

Electricity for Montserrat

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Montserrat Utilities Ltd

A Presentation to Ministers
30th August 2005

MUL Logo
to be designed

Agenda

- Our Mission Statement
- Electricity on Montserrat
 - Existing generation plant
 - Production and demand
 - Security of supply
 - Costs and prices
 - Implications of changes in world oil price
- Potential mechanisms for securing stable input prices - worked examples using indicative prices only
- Alternatives to diesel
- Managing demand

Our Mission is . . .

. . . to provide electricity and water services safely, efficiently, and sustainably, for the benefit of all people on Montserrat *

* still to be ratified by the directors and staff of MUL

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Currently, electricity is produced from four diesel units based at Brades Power Station



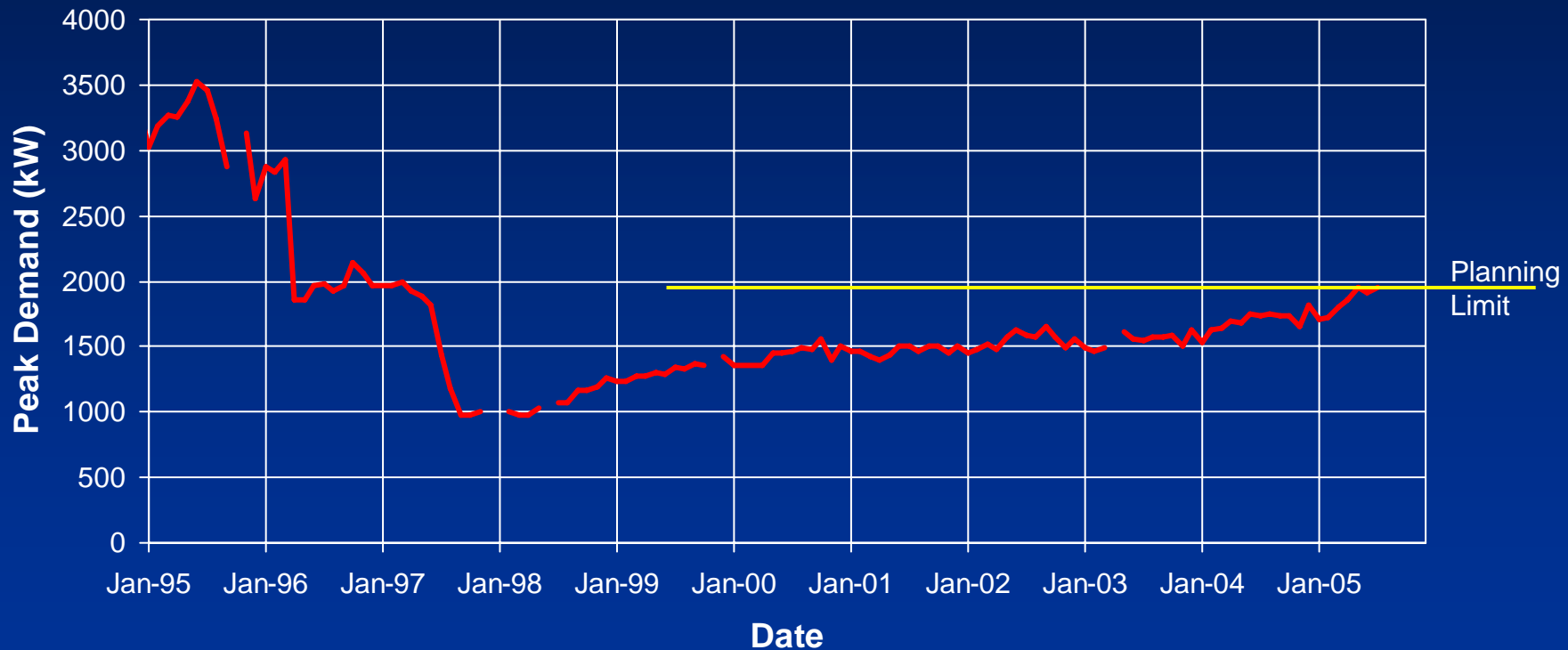
Location of Power Station:

- Plymouth (GTR) - closed in 1997
- Temporary station in Salem
- Moved to Brades in 1998 – 2000

- All mechanical plant requires periodic shut-downs for maintenance – ‘scheduled outages’
- No mechanical plant is immune to failure – so there are occasional ‘unscheduled outages’
- ‘Best Practice’ generation planning is that sufficient capacity is available such that demand can be met even if the two largest units are unavailable

Peak system demand is increasing, and is rapidly approaching the planning limit

Peak System Demand



Two of the current units are approaching the end of their design life

Unit No	1	2	2B	3	3B	4	4B
Installed	1996	1996	2000	1999	2004	2001	2003
Retired?		2000		2004		2003	
Max operating capacity	1000kW	-	900kW	-	1000kW	-	1250kW

- Two units (units 1 & 2) were relocated from the Salem site
- Two further units were added, in 1999 and 2001
- All are 'high speed' (1800 rpm) units, which require more maintenance than low-speed stationary units like the ones installed at GTR ¹
- 'This type of high speed generating set has a life of approximately 10 years provided the recommended maintenance is carried out' ²

