FIT FOR 55%
2030 CLIMATE TARGET PLAN

PRIMARY & SECONDARY IMPACTS ON DATA CENTER SECTOR

Session Structure

Outline of Problem ~15 minutes

- 2030 Climate Target Plan: Objectives
- Legislative Vehicles
- Sector Responses & Impacts?

Discussion ~25 minutes

People

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Moderator

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2030 CLIMATE PLAN CONTEXT + OBJECTIVES

European Green Deal

Package of policy initiatives aimed at attaining climate neutrality by 2050.

Member States are Legally obligated to implement policy vehicles.

2030 Climate Target Plan

Set of legislative vehicles to help attain 2050 net neutrality objective.

Cutting net EU greenhouse gas emissions ≤ 55% by 2030 vs 1990.

VEHICLES

Vehicles – Directives++

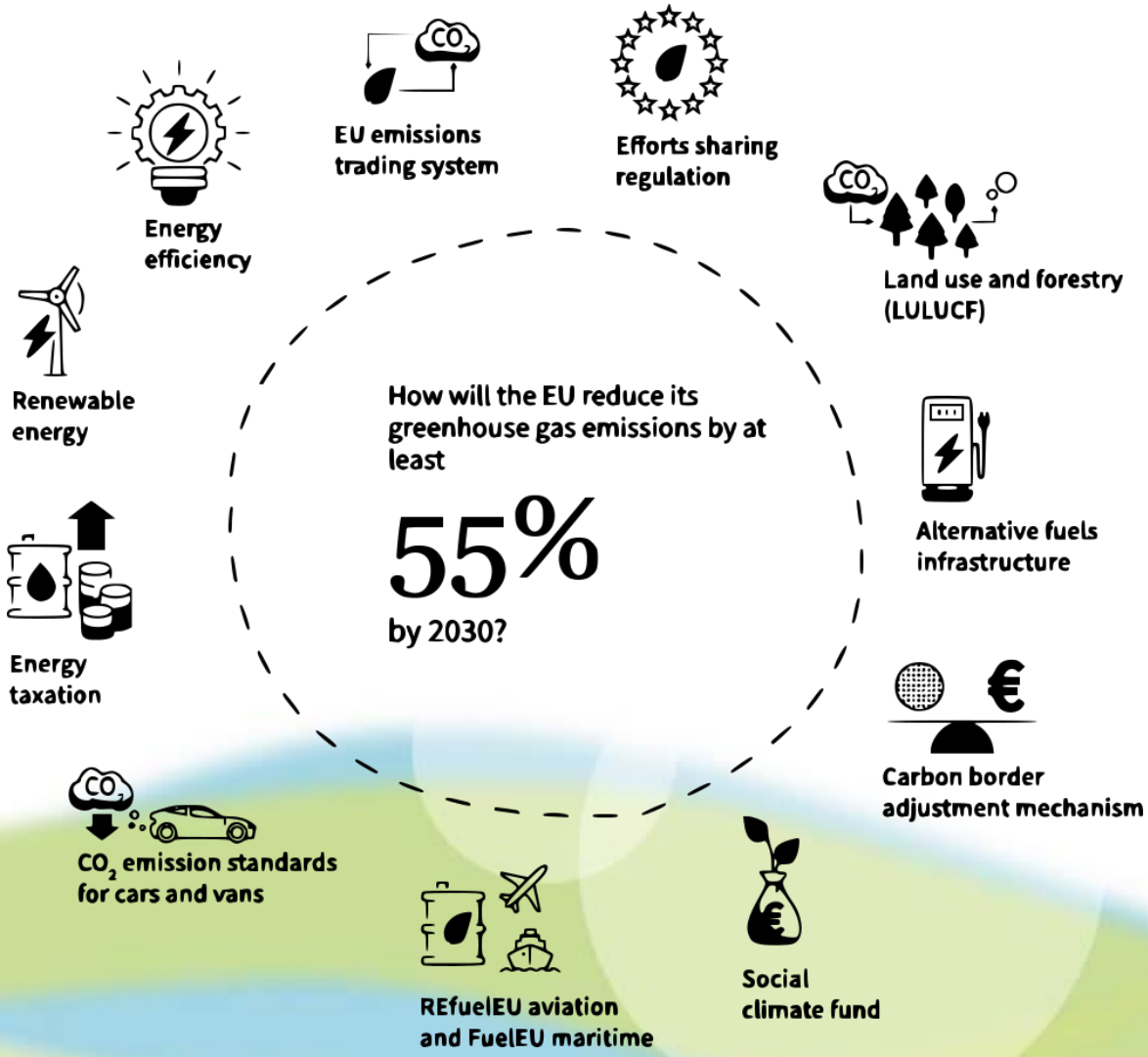
11 LEGISLATIVE VEHICLES

Focus on data center impacts of:

EED Energy Efficiency Directive

ETD Energy Taxation Directive

RED Renewable Energy Directive



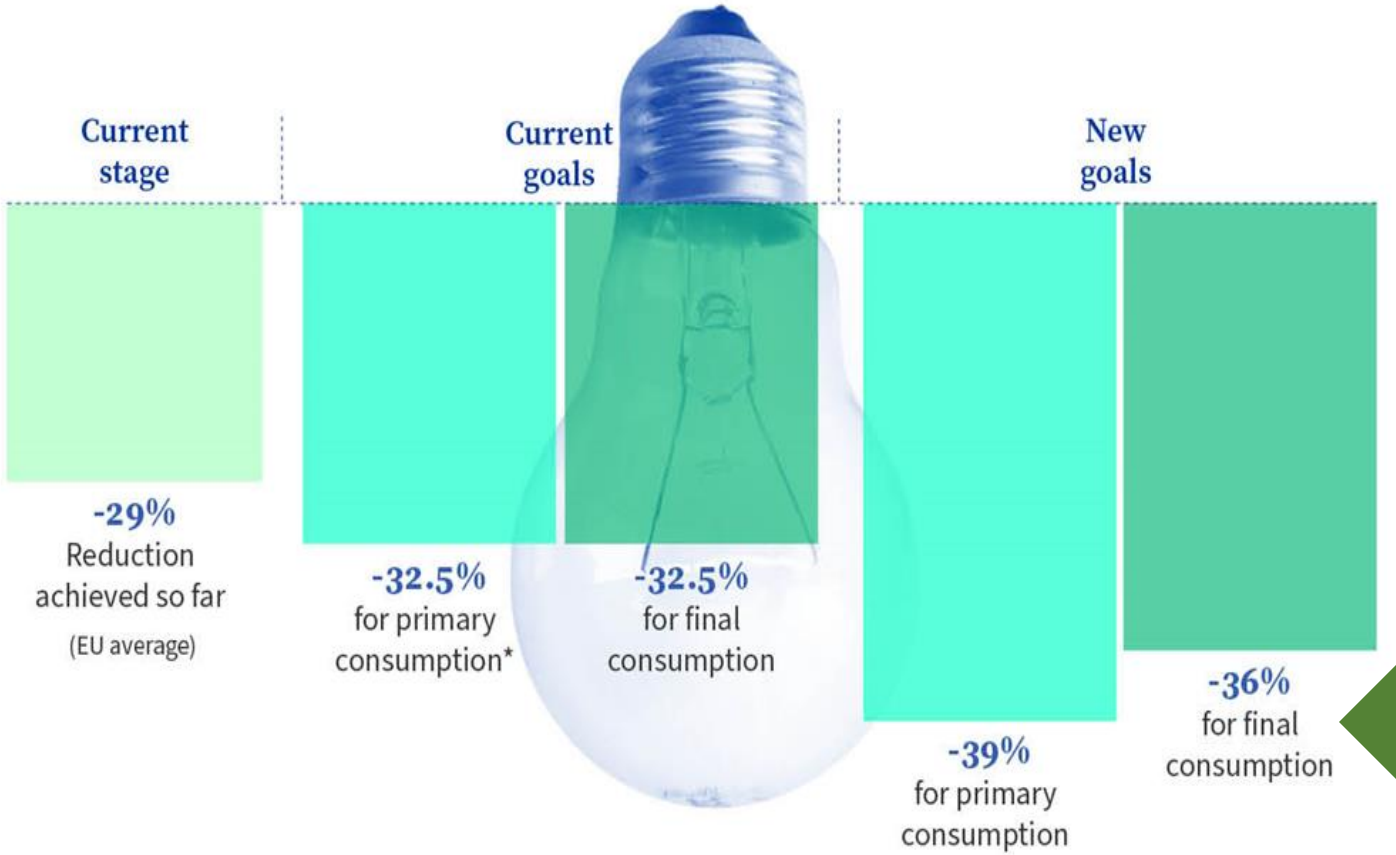
EED recast

OBJECTIVE = CROSS-SECTOR ENHANCED REDUCTION TARGETS

Increased efficiency target

The revised legislation will make it compulsory for the EU as a whole to reduce energy consumption, compared with consumption projections for 2030.

The target is binding at EU level. Member states will define their indicative national targets reflecting their national specificities.



EED recast

“To measure is to know.”
“If you cannot measure it, you cannot improve it.”

William Thomson, 1st Baron Kelvin

EED recast

1: ANNEX VI
MINIMUM REQUIREMENTS FOR MONITORING AND PUBLISHING THE ENERGY PERFORMANCE OF DATA CENTRES

The following minimum information shall be monitored and published as regards the energy performance of data centres referred to in Article 11(10)

Descriptive Data Set
(a) the name of the data centre; the name of the owner and operators of the data centre; the municipality where the data centre is based.

Operational Data Set
(b) the floor area of the data centre; the installed power; the annual incoming and outgoing data traffic; and the amount of data stored and processed within the data centre.

Performance Data Set
(c) the performance, during the last full calendar year, of the data centre in accordance with key performance indicators about, inter alia, energy consumption, power utilisation, temperature set points, waste heat utilisation, water usage and use of renewable energy.

EED recast

2: ANNEX IV
ENERGY EFFICIENCY REQUIREMENTS FOR PUBLIC PROCUREMENT

(c) where a product or a service is covered by the **Union green public procurement criteria**, with relevance to energy efficiency of the product or service, make best efforts to purchase only products and services that respect at least the technical specifications set at 'core' level in the relevant Union green public procurement criteria including among others for **data centres, server rooms and cloud services**, Union green public procurement criteria for road lighting and traffic signals, Union green public procurement criteria for computers, monitors tablets and smartphones;

| Implications |

Public sector = monitoring, reporting, publishing mandated + internal equipment procurement + external services procurement

Commercial data center operators = need to comply for public sector clients

EED recast

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Challenges?

