

# Oil Price Assumptions and Scenarios

Workshop: Assumptions and Scenarios for  
the *New Zealand Energy Outlook*

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This talk is a short summary of a paper that Michael Taylor and I have written on oil price assumptions for SADEM. This paper should be available within a few days on our web site.

Oil is, of course, the most internationally traded of fuels, and a market over which New Zealand as a country has almost no influence. Therefore, SADEM simply takes oil prices as an exogenous input. The only key assumption for oil is, therefore, what to assume about its price.

# Impact of Oil Prices in SADEM

- Not too important
  - Mostly impacts transport
  - And transport demand is not very price sensitive
  - Price of LNG is linked to price of crude
  - If no large domestic gas discoveries, LNG drives long-term gas prices
- But oil prices are highly visible
  - Can have strong impact on the economy, which is not reflected in SADEM
  - Our assumptions tend to be seen as ‘official’ government price projections

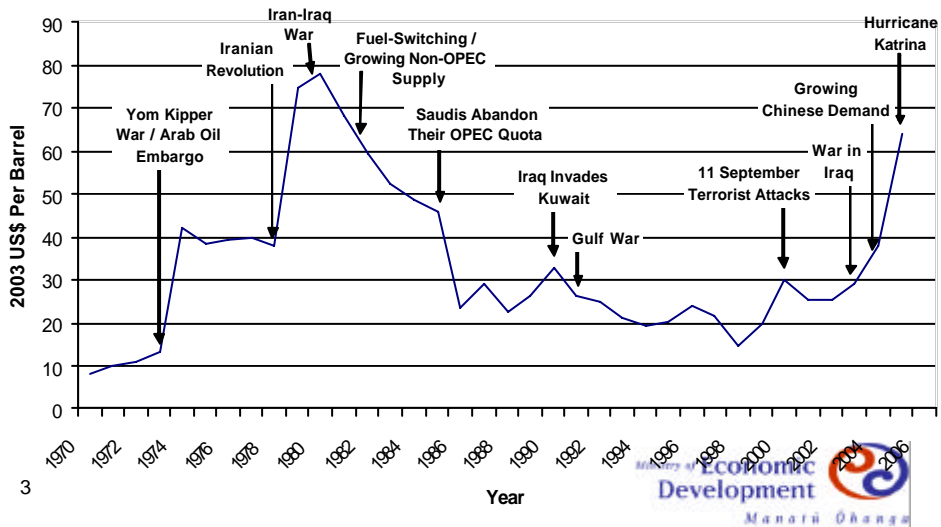
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On the scale of key assumptions in SADEM, oil actually rates fairly low. As we have seen, it impacts mostly on transport, and since transport demand is not very price sensitive, oil prices don't change the transportation results very much. A more critical impact of oil prices is actually an indirect one—we assume the price of imported LNG is linked to the price of oil. And, the price of LNG will drive the price of gas in New Zealand if indigenous supply is unable to keep up with demand. In the real world, oil prices are a good deal more important than they are in SADEM. Oil price increases can have a significant impact on the economy, an effect that is not reflected in SADEM.

Although we at MED don't actually do any oil price modelling ourselves, our experience has been that *Energy Outlook's* oil price assumptions tend to be viewed as an 'official' government oil price projection. For this reason, it is perhaps the most visible assumption in *Energy Outlook*. It becomes especially visible when it turns out to be wrong.

# Reasons for Humility

Oil Prices 1970-2005



And, unfortunately, whatever we assume, it will almost certainly turn out to be wrong. This chart shows where oil prices have been over the last 35 years, and some of the events that have impacted them. As you can see, it has been a rather wild ride. Furthermore, most of the events that impacted oil prices were unpredictable and inherently unpredictable. There is nothing to suggest that the next 25 years are going to be any different.

# Preference Hierarchy for Oil Price Projections

1. *What futures markets are saying* – Theoretical best, but only goes out to 2011 or 2012
2. *What well-know industry analysts are saying* – Can tap a lot of good research, but may be outdated or inconsistent
3. *Our own analysis* – Make sure overall conclusions are reasonable

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So what can we do? We would propose that the best we can do is to follow the hierarchy of projections listed here.

Both theory and empirical evidence suggests that oil futures markets are probably the best source of future oil price projections. That is because they are not just models, they are real prices at which you can buy and sell oil for future delivery, set by real forces of supply and demand. Anyone who has a method for forecasting oil prices better than the futures markets can get rich very quickly, so it seems very reasonable to assume that there is nothing systematically better out there. Unfortunately, the futures markets only go out six or seven years.

Beyond that, it probably makes sense to look at what the best-known industry analysts are saying.

