

Impacts of an emission trading scheme on a diversified, vertically integrated energy company

Carlo Botto
Director, Portfolio Management



Oz Carbon Trading – 31 May – 1 June 2007



Introduction

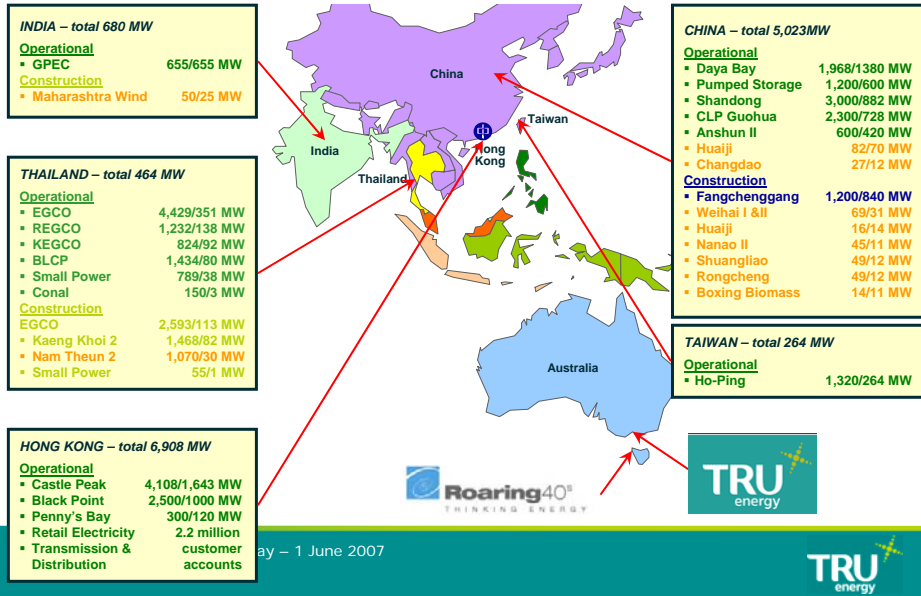
- Company background
- Impacts of emissions trading on generation business
- Implications of emissions trading on retailing business
- Major risks that carbon trading represents for a vertically integrated energy company

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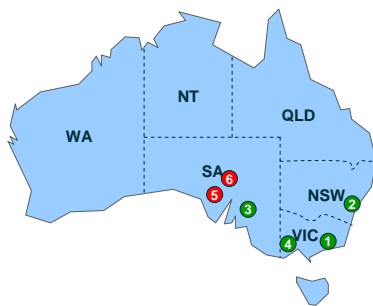


CLP Group portfolio

China Light & Power since 1901



Who is TRUenergy?



TRUenergy	Gross MW	% Net Equity
1 Yallourn	1,480	100%
2 Tallawarra (under construction)	400	100%
3 Torrens Island	1,280	100%
Ecogen Hedge (contract)	966	100%
4 Iona Gas Storage (capacity)	12 PJ	100%
SEAGas pipeline between Victoria & S. Australia		33.33%
Customer #		
Retail gas and electricity	>1.2 million	
GreenPower Products	30,893 (residential)	575 (commercial)
New GreenPower sources:		
5 - Wattle Point wind farm	90.75	75%
6 - Cathedral Rocks wind farm	66	100%

Current Emission Intensity: 1.25 tCO₂/MWh

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Why does TRUenergy support a price on carbon?

- Electricity generation and use is central to the debate on climate change which is why TRUenergy needs to be driving the process to alleviate the emissions from both a generator's and retailer's perspective
- TRUenergy seeks the early introduction of a price on carbon in the form of an emission trading scheme to reduce uncertainty for existing owners and allow investors to deploy new, cleaner technologies

Why Emissions Trading?

