How to Choose the Right Technology For Your Business

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Date: 16 February 2016

Average life-spans for selected energy-related capital stock

Equipment	Indicative life expectancy if installed in 2016							
	2016	2020	2025	2030	2035	2040	2045	2050
HTHW Boiler								
LTHW Boiler								
Fuel distribution system								
Chiller								
Cooling towers								
Heat exchangers								
Pipework systems								
Air handling								
Controls								
Large motors								
CHP Units								
Lighting								
Building insulation								
Windows								

80% CO_2 free

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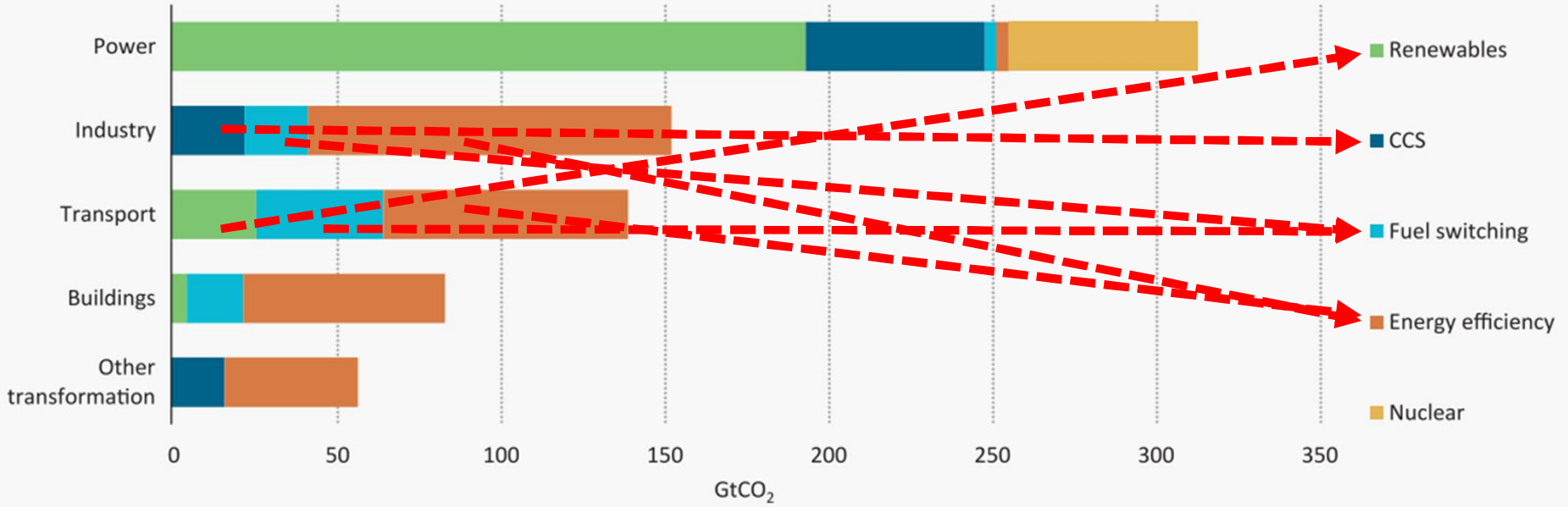
IEA: Towards 2050 to reach 2 ° C

Figure I.1 Cumulative CO_2 reductions by sector and technology in the 2DS to 2050



Key point *A portfolio of low-carbon technologies is needed to reach the 2DS; some solutions will be broadly applicable, while others will need to target specific sectors.*

Source: IEA Energy Technology Prospective 2015

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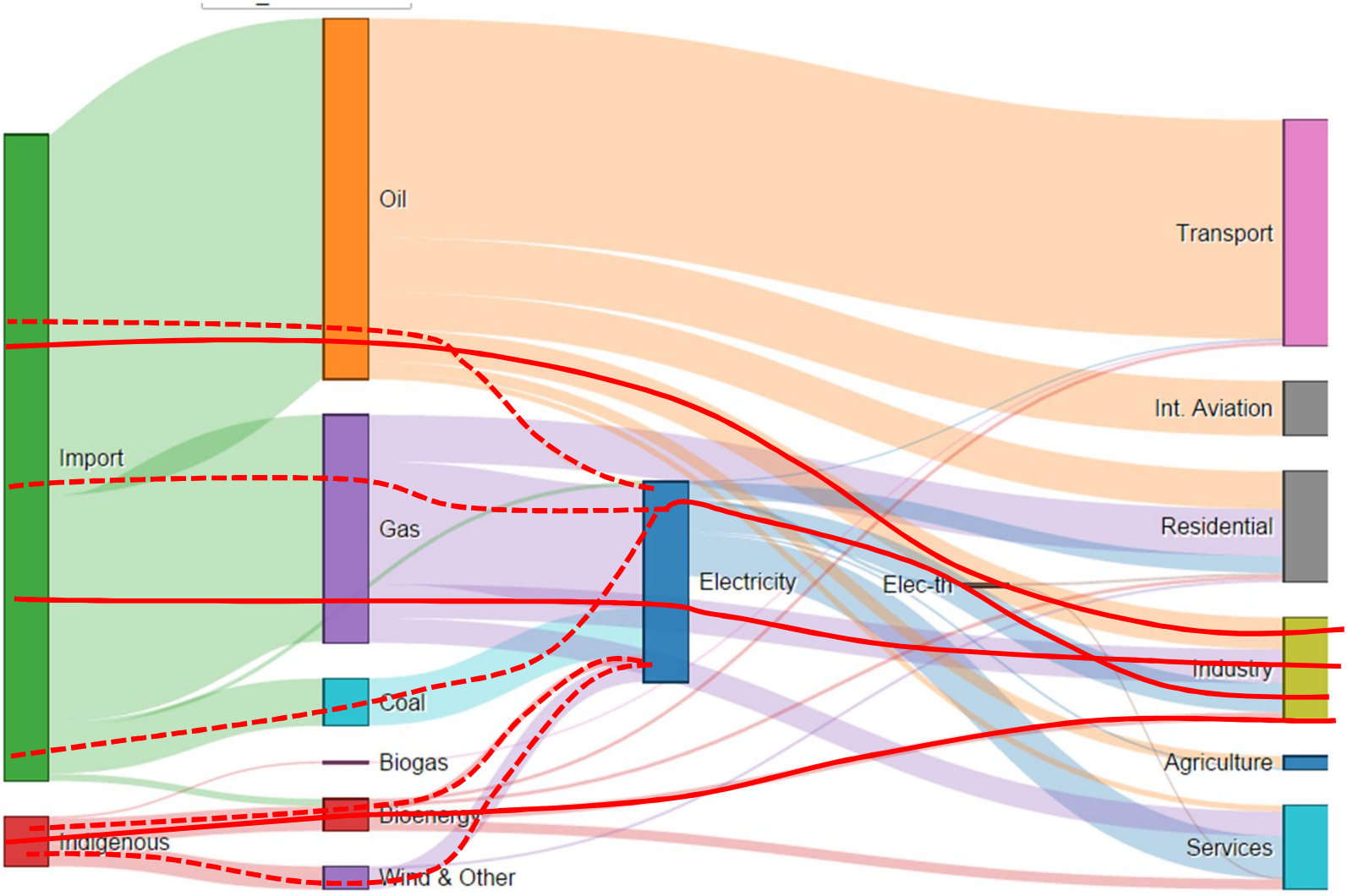
Ireland in 2050, Business as Usual



TFC
170
TWh

Elec
17%

Source: ucc.ie/en/energypolicy/irishtimes/

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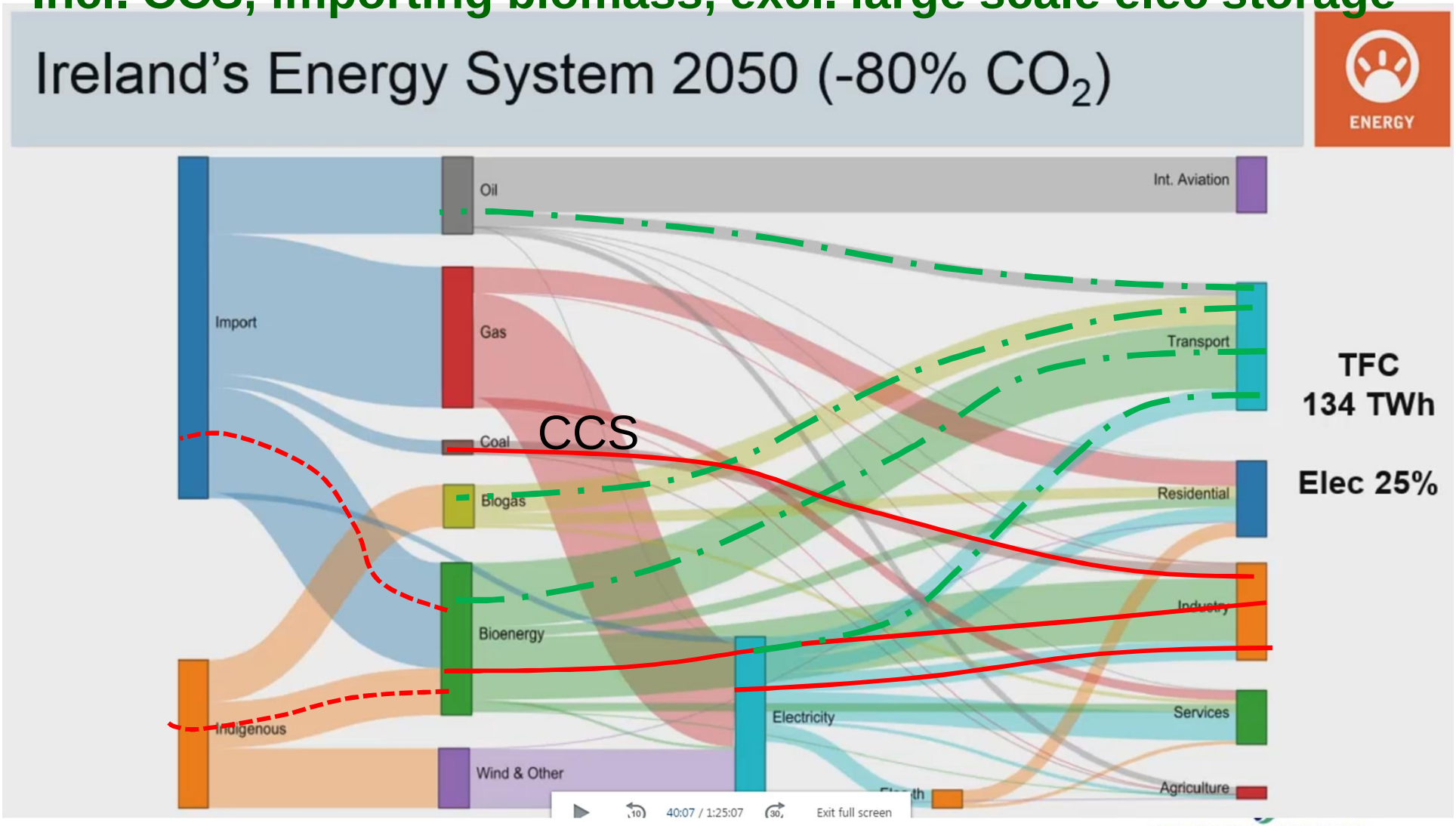
Ireland in 2050, CO2 minus 80%

