Contemporary Issues in Regulatory Theory and Practice

Changing attitudes to regulation: International evidence

NZ Institute for the Study of Competition and Regulation
Wellington 22 March 2005

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Outline

- Past attitude to regulation: UK, US, Australia
- Why is it changing?
- What are the changes?
- What went wrong?
- Finding our way back to the light

1. Past attitude

Problem

- Prices were too high
- Prices were inefficient - not cost reflective
- Profits were too high
- Network businesses were inefficient:
  - overstaffed
  - gold-plated
  - engineering driven
- Government interference

Reform would deliver:

- Lower prices
- Cost reflective prices
- Commercial rates of return
- Greater efficiency through incentive-based regulation
- Customer focus
- Regulatory independence – from government
- Greater reliability of supply

2. Why is it changing?

FINANCIAL REVIEW

Blackout chaos fuels power fears

Author: Annabel Hepworth
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Section: News
Page: 5

A blackout that left up to half of South Australia without electricity yesterday has sparked an urgent state government investigation and highlighted fears of shortfalls in the nation's power market.

A disturbance in the high-voltage network north of Adelaide disconnected the main transmission from Victoria into South Australia, plunging businesses and commuters into chaos.

The state's energy minister, Patrick Conlon, said the government would not accept excuses from power companies and that if "cutting corners" had caused the outage, the utilities should expect people to sue over the incident.

Sitting in the dark has a way of focusing the mind

2. Why is it changing?

The Australian Financial Review
www.afr.com • Friday 15 October 2004

States warned on blackouts

Annabel Hepworth and Morgan Mellish

Pressure yesterday mounted on state governments to relinquish some of

Carr abandons his dividend policy, which is ripping millions of dollars out of power companies that should be invested in maintenance and upgrade''.

Sitting in the dark has a way of focusing the mind

2. Why is it changing?

Energy users face higher prices

nnabel Hepworth

Major energy companies have called or a radical overhaul of the retail rice regulation of electricity, warn- ng it discourages new investment nd could lead to Australia facing

SPARKS FLY

"Reform of the electricity industry is a decade-old piece of unfinished national competition policy business."
– Editorial, page 58

Report calls for reforms to Queensland energy distribution, page 6

mission, claiming the system that caps Victorian-based energy giant

This comes as the Queensland government has been forced to dramatically increase spending on its ageing electricity network after a key report yesterday found that a lack of maintenance in the past decade had contributed to outages

concerned about providing divi to the government than en maintenance kept pace with the lation boom in the state's south

The warnings from AGL Origin have been backed b federal Department of Fi

Sitting in the dark has a way of focusing the mind

2. Why is it changing?

Regulators hinder power spend

Annabel Hepworth

State regulators have denied major electricity distributors about $2 billion in spending on networks, prompting fears that power supplies will be threatened after years of under-investment in key infrastructure.

In recent draft decisions on price controls, regulators in NSW, South Australia, Queensland and the ACT have rejected about $2 billion in capital expenditure and more than $200 million in operating expenditure demands by electricity distributors, despite claims by the utilities that they need to invest more in ageing assets.

The power industry estimates that $15 billion of capital investment in networks will be required by 2010 to meet anticipated demand.

Across the nation, the distribution lines that carry electricity to homes and businesses are often 40 to 50 years old. Many distributors want to spend more to replace the substations, poles, wires and underground cables that make up their networks.

User groups representing big industrial operators such as paper mills say the utilities are demanding excessive amounts of network spending, which will result in higher power prices for consumers, and say they should be trying to encourage people to use less power. Typically, network charges comprise 30 to 50 per cent of an electricity bill.

Regulators also claim that many utilities have a history of pocketing some of the money allocated for the capital expenditure programs then underinvesting in their networks to improve returns on the assets.

"We have to be wary of giving them a large sum of money ... and

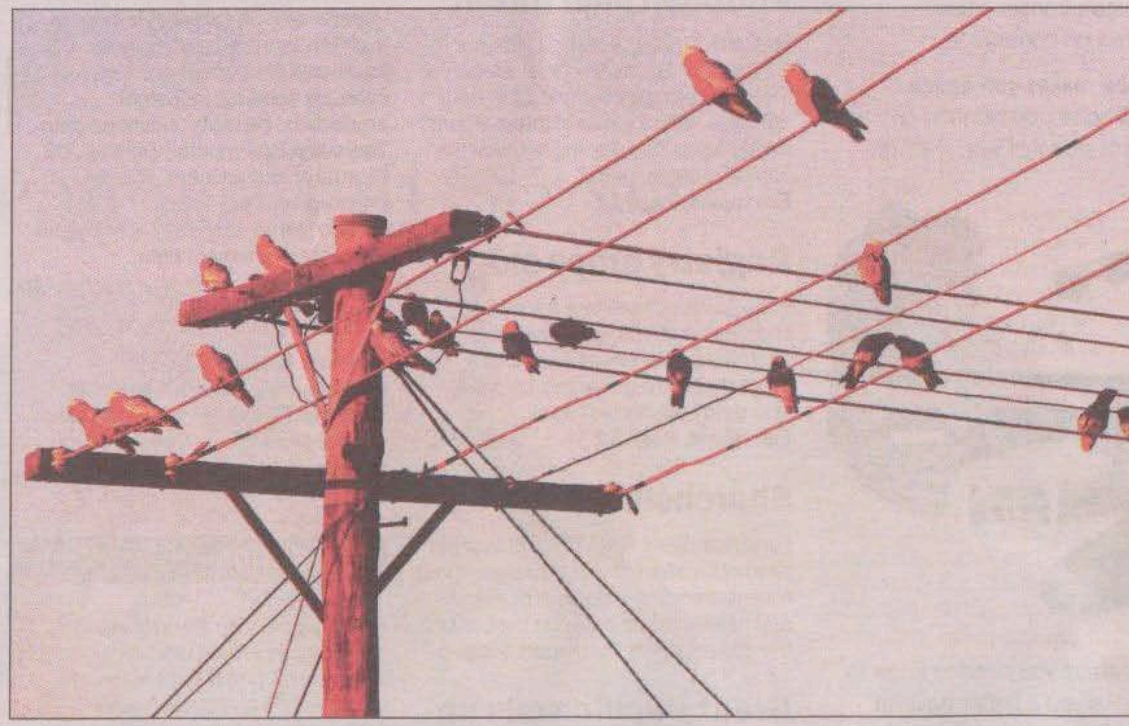
Continued page 6

INVESTMENT DEBATE

"Failure to restrain monopoly prices in gas and electricity could reduce Australia's GDP by about $11bn over the next 15 years."

