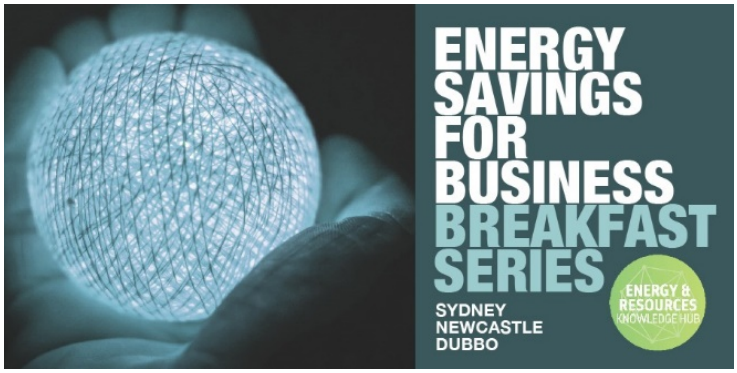

NEWCASTLE – Wednesday 16th May

Speaker Details and Presentation Slides

Speaker 1: *Professor Alan Broadfoot*, Executive Director, Newcastle Institute for Energy and Resources (NIER), University of Newcastle
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Speaker 2: *Chris Warris*, Principal Consultant, Northmore Gordon
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T: 0401 269813

Speaker 3: *Bradley Anderson*, Program Manager, Office of Environment and Heritage
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Speaker 4: *Shauna Coffey*, Head of Projects, Energy Efficiency Council
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Speaker 5: *Kari Armitage*, Managing Director, Quarry Mining
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Speaker 6: *Greg Gates*, Managing Director, Sirron Holdings
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Speaker 7: *Professor Behdad Moghtaderi*, Head of Chemical Engineering and Director of the Priority Research Centre for Frontier Energy Technologies & Utilisation, University of Newcastle
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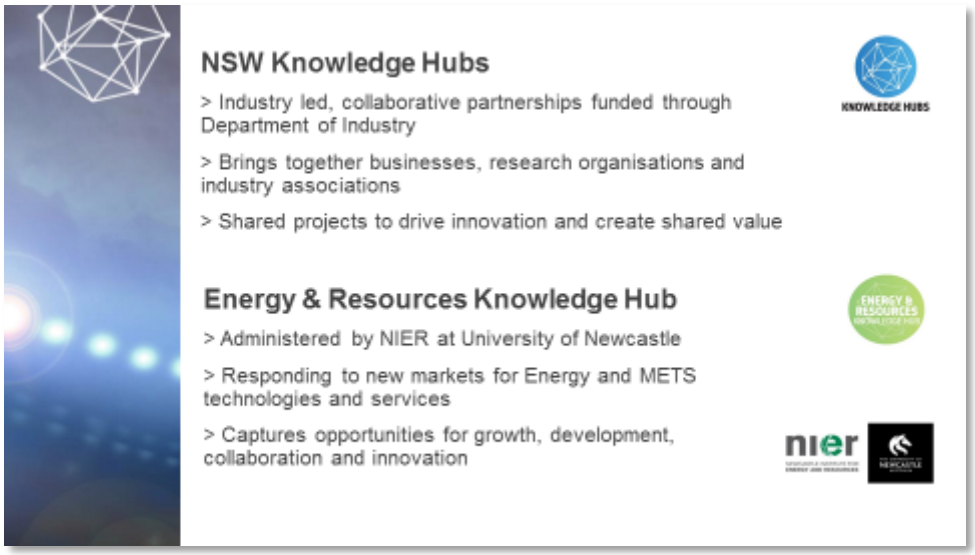
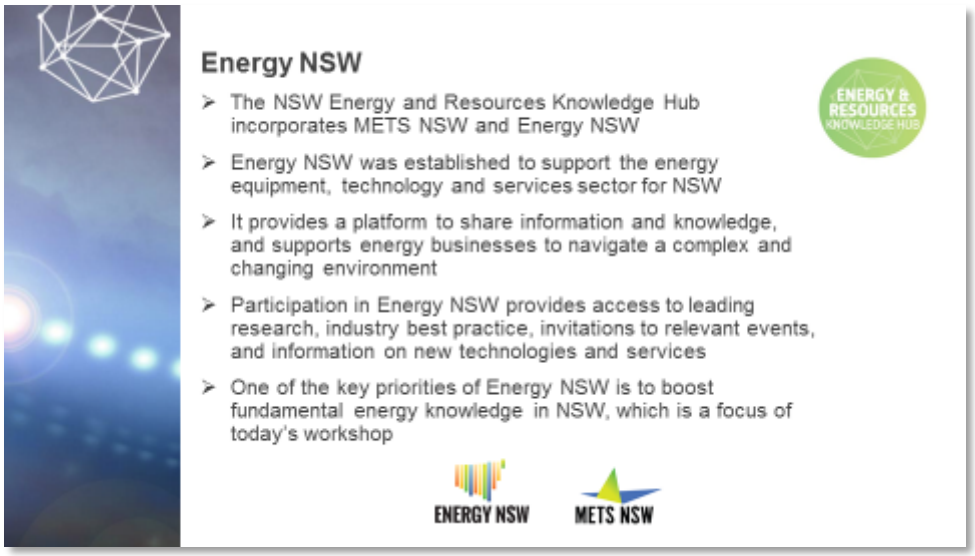
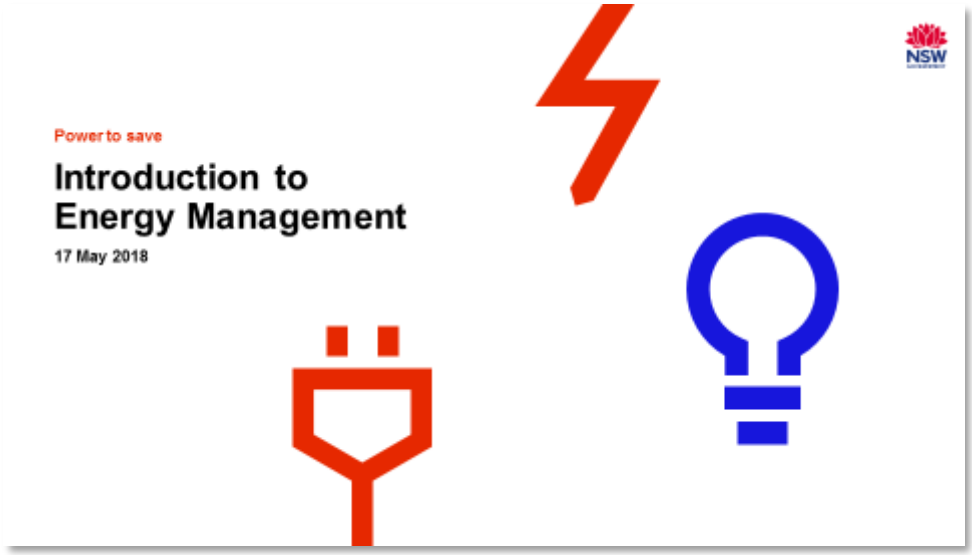
T: 4033 9062

Speaker 1: Professor Alan Broadfoot





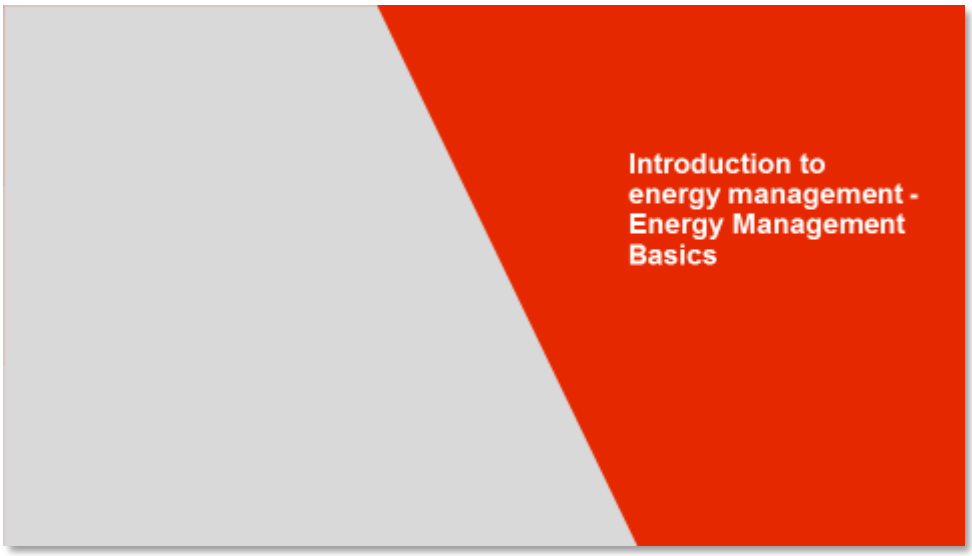
Speaker 2: Chris W'arris



Welcome to the Introduction to Energy Management for Businesses Course

Learning Objectives:

- Understand what you can do to manage your cost and energy consumption.
- Analyse your bills and identify what you are paying for.
- Identify and evaluate simple energy saving opportunities in your business.



