Auckland Airport

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ENERGY MANAGEMENT PLAN

2013

Table of Contents:

Executive Summary

This energy management plan for Auckland Airport is designed to meet the policy objective to reduce energy consumption by 20% by 2020. For terminal buildings, including both the International Terminal Building (ITB) and the Domestic Terminal Building (DTB), this target will be measured in terms of kilowatt-hours per passenger (kWh/passenger). The baseline energy usage has been measured by the facility's metering systems and is based on 2012 energy consumption.

The 2012 baseline of 4.4kWh/passenger will be used as a benchmark for the energy performance of the International Terminal Building. This baseline benchmarks favorably to other airports. Comparisons between airports are difficult however, because some airports only measure landside facility operations; whereas other airports measure landside facility energy use and airside facility energy use, while others include ground transportation and other energy uses as well. Airports are beginning to work on conventions for establishing common benchmarks for comparison and Auckland Airport will continue to monitor the progress in this area.

Up to now Auckland Airport have focused energy efficiency projects on the ITB where the company has operational control. The ITB uses circa 20,000,000 kWh p.a. and over the past 5 years energy efficiency projects have reduced consumption by some 4%.

However, if we consider the total energy consumption of the whole of airport the ITB is a small proportion i.e. less than 20% of total airport energy use. When energy savings are pursued across all airport properties, they could be enough to power a small city or at least allow the future development of Auckland Airport with minimal increase in energy consumption and carbon footprint. Whole of airport power consumption includes not only airport operations, but also tenant facilities, and lighting for roads and car parks.

The potential energy efficiency projects for the next three to five years are detailed in this plan, together with the additional measures, education, awareness and training that are needed to ensure projects are not only implemented but maintained. This plan will also be subject to annual review to ensure it keeps pace with changes in energy efficiency technology and relevant airport benchmarks.

The projected savings from all the projects currently listed will be in the order of 13 million kWh of both gas and electricity, which equates to almost 2,000 tonnes of carbon, mostly from reduced use of natural gas.

TOP CURRENT ENERGY MANAGEMENT PRIORITIES

Priority	***Project***	***Responsible Party***	***Target Proposal Date***	***Target Completion Date***
1	*Meter Mapping*	*Auckland Airport EMT*	*30/11/2013*	*31/01/2014*
2	*Energy Data Capture and Reporting System*	*Auckland Airport EMT*	*31/12/2013*	*31/03/2014*
3	*Chiller replacement*	*Economech /Siemens*	*31/12/2013*	*30/06/2014*
4	*FIDS/BMS Interface*	*Siemens/Auckland Airport BT*	*20/9/2013*	*31/3/2014*
5	*BMS Migration*	*Siemens*	*30/3/2014*	*30/6/2017*

Introduction

Auckland Airport is the key gateway into New Zealand handling some 14 Million passengers per annum, a number that includes 73% of all international visitor arrivals. In 2008 the airport company produced its first sustainability policy that set the ambitious target of reducing its total carbon footprint by 5% by 2012. This target was achieved in 2010 through the successful implementation of energy efficiency projects in the international terminal, the company's most energy intensive facility.

In 2012 a new sustainability policy and plan has been established looking to achieve 20% reductions in energy consumption on a per passenger basis. However, the target relates not just to facilities where the airport company has control, but right across the airport campus. This increase in boundary requires engagement with property and retail tenants and the inclusion of energy efficient design in infrastructure and building developments.

The energy management plan will sit with the company's energy management team but its implementation will touch on a wide array of airport stakeholders both internal and external.

The outcome will be a far more efficient and cost effective airport city with a much smaller environmental footprint.

Background

Auckland Airport is a small city that includes shopping centres, warehouses, restaurants, office buildings, freight forwarding and receiving centres, recreational facilities, transportation facilities, sewage and waste treatment facilities and all of the other aspects of modern infrastructure that are to be found in a modern city. Even though airport operations are the primary mission of the facility, energy use by the ITB accounts for less than half of total site energy consumption, even though, as a single entity, the ITB consumes the most. Some of the Auckland Airport tenancies are on the ITB site and some are off-site, and these tenancies are measured and evaluated separately.