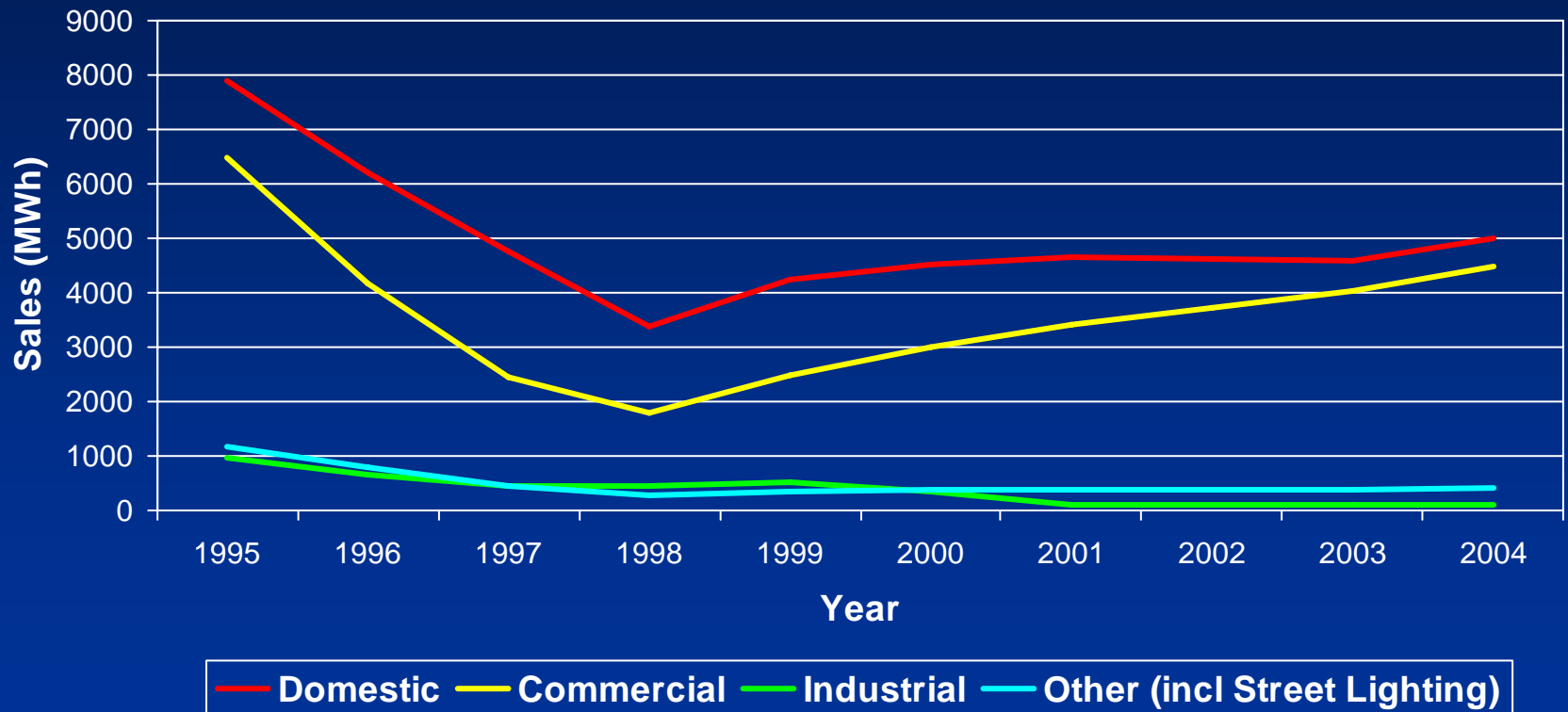
Our customer base is diverse . . .

2003 data ¹	No of Customers	Sales (MWh)
Domestic	2374	4586
Commercial	522	4032
Industrial	3	92
Street Lighting	12	388

- Domestic customers account for over 80% of our customers by number, and approx 50% by sales
- Industrial customers are very few – with the closure of Radio Antilles in 1997, only three remain
- Commercial customers (defined as neither domestic nor industrial) are very diverse – range from small retail outlets to large hotels
- Street lighting accounts for approx 4% of electricity sales (about four times as much as Industrial)

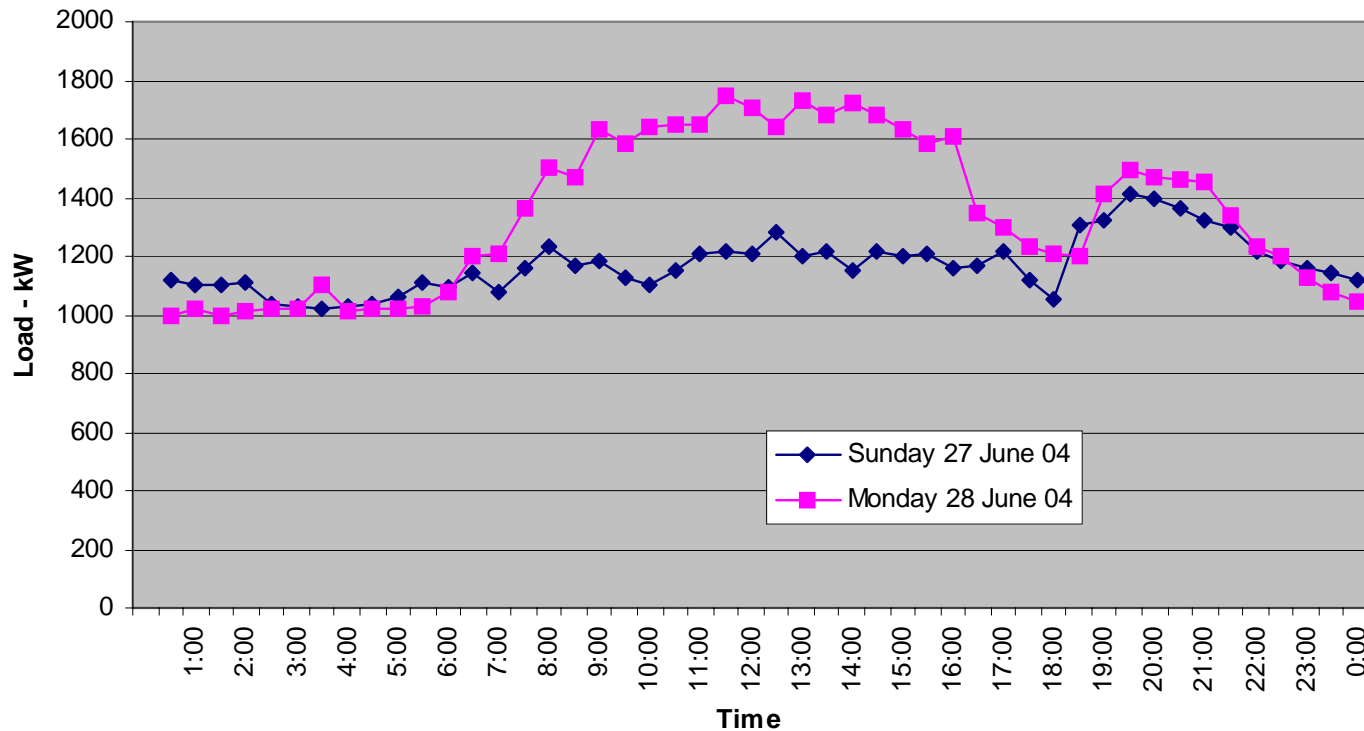
... and is recovering at different rates