Why is energy management important to an organisation?

Energy is NOT a fixed cost for your business!!

Energy management allows an organisation to get a better understanding of how it uses energy and what their opportunities are for controlling and conserving this energy use.

Reduce Cost

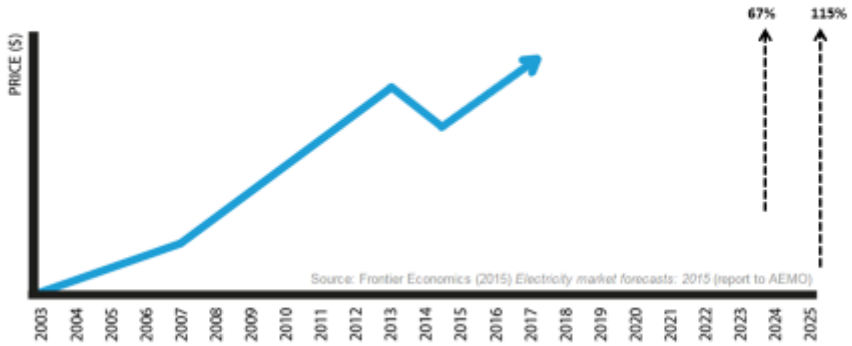
Unlock Financial Incentives

Build trust and respect

Meet legal requirements

Reduce Costs

Do you think electricity prices have gone up?



Reduce Costs

Discover how others have achieved impressive cost savings through energy management and energy efficiency.

Charles Sturt University in Bathurst achieved an 18% energy reduction, saving nearly half a million dollars annually.

4 Pines Brewery achieved a 30% reduction in natural gas use in their brewery

See more examples here.

Unlock Financial Incentives

The NSW **Energy Savings Scheme (ESS)** is an innovative program that provides businesses with financial incentives to help reduce the payback on their energy efficiency projects.

For instance, when you replace inefficient lights with more efficient ones, the ESS enables you to create Energy Savings Certificates (**ESCs or "Eskies"**), with the help of an Accredited Certificate Provider (ACP).

The ESCs can then be sold. Each ESC represents around one MWh of energy savings, as calculated using the methods defined by the ESS.

The revenue earned from the sold ESC can help fund your upgrade project.

To know more about the ESS you can register for Office of Environment and Heritage's courses through the Energy Saver learning site.

Unlock Financial Incentives

Energy Savings Scheme (ESS) - Example

Project: A commercial building chooses to replace existing fluorescent lighting with LED lighting. The initial capital cost is **$750,000** and it is expected the project will save approximately **$150,000** per year in electricity costs. The project manager decides to apply for Energy Savings Certificates (ESCs) to reduce the total capital cost of the project.

Let's look at how this can be achieved!

1. Estimated savings over project life = **8,700 MWh**
2. Number of ESCs generated = 1.06 x 8,700 (total savings in MWh) = **9,222 ESCs**
3. Market price per ESC* = **$20**
4. Eligible payment to business = $20 x 9,222 = **$184,440**

Go to Powertosave.nsw.gov.au To find a supplier who can help you access the ESS

*Estimate only. ESCs are tradable certificates. The price varies due to supply and demand and can fluctuate considerably depending on market

Introduction to energy management - Understanding Energy

How is Energy Measured?

How is energy consumed – the basics:

To understand how energy is consumed in your organisation, know that:

Energy consumption is measured in **joules (J)**

Gas:

Gas energy consumption: commonly measured as Mega-Joules (MJ)

1 MJ = 1,000,000 Joules

How is Energy Measured?

How is energy consumed – the basics:

To understand how energy is consumed in your organisation, know that:

Energy consumption is measured in **joules (J)**

Electricity:

Power: is the rate at which energy is used and is measured in Joules per second (J/s), Watts (W) or kilo-Watts (kW)
1 kW = 1000 Watts

Electricity Consumption: commonly measured in kilo-Watt-hours (kWh)
1 kWh = 1000 Watt-hours

Which consumes more power?

But, it's not just about the power!

Energy =	Power	x	Operating time
(kWh)	(kW)		(hours)

Activity:

Energy (kWh) = Power (kW) x operating time (hours)

A halogen light rated at 55W is run for 8760 hours per year. How many kWh are consumed in a year?

(55W / 1000) x 8760 hrs = 482 kWh per annum

A kettle rated at 2,000W is run for 5 minutes twice a day (61 hours per year). How many kWh are consumed in a year?

(2000W / 1000) x 61 hrs = 122 kWh per annum

How Does Electricity Get to You?

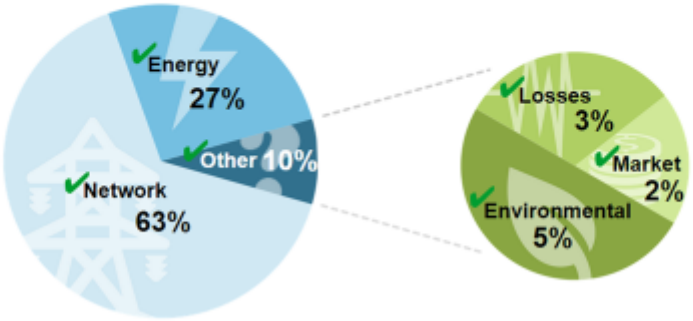
Electricity is generated at a **power plant**.
It is **transmitted** and **distributed** from the power plant through a network of power lines. The network connects to your house or business and supplies you with electricity from the power plant.
Retailers don't provide electricity; they provide the price for your electricity.

- Retailers are the middleman between the customer and electricity supply chain
- buys electricity (wholesale) from power plants
- sells electricity to you and pass on charges from distributors

Analysing Energy Bills

Electricity bill components

Electricity bills are comprised of a number of different charges; how we use electricity affects these charges.

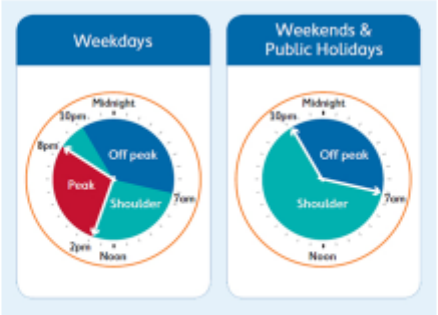


Analysing Energy Bills – Time of Use (ToU) explained

Retailers and network providers may have different rates depending on when you use electricity.

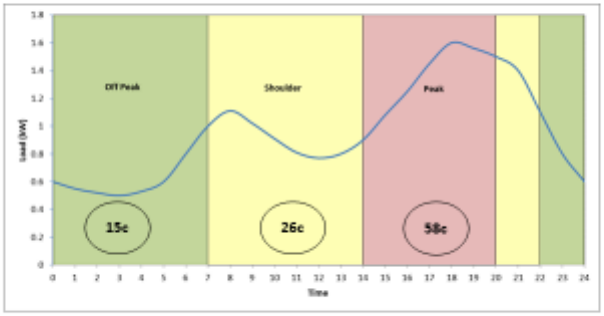
The reason for ToU pricing is simple – electricity used in peak (busy) times creates a strain on electricity network infrastructure.

Prices are more expensive during peak times to encourage users to use electricity during off-peak times if possible.



Time of Use (ToU) – Activity

There can be significant differences between peak and off peak tariffs. For example, for a typical household or small business:



What equipment in your house or business could you move from running during peak to running during off peak times?

Analysing Energy Bills

There are two types of bills - **bundled** and **unbundled**.

