UNIVERSITY of TASMANIA

Energy Strategic Plan 2018 - 2022

Version 5 July 2018

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Glossary

AER	Australian Energy Regulator
BEU	Building Energy Use
EEF	Energy Efficiency Framework
EFTSL	Equivalent Full-Time Student Load
EMP	University Environmental Management Plan 2008-2011
ERL	Energy Rating Label
ESD	Environmental Sustainable Design
GFA	Gross Floor Area
GHG	Greenhouse Gases
GJ	Gigajoules
GLP	Governance Level Principle
HEAT	Home Energy Audit Toolkit
HVAC	Heating, Ventilation, and Air-Conditioning
ISD	Infrastructure Services and Development
LGC	Large-scale Generation Certificate
LPG	Liquid (or Liquefied) Petroleum Gas
LRET	Large-scale Renewable Energy Target
MEPS	Minimum Energy Performance Standard
MWh	megawatt hour
NABERS	National Australian Built Environment Rating Scheme
NatHERS	Nationwide House Energy Rating Scheme
NGER	National Greenhouse and Energy Reporting
OTTER	Office of the Tasmanian Economic Regulator
PPA	Power Purchasing Agreement
PV	Photovoltaic
RET	Renewable Energy Target
Section J	Energy Efficiency requirements of the Building Code of Australia, for Class 3 – 9 Buildings. Provisions must be met for building to be classed as 'compliant'
SIPS	Sustainability Integration Program for Students
SRES	Small Scale Renewable Energy Scheme
STC	Small Scale Generation Certificate
tCO2-e	Tonnes Carbon Dioxide equivalent (standard unit of carbon emissions)
TEFMA	Tertiary Education Facilities Management Association
TIA	Tasmanian Institute of Agriculture
TUU	Tasmanian University Union

1 Introduction

Energy security and cost are paramount to the ongoing sustainability of the University. Recent national energy market developments have led to significant price rises in electricity (the University's major energy source) and to a lesser degree natural gas.

The University's Energy Strategy 2018–22 provides a contemporary functional response for enhancing energy security, reducing energy costs and consumption, and energy-related carbon emissions. Requirements for reducing energy consumption and emissions are outlined within the University Governance framework (specifically GLP9 – Environmental Management).

The University is uniquely positioned compared to its sector peers nationally and internationally due to the high proportion of renewable electricity supply in Tasmania. When comparably measured, the University's carbon emissions are the lowest even though its energy use is assessed as being average relative to its peers.

Significant property development plans are being advanced that will result in large scale capital works within the short to medium term, some of which have already been actioned. Due to these developments, there is an opportunity for the University to further improve its energy performance through more energy efficient infrastructure and operations.

1.1 Objectives

The objectives of the Energy Strategy are to improve energy security and reduce all forms of energy use, reduce costs and reduce carbon emissions. This will be achieved through improvements in:

- business intelligence;
- infrastructure; and
- operational efficiency.

1.2 Scope

The scope of this Energy Strategy is energy security, cost and consumption for the University's building infrastructure, including the energy-related aspects of carbon emission and reduction activities. It does not include transport energy which is covered under the University Sustainability Transport Strategy 2017 – 2021.

2 Background

Previous strategic actions for energy management at the University were embedded within the Environmental Management Plan (EMP) 2009 – 2011. It served as the initial instrument focussed on energy consumption and greenhouse gas emissions, including measurement and performance indicators. The target set was a reduction in absolute energy consumption and greenhouse gas emissions of 10 per cent below a 2008 baseline. Unfortunately due to a range of factors including construction of new research and teaching facilities and student accommodation, energy consumption and emissions have risen rather than decreased since the 2008 baseline.

To date many actions to reduce energy consumption and emissions have already been undertaken, such as lighting efficiency upgrades (lamps, sensors, timers), boiler replacements, replacements of heating water circulation loops on Sandy Bay campus, HVAC upgrades, smart-metering, building envelope upgrades, solar hot water installations, and photovoltaic (PV) panel installations.

Actions reported at the end of the EMP in 2012 included:

- quantifying the University's energy use and baseline GHG;
- BEU and NGER reports are undertaken annually;
- energy conservation technologies have been installed;
- ESD and Green Star assessments are undertaken for all construction projects; and
- education campaigns have been implemented (e.g. Energy Challenges, switch-off stickers, poster, and HEAT kits).

3 Assessment of Energy Sources

The University's energy is sourced from electricity, natural gas, diesel and LPG. The University's energy context is comparatively unique compared to its counterparts nationally and internationally. It is the only tertiary education institution for the whole state and possesses multiple, geographically separate campuses. Its main source of energy is hydro-generated electricity. Peers, nationally and internationally in the majority of instances, have energy supplies that have much higher environmental impacts as they have an increased reliance on generation sourced from fossil fuels.

3.1 Current Energy Usage Profile

In 2017, the University used:

- 49,923,437 kWh of Electricity
- 47,572 GJ of Natural Gas
- 12.65 kL of Diesel
- 15.35 kL of LPG.

This is based on the Greenhouse Gas (GHG) Inventory data for 2017 for the whole organisation (including interstate activities), and excludes non-operational control entities (such as the TUU, CSIRO Forestry, child-care centres).

This equates to a total of 228,176 GJ, and comparison between sources is shown in Figure 1.

