



Understanding the definition and rules for accounting for waste heat

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Objectives of the presentation

- Defining waste heat and cold
- Counting waste heat towards targets under Articles 23 and 24 of the Renewable Energy Directive

Note: The first part of this presentation discusses the RED and EED as they are currently written. Revisions to the Directives are still being negotiated among the European Commission, European Parliament, and Council.

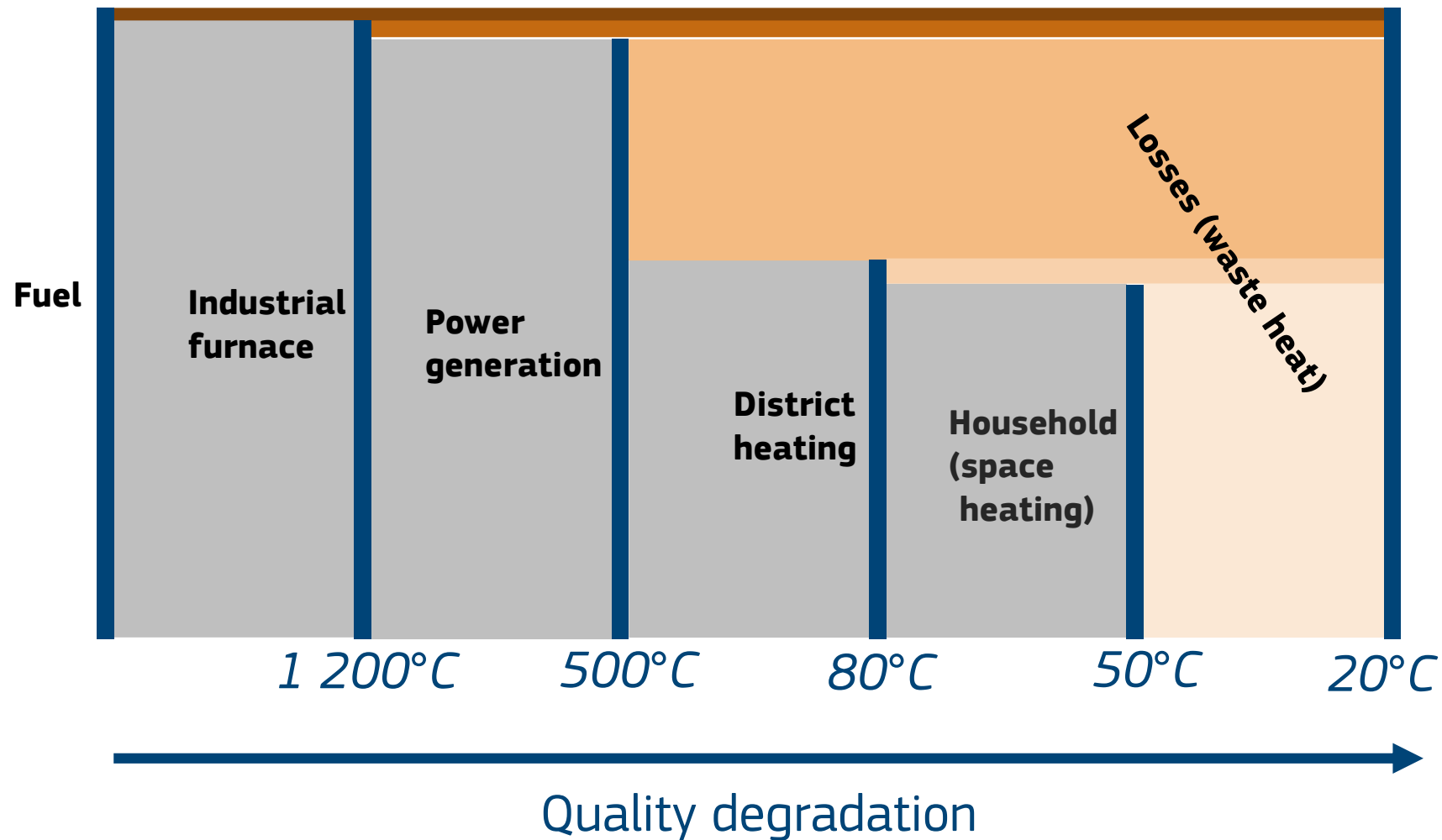
Context in EU law

- RED Article 23: target for the share of renewables in heating and cooling
- RED Article 24: target for the share of renewables in *district* heating and cooling, and definition of efficient DHC

