



A2EP – 2xEP Energy Productivity Summit
04-05 April, 2017
Australian National Maritime Museum
Darling Harbour, Sydney

Session 11
The next wave: 2xEP
Innovation: Food value chain

Mirjana Prica

Tim Penderleith

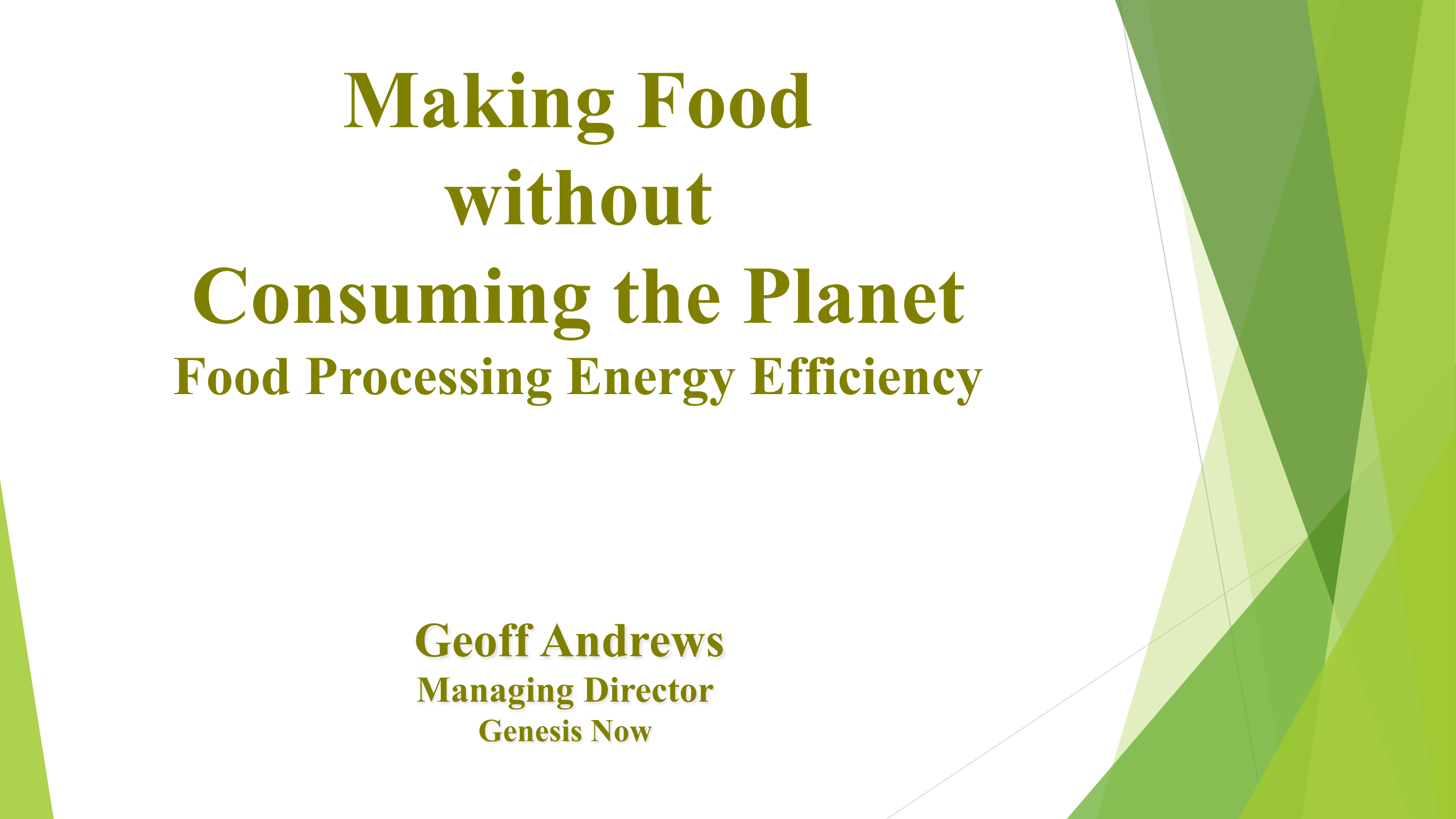
Richard Magney

Geoff Andrews > presentation follows

Chair: Angus Crossan



Doing more. Using less.