Auckland Airport has demonstrated its commitment to achieving energy savings targets by planning capital expenditure projects that meet the requirements of an energy policy. The airport will seriously consider the business case for every energy management proposal in order to meet energy targets.

Since Auckland Airport management only has direct control over the ITB and the site-wide infrastructure, the ITB will be separated from the non-ITB tenancies. The ITB is benchmarked according to kWh per passenger, and non-ITB sites are benchmarked according to kWh per square meter of gross building space. Non-building infrastructure such as street lighting is evaluated comparing total annual consumption for the baseline year, 2012.

The following table lists the top 5 electrical consumers and the electrical consumption by business unit or customer.

ICP's (yellow=TOU)	Address Property name	Type
0000021316AAE99	PC 11 - ITB AIRCON	Aeronautical
0000021419AAE45	PC 11 - ITB AIRCON	Aeronautical
0003133480AABF5	ANZ DTB - NEW MSB AIR NZ	Aeronautical
0000021415AAD5B	PC 11 - ITB AIRCON	Aeronautical
0000021420AA7EC	PC 11 - ITB AIRCON	Aeronautical
0000021334AA349	AIR NZ ENGINEERING BASE	Property
0003133585AAFBE	TAINUI AUCKLAND AIRPORT HOTEL	Property
0003133410AA412	BARBER LOGISTICS	Property
0003133297AAA94	ASC – FOODTOWN	Property
0000021336AA3CC	PRI FLIGHT CATERING	Property
0003133575AAFA9	NEW JR DUTY FREE DEPARTURES STORE	Retail
0003133517AA0DC	ITB - 3A DFS (ARRIVAL EXPANSION - SOUTH)	Retail
0003133159AADE3	ANZ DTB - THE BACH RESTAURANT	Retail
0003133469AAF1E	ANZ DTB – MCDONALDS	Retail
0003133556AAE3C	ITB - MCDONALDS 1ST FL L/S	Retail

Energy Balance

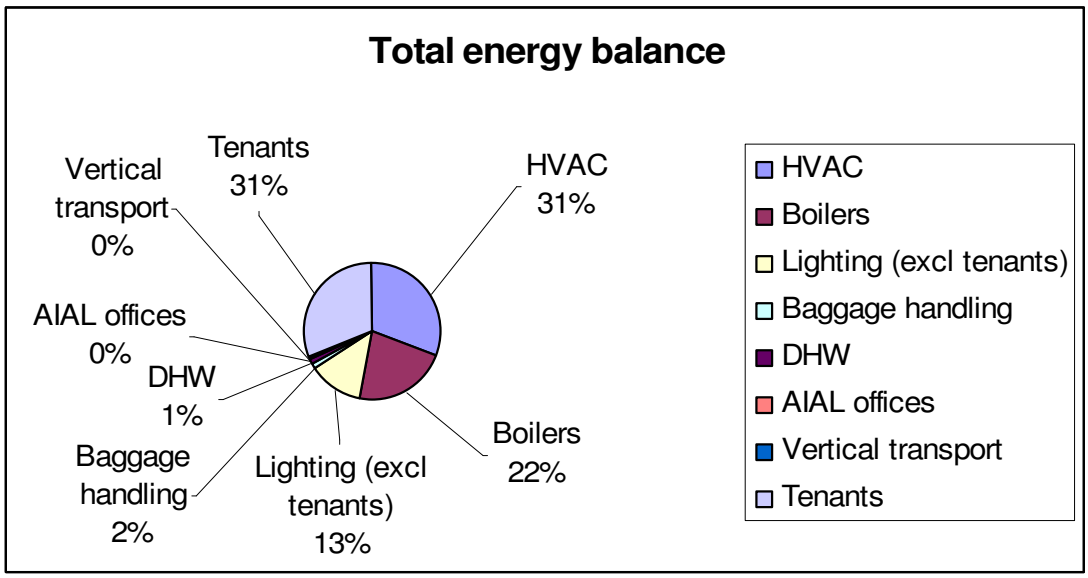
An energy balance is prepared in order to show how energy is used in a building. The energy used by the ITB is key to the energy management plan because it is the main area under direct control, where energy projects can be profitably implemented. The two largest areas of energy use at the ITB are tenants and heating ventilation and cooling (HVAC).