- A traditional cap and trade emissions trading scheme provides environmental certainty and clarity to the market about the environmental goal being pursued, whereas a tax makes the price of carbon certain (for a period) at the expense of environmental certainty
- It encourages abatement activities in markets where price signals are likely to have an influence
- It is technology-neutral and allows the market to seek out the least-cost ways of achieving any particular emission cap
- It facilitates trading in future emission permits which reduces investment risks in the power and energy intensive industry sectors
- A cap and trade scheme minimises costs but must be complemented with strong incentives for low emission R&D technology policies and energy efficiency policies that address market failures

Why an emissions trading scheme now?

- Clear signals by government policy in relation to emission trading will assist with **reducing uncertainty** faced by investors in energy markets and among energy intensive industries
- Taking action in the near future may allow Australia to follow a smoother adjustment path to a carbon constrained economy
- In the absence of a price on emissions, there is little incentive to deploy lower emission technologies to reduce greenhouse gases (although technology development policy is also needed)
- Economic modelling indicates that it is possible to reduce greenhouse emissions without major overall economic disruption if there is sufficient flexibility and efficiency of an emissions trading model to maintain a low permit price
- Domestic action forms part of a persuasive position on climate change in the international arena
- Experience in establishing and operating a carbon trading market to position Australia in a future carbon constrained economy
- Politically, the public wants to see solutions that can tackle climate change sooner rather than later

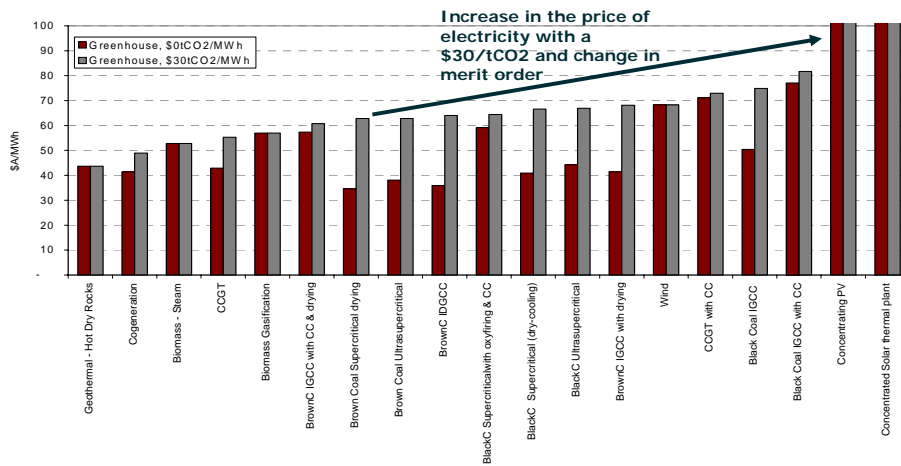
Impacts of emissions trading on generation business



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Generation cost and electricity prices



Fossil fuel generators would need to purchase or submit grandfathered permits to emit GHG when they generate electricity, which adds to their short run marginal costs and directly increases wholesale electricity prices → make low-emission generation more competitive



New generation mix resulting from increased price

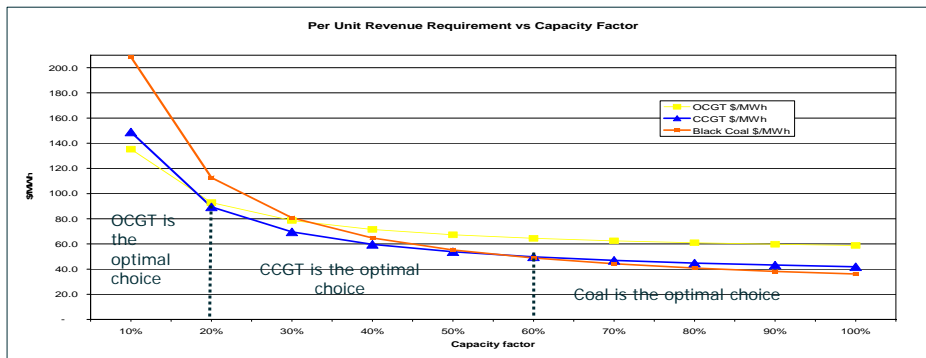
- Change merit order among **existing** generators in the short term, switch from higher carbon intensive plants to lower carbon intensive plants e.g. switch from coal to gas
- **Change capacity mix** – build less carbon intensive plants/technologies instead of new coal plants
- Build new plants and displace generation from existing plants