…

EED recast

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Operational Data Set
(b) the floor area of the data centre; the installed power; the annual incoming and outgoing data traffic; and the amount of data stored and processed within the data centre.

Challenges?

Area + Power: verifiable by design plans.

Data flow: bidirectional Network Operator (NO) infrastructure: energy data from NO? Colos?

Data stored: definition? Annualized, time averaged? Colos?

Data processed?…+/or operations? Measured how? Definition? Colos?

EED recast

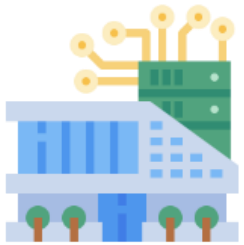
Operational Data Set
(b) **..data volume, processed, stored..**

Colos?

Network energy not measured directly (+carbon ∝ NO emissions factor)

Data processed / stored not defined?

Operations performed?



DC

NO_{fixed}

Deep Thought

Frontier Super Computer
The Ultimate Question of Life, the Universe, and Everything
1 x Frontier x 1 y
21MW
Output = 42_{10} = 101010_2 <1Byte

Energy = 184GWh/y
Carbon = 9ktCO2e/y

Energy = 10^{-15}Wh/y
Carbon = 3.10^{-10}gCO2e/y

NetFlix

163 m h/day = 60Gh/y (2021[1])
456 GWh/y (DC)
1h HD streaming = 2GB
0.0065 kWh/GB[2]

Energy = 456GWh/y
Carbon = 23ktCO2e/y

Energy = 774GWh/y
Carbon = 39ktCO2e/y

1 Netflix 2021 CSR
2 Aslan, J., Mayers, K., Koomey, J.G. and France, C., 2018. 'Electricity intensity of internet data transmission: untangling the estimates'. Journal of Industrial Ecology, 22(4), pp.785-798
3 0.05 KgCO2e/kWh - DC & NOall cases

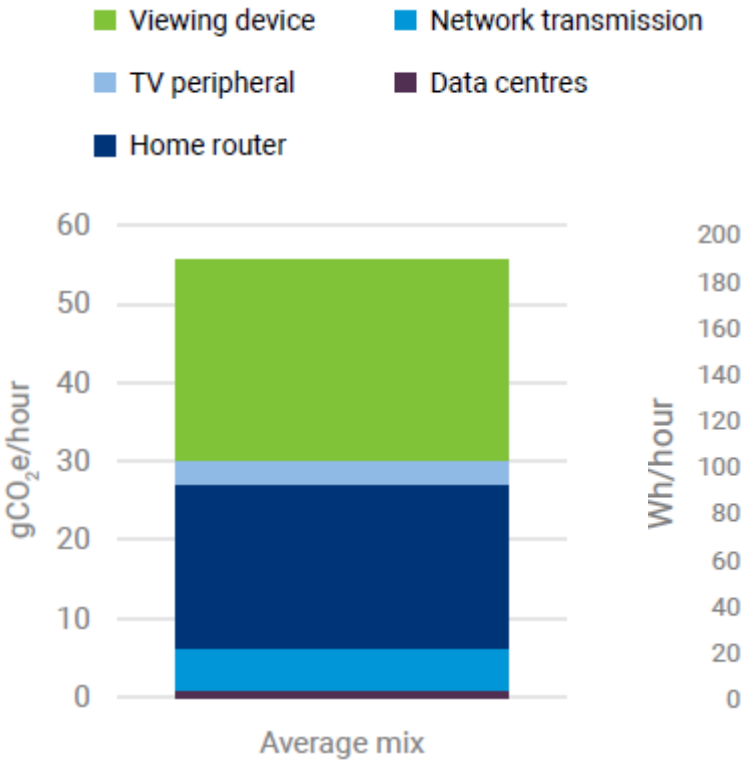
Data center icon made by ultimatearm, network operator icon made by Eucalyp, from www.flaticon.com

EED recast

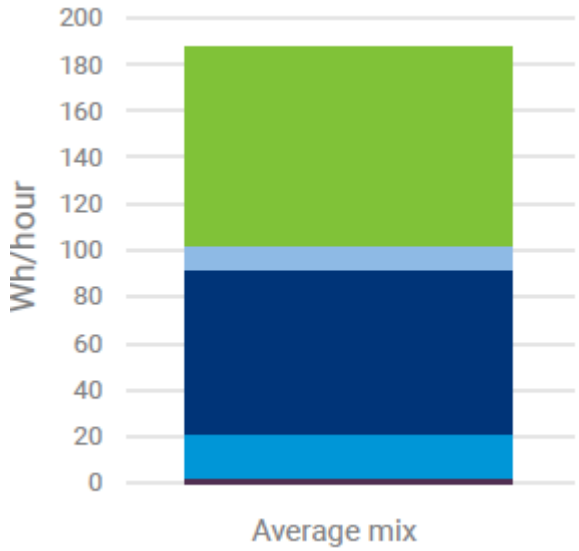
Operational Data Set
(b) **..data volume, processed, stored..**

Is the intention use this as a proxy for total energy & carbon use?