The background features abstract, overlapping green geometric shapes in various shades of green, creating a modern, layered effect on the right side of the slide.

Making Food without Consuming the Planet

Food Processing Energy Efficiency

Geoff Andrews
Managing Director
Genesis Now

Outline

- Milk Dewatering, on farm
- Other Opportunities



Background

- Genesis Now:
 - Established 1991
 - Finding, evaluating and implementing energy efficiency opportunities
 - > 2500 projects, energy efficiency, materials, renewable energy



Milk dewatering



Why bother ?

- Water shortages
- Freight task
 - 1,000,000 litres / farm / year
 - Long distances
 - Energy use
 - Cost to farmer, e.g. \$25,000 / year
 - Safety
 - Water carrying
- Cooling task
- Capital savings
- Milk quality
- Chemical savings

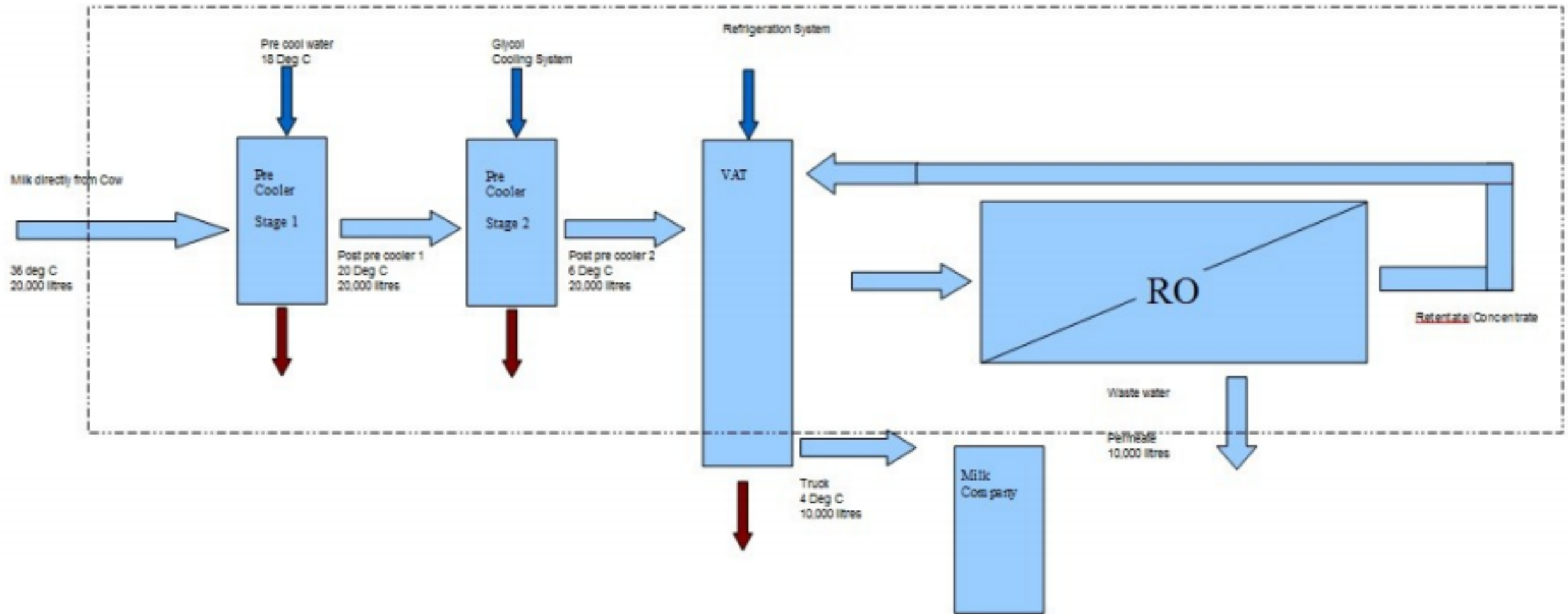


The trial

- ▶ Manager: Glenn MacMillan
- ▶ Target 50% water removal
- ▶ Goals: milk quality, practicality, risk, etc. (multiple benefits)
- ▶ Farm selection
- ▶ Equipment selection
- ▶ Trial Started 2011



