TOTAL ENVIRONMENT CENTRE

# NEW COAL OR ENERGY SAVINGS?

# The True Costs for NSW Consumers

Report by Total Environment Centre

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**For further information contact:**

Jeff Angel
Total Environment Centre
2/362 Kent St
Sydney, 2000

Ph: 02 9299 5680
02 9299 5599
Fax: 02 9299 4411
www.tec.org.au

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Ph: 02 9299 5680 / 02 9299 5599  Fax: 02 9299 4411 www.tec.org.au

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## SUMMARY OF CONCLUSIONS

New coal-fired power means higher electricity bills for NSW consumers. The actual cost of the proposed 1500MW expansion at Mount Piper is equivalent to $9.4 billion at current prices. This is equivalent to $3915 for every current household in NSW, compared to $500 with an energy savings strategy.

The capital cost of the proposed 1500MW expansion of the Mount Piper coal-fired power station has been estimated at $2 billion. This amount, however, only includes the cost of the new generation plant. It does not include the fuel, necessary network infrastructure that would be needed to deliver the power to homes and businesses or the cost of greenhouse gas emissions. When the full costs of 1500MW of new coal-fired generation are included, the actual cost to NSW consumers of the proposal would be $9.4 billion over the 30 year life of the power station.

In contrast, NSW could reduce its base-load demand growth by half from 2.8% pa to 1.4% pa by following the Californian example. The cost of reducing energy demand in NSW by 1500MW over 30 years would be around $1.2 billion. This is equivalent to $500 for every household in NSW. To achieve this, the NSW Government would have to extend the life of the Energy Savings Fund and secure it against use for any other purposes.

Reducing demand growth by half over 30 years would save consumers $2.2 billion on their energy bills.

The proposed expansion of the Mt Piper power station would only supply base-load demand for 4 years based on current demand growth projections, after which time additional measures to address increasing demand would be necessary. Energy savings measures, however, could address base-load demand until 2027, allowing time to reduce demand even further or invest in renewable and other low emission generation.

Coal is the wrong fuel for NSW energy demand. Base-load energy demand is growing at a slower rate than peak-load demand. NSW needs to address peak-load. Peak-load is most effectively met by demand management or gas-fired power. Based on average demand growth of 2.8%pa, new capacity or even new *base-load* energy savings is not needed until 2015.

New coal will create unnecessary risks for the NSW economy. These are:

- the likelihood of creating an expensive 'supply overhang' similar to that created in the 1980s with investment in unnecessary base-load (coal) capacity; and

- under any reasonable greenhouse gas emissions pricing regime, new coal-fired generation is a massive liability to its owners, the Government or to whichever party assumes the risk.

The cost of greenhouse gas emissions is likely to rise. If they do, the cost of the proposed plant would be even higher. Under the current European Union Greenhouse Gas Emission Trading Scheme (EU ETS), for example, the cost of emissions would add an extra $5.7 billion to the cost of the proposed expansion of Mt Piper, bringing the total cost to $15 billion or $6244 per household in NSW.

# The Real Cost of New Coal for NSW Consumers

## 1. The real cost of new coal for NSW consumers[1]

Estimates of the cost of the proposed 1500MW expansion of coal-fired generation at Mt Piper have focused on the isolated figure of $2 billion as the capital cost of the new plant.[2] This is an artificially low figure, as it excludes the significant additional infrastructure costs associated with new generation. When the full costs of 1500MW of new coal-fired generation are included, the actual cost of the proposed 1500MW expansion at Mount Piper would be $9.4 billion over the 30 year life of the power station. This is equivalent to $3915 per current household in NSW.[3]

These extra costs, outlined in Table 1, include:

- expanding the networks to carry the increased load;
- the cost of greenhouse gas emissions under existing and proposed schemes; and,
- the cost of fuel for the plant over its expected 30 year life.

**Table 1: Total Cost of New Coal-fired Generation**

| | **Total Cost** |
|---|---|
| Capital Cost | $2000 m |
| Fuel Costs[4] | $3547 m |
| Network Cost | $2100 m |
| NSW Greenhouse Gas Abatement Scheme Cost | $1759 m |
| **Total** | **$9,406 m** |

### 1.1. Network Costs

The costs of expanding the electricity networks (building more 'poles and wires') to deliver the increased load created by new base-load generation are substantial. These costs are usually ignored by proponents of new generation as they triple the total infrastructure bill. They must, however, be included in any estimation of costs for new coal as these costs will be passed on to consumers.

