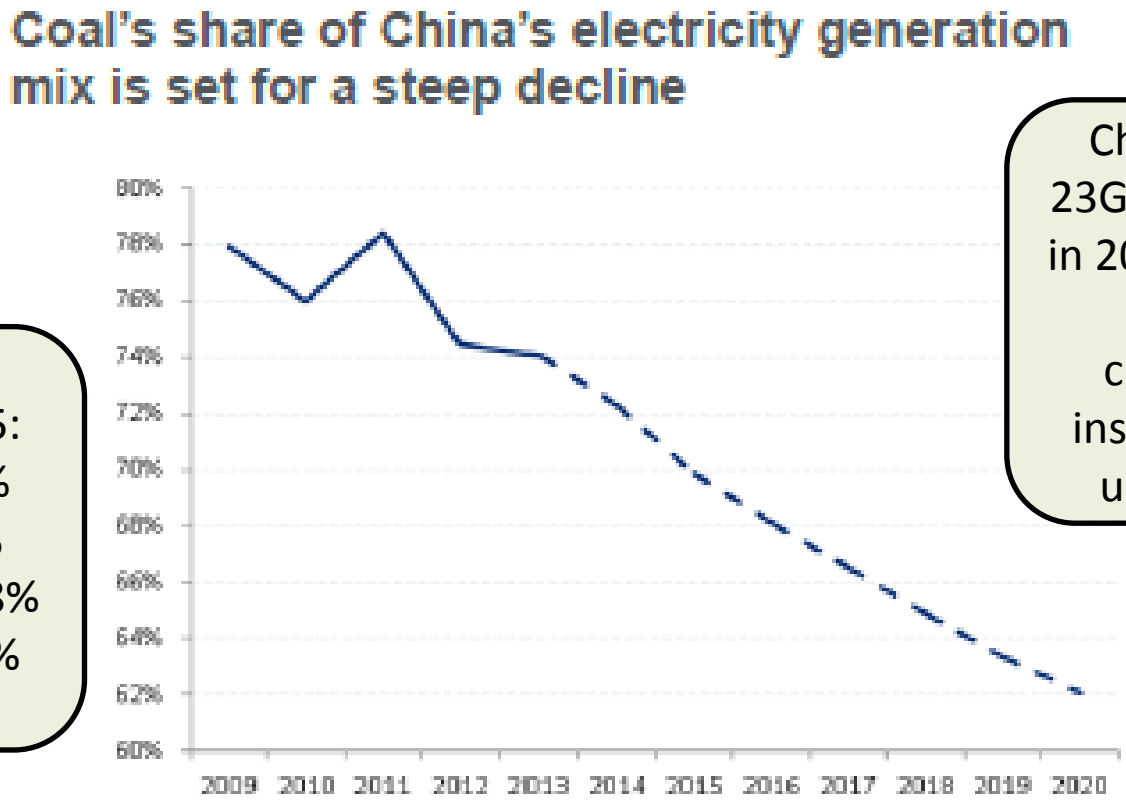
2012 76.4%
2014 71.5%
2020 59.5%

China's Power Industry

Installed Capacity (GW)	End 2010		2020	
	GW	%	GW	%
Thermal (coal)	683	69.4%	846	48.1%
Thermal (gas)	26	2.7%	79	4.5%
Biomass / CHP	4	0.4%	17	1.0%
Hydro	216	21.9%	405	23.0%
Nuclear	11	1.1%	58	3.3%
Wind - Onshore	43	4.3%	230	13.1%
Wind - Offshore	-	0.0%	13	0.8%
Energy From Waste	1	0.1%	10	0.6%
Solar - Utility Scale excluding distributed	1	0.1%	101	5.8%
Total Generation Capacity	**984**		**1,759**	
CAGR in power demand for 2008-2010	11.4%			
CAGR in power demand for 2011-2020			5.3%	
CAGR in power capacity for 2010-2020			6.0%	
GDP Growth for 2011-2020			6.9%	

Source: IEEFA

China's Electricity Sector Transformation



Year to June 2015:
China GDP +7.0%
Electricity +1.3%
Domestic coal -5.8%
Coal imports -38%

China added 23GW new wind in 2014 , giving a 115GW cumulative installed total, up 15% yoy

Source: Citi Commodities, Tony Yuen, June 2014; "*Energy Markets in Transformation*"
http://uk.reuters.com/article/2015/07/15/china-economy-output-coal-idUKL4N0ZV1FX20150715

1.2 India

India's Energy Minister Goyal stated November 2014:

1. *Plans to transformation of the entire Indian electricity system with 175GW of renewable energy installs by 2021. This involves a trebling of wind installs to 6-8GW and lifting solar installs tenfold to 10GW pa.*

2. *A plan for a US$50bn national grid upgrade to drive grid efficiency.*

3. *Plans to almost treble India's domestic coal production to 1.5Bn tpa by 2019, requiring a massive investment in rail infrastructure, coal handling and preparation plants plus major new mine development.*

4. *Goyal: "I'm very confident of achieving these targets and am very confident that India's current account deficit will not be burdened with the amount of money we lose for imports of coal. Possibly in the next two or three years we should be able to stop imports of thermal coal."*

http://in.reuters.com/article/2014/11/12/india-coal-imports-idINL3N0T234F20141112

1.3 US

America's thermal coal: down 30% in 2015 vs 2008 peak

1. ***Collapsing US coal exports –*** *too expensive on the global cost curve, and the US$ strength vs all major coal exporters.*

