

# Energy efficiency and public procurement, practical examples of M&V

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CA EED Vienna 22<sup>nd</sup> March 2018



# Agenda

- Context – policy, legislation, governance
- Energy related procurement – as part of GPP
- What is M&V ?
- Examples of energy related procurement
- What next?
- Q&A

# Public Sector Energy Strategy

Published January 2017

- 42.5% RES-E by 2020
- 12% RES-H by 2020
- 10% RES-T by 2020

• 'Exemplary role' wrt RE: construction & renovation

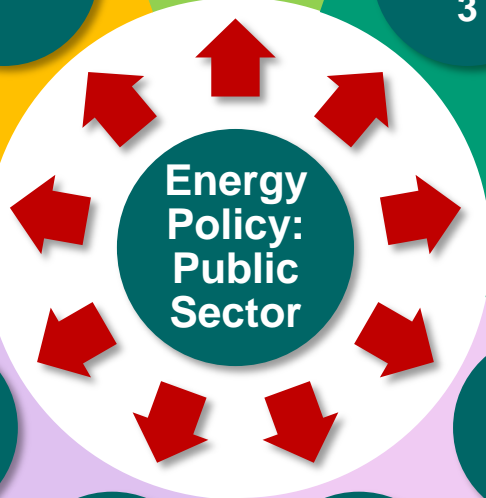
**NREAP**

**2015 IRL Energy Policy**

**NEEAP 1, 2 & 3**

- 33% by 2020
- 3,240 GWh by 2020
- 'Lead by example': EM

**SI 147 of 2011**



**SI 426 of 2014**

- 'Exemplary role'
- Buildings  $\geq$ A3
- EM practices
- Reporting to SEAI
- Energy Audits
- EE Procurement
- Energy Services

**Building Regulations**

**SI 2016**

- Triple E Register (procurement of equipment/vehicles)