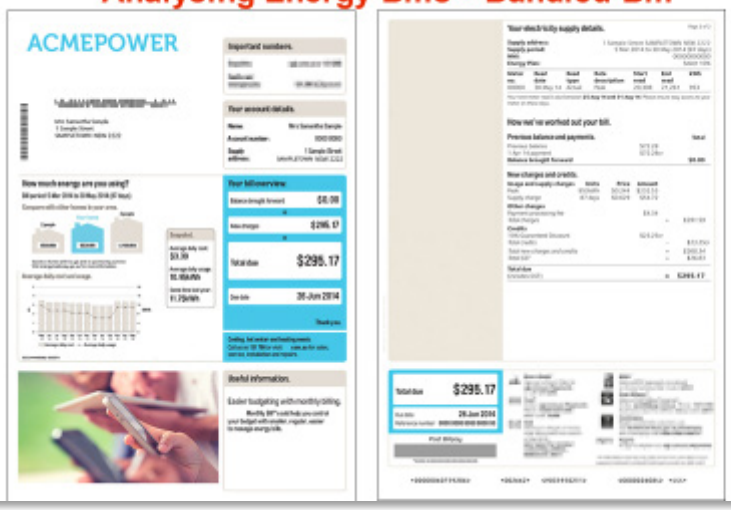
Bundled:

- Usually for homes or small businesses who don't spend a lot on electricity (<$25,000 per annum)
- No demand charges – consumption based only
- Bundled bill tariffs include all of the charges that make up your electricity bill in a single tariff

Unbundled:

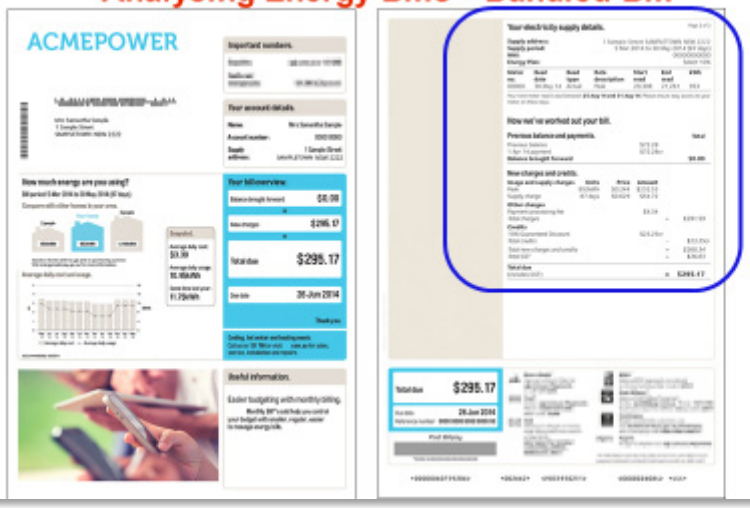
- Usually for larger sites
- Usually has demand charges
- Shows separate tariffs for the various charges that make-up the total electricity bill cost.

Analysing Energy Bills – Bundled Bill

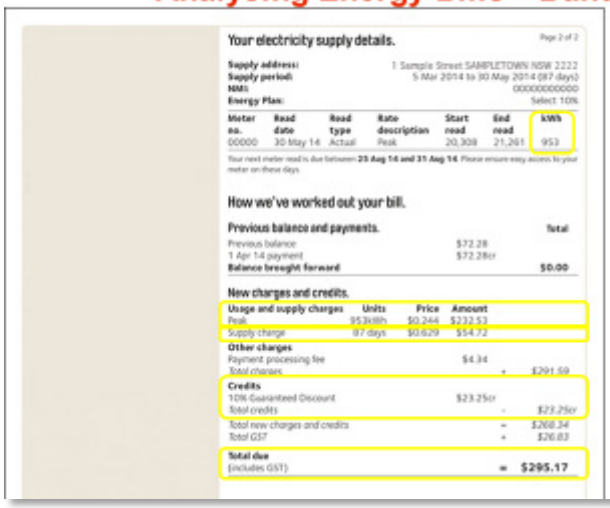


Analysing Energy Bills – Bundled Bill

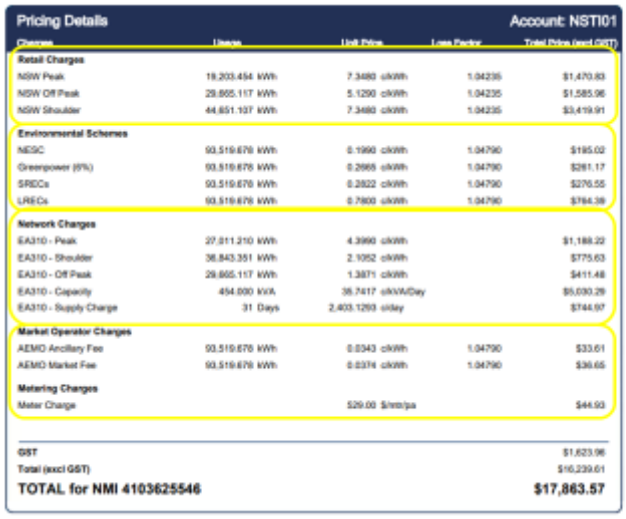
Analysing Energy Bills – Bundled Bill



Analysing Energy Bills – Bundled Bill



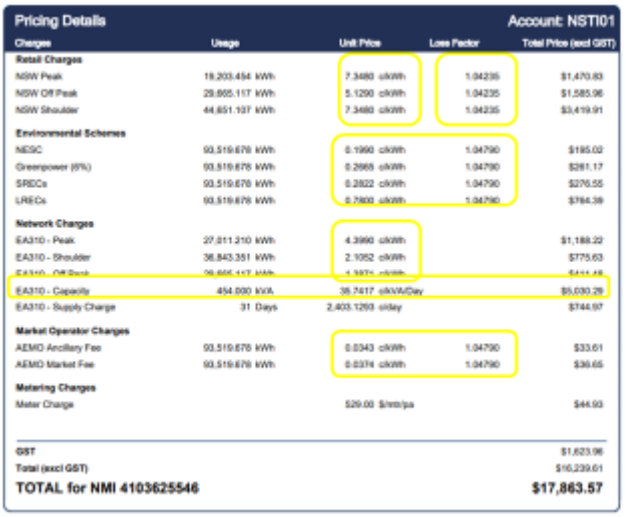
A note on the Discounts



Pricing Details — Account: NSTI01

Charges	Usage	Unit Price	Loss Factor	Total Price (excl GST)
Retail Charges				
NSW Peak	19,203.454 kWh	7.3480 c/kWh	1.04235	$1,470.83
NSW Off Peak	29,665.117 kWh	5.1290 c/kWh	1.04235	$1,585.96
NSW Shoulder	44,851.137 kWh	7.3480 c/kWh	1.04235	$3,419.91
Environmental Schemes				
NESC	93,519.676 kWh	0.1990 c/kWh	1.04790	$195.02
Greenpower (6%)	93,519.676 kWh	0.2665 c/kWh	1.04790	$261.17
SRECs	93,519.676 kWh	0.2822 c/kWh	1.04790	$276.55
LRECs	93,519.676 kWh	0.7800 c/kWh	1.04790	$764.39
Network Charges				
EA310 - Peak	27,011.210 kWh	4.3990 c/kWh		$1,188.22
EA310 - Shoulder	36,843.351 kWh	2.1052 c/kWh		$775.63
EA310 - Off Peak	29,665.117 kWh	1.3871 c/kWh		$411.48
EA310 - Capacity	454.000 kVA	35.7417 c/kVA/Day		$5,030.29
EA310 - Supply Charge	31 Days	2,403.1293 c/day		$744.97
Market Operator Charges				
AEMO Ancillary Fee	93,519.676 kWh	0.0343 c/kWh	1.04790	$33.61
AEMO Market Fee	93,519.676 kWh	0.0374 c/kWh	1.04790	$36.65
Metering Charges				
Meter Charge		$29.00 $/mtr/pa		$44.93
GST				$1,623.96
Total (excl GST)				$10,239.61
TOTAL for NMI 4103625546				**$17,863.57**

Analysing Energy Bills – Unbundled Bill



Pricing Details — Account: NSTI01

Charges	Usage	Unit Price	Loss Factor	Total Price (excl GST)
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Environmental Schemes				
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GST				$1,623.96
Total (excl GST)				$10,239.61
TOTAL for NMI 4103625546				**$17,863.57**