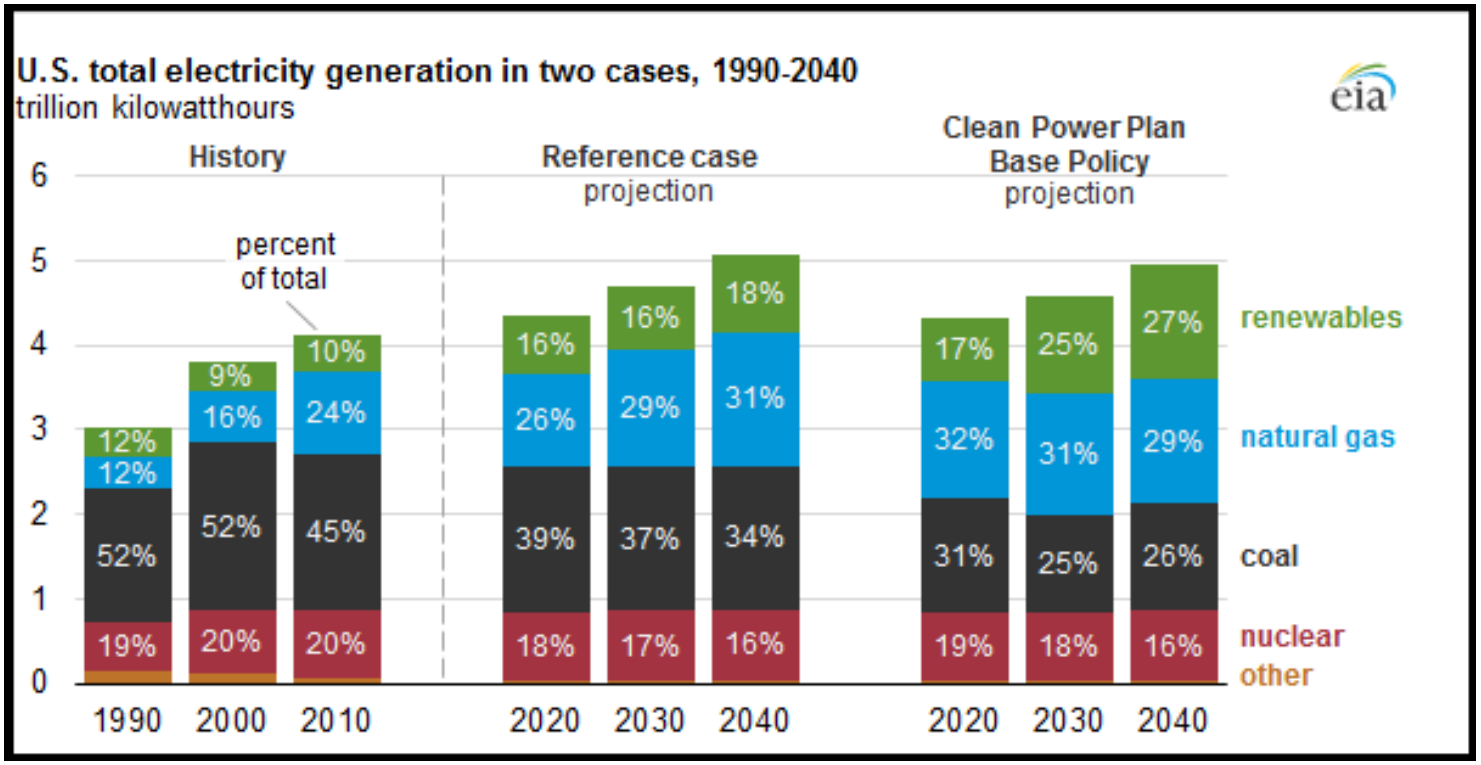
2. ***Coal power plant closures*** *- >70GW of coal-fired power plants slated for closure by 2020 due to EPA air, water and ash pond pollution rules. 15-20GW of coal plant closures in 2015 alone due to the Mercury and Air Toxics Standard, with no new coal additions.*

3. ***Renewables*** *– US push into wind (9GW in 2015) and solar (9GW in 2015) rapid and accelerating, until 2017 at least (PTC/ITC cliff?).*

4. ***Domestic gas vs coal*** *– the collapse of US$ Henry Hub gas prices over 2012-2015 continues to improve gas relative competitiveness, with over 100GW of new gas-fired capacity in the US planning system. US domestic coal volumes -10% yoy year-to-date in 2015.*

1.3 US Renewables Build

Impact of the proposed Clean Power Plan (May 2015)



Source: U.S. Energy Information Administration, http://www.eia.gov/todayinenergy/detail.cfm?id=21392

1.4 Thermal Coal Export Price Collapse

Forwards out to October 2021 have thermal coal to US$58/t

Newcastle Export 6,000kcal Thermal US$/t

http://www.indexmundi.com/commodities/?commodity=coal-australian&months=60

http://quotes.esignal.com/esignalprod/quote.action?symbol=NCFQ-ICE

1.5 International Thermal Coal – Key Markets

	Actuals				Estimate	Forecasts						
Calendar Year	**1990**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
COUNTRY												
China	11	8	126	264	240	163	131	105	84	63	44	29
India	0	10	81	142	152	192	167	139	108	72	36	0
Japan	42	93	128	142	145	142	136	131	125	120	115	111
Korea	12	45	90	96	98	100	103	106	109	112	115	117
Taiwan	14	40	58	61	63	63	65	66	67	69	70	71
South East Asia (1)	4	14	53	60	63	67	71	75	79	84	89	95
Western Europe (2)	48	80	98	128	114	102	99	95	91	87	83	79
Rest of world	191	150	172	179	181	184	188	192	196	199	203	208
Total World	**322**	**441**	**806**	**1,072**	**1,055**	**1,014**	**958**	**907**	**859**	**806**	**756**	**710**
United States	2	10	16	7	7	9	9	10	10	10	10	10
Russia	53	25	24	23	23	21	19	19	19	19	19	19
Net World Imports	**267**	**406**	**766**	**1,042**	**1,025**	**984**	**930**	**878**	**830**	**777**	**727**	**681**

(1) This includes only Thailand, Philippines, Malaysia, Pakistan and Vietnam
(2) This includes only United Kingdom, France, Germany, Spain and Italy
(3) Note - This is global traded thermal coal including lignite, and inclusive of non-seaborne trade.