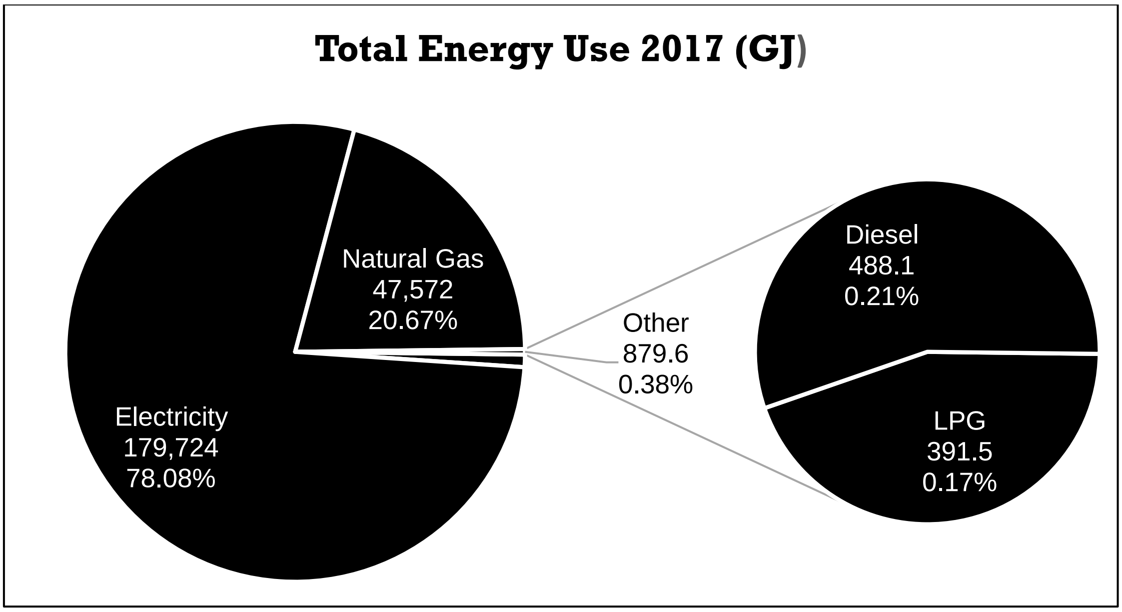

Figure 1: University built environment Total Energy Use in 2017.

The energy used by the University's built environment equated to a total of 10,516 tonnes of carbon equivalent emissions (CO_2-e) being emitted. The breakdown of CO_2-e relating to the energy source is illustrated in Figure 2.

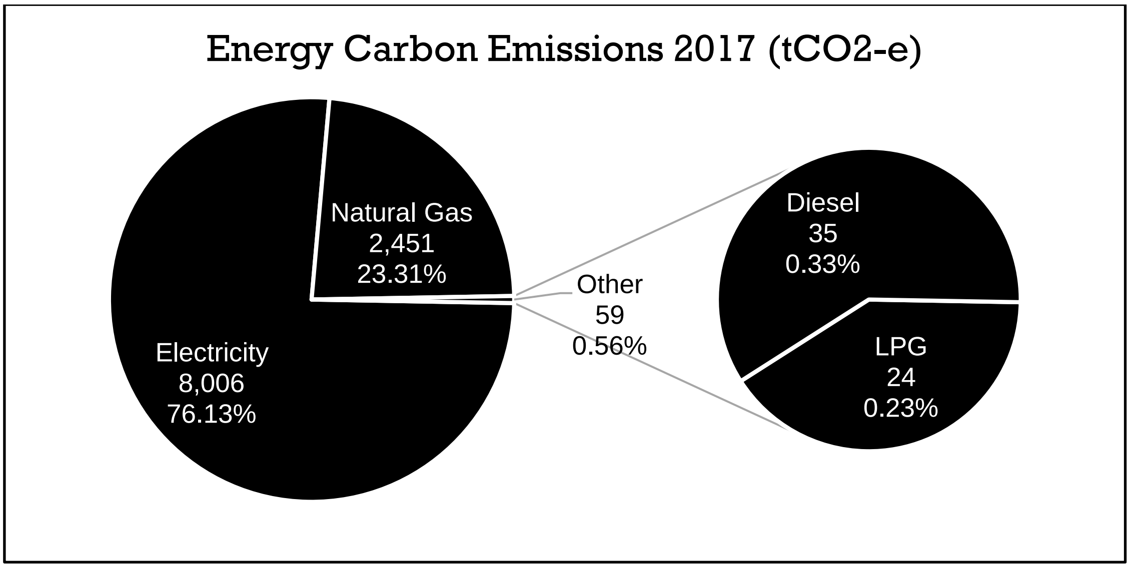

Figure 2: University built environment energy carbon emissions (Tasmania only) in 2017.

3.2 Current Performance

The Tertiary Education Facilities Management Association (TEFMA) annual survey of energy use and carbon emissions provides a good measure to assess and benchmark the University's energy performance against its peers. The measures used are benchmarked on a per student basis. Whilst energy use is more firmly linked to the built environment area (m^2), consistency with the University's main metric (on a per student number basis) and the benchmarking measures used by TEFMA, measurement on a per student basis is considered valid for the purposes of this Strategy. Figure 3 illustrates the equivalent energy and carbon emissions used per student across the sector from the TEFMA 2016 survey.