Analysing Energy Bills – Unbundled Bill

Contract rate: Peak = 7.35 c/kWh
Shoulder= 7.35 c/kWh
Off peak = 5.13 c/kWh

With loss factor, is actually:
Peak = 7.66 c/kWh
Shoulder= 7.66 c/kWh
Off peak = 5.35 c/kWh

Then add Market/Env charges:
Peak, shoulder & off-peak = 1.67 c/kWh

And add Network charges:
Peak = 4.39 c/kWh
Shoulder = 2.11 c/kWh
Off peak = 1.39 c/kWh

Total actual rate: Peak = 13.72 c/kWh
Shoulder = 11.44 c/kWh
Off peak = 8.41 c/kWh

Plus capacity charge (another 31%)

Analysing Energy Bills – Network tariffs explained

There are two main categories of network tariffs:

Consumption-based tariffs:

- Typically apply to SME's businesses (annual consumption normally <40 MWh)
- All charges are based on consumption (i.e. how much electricity you use)
- The consumption rates are typically more expensive than demand-based tariffs

Demand-based tariffs:

- Typically apply to medium to large business (annual consumption >40 MWh)
- Charged for both consumption and demand
- The consumption rates are typically lower than consumption-based tariffs, but they have an additional demand charge

Analysing Energy Bills – Network Consumption & Demand Tariffs

Consumption:

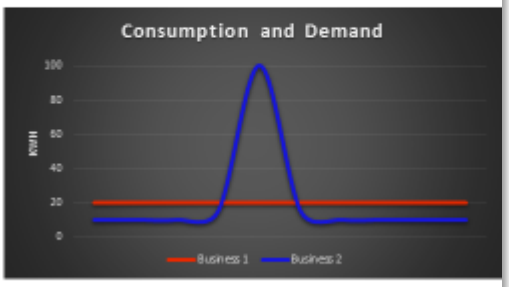
- Business 1 and Business 2 have the same daily consumption (220kWh)

Demand:

- Business 1 has a very low and constant demand
- Business 2 has a very high demand

Strain:

- Business 1 creates very little strain on the network infrastructure
- Business 2 creates a lot of strain on the network infrastructure

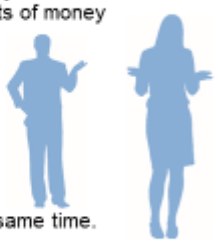


Analysing Energy Bills – Demand Charges

Why is this important?

- For large users, demand typically accounts for the greatest portion of your Network Charges. Reducing your maximum demand can save you lots of money

How do I minimize my demand charges?



- There are lots of things you can do to manage your demand
- Balance your electricity use throughout the day and night
- Stagger equipment start-up to avoid demand spikes or
- Where possible don't use all your energy intensive equipment at the same time.

How do I know my demand?

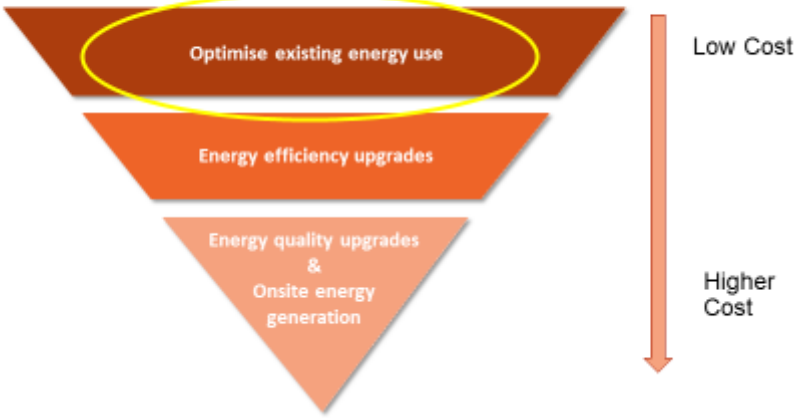
- Your bill will list your maximum demand for the last billing period.

Introduction to energy management –

Identifying and evaluating energy saving opportunities in your business

Identifying Energy Saving Opportunities

The Energy Efficiency Hierarchy



Energy Efficiency – Optimise existing energy use (no or low cost measures)

- Metering and Monitoring
- Manage your Time of Use
- Reduce Stand-by Power
- Lighting Control:
  - Switch lights off when not in use
  - Consider timers and sensors to manage on-and-off times
  - Lighting the space differently with less lights per switch and dimming
  - Use appropriate lighting levels
  - Table lamps instead of downlights
- Adjust air conditioning set-points
  - Electricity use decreases by 5% for every 1°C increase in cooling set point
  - Consider timers and sensors to manage on-and-off times

Next Section

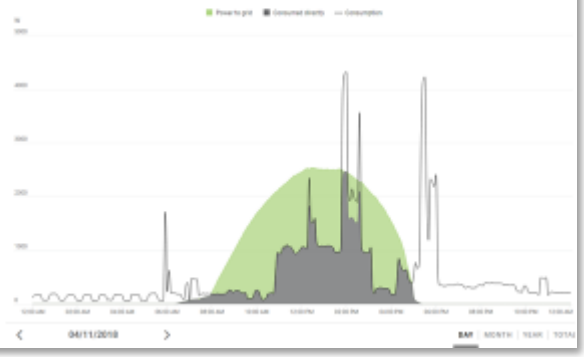
Metering and Monitoring

Back

Monitoring enables you to better assess and improve your energy performance

Ways to monitor your electricity usage:

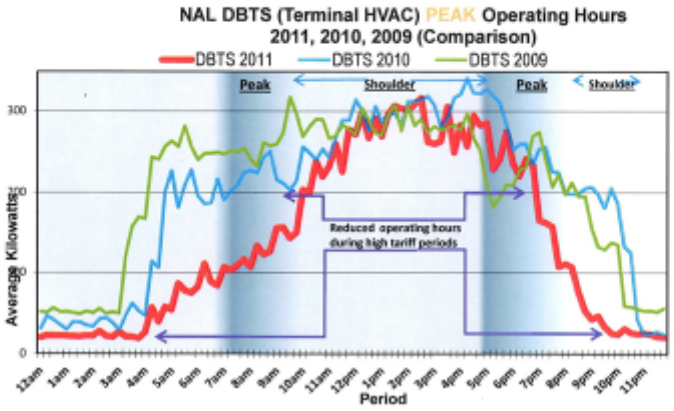
- If you have a smart meter – from your retailer or network provider:
  https://www.ausgrid.com.au/Common/Customer-Services/Homes/Meters/meter-data-access.aspx
- Third party monitoring device
- Solar PV monitoring portal



Energy Efficiency – Optimise existing energy use

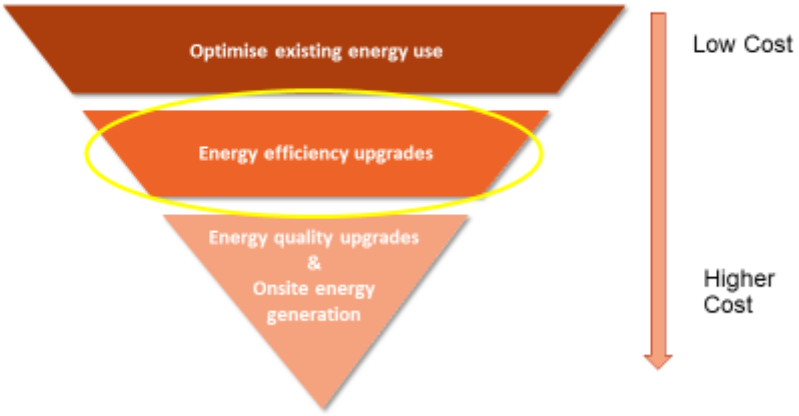
Back

Example Case Study
Optimising Air Conditioning Start/Stop Times



Identifying Energy Saving Opportunities

The Energy Efficiency Hierarchy



Energy Efficiency – Upgrade to LED Lighting

- Upgrade to LED
  - At least 50% more efficient
  - Product life 8x fluoro and 25x halogen (e.g. downlights)
- Example:
  - 50 Watt halogen x 35 hours per week = $58 p.a*

If you replace it with an LED downlight and driver:
= $13 p.a* (for the same or more light)

i.e. save $45 p.a. per light

- A quality solution should last **more than 27 years**

Quality solutions cost between $35 and $100 (plus installation)