Finally, although we at MED don't have access to knowledge about the oil market that everyone in the industry doesn't also know, it is good to give our overall conclusions a reality check, based on what we know about the oil market.

# NYMEX Futures Prices

Date	Prices Nominal US\$	Prices 2005 US \$
December 2005	\$57.68	\$57.68
December 2006	\$59.55	\$57.81
December 2007	\$57.98	\$54.65
December 2008	\$56.36	\$51.58
December 2009	\$54.81	\$48.69
December 2010	\$53.73	\$46.34
December 2011	\$53.13	\$44.50

As of 15 November 2005. Prices in 2005 US\$ assume  
3% annual U.S. inflation.

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This slide tells us what the NYMEX futures market is currently saying about the future price of oil. It shows prices declining somewhat from current levels over the next six years. However, futures market prices are in nominal dollars, whereas in SADEM, we express them in constant inflation-adjusted dollars. Assuming 3% U.S. inflation over the next six years, the price decline in nominal dollars is more dramatic.

# Oil Market Modelling Efforts

- Public Sector
  - IEA *2005 World Energy Outlook* has oil prices at \$39/barrel in 2030 in 2004 US\$
  - US EIA *2005 Annual Energy Outlook* has oil prices US\$21 to US\$48/barrel in 2030 in 2003 US\$
- Industry Consulting Firms
  - Generally less than US\$35/barrel in 2030 in 2003 US\$

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The work of industry analysts generally agrees with this view that current levels of oil prices are higher than we can expect over the longer term. In the public sector, the just released International Energy Agency (IEA) *World Energy Outlook* is projecting a price of \$39/barrel in 2004 US dollars. The U.S. Energy Information Administration (EIA) is projecting prices ranging from \$21 to \$48/barrel in 2003 U.S. dollars, depending upon the scenario. Industry consulting firms are also projecting prices lower than today's, generally less than \$35/barrel in 2030 in 2003 U.S. dollars.

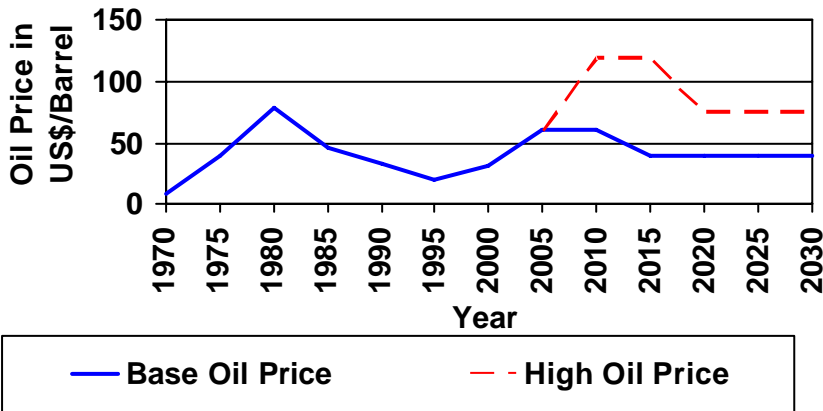
# Our Own Analysis

- Demand is growing rapidly, especially in developing countries
- Large new field discoveries are declining, suggesting demand will have to be met by
  - Lots of small discoveries
  - Enhanced recovery from existing fields
  - Unconventional oil
  - Synthetic oil
- Increasing dependence on OPEC countries
- Conclusion: Prices need to be ‘high’ by historic standards

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Finally, our own reality check here says that oil prices are likely to remain “high” by historic standards, for the reasons listed on this slide. So where does this leave us?

# Proposed Oil Price Assumptions



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We would propose a base case oil price assumption which would have oil prices remaining at roughly current levels of US\$60/barrel until 2010, then dropping back to a still historically high US\$40/barrel for the remainder of the horizon. This drop reflects what industry analysts and futures markets seem to be saying.

As I mentioned earlier, however, we do recognize that there is huge uncertainty in these numbers. Many people have serious concerns with the growing dependence of the world on a few OPEC countries and the instability that could result. Others see us facing a long-term resource exhaustion problem.

Therefore, we also proposing to look at an alternative high price case. In this case, oil prices would continue to rise to US\$125/barrel by 2010, where they would remain until 2015. After 2015, prices would drop back to US\$75/barrel by 2020, where they would stay for the remainder of the model time horizon. The drop in price after 2015 could be viewed as reflecting either an easing of the disruption or the development of alternative unconventional sources of liquid fuels, which should be economic at these prices. This case will be pushing the capabilities of our model a little bit, since prices at this level on a sustained basis are outside of historical experience. But we will do our best with it