EED definition of waste heat and cold

- EED mentions waste heat and cold several times but gives no clear definition
- Mentions waste heat from power generation, which could be recovered and used through cogeneration, and waste heat from industry
- “Useful temperature level of waste heat” and “useful waste heat” are also used but without additional explanation

Cascade effect: energy and temperature by end use



RED definition of waste heat and cold (1)

Waste heat and cold is:

“**unavoidable** heat or cold generated as by-product in industrial or power generation installations, or in the tertiary sector, which would be dissipated unused in air or water without access to a district heating or cooling system, where a cogeneration process has been used or will be used or where cogeneration is not feasible”

- Article 2(9), recast RED

On-site and off-site use

- Both RED and EED promote use of waste heat and cold while putting Energy Efficiency First
- *All* use of waste heat or cold contributes to the overall objectives of the EED
- Only heat or cold that is used *off* site in a DHC network counts towards waste heat potential (Comprehensive Assessments) and sectoral targets (RED Articles 23 and 24)

RED definition of waste heat and cold (2)

Waste heat and cold is:

“unavoidable heat or cold generated as **by-product** in industrial or power generation installations, or in the tertiary sector, which would be dissipated unused in air or water without access to a district heating or cooling system, where a cogeneration process has been used or will be used or where cogeneration is not feasible”

- Article 2(9), recast RED

By-product

Exclude: Heat that was generated with the main purpose of being directly used and is not a by-product of another process, irrespective of the energy input

RED definition of waste heat and cold (3)

Waste heat and cold is:

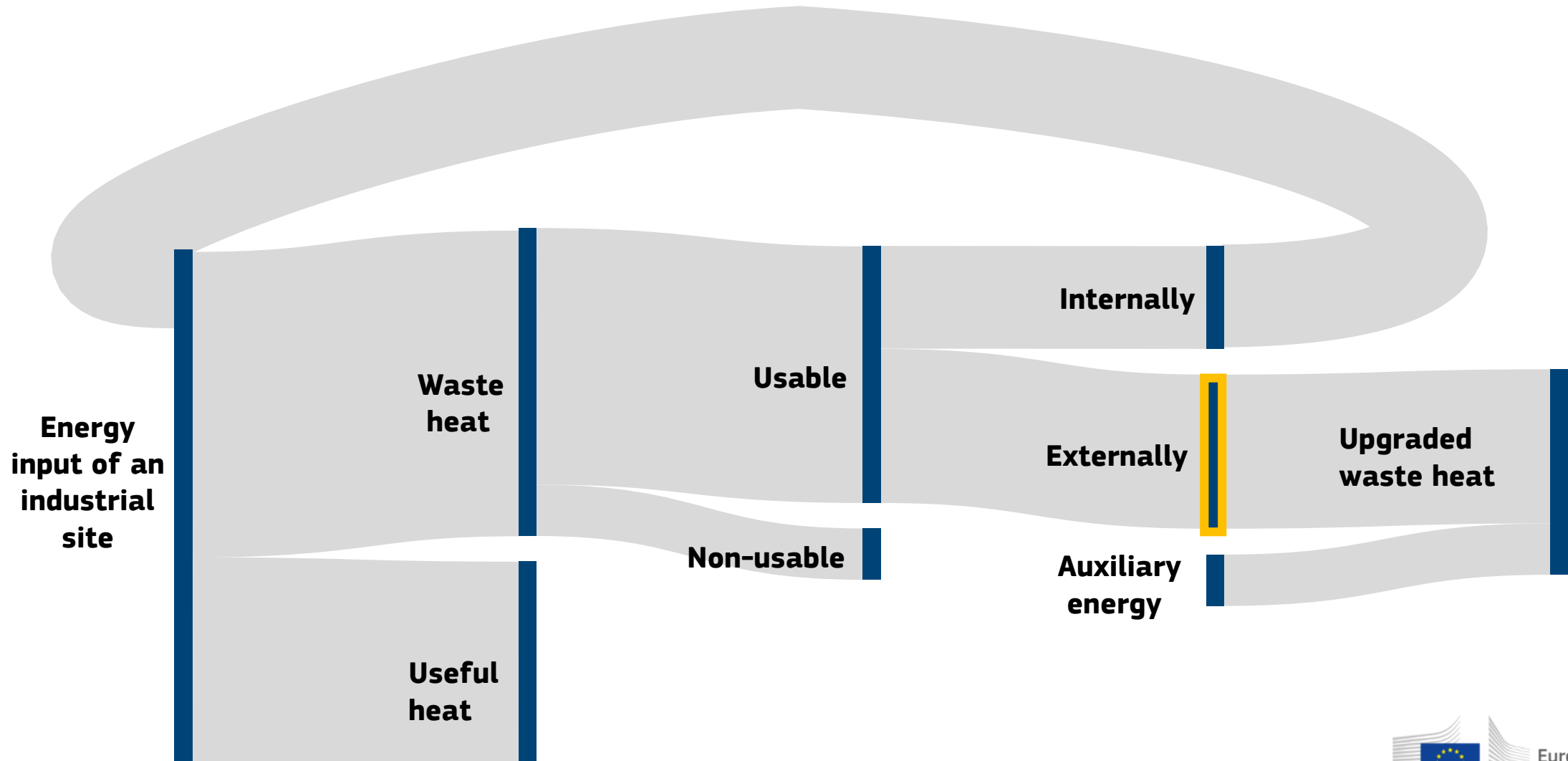
“unavoidable heat or cold generated as by-product in **industrial or power generation installations, or in the tertiary sector**, which would be dissipated unused in air or water without access to a district heating or cooling system, where a cogeneration process has been used or will be used or where cogeneration is not feasible”