Configuration



Dewatering Trial Results

- ▶ System designed, documented, demonstrated
- ▶ Cooperation: farmers, Murray Goulburn, DPI, EPA, South Gippsland Water, Smart Water Fund, Tetra Pak
- ▶ 50% water removal IS feasible.
- ▶ Milk quality maintained
- ▶ Need nett benefit, considering:
 - ▶ Cleaning effort and chemicals
 - ▶ Operator intervention
 - ▶ Dewatering plant energy use
- ▶ Water re-use for cleaning, etc.
- ▶ Drinking water tests recommended



Energy and \$ results

- ▶ Water removed: 400 litres / hour.
- ▶ Electricity used 32 kWh / kilolitre water removed
- ▶ Energy cost \$ 5.00 / kilolitre water removed
- ▶ Transport saving \$30.00 / kilolitre water removed
- ▶ Other potential savings:
 - ▶ water, \$3 - \$10 / kilolitre water saved
 - ▶ Milk quality,
 - ▶ vat capital,
 - ▶ Cooling energy

Investment performance

Description	Amount	units
Savings:		
Transport (3,000,000 litres saved / year)	\$90,000	\$ / year
Water	\$0	\$ / year
Costs:		
Electricity (\$100,000 kWh, @ 15 cents)	\$15,000	\$ / year
Chemicals	\$1,260	\$ / year
Operator labour (15 minutes/cycle, \$30/hr)	\$2,250	\$ / year
Maintenance (including membrane)	\$2,000	\$ / year
Sub-total costs	\$20,510	\$ / year
Net Benefit	\$69,490	\$ / year
Capital investment	\$100,000	
Return on investment	70%	p.a.

Other Opportunities

Heat Pumps for heat recovery

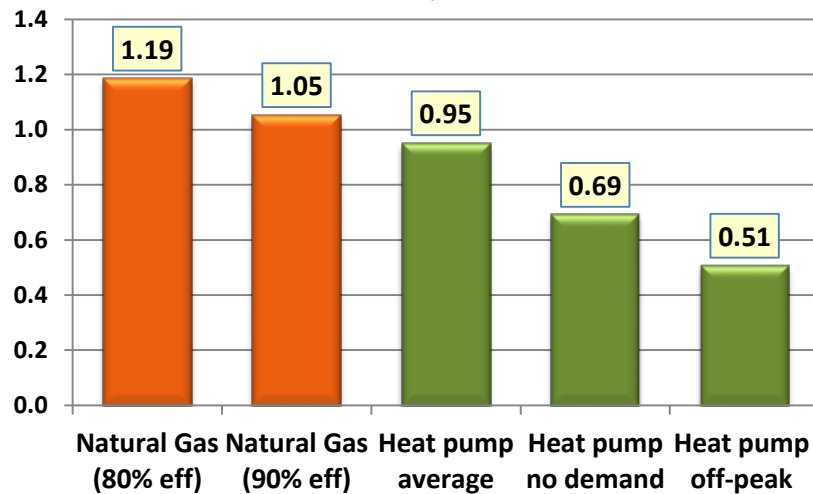
- ▶ The time is right:
 - ▶ Gas prices rising
 - ▶ Gas supply concerns (amount, lifetime, environmental damage)
 - ▶ Heat pump developments:
 - ▶ Higher efficiency
 - ▶ Higher temperatures
 - ▶ Working fluids greenhouse and ozone friendly
 - ▶ Supply with solar
 - ▶ Climate change, greenhouse and heat
- ▶ Multiple industries with heating and cooling needs:
 - ▶ Dairy farm, dairy factory
 - ▶ Food processing and cold storage
 - ▶ Injection moulding
 - ▶ Commercial buildings