Source: IEA actuals, IEEFA forecasts, International trade, including Seaborne

2. Structural decline?

The Equity markets are factoring in structural decline as an increasingly likely probability.

Coal Equities are proving to be a wealth hazard!

3.1 USA: Peabody, Arch Coal, Alpha Natural Resources

Patriot Coal, Walter Energy and Alpha Natural each Resources entered Chapter 11 in May, July and August 2015 respectively.

Source: Yahoo Finance

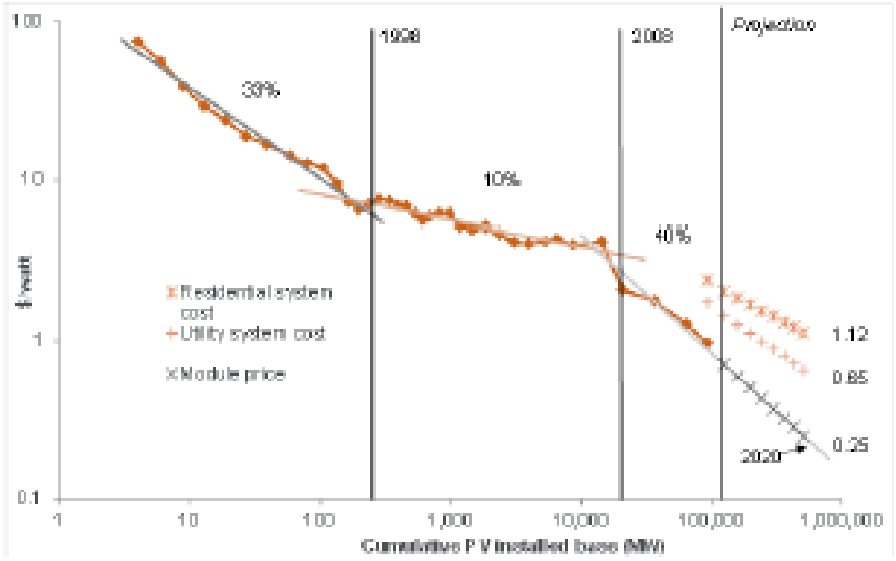
2.2 Australia: Whitehaven, Yancoal, Cockatoo Coal

Yahoo finance

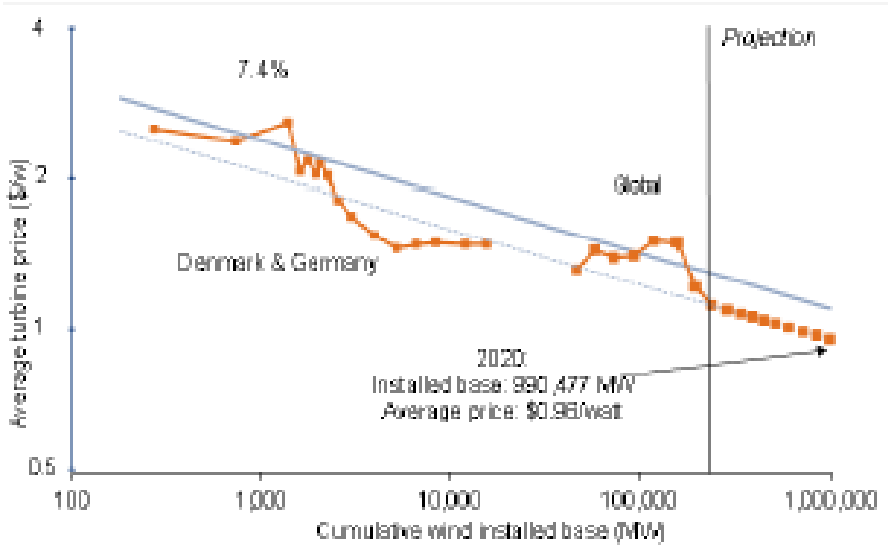
Bandanna Energy in administration.