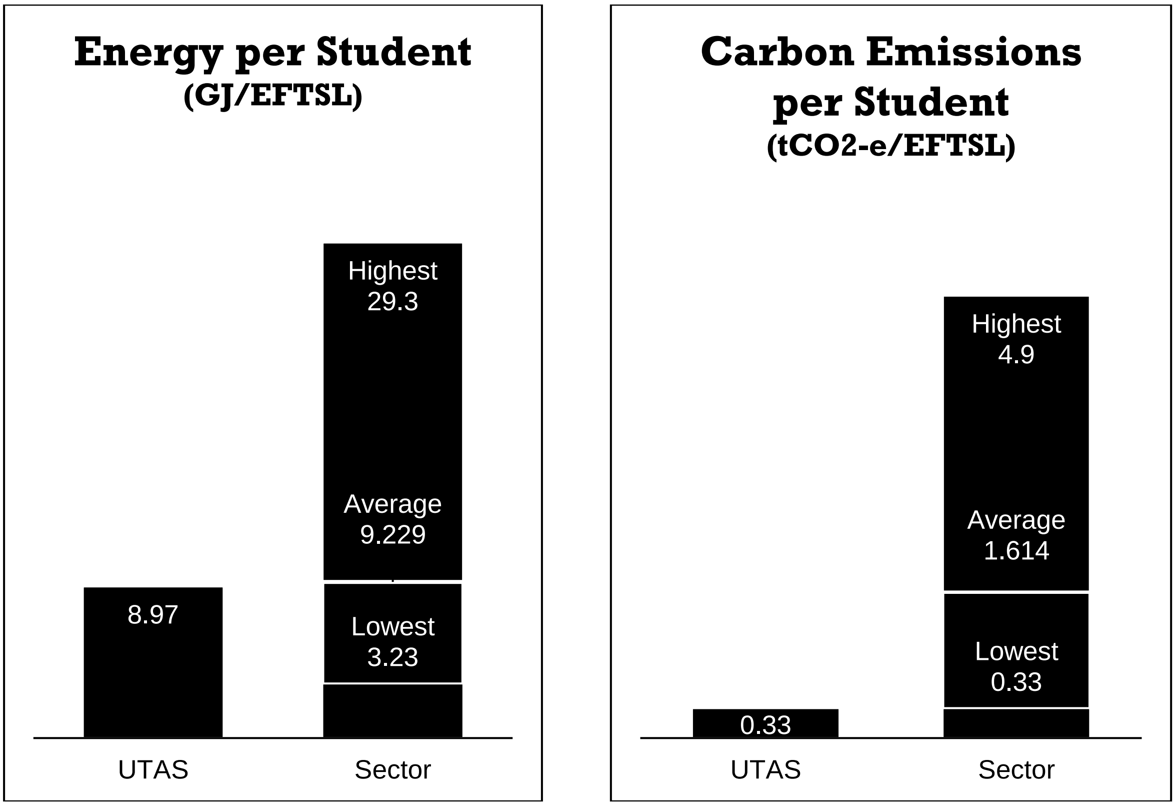

Figure 3: Sector Carbon Emissions and Energy per student (EFTSL) from TEFMA survey 2016

To assess performance on a more granular and practical level for identification of deficiency in management and infrastructure, an Energy Efficiency Framework has been developed and applied. Its results are used to inform this Strategy and have been summarised in 3.2.1 and 3.2.2.

3.2.1 Energy Efficiency Framework

The Energy Efficiency Framework (EEF) is an overarching framework for measuring and reporting energy efficiency, and incorporates a number of desktop assessments and physical audits of energy consumption and infrastructure efficiency at the University. The EEF has been developed specifically for the University based on world-leading and best practice elements of the UK Government's Energy Efficiency Program to support ready development of and access to high level and detailed information to inform this energy strategy and related other operational plans. Results from applying the framework in 2017 have been summarised below as per the identified measurement criteria.

M1 – Organisational Performance

Applying the desktop assessment for Organisational Performance, incorporating a range of high level actions (such as policy, information systems, project funding, review and reporting, within key criteria that play a role in efficient organisational energy management practices), highlight that the University has a relatively average profile for each key criteria, as indicated in the summary Table 1.

The main areas for improvement were identified as:

- policy commitments, clear management structure, communication and marketing channels;
- information systems, reporting of energy use and efficiency to staff and students, energy efficiency awareness;
- existing plant and equipment selection and condition, ongoing training; and
- system accuracy, data sources, maintenance and monitoring, and external auditing.

Table 1. Scores and ranking outcome from the Organisational Performance assessment (M1)

Criteria	Consistency (average)	Score	%	Ranking
Energy management	3.25	19.5/30	65%	Above Average
Financial management	3.42	20.5/30	68%	Above Average
Awareness and information	2.58	15.5/30	52%	Average
Technical	2.83	17/30	57%	Average
Maintenance, Monitoring & Targeting	2.57	18/35	51.4%	Average

M2 – Building Energy Use (BEU)

The Building Energy Use Annual Report provides information on all University buildings (both within Tasmania and on the mainland) and their energy use – electricity, gas, diesel or LPG.

The report provides both Energy Density (MJ/m^2) and Energy Cost Rate ($/GJ) metrics for the buildings, as well as comparing them with Green Building Council of Australia Green Star benchmarks and their past energy use (deviation from average).

Although 30 buildings were highlighted as having a 'medium to high' energy density (greater than 800 MJ/m^2), they vary greatly between very old buildings (such as student accommodation blocks at Newnham campus) to some of the newest constructions (such as Medical Science Precinct and IMAS-Salamanca). The most energy dense building was the Corporate Services Building on Sandy Bay campus (at 4,921 MJ/m^2), however this is primarily due to the presence of the corporate data centre (with an estimated demand of 180 kW, consuming approximately 1,576,800 kWh p.a.), and Uniprint (which ceased operation in May 2017).

