CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

http://www.cit.ie/energy

EMPOWER Campus Visit

Energy Strategies In Cork Institute of Technology

07 Jan 2018

Introduction to CIT

- 4 Campuses
  - Bishopstown (Main Site)
  - Crawford College of Art & Design
  - Cork School of Music
  - National Maritime College of Ireland
- CIT is the largest Institute in Ireland outside Dublin
- 14,000 Student Enrolments
  - Approximately 8,000 full-time
- 1,500 Staff
  - Approximately 1,000 Academic
- Structured Delivery
  - 13-week semester: September -January and February-June
  - 6 modules per semester

Getting Started

- Key Personnel as Regards Energy Management
- Sub-Metering (Measurement &Verification)
- The Energy Team / Champion's
- CIT Energy Partner's (SEAI & OPW)
- Energy Projects (Various)
- Financing This Energy Reduction Campaign
- Achievements - SEAI M&R Standing (ahead of 2020 target)
  - ISO50001 Certified

Energy Personnel

Campaign Energy Team/Steering Group /Managers

Campaign Team

Senior Management Mentor
Paul Gallagher (Vice President for Finance and Administration)

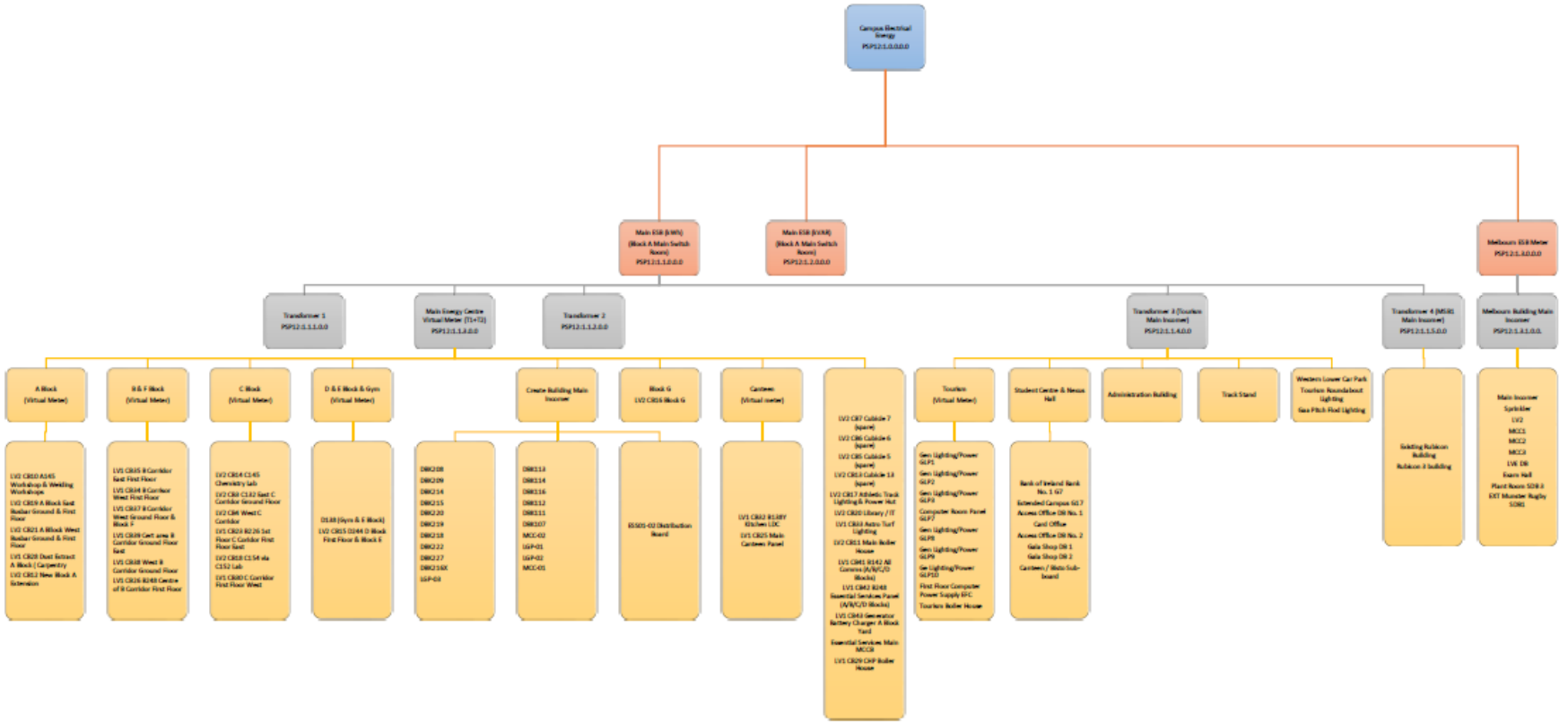
Senior Manager Champion
Kevin McCarthy (Building and Estates Manager)

Energy Manager
Michael Coughlan (Assistant Buildings and Estates Manager)