- Article 2(9), recast RED

Potential sources

- Thermal power plants that can supply, or be retrofitted to supply, waste heat with total thermal input exceeding 50 MW – **condenser heat only**
- Cogeneration installations with total thermal input exceeding 20 MW – **condenser heat only**
- Incineration plants – **treated like power generation or cogeneration**
- Renewable energy installations with a total thermal input exceeding 20 MW generating heating or cooling using energy from renewable sources
- Industrial installations with a total thermal input exceeding 20 MW that can provide waste heat – **unavoidable only**
- Other/tertiary sources (data centres, wastewater treatment, metro stations...)

Example energy process



RED definition of waste heat and cold (4)

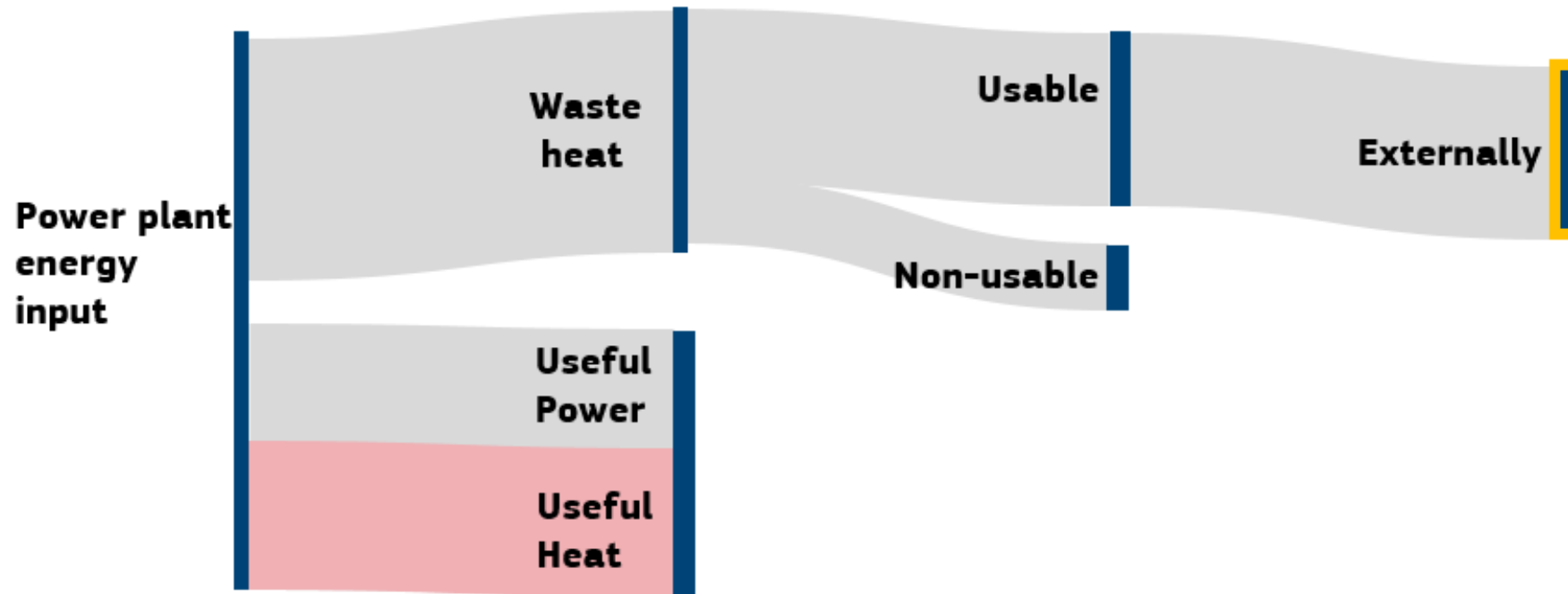
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- Article 2(9), recast RED