The airport will continue to work with tenants to improve their energy performance, but because the airport has less control over the commercial properties the focus is on the efficiency of the HVAC system. When gas and electrical energy consumption are combined, HVAC accounts for 53% of the ITB energy use.

A pilot BMS controls upgrade project was performed for the check-in area in mid-2013. This project targeted an area with some of the best energy reduction opportunities available for HVAC at the facility. Measurement and verification indicated an 83% reduction of electrical energy use and 58% reduction in natural gas use. This is an indication of the amount of energy that can be saved in parts of the ITB with older plant and controls.

Even though the entire energy management plan may not be able to produce the magnitude of savings produced by the check-in project, the remaining projects in the pipeline have the potential of meeting the airport's energy targets for 2020 by 2017.

The energy balance for the ITB is shown below.



Auckland Airport Company Policy - Energy

Purpose

Auckland Airport is committed to, and will practice, responsible energy management throughout its facilities, premises, plant and equipment.

The four primary objectives of this energy policy are to:

- **Achieve a proactive reduction in energy and fuel consumption and cost**
- **Optimise capital investment to reduce energy use**
- **Reduce pollutants and greenhouse gas emissions**
- **Increase the use of sustainable and renewable fuels**

Targets and Goals

Auckland Airport's 2012 sustainability plan has a target of reducing energy and fuel consumption by 20% per passenger by 2020.

Energy Management Programme (EMP)

This policy will be implemented through an EMP that will sit with the Energy Management Team (EMT) responsible for:

- Developing an Action Plan
- Implementing cost-effective energy savings initiatives (with a simple payback of <5 years)

Auckland Airport will streamline policies and procedures, as necessary, for the success of the EMP. The EMP will be supported with managerial and financial resources and seek buy-in from relevant stakeholders and staff. Auckland Airport will provide the training and incentives needed to encourage employee support for the EMP.
Savings, in terms of cost, energy and carbon, will be closely monitored, measured and verified for each project.

Accountability and Structure

The General Manager Aeronautical Operations is the sponsor of both the EMP and the Energy Management Team (EMT). The EMT will be comprised of representatives from across Auckland Airport and, where appropriate, outside organisations. The EMT will appoint a Chair/Energy Champion to manage its activities and seek external funding opportunities to achieve the objectives of this policy.

Review

Energy management activities will be subject to on-going review by the EMT who will report the energy performance of Auckland Airport and progress towards long term targets, on a monthly basis. The report will include details of energy consumption, key performance indicators and progress on energy management activities, using 2012 as the base year. An annual report on energy use will be prepared by the EMT, together with a documented review of this policy and its implementation.

Auckland Airport will, in addition, publicly disclose energy and carbon performance on an annual basis through the Carbon Disclosure Project (CDP)

Corporate Energy Management Activities

There are many routine and on-going activities that will be performed by the energy management team and by AUCKLAND AIRPORT corporate management. These activities will be continuously upgraded and improved and will be reported on at the regular meetings of the energy management team. These policies are important to make sure that regular airport operations are conducted with energy management as one of the priorities. These management and operations activities include:

- Develop an Auckland Airport energy efficient purchasing policy
- Incorporate energy efficiency into critical job descriptions
- Encourage the use of alternative and renewable fuels
- Develop Auckland Airport Environmentally Sustainable Design (ESD) standards that comply with the energy efficiency plan
- Develop Auckland Airport procedures to assess the financial and operational risks of energy saving projects for the purpose of managing those risks
- Develop metering, monitoring, and recording systems that aid the verification of savings from energy conservation investments
- Publish the performance of the energy policy through Auckland Airport's sustainability reports