Incl. CCS, importing biomass, excl. large scale elec storage



Source: ucc.ie/en/energypolicy/irishtimes/

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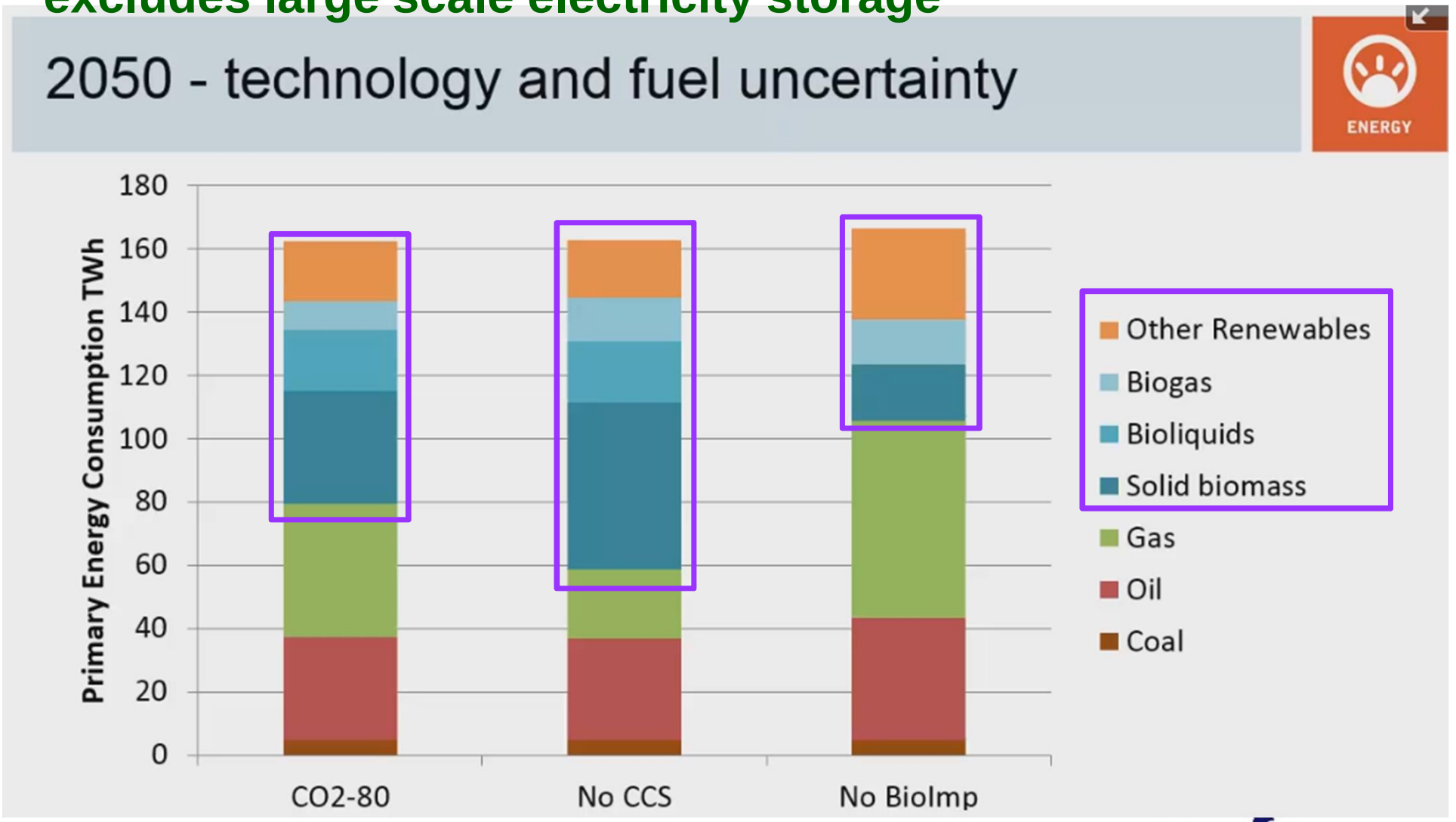
Ireland in 2050, CO2 minus 80%

excludes large scale electricity storage



Source: ucc.ie/en/energypolicy/irishtimes/

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Primary Energy past, present, future

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2.750	2.682	2.670	2.566	2.462	2.354	2.332	2.361	2.223	2.289	2.233

The forecast and actual values for 'Imported Electricity' are:

	2013	2014	2015	2016	2017	2018	2019	2020
Forecast	2.170	2.132	2.093	2.054	2.016	1.977	1.939	1.900
Actual	2.233	2.18						

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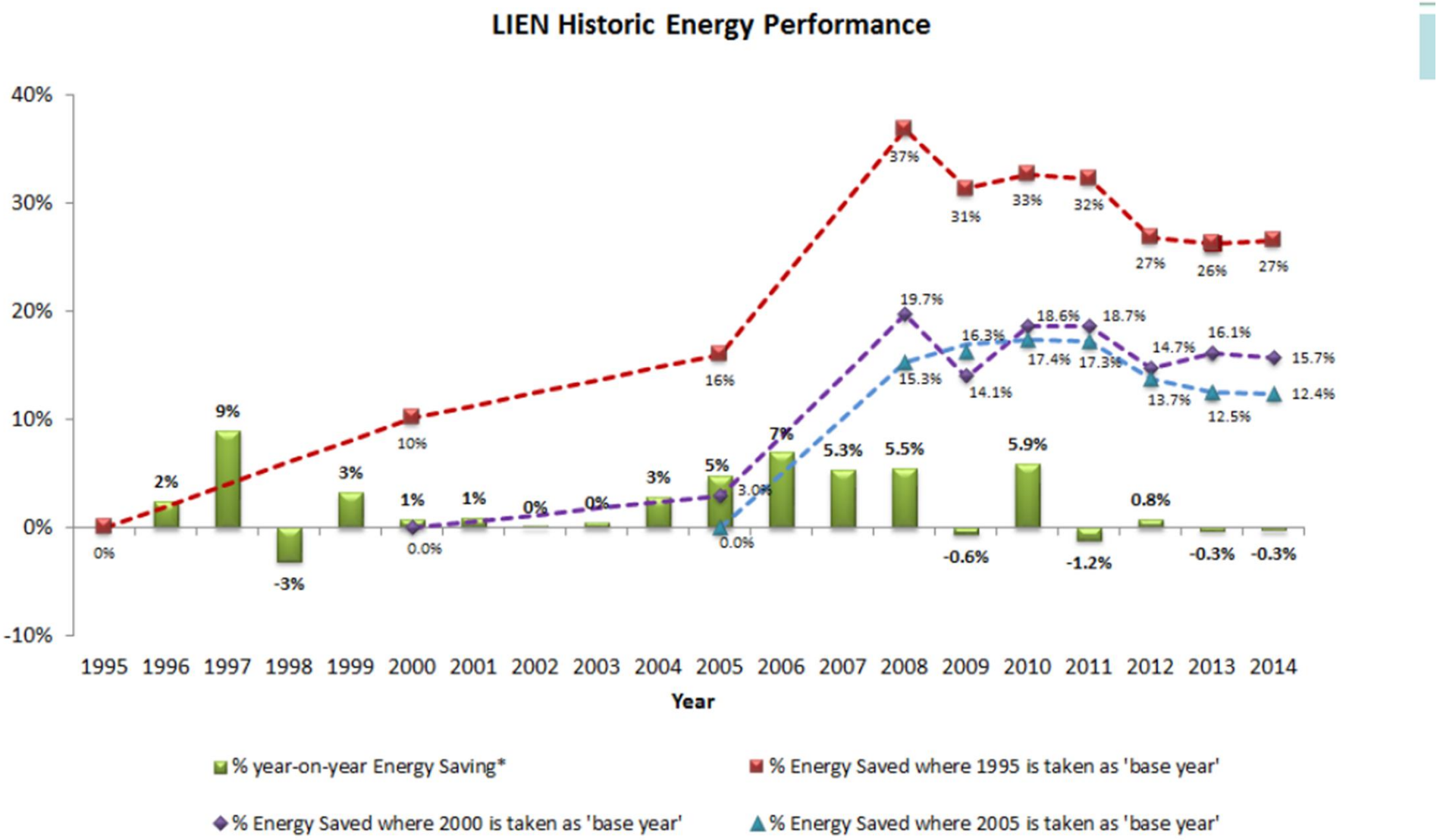
LIEN Historical Performance