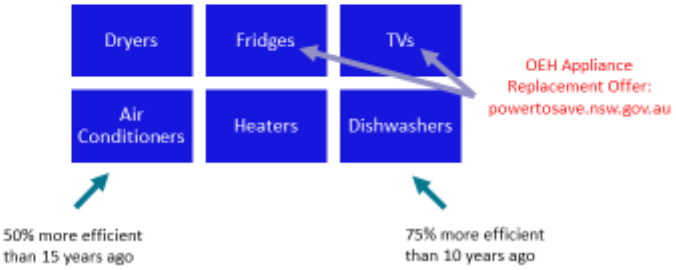
- Simple payback can be **less than 1 year**.
- Rebates are available – see powertosave.nsw.gov.au

* From OEH tool "Calculight" which assesses lighting total cost of ownership http://www.environment.nsw.gov.au/lightingToolApp/default.aspx

Energy Efficiency – Upgrade Appliances

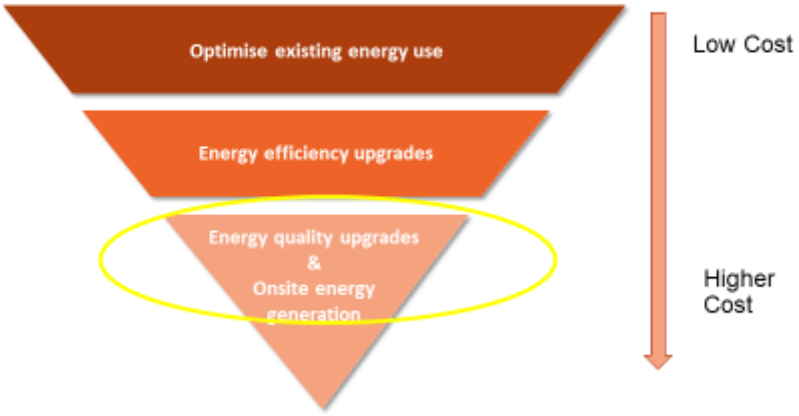
Products in Australia are continually improving!

- Minimum energy performance product ratings exist in the following areas:



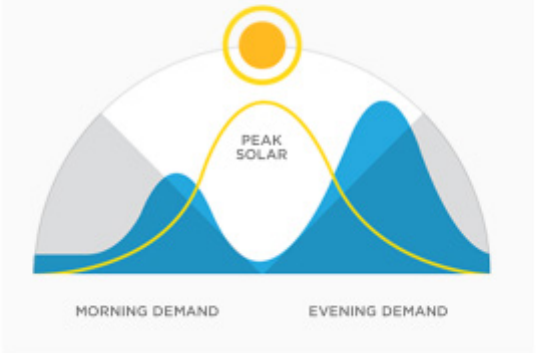
Identifying Energy Saving Opportunities

The Energy Efficiency Hierarchy



Solar Photovoltaic (PV) Panels

Is Solar PV right for your site(s)



Supply Side Opportunity: Solar Photovoltaic (PV) Panels

Financials:

A 10 kW Solar PV system should produce ~ 16,425 kWh per annum.

If your average electricity tariff is 30c/kWh, and

You self-consume 75% of the power from your solar PV system:

16,425 x 75% = 12,319 kWh per annum saving

12,319 x $0.30 = $3,695 per annum saving.

Solar PV System Cost

Solar Choice: Average solar PV system prices [PRIMARY] - Feb 2018						
	2kW	3kW	4kW	5kW	7kW	10kW
Adelaide, SA	$3,790	$4,270	$5,030	$5,550	$8,190	$12,630
Brisbane, QLD	$3,680	$4,370	$5,260	$6,070	$8,880	$12,990
Canberra, ACT	$3,150	$4,020	$4,870	$5,830	$8,160	$12,760
Darwin, NT	$6,650	$8,100	$9,550	-	$14,090	$15,700
Hobart, TAS	$4,600	$5,410	$6,630	$7,560	$10,620	$14,810
Melbourne, VIC	$4,490	$4,760	$5,650	$6,490	$11,290	$14,080
Sydney, NSW	$3,190	$3,870	$4,460	$5,120	$7,520	$11,880
Perth, WA	$2,690	$3,550	$4,270	$4,870	$7,460	$12,240
All	$4,030	$4,790	$5,720	$5,930	$9,530	$13,390

https://www.solarchoice.net.au/blog/solar-system-prices-february-2018

Supply Side Opportunity: Solar Photovoltaic (PV) Panels

Financials:

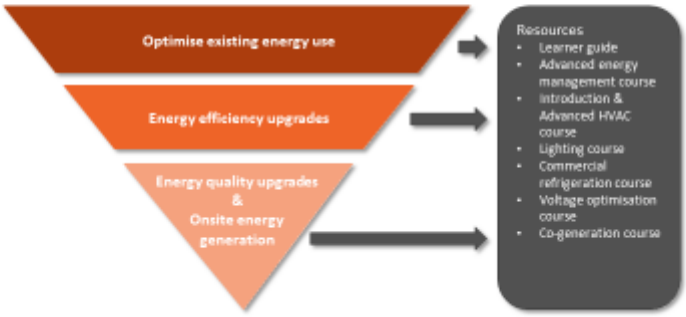
$3,695 per annum saving

Cost ~ $15,000

Payback = 4 years

Next section

Energy cost savings ideas: additional resources



Introduction to Energy Management Course Where to next?

Register for the full Introduction to Energy Management course – www.environment.nsw.gov.au/business/energy-management-training.htm

OEH Energy Management Services' free courses and webinars – https://powertosave.nsw.gov.au/business/courses-webinars

OEH Website – www.powertosave.nsw.gov.au

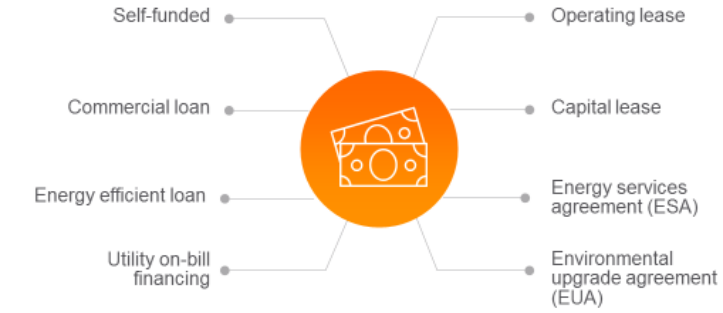
Resources and Energy - Website

Appliances – www.energyrating.gov.au

OEH Appliance Replacement Offer – Power To Save

Speaker 4: Shauna Coffey

Energy efficiency financing options



http://www.environment.nsw.gov.au/business/project-financing.htm

Accelerated depreciation options

Eligible small businesses

Eligible asset purchase

Asset costing less than $20,000 each	Asset costing more than $20,000 each
Instant asset write-off	General small business pool option
Each asset can be written off in full in the year they are bought and used, or installed ready-for-use.	A deduction for 15 per cent of the cost is allowed in the first income year and a 30 per cent deduction each year after the first year. When the balance of your small business pool is less than $20,000, you can write-off the entire balance at the end of that income year.

There are rules

- Small business definition
- Excluded assets
- Business related portion
- Installed/ready to use in previous financial year

The payback effect

Initiative	Capital Outlay	Energy Savings (kWh/yr)	Energy Savings ($/yr)	Other rebates	Maintenance savings (pa)	Tax offset[1]	Payback (years) Without tax incentive	Payback (years) With tax incentive
Lighting upgrade and installation sensors	$12,292.00	19,386	$4,857.00	$1,084.00	$1,095.00	$3,380.30	2.1	1.6

[1] Indicative only - if your business is in a company structure the most you will 'get back' is 27.5% (in 2016-17)

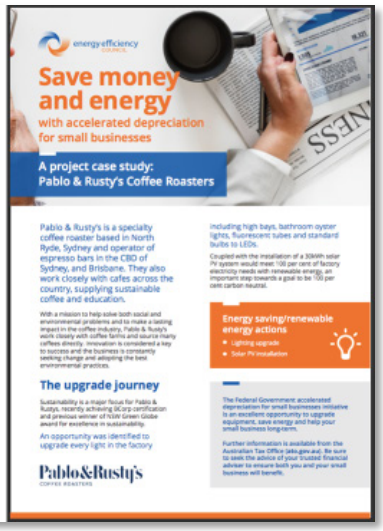
5

Energy Savings for Business - May 2018

Assistance

General guide and case studies in development.

See also the Australian Tax Office and speak to your independent, trusted financial adviser.