The next highest users were research intensive facilities such as IMAS – Taroona (4,051 MJ/m^2), Horticulture at Sandy Bay (2,544 MJ/m^2), the Cambridge Animal Facility (2,409 MJ/m^2) and the AMC Survival Centre at Newnham (2,034 MJ/m^2).

M3 – Building Infrastructure

This tool assesses each buildings' technical features in relation to energy efficiency, and covers HVAC, Lighting, Hot Water, Appliances/Plug Loads, and Building Fabric. Through the tool each building is scored in relation to a range of best-practice criteria for each of these technical features.

Currently this element of the Energy Efficiency Framework is yet to be completed, however initial assessments show most buildings could use improvements across each of the areas assessed under the tool (ie HVAC, lighting, hot water, appliances/plug loads, building fabric). It also highlights the issue that a number of buildings have had upgrades of student learning spaces (such as lecture theatres, videoconference spaces, research laboratories) which has included more efficient lighting and HVAC, however the rest of the building may score very poorly.

Table 2. Excerpt of buildings assessed against the Building Infrastructure tool (M3)

				Rankings based on Third Level Matrix Assessment (1-5 ea. category, total possible score in brackets)						
Building Code	**Common Building Name**	**Total Usage (GJ)**	**Energy Density (MJ/m2)**	HVAC (35)	Lighting (30)	Hot water (20)	Appliance/ Plug Loads (25)	Building fabric (20)	total building ranking	Proportion % of Optimal (130 max)
NH.AP30	AMC Communal Centre	1,959	1,796	16	13	14	11	13	67	53.6
NH.AM32	Survival Centre	1,657	2,034	12	13	13	13	7	58	50.4
SB.AR19	Chemistry	7,680	1,219	20.5	16.5	9	12	10	68	52.3
SB.BE20	Corporate Services Building	9,019	4,912	22.5	20	12	13.5	14	82	65.6
SB.BB39	Uni Apartments 1,2, Laundry & AS/ISD offices	1,377	1,089	13	20	9	11.5	12	65.5	54.6

M4 – Maturity Measure

The energy efficiency project completion register is a tool for monitoring progress in implementing energy efficiency across the organisation, through recording GFA where infrastructure upgrades have been undertaken which improve energy efficiency. The broad overarching categories are Building Envelope (including Building Fabric and Sealing), Electricity Distribution Efficiency (including Smart-metering, Power Factor Correction and Load Shedding), Hot Water Supply, Lighting Efficiency and Mechanical Plant Efficiency. These categories are derived from the Building Code of Australia, (Section J), TEFMA sustainability in facilities management, ISO14001 EMS Self-Assessment Checklist, and Facility Management of Australia's Operational Guide.

Given the sheer breadth and volume of this measurement, it is a continual work in progress but early results indicate a high level of maturity in some areas and not so high in others. As expected, new constructions are designed to meet BCA Section J requirements and therefore score 100% implementation.

Table 3. Excerpt of level of maturity (as GFA implemented) of energy efficiency categories (M4)

Category	Energy Efficiency Activity	% GFA implemented
Building Sealing	Efficient Glazing (new builds)	100
Building Sealing	Airlocks & self-closing doors	17.2
Building Sealing	Insulation (wall / roof)	13.5
Metering	Smart metering	57.4
Distribution Efficiency	Power factor correction	100
Distribution Efficiency	Load Shedding	100
Lighting efficiency	Motion & daylight sensors	10
Lighting efficiency	Lamp replacements	9.6
Lighting efficiency	Efficient lamps (new builds)	100
HVAC efficiency	Boiler upgrades & tuning	28.4
HVAC efficiency	CO_2 & temperature sensors	10.5
HVAC efficiency	BMS scheduling	57.4

On average (from both the internal audits and the National Strategy on Energy Efficiency 2012) the proportion of electricity use for office buildings is - HVAC 43%, lighting 26% and equipment 20%. Total gas consumption in the same building type is primarily for space heating (56%), with a small amount for domestic hot water (9%). For Universities, (from NSEE 2012) on average 50% is HVAC, 18% is lighting and 15% is total equipment. For research intensive buildings such as Chemistry and Engineering (on Sandy Bay campus), on average HVAC was between 57%-60% electricity use, 14% lighting, and 14% laboratory equipment.

Based on the proportional energy consumption, it is recommended to focus on HVAC efficiency and lighting, as well as working with stakeholders in each building to improve equipment and appliance selection, upgrades and operation.

3.3 Carbon Emissions

The greenhouse gas emissions factors for 2016–17 for the various energy sources used by the University are shown in Figure 4.

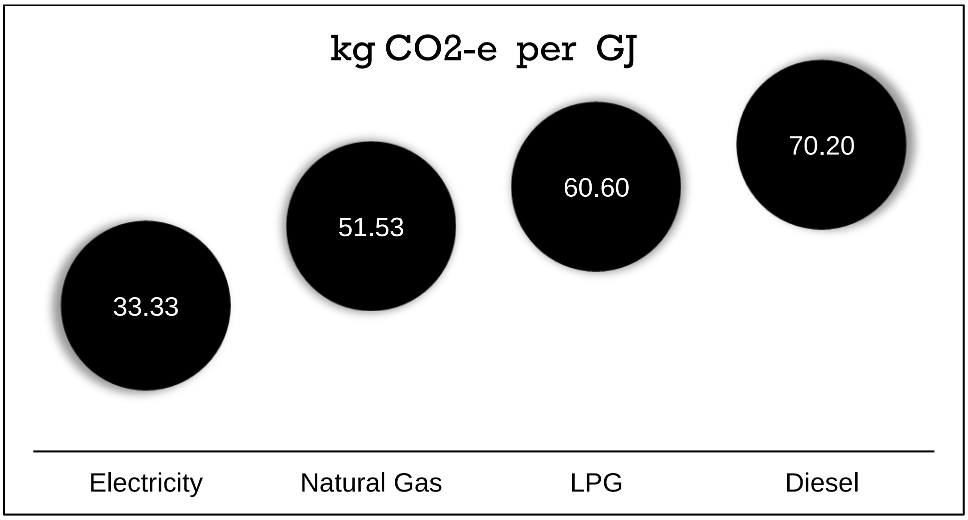

Figure 4: GHG emissions factors (from National Greenhouse Accounts)