Existing Plants
 Additional assets to satisfy additional demand
 Replacement of existing assets

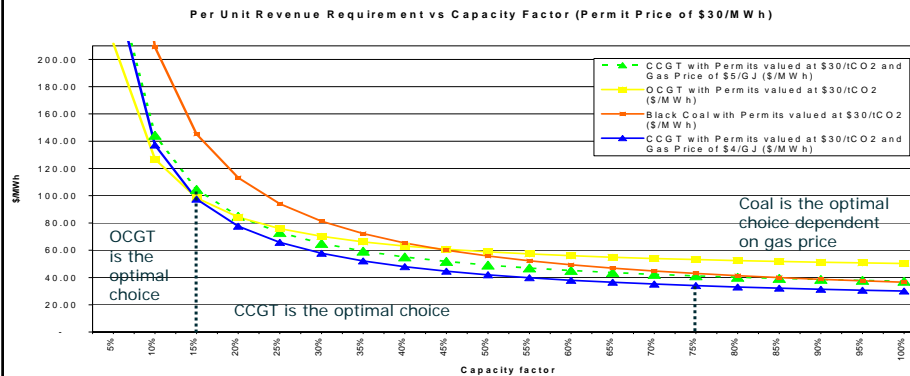
Emission trading should enable utilities to make optimal adjustments to their portfolio, such as expansion into the gas sector or involvement in energy substitute technology such as carbon sequestration

Current merit order of technologies w/o carbon cost (\$/tCO₂/MWh)



- If the plant is needed only to meet peak demand for a few hours each year, then low fixed costs of OCGT technology makes it the optimal choice
- Past approx 20-30% capacity factor, the high variable costs of OCGT technology makes it uneconomic and CCGT becomes the optimal choice
- For capacity factors greater than 60%, coal becomes the optimal choice

New merit order of technologies with carbon cost (\$30/tCO₂/MWh)



- The cost differential between gas fired generation relative to black coal will determine whether or not gas will continue to be restricted in a peaking role
- A carbon signal will be decisive in leading gas to become economic for intermediate and even baseload (subject to gas reserves)

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Adjustments to the generation portfolios

- Abatement is low in the early years of the scheme and largely occurs as a result of fuel switching to low emissions intensity such as gas
- Investment in new coal-fired capacity will be lower under emissions trading than in the BAU case but coal fired generation will continue to be the dominant source of electricity for the next 15-20 years depending on the carbon price (currently 84% of energy production comes from coal)

NETS modelling key sources of abatement after 2020 suggests:

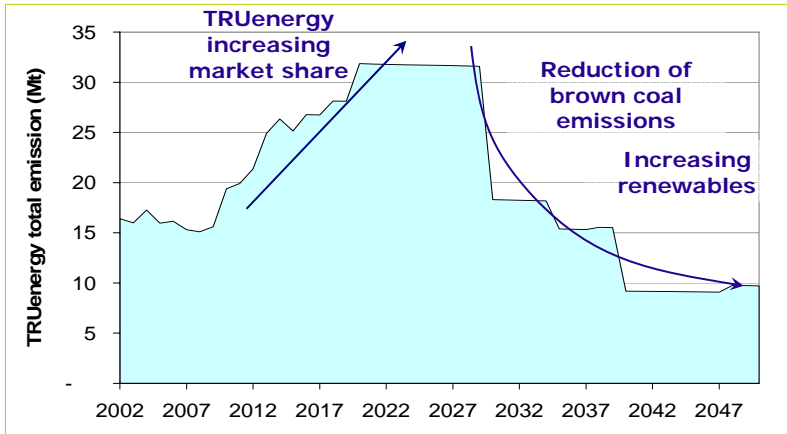
- Gas fired electricity generation sector is expected to increase driven by permit prices → operate more like baseload plant than intermediate plant
- A market increase in the level of renewable generation capacity → largely wind and biomass and some hydro upgrades
- Conversion of IGCC to include pre-combustion carbon capture and storage post 2020 when permit price rises to \$30/t CO₂
- **Energy efficiency has the largest impact on the timing and amount of new capacity**