Energy Awareness Steering Group
Kevin, Michael, Frank & Susan

Energy Team
30 members, these all act as the champions

Sub Metering System – Main Campus



Identity Survey

Matrix/pre campaign survey

Level	Policy and Commitment	Awareness	Motivation	Promotion	Organisation
	Q: Which statement do you think best describes CIT's Commitment to Energy Management	**Q: How would you rate staff awareness on Energy Management and saving**	**Q: Which statement best describes CIT's motivation to save energy?**	**Q: Which statement best describes the promotion of Energy saving in CIT**	**Q: Which statement best describes CITs organisation for energy management**
4	Active commitment from senior management supporting a comprehensive strategy to save energy through people	High awareness levels throughout CIT	All users at every level self-motivated to save energy	Regular promotional campaigns tailored to CIT's culture using existing information highways	Energy management fully integrated into Management structure. Clear delegation of responsibility for energy consumption
3	Formal policy and strategy but lacking senior level commitment	Most major users aware of potential and opportunities to save energy	Most major users motivated to save energy	One off energy campaign tailored to the organisation	Energy manager accountable to energy committee representing all users, chaired by a member of the managing board
2	Outline strategy drafted but lacking commitment	Some awareness of energy saving potential and how to achieve it	Some motivation by a few major users	Some use made of organisation's information channels to pro[illegible] energy savings	Energy manager in post, reporting to ad hoc committee, but line management and authority unclear
1	Commitment by a few people to some unwritten ideas	Awareness in places but patchy	Motivation restricted to enthusiasts	Energy savings promoted by informal contacts and published awareness literature	Energy management the part-time responsibility of someo[illegible]ith only limited authority or influence
0	No interest, initiative or commitment to saving energy through people	No awareness of how to save energy.	No motivation to save energy	No promotion to save energy	No energy manager or any formal delegation of responsibility for energy consumption

Baseline Data & Historical Energy Data

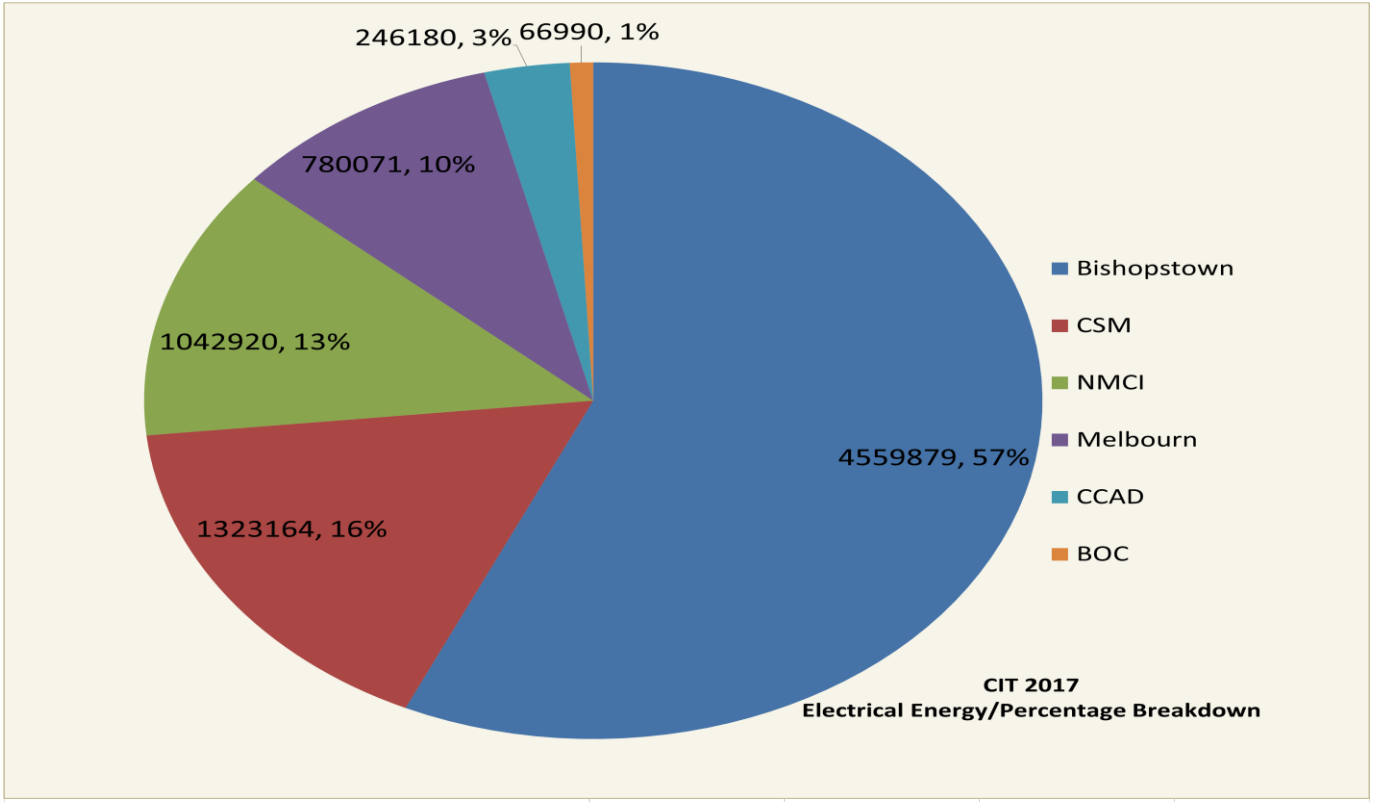
- Start Compiling Energy Consumption data immediately. Initially aim to have monthly consumption for Electricity / Gas / Oil etc.

- Gather list of MPRN / GPRN Numbers and contact MRSO to see if they will have historical data on their system.

- The CIT initially followed and used the 20 steps in the SEAI Energy Road Map for direction and guidance. We are now following the ISO50001 route with the aid of the SEAI support workshops.

- Monitoring and Targeting (Measurement & Verification): The Energy sub metering system was first installed in CIT in 2006. This covered approx. 60% of the Bishopstown main campus. CIT joined the OPW Optimising Power @ Work Public Sector Programme. The OPW completed the remaining 40% of CIT building's energy metering and are now assisting in the preparation of customised energy audits/reports for each of our campus main facilities.