– Graeme Samuel, page 63

- Queensland rail fight heats up, **page 7**
- Carr turns to PPPs, **page 8**



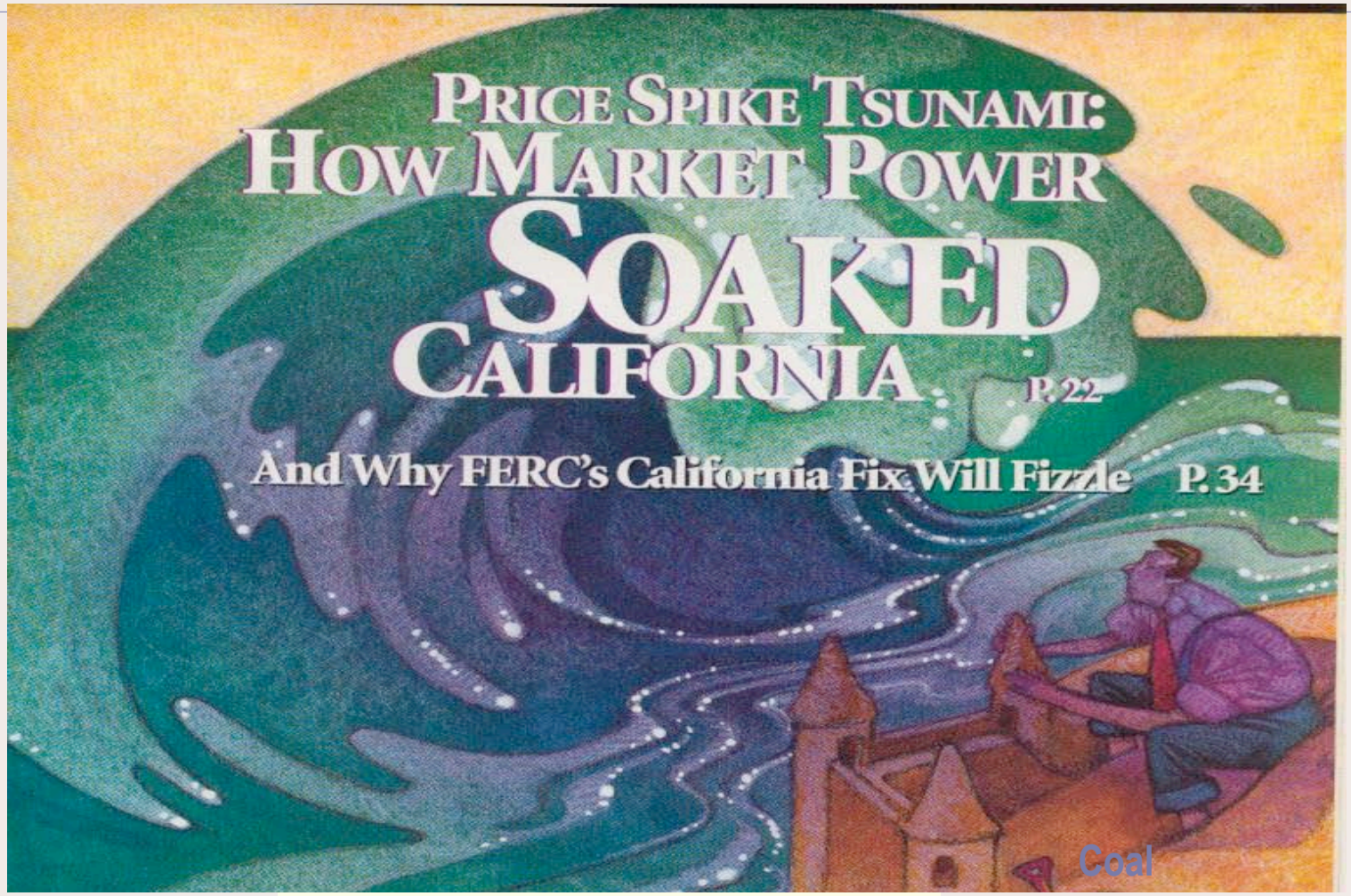
The power industry estimates that $15bn must be spent on distribution networks by 2010 to meet demand. Photo: ROB

Sitting in the dark has a way of focusing the mind

2. Why is it changing?

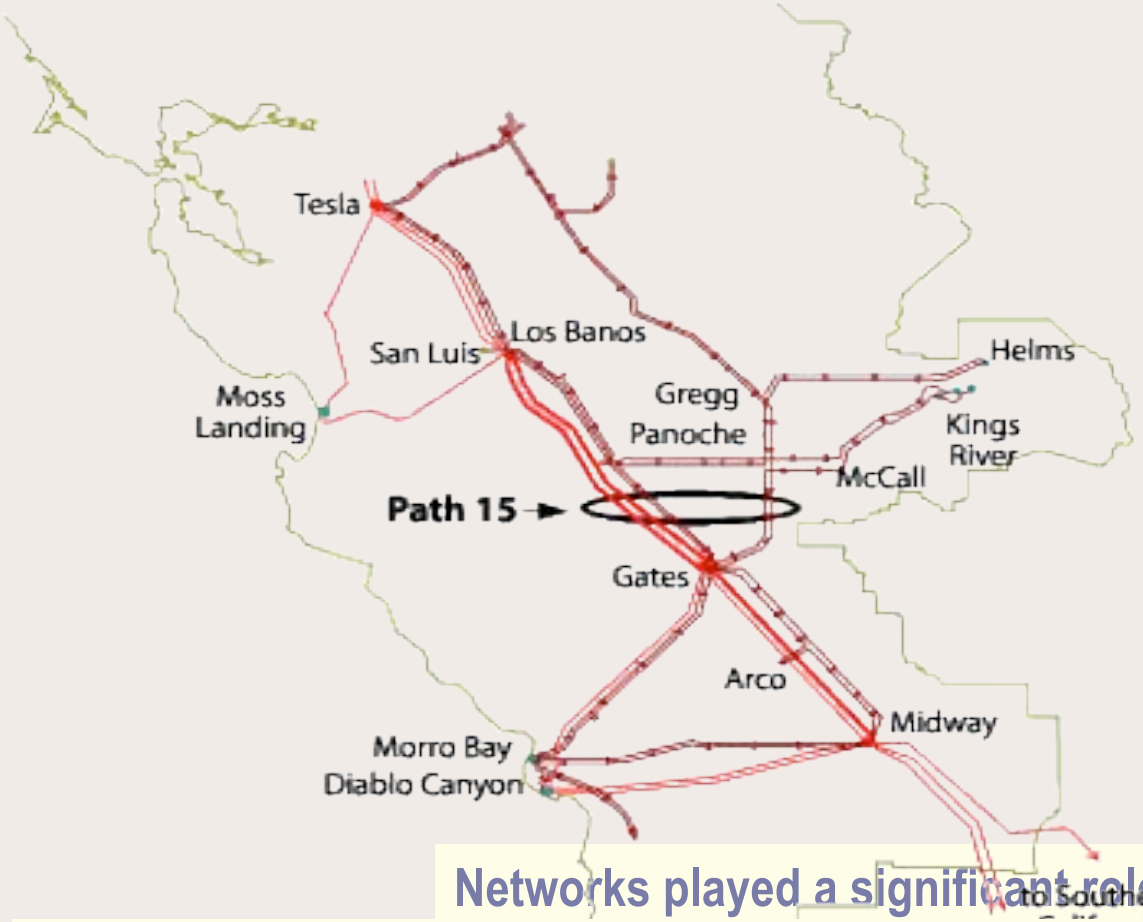
- Response to growing power failures
- Concerns at lack of investment/expenditure
- Implications of aging infrastructure

2. Why it is changing – Lack of incentive US



2. Why it is changing – Lack of incentive US

Northern California – Hydro: Oregon, Washington State, Canada



Networks played a role in the blackouts in California. One reason was the congestion on Path 15 – a link between the south and north of California.

In 2000 there had been droughts in the northern states which restricted the flow of hydro based electricity – there was electricity available from the coal based south but it could not reach the north because of congestion on path 15.

The community had been against the development of new transmission lines

Networks played a significant role

Southern California – Coal: Nevada, Arizona, Mexico,

2. Why it is changing – Lack of incentive US

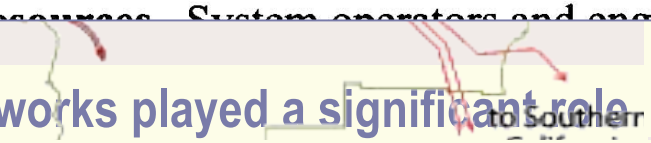
Northern California – Hydro: Oregon, Washington State, Canada

Networks played a role in the blackouts in California. One reason was the congestion on Path 15 – a link between the south and north of California.

Report by DoE 2000 Power Outage Study Team (POST)

2. **Regulatory Policy for Reliable Transmission and Distribution.** The POST investigations found that the aging infrastructure and increased demand for power have strained many transmission and distribution systems to the point of interrupting service. In many cases, state and federal regulatory policies are not providing adequate incentives for utilities to maintain and upgrade facilities to provide an acceptable level of reliability.

2. **Information Resources.** System operators and engineering staff need accurate



Networks played a significant role in the development of new transmission lines

Southern California – Coal: Nevada, Arizona, Mexico,

2. Why it is changing – UK: Under investment

More expenditure is required:

House of Commons, Trade & Industry Committee,2004: Report into Resilience of Electricity Networks

"The starkest summary of the problem as described to us is as follows. The total asset base of NGC's network is about £16 billion, while about £150 million is being spent each year on asset replacement; which means that less than one percent of the network is being replaced each year. **At this rate it would take over 100 years to replace all the equipment on the network.** Equipment installed now, even though in practice it might last longer than the design life of 40 years, would fail from old age before current, older assets had all been replaced.

