Submission to the Consultation on the Introduction of the European Union (District Heating) Regulations 2022

Prepared by Codema - Dublin's Energy Agency

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Background

Codema is Dublin's Energy Agency is a not-for-profit company limited by guarantee and was founded in 1997. We are the energy agency to the four Local Authorities in Dublin, and our mission is to accelerate Dublin's low-carbon transition through innovative, local-level energy and climate change research, planning, engagement and project delivery, in order to mitigate the effects of climate change and improve the lives of citizens. We are the Dublin Local Authority's one-stop-shop for developing pathways and projects to achieve their carbon reduction and climate targets. Examples of Codema's work include energy masterplanning, district heating system analysis, energy performance contracting, management of European projects, energy saving behavioural campaigns and detailed energy reviews. Codema is well networked in Europe and has been very successful in bringing European projects to Dublin with a local implementation for the Local Authorities.

Context

Codema's Experience in District Heating

Codema is Ireland's leading expert in District Heating research and project implementation. We have built the evidence-base to support the roll-out of DH in Dublin, developing the first heat demand and heat source maps in Ireland, based on European best practice methodologies. We have identified potential projects across Dublin and, working with Local Authority project champions, have **brought projects from idea to reality; from pre-feasibility, techno-economic analysis, business case through to securing funding, procurement, contracting and delivery**. We are the Dublin Local Authority's one-stop-shop for the roll-out of DH projects. Codema therefore very much welcome this opportunity to make a submission to this consultation on "the Introduction of the EU (District Heating) Regulations 2022", which has the potential to be a key initiative for decarbonising heating in Ireland. We fully understand the barriers at all stages of the project development process and hope our submission will be informative to DHLGH.

Based on our knowledge of best-practice in the European DHC market and our close collaboration with cities and energy agencies across Europe through involvement in multiple EU projects, we feel strongly that the ownership of DHC systems should lie with the public sector. Enabling LAs and giving them the autonomy and resources to act at a local level in the energy sector will also not only help to overcome some of the many barriers facing the development of DHC in Ireland, but importantly ensure the development of a low-cost, low-carbon heating solution that puts priority on the protection of customers. It enables a local, bottom-up energy utility to evolve whose core values are based on **making the region lower-carbon and a more attractive, healthier environment for its citizens**. It allows **fair and equal access** for the lowest carbon, lowest cost heat suppliers to supply the system. It also allows possibilities to open **investment opportunities to urban citizens to invest in local low-carbon energy projects**.

Codema is a founding member of the **Irish District Energy Association (IrDEA)**, and some of our response will also be reflected in the IrDEA submission.

Response to Consultation

Codema welcomes the opportunity to make a submission on a vitally important piece of low-carbon infrastructure which is one of the cornerstones of a smart energy system, district heating and cooling (DHC) networks. Heating is a hugely important sector in Ireland when it comes to decarbonisation as it represents approximately **40% of energy demand (twice the demand of electricity)** and is the worst performing sector in terms of renewable proportion (currently at 6.3% of total heat production) behind both electricity and transport. **District heating is new technology in Ireland, currently representing less than 1% of the heat market but with potential for this to be between 50% and 60% based on a 2019 study performed by the Heat Roadmap Europe researchers and results from SEAI's 2022 National Heat Study**. District heating networks potential to enable greater uptake of renewable and waste heat sources is shown in the figure below where there is a strong correlation between DH and renewable heat proportions.