Energy Team

Name	Position	Energy Champion?	Percent of Time on Energy Team
Martin Fryer	*Sustainability Manager*	*Yes*	*10%*
Jason Gray	*Airfield & Terminal Services Manager*	*Yes*	*10%*
Geoff Alley	*Building Services Maintenance Planner*	*Yes*	*10%*
Martin Todd	*Project Engineer*	*Yes*	*5%*
Paul Vaughan	*Property Asset Manager*	*Yes*	*5%*
Duncan Hand	*Siemens*	*No*	*5%*
Martin Lynch	*0800 Save Energy*	*No*	*1%*
Judy Nicholl	*General Manager Aeronautical Operations (Sponsor)*	*Yes*	*1%*

Energy Baseline

The energy baseline for the Auckland International Airport Ltd. site includes energy that is used for airport operations as well as energy that is used by tenants and vendors at the airport. The energy that can be saved by the AUCKLAND AIRPORT air operations at the ITB can meet the 20% by 2020 target for all airport facilities. This does not include the offsite commercial facilities which will be evaluated separately. There will be significant operating savings for the airport as the result of doing this. In 2012, the baseline year, the airport spent $4,398,793 on energy. This cost, from a financial point of view, is the justification for the capital investments the airport has made and will make to reduce energy consumption. The consumption shown below is only for air operations and does not include the retail operations at the ITB.

ITB Fuel source usage breakdown FY12

Fuel Source	Total Annual Consumption	Total Annual Cost	Percentage of Total Plant Energy Cost
Electricity	*20,151,268 kWh*	*$3,719,222*	*84%*
Natural Gas	*11,016,000,kWh*	*$439,628*	*10%*
Fuel Oil	*82,864litres*	*$165,815*	*4%*
Jet Fuel	*25,244litres*	*$74,128*	*2%*

Including commercial tenants, the international terminal used about 31 million kWh in FY12 and the domestic terminal used about 5,000,000. Therefore total airport energy use was about 36,000,000 kWh. In order to save 20% of the energy used, assuming passenger numbers remain the same, the airport will need to reduce energy use by 7,200,000 kWh by 2020 in order to reduce energy use by 20%.

In the 2012 fiscal year the ITB saw just over 7 million passengers and the domestic terminal saw just over six million passengers. On a per passenger basis the older domestic terminal appears to perform much better than the ITB. However, these numbers are misleading because all of the airfield operations for both terminals are included in the ITB for continuity purposes when the airport is rebuilt. The ITB and domestic terminals together use 2.77 kWh of electricity per passenger. The ITB considered separately uses 4.37 kWh of electricity per passenger.

Auckland Airport Limited (used to calculate annual carbon footprint).

Fuel Source	Unit	FY08	FY09	FY10	FY11	FY12	FY13
Natural Gas	*MWhr*	*9,789*	*12,024*	*10,750*	*9,457*	*11,721*	*9,868*
Petrol 91	*l*	*82,558*	*59,429*	*52,416*	*42,049*	*30,782*	*33,155*
Petrol 96	*l*	*12,002*	*5,527*	*193*	*-*	*1,298*	*4,355*
Diesel	*l*	*108,402*	*102,964*	*113,852*	*65,134*	*50,784*	*44,589*
JetA1	*l*	*30,250*	*41,210*	*30,065*	*34,265*	*25,244*	*29,148*
Electricity	*MWhr*	*85,558*	*93,989*	*96,037*	*100,442*	*101,405*	*98,227*

Cleary from the table above the use of all of the various energy sources have been reduced over the past six years. Most of the reduction of energy consumption will clearly have to be electricity. The carbon footprint of the airport has been reduced dramatically with the reduction in the use of petrol and diesel fuel. But, from the M&V of the check-in area we discovered that natural gas can also play a significant role in justifying energy projects especially HVAC project and reduction of natural gas use will significantly also reduce the remaining carbon footprint of the airport.