Trends in Sales - by sector



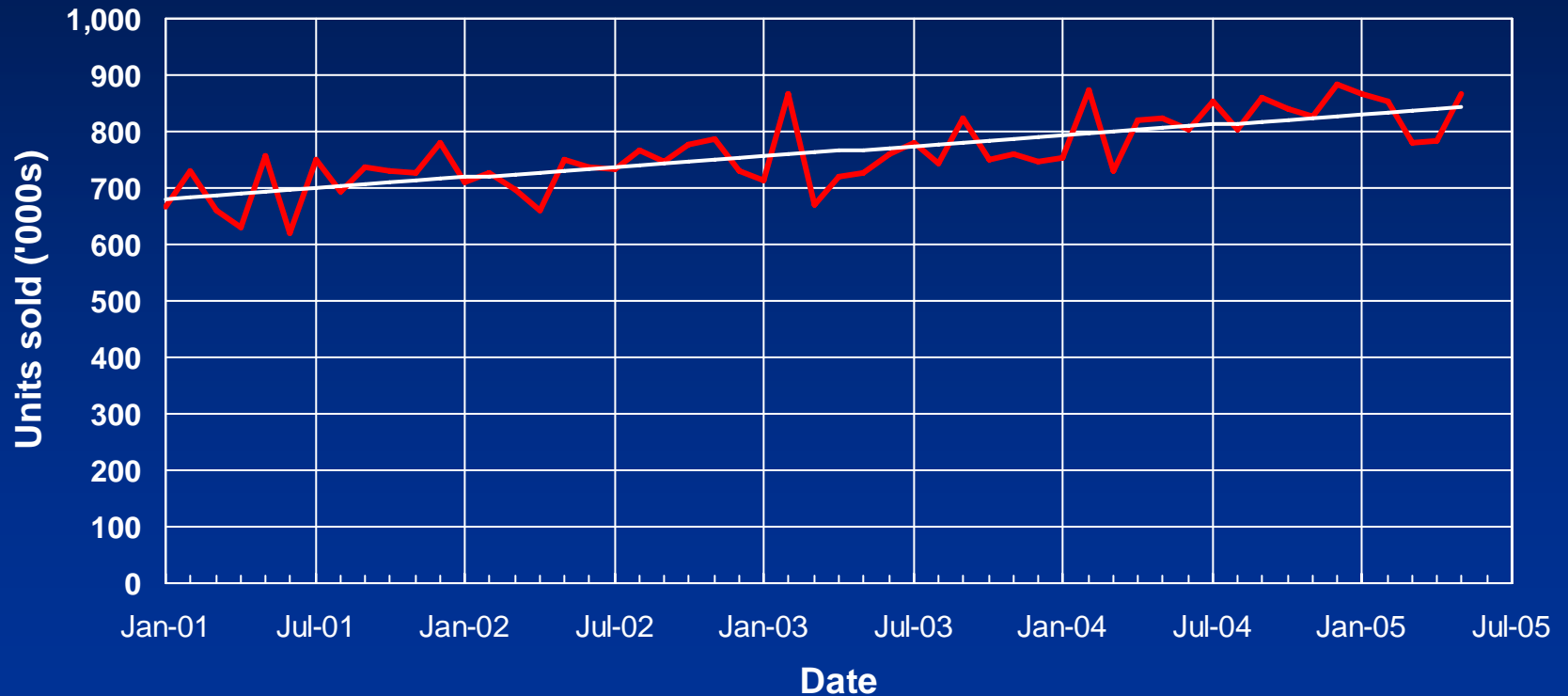
Consumption is greatest during working hours and there is a secondary evening peak