The representatives from NGC said that the company's current rate of asset replacement of about £150 million per year **would have to roughly double"**

2. Why it is changing – UK: Under investment

Regulatory allowances have been inadequate

*"Coupled with this **under-investment** has been pressure to minimise operational expenditure, for example on maintenance repair. While this pressure has doubtless resulted in reducing some inefficiencies, we think that to continue it **may be counter-productive** for network performance…"*

0

…UK House of Commons

2. Why it is changing – Australia: Infrastructure failing

Infrastructure is clearly failing

Cable mishaps blamed for latest electricity blackouts

About 40,000 homes and businesses on the North Shore experienced blackouts yesterday afternoon when power failed at the Mosman and Castle Cove substations.

Sydney Morning Herald 27/10/2004 **Cost - $1.65** 231 words

The political risk in private power

It promised so much, yet has the gain of establishing the national electricity market been worth the pain? The prospect of using surplus electricity generating capacity in NSW to supply other states was delayed by administrative intervention by the Australian Competition and Consumer Commission which, with associated bungling, has resulted in little more than state-based, regional electricity markets.

Sydney Morning Herald 26/10/2004 **Cost - $1.65** 486 words

…and skills base is eroding:

"…the biggest thing that stands out here is skills shortages…The 25 per cent wage increase over 3 years for electricity linesmen in Queensland …was a classic example of the need for more skilled workers…they were going to lose all their linesmen"

...Governor, Reserve Bank of Australia

2. Why it is changing – Australia: Regulation distorting investment

Productivity Commission – Architect of electricity sector reform

"Review of the Gas Access Regime" June 2004

"…high potential for regulatory error when approving reference tariffs. The regime requires regulators to make decisions about future market circumstances that are uncertain. This has led regulators to use many debatable assumptions"

"There is a high degree of risk that the price set by the regulator is no more efficient than …in the absence of price regulation"

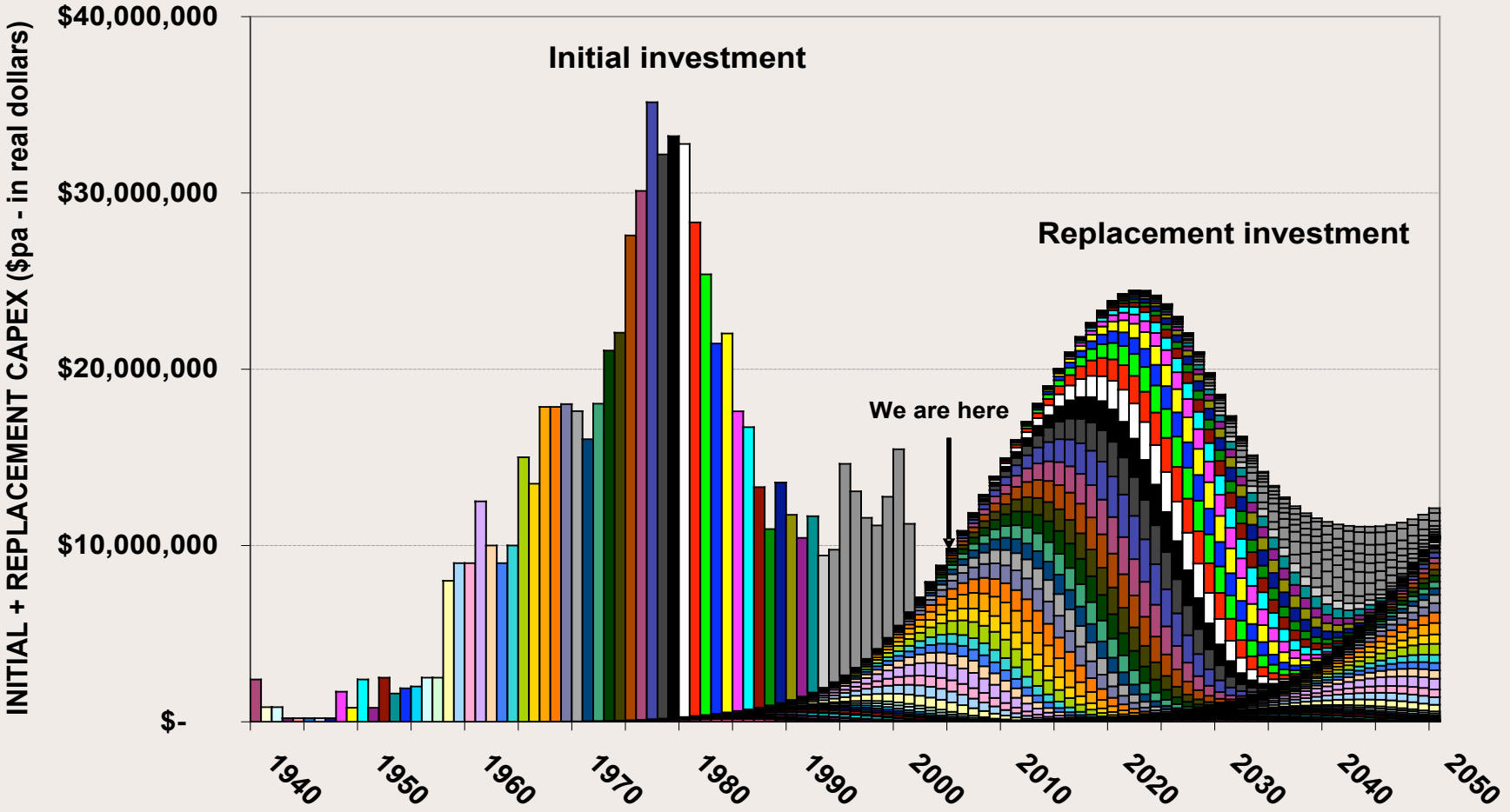
"Current regulatory approach of cost-based regulation is costly…while generating benefits, its significant costs include a potential to distort investment"

Key recommendation is addition of less costly **monitoring option**:

"Choice between price regulation and monitoring…would be based on which option was assessed as generating the greater net economic benefits".

"Price regulation would only apply when the net benefits would be **markedly greater** than those of the monitoring option"

2. Why is it changing?
Aging infrastructure: the replacement cycle



3. What are the changes?

Changes at two levels:

- Macro-level: Institutions and framework
  - UK House of Lords Report: :*The Regulatory State: Ensuring its Accountability", 2004*

- Micro-level: Implementation
  - UK, Ofgem,2004 draft pricing decision
  - NSW 2004 pricing decision
  - Queensland 2004 draft pricing decision
  - South Australia 2004 draft pricing decision

3. What are the changes – Macro level: UK – House of Lords Report

The Regulatory State: Ensuring its Accountability", 2004

"The issue of regulation has itself been a matter of Governmental concern… regulatory reform has been high on the agenda…..

The Government is now focussing on better regulation rather than simply deregulation…and improving accountability is a integral part of that agenda"

House of Lords report recommended *"that regulated should have opportunity to have their objections reviewed on the merits of the case by independent tribunal"*

Appeal rights traced to effect of Article 6 of the European Directives Convention on Human Rights requiring availability of a fair hearing before an independent tribunal

Australia has merits based reviews for gas; considering extending this to electricity