• Technical Guide Part L

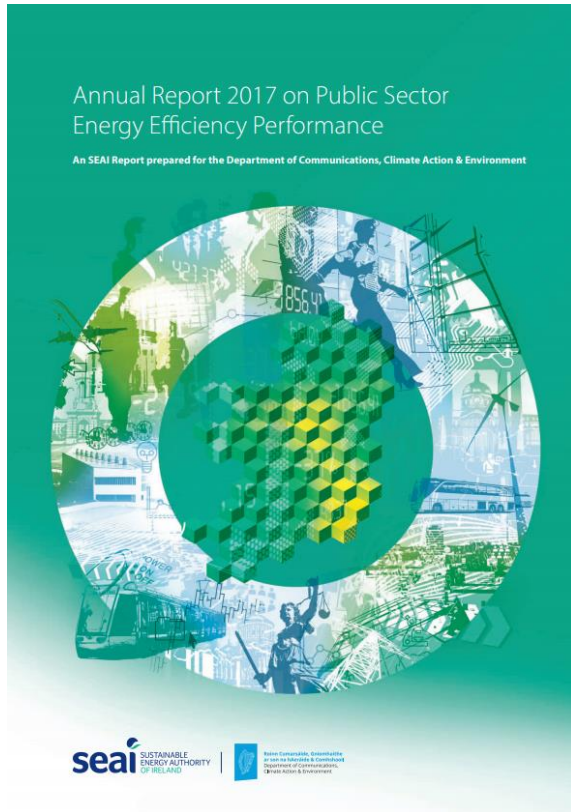
**EPBD**

**Green Tenders**

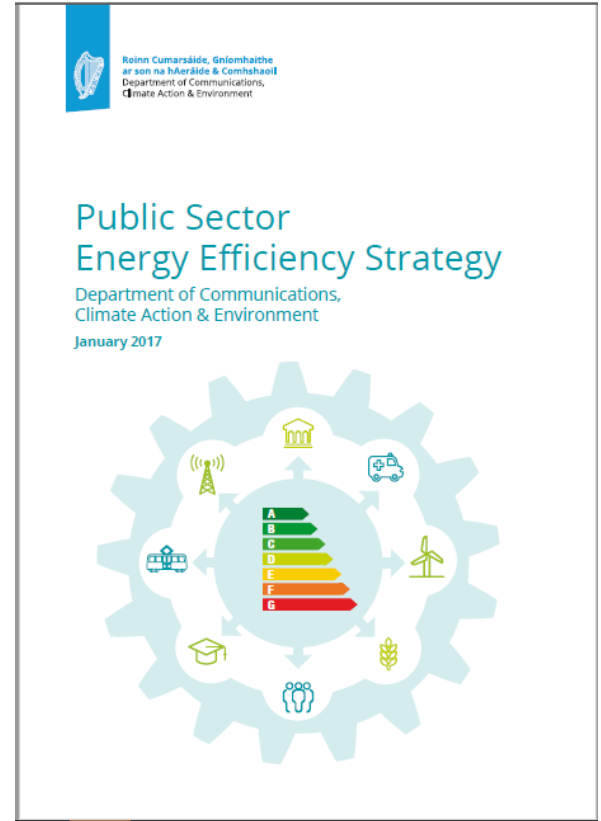
- Better procurement of energy supplies, EE & RE services, products & capital projects

- DEC > 500 m<sup>2</sup>
- July 2015: DEC > 250 m<sup>2</sup>
- 2018: "nearly zero energy"

# Drivers – 33% energy efficiency target and public sector energy efficiency strategy



EED  
NEEAP  
↓  
Two key documents



## Annual Report 2017 on Public Sector Energy Efficiency Performance

An SEAI Report prepared for the Department of Communications, Climate Action & Environment



**seai** SUSTAINABLE ENERGY AUTHORITY OF IRELAND

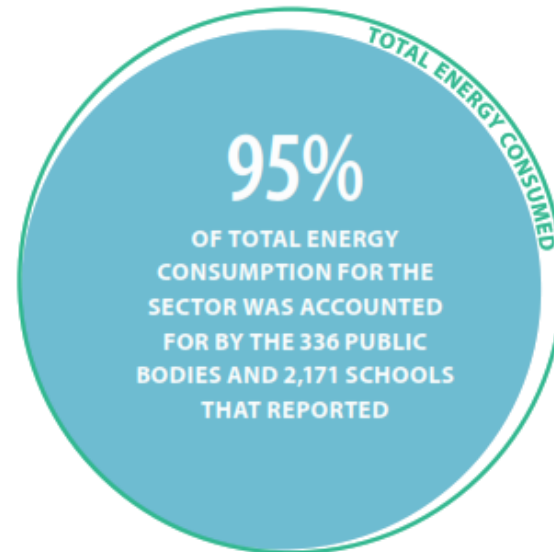
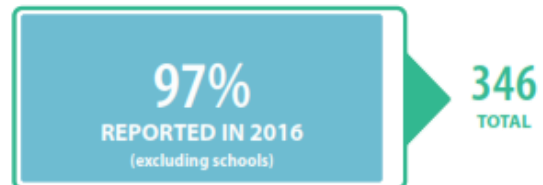


## Current Position

### ENERGY EFFICIENCY IMPROVEMENT



### PUBLIC BODY REPORTING RATE



- 1 Reporting by public bodies in Ireland is required under Regulation 5(4) of SI 426 2014. The number of public bodies that are required to report may change each year due to organisational changes in line with government policy and legislation.
- 2 338 public bodies attempted to submit reports but data for two of these was incomplete and is not included in this report.
- 3 An additional 208 schools attempted to submit reports but their data was incomplete and is not included in this report.