The emissions factor for electricity as determined by the Federal Department of the Environment and Energy, has varied for Tasmania over time due to the generation mix in different financial years and is dependent on a number of factors. Since 2008, it has been as high as 88.88 kgCO_2-e/GJ (FY10) and as low as 33.33 kgCO_2-e/GJ (FY08 & FY17). The factor is determined by the prior financial year and applied to the following one. With the generation mix dependent on the generation market, it cannot be determined if the factor will rise or fall in any year until the following year.

The impact of the varying emissions factor for electricity is demonstrated in Table 4 where, regardless of total electricity use increasing slightly over that time, the emissions increased greatly from 2010-2012, then decreased markedly from this point.

Table 4: University built environment annual greenhouse gas emissions (tCO_2e) by source over time

Emissions (tCO2-e)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Electricity	9,640	13,912	13,659	11,953	8,889	9,045	5,708	5,710	8006
Natural gas	1,396	1,708	1,721	1,770	1,998	2,053	2,371	2,127	2451
LPG	144	153	148	148	51	51	36	24	24
Diesel Facility	80	39	21	24	8	26	85	33	35
Total	**11,260**	**15,812**	**15,549**	**13,895**	**10,896**	**11,175**	**8,201**	**7,895**	**10,516**

3.3.1 Renewable Generation

On average, the renewable generation involved in the University's electricity supply is over 80% (as shown in the state's generation mix in Table 5). In recent years, the average legislated percentage of renewable generation mandatorily purchased through the Renewable Energy Act schemes is 22%. This means that in net terms, the University is fully (100%) renewably powered and has been for some time. In non-net terms however, this is not the case as evidenced by the state's generation mix.

Table 5. Generation Mix and Use in Tasmania over the last five financial years (OTTER, 2016)

Demand and Generation	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Tas Demand (GWh)	10,617	10,622	10,720	10,513	10,487
Hydro Gen (GWh)	8,421	10,627	11,925	8,167	8,018
Thermal Gen (GWh)	1,516	1,696	893	18	781
Wind Gen (GWh)	456	463	996	898	1,009
Temporary Diesel[1] Gen (GWh)	-	-	-	-	55
Basslink Import (GWh)	1,273	255	20	2,203	1,097
Basslink Export (GWh)	1,049	2,419	3,113	772	473
% of Tas Demand					
Hydro	69%	77%	83%	70%	71%
Thermal	14%	16%	8%	0%	7%
Wind	4%	4%	9%	8%	10%
Temporary Diesel	0%	0%	0%	0%	1%
Basslink Import	12%	2%	0%	21%	10%
Est. Renewable	**74%**	**82%**	**92%**	**78%**	**81%**

The University has various small scale on-site renewable generation (PV) installations. These are listed in Table 6.

Table 6. Current photovoltaic installations at University, size and annual generation (kWh).

		Total Generation (kWh)				
Installation	**Size (kW)**	**2013**	**2014**	**2015**	**2016**	**2017**
Building V, Newnham*	31.2	0	0	50,863	41,621	43,950
Social Sciences, Sandy Bay*	20	0	21,697	26,260	24,919	26,276
Source, Sandy Bay^#	1.9	2,300	2,300	2,300	2,300	2,300
Bike Hub, Sandy Bay#	2.5	3,000	3,000	3,000	3,000	3,000
Bike Hub, Inveresk	2.5	0	1,982	3,399	3,731	3,470
Inveresk Apartments	40	0	0	0	1,964	47,528
Bisdee Tier#	5.18	6,300	6,300	6,300	6,300	6,300
All	**103.28**	**11,600**	**35,279**	**92,122**	**83,835**	**132,824**

* Tasmania University Union
^ Source Community Wholefoods Shop and Cafe
# Estimate (unmetered)

[1] Temporary diesel generation was connected to the electricity network to ensure power system security was maintained whilst the Basslink cable was being repaired after it failed in 2015.

3.4 Energy Prices

Current comparative cost rates for the various energy sources used by the University are illustrated in Figure 5. These are expressed as $/GJ. The energy prices for 2016 and 2017 shown are based on the actual cost to the University by energy source. Prices for 2018 are based on new supply contracts and expected volumes. It highlights an increasing trend in energy prices particularly for electricity (53 percent) and natural gas (12%) which constitute the main sources of energy (99%) used by the University.