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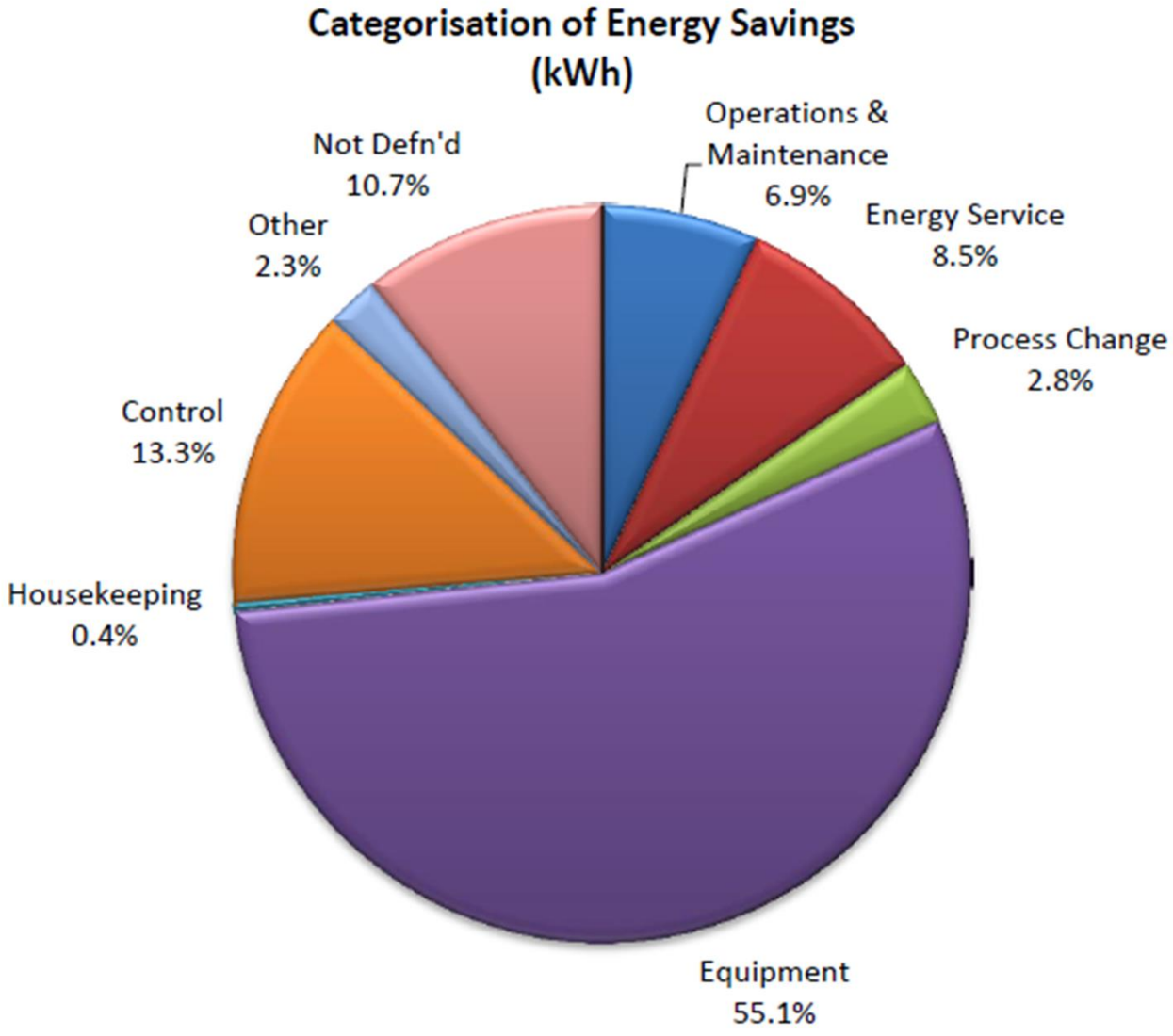
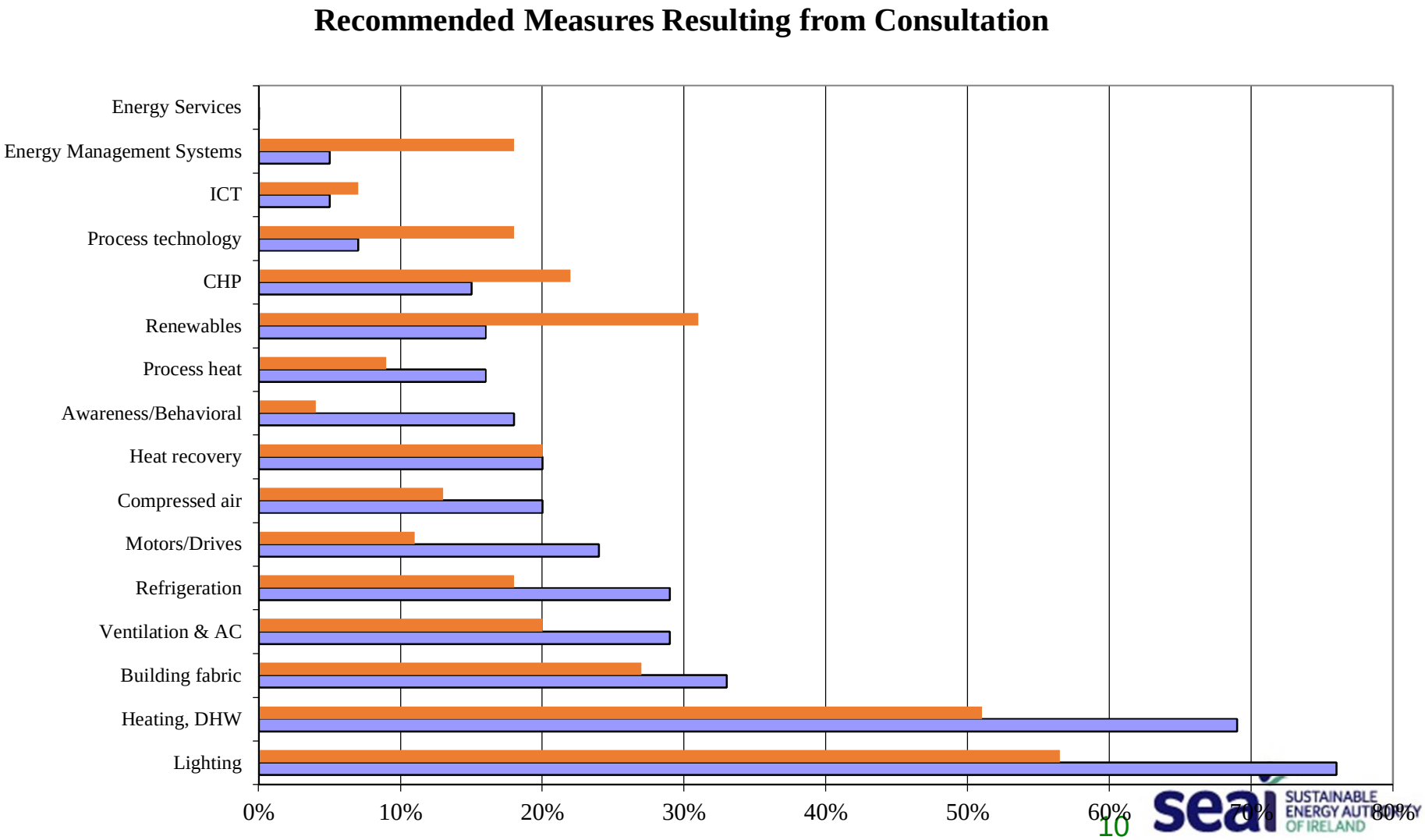
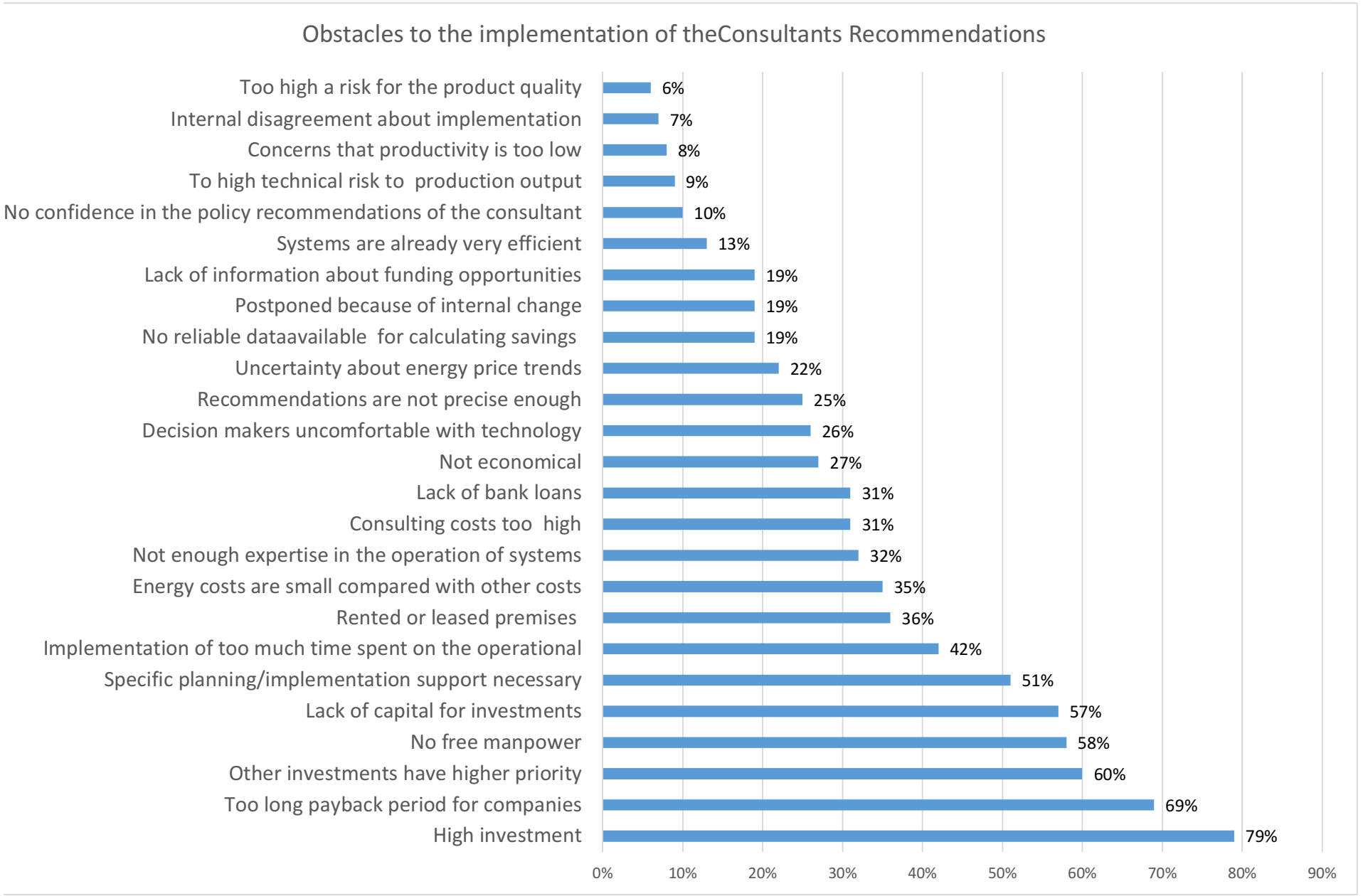
Large Industry: Savings by kWh