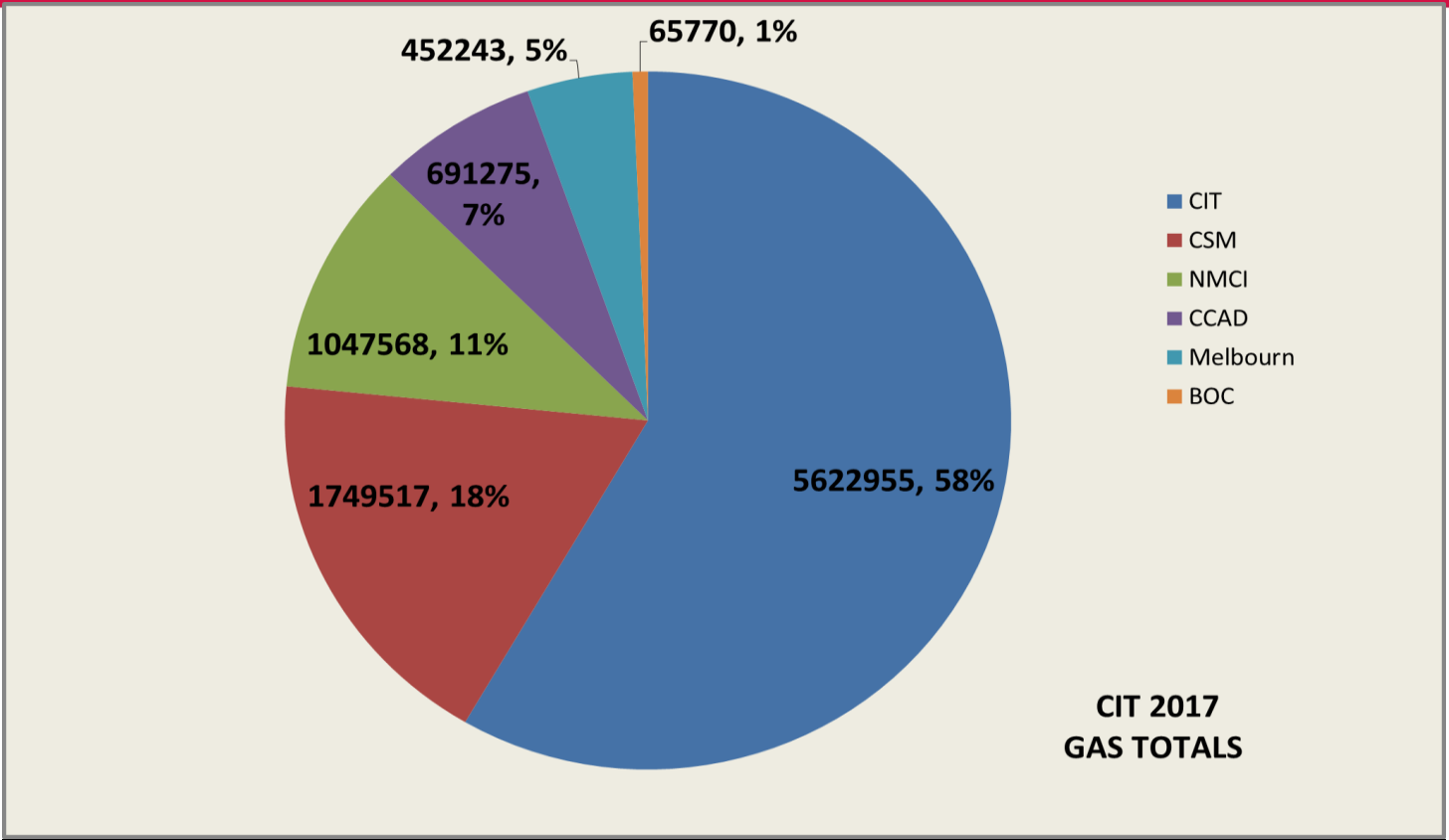
CIT Electricity Significant Energy Users



SEAI M&R - CIT Top Six Electrical Users (2017)

MPRN	Building Location	Rank	2017	Total	Rank	%
10000042306	Bishopstown	1	4559879	4559879	1	57
10302750556	CSM	2	1323164	1323164	2	16
10020169659	NMCI	3	1042920	1042920	3	13
10000042498	Melbourne	4	780071	780071	4	10
10000044174	CCAD	5	246180	246180	5	3
10021300097	BOC	6	66990	66990	6	1
	Top 6 Users		8019204	8019204		
				%	100	100