Cost of delivering heat

Energy Source and Heating Technology	Fuel Price	Units	Conversion Efficiency	Delivered Fuel Price	Delivered Heat Price	Specific Price	Fuel Greenhouse intensity	Heating greenhouse intensity
				cents/MJ	cents/MJ	cents / kW.h		kg CO ₂ / GJ delivered
Natural Gas (80% eff)	0.95cents/MJ		80%	0.95	1.19	4.27	55.43kg CO ₂ / GJ	69.3
Natural Gas (90% eff)	0.95cents/MJ		90%	0.95	1.05	3.79	55.43kg CO ₂ / GJ	61.6
Heat pump average	13.70cents / kWh		400%	3.81	0.95	13.70	1.19kg CO ₂ / kWh	82.6
Heat pump no demand	9.95cents / kWh		400%	2.76	0.69	9.95	1.19kg CO ₂ / kWh	82.6
Heat pump off-peak	7.30cents / kWh		400%	2.03	0.51	7.30	1.19kg CO ₂ / kWh	82.6

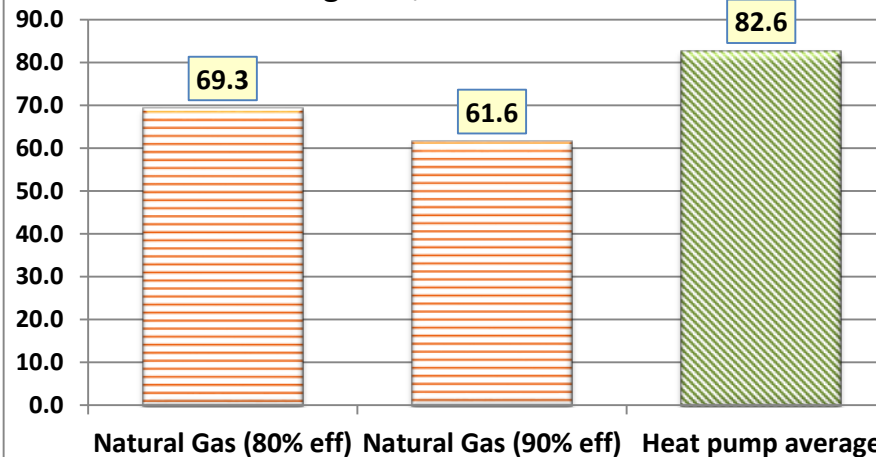
Cost of Delivered Heat

cents / MJ



Heating Greenhouse Intensity

kg CO₂ / GJ delivered

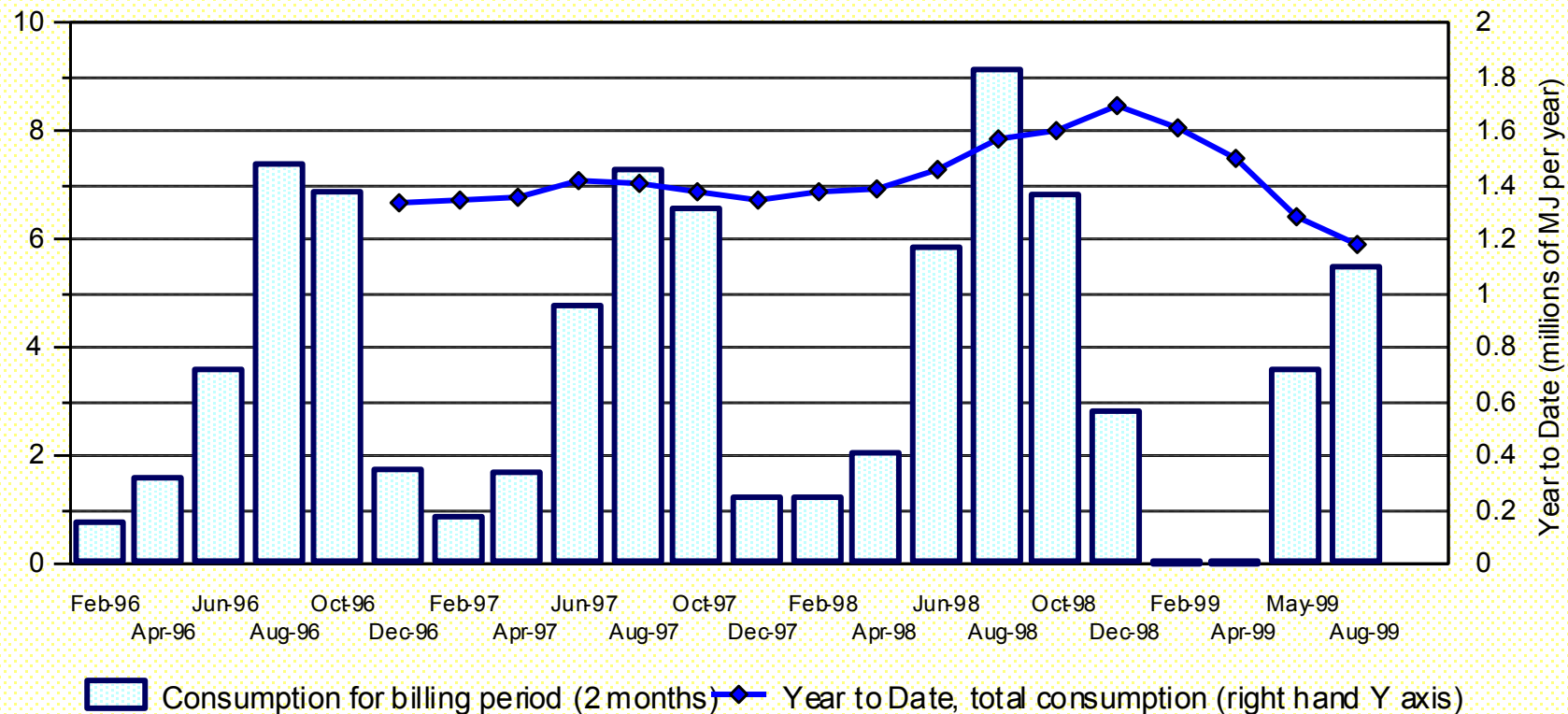


Point of use water heating.