Figure 4.9 - Typical Daily Load Profiles



There is some seasonality in monthly sales, but trend is upward

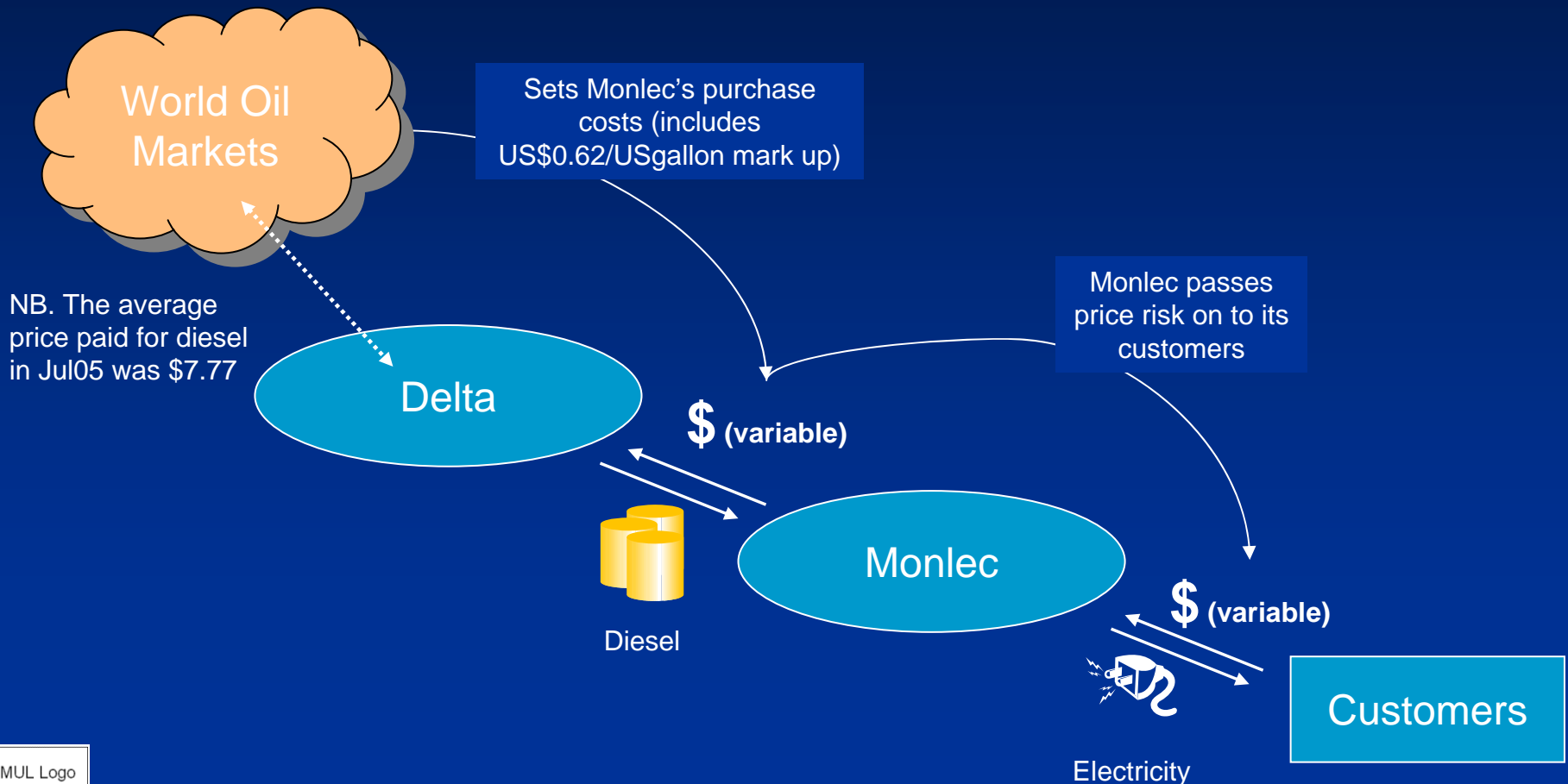
Monthly sales - Jan01 to Jul05



Customers are metered and billed monthly

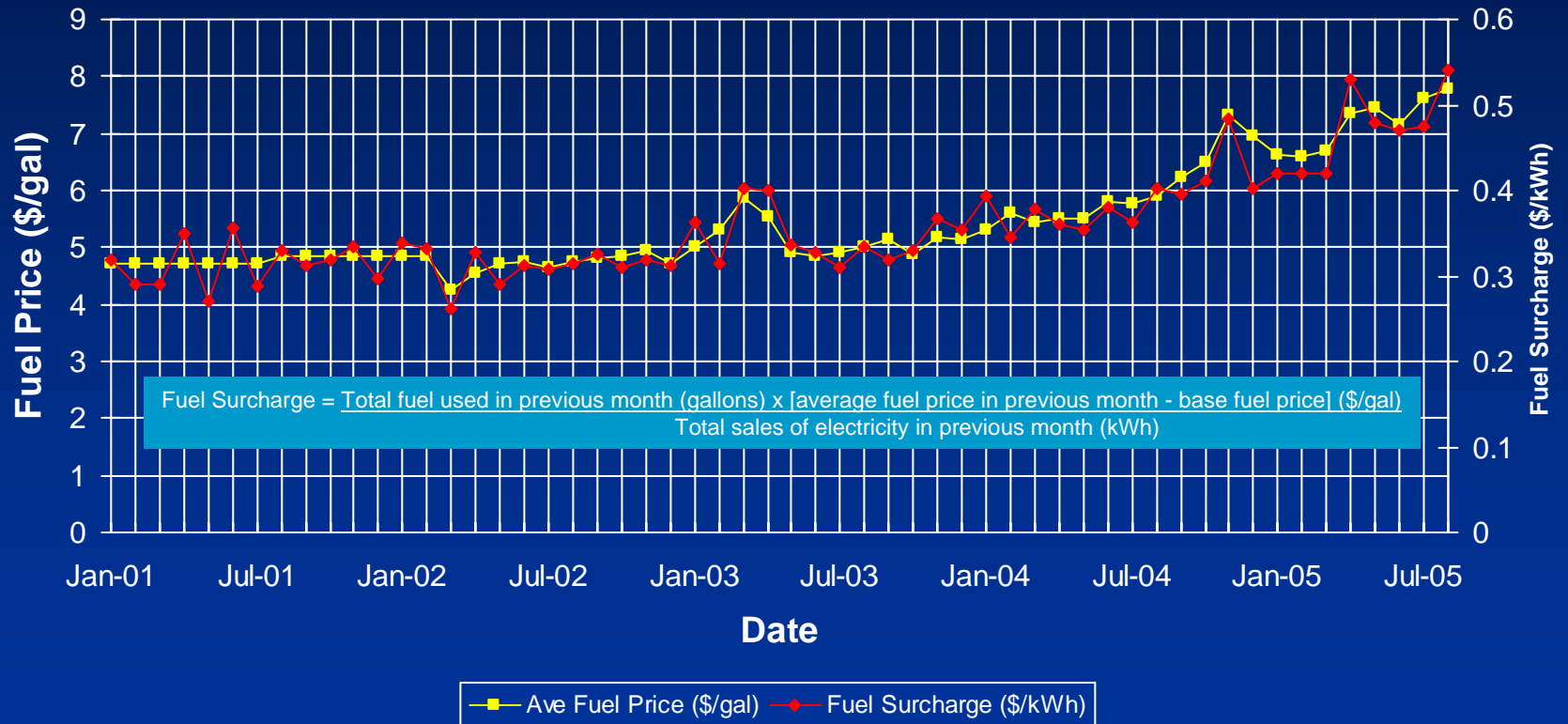
- Customers pay a two-part tariff – ‘Basic Price’, and ‘Fuel Surcharge’
- The Basic Price is intended to recover all operational costs (generation, transmission & distribution, administration and customer service) as well as provide revenue for further investment. It has remained at its current level since Feb 2001
- The Fuel Surcharge was introduced to protect Monlec from changes in the price of fuel – through it, the cost of diesel (excluding a very small amount already included in the Basic Price) is passed on to customers. It changes every month.
- There is no standing charge
- Current tariff (Basic Price):
 - Domestic - 48¢/kWh for first 75 units, 55¢/kWh thereafter
 - Commercial - 54¢/kWh
 - Industrial - 47¢/kWh