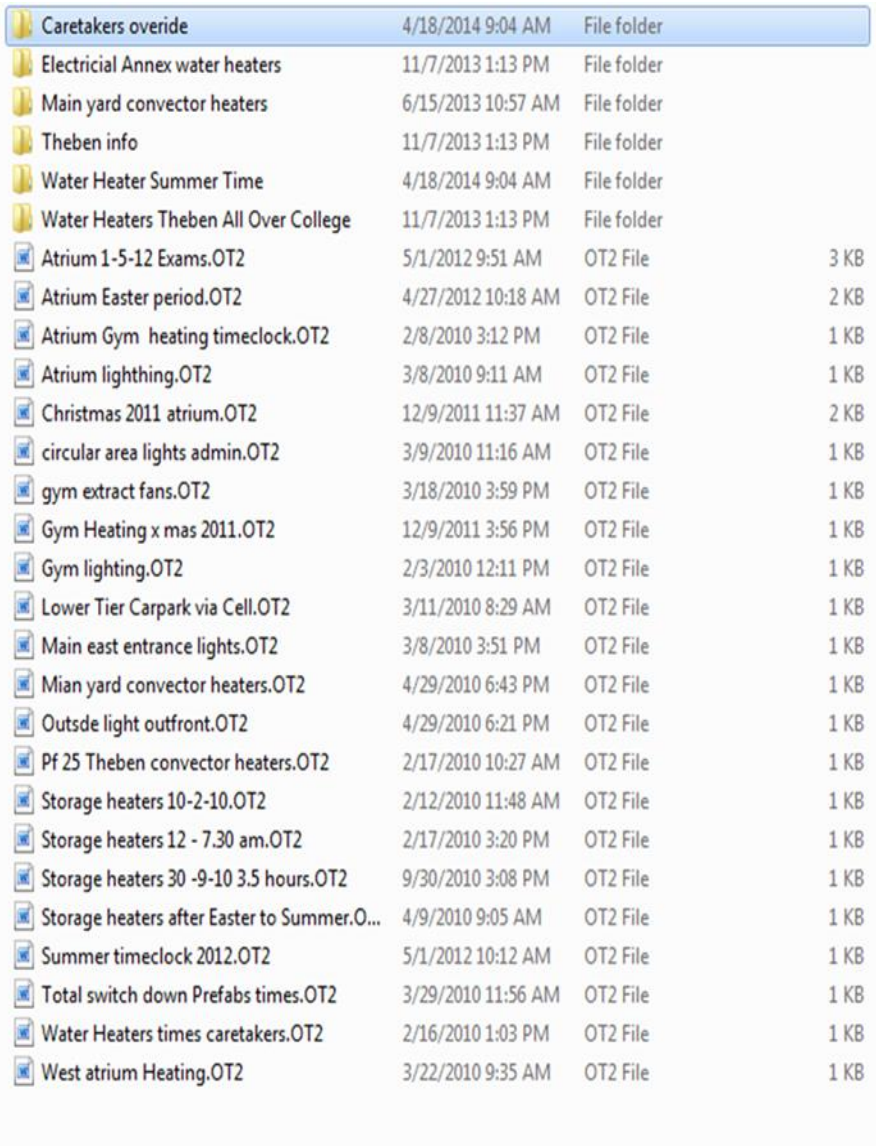
CIT GAS Significant Energy Users



Building Description	Building Name	2017	Total	Rank	GPRN	%
Bishopstown Campus	Bishopstown	5622955	5622955	1	Combined	58
Cork School of Music	CSM 01	1749517	1749517	2	1099905	18
National Maritime College of Ireland, Ringaskiddy, Cork	NMCI	1047568	1047568	3	963685	11
Crawford College of Art and Design, Sharman Crawford st.	CCAD	691275	691275	4	Combined	7
Melbourne Building, (Former TYCO) Melbourne Road, Bishopstown	Melbourne	452243	452243	5	606755	5
Blackrock Observatory Centre	BOC	65770	65770	6	618770	1
		9629328				
			9629328		%	100

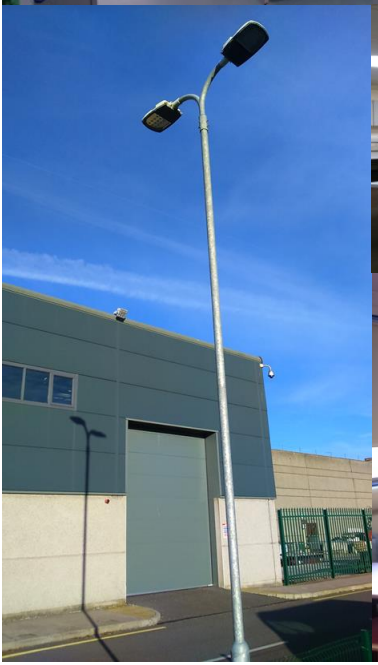
Energy Projects

Project Name	Facility Location	Implementation Date
CIT Sub Metering System	CIT Main Campus	2006
SEAI SEEEP (Grant) Project	CIT Main Campus	2009
CCAD OIL To GAS	CCAD	2010
THEBEN TIMERS 2006 - 2013	CIT Main Campus	2010
CIT 115Kwe CHP	CIT Main Campus	2011
Boiler Optimisation	CIT Main Building (Boiler House)	2011
CIT LED Lighting Strategy	CIT Main Campus	2013
CIT Energy Awarness Campaign 2014 - 2020	CIT (All Buildings)	2014
CCAD Energy works	CCAD	2014
CHP/ Kitchen Clarifier Project	CIT Main Campus (Canteen)	2015
Library Building LED Lighting	CIT Main Campus (Library)	2015
LPHW Pump Upgrade 2015	CIT Main Campus	2015
2020 PV (Fergus Delaney)	CIT Main Campus	2015
CIT UTRC 315Kwe CHP	CIT Main Building (Boiler House)	2016
Gas Boiler Optimisation	CIT Main Campus	2017
Bishopstown LPHW Pump upgrade for 2017	CIT Main Campus & CCAD	2017