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Growth challenge for TRUenergy

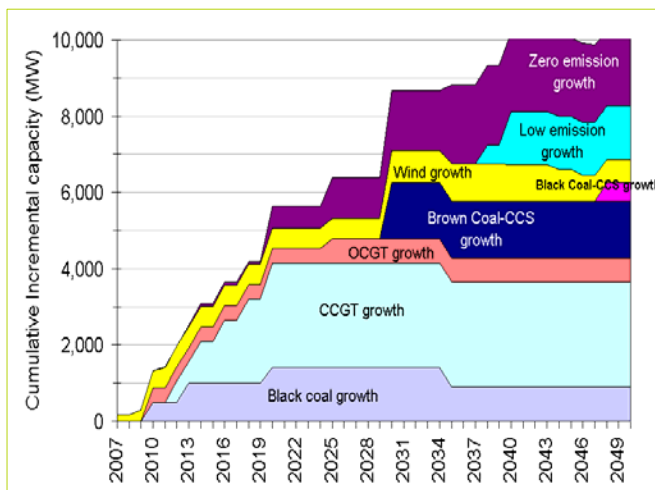
The major challenge for TRUenergy is how to continue growing its market share and investing while reducing its emission profile



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Strategy to deliver on growth and reduce our emission profile



This adjustment to our generation portfolio can be achieved through:

- driving significant growth in gas-fired generation from 2010 onwards
- leading the development and implementation of renewables technology to provide reliable and economic intermediate generation capacity by 2020
- investment in developing zero emission technology and clean coal technology

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Permit allocation for incumbents

- An emission trading scheme is proposed to be introduced in the middle of an asset cycle
- TRUenergy and other incumbents are making choices to invest in a carbon constrained world, but our existing value is tied to our existing assets, including coal-fired generation
- TRUenergy generation portfolio and most of Australia's electricity currently relies on a high emission intensity fleet
- For an industry that is highly emission intensive, an emissions trading scheme is a good policy option **provided an allocation policy deals with existing asset values appropriately**

Compensation is required because:

- emissions trading would represent the introduction of a new market. Compensation to existing assets is required to mitigate sovereign risk
 - Australia would otherwise be subject to a higher risk premium and become less attractive place for capital investment made in good faith
 - Current owners are also potential future investors

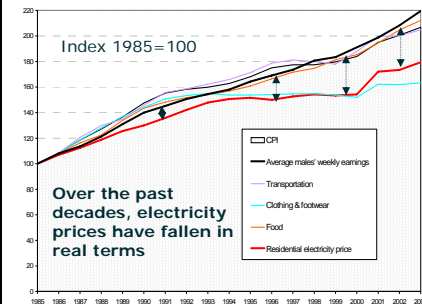
Implications of emissions trading on retailing business



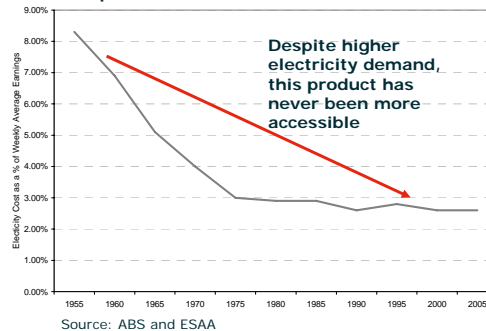
Source: Solar Systems

Electricity affordability

Price index of residential electricity, other selected goods and services and income



Household average weekly expenditure of fuel and power



At current prices, energy is a relatively minor component of household expenditure. In 2003-04, Australian households spent, on average, 2.6 per cent of their total expenditure on domestic fuel and power (exclusive of motor vehicle fuels). This amounted to around \$24 per week.

