



**NEW ZEALAND INSTITUTE FOR THE STUDY  
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# Current Comment

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## **Profit Definitions Galore: the case of electricity**

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“Profit” and “cost” in electricity have multiple meanings that are shaping the electricity debate.

This note sets out the meanings and origins of four profit measures referred to: accounting, economic, monopoly and Wolak profits.

In the Figures 1-5 below, the following definitions apply

- *established* generation plant are plants in existence and have only running and maintenance costs;
- *new* generation plant are either under construction or have just been installed: their costs include establishment running, maintenance and financing costs;
- *price* is the price at which demand equals supply; as in any reasonably (lawyers would say workably) competitive market.

### **Accounting profits**

*Accounting profits* arise when *financial costs* (for the items described above for “new” and “established” firms) are subtracted from revenue.

The established firms have low financial costs, albeit that costs differ between generation types (Figure 1). In a reasonably (workably) competitive market firms face the same electricity price as the price required for innovation and new investment in a static or growing electricity industry (Figure 2). It is important that this price be the same for all consumers and generators because all their decisions affect the need for new generation. The price indicates the value of substitutes for electricity production and consumption. This common price is set by the cost of additional electricity production.

Accounting profits arise in competitive markets as Figure 3 illustrates. They do not of themselves indicate a problem of the electricity market, or other markets where they arise.

### **Economic Profits**

These are the profits left over after the *opportunity costs* of all inputs are subtracted from revenue. In the example of hydro generation, if water were more valuable in urban or rural uses than it is in electricity then hydro generators’ economic profit would be negative. Even though Figures 1 to 3 indicate high accounting profit in established hydro generation, negative economic profit would imply water should be shifted from electricity to some other use.

The accounting profit of established hydro plant indicates the value of water *to electricity*. Stored water has an opportunity cost or value that is determined within the electricity industry and which determines the optimal use of water and gas by generators.

### **Monopoly Profits**

*Monopoly profits* arise where generators withhold generation and prices rise such that *economic* profits are greater than normal (Figure 4). Greater than normal economic profits arise in markets

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when there are barriers to entry preventing workable competition. Their presence is indicated where the price is generally greater than the price at which investment in efficient new plant is viable.

Accounting profit also increases under monopoly. Firms benefit from *accounting* profits and these too will be higher in the presence of monopoly power. It is accounting profitability that provides the incentive for monopoly behaviour.

Monopoly has the effect of raising prices beyond those prices that are required for new investment. New Zealand has an oligopoly of 5 firms, and some small fringe generators. Different firms have different cost levels that change with climatic variation such as the location of rainfall. Under these conditions and a nationwide-wide market it is not surprising that the market performs as generally competitive. Further, there has been active new plant investment and the average spot price and the consequent long-term contract prices have been of an order that just supports these investments. Monopoly profits have not been shown to be an issue in the New Zealand market to date.

The Figures 1-4 show that **high accounting profit does NOT imply monopoly profit.**

## Wolak Profits

Frank Wolak in his Commerce Commission study of 2009 found no collusion among generators, but claimed that there had been monopoly rents of \$4.3b over a period of 7 years. His use of the term monopoly suggests they correspond closely to firms' take-home or accounting profits; but they do not. The flaws of Wolak's theory of monopoly in electricity and his empirical work on testing for monopoly are set out in a set of papers in the New Zealand Association of Economists' journal *New Zealand Economic Papers*, 46(1), 2012. Wolak has not responded to them. A key issue with this element of his work is that he does not consider volatility and risk in water and gas supplies.

*Wolak profits* are shown in Figure 5 below as monopoly rents. Their problems include:

- a) *Wolak costs* are neither *accounting* nor *opportunity* costs.
  - They are not *accounting costs* for the calculation of *accounting profit* because Wolak monopoly rents are entirely based upon spot prices, but generators' revenues and customer payments are very largely determined by contract and hedge prices that are by design typically very different from the spot price.
  - They are not *opportunity costs* because they ignore the value of water and measure the gas opportunity cost with significant error.