Cogeneration is not a by-product

Usable heat from cogeneration plants cannot be considered waste heat



Waste heat and cold in RED sectoral targets

Sector		By-product		Energy efficiency		Use
Power generation	+	Waste	+	Unavoidable waste	+	Sale to a DHC network
Cogeneration						
WtE						
Industry		Intended production		Avoidable waste		On-site use
Services						Industrial symbiosis
Residential						Any off-site use other than DHC

RED and EED under negotiation

- EC proposed FF55 in July 2021
- EED and RED are currently being negotiated by the Council and the European Parliament, and the European Commission.
- Adoption expected by the end 2022
- The proposal by the EC is briefly presented here.

Articles 23 and 24, and 15a of RED

- **23:** *Binding* target to increase share of RES by 1.1 pp per year in H&C sector.
 - When WHC is used the increase must be 1.5 pp per year.
 - WHC can account up to 40% of average annual increase.
 - Both EP and Council has similar amendments on including WCH up to 40% (EP) or 0,4 pp (Council) and increasing the target by half of the WHC used.
- **24:** *Indicative* target to increase share of RES/WHC in DHC by 2.1 pp per year
 - information on the energy performance and the share of renewable energy in their DHC systems is provided to final consumers in an easily accessible manner
 - obliging the connection of third-party suppliers of WHC to systems above 25 MW (with some exceptions)
 - WHC can be used up to 100% to fulfil the indicative 2.1 ppt target.
 - MSs should put in place coordination framework to facilitate the use of WHC
 - Both EP and Council maintain the 100% WHC flexibility, EP raises indicative target to 2.3 ppt
- **23&24:** For those MSs, with RES shares above 50% in the H&C sector, only half of the binding annual increase rate is required, and greater than 60% count as any such share as fulfilling the average annual increase rate
- **15a** (RES in buildings): Indicative RES target of 49% for EU building sector
 - EP and Council includes WHC to fulfil the target up to 20%, target must be increased by half of the WHC used, with upper limit of 54% in EP text.

Proposed article 24 EED – Efficient DHC

- until 31 December 2025, a DHC system using at least 50% RES, 50% WH, 75% CHP heat or 50% of a combination of such energy and heat
- from 2026, at least 50% RES, 50% WH, **80% of HECHP heat** or at least a combination of such thermal energy going into the network where the share of renewable energy is at least **5%**;
- from 2035, at least 50% RES and WH, where the share of RES is at least **20%**;
- from 2045, at least **75 %** RES and WH, where the share of RES is at least **40%**;
- from 2050, **only** RES and WH, where the share of RES is at least **60%**.

JRC reports about DHC and WHC

- Defining and accounting for waste heat and cold
<https://publications.jrc.ec.europa.eu/repository/handle/JRC126383>
- Integrating renewable and waste heat and cold sources into district heating and cooling systems
<https://publications.jrc.ec.europa.eu/repository/handle/JRC123771>
- Efficient district heating and cooling markets in the EU: Case studies analysis, replicable key success factors and potential policy implications
<https://publications.jrc.ec.europa.eu/repository/handle/JRC104437>

Thank you

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Suggested approach for Comprehensive Assessments

- Member States are requested to identify:
 - industrial installations with a total thermal input exceeding 20 MW that can provide waste heat
 - thermal power generation installations that can supply or can be retrofitted to supply waste heat with a total thermal input exceeding 50 MW
- Assumptions can be made for the fraction of unavoidable waste heat that is used off-site
- However, the temperature of waste heat and cold and the fraction of it that is used vary significantly by sector
- Greater accuracy would require site-level analysis, i.e. pinch analysis
- sEEnergies project is an important source of reference values

Comprehensive Assessments latest round

- 6 Member States (LT, PL, RO) have not yet sent their CA
- All Member States except HU referred to waste heat. Some give a lot of information (AT, DE, EE, HR)
- Some (e.g. NL) give only a little information. MT mentions that the country is too small to efficiently take into consideration waste heat
- Only four Member States (CZ, FR, IT, NL) referred to Article 23, with NL just mentioning it