[1] It is assumed that the option under consideration is 1,500 MW of coal at Mt Piper based on the *NSW Government Energy Directions Green Paper* and other announcements.
[2] Sydney Morning Herald, 'Power play threatens supply', March 8, 2005.
[3] This is not necessarily a measure of the total amount that electricity bills will rise by but the total additional costs that will have to be borne by the NSW economy as a whole. Based on the expected 30 year life of the new plant and 2.4 million households in NSW (2000-2001 ABS data).
[4] Based on 75% capacity factor and $12 per MWh as estimated by IES for Independent Pricing and Regulatory Tribunal, *The Long Run Marginal Cost of Electricity Generation in NSW*, February 2004, p. 3-17

The average cost of expanding the networks is determined by analysis of the growth related costs of transmission network service providers (TNSPs) and distribution network service providers (DNSPs). Current growth related expenditure by the TNSPs and the DNSPs is set out in Table 2.

**Table 2: Growth related network expenditure projections**

| **Networks** | **Growth Related Expenditure Projections** |
|---|---|
| | |
| **Distribution:**<br>Energy Australia, Integral Energy, Country Energy, Australian Inland [5] | $380 million pa |
| **Transmission:**<br>TransGrid, Energy Australia [6, 7, 8] | $340 million pa |
| | |
| **TOTAL** | **$720 million pa** |

Growth related expenditure projections of the networks currently amount to $720 million per year. This equates to an average network cost of $1.4 million per MW.[9] For the proposed 1500MW of generation, network costs would therefore amount to at least $2.1 billion.

## 1.2. Greenhouse Gas Emission Costs

The proposed coal-fired plant would generate over 8 million tonnes of greenhouse gas emissions each year. This is based on a 75% capacity factor and an emissions intensity of 0.85 tonnes of carbon dioxide ($CO_2$) per MWh. The cost of these emissions under the current NSW Greenhouse Gas Abatement Scheme (NGAS) would be equivalent to $1.8 billion at current prices.

It is broadly accepted, however, that prices for the abatement of greenhouse gas emissions under NGAS do not accurately reflect the rising cost of the impact of global climate change. Realistic carbon prices range between $30[10] and $65[11] per tonne of $CO_2$. Depending on the final price of carbon, this could cost NSW $7.5 billion to $16.3 billion over the life of the new plant. This would take the total cost of the Mt Piper expansion to at least $15 billion and up to $24 billion.

[5] Meritec for IPART, *Review of Capital and Operating Expenditure of the NSW Electricity Distribution Network Service Providers – Final Report*, September 2003, p.25.
[6] Energy Australia, *Revised Transmission Capital Investment Program 2004 – 2009*, 29 October 2004, p. 28.
[7] ACCC, *NSW and ACT Transmission Network Revenue Cap – Energy Australia Capex 2004-05 to 2008-09- Supplementary Draft Decision*, 2 March 2005, p. xi.
[8] ACCC, *NSW and ACT Transmission TransGrid Network Revenue Cap Forward Capital Expenditure, 2004-05 to 2008-09- Supplementary Draft Decision*, 2 March 2005, pp. 7-8.
[9] Growth related network expenditure is required to meet growing demand. To calculate the average annual cost for networks to meet demand growth, annual growth related network expenditure is divided by annual growth in peak demand (500MW).
[10] The current price for 1 tonne of $CO_2$ under the European Union Greenhouse Gas Emission Trading Scheme.
[11] The price of for 1 tonne of $CO_2$ estimated by the International Energy Agency.

Table 3: Cost of Greenhouse Gas Emissions

| | $CO_2$pa | Carbon Price | Annual Cost | Total Cost |
|---|---|---|---|---|
| | (million tonnes) | ($/tonne) | ($ million) | ($ billion) |
| **NSW Greenhouse Gas Abatement Scheme** | 8.4 | 7 | 58 | $1.8 |
| **European Union Greenhouse Gas Emission Trading Scheme**[12] | 8.4 | 30 | 251 | $7.5 |
| **International Energy Agency**[13] | 8.4 | 65 | 545 | $16.3 |

Under any reasonable carbon pricing regime, new coal-fired generation is a massive liability to its owners or to whichever party assumes the carbon (greenhouse gas emission) risk. There is a strong likelihood that a higher carbon cost will occur in the near future for NSW.

Table 4 shows the total costs of 1500MW of new generation in NSW with different greenhouse gas emission prices.