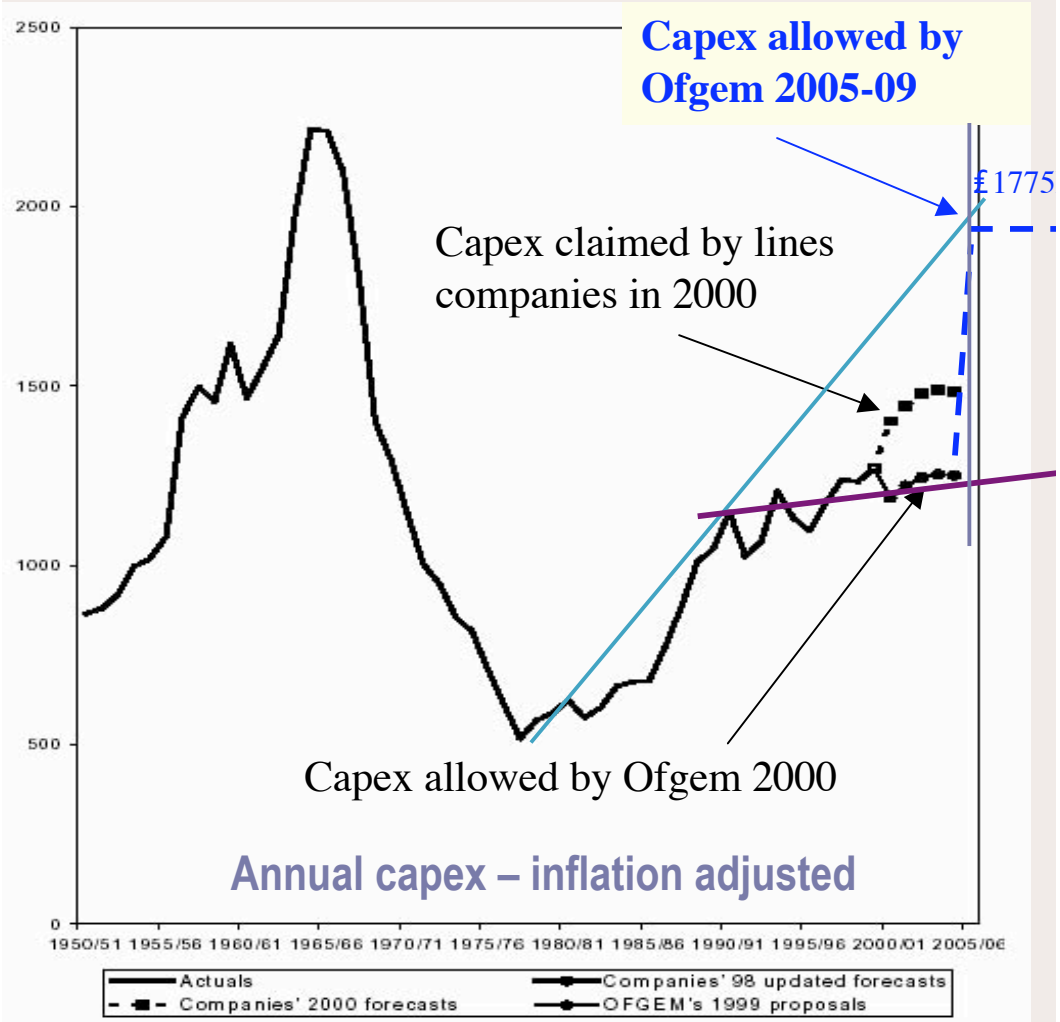
3. What are the changes: Implementation UK 2004 pricing decision: a watershed

The value of the triangle is NZD 33B in 2004 dollars

This capex has been taken from the industry and passed through to the customers as lower prices

It could not continue once the power failures started…

But take heart, economists and regulators in the electricity sector are not the only ones to look back



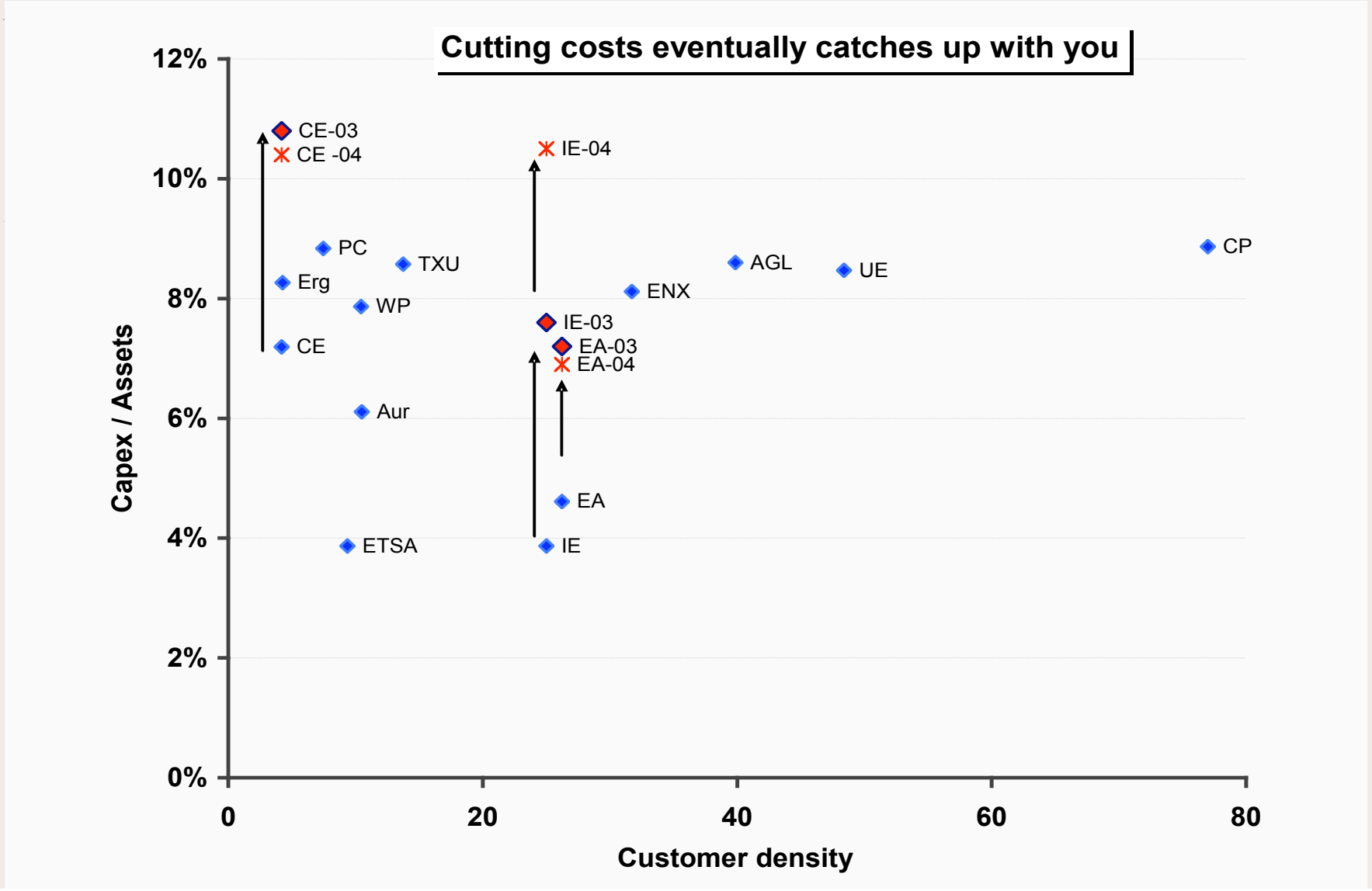
3. What are the changes – Implementation Australia NSW

IPART pricing decision 2004

"The trend of increasing consumption and reducing prices in no longer sustainable. Over the past 7 years, average prices have reduced in real terms by 24%, while average demand has risen by 31%". In some cases growth-related expenditure has been at expense of replacement…"

NSW IPART 2004 Pricing decision for period 2005-2009 (A$)		
	Opex 2005	Capex 2005
EnergyAustralia	$288M	$403M
Increase	*29%*	*126%*
Integral Energy	$208M	$285M
Increase	*24%*	*300%*
Country Energy	$222M	$240M
Increase	*30%*	*106%*

3. What are the changes – Implementation Australia NSW



3. What are the changes - Implementation Australia: Qld 2001 and 2005

QCA Decision 2001:

Opex cut by 2.8% for Ergon and 1.7% for Energex each year 2001 – 2005

"*The Authority considers these targets are somewhat conservative*"

An Australian study of comparative performance concluded that Energex represented "best practice"

An international study concluded that Energex still needed to cut its opex by 17% to move into the top quartile of international best practice – and Ergon by 28%

….but

by 2005 both businesses were spending **double** their regulated opex allowance

How could the performance comparisons be so wide of the mark?

Queensland: QCA 2004 Draft Decision Capex 2005-2010 (A$)	
ENERGEX *Increase*	$392M *105%*
Ergon *Increase*	$474M 154%

3. What are the changes? Implementation
South Australia 2005

Costs had been kept low for purposes of privatisation

Regulator recognised that costs were not in line with rest of industry

But 2004 allowances are still too low and no catch-up was allowed after years of depressed expenditures

Expenditures lagged by up to $200M behind industry trend..