It follows that *Wolak profits* are **neither accounting nor economic profits.**

- b) Wolak in his calculation of rents does not give any credit to the spot market's role in allocating scarce water to those most willing and able to manage it in dry years. He finds Wolak profits only in dry periods.

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In his Wolak-profit calculation:

- (i) Wolak assumes that very high prices that last for weeks or months have no effect whatever on the amount of electricity demanded. This is demonstrably false. If it were true then he would have a point.

Equivalently:

- (ii) He assumes that there are no dry periods and/or New Zealand has essentially unlimited capacity in thermal (gas) generation. These too are false.

Put another way:

Wolak does not consider the management and value of water in dry years in his calculations. Diana Tam and Lewis Evans (*Water is Valuable: the allocation of water and other resources in the New Zealand electricity market*, forthcoming Monograph, New Zealand Institute for the Study of Competition and Regulation, 2013) explain research that shows that one would expect to see something very close to Figure 5 in a competitive New Zealand electricity market. The heights of the red 'Market power rents' bars approximately indicate the value of water in dry years. Its high value ekes out stored water and dam inflows over the dry period.

## Summary

In summary, firms, including monopolists, care about accounting profit.

***Wolak profits do NOT represent accounting profit.*** His electricity-price pictures are what would be expected from the New Zealand system were it operating in a reasonably (workably) competitive manner. They accord with **normal economic profit**.

## Profit in Electricity

These figures are simplified for presentational purposes

Figures 1 to 4 show that high accounting profit does not imply monopoly profit.

Figure 1: Electricity's "accounting" cost structure

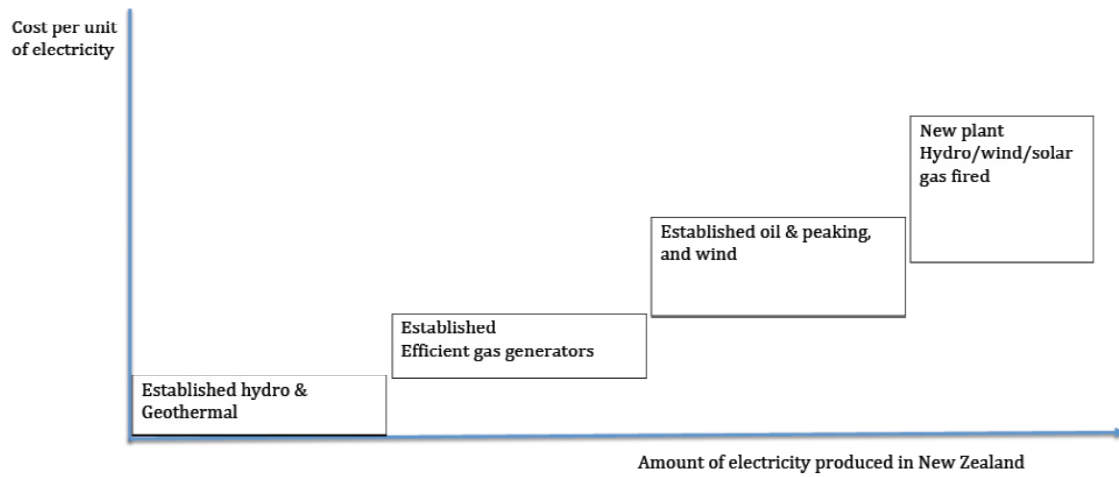


Figure 2: Market demand sets a price at which it just enables investment in new generation (assumes static or growing demand).