Currently, all diesel for generation is supplied by Delta on a ten-year contract signed in 1992



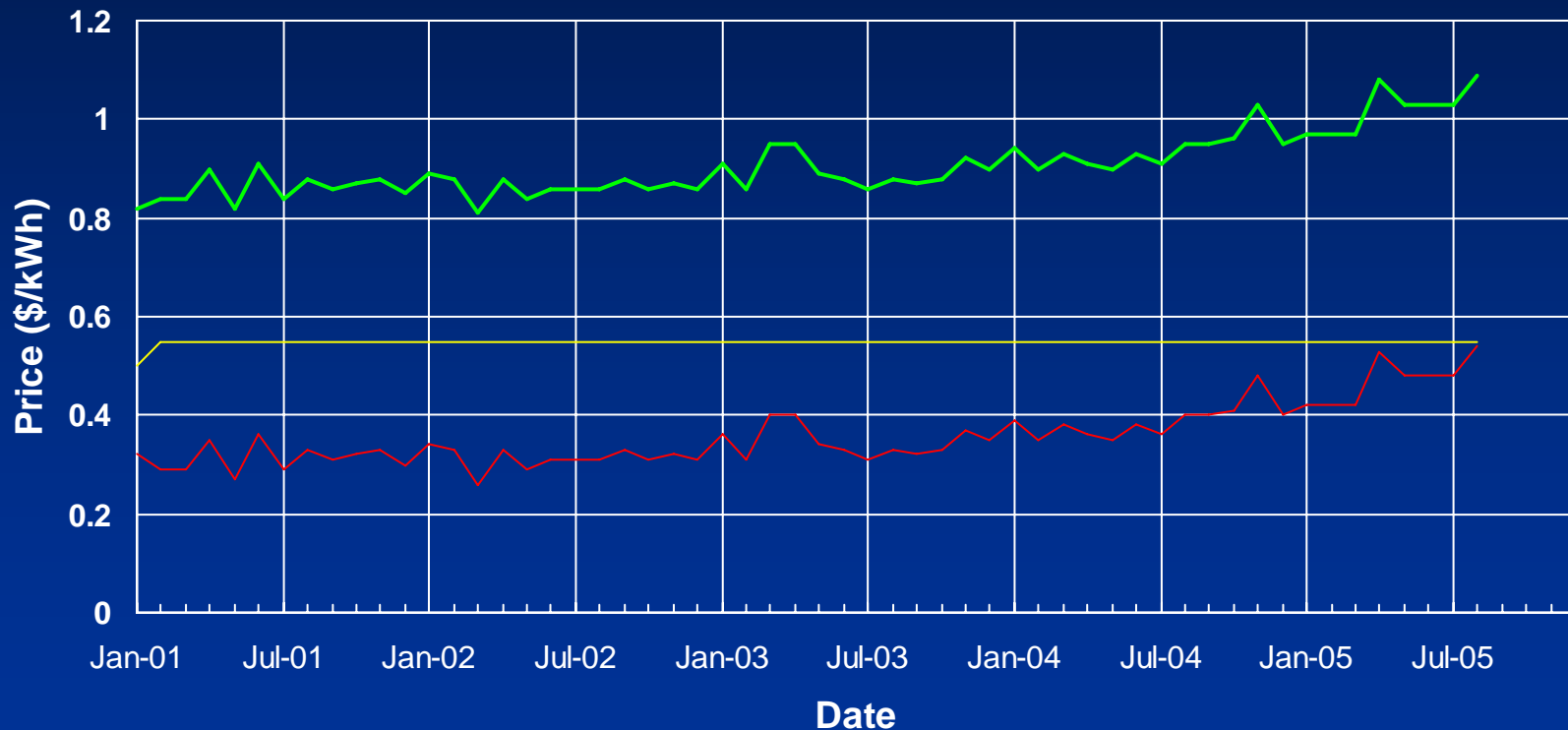
Each month, Monlec calculates the Fuel Surcharge based on fuel purchase costs

Fuel Price and Fuel Surcharge



Currently, electricity prices (Basic Price plus Fuel Surcharge) are at their highest ever level

Price of Electricity for Domestic Customers



What happens if oil prices continue to rise?

- Do nothing - electricity prices will continue to increase through the Fuel Surcharge mechanism
- Look for financial solutions for fixing input costs
- Look for alternatives to diesel for generation
- Look for ways to assist customers to reduce consumption