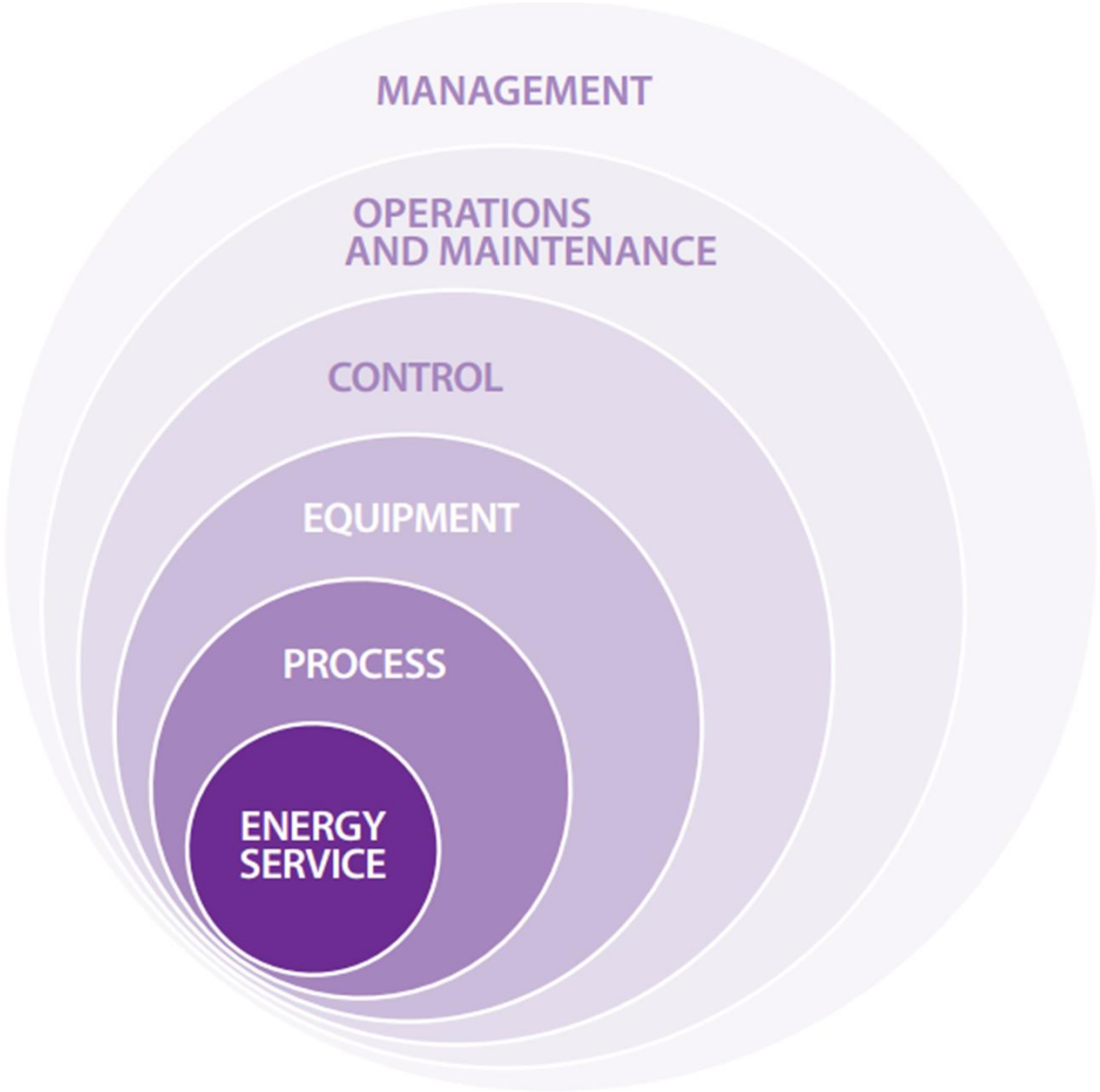
German Energy Assessments Recommended Measures (SMEs)

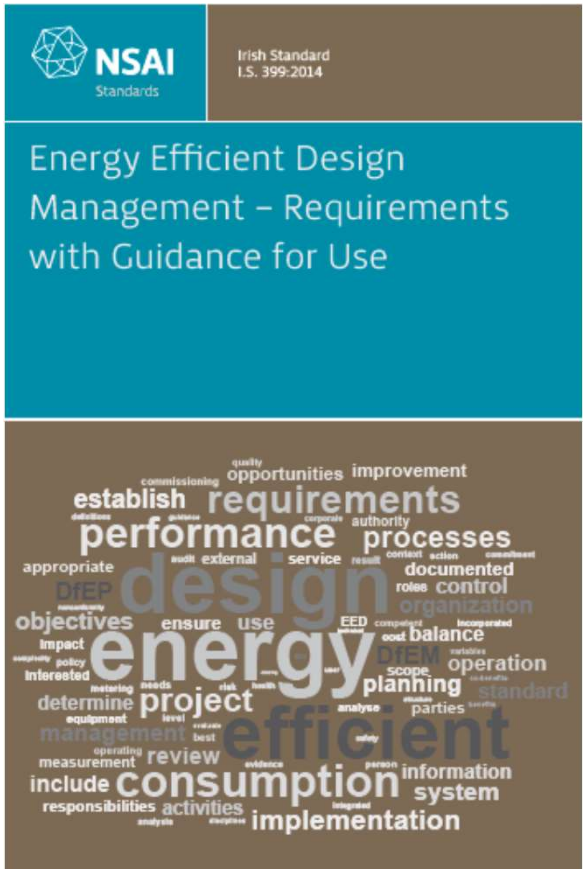


Obstacles :Germany (SMEs)



Venn diagram :energy ‘layers’





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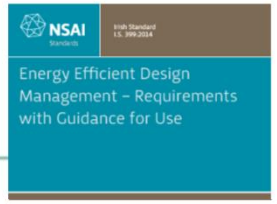
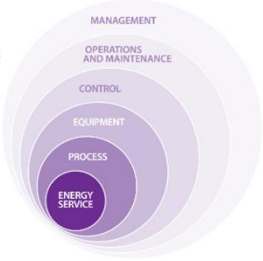


Layer	Definition	Lighting Example
Energy Service	The desired outcome that necessitates the consumption of energy	Luminance level for office tasks
Process	The means by which the energy service is delivered	Natural/artificial lighting
Equipment	The constituent parts of the process	Fixtures, shading devices, sensors
Control	The control applied on the above equipment	Automation systems, switches
Operation and Maintenance	The on-going operation and maintenance applied to the equipment	Optimal replacement of light tubes, alignment to evolving occupancy patterns
Management	The on-going management of the system including general housekeeping, logging, etc	Awareness campaigns, EnPI's



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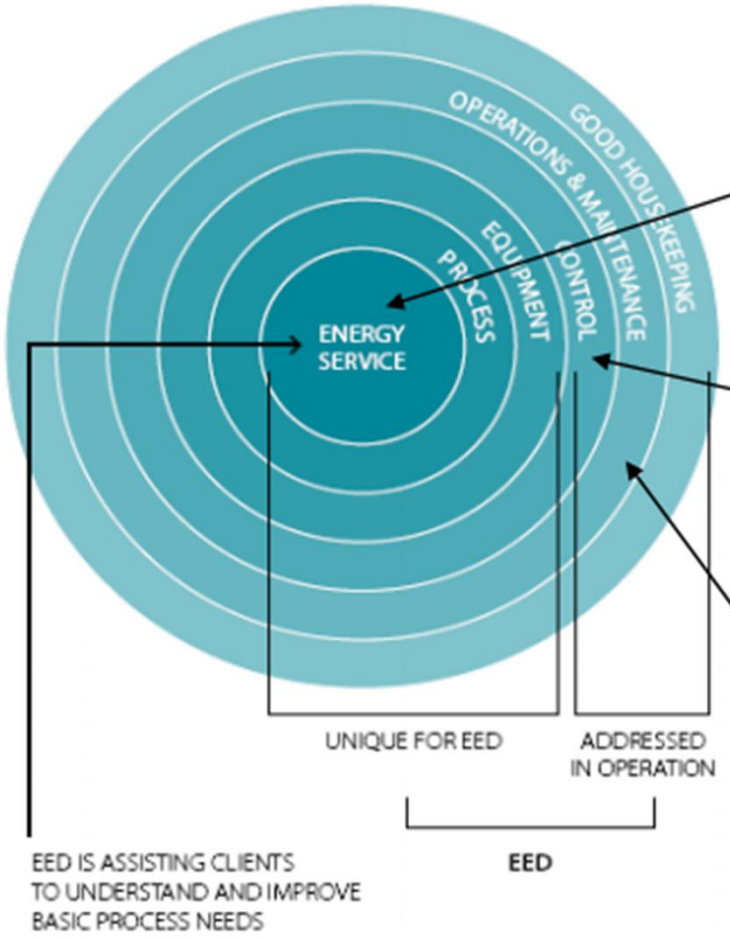
HVAC