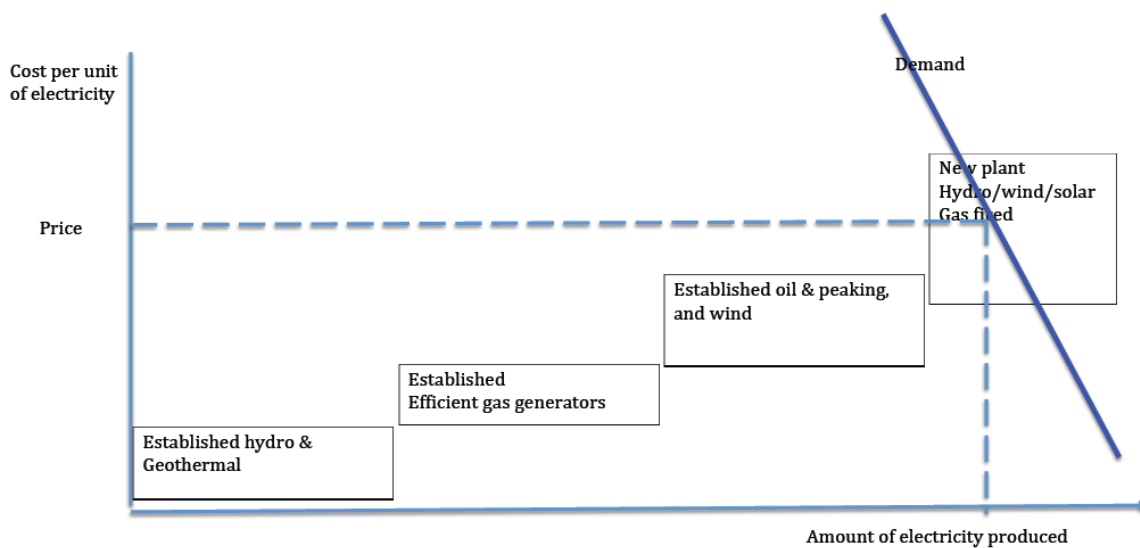


Figure 3: Shaded area is accounting profit arising for established generation plant