**seai** SUSTAINABLE ENERGY AUTHORITY OF IRELAND

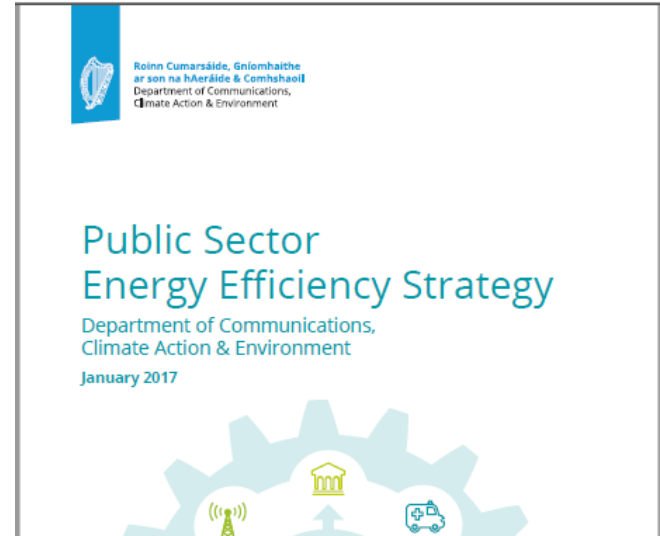
# Public Sector Strategy

- Led by Department of Communications, Climate Action and Environment
- User level
  - Energy Performance Officers (EPO) appointed in all 350 PBs and 17 government Ministries
  - Government steering committee – Dept networks
  - Example – national public lighting project
- Procurement frameworks for energy efficiency works to State owned buildings occupied by Government Departments and their agencies
- Project design support and management services for building upgrades
- Ongoing development of public procurement frameworks to saving capacity across the public sector

## 3.5.4 Central procurement

Public procurement has a critical enabling role in helping public sector bodies achieve their energy efficiency objectives. The OGP continually reviews its sourcing programme to prioritise activity that will best serve requirements, enable savings and ensure compliance with procurement procedures. OGP can advise and offer assistance in developing criteria where relevant. DCCAE and SEAI will work with the OGP to explore the potential to assist public sector bodies achieve enhanced energy efficiency through procurement.

*Public procurement has a critical enabling role in helping public sector bodies achieve their energy efficiency objectives.*



# Government departments 'accountability'

Departmental Group	2016 Energy Consumption (Primary)	Complete reports	Overall Status (2016)	Energy Savings Since Baseline
	% public sector			%
Agriculture, Food & the Marine	3%	9 of 9	● <sup>1</sup>	-3%
Business, Enterprise & Innovation	<1%	15 of 15	●	37%
Children & Youth Affairs	<1%	4 of 4	●	27%
Communications, Climate Action & Environment	5%	16 of 16	●	31%
Culture, Heritage & the Gaeltacht	1%	16 of 17	●	28%
Defence	3%	3 of 3	●	7%
Education & Skills	12%	74 of 78	●	25%
– Standalone Schools	5%	2,171 of 3,735	●	3%
Employment Affairs & Social Protection	1%	3 of 3	●	24%
Finance	2%	9 of 10	●	21%
Foreign Affairs & Trade	<1%	1 of 1	●	37%
Health	20%	76 of 78	●	17%
Housing, Planning & Local Government	12%	12 of 12	●	10%
– Local Authorities	13%	31 of 31	●	20%
Justice & Equality	4%	20 of 20	●	16%
Public Expenditure & Reform	1%	9 of 9	●	33%
Rural & Community Development	<1%	2 of 2	●	31%
Taoiseach	<1%	8 of 8	●	22%
Transport, Tourism & Sport	19%	28 of 30	●	26%

# The four energy related elements of GPP

- Purchasing energy supplies
- Purchasing energy using equipment
- Purchasing energy services
- Purchase new facilities / buildings etc



# Energy using equipment

## Must buy equipment off the Triple E or equivalent

- > Accelerated Capital Allowance
- > About the ACA
- > Search ACA Products
- > How to claim the ACA
- > **ACA Categories and Criteria**
- > Technical Guidance
- > Contact Us
- > Product Provider Login
- > Frequently Asked Questions