**Table 4: Total Cost of New Coal-fired Generation Including Greenhouse Gas Emission Costs**

| | Total Cost |
|---|---|
| Capital Cost | $2000 m |
| Fuel Costs | $3547 m |
| Network Cost | $2100 m |
| NSW Greenhouse Gas Abatement Scheme Cost | $1759 m |
| **Total** | **$9,406 m** |

| | |
|---|---|
| European Union Greenhouse Gas Emission Trading Scheme | $7538 m |
| **Total** | **$15,185 m** |
| International Energy Agency Emissions Cost | $16,335 m |
| **Total** | **$23,978** |

[12] As of 22 June 2005, prices for carbon in the EUETS have jumped even higher to E22.80 t/$CO_2$ at www.pointcarbon.com/

[13] International Energy Agency, *The Future Role of CO2 Capture and Storage Results of the IEA-ETP Model*, November 2003, at http://www.iea.org/

## 2. New coal will create unjustifiable risks for the NSW economy

There are two significant and unnecessary economic risks associated with allowing investment in new coal. These constitute a potentially huge burden for NSW consumers.

### 2.1. Risk of 'Supply Overhang'

The first is the likelihood of creating a 'supply overhang' similar to the one created in the 1980s when excessive base-load (coal) capacity cost NSW consumers billions.

If there is new investment in new base-load (coal) generation prior to demand matching the generation capacity, it is reasonable to expect that this will sit idle for some years, burdening consumers with the cost of capital and depreciation, which on average is about 9% pa.

If the private sector invests in the proposed new base-load (coal) generation, it would be reasonable to expect that investors would rely on Government commitments on growing energy demand in order to keep the new plant running at maximum capacity. This would create a critical conflict between the Government's plan to attract private investment in new generation and the Government's policies and programs to save energy.[14]

The flip side of this situation is that in order to attract private investment in new base-load (coal) generation, the Government may seek to allow electricity prices to rise, so that there is sufficient incentive for the private sector to invest in the proposed new generation. This would result, effectively, in consumers subsidising new investments at the expense of energy savings.

### 2.2. Risk of Rising Carbon Costs

The second significant risk associated with investment in new base-load (coal) generation is the likelihood of a carbon (greenhouse gas emissions) cost being imposed on NSW consumers. The proposed coal plant would generate over 8 million tonnes of $CO_2$ (greenhouse gas emissions) each year based on 1500 MW X 0.85t$CO_2$/MWh X 75% capacity factor X 8760 hours/year.

Estimates for realistic carbon prices range between \$30[15] and \$65[16] per tonne of $CO_2$. If these prices were applied to NSW, the cost of greenhouse emissions could be between \$7.5 billion and \$16.3 billion. This could bring the total cost of the proposed coal-fired generation to between \$15.1 and \$23.9 billion.

## 3. Coal is the wrong fuel for NSW energy demand

Base-load energy demand is growing at a slower rate than peak-load demand.[17] NSW needs to address peak-load. Peak-load is most effectively met by demand management or gas-fired power. Based on the current rate of average demand growth, new base-load capacity would not be needed until 2015/16.[18]

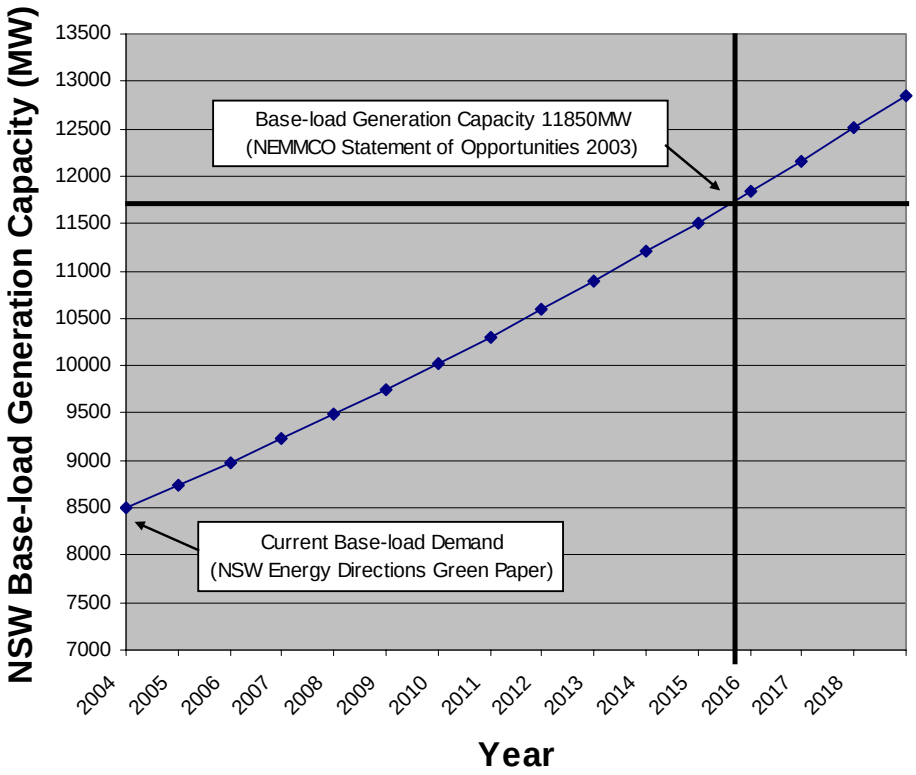
[14] For example, the recently announced Energy Savings Fund.
[15] The current European Union carbon price.
[16] The price of carbon estimated by the International Energy Agency.
[17] *NSW Government Energy Directions Green Paper*, December 2004, pp. 10 – 12.
[18] Based on average demand growth of 2.8% pa and current base-load capacity of 8500MW as set out in *NSW Government Energy Directions Green Paper*, p. 10.