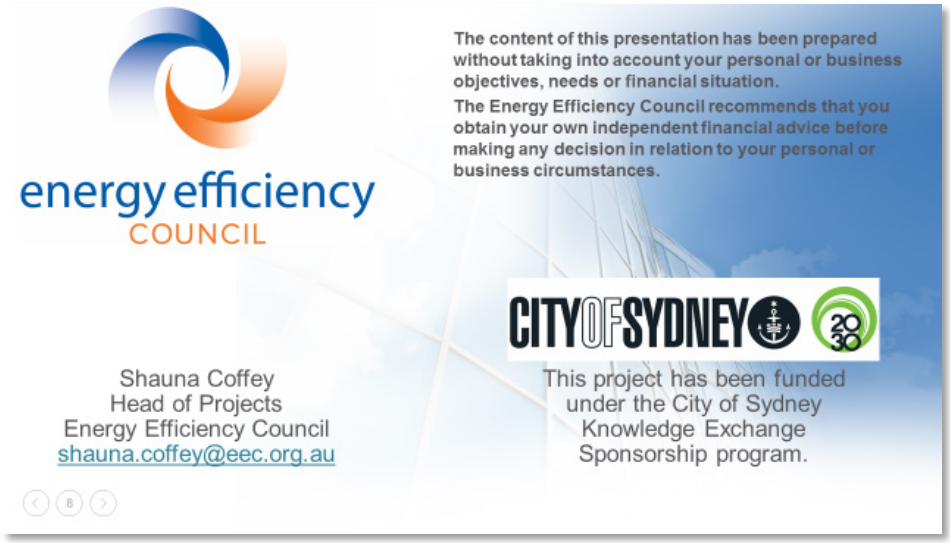
6

Energy efficiency makes sense

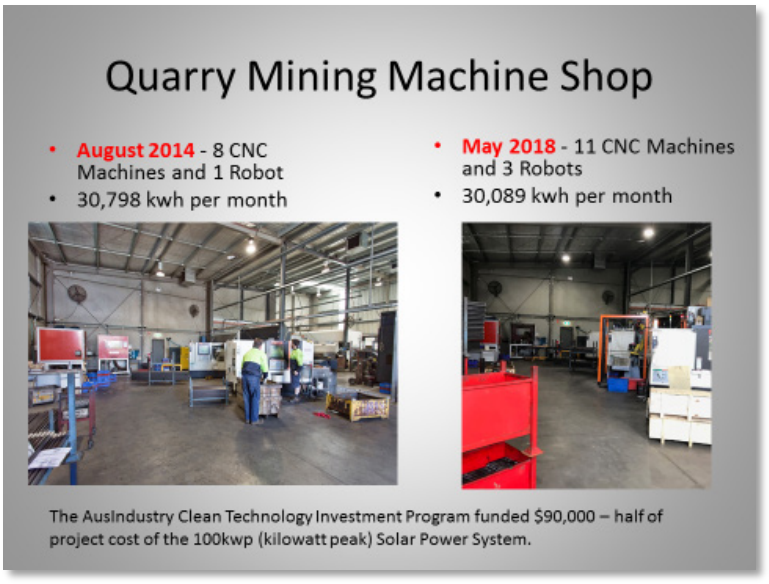
The ***Federal Government accelerated depreciation for small businesses initiative*** is an excellent opportunity to upgrade equipment, save energy and help your small business long-term.

7

Energy Savings for Business - May 2018



Speaker 5: Kari Armitage



2015

2018

Key Points

- Contract electricity pricing to ensure cost is kept low and market fluctuation is avoided.
- It took approximately 3 years for the energy cost savings to pay for the $90K investment.
- The panels have a 20 year life
- E.g. month of January – having the panels saved $2,700.0 on our bill for the machine shop that month.
- We have an annual cleaning bill to ensure their maintenance.
- Series power down when un-manned

Energy Savings Scheme
Commercial Lighting

- Old lights were 400W Metal halide with very inefficient fittings
- Now 50W LED (less than half of the original)
- No lights at all in warehouse

Speaker 6: Greg Gates

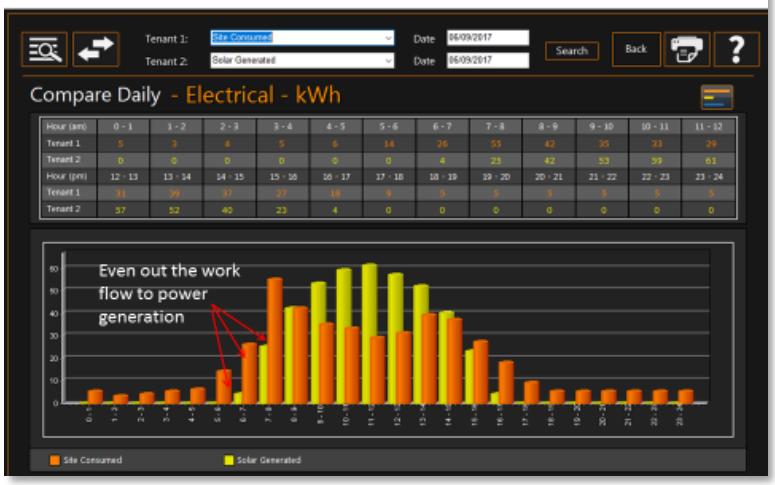
Solar Panels
(Generates 98kw)

Building Management System

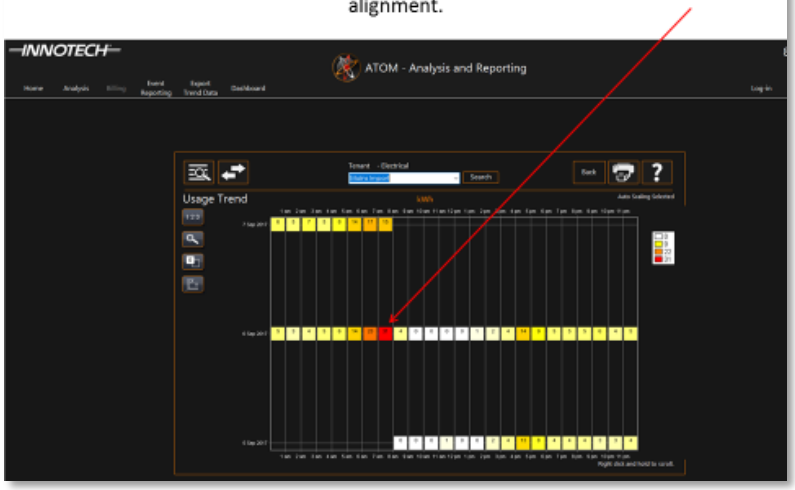
The Innotech Omni building management system allows measurement and management of power consumption, generation, storage, use of power from the grid to ensure the most efficient approach is used.

Solar Generation vs Power Use from The Grid

Solar Generation vs Power Consumed



For example Red shows high use of power from the grid – white shows no use of power from the grid. This gives us visibility of consumption in relation to when we are generating power and when we are using power for better alignment.



What we have learned so far

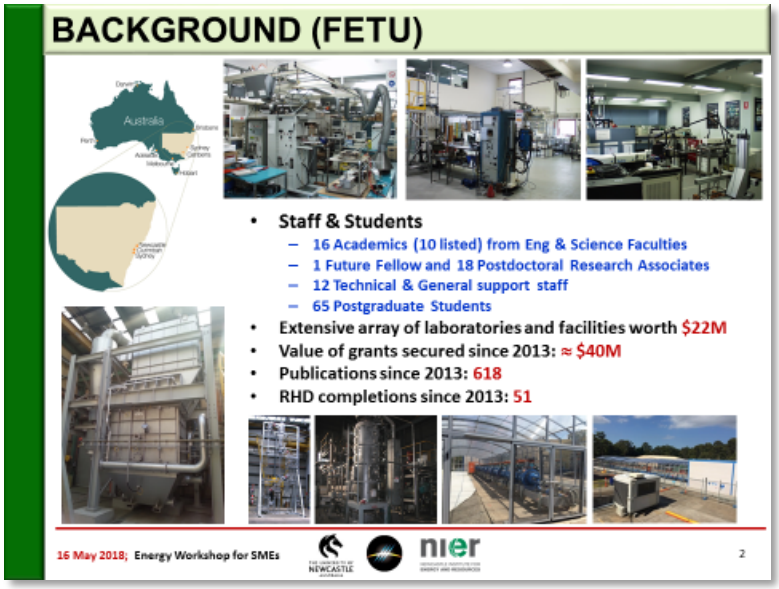
- The building management system has only been in place for a short time and already we have made changes to start times of heavy machinery to be better matched with power generation.
- This has a direct impact on cost in both the consumption of power and the potential for peak demand charges to grow.
- We will continue to monitor power consumption and once we understand established patterns arrange our start and stop times and other activity accordingly to maximise the solar investment.
- In addition, the building management system allows us to monitor water consumption from both the rain tanks and town supplied water. Approval has been given 6/9/2018 to install flow meters to we can monitor and control electronically the use of water.