The terminal facilities and operations use about half of the energy recorded at the main incoming meters for the airport electrical distribution network. The rest of the energy is used by the commercial properties. This information is based on revenue grade metering, which accurately accounts for 89% of the site's energy use. The fundamental uncertainty of this energy balance is the result of the 11% of the facility that is not being metered by sub-metering.

Facilities	***kWh/yr***	***% of Total***	***Uncertainty +/- %***	***Source of Energy Information***
Aeronautical	20,151,268	20%	3%	Airport Electrical Metering
Commercial/ITB	11,321,346	11%	2%	Airport Electrical Metering
Infrastructure, Roads, and Parking	1,410,104	1%	5%	Airport Electrical Metering
Commercial Property	51,458,104	51%	6%	Airport Electrical Metering
Domestic Terminal	5,664,580	6%	1%	Airport Electrical Metering
Unmetered Electrical	11,399,487	11%	1%	Airport Electrical Metering
Total	101,404,889	100%		Airport Electrical Metering

Unmetered or improperly metered infrastructure likely accounts for more than twice the electricity used by the domestic terminal. Knowing where this electricity is being used could justify investment for significant energy savings. It also introduces most of the uncertainty in the other energy use categories because until this discrepancy is reconciled its causes cannot be known. The unmeasured use can be the result of actual consumption that is not metered or because of inaccurate metering.

Commercial Properties

When both air terminal commercial properties and off-site commercial properties that use airport power are combined, they use 62% of all of the energy coming into the airport. These areas are also included in the airport's energy policy.

Off site properties are benchmarked according to floor area instead of numbers of passengers which is how the terminals are benchmarked. Long term plans include obtaining a NABERSNZ energy rating for relevant facilities in the property portfolio.

As energy use declines at the airport facilities more attention will fall to these commercial properties in order to reduce energy use.

Identified Conservation Capital Projects

Capital projects planned for the airport include a chiller plant replacement, continued lighting upgrades, an interface between the Flight Information Display System (FIDS) and the BMS, and other projects that will allow optimisation of central plant capacity.

SUMMARY OF CURRENTLY PLANNED ITB ENERGY CONSERVATION PROJECTS

Project Description	Fuel Type	Project Type	Project Location	Source of Savings	Energy Savings kWh per year	Dollar Savings per year	Gross ROI %	CAPEX Budget Year
FY14 Chiller Replacement PC11	Electricity	CAPEX	Central Plant	COP, Staging	1,800,000	$200,000	20%	FY14
BMS Migration &FIDS Interface	Electricity + Gas	CAPEX	BMS, Gate Lounges	Reduced run time & demand control optimisation	16,000,000	$825,000	40%	FY14-17
Server Room Cooling	Electricity	CAPEX	Server Rm	Reduce base cooling load from central plant	250,000	$27,500	83%	FY14
Exterior Up-lighting Replacement,	Electricity	CAPEX	Entry - ITB	More efficiency less run time	121,000	$34,500	17%	FY14
HVAC Retro Commissioning	Electricity + Gas	CAPEX	ITB Wide	Tuning, better performance, controls project management	1,475,000	$97,500	83%	FY14
Street Lights and Car Park Lights	Electricity	CAPEX	Entire AUCKLAND	improved luminaire and lamp efficiency, better control	Tbd	tbd	tbd	FY14-18
FY15 Chiller Replacement Pier A	Electricity	CAPEX	Pier A	COP, Staging	TBD	TBD	TBD	FY15

Operational Savings and Employee Awareness Plan

Operational savings have been achieved over the past six years with a focus on energy consumption in the terminal buildings. The majority of these savings are "back of house" and do not require a great deal of stakeholder input. However, in addition to electricity savings, there has been a real focus on vehicle fuel efficiency. The number of vehicles in the company car fleet has reduced and vehicle replacement has improved fleet efficiency, reducing fuel consumption.

