Neo-Carbon Energy
Down Under
Australian energy case

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For WP1:
New Case
Different from other cases
Paradoxical
Energy + Futures Studies
Australia + China
Facts about Australia

- Australia is a federation that consists of six states (New South Wales, Queensland, South Australia, Tasmania, Victoria and Western Australia) & 10 territories
- The estimated resident population 24 million people (2016)
- Total area of mainland is 7.69 million square km, making Australia the world’s largest island - but smallest continent
- Three levels of government
  1) The federal Australian Government
  2) The governments of the six states and two territories
  3) Ca. 700 local government authorities
- Monarchy, Queen Elizabeth II
- Two major political groups that usually form federal/state government, the Australian Labor Party, and the Coalition of the Liberal Party and its minor partner the National Party.
- This majority party/coalition becomes the government.
- The other major political party or coalition is called ‘the opposition’. This is decided in an election by citizens

Sources:
Australia exports around 80% of its ENERGY PRODUCTION.

Coal-fired electricity generation decreased by 7 per cent in 2012-13, but remains the largest source of electricity generation in Australia at 64 per cent, followed by natural gas (21 per cent), which increased by 5 per cent, and renewable energy (13 per cent), which increased by 26 per cent.
The export market accounts for 83% of Australian energy extraction.

Energy exports in 2013-14 were approximately 15,718 PJ, an increase of 2% from 2012-13.

Australia’s main exports were black coal (10,578 PJ or 67%), uranium (3,149 PJ or 20%) and natural gas (1,267 PJ or 8%).

The Mining industry was the largest supplier of energy in 2012-13, supplying 19,622 PJ of total energy worth $75 billion.

While this was a 1,956 PJ or 11% increase on 2011-12 volumes, the value of energy supplied by the industry fell by 11% or $9 billion.

Black coal supply increased by 9% or 905 PJ from 2011-12 to 2012-13.

However, the value of black coal supply fell by 19% or $9 billion due to falling prices.

Imports of crude oil and petroleum products (petrol, diesel and other refined fuels) were valued at $17 billion each.

Together these two products comprised 96% of the value of energy products imported ($35 billion) into Australia in 2012-13.
Net Energy Use by Industry

- Extensive non-renewable energy resources, including oil, coal, gas and uranium
- Australia possesses ca 10% of global recoverable black coal resources

• Energy use per Australian household decreased by 1 GJ from 2012-13 to 2013-14 at the same time as the number of households increased by approximately 165,000.
• Since 2002-03, energy use per capita has decreased by 5% and per household by 7%
• The total energy use by Australian households has increased by 13% from 2002-03 to 2013-14, while the number of Australian households increased by 21% and the population grew 19%.
• Household renewable energy extraction has increased by 38% from 2002-03 to 2013-14 including an increase of 5% from 2012-13 to 2013-14.
2015: Renewable Energy Target (RET)

- More than 23.5% of Australia’s electricity being derived from **renewable sources** by 2020.
- The 33,000 gigawatt hour Renewable Energy Target will not be reviewed until 2020. This will give the renewable energy industry the certainty it needs to grow.
- The Clean Energy Regulator will provide an annual statement to Parliament on how the scheme is tracking towards the 2020 target, and any impact the RET is having on electricity prices.

2015 Energy White Paper

An integrated Australian energy policy framework by the Australian Government

**Vision for the energy sector**

<table>
<thead>
<tr>
<th>Competitively priced and reliable energy supply to households, business and international markets through:</th>
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<tr>
<td>1. <strong>competition</strong> that will improve consumer choice and put downward pressure on prices</td>
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<td>2. the more <strong>productive use of energy</strong> to lower costs, improve energy use and stimulate economic growth</td>
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<td>3. <strong>investment</strong> to encourage innovation and energy resources development to grow jobs and exports</td>
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The Paradox

- Australian solar industry [...] pioneers the best technology in the world
  - i.e. UNSW School of Photovoltaic and Renewable Energy Engineering
- The highest rates of solar penetration and lowest costs in the world at a residential level
- Renewable energy becoming cheaper than new-build coal
- RE an enormous export opportunity
- Yet: Coal-fired power industry supported with subsidies, fossil fuel research supported

"Australia is not an innovation nation, it’s an inertia nation"
- Danny Kennedy 2015

Sources: 1) Kennedy (2015)
Photo: CSIRO [CC BY 3.0 (http://creativecommons.org/licenses/by/3.0)], via Flickr, Wikimedia Commons
**Australian Energy Landscape**

**Australian energy production**

*Australia has world-class SOLAR, WIND AND GEOTHERMAL resources and good potential across a range of other renewable energy sources.*

**Energy generation in Australia**

TRENDS 2012-13

- **coal**: -7%
- **gas**: +5%
- **renewables**: +26%*

*Mostly due to hydro*

National Energy Productivity Plan 2015–2030 (NEPP)

WHY improve energy productivity?
- Boosting competitiveness and growth
- Helping families and business manage their energy costs
- Reducing greenhouse gas emissions