Caretakers overide	4/18/2014 9:04 AM	File folder	
Electricial Annex water heaters	11/7/2013 1:13 PM	File folder	
Main yard convector heaters	6/15/2013 10:57 AM	File folder	
Theben info	11/7/2013 1:13 PM	File folder	
Water Heater Summer Time	4/18/2014 9:04 AM	File folder	
Water Heaters Theben All Over College	11/7/2013 1:13 PM	File folder	
Atrium 1-5-12 Exams.OT2	5/1/2012 9:51 AM	OT2 File	3 KB
Atrium Easter period.OT2	4/27/2012 10:18 AM	OT2 File	2 KB
Atrium Gym heating timeclock.OT2	2/8/2010 3:12 PM	OT2 File	1 KB
Atrium lighthing.OT2	3/8/2010 9:11 AM	OT2 File	1 KB
Christmas 2011 atrium.OT2	12/9/2011 11:37 AM	OT2 File	2 KB
circular area lights admin.OT2	3/9/2010 11:16 AM	OT2 File	1 KB
gym extract fans.OT2	3/18/2010 3:59 PM	OT2 File	1 KB
Gym Heating x mas 2011.OT2	12/9/2011 3:56 PM	OT2 File	1 KB
Gym lighting.OT2	2/3/2010 12:11 PM	OT2 File	1 KB
Lower Tier Carpark via Cell.OT2	3/11/2010 8:29 AM	OT2 File	1 KB
Main east entrance lights.OT2	3/8/2010 3:51 PM	OT2 File	1 KB
Mian yard convector heaters.OT2	4/29/2010 6:43 PM	OT2 File	1 KB
Outsde light outfront.OT2	4/29/2010 6:21 PM	OT2 File	1 KB
Pf 25 Theben convector heaters.OT2	2/17/2010 10:27 AM	OT2 File	1 KB
Storage heaters 10-2-10.OT2	2/12/2010 11:48 AM	OT2 File	1 KB
Storage heaters 12 - 7.30 am.OT2	2/17/2010 3:20 PM	OT2 File	1 KB
Storage heaters 30 -9-10 3.5 hours.OT2	9/30/2010 3:08 PM	OT2 File	1 KB
Storage heaters after Easter to Summer.O...	4/9/2010 9:05 AM	OT2 File	1 KB
Summer timeclock 2012.OT2	5/1/2012 10:12 AM	OT2 File	1 KB
Total switch down Prefabs times.OT2	3/29/2010 11:56 AM	OT2 File	1 KB
Water Heaters times caretakers.OT2	2/16/2010 1:03 PM	OT2 File	1 KB
West atrium Heating.OT2	3/22/2010 9:35 AM	OT2 File	1 KB

Energy Projects – LED Lighting



Energy Projects – CHP

Energy Projects – Renewable

Energy Awareness Campaign

Energy Awareness Targets.

Comparison study to Achieve the Energy Awareness Campaign Targets:

The study of the energy raw data collected over various requested and non requested power shutdowns gave us the following average potential savings.

- **Unoccupied Hours on the Campus = 5400 (Hours)**
- **Electrical Differential in comparison study base lines = 122 Kwh (Mean)**
- **Total =658800Kwh (Waste)**
- **A Potential saving of €65880.00 & 309000 Kg CO2 / Kwh.**

The result concluded that 122kWh could be potentially saved per hour during unoccupied hours. This target does not include savings that can be made during normal operational times. This factor will act as a buffer as regards the Energy Awareness Campaign.

658800 Kwh will be our target as regards our Energy Awareness campaign and this accounts for **8%** of our overall electrical load in 2014. We have saved **5.9%** in 2016 on energy awareness alone.

Example of LED Lighting Upgrade - NEXUS

Lighting Energy Up Grade:				Date:	5/6/2010
				Cell Reference Details	
Energy Saving Report Number		Cost Cell	Summary	Calc Cell	Input Cell

Description:	**(No.7)** Replacement of 400 floods on student centre main courtyard inside with 30 watt / 90 watt led floods .

Existing Fitting Type / Model			New Fitting Type / Model		
400Watt Metal Halide			30Watt LED Floods		
Existing Fitting Quantity	44		New Fitting Quantity	30	
Sample Testing No	22	50%	Sample Testing No	15	50%
			Cost Per Fitting	560	
			Total Investment Cost	16800	

Note: Samples Tested For 1 Hour

Sample	Watts	Sample	Watts
1	387	15	387
2	387	16	387
3	387	17	387
4	387	18	387
5	387	19	387
6	387	20	387
7	387	21	387
8	387	22	387
9	387	23	
10	387	24	
11	387	25	
12	387	26	
13	387	27	
14	387	28	
Sample Fittings Total Watts Average			387

Existing Energy KW Total Per Hour	17.028
Electrical Cost KWH	0.10266
Existing Energy Cost/Hour	1.748094
Operational Hours / Year	4000
Total Energy (Kwh / Year)	68112

Note: Samples Tested For 1 Hour

Sample	Watts	Sample	Watts
1	29	15	29
2	29	16	
3	29	17	
4	29	18	
5	29	19	
6	29	20	
7	29	21	
8	29	22	
9	29	23	
10	29	24	
11	29	25	
12	29	26	
13	29	27	
14	29	28	
Sample Fittings Total Watts Average			29

New Energy KW Total Per Hour	0.87
Electrical Cost KWH	0.10266
New Energy Cost/Hour	0.089314
Operational Hours / Year	4000
Total Energy Cost /Year	3480

Total Energy Saving (Kwh / Year)	64632.00
Total Energy Saving (Euro / Year)	6635.12
Payback Time (Years)	2.53

OPW - Optimising Power @ Work Programme

Background

- The OPW has been running a state-wide staff energy conservation campaign, entitled *Optimising Power @ Work*, in Central Government buildings since 2008.
- The programme is funded by Central Government.
- The campaign relies on 3 fundamentals: 1) Technology – installation of energy monitoring equipment 2) Specialist Resources – application of adequate and suitable specialist resources (energy consultants) 3) Energy Teams – establishing suitable active energy teams in each participating building
- In 2014 *Optimising Power @ Work* was launched in the wider Public Sector. The campaign began working with Cork Institute of Technology and established 2014 as the Baseline Year for measuring energy savings against.