Retail cost of electricity with CO₂

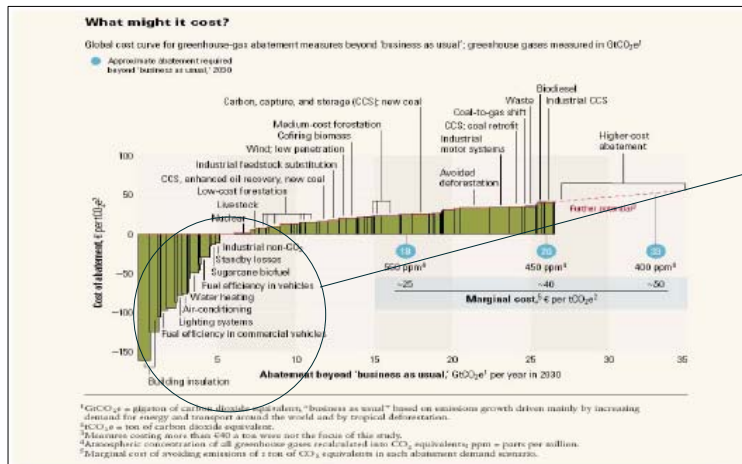
- Policy makers must strike a balance within several objectives:
 - maintaining a competitive generation industry
 - reducing CO₂ emissions
 - maintaining reasonable retail electricity price
- Australians are among the largest consumers of electricity and the highest emitters of carbon per capita in the world → According to the CSIRO each Australian now emits more than five tonnes of carbon a year - a figure equalled in the world only by US citizens. Moreover, over the past 25 years, the average growth rate of Australian emissions has been approximately twice that of the US and Japan, and five times that of Europe
- The effectiveness of an emissions trading scheme in achieving reductions in emissions is predicated on the carbon signal it creates and the flow-through impact of this carbon signal to the final price of energy → It is, however, important that consumers have as much information about this carbon signal as possible, which means that retail tariffs must be reflective of the carbon price signal (wholesale price constitutes about 40-50% of the end-users retail price)

Retailers' challenge is to manage price shocks for customers to adjust to higher new electricity prices in the following ways:

- education about the impact of greenhouse gases on the planet
- ability to adjust smoothly either through paying more or reducing consumption

Retailer as service provider of energy efficiency

There is significant abatement from measures that are either independent of technology or rely on mature rather than new technologies



DSA and energy efficiency measures make good sense today and represent an extra revenue per tCO₂ abated rather than a cost → TRUenergy's new role is to advise customers on those activities and help them implement them

A cost curve for greenhouse gas reduction, MckinseyQuarterly 2006

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Retailer as service providers of low carbon products

We are witnessing a radical change in consumer attitude to electricity:

- climate change has changed the perception and interest of the consumers for electricity. It has always been considered as a basic product that never interested the consumer
 - "sexiness" of electricity as a product has increased
 - increasingly, consumers associate electricity with their social values and are paying more and more attention to the source of their energy.

→ This will lead to a change of business model for retailers to become service providers

Currently TRUenergy:

- ✓ offers a range of green energy products (Go Green) to its residential customers
- ✓ participant in AGO Greenhouse Challenge Plus Programme
- ✓ An ongoing commitment to lowering the emissions intensity of existing operations through Research and Development into Greenhouse Gas improvement projects of Coal technology.
- ✓ currently reviewing its positioning as a 'sustainable' organization and taking the time necessary to deliver a position of substance



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Major risks that carbon trading represents for a vertically integrated energy company