Employee participation has been limited, but awareness of energy efficiency has been introduced to staff wellbeing programmes whereby the company's Sustainability Manager presented to interested staff on the importance of a healthy home and the opportunities available to homeowners through the Government Energy Efficiency and Conservation Authority's (EECA) grants scheme.

Employees are also made aware of the successes around energy efficiency through the company's intranet where there is a sustainability blog. In addition periodic articles are produced for The Airport Times, an airport company publication that is distributed electronically to the whole of airport and beyond.

Energy Conservation Targets

The energy management policy has chosen fiscal year 2012 to serve as the baseline for the 20% by 2020 target. The energy plan is actually targeting energy savings of 35% of Aero Operations by 2020 in its portfolio of currently planned projects.

In this way the airport can meet the savings targets for the entire airport by improving the energy performance of aeronautical operations.

Combined Electricity and Natural Gas Savings Targets

Year	*Savings Target kWh*	*Target $/year*	*Target Percent Savings*
FY12	*1,100,000*	*$166,000*	*0.9%*
FY13	*5,070,000*	*$417,000*	*4.4%*
FY14	*8,870,000*	*$720,000*	*7.6%*
FY15	*1,400,000*	*$95,000*	*1.2%*
FY16	*1,400,000*	*$95,000*	*1.2%*
FY17	*1,400,000*	*$95,000*	*1.2%*
FY18	*1,400,000*	*$95,000*	*1.2%*
FY19	*1,400,000*	*$95,000*	*1.2%*
FY20	*1,400,000*	*$95,000*	*1.2%*
Totals	*22,840,000*	*$1,842,000*	*20%*

This schedule will be updated annually to include new projects that come to the fore. The schedule only includes projects currently planned as a part of aero operations. Any projects performed on commercial properties, outside terminal operations, will extend the savings beyond the 20% by 2020 target.

Action Plan

The Action plan is a process to insure the implementation of the projects and is included at Appendix 1. It will be updated quarterly in order to make sure all of the projects are tracked. An annual review of the action plan will be included in a revised energy management plan for the upcoming fiscal year. This will facilitate the inclusion of projects in relevant capital expenditure budgets. All capital projects have a standard approval process to make sure it is financially beneficial or necessary. It is the role of respective project manager to put together a business case that makes sure energy projects are justified and approved. The EMT can provide assistance in this process.

Energy Management Education and Training

Auckland Airport undertakes EECA's One to Five programme on a regular basis. This programme allows the company to assess how well it is managing energy and provides pointers to how that management can be improved. Energy consumption and cost is a regular item of discussion at the Leadership Team.

Specific training is undertaken on an as and when required e.g. new LED lighting installations in 2012 and 2013 also included new technology such as a DALI system, this required training of the company's in house electricians who could then monitor and manage the entire installation remotely.

This approach will be replicated in the future as and when new and improved technology is introduced.

Financial Planning and Analysis

Energy efficiency projects will tend to have a simple payback of less than three years, which equates to a 33% gross return on investment. These investment returns demonstrate the commitment of Auckland Airport to improving its sustainability and reducing its carbon footprint.
The reduced costs of operation will free up resources that will allow continued reductions of energy use in the future. The table below documents the capital financing requirements and return on investment (ROI) for currently planned projects:

CAPITAL PROJECTS ECONOMICS

Project Description	CAPEX Budget Year	Combined[3] Energy Savings kWh per year	Dollar Savings per year[2]	Project Cost	EECA Funding	ROI %
Meter Tree	FY14	220,000	$19,800	$80,000	$0.00	25%
Energy Reporting System	FY14	200,000	$18,000	$50,000	$0.00	36%
Exterior Uplight Replacement, Control, East	FY14	31,000	$17,000	$120,000	$0.00	14%
Exterior Uplight Replacement, Control, West	FY14	90,000	$17,500	$80,000	$0.00	22%
Server Room Cooling	FY14	250,000	$27,500	$30,000	$0.00	92%
FY14 Chiller Replacement PC11	FY14	1,600,000	$180,000	$900,000	$0.00	20%
BMS Migration & FIDS Interface	FY14-17	16,000,000	$840,000	$2,090,000	$0.00	45%
Totals		18,391,000	$1,119,800	$3,350,000	$0.00	36%