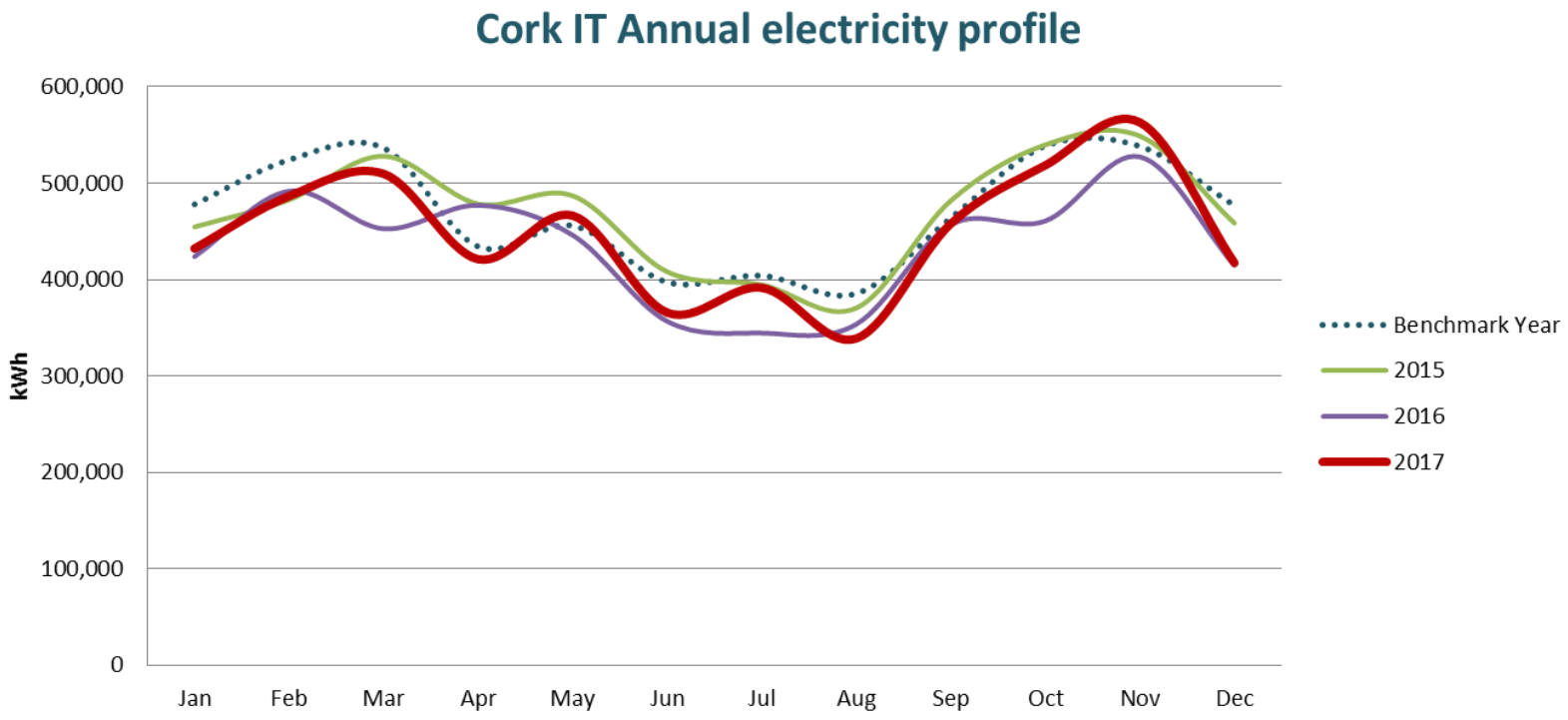
Optimising Power @ Work

OPW – Energy Awarness Partner

➢ Cork Institute of Technology Energy Performance

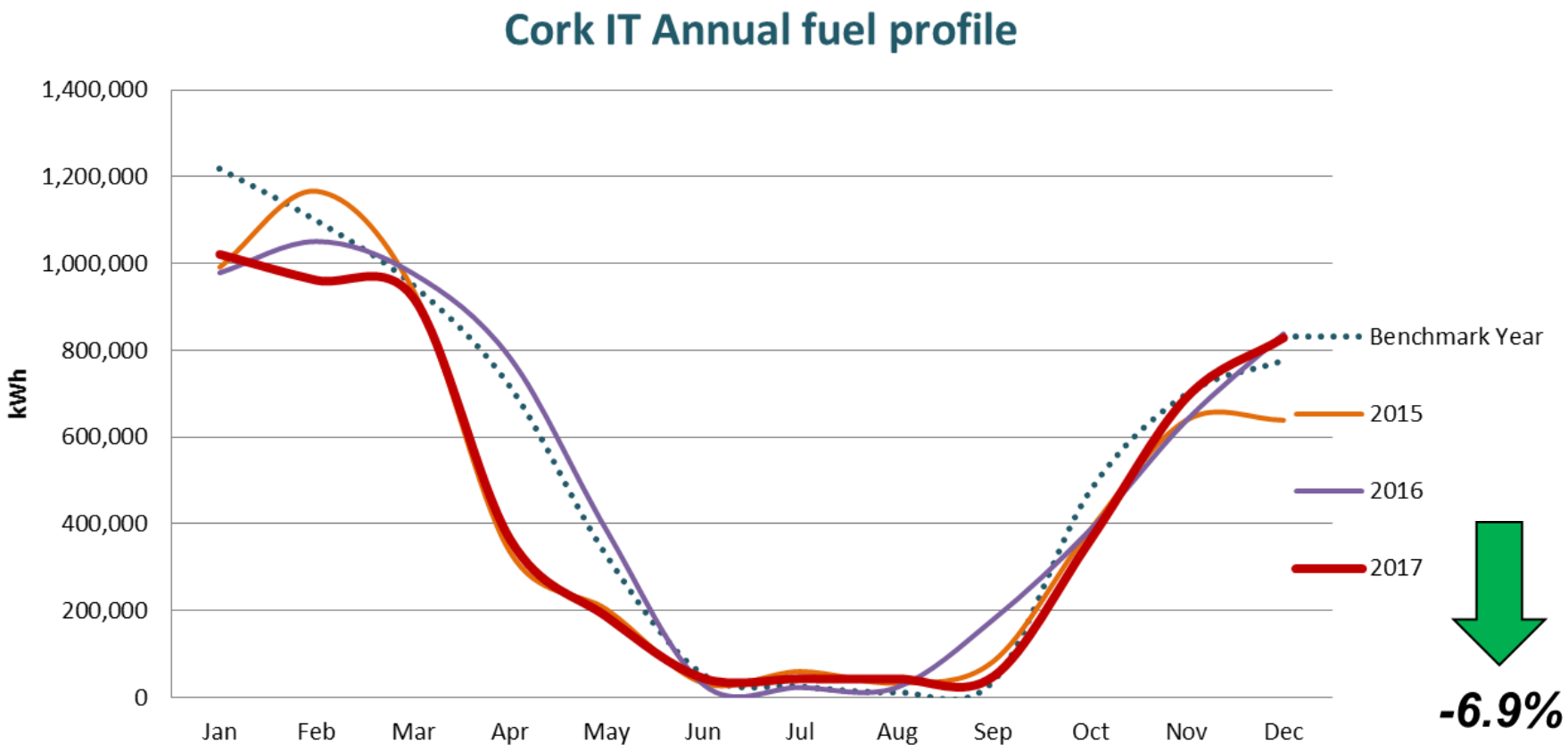
- In 2014 Cork IT partnered with the OPW to introduce the Optimising Power at Work Programme to promote and achieve best practice energy efficiency on site.
- 2014 will be used as the baseline year for measurement of energy performance.
- Total Electrical Consumption in 2014 was 5,633,834 kWh
- Total Gas Consumption in 2014 was 6,397,376 kWh
- Total Electrical Consumption in 2017 was 5,369,367 kWh (5% below Baseline year)