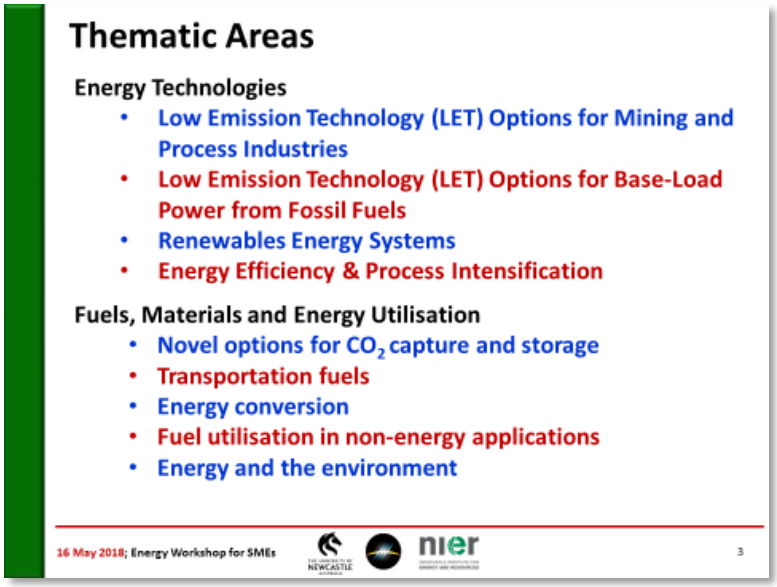
2 x 2500lt Water Tanks Machine Testing

Re purposed cardboard box to a "bubble wrap" equivalent

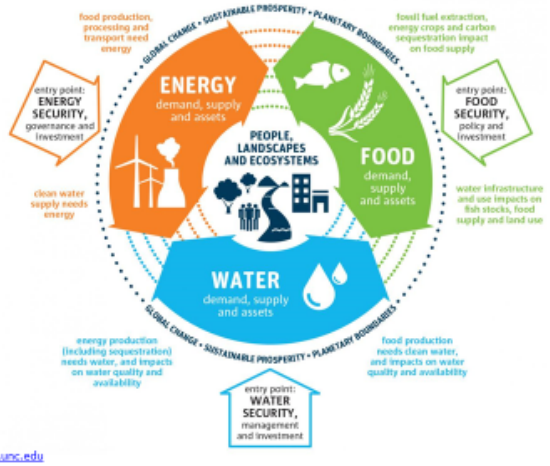
Packaging reduction example

Speaker 7: Professor Behdad Moghtaderi





ENERGY, WATER AND FOOD NEXUS



Source: planning.unc.edu

OPPORTUNITIES

1. Equipment and appliances

- Compressed air minimisation
- Energy metering, monitoring and control
- Heating, ventilation and air conditioning
- Motors and motor systems
- Lighting
- Pumping systems

2. Dissipated energy

- Process heat, boilers and steam systems
- Waste heat minimisation and recovery
- Advanced cooling systems (e.g. printed heat exchangers, PCMs)

3. Alternatives to freshwater

- Desalination
- Non-traditional waters
  - Sea water
  - Brackish water
  - Atmospheric water generation

4. Net-zero wastewater treatment

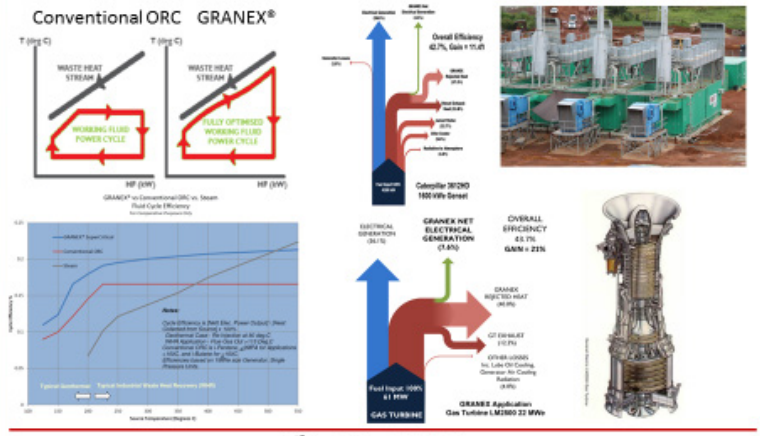
- Bioenergy
- Biosolids
- Resource recovery

5. Transport

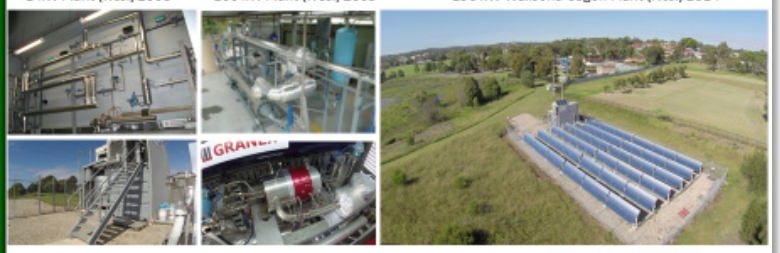
- Fuel efficiency / biofuels
- Rolling resistance
- Aerodynamics
- Alternative drive-trains

RELEVANT UON TECHNOLOGIES

GRANEX Heat Engine (fully commercialized)

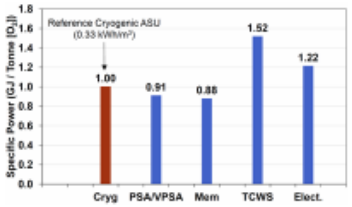


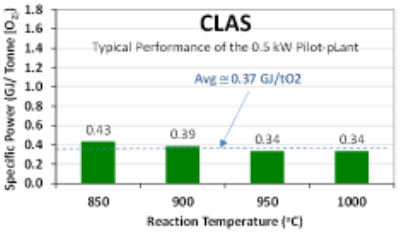
1 kW Plant (Ncsl) 2008 | 100 kW Plant (NCsl) 2009 | 196 kW Wallsend Cogen Plant (Ncsl) 2014

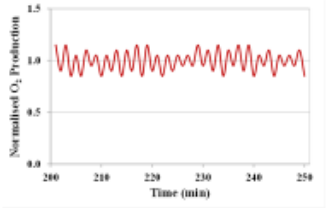


170 kW Koppers Plant (Ncsl) 2015

CLAS (at large-scale demo phase)



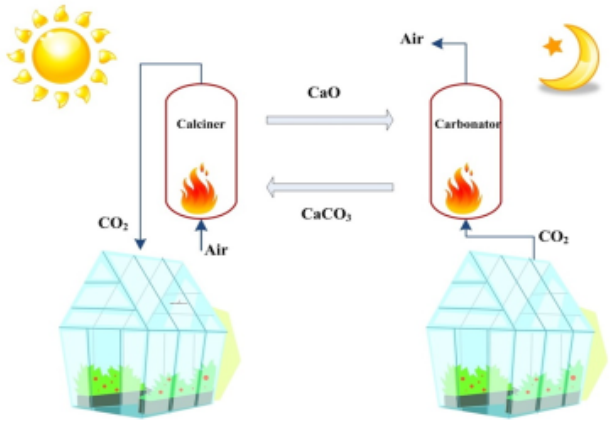




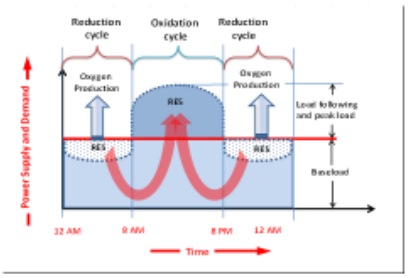
Typical performance of the pilot-scale prototype