The NSW Government's Green Paper asserts that new base-load supply will be needed in 2012/13. It assumes that a reserve capacity of 1000MW must be quarantined from the state's total base-load capacity. Views on the appropriate level of reserve capacity required by NSW, however, vary widely, ranging from the National Electricity Market Management Company (NEMMCO) level of – 290MW,[19] to the Ministry of Energy and Utilities level of 1000MW[20]. These levels are based on the use of interconnectors to import electricity from other states, weather projections and NSW based reserve capacity.

The Green Paper's assumption that new base-load power will be needed by 2012/13 does not take account of the capacity of the interconnectors that allow the import of up to 4000MW from other states.[21] It therefore underestimates the base-load capacity of the state.

NSW currently has around 11,850MW of average (base-load) electricity generation capacity.[22] Average demand in NSW is around 8500MW.[23] This leaves over 3000MW of average capacity available. Average demand is currently growing at 2.8% per year. As Graph 1 illustrates, new base-load capacity is not needed until 2015/16.

**Graph 1: Base-load Generation Capacity and Demand Growth**




* Based on average demand growth of 2.8% pa and current base-load demand of 8500MW.[24]

[19] NEMMCO, *2003 Statement of Opportunities for the National Electricity Market*, 2003, Appendix F, p.5.
[20] Ministry of Energy and Utilities, *NSW Statement of System Opportunities*, 2001, p. 2.
[21] *NSW Government Energy Directions Green Paper*, December 2004, p. 11.
[22] Not including interconnector capacity or reserve capacity levels.
[23] *NSW Government Energy Directions Green Paper*, December 2004, p. 10.
[24] *NSW Government Energy Directions Green Paper*, December 2004, p. 10.

Graph 1 above illustrates that new base-load capacity would not be needed until 2015/16 based on current average demand of 8500MW and an annual growth rate of 2.8% pa. It uses the NEMMCO level of reserve capacity which assumes the use of interconnectors.

Finally, an estimate needs to be made of the length of time from approval processes to completion of construction. If Mt Piper is the chosen site, the period might be 4 years given it is not a virgin site and the likelihood of using 'critical infrastructure' status.[25]