- Electrical Saving in 2017 was 264,476 kWh
- Total Gas Consumption in 2017 was 5,516,468 kWh(14% below Baseline year)
- Gas Saving in 2017 was 880,908 kWh
- **Total Energy Saving in 2017 was 1,145,375 kWh(9.5**% below Baseline year)

OPW – Energy Awarness Partner (Electricity)



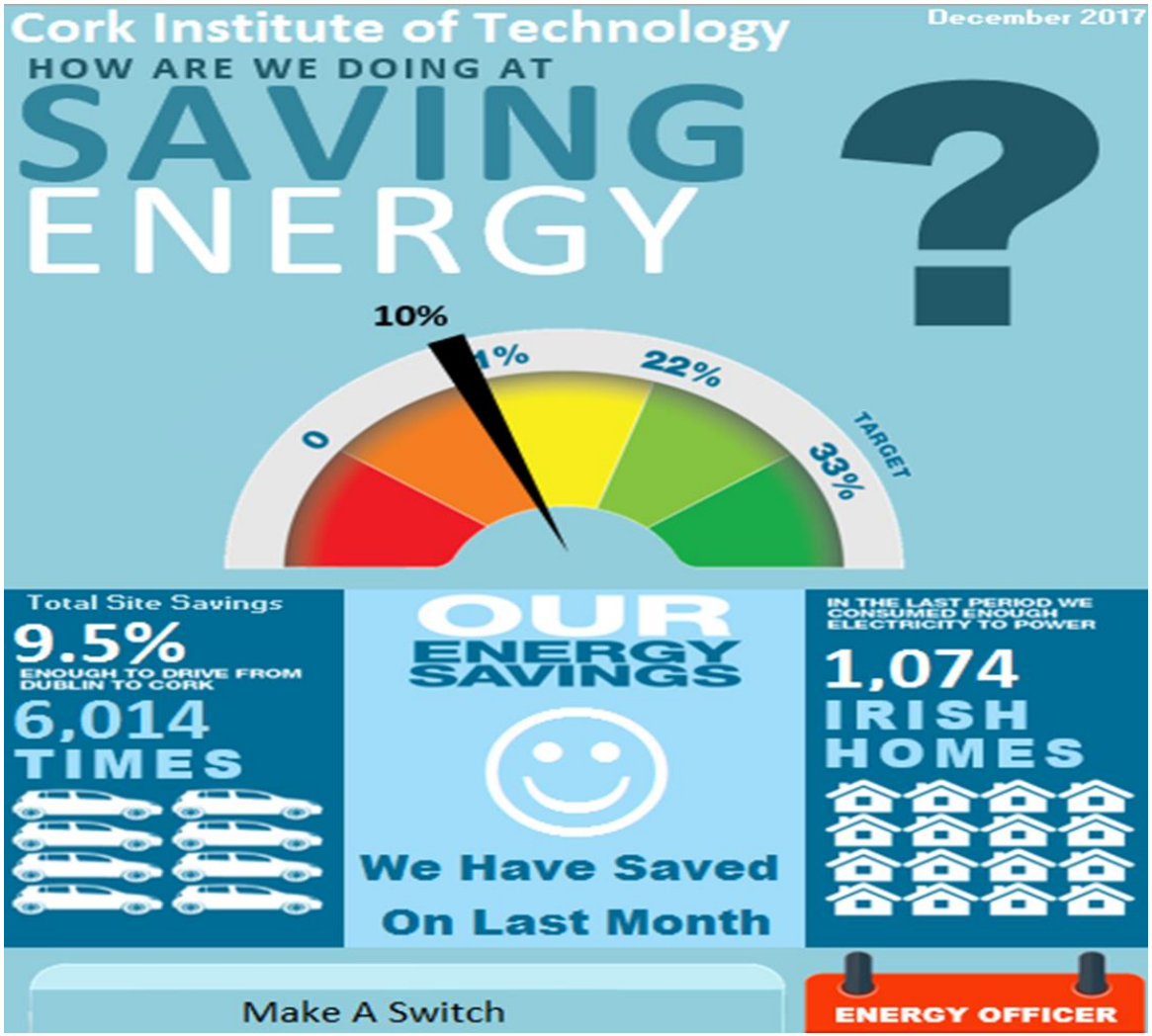
Monthly comparison data shows usage in December 2018 **decreased by 12% or 59,456kWh** against December 2014. Compared to 2014, annual electricity consumption on site has **decreased by 264,467kWh or 5%** over the last 12 months.