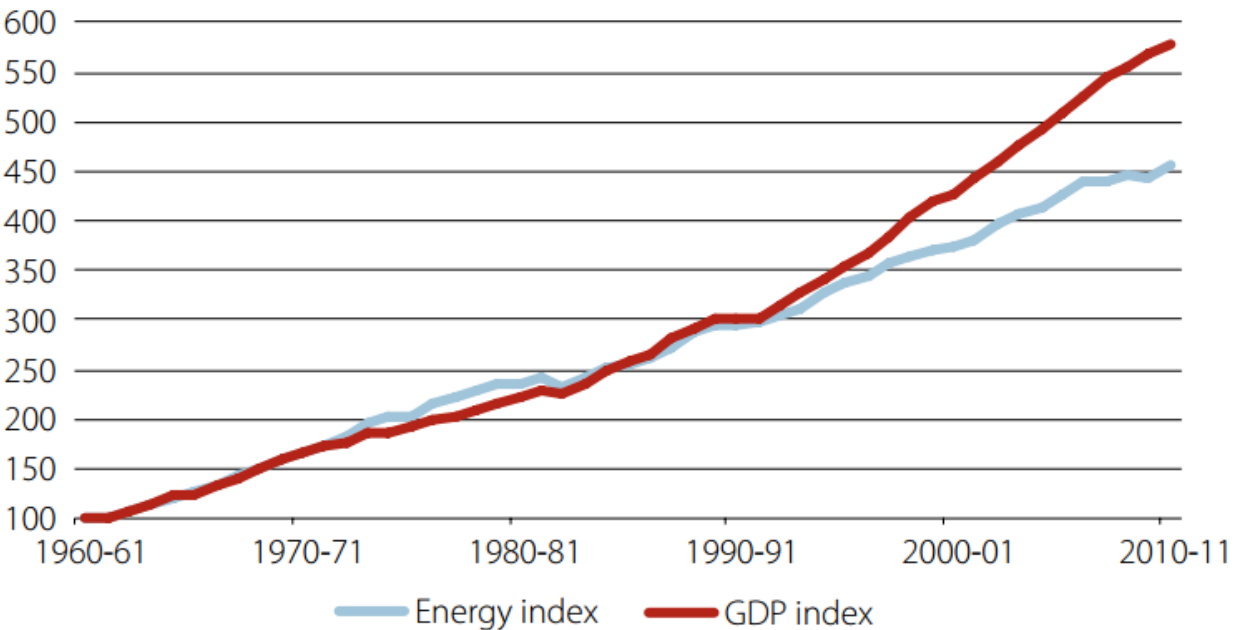
MicroHeat
HOT WATER AS IT SHOULD BE

Fawkner Secondary College
Gas Consumption, average GigaJoules per day



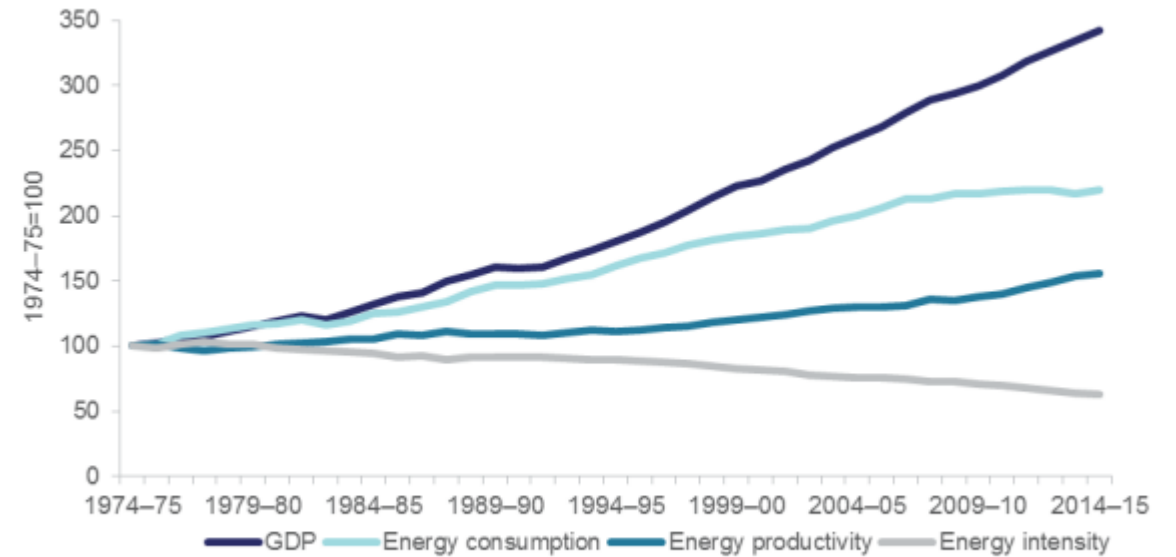
We can win this...

1960-61 = 100



Sources: BREE 2012, Australian Energy Statistics; ABS 2012, Australian National Accounts: State Accounts, cat. no. 5206.

Figure 3.1: Australian energy intensity and energy productivity



Source: Department of Industry, Innovation and Science (2016) *Australian Energy Statistics*, Table B

Thank you

Further questions, ideas:

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Genesis Now

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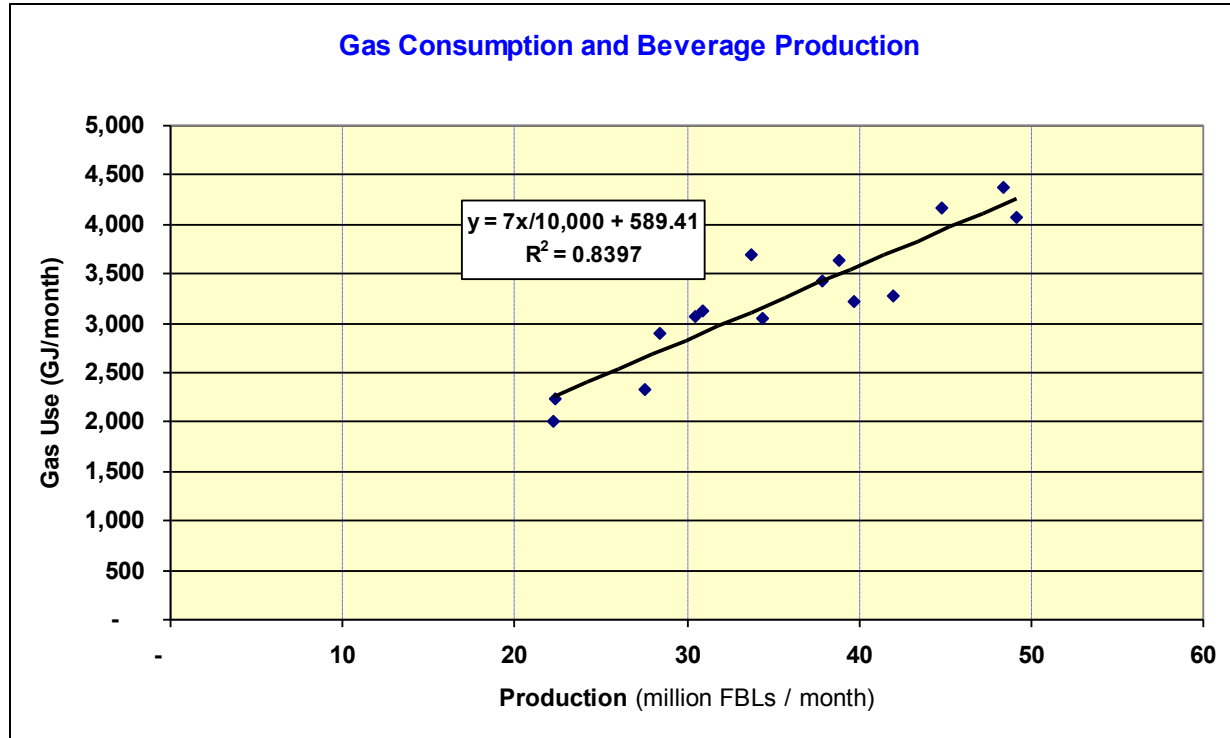
 @GenesisNowAu

Ph. 1800 22 99 11

03 9885 2450

Energy visibility

Beverage manufacturer, gas



Base Load	
base load GJ / month	589
base load GJ / year	7,068
Total gas GJ / year	37,039
base load portion	19%

Monitoring & Management

eco-tracker: Weekly Report for X-Organisation, Monday 06/08/2012 to Sunday 12/08/2012

Inbox x



support@eco-tracker.com

to geoff, reports

16 Aug (4 days ago)



Dear Demo2,

Thank you for using eco-tracker.

The monitoring results for **X-Organisation**, for the week of Monday 06/08/2012 to Sunday 12/08/2012 are:

Site: **Geelong**

Number	Utility Type	Serves End-Use	Last Week	Prev Week		Year Ago		Units
			Use	Change	Use	Change	Use	
1	Electricity- Real	Electricity: Office, R&D	1394	+1.5%	1373	-2.1%	1424	kWh/day
2	Electricity- Real	Electricity: Production	25738	+18.6%	21709	+4.1%	24731	kWh/day
3	Electricity- Real	Electricity: Total	27132	+17.5%	23083	+3.7%	26156	kWh/day
4	Gas	Gas: Total	63102	-14.6%	73927	-13.4%	72841	MJ/day
5	GHG Emissions	Greenhouse Gas Emissions	40112	+13.8%	35242	+2%	39331	Daily kg CO2-e
6	Water	Trade Waste	Data Unavailable		Data Unavailable		1072241	L/day
7	Water	Water	Data Unavailable		Data Unavailable		1081617	L/day

Site: **Melbourne Office**

Number	Utility Type	Serves End-Use	Last Week	Prev Week		Year Ago		Units
			Use	Change	Use	Change	Use	
8	Electricity- Real	Electricity	334	-9.2%	369	-41.1%	568	kWh/day
9	GHG Emissions	GHG Emissions	452	-9.2%	498	-41.1%	766	Daily kg CO2-e

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(This is an automated email service generated by eco-tracker. Please do not reply to this email)

Regards,