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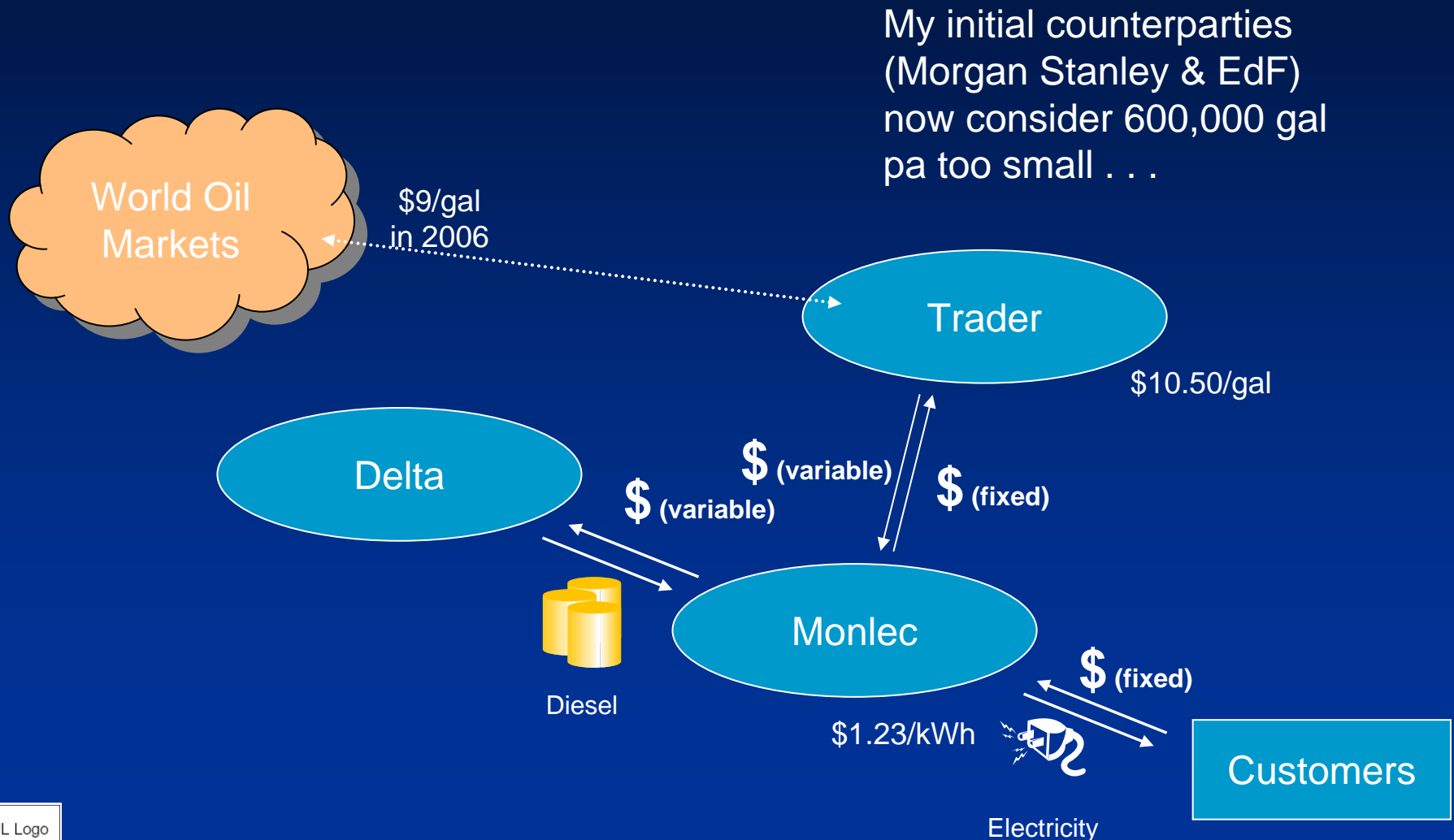
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Option 1. Ask Delta to sell us diesel on a fixed price basis

I asked, but Delta do not want to move away from the current arrangements



Option 2. Open a financial contract with a trader to swap fixed prices for variable



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- **Alternatives to diesel**
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Why look at alternatives?

- Strategic diversity - reduces Montserrat's dependence on imported diesel
 - What happens if fuel prices continue to rise?
 - What happens if supply is disrupted?
- Can lead to a reduction in prices and/or provide extra income
- Supports GoM's efforts towards sustainability and it's recent decision to ratify Kyoto
- May support tourism (and eco-tourism in particular) by positioning Montserrat as a truly 'green' island
- Our main areas of immediate interest for electricity generation are wind and geothermal
- We will maintain a 'watching brief' on solar and other technologies

Wind energy is well proven around the world

- Over 13,000 MW installed world wide ¹
- Installed capacity has doubled every three years since 1990 ²
- Each doubling has been accompanied by a 15% reduction in the price of wind turbines (USD/kW) – but smaller machines are proportionately more expensive
 - Current (Sept 2004) capital costs for small machines (less than 200kW) range from 1100 USD/kW for a 120kW machine, to 1500 USD/kW for a 50kW machine.
 - Operating costs range from 25USD/kW pa for 250kW machines to around \$13USD/kW pa for a 1.5 MW machine
 - Overall generation costs depend on wind speed, cost of capital, and economic life of the turbines – European experience in small turbines suggests US 8¢/kWh at 7.5 m/s ³

1 World Energy Council website: www.worldenergy.org

2 David Milborrow, WREN International Seminar, 2004

3 Gipe, P. 'Wind Power' published by James & James Ltd. 2004

Montserrat has direct experience of wind turbines

- May 1982 – Wind Resource Assessment completed
- Nov 1986 – BEI are appointed to advise on wind projects
- May 1987 – 80kW ESI wind turbine installed at St Georges Hill East
- Dec 1987 – 27 manufacturers invited to tender
- Jun 1989 – Second turbine installed – a 100kW Vestas V20
- Sep 1989 – Both turbines destroyed by Hurricane Hugo
- Jun 1991 – Two new 100kW Vestas machines commissioned

- The turbines were shut down after major volcanic activity in 1997, and have not operated since. They are currently in a state of disrepair and may not be recoverable

Key considerations for siting wind turbines

- Wind speeds at the site – mean wind speeds, distribution, prevailing direction
- Ease of access for construction and maintenance
- Proximity to the main transmission/distribution network
- Environmental issues
- Site topography – affects wind speed and turbulence
- Foundation conditions

BEI identified a number of potential sites:

- 1) St Georges Hill
- 2) Windy Hill (Farrells)
- 3) 'Northern Region' - the saddle to north and east of Gerald's, and the northeastward pointing ridges at Lookout Yard and Blakes Yard