[1]Combined Natural Gas & Electrical consumption (if applicable)
[2]Some Dollar Savings include maintenance Savings

Measurement and Verification Plan

Measurement and verification is to be implemented through a metering data acquisition, analysis, and reporting tool. The system will be capable of both verifying the energy impact of specific projects and reconciling that information with the energy consumption of individual airport properties. It will also reconcile against the energy consumption of the entire Auckland Airport site.

This approach is superior to a series of individual energy audits because it allows continuous updates of energy consumption data, allows flexible implementation and verification of energy projects and allows the impact of individual energy projects on the energy consumption of the total site to be evaluated.

Metering and BMS Logging Standards

BMS logs will be used for measurement and verification and these will be integrated into metering data using a standard format and data recording interval. All metering and BMS trend logs will be set up with half hourly recording intervals to ensure that recorded data from different sources can be correlated for measurement and verification purposes.

Communication

This energy management plan will be a public document and will feature on the company's website as one of a suite of documents enabling the business to develop in a more sustainable manner.

It will also be made available through the company's internal file storage system and will be brought to the staff and the public's attention through the company's intranet and sustainability blog.

The company's Leadership Team will also be brought up to date on the progress of the plan on a regular basis and the company's sustainability reporting will include energy and carbon performance out to 2020 as these are material sustainability issue for our stakeholders.

Energy Management Plan Document Maintenance

The energy management plan is not to be a static document and will be updated by the EMT on a quarterly basis, as well being subject to annual review, to ensure progress against targets is monitored and managed. The annual update will include a full review of content and will be signed off by the General Manager Aeronautical Operations.

The Energy Policy is due for review in 2015.

This document is a controlled document and will be reviewed annually by Auckland Airport's Energy Management Team.

Printed versions of this document are uncontrolled.

Appendix 1: Energy Management Action Plan as at November 2013 (to be updated quarterly)