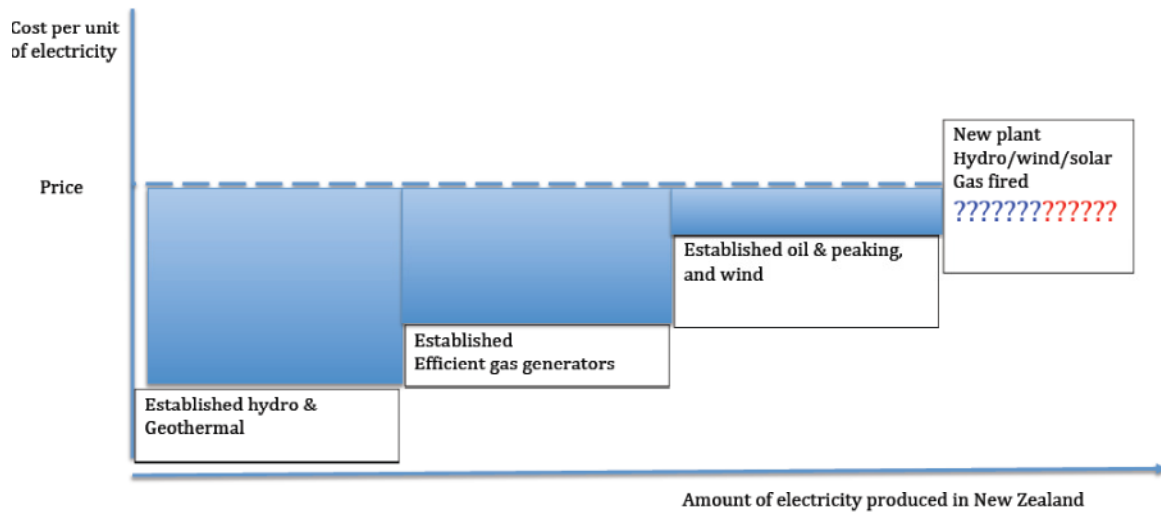


Figure 4: Monopoly profit (dotted) price above the cost of new plant

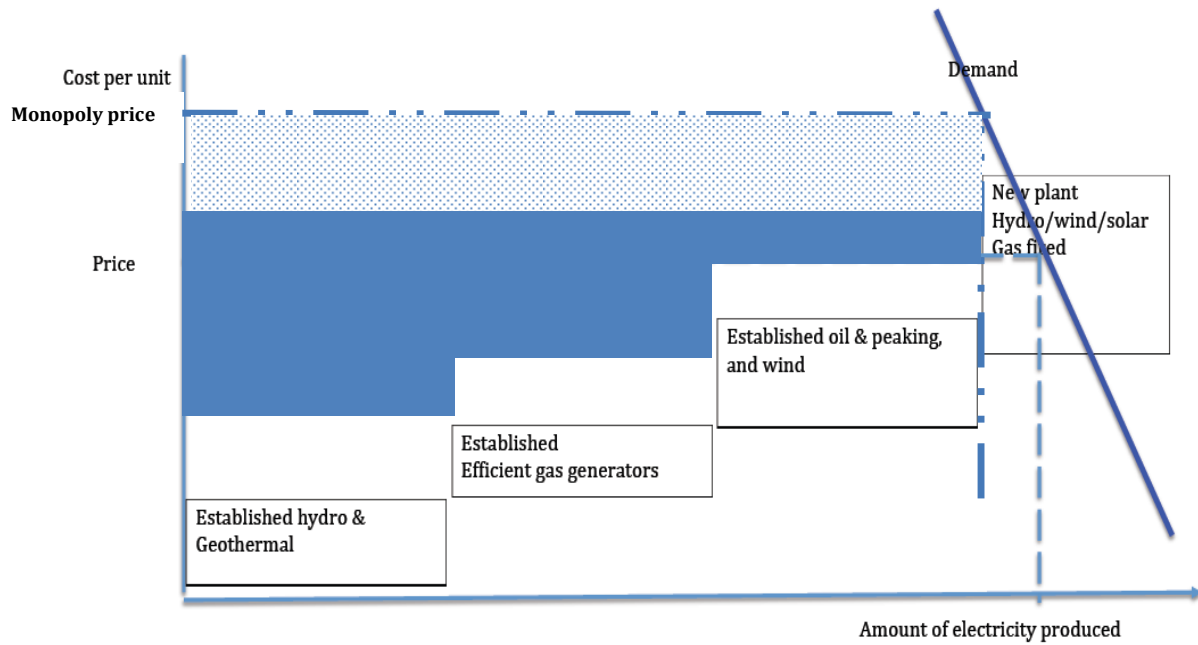
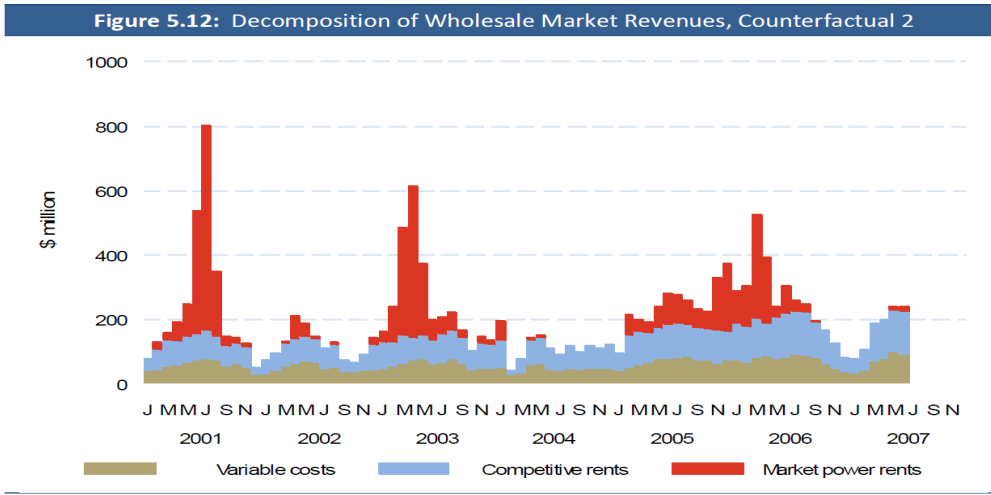


Figure 5: Wolak Profit (taken from Wolak 2009)



**Source:** Calculations as described in text using offer data from Centralised Data Set and EMS, dispatch data from M-Co, and fuel price and usage data from Contact Energy, Genesis Energy and MED.