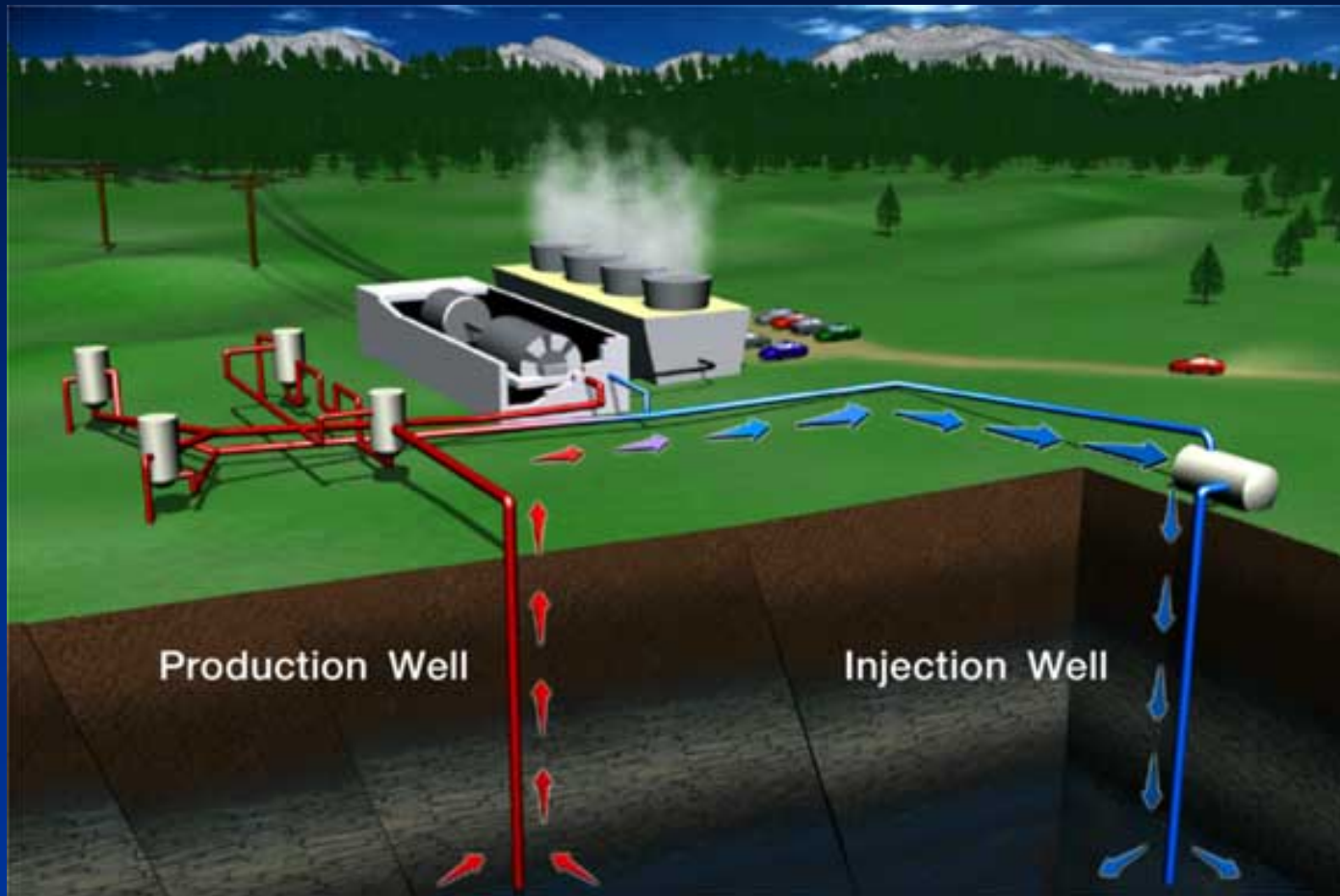
Current status on wind

- We are actively considering how best to incorporate wind energy into a balanced generation portfolio
- One team of prospective developers will be visiting Montserrat in September to look at wind (and geothermal)
- I'd also like to start soliciting expressions of interest from other prospective developers – so we can have some competition!

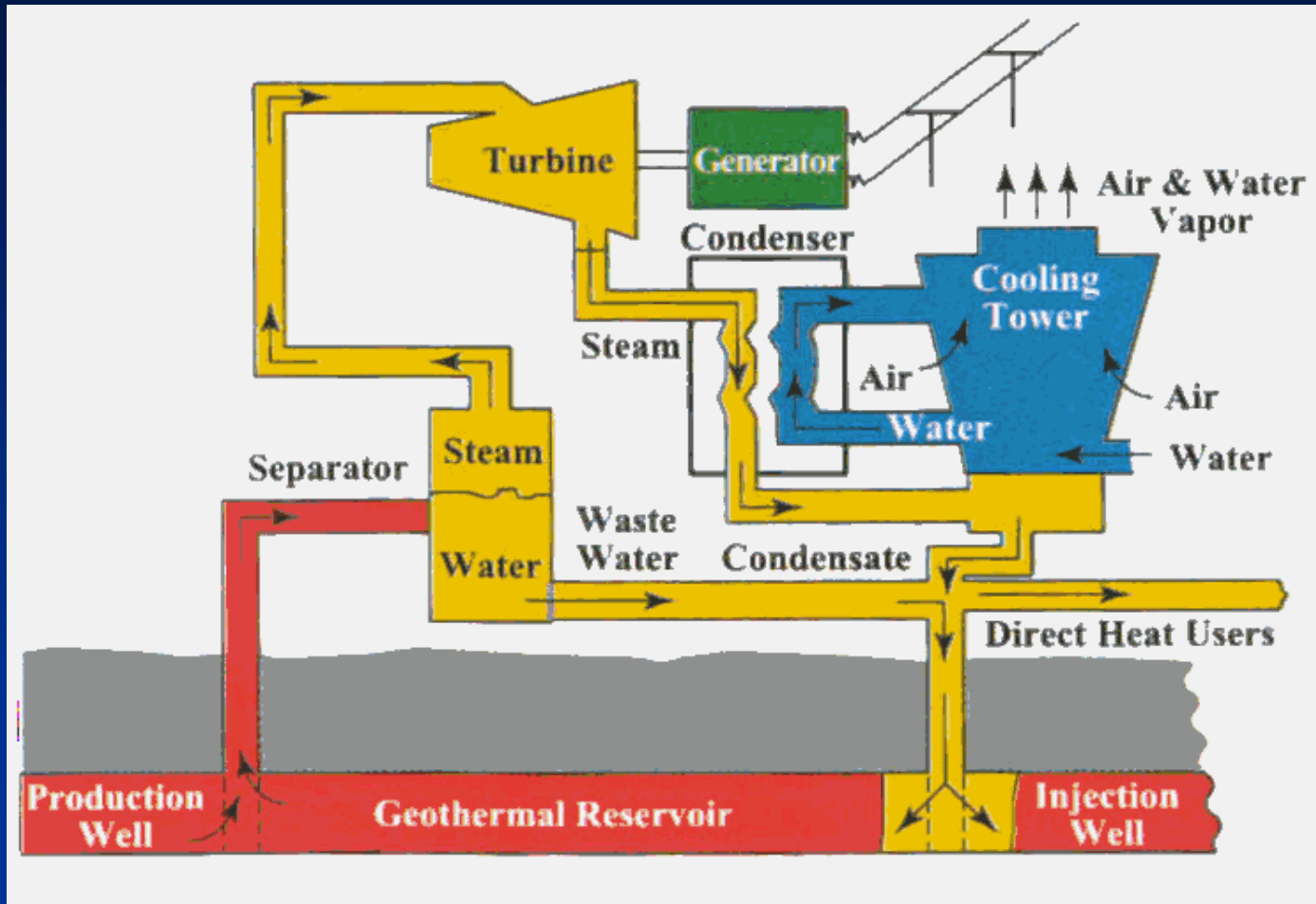
Geothermal for electricity generation is less proven than wind . . .