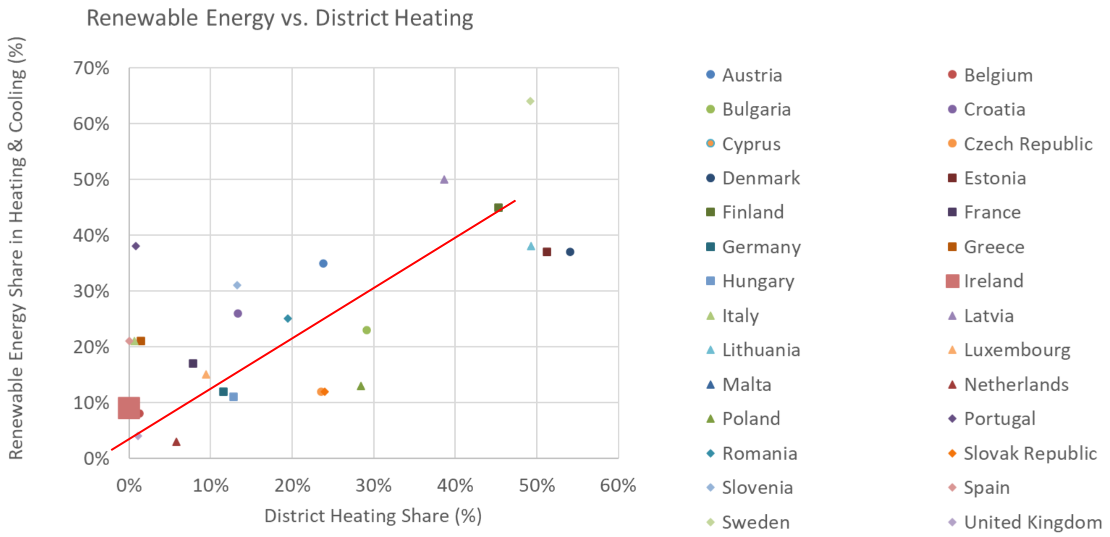

Figure 1: Correlation Between Renewable Heat Share and District Heating Share in Europe (Source: Heat Roadmaps Europe)

Apart from being a method for increasing the proportion of low-carbon and renewable heating, DHC provides many additional benefits to an overall integrated energy system, such as:

- **Easier integration of renewable and low-carbon heat sources** without disruption to customers/homeowners as access to each individual dwelling is not required
- **Lower local air pollution** as buildings fossil fuel boilers would no longer be required
- Facilitates **utilisation of indigenous low-carbon resources which would not make sense at a smaller (individual building) scale such as deep geothermal and industrial waste heat resources** – leading to more efficient operation of both industrial plants and heat production and supporting a more circular economy by reusing the waste heat that would otherwise be dumped into the atmosphere or into local water bodies
- **Provides storage and demand side response for the electricity grid** at a fraction of the cost of battery storage when supplied by large-scale heat pumps, electric boilers etc. This also **facilitates greater production of renewable electricity** (e.g. curtailment of wind turbines can be reduced) due to the flexibility provided by this thermal storage capacity.
- **Increased customer safety** as there is no risk of gas leaks or carbon monoxide due to on-site combustion of fuels
- **Benefits local economy** by providing low-cost heating to customers (reduced overheads) and residents (**reduced fuel poverty**), keeping money spent on heat in the local area rather than being spent on imported fossil fuels and providing **new local employment** in the construction, operation and maintenance of the network
- **Reducing Ireland's vulnerability to fuel price fluctuations**
- **Providing a just transition for those with complementary skills** which currently work in the fossil fuel industry (welders, engineers, civil contractors, geotechnical experts, etc.)
- Efficient operation of heat production plants is ensured by **constant monitoring, operation and maintenance being carried out by trained professionals** – this is not possible with solutions located in individual homes where equipment is often not maintained to regularly achieve **high operating efficiencies throughout its life**

General Comments

- Codema welcome these updates to the Part L process to reflect the significant role district heating and cooling can play in tackling Ireland's carbon emissions.

- The stated aim of Part L is to limit the use of fossil energy and related CO2 emissions. Codema believe that buildings should be assessed primarily on the Carbon Performance Coefficient (CPC) requirement of the building as the triple lock of achieving required

Energy Performance Coefficient (EPC), CPC, and Renewable Energy Ratio (RER) targets is not necessary to achieve this decarbonisation goal (the EPC and RER already contribute to improving the CPC without further targets being required). These further targets can also lead to unforeseen negative consequences from a decarbonisation perspective. As an example:

  - A fully renewable biomass district heating network would over achieve significantly on CPC (provide a significant reduction in carbon emissions) and RER but will not satisfy the EPC requirements. In this case, it may be possible to relax EPC requirements when achieving CPC figures that are significantly better than targeted. A precedent for such an approach already exists where overachieving in one area can allow a relaxing of threshold values in another - In NEAP where an EPC ≤ 0.9 and CPC ≤ 1.04 results in a lower allowable RER of 0.1 (rather than 0.2).

  - The RER is not a requirement in many other European countries as this already feeds into the carbon emissions requirement. The proposed RER + WHR (Waste Heat Recovery) approach is a work around to satisfy this RER requirement but the requirement itself is in fact unnecessary and removing it would simplify the process.