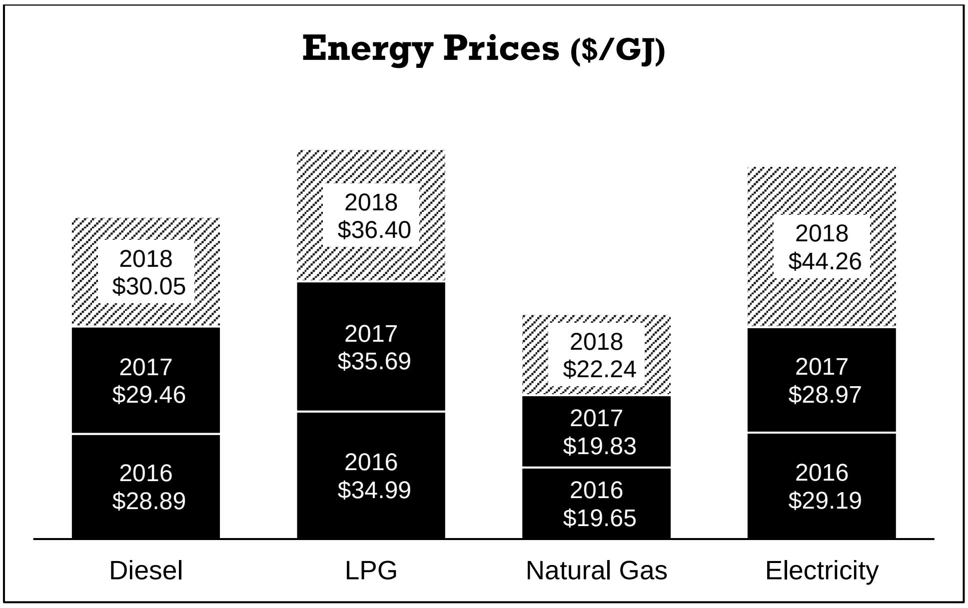

Figure 5: Cost rates for various energy sources 2016-2018

Electricity is the largest energy source consumed by the University (approx. 72%). Figure 7 highlights the various pricing levels for electricity and the percentage of electricity consumed at these levels for 2017.

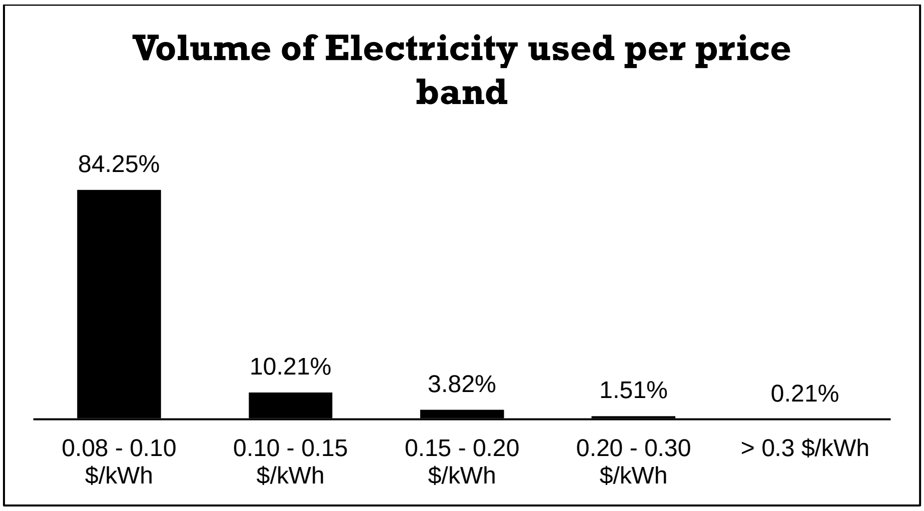

Figure 6: Percentage of electricity used within a specific cost rate band

A number of influencing factors impact on energy prices. These include, but not limited to, the closure of mainland coal fired power stations, gas pipeline costs and increased gas exports. At present, both the natural gas and electricity markets are in a state of flux and provide little price certainty for consumers. Current ASX Energy reports indicate a softening in prices by up to 20-30% for the years beyond 2018.

The lesser used but higher carbon emissions fuels, LPG and diesel, have had a very stable pricing in recent history and look set to continue that trend.

4 National Energy Policy

The Renewable Energy Target (RET) is an Australian Government scheme designed to reduce emissions from the electricity sector and encourage additional generation of electricity from sustainable and renewable sources. The Large-scale Renewable Energy Target (LRET) creates financial incentives for renewable energy power stations (eg wind and solar farms, hydro power stations) through the creation of Large-scale Generation Certificates (LGC) for every megawatt hour (MWh) of power they generate. The Small-scale Renewable Energy Scheme (SRES) supports small-scale (eg household or systems less than 100kW) installations, through the creation of Small-scale Technology Certificates (STC).
Wholesale energy purchasers (eg electricity retailers) buy the certificates as part of their renewable energy obligations and pass the costs on to customers. Through these legislated costs imposed on electricity supply and passed on by the retailers, the University paid for approximately 4,563 STC and 6,095 LGC last year.

This total 10,657 MWh volume of LGC and STC represented 22.5% of the University's electricity requirements. Purchasing additional LGC's (certified green electricity) to ensure a net renewable electricity supply of electricity would cost approximately $2,830,000 per year at current LGC rates in addition to standard electricity costs.

It should be noted that the future RET scheme may no longer apply as the Federal Government has proposed a new scheme under its National Energy Guarantee policy framework. The proposed scheme has two components:

- A reliability guarantee — minimum amount of dispatchable energy available to meet consumer and system needs (set by the Reliability Panel and Australian Energy Market Operator)
- An emissions guarantee — the average emissions level of the electricity that retailers sell to consumers is in line with Australia's international commitments (set by the Commonwealth Government).