3 Renewable Energy is deflationary

Solar exhibits potentially rapid learning rates



Learning rates of Wind



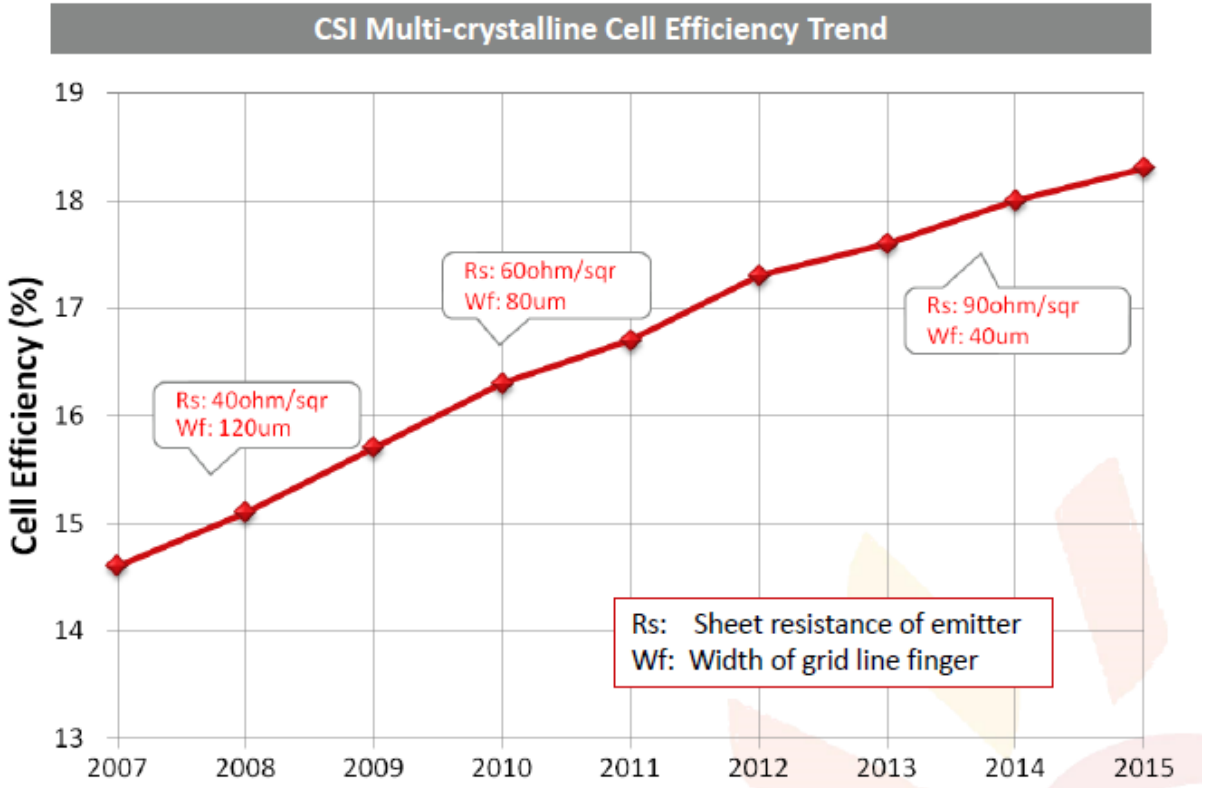
IEA's new solar roadmap has solar halving by 2030.

Source: Citi Commodities, Tony Yuen, June 2014; "*Energy Markets in Transformation*"

3.1 Renewable Energy is deflationary

Canadian Solar Multi-cell efficiency progress

Solar technology gains are continuing to build: unstoppable.