- A report produced by Building Performance Institute Europe (BPIE)[1] provides additional information on what can be included in BERs/EPC certificates to help the development of DHC networks. This includes:
  - Providing details of the nearest DH network or waste heat source as outlined in the report by BPIE in order to raise awareness of low-carbon heating opportunities outside of individual building systems among BER assessors and designers at an early stage.
  - Providing details that are important for heat planning and DHC feasibility analysis such as tenure of building, heating system operating temperatures (minimum flow and expected return temperatures), geolocation or Eircode of building where available, etc.

  We would recommend that these be included in Irish BER assessments.

- There is inconsistency around how renewable electricity and renewable heat are treated within the current BER process e.g. solar PV electricity generated is taken away from the total energy demand but renewable biomass energy is not. The solar electricity may not even be used onsite, and may spill back to the grid, but is still fully accounted for and is

[1] https://x-tendo.eu/wp-content/uploads/2021/03/X-TENDO_MINI_5_District-energy_03.pdf

subtracted from the total energy. We feel the production of renewable electricity and renewable heat should be treated equally, and one renewable technology not given an advantage over others.

- It should also be noted for clarity that Combined Heat & Power (CHP) plants which burn fuels and Energy from Waste (EfW) plants are not the same thing - The primary function of a CHP is to generate heat and electricity and will burn fuel to achieve this. The primary function of an EfW plant is to dispose of waste and can produce electricity and heat as a by-product of this. The CO2 emission produced by the EfW plant will not change whether it supplies heat to a DH network or not. As such there should be zero carbon associated with the waste heat and the associated carbon emissions for the use of this waste heat should be determined by the trade off in electricity production of the plant (when it is not being curtailed), the electricity associated with capturing the waste heat and the fuel used as peaking/backup heat supply to the network.

- If there is a case where default Primary Energy Factors (PEF) and Carbon emission factors are being considered and a responsible body has assumed a conservative estimate, these defaults may not support the integrity of the Part L process as it does not accurately represent the real decarbonising potential of the actual DHC system. This may underestimate the benefits of DHC systems and hinder project development. In this instance it is better that the DHC operator/designer can provide the best available data to derive more accurate factors. These can be further verified as the project progresses.

Responses to Consultation

Draft EU Regulations - Overview

Citation and construction

1. (1) These Regulations may be cited as the European Union (District Heating) Regulations 2022.

(2) The Building Regulations 1997 to 2021 and these Regulations may be cited together as the Building Regulations 1997 to 2022 and shall be construed together as one.

Definition

2. (1) In these Regulations –

"Directive" means Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources;

"efficient district heating and cooling" means a district heating or cooling system using at least –

(a) 50% renewable energy,

(b) 50% waste heat,
(c) 75% cogenerated heat, or
(d) 50% of a combination of such energy and heat.

(2) A word or expression used in these Regulations and which is also used in the Directive has, unless the context otherwise requires, the same meaning in these Regulations as it has in that Directive.

3. The minimum levels of energy from renewable sources, referred to in Article 15(4) of the Directive, may be fulfilled through efficient district heating and cooling using a significant share of renewable energy and waste heat and cold.

Response

Codema proposes an additional definition of an efficient district heating and cooling (DHC) network to that set out in the "Draft EU DH Regulation" PDF document. District heating and cooling networks which satisfy either the definition proposed in the "Draft EU DH Regulation" PDF document or the additional definition set out below should be considered an Efficient District Heating and Cooling network. Codema support the inclusion of this additional definition, which is based on the carbon content of the heat delivered, for the following reasons:

- This additional definition supports a technology neutral approach to decarbonising the heating sector which allows the flexibility to adopt a greater range of sources (such as waste heat sources) which are lower carbon and more cost effective, therefore facilitating greater decarbonisation. The use of the EED definition alone is set to become overly prescriptive from 2026 onwards when minimum renewable proportions will be required for a DHC network to be defined as efficient under the EU Fit for 55 package. This does not recognise that waste heat sources represent a lower carbon option when compared with most renewable options and limits the use of low-cost, indigenous, low-carbon heat sources which can catalyse greater growth of the DH sector and help Ireland achieve its target of 2.7TWh of heat to be supplied by DHC by 2030.

- This additional definition also enables full utilisation of local heat sources available in each area, allowing the wider benefits of waste heat absorption to be fully realised (i.e. reducing the impact on the increasingly constrained electricity grid, provision of free cooling as a by-product, reduced water consumption by cooling systems, etc.).