WHAT are our goals?
- Energy systems that deliver least cost energy in the long term interests of consumers
- More informed energy consumers managing their energy bills

HOW will we get there?
- Encouraging more productive consumer choices through:
  - efficient incentives
  - empowering consumers
  - helping business compete
- Promoting more productive energy services through:
  - innovation support
  - competitive modern markets
  - consumer protections

Examples of NEPP measures

Figure 1: Examples of NEPP measures

Illustrative examples

Industry
- Help business self-manage energy costs
- Recognise business leadership and support voluntary action
- Research business benchmarks and success factors
- Reduce barriers to financing

Agriculture & Other
- Cars
  - Improve light vehicle efficiency
  - Drive innovation in transport and infrastructure systems

Mining
- Commercial Buildings
  - Expand commercial buildings ratings and disclosure
  - Advance the National Construction Code
  - Improve energy productivity in government

Manufacturing
- Residential
  - Make choice easier
  - Deliver a new Equipment Energy Efficiency (E3) prioritisation plan
  - Support best practice services for vulnerable consumers
  - Improve residential building energy ratings and disclosure
  - Improve compliance with building energy efficiency regulation

Freight & Commercial Transport

Energy Cost Savings

Market Benefits

New and Innovative Products and Services

Energy Market Reforms
- Emerging technologies in the electricity system
- Transition to cost reflective energy pricing
- Competitive smart meter rollout
- Develop an Energy Use Data Model for better planning
- Deliver a Gas Supply Strategy

Innovation
- Support innovation and commercialisation
- Promote best performers
- Collaborate internationally

New South Wales has the largest renewable energy and sustainability sectors in Australia.
Backed by major government and private sector initiatives.
Abundant and world-class renewable energy resources.
Well positioned to attract future investment.
Research and development facilities paving the way for performance improvements across all major renewable energy sources.

National Solar Schools Program (-2013)

Over $217 million was provided to 5,310 schools (or almost 60 per cent of all Australian schools) to install renewable energy systems, rainwater tanks and a range of energy efficiency measures.

- The solar power systems installed produce enough electricity to power the equivalent of 4600 average households every day.

- The funding helped to educate students about renewable energy and energy efficiency, and that everyday actions can prevent the production of millions of tonnes of carbon pollution.

The Solar Towns Programme

- Part of the Australian Government’s commitment to reduce greenhouse gas emissions
- Funding of $2.1 million (GST exclusive) is provided for the programme to support community organisations who wish to install a renewable energy system (solar photovoltaic panels or a solar hot water system only) on an existing building that provides support to the local community.
- The Australian Government has made a commitment to install renewable energy systems in preselected community sites and regions.

Hong Kong meetings with foresight analysts and Finnish Consulate: Justine Tang, Les Hales, Alan Lung, Consul General, Innovation Consul, Technology Innovation Centre estbl.
Melbourne Futures HUB Roundtable 19.11.2015
with foresight and energy experts + urban solutions
Swinburne University of Technology/Peter Hayward/Richard Slaughter

Charles Brass AHRI Convention 2014 Future of Australians at work 2020
https://www.youtube.com/watch?v=SeDD-f3Lcgk

Automotive manufacturing ends in Australia
CSIRO urban solutions
Australia’s growth and way of life is underpinned by access to affordable and sustainable energy sources. CSIRO leading the way in the development of low cost, environmentally friendly production methods and flexible materials that could change how and where photovoltaic energy can be generated.

In the lead-up to December’s Paris climate change conference, the Australian Government committed to the target of reducing greenhouse gas emissions by 26-28 per cent below 2005.
Mobile portable & foldable PV
-> Mobile café van

Visiting Lecture + expert discussion at Univ. Sunshine Coast, Australia. Faculty of Art and Business. Futures Program Co-ordinated by Dr. Marcus Bussey (Graduate Certificate in Futures Studies).
Sustainable Development
MOOLOOLABA
Permaculture Village CRYSTAL WATERS

Prof. Sohail Inayatullah
Developer of CLA method
See CLA Game Report:
BRISBANE

QUT Queensland University of Technology + urban solutions

Solar-powered Christmas tree
SYDNEY
Vulnerable to Flooding

A vision of Brisbane
in 2070

Meeting with Sandvik repr.
Sydney meets with Club of Rome members + Gov repr. + urban solutions + Coal Moratorium

Feedback for Scenarios

There is no moral case for further use of coal.
— Ian Dunlop, former Shell executive and former chair of the Australian Coal Association

Push for global moratorium on new coal mines by leading scientists and economists
A collection of some of the world's leading scientists and economists will today publish an open letter calling for a global moratorium on new coal mines. The...
Kiribati, an island republic in the Central Pacific, comprises 33 coral atolls stretching along the equator. With lagoons and white-sand beaches, many of its islands are uninhabited, offering a remote setting for fishing, diving and bird-watching.
NEXT in Phase II

Working paper on Australian results
Feedback from the interviewees
Criteria for evaluating the potential of neo-carbon scenarios for case countries
Electricity markets reflections per case

Thank You!
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REFERENCES