Cell efficiency improved at a rate of 0.5% (absolute) each year

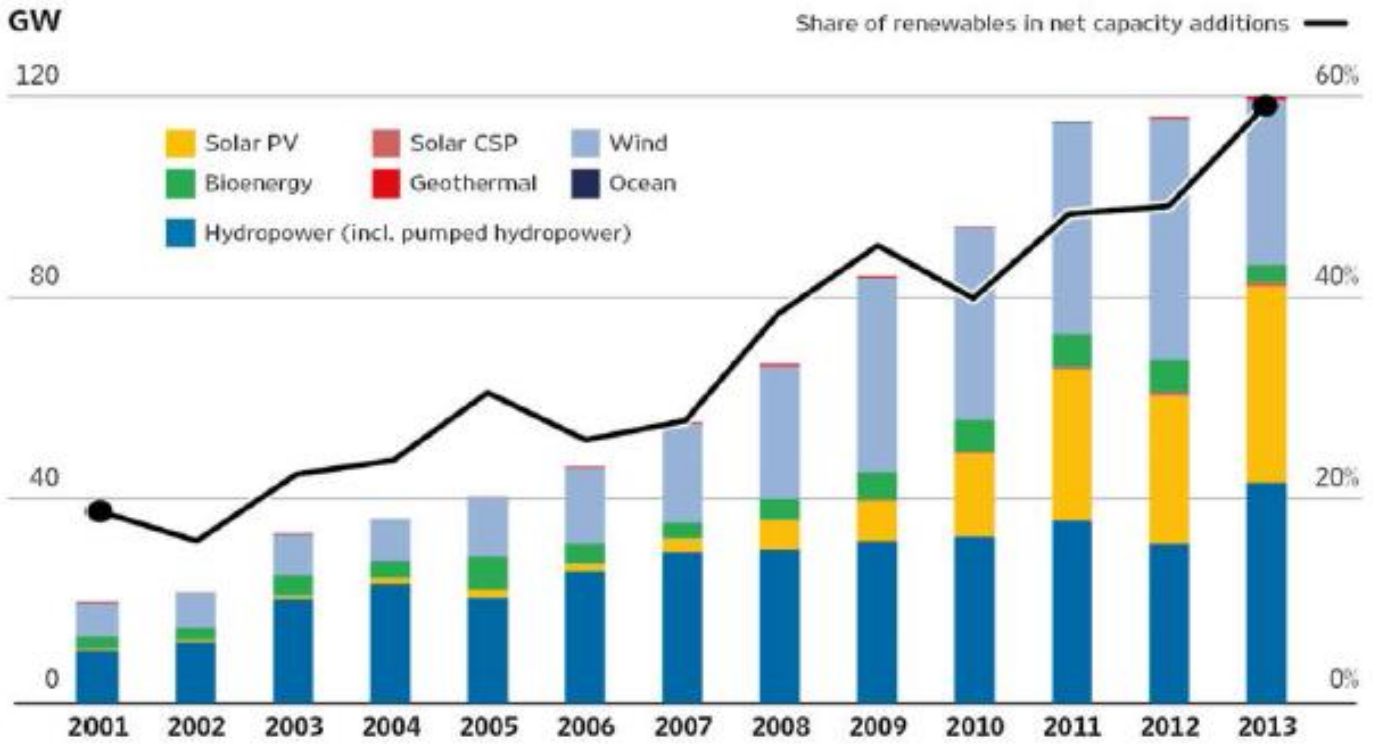
Source: Canadian Solar, May 2015

3.2 Renewables are spreading

New Renewables vs Total Electricity Generation Investment Globally, 2006-14

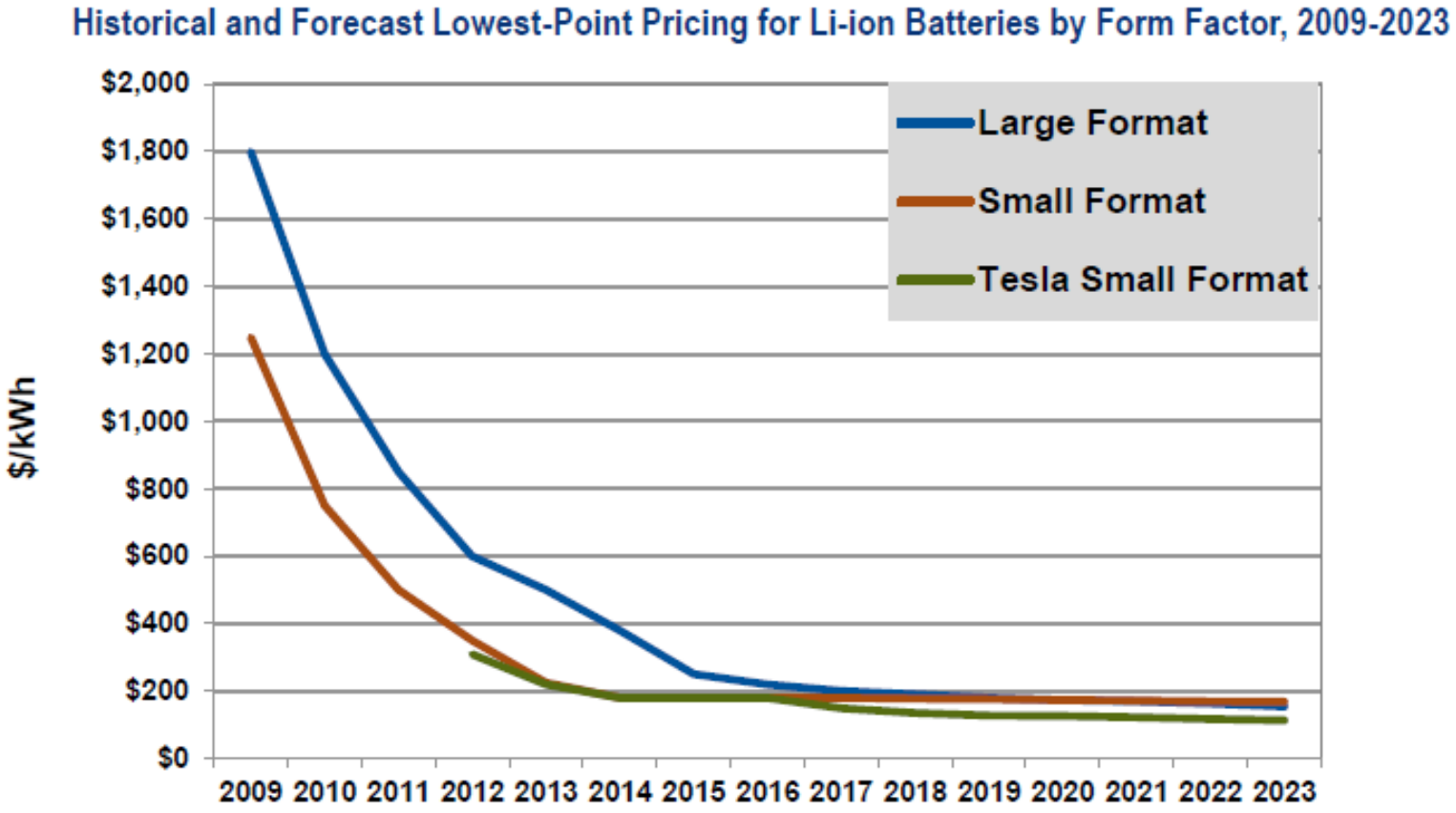
China is adding 200GW new hydro this decade.

Renewable investment again exceeded fossil fuel capacity net additions in 2014, and this trend will accelerate in 2015.



Source: IRENA, Citi Research, 30 March 2015, "Fight for the Future of Energy", Richard Morse