Response - Additional Definition of an Efficient District Heating and Cooling Network

Codema proposes a carbon content of heat delivered (gCO2/kWh heat) approach as an additional method for defining a DHC network as efficient i.e. networks which may not satisfy the 50% renewable content can also be defined as efficient if the carbon content of the heat delivered is lower than what is set out in this section. This approach is similar to that set out in the Proposal for a Directive of the European Parliament and of the Council on energy efficiency (recast)[2] which is shown in italics below. This approach is also being considered for adoption in other EU Member States such as the Netherlands. This carbon content approach is fully in line with the overall objective of cost-effective decarbonisation and is fully technology neutral. Codema have also performed a high-level analysis on whether such carbon content figures would be suitable for the Irish context discussed on the next page.

2. Member States may also choose, as an alternative to the criteria set out in points (a) to (e) of the paragraph 1 of this article, a sustainability performance criteria based on the amount of greenhouse gas emissions from the district heating and cooling system per unit of heat or cold delivered to the customers, taking into consideration measures implemented to fulfil the obligation pursuant to [Article 24(4) Renewable Energy Directive COM(2021) 557 final]. When choosing this criteria, an efficient district heating and cooling system is a system which has the following maximum amount of greenhouse gas emissions per unit of heat or cold delivered to the customers:

a. until 31 December 2025: 200 grams/kWh

b. from 1 January 2026: 150 grams/kWh

c. from 1 January 2035: 100 grams/kWh

d. from 1 January 2045: 50 grams/kWh

e. from 1 January 2050: 0 grams/kWh

Member states may choose to apply the aforementioned criteria of greenhouse gas emissions per unit of heat or cold for any given period referred to points (a) to (e) of this paragraph. When doing so, they shall notify the Commission of their choice at least six months before the beginning of the given period.

Potential Carbon Content Figures for Defining Efficient DHC Networks in Ireland

To provide a better sense of what these figures could be for the relevant years, Codema have carried out some analysis based on a range of scenarios looking at variables such as electricity

[2] https://data.consilium.europa.eu/doc/document/ST-10490-2022-INIT/en/pdf

grid decarbonisation and heat source breakdown to come up with some Irish-specific estimates (see below).

Scenarios B and C represent what Codema would consider a sufficient threshold efficient DHC network (each has slightly different assumptions for the electricity grid decarbonisation rate). The efficient DHC emissions factors from these scenarios are very similar to those set out in the Proposal for a Directive of the European Parliament and of the Council on energy efficiency (recast)[3] discussed above despite Ireland having carbon emissions factors for both grid electricity and gas that are above the EU average. Based on this analysis Codema broadly agree with the carbon content figures (gCO2/kWh) set out in the proposed EU directive for determining Efficient DHC systems, if the electricity grid and gas grid carbon factors reduce as expected.

It should be noted that the assumptions around heat losses consider that the network is designed so that the primary network losses are less than 20% and preferably 10% or lower at final build out[4]. However, networks which have big diameter pipes (which increase heat losses) to carry large loads at final build out but which initially are only carrying a small proportion of that heat may experience relatively high heat losses as a proportion of heat produced in this initial stage of development before expanding. In this case temporary heat losses in excess of 20% may be acceptable.

Scenario	A	B	C	D	E	F
Primary heat source efficiency	250%	280%	280%	320%	600%	600%
Primary proportion of heat	70%	75%	75%	85%	99%	99%
Primary heat source fuel	Elec	Elec	Elec	Elec	Elec	Elec
Secondary heat source efficiency	85%	85%	85%	85%	85%	85%
Secondary proportion	30%	25%	25%	15%	1%	1%
Secondary heat source fuel	Gas	Gas	Gas	Gas	Gas	Elec
Heat losses	30%	20%	20%	15%	7%	7%

[3] https://data.consilium.europa.eu/doc/document/ST-10490-2022-INIT/en/pdf
[4] In line CIBSE CP1 guidance

Carbon factor of electricity and gas grids	Elec factor lag based on typical part L. Gas factors held at current levels.	Elec factor lag based on typical Part L. Aggressive gas decarbonisation using existing gas network.	Elec factor based on 70% renewables by 2030 and 100% by 2050. Aggressive gas decarbonisation using existing gas network.	Elec factor based on 70% renewables by 2030 and 100% by 2050. Aggressive gas decarbonisation using existing gas network.	Elec factor based on 70% renewables by 2030 and 100% by 2050. Aggressive gas decarbonisation using existing gas network.	Elec factor based on 70% renewables by 2030 and 100% by 2050. Aggressive gas decarbonisation using existing gas network.