- Installed geothermal generation capacity worldwide is 7700 MW (major countries are USA (2228MW) Philippines (1863MW), Italy (621MW), Indonesia (590MW), and Japan (547MW))
- More locally, several other countries use geothermal as part of their generation portfolio
 - Mexico: 750MW
 - El Salvador: 161MW
 - Costa Rica: 115MW
 - Nicaragua: 70MW
 - Guatemala: 33MW
 - Guadeloupe: 4MW

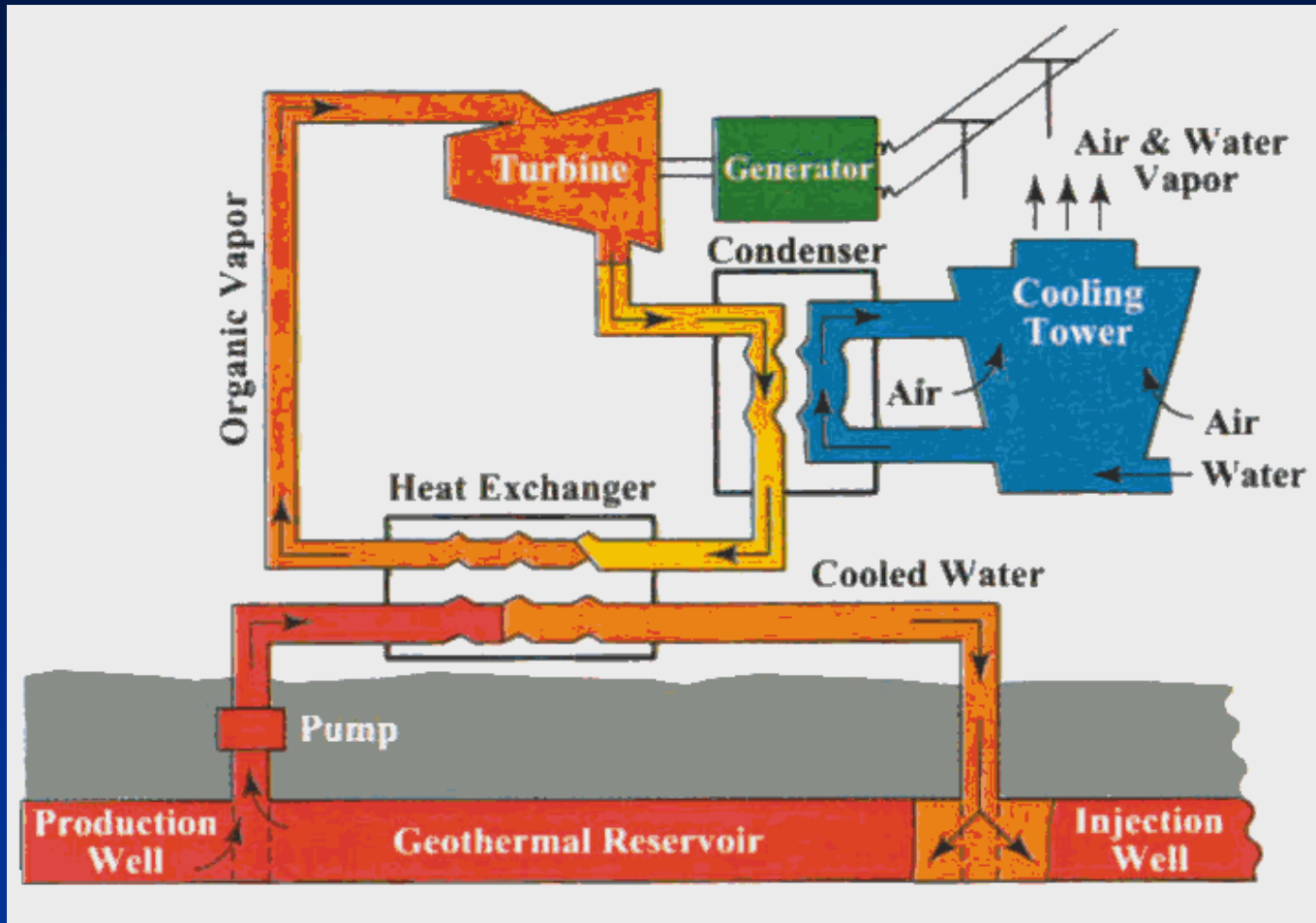
Most of the cost of geothermal is underground



If the well produces very hot water (above 150°C) then 'flash' generation is used . . .



If the water extracted is cooler than 150°C, then a 'binary' cycle must be used



Current status on geothermal

- GoM has granted a licence to Caribbean Power Ltd/West Indies Power Ltd ' . . . to explore and develop the geothermal resource . . . subject to the execution of an agreement between both parties on terms and conditions to be agreed . . . ' ¹
- This agreement is still being reviewed and revised, with input from many people in GoM and elsewhere
- A UK team (led by Prof Paul Younger of Newcastle Uni) will be visiting Montserrat in September to assess the likely costs of exploration and development, and to prepare themselves to respond to any RFP we might issue

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Energy efficiency is an important part of balancing supply and demand

- Working with the National Consumer Association, we are developing advice and guidance for all consumers on how to make effective use of energy
- ‘Save Money – Save Energy – Save the Planet’ is the (working) title of the initiative
- We will provide energy saving tips on the website, and distribute a small booklet of energy-saving tips to customers on request

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