### Search Products

Click here to search ACA products



### ACA Categories and Criteria

The ACA, as detailed in the [Finance Act](#), covers 1 **eligibility criteria** applicable for a particular technology

The ACA criteria are updated on a regular basis -

**If you would like to subscribe to receive**

#### Overview of the ACA equipment categories

Equipment Category	Minimum expenditure (for ACA incentive)*
Building Energy Management Systems (BEMS)	€5,000
Lighting	€3,000
Motors and Drives	€1,000
Information and Communications Technology (ICT)	€1,000
Heating and Electricity Provision	€1,000

Equipment Category	Minimum expenditure (for ACA incentive)*	Equipment Category	Effective Date
Process and Heating, Ventilation and Air-conditioning (HVAC) Control Systems	€1,000	<a href="#">Boiler Controls</a>	20.09.2009
		<a href="#">Condensate Recovery Systems</a>	17.12.2009
		<a href="#">Steam Systems</a>	28.09.2009
		<a href="#">Biomass Boilers</a>	23.08.2011
		<a href="#">Inverters</a>	30.09.2011
		<a href="#">Solar Thermal Collectors</a>	02.09.2013
		<a href="#">HVAC Zone Control</a>	28.09.2009
		<a href="#">Heat Exchangers</a>	27.09.2010
		<a href="#">Pumps</a>	28.09.2009
		<a href="#">Hydraulic Power Recovery Turbine</a>	28.09.2009
Electric and Alternative Fuel Vehicles	€1,000	<a href="#">Blowers</a>	28.09.2009
		<a href="#">Fans</a>	28.09.2009
Catering and Hospitality	€1,000	<a href="#">Electric Vehicles and Associated Charging Equipment</a>	28.09.2009
		<a href="#">Alternative Energy Vehicle Conversions</a>	28.09.2009
Electromechanical Systems	€1,000	<a href="#">Commercial Dishwashers</a>	18.06.2010
		<a href="#">Commercial Laundry Dryer</a>	18.06.2010
		<a href="#">Commercial Combination Ovens</a>	18.06.2010
		<a href="#">Commercial Laundry Washer</a>	23.06.2010
		<a href="#">Water Boilers</a>	04.06.2010
		<a href="#">Electrical Actuators</a>	18.06.2010
		<a href="#">Extrusion Blow Moulding Machines</a>	18.06.2010
		<a href="#">Injection Blow Moulding Machines</a>	18.06.2010
		<a href="#">Injection Moulding Machines</a>	18.06.2010
		<a href="#">Process Energy Management Systems</a>	23.06.2010
Refrigeration and Cooling	€1,000	<a href="#">Voltage Stabilisation</a>	23.06.2010
		<a href="#">Compressors and Condensing Units</a>	23.06.2010
		<a href="#">Condensers</a>	23.06.2010
		<a href="#">Refrigerated Display Cabinets</a>	23.06.2010
		<a href="#">Refrigeration System Controls and Monitoring</a>	23.06.2010
		<a href="#">Chillers and Fluid Coolers</a>	27.09.2010
		<a href="#">Heat Pumps</a>	25.07.2011

# Procuring a service - Performance Contracting

## Performance Risk Allocation



Energy Performance Guarantee

Energy Performance Contract

Basis of all performance contracting is Measurement and Verification

# M&V in public procurement

- What is Measurement and Verification ?
- Measure – boundary, before / after
- Verify – assumptions, method (measure one parameter, more than one, regression or calibrated model)
- M&V plan – before project, independent
- Standards - ISO50015 or IPMVP

# Basic Energy Performance Guarantee – lighting

- Replace lights with new LED lamps
- Measure – the power draw before, the power draw after
- Establish minimum saving or final & payment not paid
- In Invitation to Tender
- More complicated if involves controls
- Many lighting examples
- Moving slowly from procuring lamps to a service

## Energy Performance Guarantee – a framework for more robust approach

- Four core elements to a good EPG
  - Performance Guarantee – what is the performance guarantee
  - Performance Payment – what's at risk if the performance guarantee is not met
  - Payment mechanism – when and how get paid
  - M&V – boundary, method, timeline, etc
- Include in tender – then assess in operation

# Product EPG: Boiler controller



As much as **30%\*** of your heating costs could be saved and your CO2 emissions reduced with a modest investment.