The table below provides the carbon content for each of the years stated in the EED Article based on the scenarios above. Please note that if the backup heat supply were to be renewable or electric boilers rather than gas, all scenarios would go to zero by 2050 if 100% decarbonisation of the electricity system were to be achieved by 2050, but would have a higher carbon content than systems using gas backup in the shorter term (before 2030).

gCO2/kWh	2025	2026	2035	2045	2050
A	210	200	150	120	105
B	165	155	105	75	55
C	150	140	100	70	55
D	110	105	70	45	35
E	45	40	20	10	5
F	45	40	20	10	0
Proposed in EU Directive (for comparison)	200	150	100	50	0

Additional Clarification of Definition of Efficient DHC with respect to "Renewable Energy"

The definition of Efficient District Heating and Cooling set out in the "Draft EU DH Regulation" PDF document references a figure of "50% renewable energy" for defining DHC networks as efficient. Codema wishes to request a clarification that renewable electricity when used by an electric boiler through a behind-the-meter connection (i.e. where the renewable electricity is used directly before it reaches the grid) or through a private wire connection can contribute to this "50% renewable energy" figure. Heat energy produced in this way should be considered "renewable energy" for the purpose of defining an efficient DHC network in order to fully recognise the role efficient DHC networks which utilise such installations in conjunction with large-scale thermal energy storage (which provide storage at a fraction of the cost of battery storage) can play in grid balancing and providing grid services such as frequency response to enable greater proportions of renewables on the electricity grid.

Dwellings - Part L Changes

Section 0.5 – Definitions:

1. Efficient District Heating and cooling: a district heating or cooling system using at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of such energy and heat.

2. Heat Generator: means the part of a heating system that generates useful heat using one or more of the following processes:
(a) the combustion of fuels in, for example, a boiler;
(b) the Joule effect, taking place in the heating elements of an electric resistance heating system;
(c) capturing heat from ambient air, ventilation exhaust air, or a water or ground heat source using a heat pump.

3. Waste heat and cold: unavoidable heat and 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.

Response to Definitions

Codema welcome the recognition in Part L that waste heat is considered on a par with renewable in line with Article 15 of the Renewable Energy Directive.

The definition of an Efficient DHC system should also include the additional carbon intensity definition (gCO2/kWh heat) as discussed in the Draft EU Regulations section above.

For completeness the definition of Heat Generators could also include the capture heat from liquids such as process heat which is currently sent to drain, direct liquid cooled processes e.g. direct liquid cooled data centres, oil-cooled transformers etc.

Prior to verification high-level guidance on what sources are considered waste heat could be provided to allow the utilisation of waste heat in DHC systems to be assessed at the early stage in order to help project development to progress. The provision of default Renewable PEF Factors, Non-Renewable PEF Factors and Carbon Emission Factors for various types of DHC network would be required to support this. To assess where these default factors can be used, high-level indicators of what is considered waste heat should be published. Waste heat could be defined at a high level using some of the following approaches:

- Waste heat is where the production of heat is not the primary business of the business from which the waste heat is being produced i.e. the process from which the waste heat is captured would continue whether the waste heat was utilised or not or where the heat is not produced intentionally e.g. data centres where provision of data storage is the primary business or EfW plants where the primary business is the management of waste without the use of landfill
- Waste heat is where the heat produced cannot be feasibly (technically or economically) reduced or reused on site i.e. where it cannot be used on site due to a lack of on-site demand or due to technical limitations to reuse based on the required temperature levels for heat demand on site
- Where the waste heat quantity available aligns with certain waste heat benchmarks based on the type of waste heat source - This could also be used to set a cap on the quantity of waste heat by certain waste heat sources and this cap could be used as a trigger to warrant more detailed verification of the heat as being waste heat.
- In general waste heat could also be defined as heat where the cost of the heat production exceeds what would be earned by the waste heat owner for its use in a DHC network. In some cases payment may be provided for heat from waste heat owners but this is generally in the form of compensation payment for any impact on their primary business or for the installation of heat recovery equipment required for utilisation in DHC networks

The verification process for waste heat could be broken into two where high-level verification as described above could be used at early stage (or below a certain threshold benchmark value) and more detailed verification at later stage of project development.

Section 1.2.11 and 1.2.15: For clarity the text could be updated to refer to renewable <u>or</u> waste heat as opposed to renewable <u>and</u> waste heat to ensure that it is clear to the reader that either can satisfy the requirement rather than needing both and ensuring that this text accurately reflects what is discussed in the "Draft EU DH Regulation" PDF document.