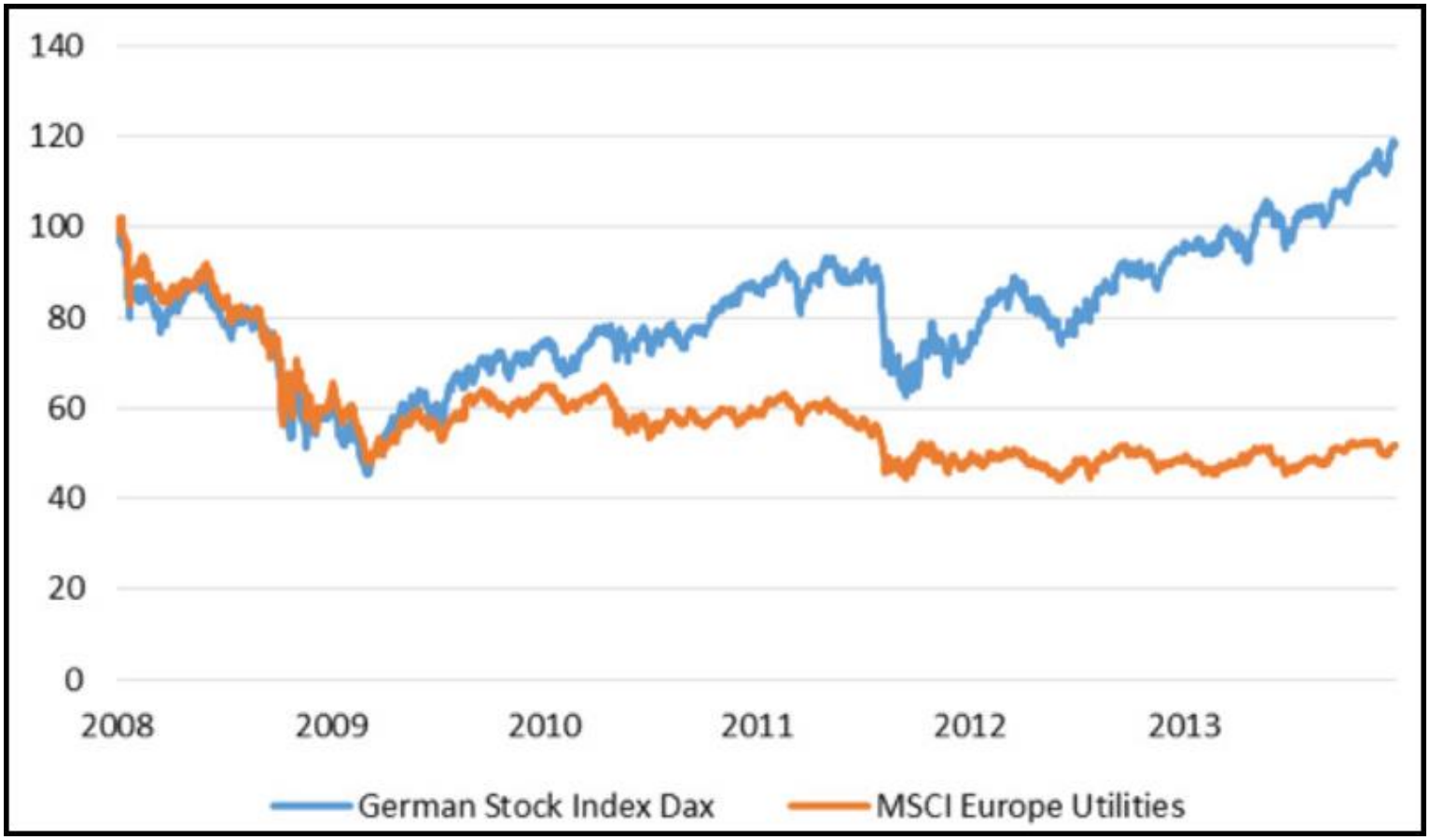
3.3 Storage is coming, rapidly



Source: *Navigant Research, IEEFA NYU Conference, March 2015*

4 Stranded Assets: Utilities & the Grid

European Utilities Share price performance vs DAX (2008-2013)



Source: Carbon Tracker Initiative, June 2015 "Caught in the EU Utility Death Spiral"

4.1 Structural decline means Stranded Assets

Examples of Stranded Assets in Australia:

1. WICET: a $3bn coal port and $1bn rail line, 100% debt financed. ToP liabilities put Bandanna Energy in administration Sept'2014. Cockatoo Coal down 99%.
2. Newcastle Coal Port: Westpac and China Merchants bought this for 27x EV/EBITDA in 2014. T4 A$4.8bn 70Mtpa capacity expansion stranded.
3. CLP A$435m writedown of Yallourn, Feb'2014: "Yallourn has suffered from declining demand and oversupply of base load energy in Victoria".
4. Lanco's Griffin Coal: In 2011 Lanco of India made a $740m WA coal acquisition that has lost money at the EBITDA level ever since.
5. China Shenhua: Has spent A$700m since 2008 on the Watermark coal proposal, over A$1bn of capex and payments to NSW government still to go.
6. GVK Power: Spent US$1.26bn for Hancock's Alpha, Galilee proposal in 2011, was unable to make the final payment in Sept'2014.
7. Adani Enterprise Carmichael proposal: Still to raise A$10bn of capital. SBI refused US$1bn loan. Sacked 6 engineering firms and 80% of staff in July 2015.
8. Queensland LNG export terminals: following a halving of Asian LNG prices post oil collapse, this US$75bn investment is not delivering the expected returns.
9. Whitehaven Coal: A$1.4bn debt refinance March'15 now trading at 80c/$.

4.2 Economic Implications for Australia

83% of Australian coal mines are foreign owned, hence direct leverage of fossil fuels to the ASX is relatively small at 1-2%. However, for Australia the exposure is high, time is needed for transition and the new industry opportunities are significant:

1. Energy Infrastructure: Australia spends $5-10bn pa on electricity / grid sector, much of it a regulated asset base that all ratepayers fund much of it stranded.
   - BNEF estimate of Australia's renewable energy infrastructure investment for 2015-2020 was cut 30% from A$20bn post RET. Lost opportunities.
2. Direct employment: The ABS shows a fall of ~20k from the 2012 peak of 70K from coal mining across Australia, and cuts are ongoing. Indirect employment material.
3. Terms of trade: BZE estimates the collapse in the pricing of iron ore, coal and LNG cuts A$100bn pa from Australia's export revenues by 2030, a halving relative to government budget estimates of 2013/14. Coal was 25% of NSW's total A$ value of exports in 2013/14 (38% of Qld). Australia will be #1 globally in LNG by 2018.
4. The financial sector: is leveraged to mining and associated rail port infrastructure. WICET 80% financed by banks, mostly Australian. Adani's Abbot Point Port is foreign owned, but A$1.2bn of Australian sourced debt. Insurance firms and infrastructure funds are leveraged to fossil fuels vs little RE infrastructure assets. BBY!
5. Rehabilitation: $18bn of unfunded coal mining rehabilitation across Australia.
6. Economic growth: curtailed as Australia fails to develop low carbon industries.