OPW – Energy Awarness Partner (GAS)



Monthly comparison data shows usage in December 2018 **increased by -7% or -51,994kWh** against December 2014. Compared to 2014, annual gas consumption on site has **decreased by -880,908kWh or 7%** over the last 12 months.

OPW – Energy Awarness Partner (Savings)



Implement – Energy Awareness Day
Energy Stands on the Day (1)

Energy Management (Funding & Application)

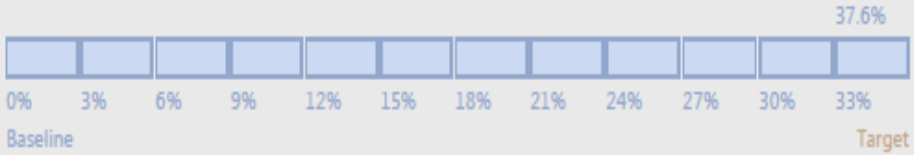
- SEAI - Grants
- OPW – Optimising Power @Work Program
- Buildings & Estates – Self Financing
- Departmental Maintenance Budgets – Green Design /Advisory
- Research Grants – B&E internal partner with NIMBUS Research Centre. Working on Horizon 2020 / Topaz energy related projects.
- External Energy Research Partners – UTRC (District Heating Program)
- Ensuring green design & procurement at all levels /stages across all Maintenance / Capital Projects within the Institute.

SEAI – Monitoring & Reporting Cycle 2015

Since Baseline to 2016

Energy Savings: 37.6% lower

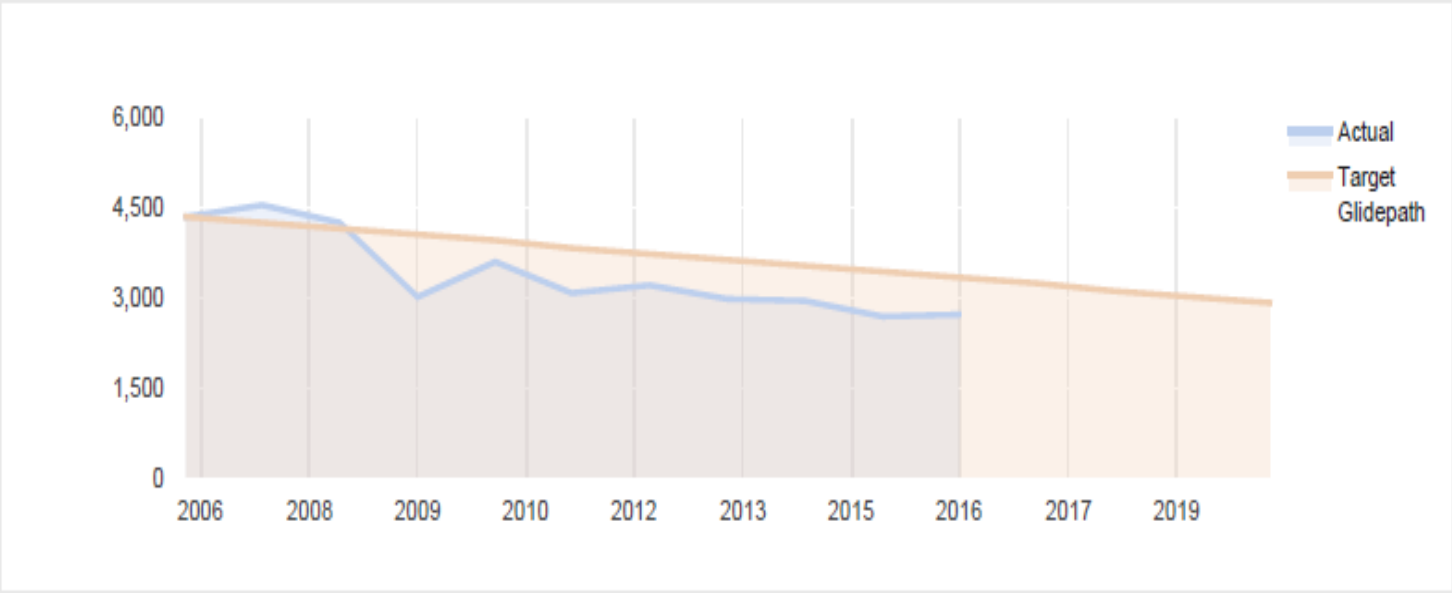
Change in Energy Consumption: 5.7% lower



Energy Performance Indicators - 2016

2016 EnPI = 2,722 kWh / FTE Students

Target EnPI = 2,921 kWh / FTE Students



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Thank you.
Any questions?