Note mobile 15x energy/GB than fixed networks.



Emissions 1h video, EU 2020[1]



Energy 1h video, EU 2020[1]

1 Carbon impact of video streaming, Carbon Trust/Netflix 2021
2 Fixed: 0.0065kWh/GB, Mobile 0.1 kWh/GB, Aslan, 2018

EED recast

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The following minimum information shall be monitored and published as regards the energy performance of data centres referred to in Article 11(10):

Performance Data Set
(c) the performance, during the last full calendar year, of the data centre in accordance with key performance indicators about, inter alia, energy consumption, power utilisation, temperature set points, waste heat utilisation, water usage and use of renewable energy.

Challenges?

Third party renewables certificates with emissions factors, therefore estimate of Scope 2 emissions.

Third party energy and water data.

Energy reuse.

Set point records.

Feasible…

EED recast

“To measure is to know.”
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William Thomson, 1st Baron Kelvin

MONITORING→ MANDATED PERFORMANCE?

MONITORING

Self-reported?

Automated?

EU Taxonomy Redundancy?

REPORTING

Collected via the Member State

Mechanism TBD

Automation: acceptable to operators?

PUBLISHING

Commercially sensitive?

Security risk?

Mandated Performance Levels?

Performance Labelling?

ETD

Energy Taxation Directive

OBJECTIVES

PRICING FOR ENERGY CONTENT

Electricity =
Advanced Biofuels =
Renewable Hydrogen

ENVIRONMENTAL IMPACT

LEVEL PLAYING FIELD – MINIMUMS + RAMP

~~BUSINESS RATES~~

Structure

Price is a function of: energy content & environmental impact (fuels).

Rates

No distinction between business vs non-business rates for fuels and electrical power.

Minimum rates*:
€0.15/GJ = €0.54/MWh = ¢0.054/kWh

Continuous ramping of minimum rates:
€0.67/MWh, 2033

*Non-Indexed, end 2022/start 2023

ETD

Energy Taxation Directive

Avoids taxing carbon twice as this occurs at point of production.

Table 6: Options considered in the modelling exercise

Scenario	Specifications
Option 0	Baseline scenario
Option 1	"Minimalistic" Option
Option 2a	"Energy content" Option with 10 year transitional period
Option 2b	"Energy content" Option with 7 year transitional period
Option 2c	"Energy content" Option with 10 year transitional period and pollution
Option 3a	"Carbon content" Option with 10 year transitional period
Option 3b	"Carbon content" Option with 7 year transitional period
Option 3c	"Carbon content" Option with 10 year transitional period and pollution

COMMISSION STAFF WORKING DOCUMENT EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT REPORT *Accompanying the document* Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (recast), 2021 Option 2a

ETD

Energy Taxation Directive

€/GJ

Electricity, advanced biofuels, e-fuels and renewable hydrogen (all uses)				
	Non-indexed		Indexed	
	Start of transitional period (2023) – not indexed	Final rate after completion of transitional period (2033) – not indexed	Start of transitional period (2023)- indexed	Final rate after completion of transitional period (2033) - indexed
Electricity	0,15	0,15	0,16	0,18
Advanced biofuels	0,15	0,15	0,16	0,18
Renewable hydrogen	0,15	0,15	0,16	0,18

€/MWh

Electricity (all uses)				
		Current ETD minima	Option 2a	
			Start of transitional period (2023) - indexed	Final rate after completion of transitional period (2033) - indexed
Electricity business	EUR/ MWh	0,50	0,58	0,67
Electricity non business	EUR/ MWh	1,00	0,58	0,67

IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (recast) 2021

ETD

Energy Taxation Directive

€/MWh

Electricity, advanced biofuels, e-fuels and renewable hydrogen (all uses)			
	Metric	Current ETD minima	Start of transitional period (2023) -indexed
Electricity business	EUR/ MWh	0,50	0,54
Electricity non business	EUR/ MWh	1,00	1,07
Advanced biofuels and e-fuels	EUR/GJ	n/a	Same as electricity
Renewable Hydrogen	EUR/GJ	n/a	Same as electricity