Top 3 Opportunity Categories

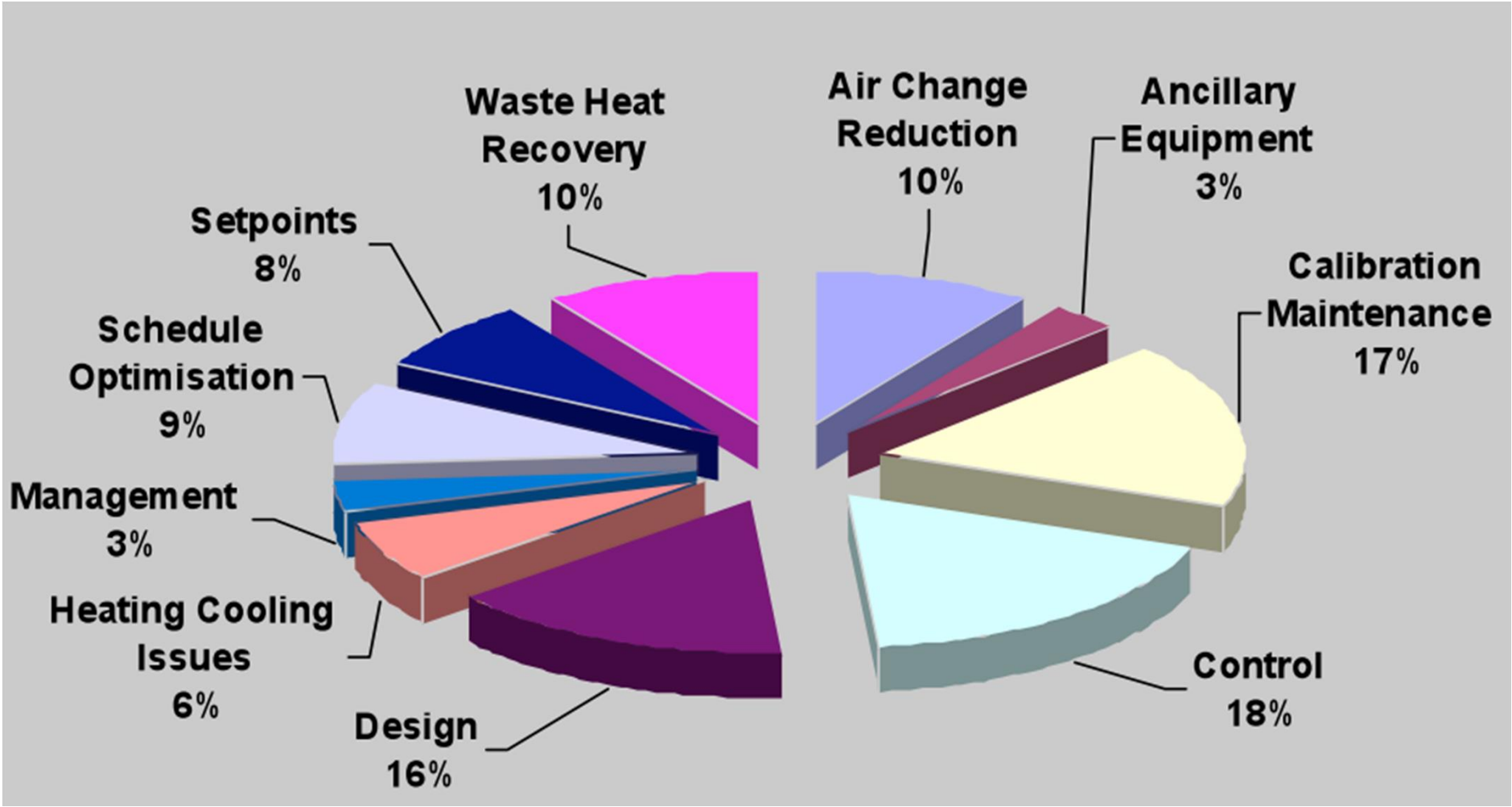


Understanding of Energy Service Requirement

Optimum HVAC Control

Efficient Operation and Manintenance

HVAC Opportunities Frequency



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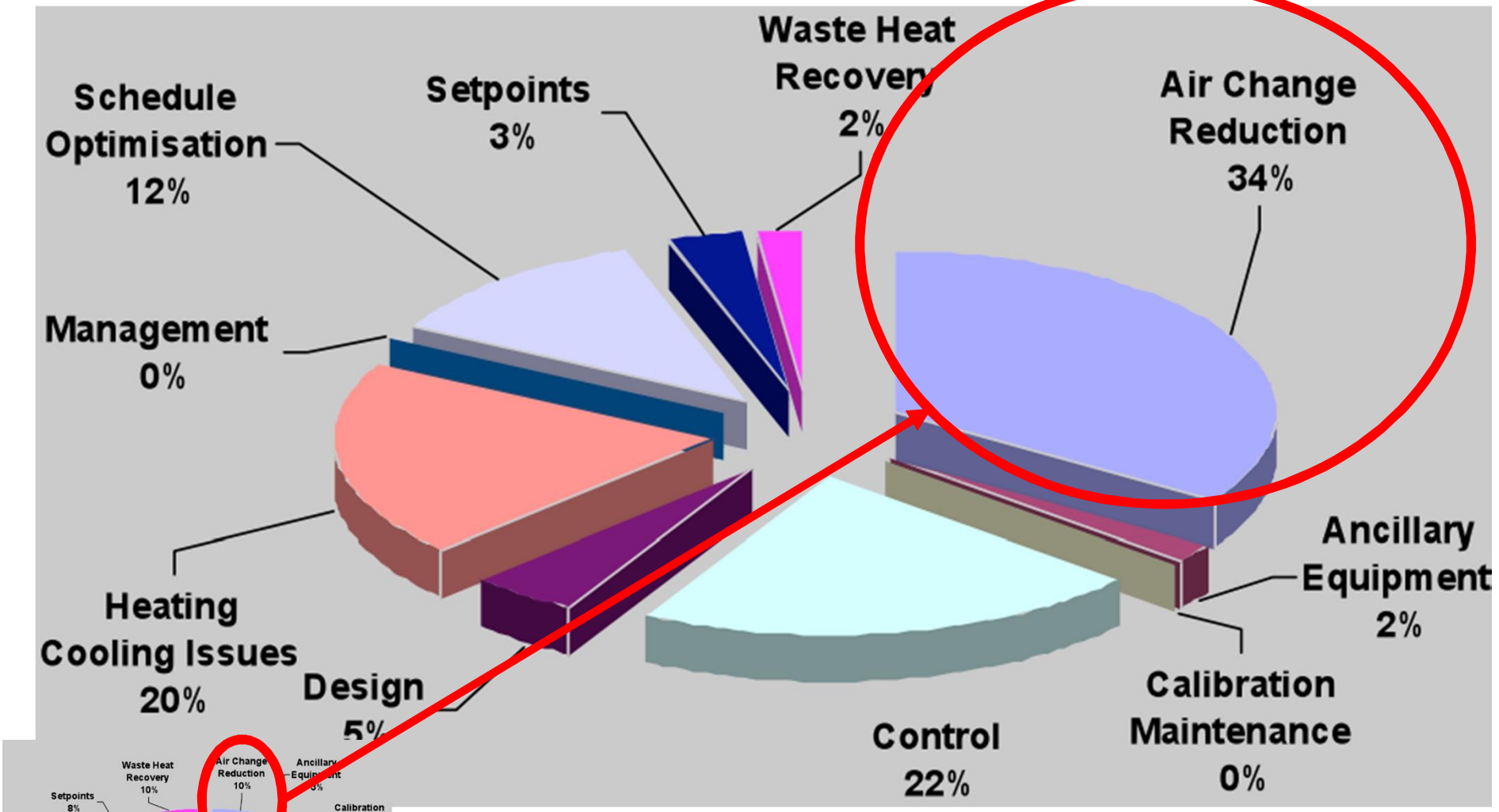
Opportunity Savings Potential



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HVAC –Air Change Reduction

- Reduce air changes to reflect space requirements
- Reduce air changes from 100% during periods of low occupancy
- Install suspended ceiling to reduce space volume and thus required air flow rate
- Review calculations of room volumes (remove equipment volume from overall volume)