Section 1.2.12: For some heat sources verification may not be required as the waste heat from a particular process is by default unavoidable or undesirable to the business, such as in data centres or electrolysers producing green hydrogen.

Section 1.2.13: Codema welcomes the early publication of the DEAP Methodology.

Section 1.2.14: Where the MPEPC of 0.30 and MPCPC of 0.35 are achieved, a (RER+WHR) onsite and nearby of 0.20 represents a very significant level of energy provision from renewable energy technologies. A (RER+WHR) onsite and nearby of 0.2 represents 20 % of the primary energy from renewable energy technologies and waste heat from the efficient district system to total primary energy as defined and calculated in DEAP (methodology to be published).

Section 1.2.15: Where an efficient district heating system services a building that contains more than one dwelling, reasonable provision would be to show that:

- **every individual dwelling should meet the minimum provision from renewable energy technologies and waste heat specified in paragraph 1.2.3.1 above; or**
- **the average contribution of renewable technologies and waste heat to all dwellings in the building should meet that minimum level of provision per dwelling.**

Where there are both common areas and individual dwellings in a building, reasonable provision would be to show that the average contribution of renewable technologies and from waste heat to all areas meets the minimum level of renewable provision to the individual dwellings and common areas combined. In this case, a proportion of the renewable technologies and waste heat should be provided to each area and individual dwelling in the building.

Codema agree with the approach to combining dwelling in this way but do not agree with the triple lock approach as outlined in paragraph 1.2.3.1 as discussed in the general comments section above.

The reason for this is that the stated aim of Part L is to limit the use of fossil energy and related CO_2 emissions. Codema believe that buildings should be assessed primarily on the Carbon Performance Coefficient (CPC) requirement of the building as the triple lock of achieving required Energy Performance Coefficient (EPC), CPC, and Renewable Energy Ratio (RER) targets is not necessary to achieve this decarbonisation goal (the EPC and RER already contribute to improving the CPC without further targets being required). These further targets can also lead to unforeseen negative consequences from a decarbonisation perspective. As an example:

- A fully renewable biomass district heating network would over achieve significantly on CPC (provide a significant reduction in carbon emissions) and RER but will not satisfy the EPC requirements. In this case, it may be possible to relax EPC requirements when achieving CPC figures that are significantly better than targeted. A precedent for such an approach already exists where overachieving in one area can allow a relaxing of threshold values in another - In NEAP where an EPC ≤ 0.9 and CPC ≤ 1.04 results in a lower allowable RER of 0.1 (rather than 0.2).

- The RER is not a requirement in many other European countries as this already feeds into the carbon emissions requirement. The proposed RER + WHR approach is a work around to satisfy this RER requirement but the requirement itself is in fact unnecessary and removing it would simplify the process.

Buildings other than Dwellings - Part L Changes

Efficient District Heating and cooling: means a district heating or cooling system using at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of such energy and heat.

See comments from overview section

Waste heat and cold: means 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.

See comments from Dwellings section above

1.2.11 Efficient district heating means a district heating system using at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of such energy and heat. This should be verified by the Regulator of District Heat Networks (to be established) or by an independent competent body appointed by the Department of the Environment, Climate and Communications as set out in NEAP.

See comments from overview section above

1.2.12 The Renewable Energy Ratio (RER) and the Waste Heat Ratio (WHR) are respectively the ratio of the primary energy from renewable energy technologies and the primary energy from non-renewable waste heat from the efficient district heating system to total primary energy at building level or building unit level as defined and calculated in NEAP (methodology to be published).

1.2.13 Where the MPEPC of 1.0 and MPCPC of 1.15 is achieved, a (RER+WHR) onsite and nearby of 0.20 represents a very significant level of energy provision from renewable energy technologies.

A (RER+WHR) onsite and nearby of 0.2 represents 20 % of the primary energy from renewable energy technologies and waste heat from the efficient district heating system to total primary energy as defined and calculated in NEAP (methodology to be published).

Where an EPC of 0.9 and a CPC of 1.04 is achieved, a (RER+WHR) onsite and nearby of 0.10 represents a very significant level of energy provision from renewable energy technologies.

A (RER+WHR) onsite and nearby of 0.1 represents 10 % of the primary energy from renewable energy technologies and waste heat from the efficient district heating system to total primary energy as defined and calculated in NEAP (methodology to be published).

See comments from Dwellings section above

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