But business still bear the risk when the lights go out…

South Australia: ESCOSA 2004 Draft Decision – Opex and Capex	
ETSA Utilities	2005
Opex *Increase*	$122M 13%
Capex *Increase*	$150M *68%*

3. What are the changes? Implementation South Australia 2005

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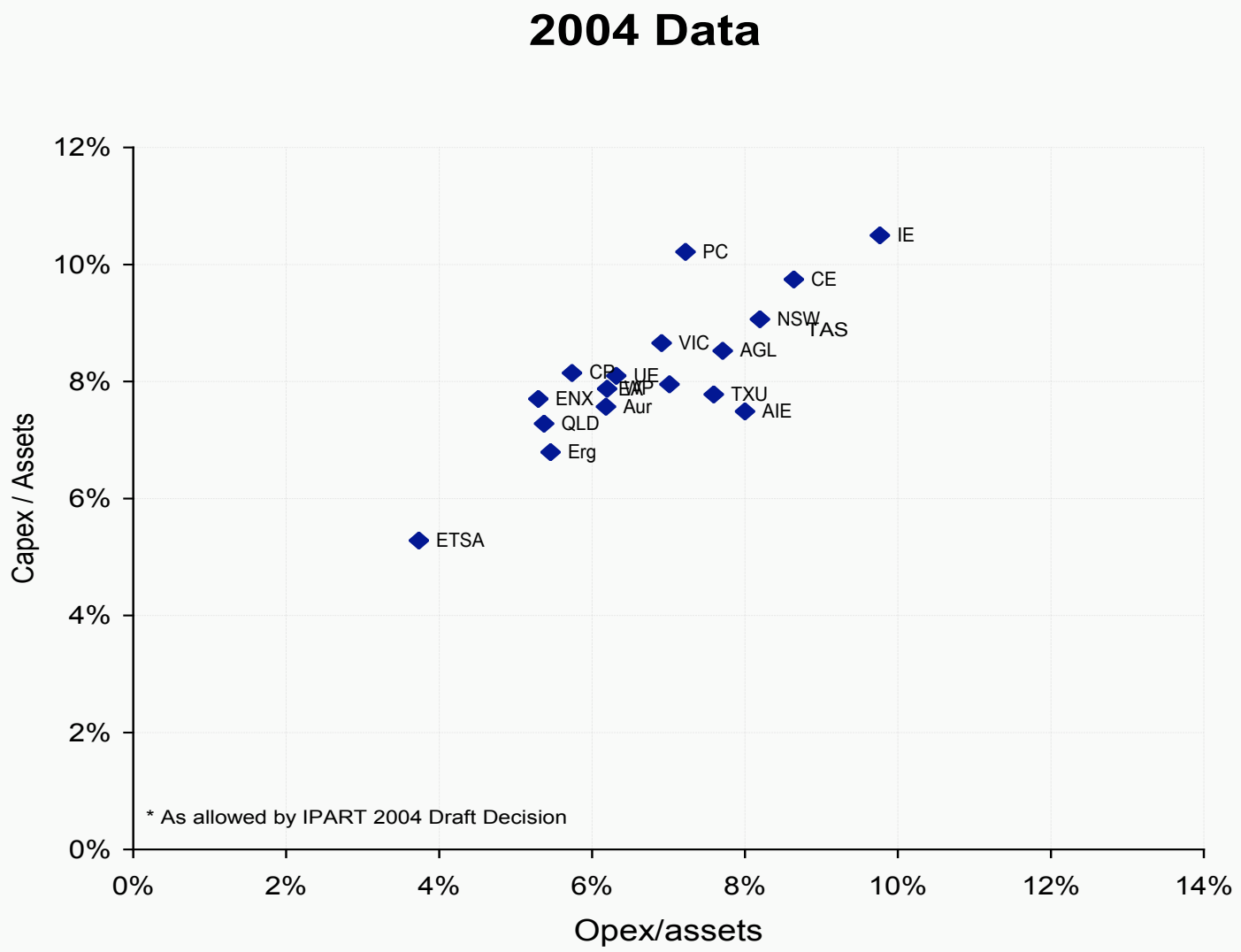
3. What are the changes? Implementation South Australia 2005



4. What went wrong?

Indeterminate regulatory framework: Incommensurable standards*

- no common set of principles
- too many objectives: economic/ social/environment
- layered objectives sending conflicting and contradictory messages
- imbalance in price considerations as consumers given first priority

Inadequate regulatory accountability

- previously Government departments accountable to Minister, Minister answerable to Parliament, and Parliament to the people
- issues hotly debated in Parliament
- Westminster system – Ministers fell on their sword
- current system has gap between actions of regulators and their accountability to the community

Inadequate knowledge base for network economics/ engineering

- network regulation treated as 'economics' issue
- misunderstood objective: "efficient cost" is a concept – not a target
- treatment of network costs as a statistical issue

*Justin Gleeson SC Aust.

4. What went wrong? Inadequate regulatory accountability

Australian Competition Tribunal Findings: Gas Code Appeals

- Misinterpretation of code: *"Contrary to the submission of the ACCC, it is not the task of the regulator under s8.30 of the Code to determine "a return which is commensurate with prevailing conditions"*
- Unreasonable: *"choice of lowest cost pipe for valuation purposes – it falls beyond boundaries of what a prudent commercial operator would objectively be expected to do"*
- Error in principle:" *it was a fundamental error in principle for the ACCC to put aside known valuation methodologies and devise a methodology of its own which adjusted ORC in a novel fashion…it is properly described as idiosyncratic"*
- Regulatory error: "*There is no logic or reason to that approach (averaging credit ratings) and there is no material to suggest it has any support in the theory or practice of statistics"*

Like everyone else, regulators are capable of error,
some redress for the regulated is simply a matter of natural justice

4. What went wrong? Indeterminate economics

Efficient cost is a concept, not a target

"Determining…the efficient level of costs or the outcome of a competition are matters of economic theory and practice which, on the evidence, are in the course of constant revision, development and refinement."

…Judgement in EPIC case

Professor Phillip Williams, former Professor of Economics and Law at the Melbourne Business School, an expert witness in the EPIC appeal, went beyond this and proffered the view that:

"The phrase did not have a technical economic meaning"

Yet, all regulation was, and still is, based on the objective of achieving efficient cost

If we do not know what it is, how do we know where it is, or when we have achieved it?

4. What went wrong? Indeterminate economics

Without a defined target "efficiency" is determined by statistics, not engineering analysis

Ofgem: "*On quality of service, alternative regressions have not demonstrated a statistically significant link to quality…so opex analysis has not been adjusted for quality of service*"

But, reliability can depend heavily on tree trimming and number of maintenance crews (opex) – perhaps they should have consulted the industry engineers

Economic consultant justifying the omission of line length as an output : "*customers do not demand wires and poles, they demand electricity, the output is therefore MWh*" - but the wire/poles connection provided to customers to allow delivery of electricity is up to 65% of network inputs

Or sometimes, rule of thumb

Ofgem: Weights in composite variable for use in normalising costs changed from 70% connections; 15% km and MWh in May 1999, to 50% connections, 25% each km and MWh by July 1999 – No quantitative basis