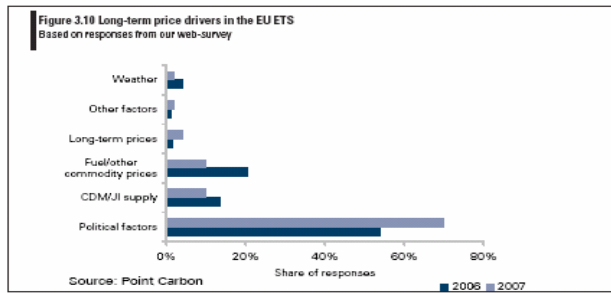
Cathedral Rocks Wind Farm

Future market challenges

- Ensuring the introduction of a carbon cost is done in ways that allow effective mitigation action to reduce impact
- Alignment of costs and risks with those best placed to manage them, and alignment of incentives to ensure effective and efficient emission reduction
- Does not harm suppliers and consumers for past investment decisions made in good faith
- Proper and adequate regulation to provide market participants, particularly retail customers, with confidence in market integrity
 - stamp out “Greenwashing” and other unscrupulous marketing behaviour
 - maximise transparency and predicability in market
 - minimise *ad hoc* government intervention or changes

Political risk

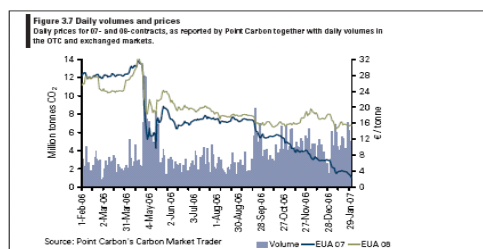
- Uncertainty about future regulations is the largest risk in the carbon equation → Companies need long term assurances on permits and caps to factor them into plans for capital investments
- Moreover, there is no guarantee that political decisions in the future will not impact the trading scheme
- In the EU ETS, although fundamentals like fuel prices and weather have seen a high correlation with the EUA price over major parts of the year, the price crash in April 2006 was caused by the verification of emissions which was a decisive factor for the EUA price level



Source: Point Carbon, 2007, Carbon 2007,

Trading risk

To reap the benefits of emissions trading, deep and liquid markets and well designed rules are important → danger that an immature market is prone to volatility particularly in the initial stages



Source: Point Carbon, 2007, Carbon 2007,

Early experience in the EU ETS highlighted a number of important issues:

1. long term confidence in the future of the scheme
2. impact of insufficient information on prices → release of first data on actual emissions from the scheme's participants in April 2006 led to a dramatic correction in price as the data showed that the initial allocation exceeded emissions in most sectors of the scheme
3. difficulty in ensuring scarcity in the market
4. need for robust administrative system

Broadening the scope of the scheme will tend to lower the costs and reduce volatility → other sectors of the economy should be included, as a scheme that only impacts a third of the problem will not be able to solve the problem

Business transformation

- TRUenergy as a retailer, will need to manage price increases and assist customers in the transition to new energy prices as well as explaining the reasons for increases
 - **Education**
- TRUenergy and other retailers will have to incentivise customers to reduce their energy consumption and adopt energy efficiency measures to deal with the changes
 - **De-commoditisation**
- Both changes will lead retailers to adapt to this new carbon constrained economy by providing a new service in the form of a reduction of carbon in conjunction with providing energy
 - **Shift in business model**

Conclusion

- There is currently a climate of significant regulatory uncertainty. The challenge is to manage the introduction of a new cost for emitting carbon dioxide and other greenhouse gases, and the impact on our key stakeholders. These include:
 - government/NGOs – ensuring good, balanced policy is introduced so that policy objectives are met without unnecessary damage to business
 - customers – managing introduction of new costs, and delivery of new services and products
 - equity and debt - explaining how we are planning to effectively manage the costs/risks and the new opportunities.
- New carbon markets are introducing significant risks and opening up opportunities for business to diversify and grow. TRUenergy as a vertically integrated utility, is:
 - managing the carbon risks associated with its existing and future portfolio of physical energy assets
 - translating its business model from commodity provider to service provider to end-use customers