Effectively this will mean that retailers will need to manage these obligations in their trading portfolios by contracting with or directly invest in generation, storage or demand response. The emissions guarantee can be met from any generation, plus offsets such as approved carbon credits.

There will not be a transparent or explicit price signal on either obligation, unlike the current renewable energy target (which is obviously biased to renewables over other low emissions generators) or various carbon pricing mechanisms.

There is very little detail on how the scheme will work at this stage, and it will not take effect until 2020, all thigs being equal.

4.1 Energy Security

Based on previous performance, energy sources used by the University are highly secure, despite the Basslink interconnector failure late 2015 - early 2016. The University has not suffered any supply or distribution issues with natural gas, diesel or LPG to date and there are no apparent changes or foreseeable threats to those supplies.

TasNetworks (Tasmania's electricity network service provider) reported distribution system interruption duration of only 221 minutes last year and transmission loss events (>0.1 system minutes) of three. The Mt Pleasant facility at the University Farm suffered the most and longest outage, three over a period of seven days and one earlier in the year. When outages do occur nearly all are due to severe weather events and not as a result of network infrastructure failure.

A number of backup and protection systems for critical research and corporate activities are installed across the University's facilities. These are located at:

- Sandy Bay – Corporate Services;
- Sandy Bay – High Performance Computer;
- Newnham - Building R;
- Medical Sciences Precinct;
- IMAS Taroona;
- IMAS Salamanca;

- Mount Pleasant;
- Cradle Coast – Building A;
- University Farm – Cambridge Animal Facility; and
- Bisdee Tier.

Not all known research and research assets are covered by backup and protection systems. The most notable exposures are the Chemistry and Life Sciences buildings at the Sandy Bay campus and Health Science and Building S buildings at the Newnham campus.

Proactive maintenance programs are undertaken on energy supply and distribution assets to avoid failure and disruption.

5 Performance Improvement Opportunities

There are a range of performance improvement opportunities considered as part of this strategy to deliver on the objectives.

The University, in regards to carbon emissions is consistently one of the lowest, if not the lowest, in the university sector when comparably measured. Carbon emissions are five times lower than the sector average.

Performance in energy consumption however is consistently near sector average. Compared to carbon emissions there is reasonable scope for improvement.

Significant opportunity exists to increase energy efficiency through the proposed capital works and property disposal aspects as part of the Northern Transformation projects, Southern consolidation projects and the Southern Infrastructure Program.

The properties at 5-7 Sandy Bay Road (current Conservatorium of Music) have been sold and are due to be vacated upon completion of the Hedberg building in October 2019. This will eliminate a majority of the diesel used by the University as the diesel fired boiler in that building will no longer be included in University operations.

Because of Tasmania’s high renewable electricity generation, a low carbon economy can be achieved. However, due to its participation in the national energy market, Tasmania is subject to elevated energy prices. The increase in electricity prices will trigger a more intense focus looking at expense reduction measures. The biggest opportunity will arise as new infrastructure is designed and implemented, and/or existing infrastructure is refurbished.

The Energy Efficiency Framework assessment (Section 3.2.1) identified above average organisational performance in energy management across the University. It is anticipated that further improvements in business intelligence data capture will provide an opportunity to improve energy efficiencies and reduce emissions.

Conversion to alternative fuel sources may or may not be practicable nor deliver economical outcomes but should be considered as opportunities arise. A balance of carbon emission reduction and economic viability is required to ensure optimum and sustainable outcomes are achieved for the University.

TasNetworks is currently changing its electricity tariff structure to better incentivise consumers to assist in reducing peak demand periods. This is supported by the AER as it defers capital expenditure on the network and in turn results in lower prices for consumers. Currently there is no control or visibility of controllable generation in the network coming from electricity generated ‘behind the meter’ largely from rooftop solar installations. Customers who generate excess power (over their requirements) back into the network receive a small feed-in tariff. Under the proposed Federal Energy Policy, a component of dispatchable generation must be available to meet consumer and system needs. This is intended to enable some form of economic drivers for demand response or controllable generation. The objective of this is to lower peak electricity demand that typically occurs during winter in Tasmanian, which is out of sync with the rest of Australia. The University should continue to monitor the proposed changes arising from State and Federal energy policies, to ensure that it can leverage any benefits to reducing energy consumption and/or reducing its carbon footprint and how it can better work with the State Government, industry and NEM participants.

6 Constraints

There are a number of constraints that may impact on the University's ability to deliver this Energy Strategy. These include:

- Availability of funding to implement projects that support the strategy;
- Changes to the electricity emissions factor that is influenced by the operation of the NEM;
- Adoption of new technologies that may not deliver the expected performance or environmental outcomes;
- Continued use of aged infrastructure that is not cost effective to upgrade; and
- Meeting minimum Work Health and Safety standards for all buildings.

7 Strategic Action Plan

A number of actions have been identified under the categories of energy use reduction, emissions reduction and energy security to support the University's Energy Strategy to achieve the following objectives:

- ensure all new and/or refurbished built environments are designed in accordance with Environmental Sustainable Design (ESD) principles to deliver demonstrable benefits in terms of environmental sustainability and energy-related operating costs;
- promote investment in, and efficient operation and use of, energy services for the long term interests of the University with respect to – price, quality, safety, reliability, and energy security;
- reduce University carbon emissions, energy usage and/or costs from its built infrastructure; and
- manage University commitments outlined in GLP9 (Environment Sustainability) and GLP10 (Built Environment)
- work with members of the University with relevant expertise, individually and through the interdisciplinary group *Future Energy*, to help deliver these objectives.