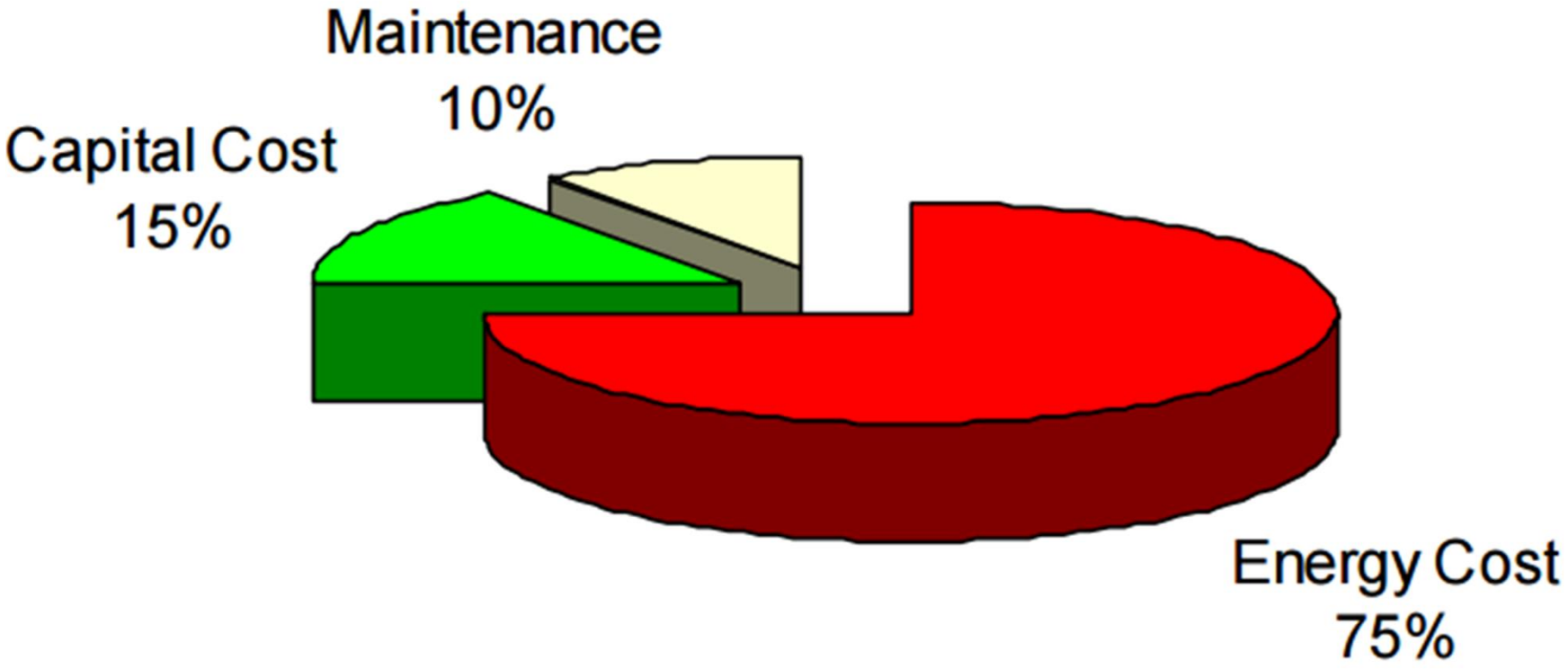
HVAC-Heating and Cooling

- Repair Passing Heating Coil Valve
- Repair Passing Cooling Coil Valve
- Repair passing reheat batteries
- Enable floating AHU supply set point
- Supply set points conflicting with room set points

HVAC-Controls

- Tune control valves to prevent hunting
- Enable Enthalpy Control for Mixing Box to enable free heating and free cooling
- Disable Space Humidity Control
- Enable floating supply temperature set-point
- Relax close control on temperature, humidity and airflow during low occupancy periods
- Install temperature control for exhaust fans to automate control
- Install VSD on variable-load fans
- Review control of reheat batteries

Compressed Air: 10 Year Cost View



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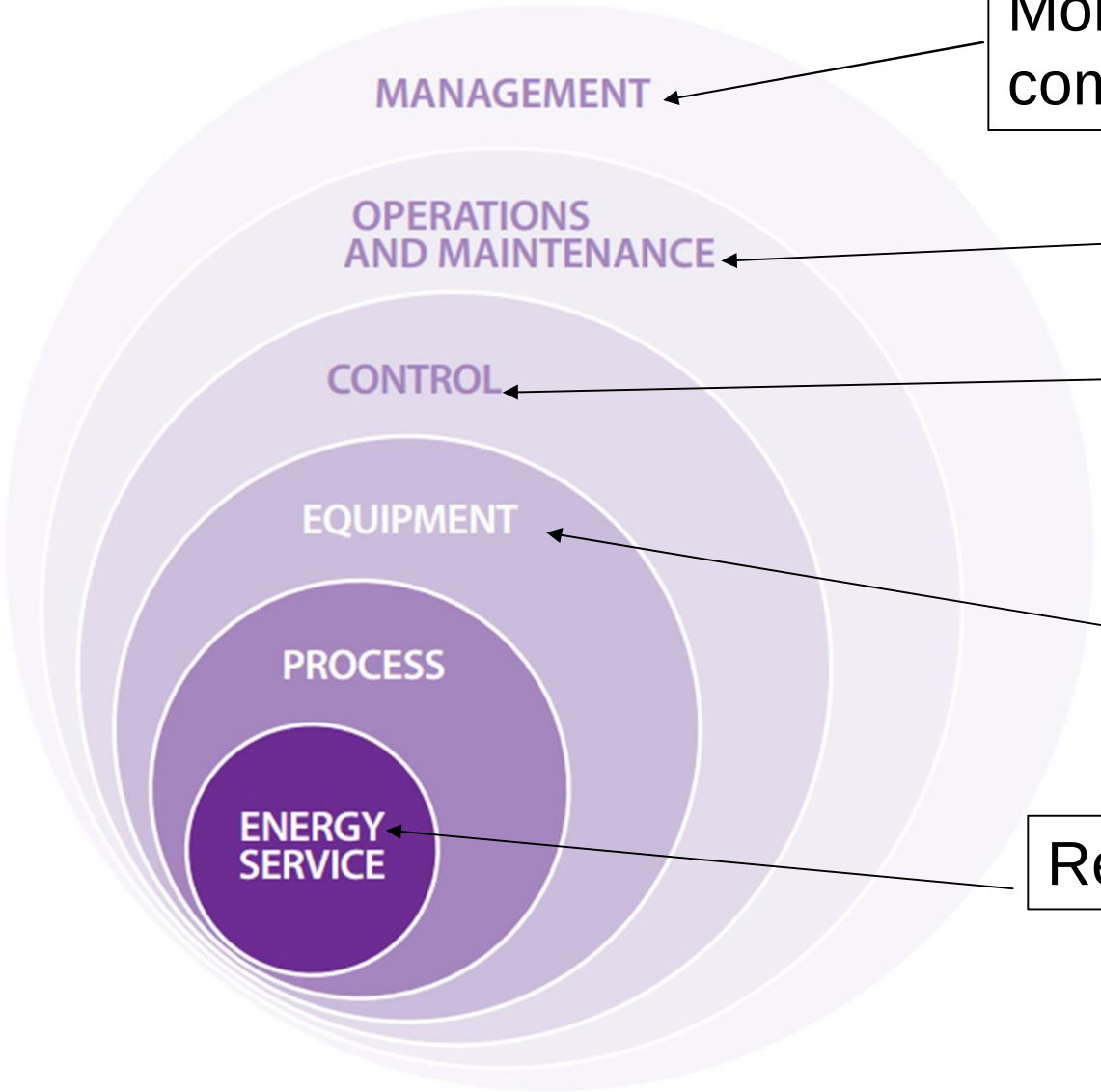
Compressors Venn Diagram



Monitor EPI's for compressor energy use

Leak detection and repair

Sequence multiple compressors

Install compressor control system

Reduce delivery pressure

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Energy usage in Compressed Air across six companies:

Energy usage in Compressed Air across six companies:

- Total energy usage on compressed air for the companies was approximately 50,000,000 kWh of electricity annually.
- Compressed air can consume as much as 5 – 50% of a companies' total energy usage.
- Average spend on compressed air for the six companies was in the order of €1,000,000 per annum.
- Total Carbon footprint for the group of approx 36,000 Tonnes of CO2 per annum.

Opportunities identified at 6 companies

- Potential savings of 16,142,225 kWh, equal to 12,332 Tonnes CO2.
- Aggregate savings of 30% if all projects were implemented.
- Payback periods varied between 0 - 4 years.
- Best practice identified.

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Summary of opportunities-1

Recommendations	Estimated Annual Savings			Estimated Cost	Payback Period
	(€)	kWh	CO2 (tonnes)	(€)	(years)
Install Moisture Traps	€ 500	5,319	3	€ 200	0.4
VSD Compressor	€ 30,000	319,149	192	€ 170,000	5.7
Base loss reduction	€ 21,000	223,404	134	€ 1,000	0
Misuse reduction	€ 5,000	53,191	32	€ 5,000	1
Generation pressure reduction	€ 3,000	31,915	19	€ 7,000	2.3
Waste heat recovery dryer	€ 9,500	101,063	61	€ 50,000	5.3
Interlink Compressor systems	€ 120,000	1,500,000	900	€ 500,000	4.2
Eliminate pressure drop	€ 20,000	250,000	150	€ 30,000	1.5
Fit dewpoint sensing to air dryers	€ 85,000	1,062,500	638	€ 50,000	0.6
Install compressor control systems	€ 140,000	1,750,000	1,050	€ 250,000	1.8
Improve dryers	€ 50,000	625,000	375	€ 200,000	4
Pressure reduction, Zone Isolation, Sequencing of compressors	€ 5,000	48,000	31	€ 5,000	1
Decommission the Air Compressors	€ 531,300	5,313,000	4,569	High/Medium	

Summary of opportunities-2

Decommission the Air Compressors	€ 331,500	3,315,000	4,369	High/Medium	
Dedicated 1.5 bar system for instrumentation	€ 26,536	265,363	228	High	
Draw in fresh air from outside	€ 606	6,057	5	Medium	
Install new Dryer	€ 6,297	62,970	54	Medium	
Stop Compressor cutting in	€ 29,025	290,254	250	Medium / Low	
Set compressor as lead compressor and stop other by fixing largest leaks in the distribution network	€ 50,200	502,000	432	High	
Set compressor as lead compressor and stop other by engaging in a leak reduction programme	€ 301,400	3,014,000	2,592	Medium	
Turn off one Compressor and integrate it into the system served by other incorporating optimal sequencing	€ 61,152	611,520	526	Medium	
Draw in Fresh air for 2 compressors	€ 4,301	43,008	37	Low	
Remove Refrigerated Dryers	€ 6,451	64,512	55	Low	

Current Totals	**€5,000,000**	**50,000,000**	**36,000**	**30%**
Savings Potential Totals	**€ 1,506,268**	**16,142,225**	**12,332**	

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Biomass CHP: Munster Joinery

Location:
Lackacross, Ballydesmond, Cork
Project start date:
May 2005
Commission date:
October 2008
Owner:
Munster Joinery
Project capital costs:
€10m
Engineering, design and project management:
Fingleton White & Co. Ltd.