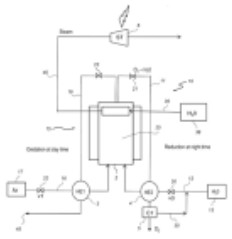
0.5 kW (~100 kg.O_2/day) pilot-plant

Greenhouse Chemical Looping (at pilot-scale demo)



Infratech-CLES Energy on Demand System (at pilot-scale demo)

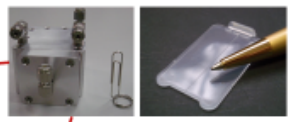


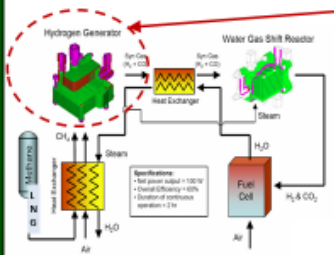


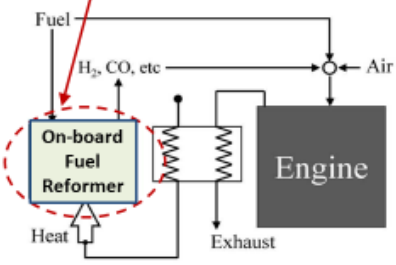
- Grant proposals are being assessed for the large-scale version
- Huge market for small-scale version (hospitals, glass factories, etc)

Miniaturized H_2 Generators / Power Units (R&D)

H_2 storage issues → on-board production







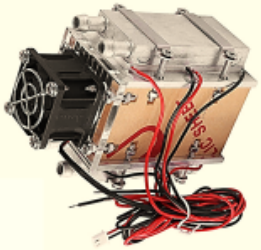
Energy Efficient Water Generation

Atmospheric Water Generation (Hydro Harvest Operation [H2O])

Water Abundance XPRIZE
2000 l/day @ 2 cents/l or less
US $1.5 M Prize money

Miniaturized Atmospheric Water Generation (Defense Applications)

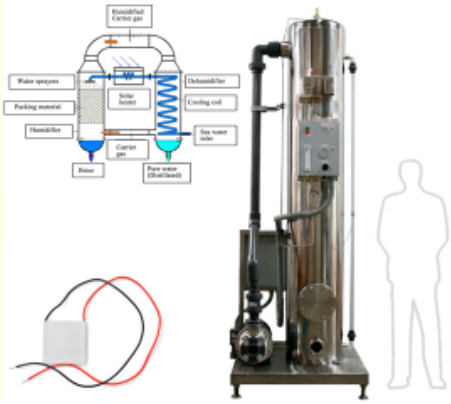
Concept Prototype Mark-I



Size: 120 x 95 x 70 mm
240 W; 12V DC

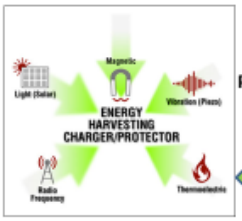
GRANSAL: Closed Loop Helium Based HDH

$$GOR = \frac{\dot{m}_{pw} \cdot h_{fg}}{Q_{in}} \cong 6$$

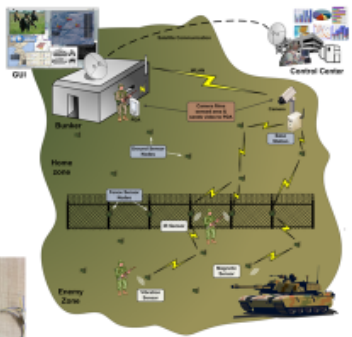


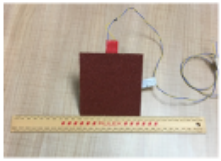
Energy Harvesting (R&D)

Fit & Forget Sensors and Sensor Networks



Pyroelectric





1 mW/cm² (10 W/m²) pyroelectric harvester

INDUSTRY PROJECT

Large R&D Projects (3+ years)

Project Status (R&D; Ongoing)	Low energy footprint alternatives for generation of high quality dry steam
Project Status (R&D; Ongoing)	Low-temperature innovative processes for food preservation
Project Status (R&D; Ongoing)	Advanced vapour compression drying
Project Status (R&D; Ongoing)	Reduction in refrigeration use during storage and transport by controlled atmosphere
Project Status (R&D; Ongoing)	Integration & interoperability of onsite generation and loads using mini-smart grids
Project Status (R&D; Ongoing)	Process optimisation by load-profile matching and use of variable speed drives
Project Status (R&D; Ongoing)	Solid waste minimisation in food plants by onsite production of organic fertilisers
Project Status (R&D; Ongoing)	Renewable energy assisted supercritical extraction
Project Status (R&D; Ongoing)	Novel fuel-flexible high-efficiency low-emission conversion systems for biofuels
Project Status (R&D; Ongoing)	Research on phase change materials and their effectiveness in reducing heat losses
Project Status (R&D; Ongoing)	Waste heat recovery and reuse using nanofluidic supercritical organic Rankine cycles
Project Status (R&D; Ongoing)	Developing vision and future scenarios for the energy productivity of the food sector
Project Status (R&D; Ongoing)	Chailing

Short Applied Projects (3-6 Months)

	Business ID	Main Product and/or Activity	Problem	Project Duration (weeks)	Project Outcomes	Project Status
1	SA	Food Industry	* Fire and explosion characteristics of food ingredient	6	* Thermo- physical properties of food ingredient samples determined. * Fire and explosion characteristics of food ingredient samples identified. * Safety related recommendation provided.	Complete
2	OS-1	Reinforcing structural steel manufacture	* Critical safety examination on water (hydrogen-oxygen) based cutting	10	* Critical Safety assessment conducted. * Safety issues identified. * Appropriate and practical solution provided.	Complete
3	OS-2	Reinforcing structural steel manufacture	* Critical risk and Australian standards compliance assessment on a new water (O2-H2) based steel cutting technology	8	* Detailed compliances assessment developed. * Recommendation on performance improvement provided * Critical risk assessment including practical solutions provided.	Complete
4	MT	Engineering heat treated alloy Bar processor	* Investigating an inexpensive alternative energy solutions	12	* Techno-economic analysis of alternative energy solutions provided. * Net present value and payback period for different options determined. * Client could save up to $10m in 20 years implementing the suggested options.	Complete
5	IN	Wastewater treatment technology provider	High BOD and COD in the treated effluent	26	* Combined physio-chemical investigation on conventional methods carried out. * performance of activated and non-activated filter media determined. * Performance of zonation technique investigated. * An inexpensive method discovered and the problem solved.	Complete
6	SF	Manufacturing hose fittings for the motorsport and automotive industry	Removal of aluminium from the anodising bath	16	* An effective chemical to remove the Al from the anodising bath identified. * Practical dye separation procedure developed. * Waste volume significantly reduced. * Sulphuric acid consumption reduced.	Complete
7	AO	Underground coal mine	Fire and explosion characteristics of coal dust particles	10	* Thermo- physical properties of coal dust samples determined. * Fire and explosion characteristics of coal samples identified. * Safety related recommendation provided.	Complete
8	TU-1	Research body	Thermal properties of fuel contaminated soil	4	* Thermal properties of fuel contaminated soil determined. * Heat release rate, CO2 and smoke production of the samples determined. * Decontamination via combustion investigated.	Complete
9	TU-2	Research body	Characterisation of Bio-mass samples	8	* Thermo- physical properties of bio-mass samples determined. * Heat release rate, CO, CO2 and smoke production of the samples specified. * Thermal energy content of samples determined.	Complete
10	FS	Fire safety systems manufacturer	non- uniform distribution of atypical fire retardant	24	Work in Progress	In progress
11	TY	Manufacturer of recycled rubber	Environmental impact on the efficiency of	16	Work in Progress	In progress
12	UQ	Mining Industry	Decomposition of refrigerant	4	Work in Progress	In progress
13	NO	White goods manufacturer	Thermal efficiency of the systems	13	Work in Progress	In progress
14	MP	City Council	Energy harvesting	10	Work in Progress	Proposal stage
15	WA	Aluminium Manufacturer	Waste heat recovery		Discussion in Progress	Proposal Stage
16	AB	Beverage factory	Wastewater management		Discussion in Progress	Proposal Stage

CONCLUSIONS

- A vast array of opportunities exist for lowering the energy footprint and water consumption of SMEs.
- A range of existing and emerging technologies can be applied to take advantage of these opportunities.