Appendix A: Japan

Japan's thermal coal demand outlook: down 3% pa

1. ***Energy efficiency*** *– 12% decline in electricity demand from 2010-2014 despite 1% pa GDP growth (a 4% pa reduction in electricity intensity)*

2. ***Nuclear restart*** *– The key question is the rate of restarts for the 42GW of idle nuclear capacity – US$50bn of assets sitting idle.*

3. ***Solar surge*** *– Japan installed 7GW in 2013 and 10GW in 2014; part of a 70GW pipeline of approved projects. Offshore wind plan post 2020.*

4. ***LNG vs coal vs oil*** *– relative price moves, Japanese LNG pricing has almost halved in US$ terms over 2014. Japan has signed over 1000Bcf/year of new US LNG supply contracts due online by 2020.*

Appendix B: Korea

Korea's thermal coal outlook: 2% pa growth to 2020

1. ***Energy efficiency*** *– In contrast to Japan, electricity demand has grown 5.3% pa from 2000-2013, higher than the average 4.4% pa real GDP growth (a 1% pa expansion in electricity intensity).*

2. ***Nuclear resistance****- Post Fukushima, public opposition to nuclear is limiting the growth in the existing 21GW of nuclear capacity (27% of mix).*

3. ***Renewables*** *– Again in contrast to Japan, Korea has made no material progress in renewable energy installations. Hanwha Solar is now a top 10 global solar industry supplier. Offshore wind plan from 2020.*

4. ***LNG vs coal*** *– Korea's US$16/t coal tax in June 2014 (raised to US$21/t in July 2015) and the Jan'2015 commencement of the National ETS at US$8/t combine with the collapse of US$ LNG prices over 2014 to improve LNG's relative competitiveness.*

Appendix C: EU

European Union thermal coal outlook: down 3% pa to 2020

1. ***Collapsing UK coal use –*** Total 2014 UK coal demand was 48.1Mt, down 20% on 2013. UK coal-fired generators now have to pay the CPS tax (in addition to the EU carbon price) of £18/ton of CO2 for 2015/16 (up vs 2014's £9/t CO2).

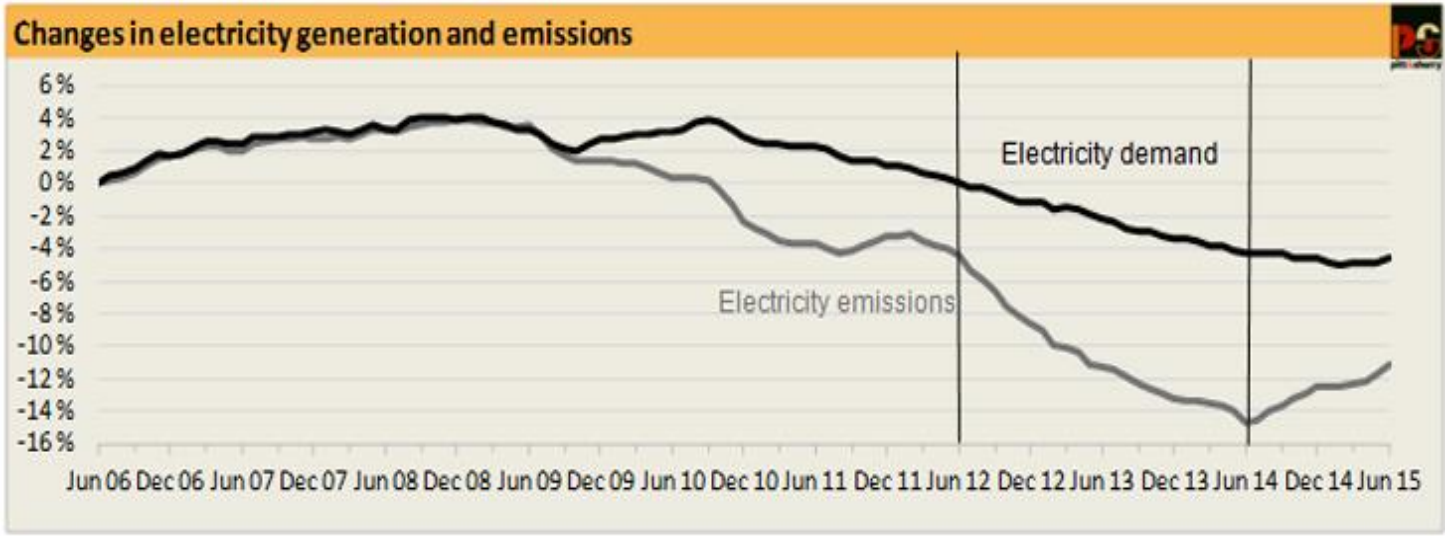
2. ***Collapsing French coal use –*** *Output from French coal-fired plants fell in 2014 to its lowest level since at least 2007. Coal-fired output in 2014 fell to 8.4TWh, down 58% from 19.9TWh in 2013, accounting for only 2% of the energy mix. Coal-fired power in 2007 generated 26.7TWh, 5.3% of electricity generation.*