Technical details:
13.8 MW fuel input
12 MW steam capacity
3 MW maximum electrical output or 24.6 GWh/yr
9 MW maximum thermal output or 73.8 GWh/yr

Fig 1 – Controlled extraction turbine

Fig 4 – Boiler house

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300 kW Fuel Cell CHP: London

Source:

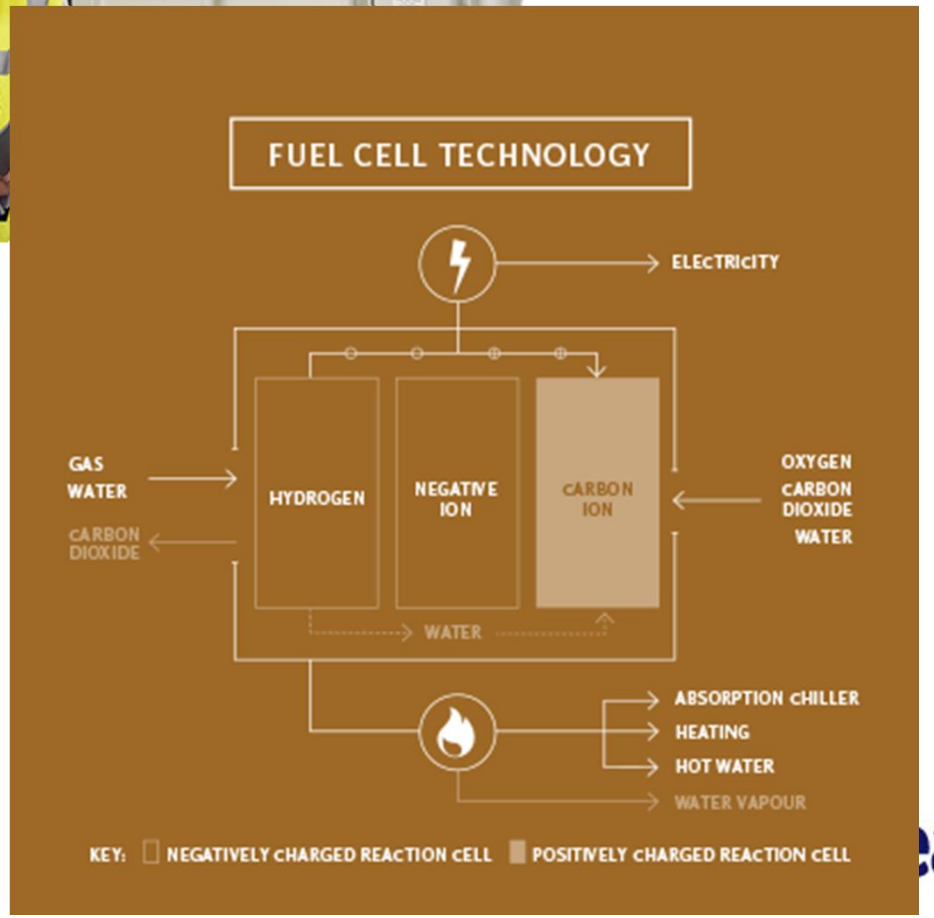
HILSON MORAN

The Fuel Cell at 20 Fenchurch Street generates 300kW of low carbon, low emissions electricity

The Fuel Cell is integrated into a Combined Cooling, Heat & Power (CCHP) configuration to efficiently support the building's essential services

Conservatively, the Fuel Cell will reduce the carbon dioxide emissions of the building by at least 270 tonnes per annum

Innovative Fuel Cell technology supports the Mayor of London's policies on climate change mitigation



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9 MW Photovoltaics, Cement Plant, UK

Hanson Cement’s Ketton, Rutland, UK

CASE STUDY

Munster Joinery

Project Economics

Total Project Cost	€6,116, 000
SEAI Grant	€1,005,763
Annual Savings for Munster Joinery	Approximately €150,000*

*depending on the price of fossil fuels

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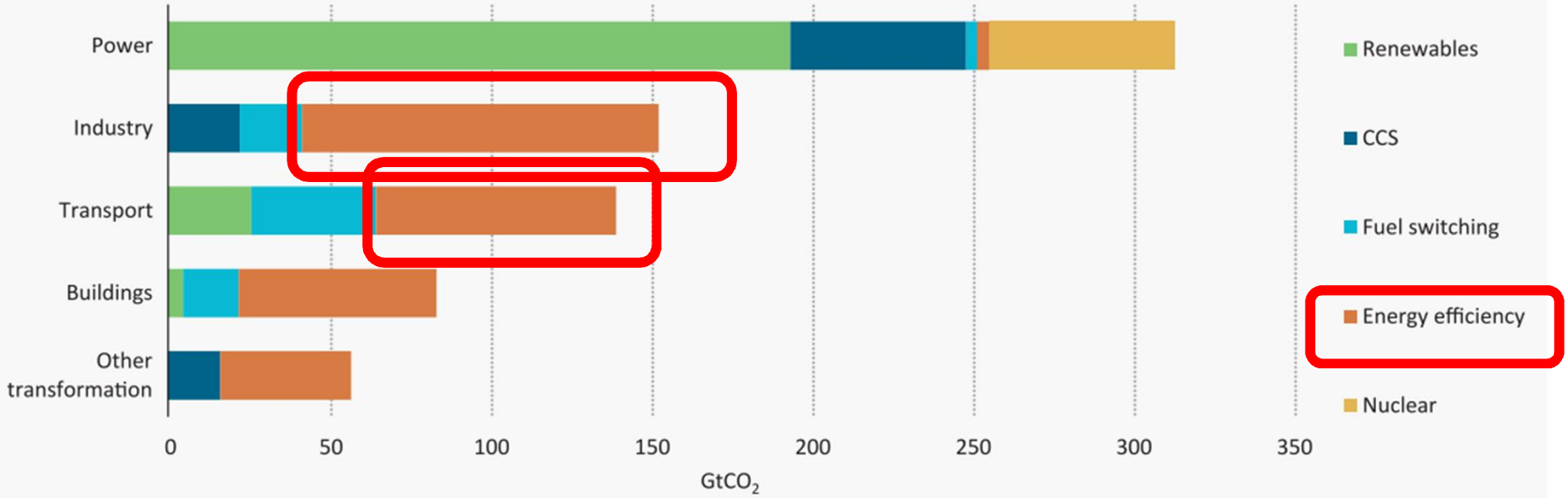
Energy Efficiency

Figure I.1 Cumulative CO_2 reductions by sector and technology in the 2DS to 2050



Key point *A portfolio of low-carbon technologies is needed to reach the 2DS; some solutions will be broadly applicable, while others will need to target specific sectors.*

Source: IEA Energy Technology Prospective 2015

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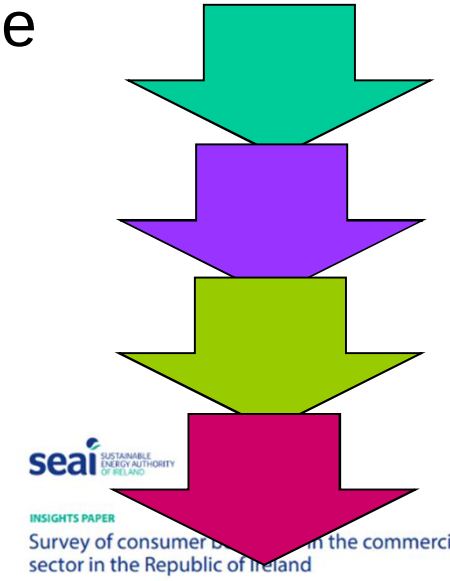
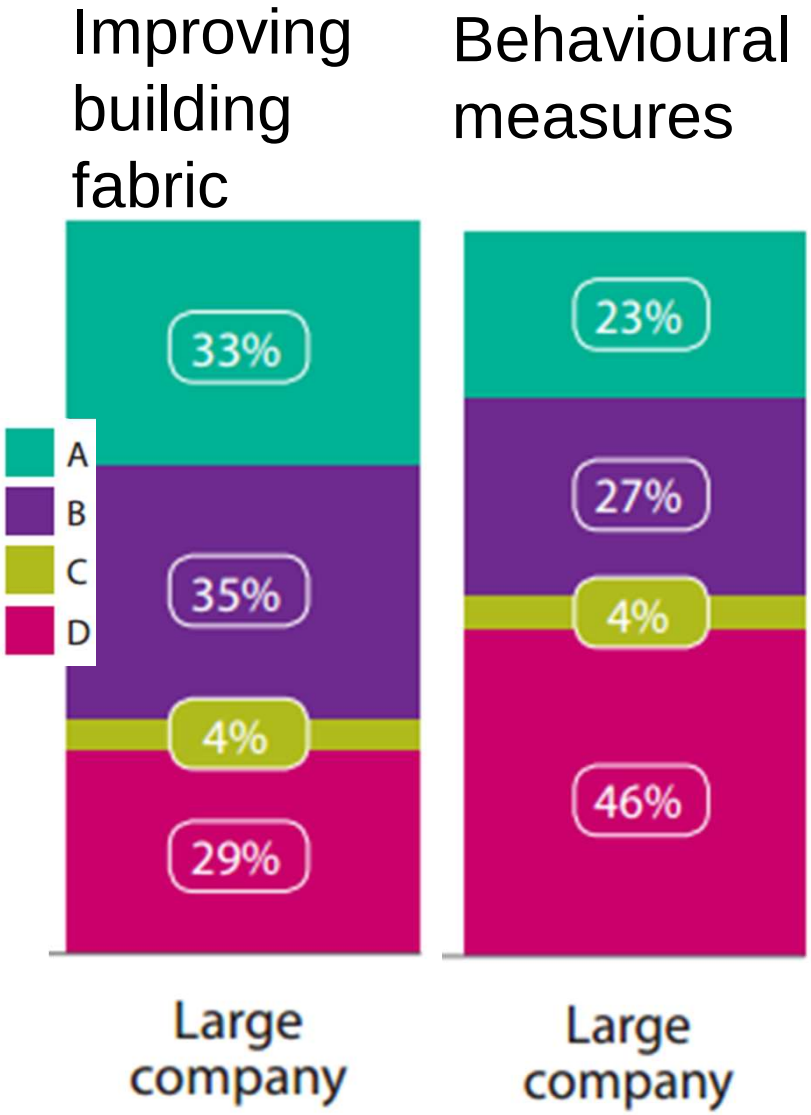
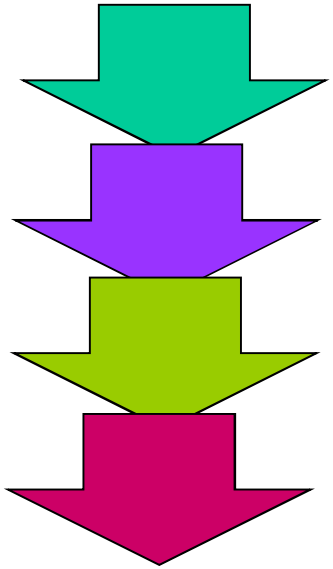
Consumer Behaviour: Commercial Bldgs