The following table identifies specific actions, associated outcomes, responsibility and prioritisation under the three focus areas of:

1 Energy Use Reduction;
2 Emissions Reduction; and
3 Energy Security.

Actions are prioritised based on capacity to be undertaken within the timeframe of the Energy Strategy.

- Priority 1 – within the first year
- Priority 2 – within the first three years
- Priority 3 – with in the five year life of the strategy.

Energy Strategy Objective	Action	Expected outcomes	Responsibility	Priority
1 Energy Use Reduction				
1.1	Improve energy information and accessibility for staff and students	All staff aware of impact on energy efficiency and use measures to save energy Linkage between SISfm mapping and energy use data Energy data displayed in SISfm and website Energy data downloadable from website	ISD	1
1.2	Establish correlative data for energy analysis, forecasting and targets	Determine baseline energy usage Ability to set targets based on forecasting	ISD	1
1.3	Incorporate energy metrics (e.g. usage and cost) within business intelligence and reports	Visibility of energy cost and usage for organisational unit and University managerial staff	ISD	1
1.4	Engage the contracted services market for identification, financing and delivery of energy reduction measures for infrastructure	Firm knowledge and measure of energy reduction opportunities Equipment & plant is appropriate and energy efficient, considering life cycle costs Backlog maintenance reduction	ISD	1
1.5	Review existing works governance and incorporate use of Green Star and Passive House philosophy for all new buildings and significant refurbishments	Delivery on existing governance commitment and significantly reduced energy requirements Reporting evidence based support for more stringent adherence to requirements	ISD	1
1.6	Set a minimum tenancy standard for applicable tenancies (eg minimum rating NABERS 4 star or NATHERS 5 star)	Leased properties or space does not cost more than University owned & operated	ISD	2
1.7	Introduce requirement for all applicable products (plant, equipment, fixtures and appliances) to be of the highest	Reducing energy consumption from individual appliances	ISD / Finance	2

Energy Strategy Objective	Action	Expected outcomes	Responsibility	Priority
	Minimum Energy Performance Standard (MEPS) or Energy Rating Label (ERL) for that type of product			
1.8	Explore data analytics for automated analysis of energy usage and heating/cooling systems	Automatic detection of anomalies, or irregular and unconventional usage Automatic determination of infrastructure performance or issues	ISD	3
1.9	Continue energy benchmarking for the built environment	Up to date knowledge of organisational energy management and infrastructure energy efficiency against benchmarks Identification of opportunities to improve	ISD	ongoing
1.10	Continue measurement of performance against the energy efficiency framework	Up to date knowledge of organisational energy management and infrastructure energy efficiency Identification of opportunities to improve	ISD	ongoing
1.11	Continue involvement of academics and students in delivery of this strategy, such as through energy-related SIPS projects, the Future Energy group, and incorporation into other teaching and learning activities	Continue to provide data, advice and support for energy-related SIPS activities	ISD	ongoing
1.12	Promote energy efficiency usage programs and campaigns for behavioural change	Continue to work with Sustainability staff around energy efficiency programs, such as competitions and rewards programs Continue to provide data, advice and support for energy efficiency activities Report on achieved energy efficiencies or avoidances, supporting application of best practices	ISD	ongoing
2 Emissions Reduction				
2.1	Determine the penetration level of renewable on-site generation for all sites	A practical scope of generation and works required Established economic conditions and required infrastructure for those conditions (ie is storage required or not)	ISD	1

Energy Strategy Objective	Action	Expected outcomes	Responsibility	Priority
2.2	Engage the contracted services market for financing, delivery, monitoring, operation and maintenance of onsite renewable generation infrastructure	Reduced purchasing of electricity Reduction of GHG	ISD	1
2.3	Investigate the opportunity and feasibility for the University to invest in, and be net supplied by, large scale renewable generation (e.g. PPAs)	Midterm pricing stability Reduction of GHG	ISD / Finance	2
2.4	Undertake feasibility study, including as appropriate cost benefit analysis, of fuel changes and develop infrastructure recapitalisation plans for feasible changes	Quantified requirements to deliver fuel changes	ISD	3
2.5	Continue involvement of academics and students in delivery of this strategy, such as through energy-related SIPS projects, the Future Energy group, and incorporation into other teaching and learning activities	Continue to provide data, advice and support for energy-related SIPS activities	ISD	ongoing
3 Energy Security				
3.1	Determine critical research and corporate assets requiring short term supply protection in-line with business continuity plans	Refreshed business continuity plans for organisational units Knowledge base of critical power supplies established	ISD	1
3.2	Develop plans for installation of required systems to provide electricity loss protection	Documented and costed works for installation of UPS and / or generator systems	ISD	1
3.3	Ensure suitable maintenance programs are in place for emergency power and critical energy distribution assets	No asset failures	ISD	1
3.4	Review redundancy capability and arrangement of critical energy distribution assets	Enhanced business continuity plans and projects identified to address deficiencies	ISD	2
3.5	Engage with energy suppliers, in particular distribution network providers to establish understanding of the University's operations and reliance on having a secure energy supply and emergency response	Confirmed supply priority within emergency management plans	ISD	ongoing

8 Monitoring, Evaluation and Reporting

Progress against the actions identified in the Energy Strategy and the University's performance will be reported annually to the Sustainability Committee and the Built Environment and Infrastructure Committee.

The overall key performance indicators of energy use and cost per EFTSL and carbon emissions per EFTSL will be the key measures used to assess the effectiveness of the Energy Strategic Plan.