**Performance Guarantee** saving

**Performance Payment** pay back

**Payment Mechanism** 50% at end of test

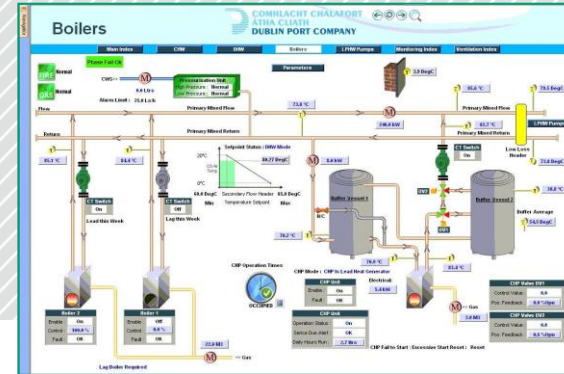
**Measurement & Verification** 10 weeks, week on – week off

- Simple comparison of weeks on V weeks off
- Or weekly use versus degree days analysis

# Dublin Port



- Invitation to tender - The consultant and the main contractor each guaranteed separately to the client that the project would achieve a 15% energy efficiency improvement in fossil fuel use.
- If this guarantee was not achieved, each would lose 7.5% of their respective contract values.
- Project saved over 30% on gas usage (and continues to do so 4 years on)



# Postal service – transport EPG

- Vehicle lease tenders include CVD scoring
  - Shortlisted vehicles are tested on a fixed test route in Wicklow to establish comparative fuel performance over 6 weeks:

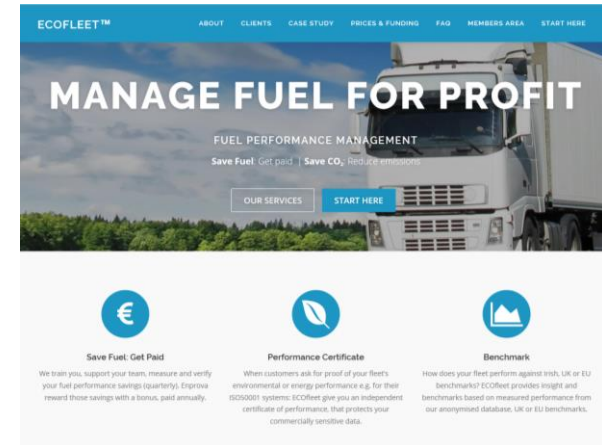
As part of the evaluation process, An Post will carry out fuel consumption testing on proposed vehicles in An Post operating environment. You are required to make available each vehicle proposed for a period of 6 weeks. Testing will involve installing a device in the vehicle to monitor fuel consumption and this device will be removed before vehicles are returned. Vehicles should be made available for a 6 week period. Results from fuel consumption testing will be used to calculate fuel life costs which will be included in Total Life Cost in the evaluation.





# Transport and energy suppliers example (Article 7 driven)

- Fuel Performance training programme
  - Quarterly returns of L and km to calculate Litres saved vs baseline in L/100km, t.km etc.
  - Broadly follows IPMVP Option B (fleet only)
- 80 fleets participating 2012-2020
  - 25+ saving fuel vs baseline at any one time
  - Balance either newly signed up, too busy, or plateaued after 3+ years of savings
- Programme funded under EEOS (Art.7)
  - Online app + manual checking of evidence submitted from pumps or calibrated telematics