A. Do not think they need to reduce energy use (not a top priority)
B. Think they have already put in place all possible measures
C. Think they can reduce energy use but they need more information
D. Consumers who consider energy efficiency options.



Findings





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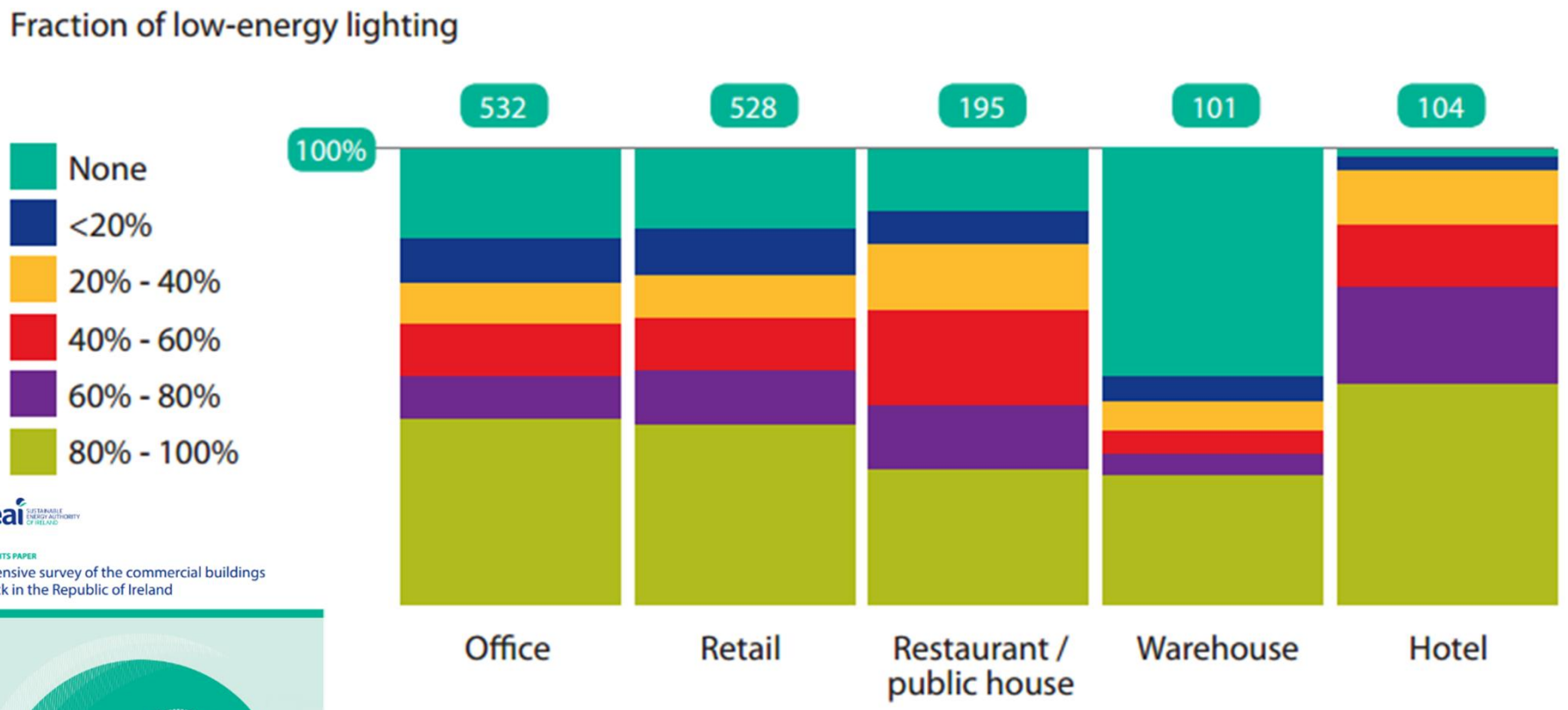
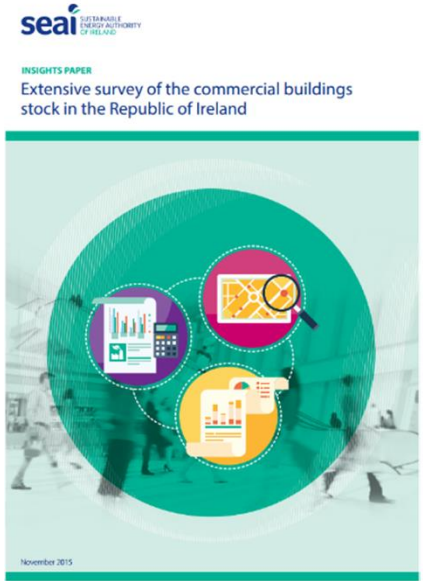
Commercial Bldgs: Summary

- ~ 2/3 do not currently consider energy efficiency measures
- the majority of these consumers state
  - either that they do not consider energy use a top priority,
  - or that they have already implemented all possible measures.
- ~ 3% state that the reason they have not investigated energy efficiency is because they need more information.

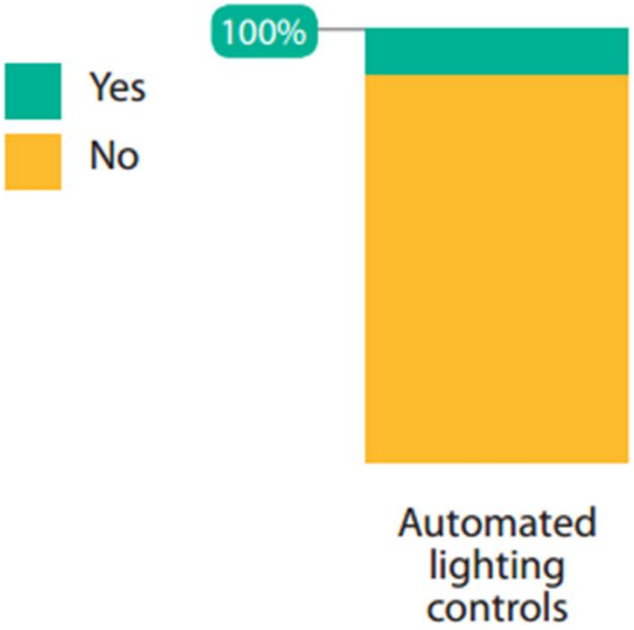
Lighting-Fraction of Low Energy



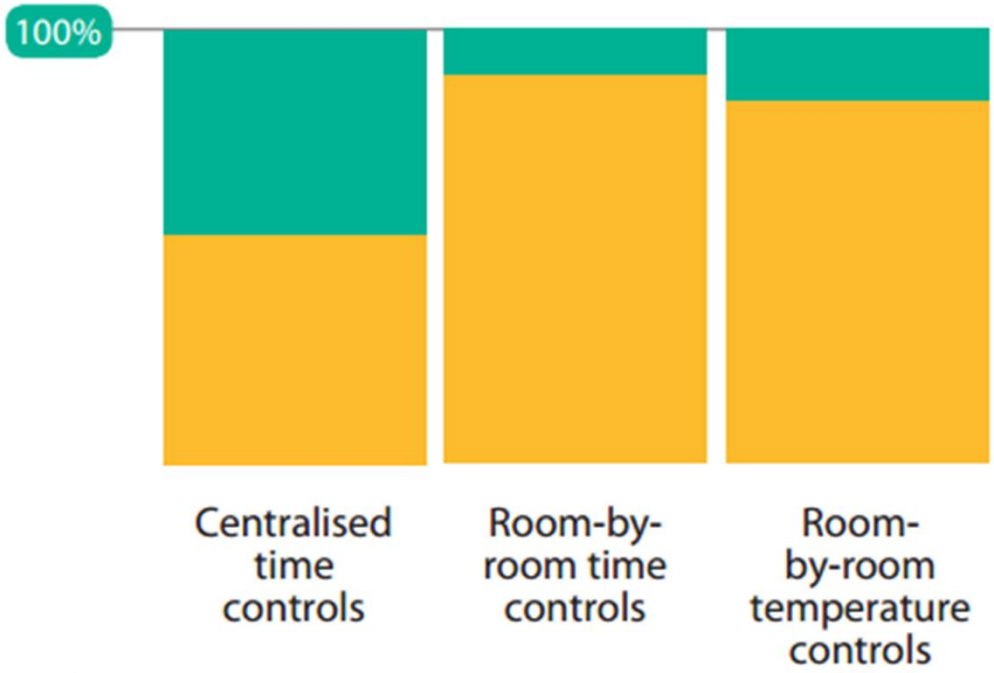


Heating & Lighting Controls: Survey

Lighting controls



Heating controls



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