€/MWh

Electricity (all uses)				
		Current ETD minima	Option 2a	
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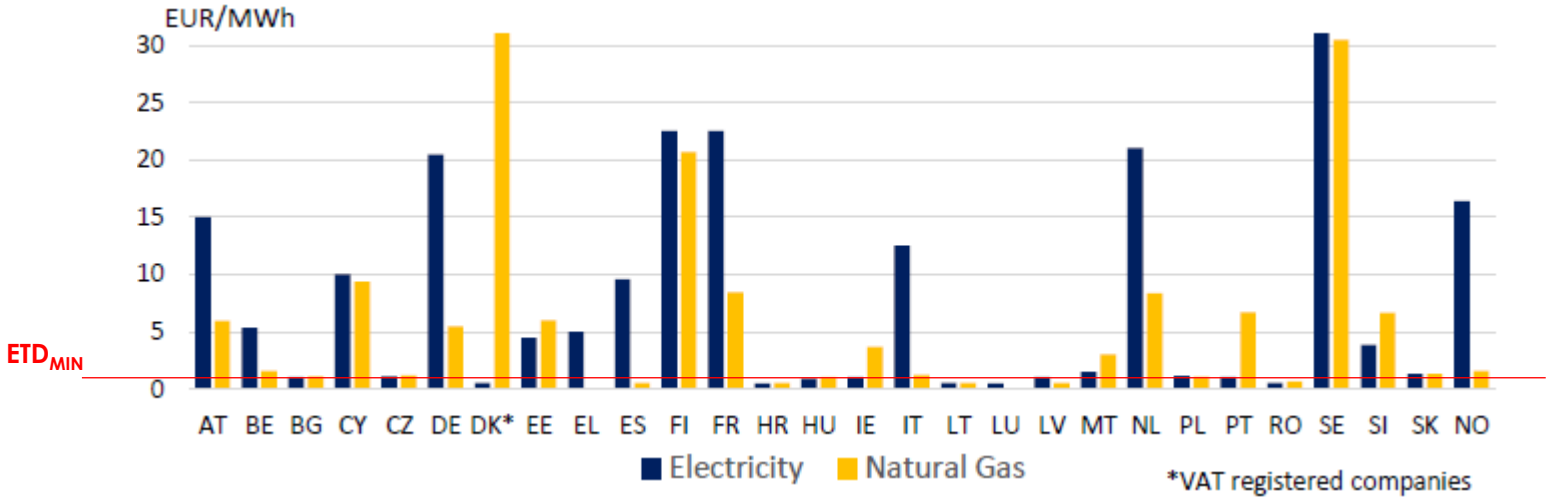
IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (recast) 2021

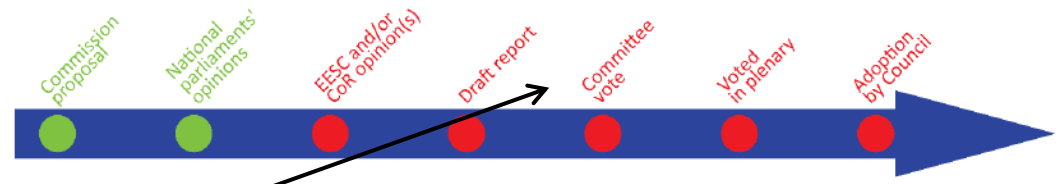
ETD

Energy Taxation Directive

Nominal Tax Rates applicable to Services – '2021



Data centers benefit from special provisions in some countries. Data centers are energy intensive services. In Finland, data centers can benefit from the lower, business rate, alongside industry, mining and agriculture. In France, data centers can benefit from a reduced tax rate of 12 €/MWh for the fraction of their annual consumption that exceeds 1 GWh, if their total consumption of electricity equals or exceeds 1 kWh/€ of added value. Norway also attaches a criteria: data centers with an output in excess of 0.5 MW can benefit from the business rate. In Sweden, the lower tax rate of SEK 5/MWh for business use applies to electricity used in data centers, alongside manufacturing and shore- side electricity.



EPRS | European Parliamentary Research Service

Author: Miroslava Kostova Karaboytcheva
Members' Research Service
PE 698.883 – January 2022

COUNCIL DIRECTIVE restructuring the Union framework for the taxation of energy products and electricity (recast). Brussels, 14.7.2021 COM(2021) 563 final 2021/0213 (CNS)

Vehicles – EU Taxonomy

Taxonomy Regulation and Delegated Acts 2020…

EU Taxonomy =
A classification system establishing a list of environmentally sustainable economic activities

Resource Allocation Objectives =
Aiding scale up of sustainable investment & implementation of European Green Deal.
Directing investments & policy decisions to the most sustainable economic activities.

Environmental Objectives =
Climate change mitigation.
Climate change adaptation.
Sustainable use of water/ marine resources.
The transition to a circular economy.
Pollution prevention and control.
Restoration of biodiversity & ecosystems.

Data Centers

Mandated 3rd Party Audit

Via: EUCoC redraft to auditable version - in progress, October 2022.

Implementation: 2023.

TIC Council.

Significance = crossover with EED datasets b) and c) where tools = EUCoC redraft ∴ metrics EN 50600-4[] == ISO 30134-[] series.

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R0852

Vehicles – EU Taxonomy

Taxonomy Regulation and Delegated Acts 2020…

Data Centre Key Performance Indicators
EN 50600-4[] + ISO/IEC 30134-[]