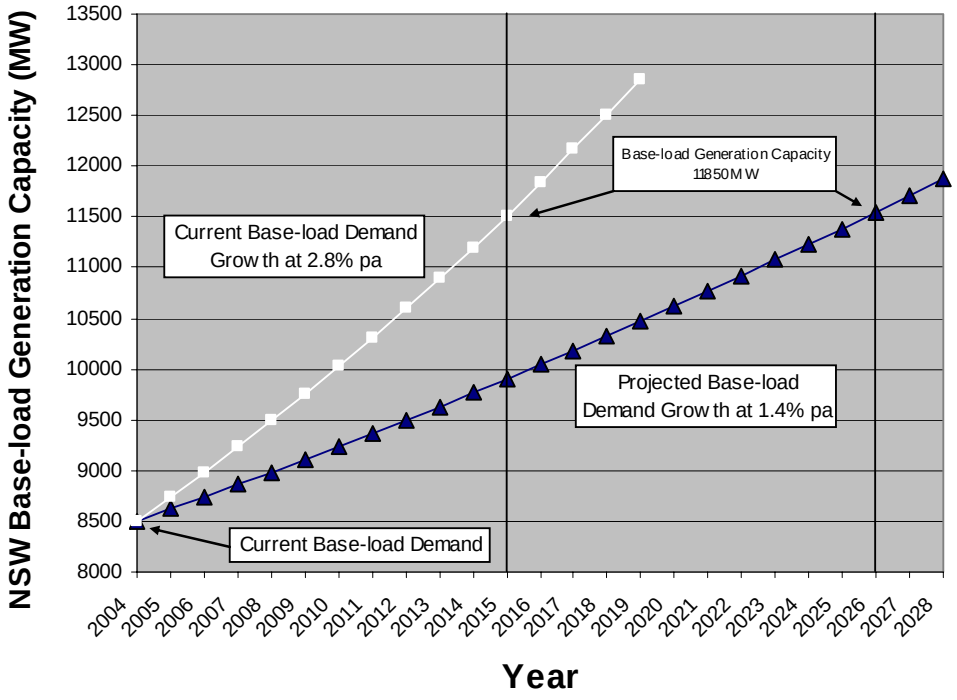
## 4. Reducing demand costs a fraction of new coal-fired infrastructure

Investing in energy savings is only a fraction of the cost of building new infrastructure. This is because energy savings defer or avoid the building of new network infrastructure and avoid expensive greenhouse gas emissions. This has been the experience for energy savings measures undertaken in NSW and abroad.

Energy savings programs in California have reduced demand growth by half. If NSW invested a similar proportion in energy savings, new base-load generation could be deferred for decades, saving consumers billions of dollars in infrastructure costs. By following the Californian example, NSW could reduce its demand growth from 2.8% to 1.4% per year. This would defer the need for new generation to 2027.

By comparison the proposed expansion of Mt Piper would only meet demand growth for 4-5 years at the most, after which additional measures to address increasing demand would be necessary.

**Graph 2: The Effect of Energy Savings on the Need for NSW Base-load Generation**




[25] The Green Paper claims 8 years, an excessively long time.

## 4.1. The Cost of Energy Savings

The cost of halving[26] energy demand growth in NSW would be $400 million over 10 years and $1.2 billion over 30 years. This is based on the NSW Government's projections for the Energy Savings Fund of reductions of 153MW per year at a cost of $40 million pa.[27] Over the life of the current Fund, the average cost of energy savings is therefore around $262,000 per MW. Over 30 years, this would amount to $1.2 billion. This figure equates with the cost of energy savings implemented in California.[28] This is a fraction of the total cost of building new generation infrastructure and would result in billions in savings on NSW consumer electricity bills.

The current Energy Savings Fund ($40 million pa over 5 years) has been estimated to save consumers $370 million on their energy bills.[29] Over 30 years, NSW consumers would save $2.2 billion. This reflects the ongoing experience of investment in energy savings both here and abroad. On average, energy savings deliver a return on investments of 2:1.

The economy-wide benefits from increased efficiency, increased productivity, deferral of expensive infrastructure and GSP growth more than off-set revenue losses in the electricity production sector. An aggressive energy savings program for NSW would contribute to substantial jobs growth of between 1,400 to 3,400 jobs.[30, 31]

[26] I.e. (reducing demand growth from 2.8% pa to 1.4% pa)

[27] NSW Government projections estimate that the $40 million pa Fund will deliver 900,000MW hours per year. Based on the NSW load factor of .67, this is equivalent to 153MW in demand reductions (peak and base-load) per year.

[28] The average cost of energy savings in California is $750,000/peak MW and $1,334,000/average MW and takes into account securing energy savings over the long term. To achieve equivalent energy savings in NSW, investment would have to be repeated on average every 10 years over 30 years to ensure the longevity of energy savings.

[29] NSW Parliament Hansard, *Energy Administration Amendment (Water and Energy Savings) Bill*, Second Reading Speech by the Minister for Energy, 6 April 2005.

[30] The Allen Consulting report, 'Sustainable Energy Jobs Report' (2003) showed that 3,400 jobs would be created by investment in demand management over a 15 year period, using a pay-back period of 5 years. The same report looked at the establishment of a 'Sustainable Energy Industry Fund' which would include DM, and concluded that 1,400 jobs would be created. The National Framework for Energy Efficiency, undertaken by the Ministerial Council on Energy's 'Energy Efficiency and Greenhouse Working Group' showed that 9200 jobs would be created nationwide by investment in energy efficiency over a 12 year period, using a pay-back period of 4 years with only 50% take-up.