3. ***Coal power plant closures*** *– Net coal plant closures continues across West Europe (Poland and Turkey are exceptions) driven by the Large Combustion Plant Directive. German black coal mining to cease by 2018.*

4. ***Renewables*** *– The EU's wind energy push continues. Wind generated 10.2% of EU electricity in 2014 vs 8% in 2013 (6.3% in 2011). Offshore wind is building. Germany targets 40-45% renewable electricity by 2025 and 55-60% by 2035.*

Appendix D: Stranded Assets: the Grid

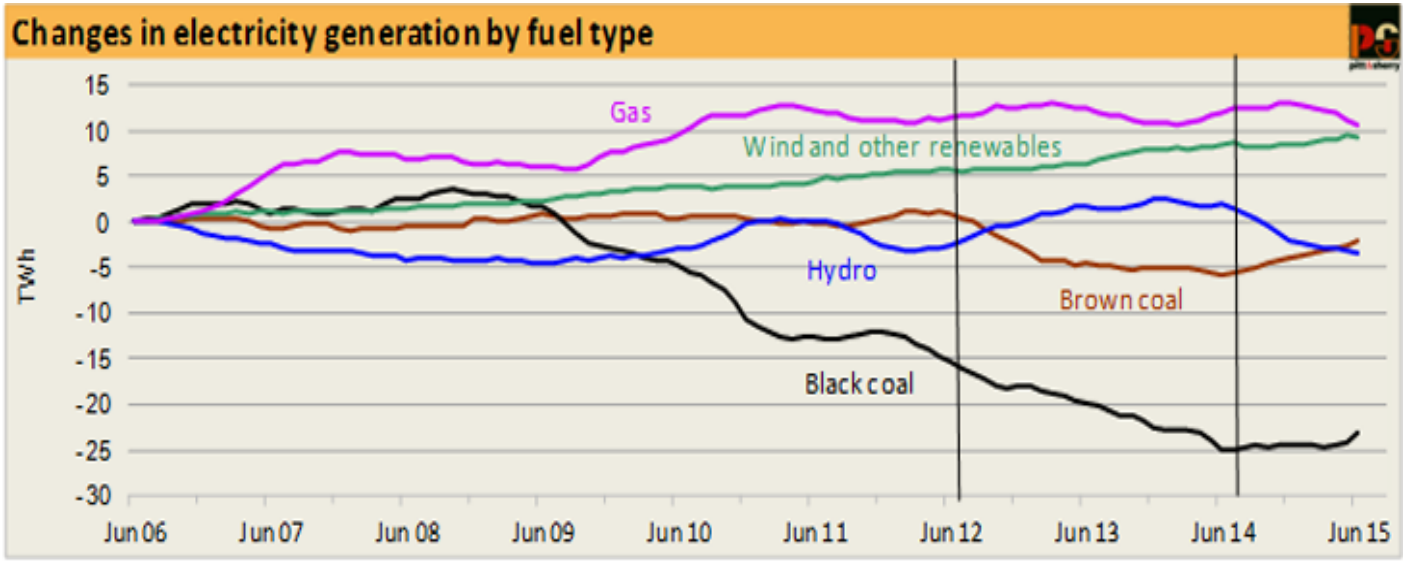
Australian NEM Electricity Demand and Emissions (2006-2015)



Source: AEMO

Appendix D: Stranded Assets: the Australian market

NEM, Changing sources of supply (2006-2015)



The Abbot government's plan is working – reduced electricity supply from low emissions sources (hydro and gas down), maximising supply from most emissions intensive sources (black and brown coal up).

Source: AEMO

- **DISCLAIMER**

- The Institute for Energy Economics and Financial Analysis (IEEFA) is a not-for-profit research Institution organized under Internal Revenue Code 501(c)(3) of the United States.
- The authors of this presentation are not brokers, dealers or registered investment advisors and do not attempt or intend to influence the purchase or sale of any security.
- This presentation is intended for informational and educational purposes only. This presentation is not a solicitation, an offer, a recommendation to buy, hold, or sell any securities, products, service, investment or participate in any particular trading scheme in any jurisdiction. The presentation is not and shall not be used as part of any prospectus, offering memorandum or other disclosure attributable to any issuer of securities. No individual or entity is authorized to use the information contained herein for the purpose or with the effect of incorporating any such information into any disclosure intended for any investor or potential investor. This presentation is not intended, in part or in whole, as financial advice.
- The information and opinions in the presentation constitute a judgment as at the date of the presentation and are subject to change without notice. The information and opinions contained have been compiled or arrived at from sources believed to be reliable and in good faith, but the authors do not represent and make no warranty, express or implied, as to the accuracy, completeness or correctness contained in this presentation. The authors do not warrant that the information is up to date. All information provided expressly disclaims any and all warranties, express or implied, including without limitation warranties of satisfactory quality and fitness for a particular purpose with respect to the information contained herein.
- All information contained herein is protected by law, including but not limited to Copyright Law, and none of the information contained herein is to be copied or otherwise reproduced, repackaged further transmitted, transferred, or redistributed for subsequent use for any such purpose in whole or in part, in any form or manner or by any means whatsoever, by any person without prior written consent from the authors.

- **JURISDICTION**
- The authors do not make any representations that the use of information contained herein is appropriate for use in other locations or that may access this information from outside of the United States.
- This document is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or would subject the Institute to any registration or licensing agreement within such jurisdiction.