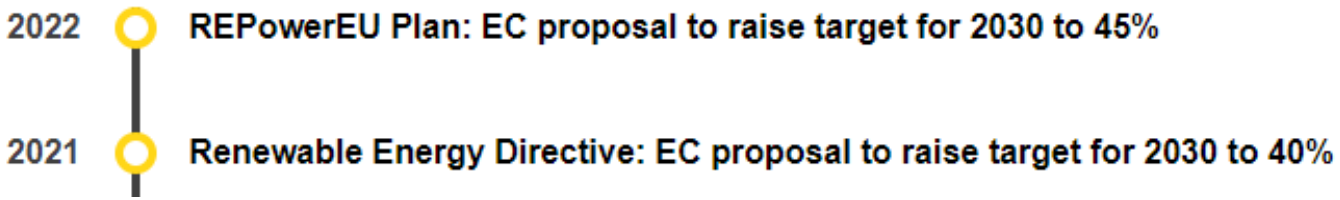
EN 50600-4-1 Data Centre KPIs	ISO/IEC 30134-1
EN 50600-4-2 Power Usage Effectiveness (PUE)	ISO/IEC 30134-2
EN 50600-4-3 Renewable Energy Factor (REF)	ISO/IEC 30134-3
EN 50600-4-4 IT Energy Efficiency (ITEEsv)	ISO/IEC 30134-4
EN 50600-4-5 IT Equipment Utilisation (ITUEsv)	ISO/IEC 30134-5
EN 50600-4-6 Energy Reuse Effectiveness (ERE)	ISO/IEC 30134-6
EN 50600-4-7 Cooling Efficiency Ratio (CER)	ISO/IEC 30134-7
EN 50600-4-8 Carbon Usage Effectiveness (CUE)	ISO/IEC 30134-8
EN 50600-4-9 Water Usage Effectiveness (WUE)	ISO/IEC 30134-9

RED

Renewable Energy Directive II->III

Article 24:

6. Member States shall put in place a coordination framework between district heating and cooling system operators and the potential sources of waste heat and cold in the industrial and tertiary sectors to facilitate the use of waste heat and cold. That coordination framework shall ensure dialogue as regards the use of waste heat and cold involving at least:



VIABILITY ASSESSMENT OF WASTE HEAT RECOVERY @ > 1MW

1% ramp annually

(a) strict heating and cooling system operators;

(b) industrial and tertiary sector enterprises generating waste heat and cold that can be economically recovered via district heating and cooling systems, such as **data centres**, industrial plants, large commercial buildings and public transport;

RESPONSES & IMPACTS

SUMMARY - VEHICLES

EED

Objective
-36% End-User Energy
Datasets
Descriptive
Operational
Performance
Public Procurement
Ecodesign Directive Compliant

RED

Waste Heat Re-use

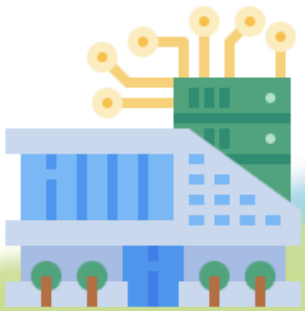
ETD

Structure
∝ Energy Content
∝ Carbon, NO_x, Emissions
Rates ≠ Use-Case
Commercial = Consumer
Minimum, Ramped

EU Taxonomy

Mandatory 3rd Party Audit
EUCoC Redraft - 50600-4[]

EED crossover 50600-4[]/ISO 30134-series:
ISO 30134-2 Power Usage Effectiveness (PUE)
ISO 30134-3 Renewable Energy Factor (REF)
ISO 30134-6: Energy Reuse Factor (ERF)
ISO 30134-9 Water Usage Effectiveness (WUE)



IMPACT

Client Behaviour
Investment
Power Price
Service Geolocalization
Deployment
Power Availability

Data center icon made by ultimatearm from www.flaticon.com

3 CLASSS OF QUESTIONS

Monitoring Reporting Publishing (EED, EU Taxonomy)	Mandated Performance Levels + Labelling	Waste Heat Reuse (RED, EED, EU Taxonomy)	Rates & Structures (ETD)
Responses of DC Sector?			
1°,2° impacts on DC Sector?			
Policy objectives attained?			

RESPONSES & IMPACTS

Monitoring Reporting Publishing

Are all players able to respond equally? …if not

What are the MS* and geographical impacts on DCs*?

Performance +Labelling

…a prelude to mandated performance levels and labelling?

…if so, which performance metrics and what labelling scheme?

Waste Heat Reuse

Not all players *can* respond equally …if not

What are the MS* and geographical impacts on DC*s?

ETD

The minimum rate is unlikely to have significant impact?

If adopted, flat rates are impactful.

Impacts on client supplier selection, capacity investment?

* MS: Member States. DCs*: Data Centers.

IMPACTS

1° Impacts

Client supplier selection.

Investment new deployment in capacity – investment in new sensors, monitoring.

Faster ramp-up of low carbon power across EU?

Migration of clients away from low performing regions/DCs?

Stranded DC Assets?→ Write offs?

Migration of high value services to high performing regions/DCs?

2° Impacts

Power availability constraints in high demand regions?

Water use impact & constraints?

Negative impact on other sectors, local, expansion of deployment moratoria?

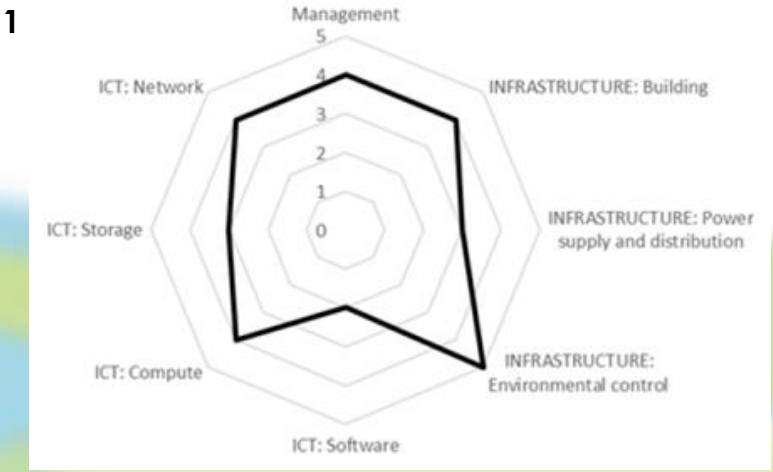
Published data used by pressure groups and industry lobbies?