Either we change the target or we find a way of measuring it

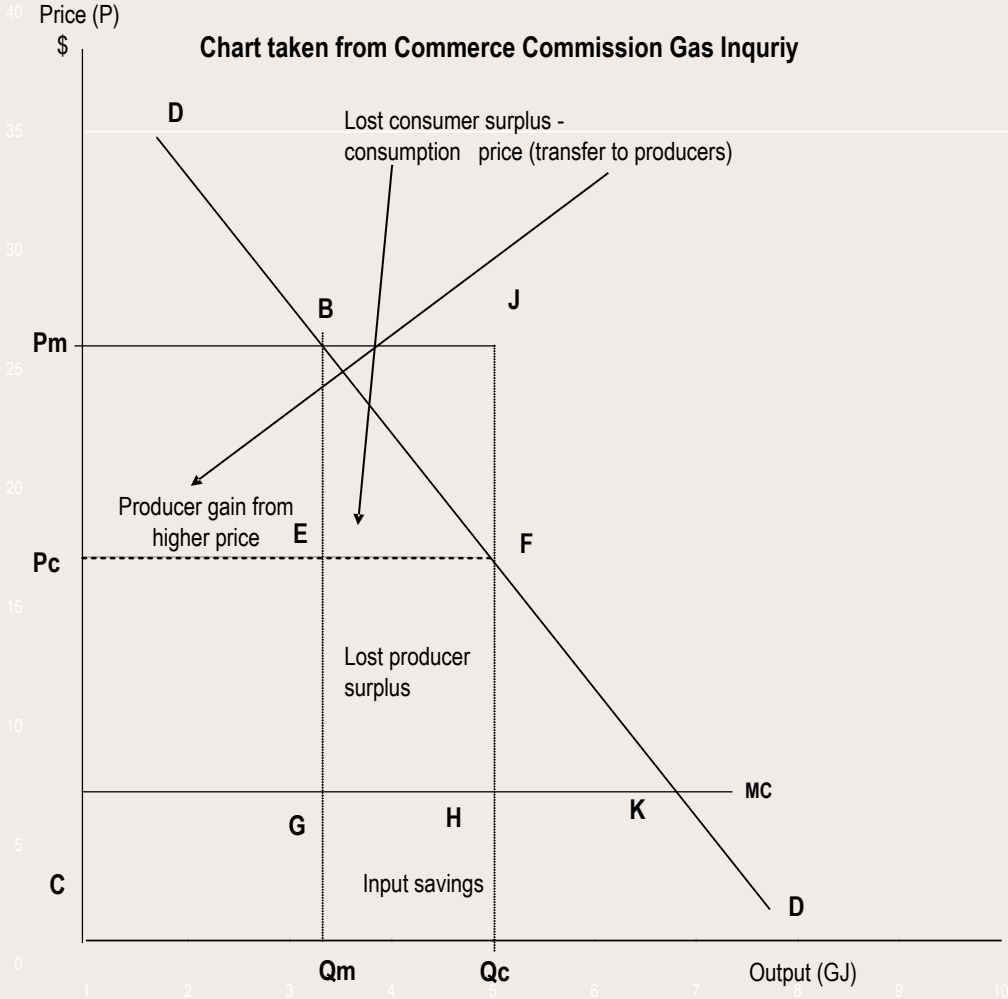
4. What went wrong? Towards improved analysis – a small economics lesson

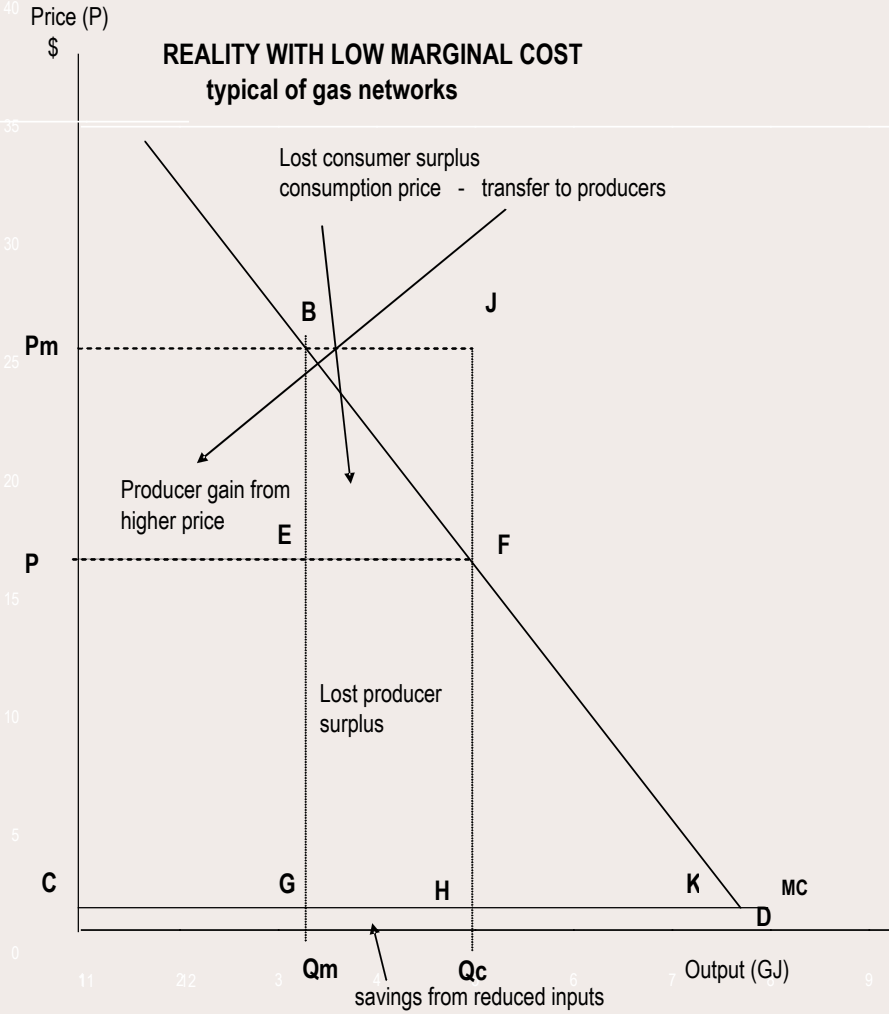
- Cost of production theory describes the way in which firms transform inputs (the factors of production) into outputs of goods and services.
- Theory states that inputs are resources purchased by the business and transformed into network outputs or services.
- Network **outputs** will therefore represent the transformation of network **inputs**
- **Inputs** of poles, wires, and transformers are transformed into **outputs** of connectivity (poles & wires), capacity (MW), connections (ICPs), and reliability
- Network inputs cannot ***produce*** electricity – they provide only a mode for its transport
- ***Electricity throughput (MWh) should not be used as an output since it has no inputs and therefore no costs –***

Effectively the marginal cost of transporting one unit of electricity is zero

This confounds the estimation of producer and consumer surplus

4. What went wrong? A small economics lesson





4. What went wrong? A small economics lesson

Throughput (GJ or MWh) is not an output. Reducing it will have no affect on costs

Costs are only affected by the outputs: km, MW, connection numbers, reliability

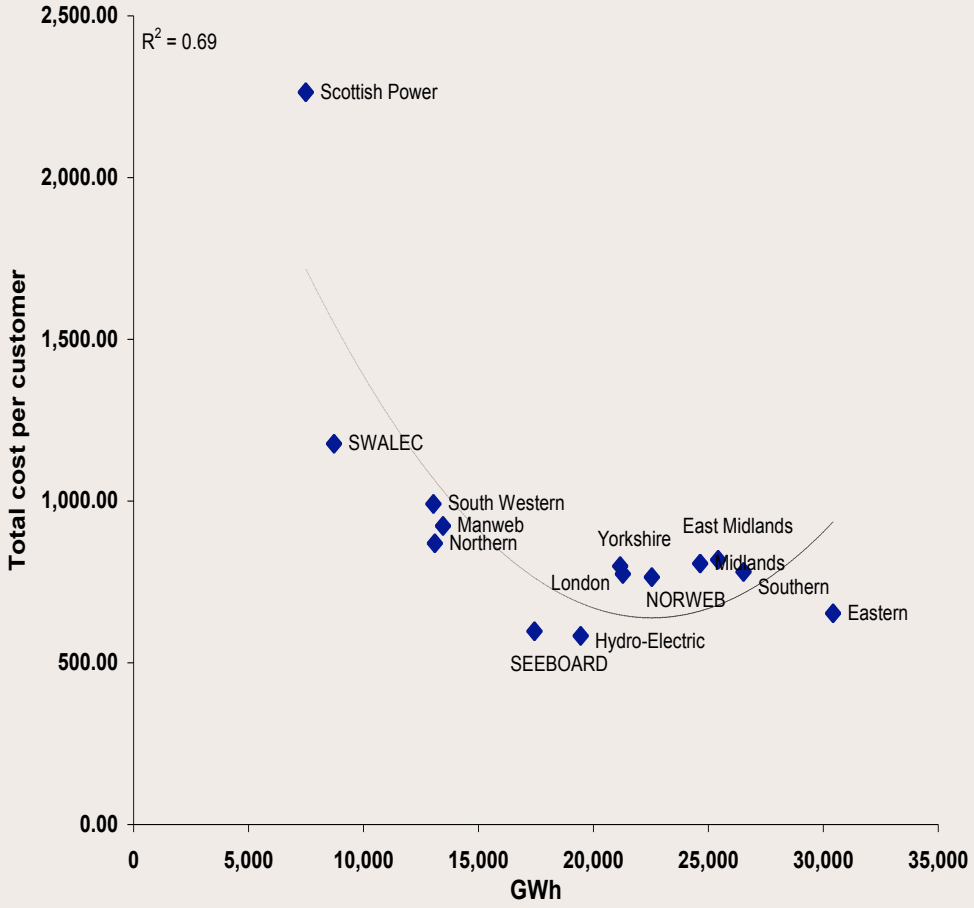
It is arguable whether any network – especially electricity – could cut output by refusing to connect customers or meet peak demand