# Energy Performance in Procurement: Pumps

- Energy costs of pumps typically 80-90% of life cycle costs
- Effective procurement incentivises supplier to put lowest life cycle cost **pumping system** (usually most energy efficient)
- kWh/ m3 is the energy performance indicator used
- Evaluated over 10 years @ standard cost @ multiple duty points
- Verified as part of commissioning by 3<sup>rd</sup> party.
  - In Situ < 100kW
  - Vendor factory >100kW
- Developed by SEAI /LA working group
- Now industry standard >10kW
- Sample is sewerage pump

Response:	kWh /m3	M3/year	Euro/ kWh	Cost Per annum	Cost 10 years
New pump @ duty	0.088	1,314,000	€ 0.14	€ 16,188	€ 161,885
New pump at max	0.174	146,000	€ 0.14	€ 3,557	€ 35,566
Total energy cost					€ 197,450
Bond					€ 900
Fixed price Lump sum capital Cost					€ 52,410
Total 5 year cost (Energy plus Capital)					€ 250,760

# Photovoltaics

- Important thing that matters is kWh generated not kW installed
- Self generation, no export in Ireland.
- Design / build on complicated roof wanted vendor to:
  - Maximise production from roof space
  - Minimise cost
- Other marks for design requirements
- 1<sup>st</sup> year evaluation Vs Irradiance @ local weather station (4% ahead)

Criteria	Overall %
Overall Capital Cost per kWh (over 10 years)	75
Electricity Produced (kWh/year generated)	25
<b>Total</b>	<b>100</b>

Vendor	1	2	3	4
Electricity Produced (kWh/ Yr generated)	160,011	177,464	130,436	164,769
10 year cost per kWh generated Inc. VAT	€ 0.247	€ 0.194	€ 0.208	€ 0.195

E



# Heat pumps in Domestic properties: focussing on what matters

- Heat pumps can be complicated retrofit
- Performance maximised by combination of:
  - Design
  - Installation
  - Commissioning
- Installer must be incentivised to deliver performance measured by Co-efficient of performance
- Effective floor in performance, monitored as part of first 20 installations
  - Cycling
  - Poor radiator balancing
  - Improper wiring of valves
  - Improper weather compensation/ set points
- Bond required.

## Energy Performance Guarantees – Where applicable

### Product

Equipment supplied with a money-back guarantee that it will deliver a %/kWh reduction in energy use.

Equipment lease with payments matched to value of energy savings delivered. If savings are below expected, then term of lease extended.

### Service

Facilities or maintenance management service incorporating a bonus payment for each 1% reduction in facility energy use.

Energy management service with guarantee that value of energy savings will exceed the cost of the annual service fee.

### Works

Contractor upgrades a boiler house and guarantees x% improvement in energy efficiency. If savings not achieved, then contractor forfeits an agreed y% retention amount.

Contractor upgrades ventilation system control with target savings in AHU fan power of x%. A bonus is paid if actual savings exceed target; a penalty is deducted if actual savings are less than target.

# Energy Performance Contracting

- National form of contract and Technical Assistance
  - Small number of examples
  - Three leisure centres, mental health hospital
- Health Service partnered with Carbon Energy Fund in the UK
  - Created an EPC framework based on UK EPC experience
  - <http://www.carbonandenergyfund.ie/contractors/>
- PV performance – tendering and performance

# Procuring large capital assets – new and retrofit

- Energy Efficiency Design – challenge the design norms
- National standard IS. 399, aligns well with NZEB
- SEAI encouraging performance focused design. Awaiting examples where tendered performance / payment linked to actual performance (and involve designer payment!)
- National badging scheme (EXEED) and capital grants

# 2018 Procurement Package

- In discussion with Office of Government Procurement
- To produce a 'Procurement Package' in 2018 / 2019
  - Awareness / training / workshops / best practices
  - Templates / marking criteria / tenders
  - Energy Performance Guarantees – basic to more robust – guidance / templates / examples for category
  - Medium – long term – equipment / service frameworks
- 'Known' Gaps
  - Before and After - Evaluating impacts
  - Assurance / risk management – who best to give it



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- What is M&V ?
- Examples of energy related procurement
- What next?
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