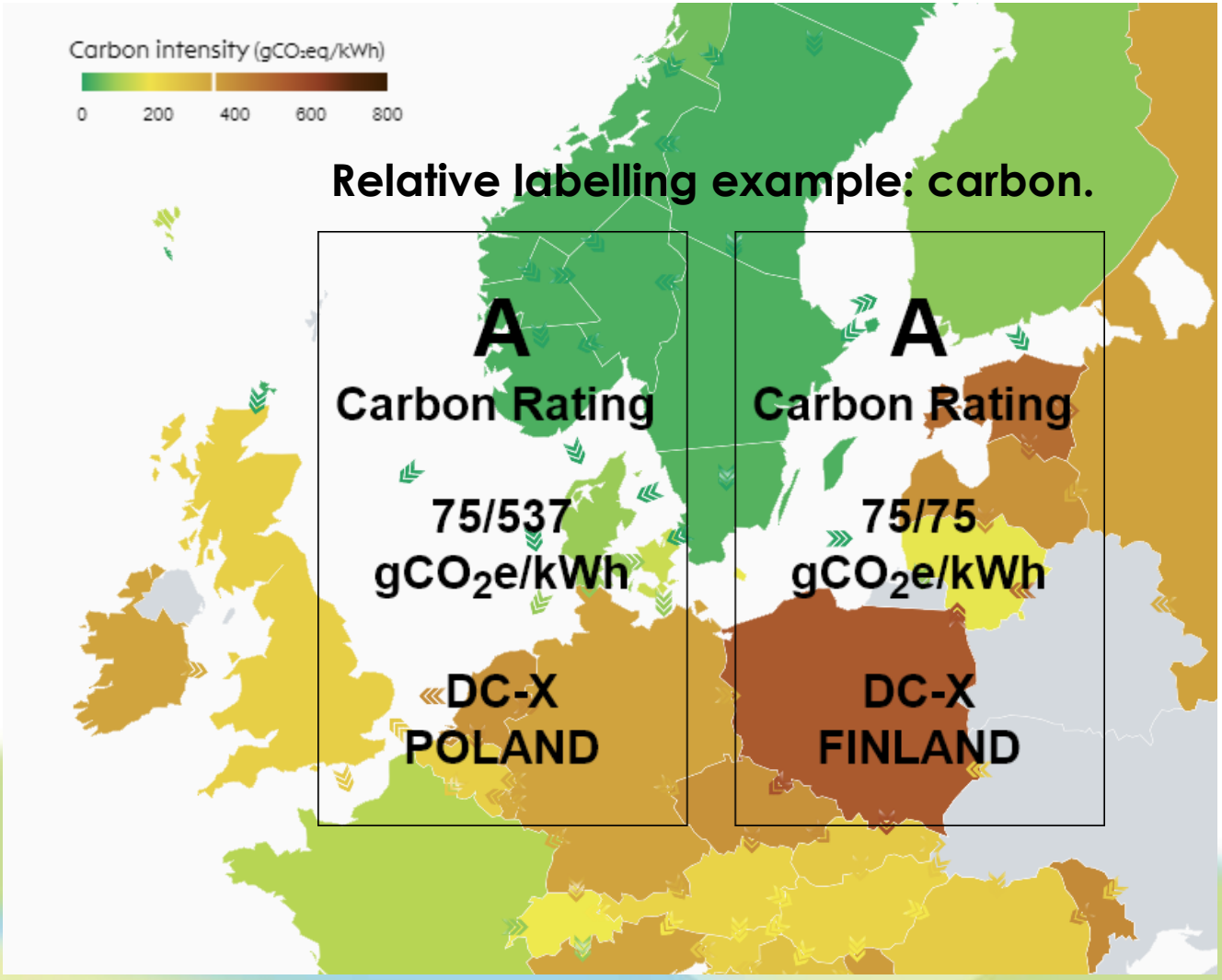
LABELLING

Complex, Multidimensional

Challenge is to devise a labelling scheme that accurately represents the multiple dimensions, assisting client service selection and attain policy objectives.

Use of spider diagrams as in CLC TS 50600 5-1 DC maturity model?