Theoretical implications of reducing output to lift profitability therefore becomes academic

Just because the whole world uses MWh as an output does not make it correct

4. What went wrong? Network cost drivers –UK statistical analysis

Economies of scale -
Average costs per customer and energy throughput (GWh)



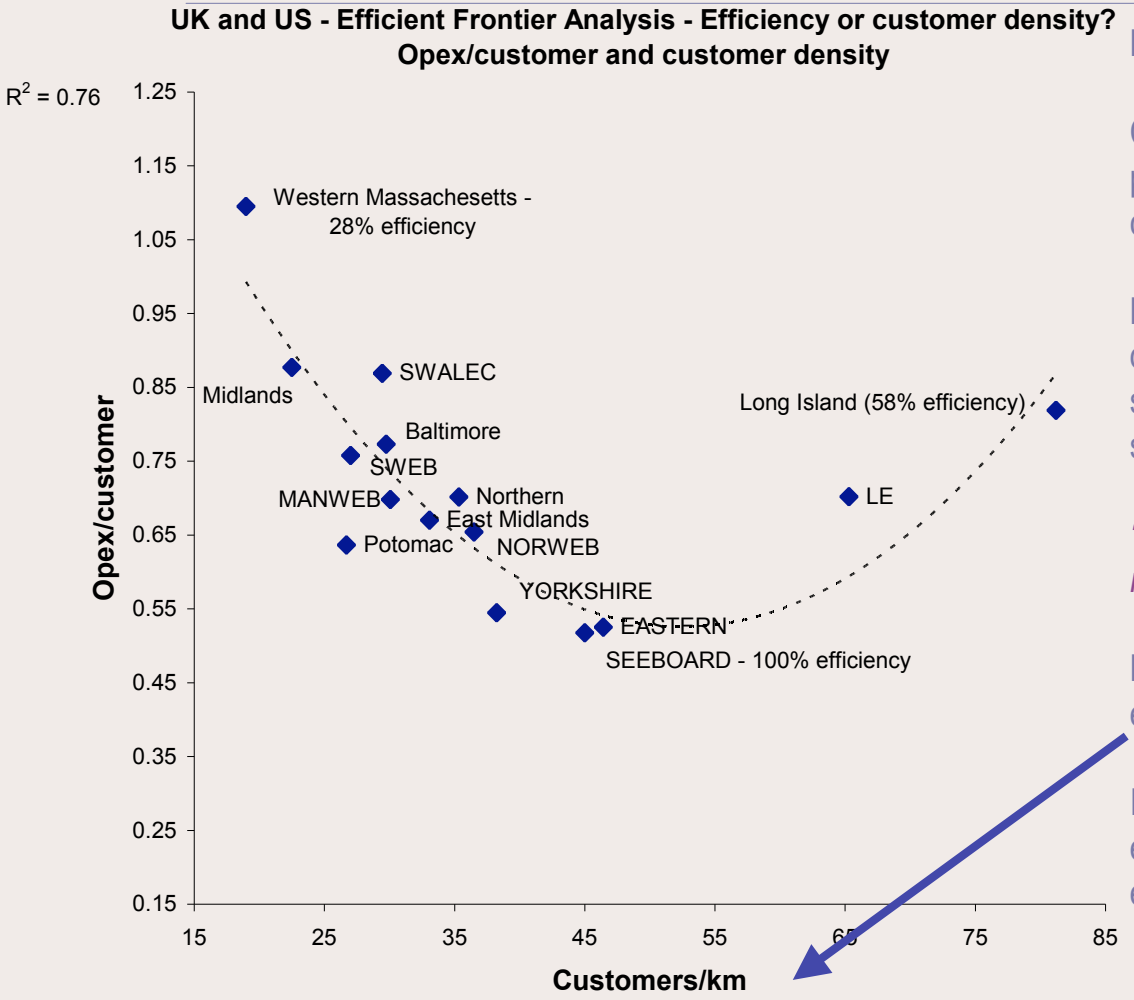
In 1999 Seeboard and Eastern identified as most efficient - other networks given efficiency targets to emulate their performance.

However, the outcome by 2003 was not in accord with the theory:

- one of most efficient firms in 1999 improved efficiency the most by 2003
- one of least efficient made little improvement
- greater dispersion in efficiency scores in 2003 than in 1999

In 2003, a perplexed Ofgem asked Cambridge Economic Policy Associates to review earlier analysis and find the problem…

4. What went wrong? Network cost drivers –UK statistical analysis



Do not hold out high hopes…

CEPA in analysing network costs did not examine network production function or even consult an engineer as to possibl cost drivers ….

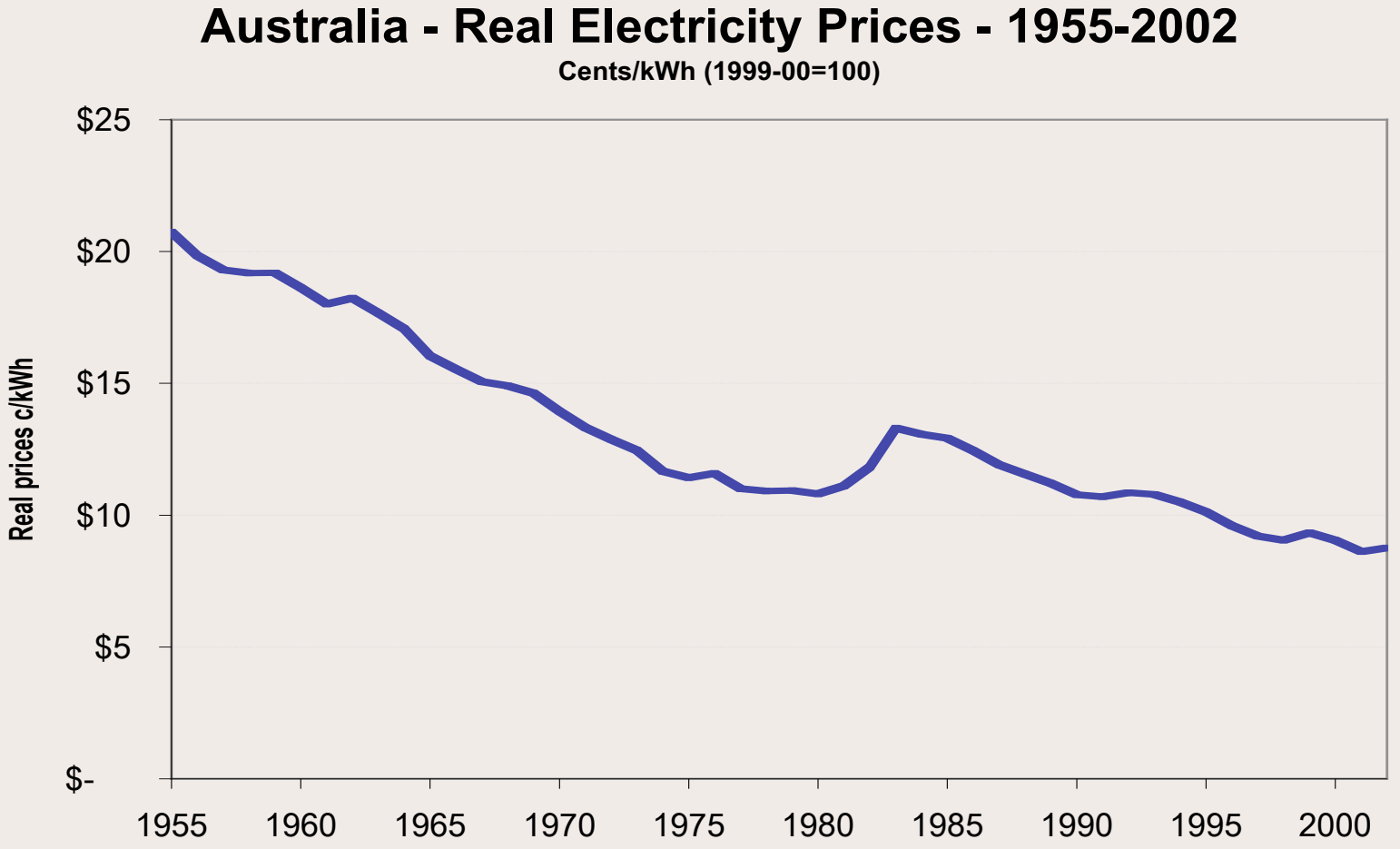
Based selection of variables on precedent "representative co drivers", including customer density, type of customer, losses scale. After statistical analysis declared that "none of these v statistically significant"