ITB ENERGY CONSERVATION PROJECTS TRACKING

Project Description	Fuel Type	Project Type	Project Location	Source of Savings	Combined[3] Energy Savings kWh per year	Dollar Savings per year[4]	Project Cost	ROI %	CAPEX Budget Year	M&V Method	Project Manager	% Complete	Target Completion Date
Check-in lighting upgrade phase[1]	Elec	CAPEX	ITB Check-in	More efficient luminaires and lamps	500,000	$83,000	$345,000	24%	FY12	Calc	Martin F	100%	
1st Floor Departures and Arrivals[2]	Elec	CAPEX	ITB Check-in	More efficient luminaires and lamps	510,000	$83,000	$540,000	15%	FY12	Calc	Martin F	100%	
Central Plant & Check In 1 & 2 Controls upgra	Elec + Gas	CAPEX	ITB Check-in	Improved DESOPs, VSDs, Demand control.	2,500,000	$135,000	$302,000	45%	FY13	meter/log	Martin T	100%	Jul-13
Central Plant Centralisation (Stage 1)	Elec + Gas	CAPEX	ITB & Central Plant	Improved DESOPs, loading, staging, chiller isolations	3,070,000	$292,000	$853,000	34%	FY13	meter/log	Martin T	100%	Apr-13
Central Plant Optimisation	Elec + Gas	CAPEX	CP Controls	Improved DESOPs, loading, staging, demand response	not complete				FY12	meter/log		60%	
Widen HVAC Temperature Deadbands	Elec + Gas	OPEX	BMS	Reduced heat-cool fighting	300,000	$28,500	$15,000	190%	N/A	meter/log	Martin T	0%	Apr-14
Meter Tree	Electricity	CAPEX	Airport Wide	Better tracking & granularity of energy use	220,000	$19,800	$80,000	25%	FY14	N/A	Martin T	0%	Jun-14
Energy Reporting System	Elec + Gas	CAPEX	Management	Ability to continuously track and report on energy use	200,000	$18,000	$50,000	36%	FY14	N/A	Martin F	0%	
Exterior Uplight Replacemnt, Control, East	Elec	CAPEX	Entry - ITB	More effieciency less run time	31,000	$17,000	$120,000	14%	FY14	Calc		0%	
Exterior Uplight Replacemnt, Control, West	Elec	CAPEX	Entry - ITB	More effieciency less run time	90,000	$17,500	$80,000	22%	FY14	Calc		0%	
Server Room Cooling	Elec	CAPEX	Server Rm	Reduced base load from central plant	250,000	$27,500	$30,000	92%	FY14	Calc	Martin T	5%	Jun-14
FY14 Chiller Replacement PC11	Elec	CAPEX	Central Plant	Co-efficient of Performance, Staging, Desops.	1,600,000	$180,000	$900,000	20%	FY14	meter/log	Martin T	15%	Jun-14
ITB BMS Replacement & FIDS/AFFISS Interfac	Elec + Gas	CAPEX	ITB Wide	Better DESOPs, demand response, reduced run time.	11,300,000	$747,000	$2,080,000	36%	FY14-17	meter/log	Martin T	15%	Jun-17
HVAC Retro Commissioning	Elec + Gas	CAPEX	ITB Wide	Tuning, better performance	tbd				FY14	meter/log		0%	
Ground Energy Storage - New Terminals	Elec + Gas	CAPEX	Major New Const.	Heat reclamation, reduced energy waste	tbd				Future	meter/log		0%	
Street Lights and Car Park Lights Upgrade	Elec	CAPEX	Entire AIAL	improved luminaire and lamp efficiency, better control	tbd				FY14-18	meter/log		0%	
Life Cycle Fan Coil Upgrades	Elec + Gas	OPEX	ITB	Less heat-cool fighting, more efficient fan motors	tbd				N/A	meter/log		0%	
Variable Secondary CW Loop Pumping	Elec	CAPEX	Central Plant	Less pump energy, improved chiller performance	tbd				FY16	meter/log		0%	
Variable Secondary HW Loop Pumping	Elec + Gas	CAPEX	Central Plant	Less pump energy, improve boiler performance	tbd				FY16	meter/log		0%	
				Total Gas and Electrical kWh Saved	20,571,000	$1,648,300	$5,395,000	31%					
				Current total gas and electrical consumption %	26%								

[1] Excludes $117,320 of EECA funding

[2] Excludes $110,480 of EECA funding

[3] Combined Natural Gas & Electrical consumption (if applicable)

[4] Some Dollar Savings include maintenance Savings

Appendix 2: Energy Management Action Plan (Property) as at November 2013 (to be updated quarterly)

COMMERCIAL PROPERTIES ENERGY CONSERVATION PROJECTS TRACKING

Project Description	Fuel Type	Project Type	Project Location	Source of Savings	Combined Energy Savings kWh per year	Dollar Savings per year	Project Cost	ROI %	CAPEX Budget Year	M&V Method	Project Manager	% Complete	Target Completion Date
Chiller - Cargo Central	ELEC	CAPEX	Central Plant	Higher COP	54163.2	$5,037	$76,137	7%	FY13	N/A	Paul V	100%	
Chiller - BNZ	ELEC	CAPEX	Central Plant	Higher COP	59072	$5,494	$77,205	7%	FY12	N/A	Paul V	100%	
Chiller - DHL	ELEC	CAPEX	Central Plant	Higher COP	81536	$7,583	$131,911	6%	FY11	N/A	Paul V	100%	
Chiller - Cargo 1	ELEC	CAPEX	Central Plant						FY14	N/A	Paul V	0%	
				Total Gas and Electrical kWh Saved	194,771	$18,114	$285,253	6%					