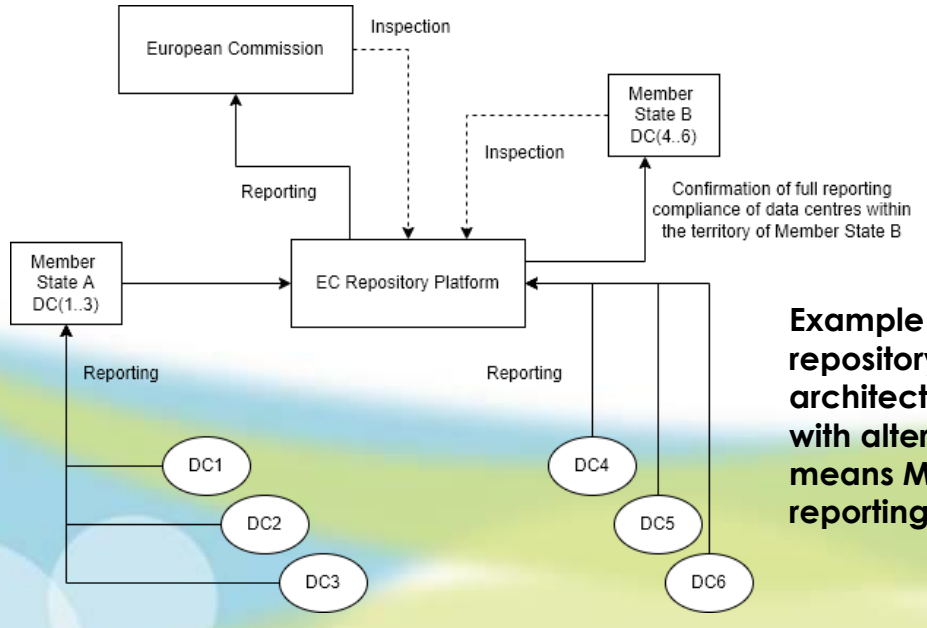




https://app.electricitymaps.com/zone/NO-NO2

REPORTING→PUBLISHING = ACCESS

How do operators feel about access to their performance data?



Example of repository architecture, with alternate means MS reporting.

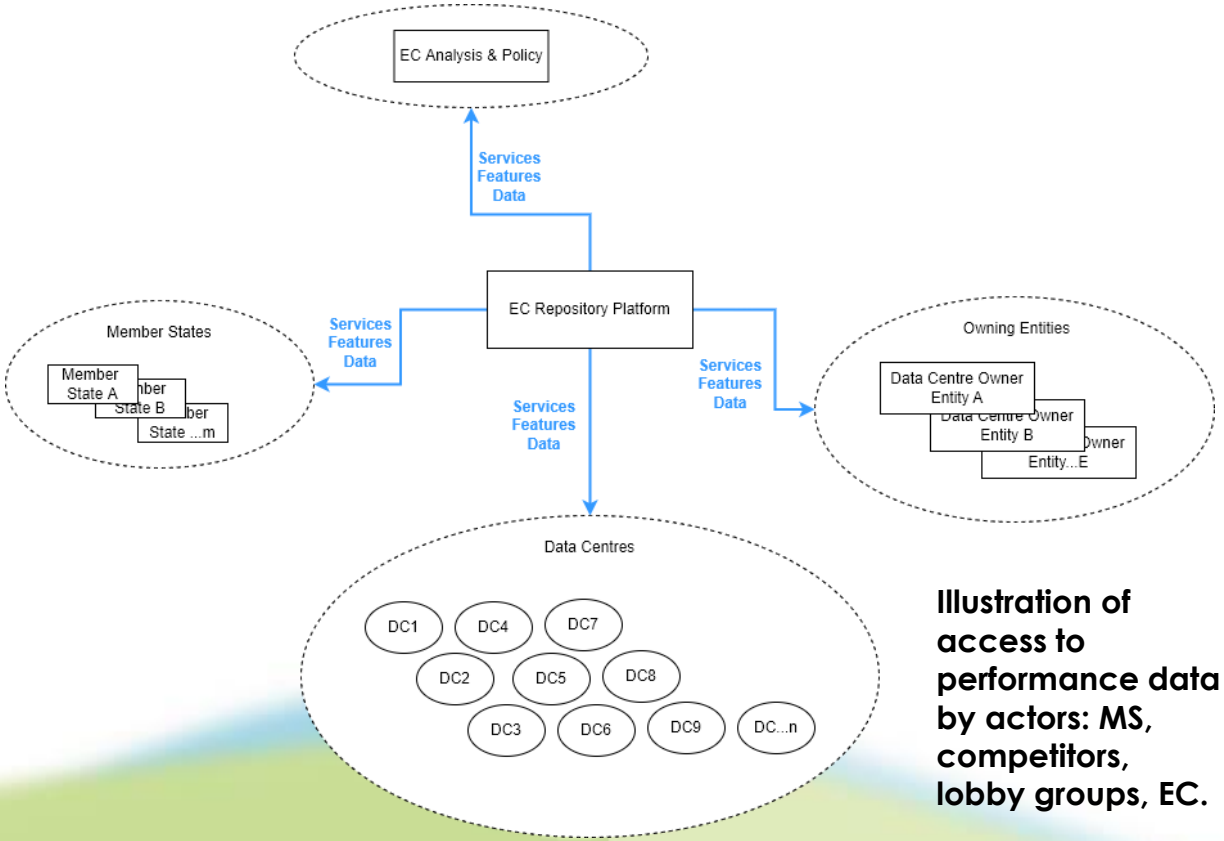


Illustration of access to performance data by actors: MS, competitors, lobby groups, EC.

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