"While they may in practice affect costs does not appear to b merit in including them in a statistical benchmarking exercise

However, their estimated "efficiency" rankings did not measu efficiency they only measured customer density

Inappropriate benchmarking plus the tendency to base future expenditures on past experience caused large reductions in expenditures…..

5. Finding our way back to the light
Putting it into perspective:



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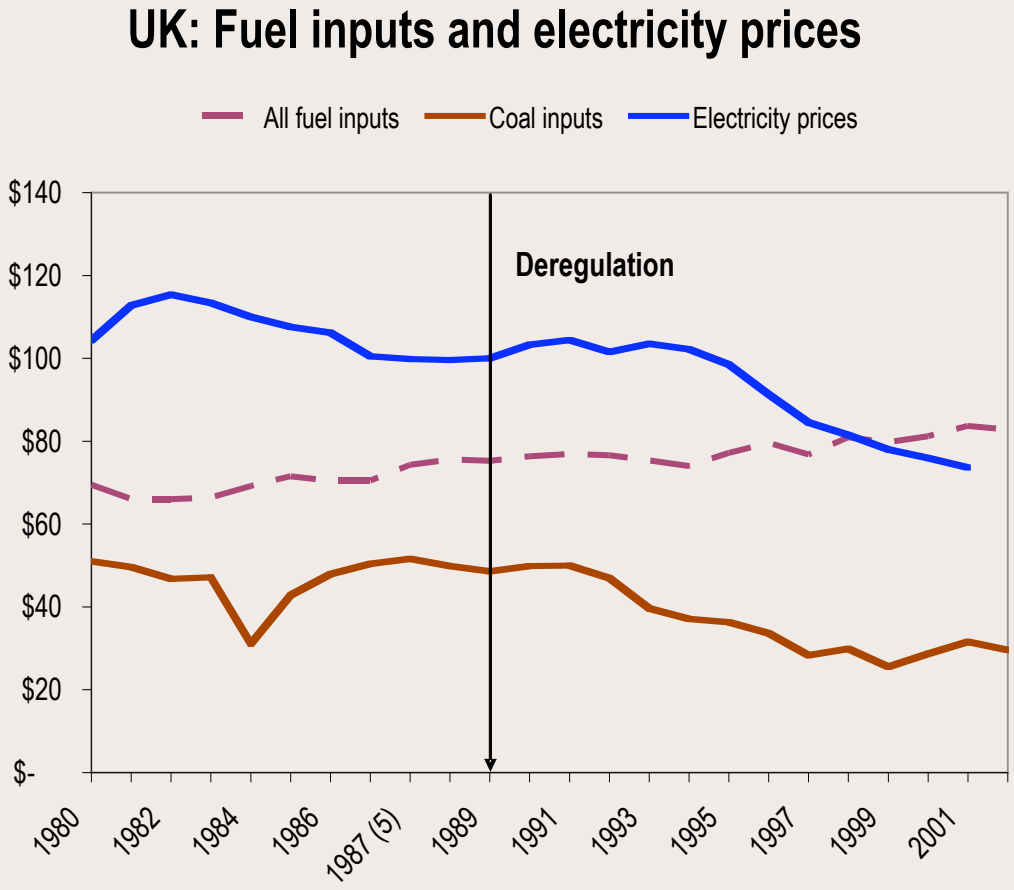


Coal prices fell 50% after deregulation

"Dash to gas"- still cheaper than coal

EU sulphur limits also contributed to dash to gas

As fuel costs declined, retail electricity prices fell

4. Finding our way back to the light
A more objective way of measuring efficiency

Perhaps we need a new paradigm –

more engineers and fewer economists

4. Finding our way back to the light
Another way of measuring efficiency?

Engineering-Economic Cost model

Consumers/Zone	2,339
Consumers/sq km	57
MVA/sq km	0.2
HV Route km	70
Total Route km	230
Consumers/Circuit km	6.8
Consumers/Route km	10.2
kW/Consumer	2.4
kVA/Consumer	2.8
kWh/Consumer	12,420

Qty	$ / km	$ / Cons	$ / kVA	c / kWh
RC	$ 82,480	$ 8,108	$ 2,897	
ORC	$ 61,860	$ 6,081	$ 2,172	
ODRC	$ 30,930	$ 3,040	$ 1,086	
O&M	$ 1,974	$ 194.03	$ 69.32	1.56
Dep	$ 1,237	$ 121.62	$ 43.45	0.98
RoA	$ 2,320	$ 228.03	$ 81.47	1.83
DUOS	$ 5,531	$ 543.68	$ 194.24	4.37
Losses	$ 280	$ 41.20	$ 14.72	0.33
Outage	$ 58	$ 8.55	$ 3.04	0.07
Total	$ 5,869	$ 593.43	$ 212.00	4.77

Lowest price	$ 14.57	$ 5.24	1.41
Average price	$ 543.68	$ 194.24	4.37
Highest price	$ 112.78	$ 40.57	10.90

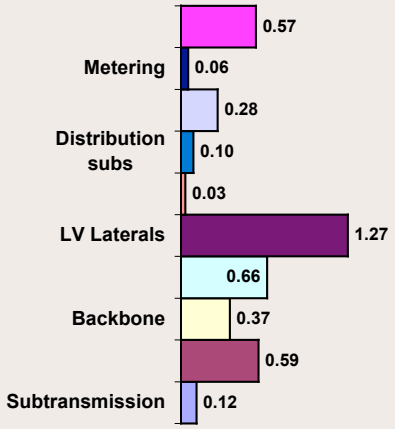
Interruptions		Worst	Avge
Momentary Index	MAIFI		3.92
Frequency Index	SAIFI	1.20	1.20
Duration Index	SAIDI	180	181
Response Time	CAIDI	150	150
Distribution Loss Factor			5.5%

Charted costs	$ 5,531	$ 543.68	$ 194.24	4.37

Lot frontage	170	ft
Occupancy Rate	42	%
Multiple Occupants	1.0	#
Laterals	12	
Feeders	8	
	2	

MEDIUM SUBSTATION
MEDIUM SUBSTATION - UNIT COSTS, PRICES & PERFORMANCE
URBAN NETWORK
MEDIUM SUBSTATION - URBAN NETWORK

Consumpti	12,420	kWh pa
Load Facto	60	%
Power Fact	85	%
Diversity Fa	3.0	
Low Load /	0.3	Ratio
kVA/kWh C	2	



Average Price - cents per kWh

5. Finding our way back to the light

Framework

- There is an established OECD framework for efficient regulation, it should be used as base for rewriting laws and regulations
- "Mapping" objectives, principles, rules, criteria etc would help to eliminate layered regulation and remove conflicts, confusion, and contradiction
- Australia's new electricity law establishing new energy regulators has streamlined the Code

Accountability

- "Right of appeal is the sine qua non of fair and equitable regulation" ….Professor David Round
- Introduction of merits based reviews should be pursued with vigour

Knowledge base

- Industry needs to understand its cost structures in terms of regulatory economics
- Regulators must step outside economic paradigm to understand network cost drivers
- Just because the industry says it ---- does not make it self-pleading


Thank you