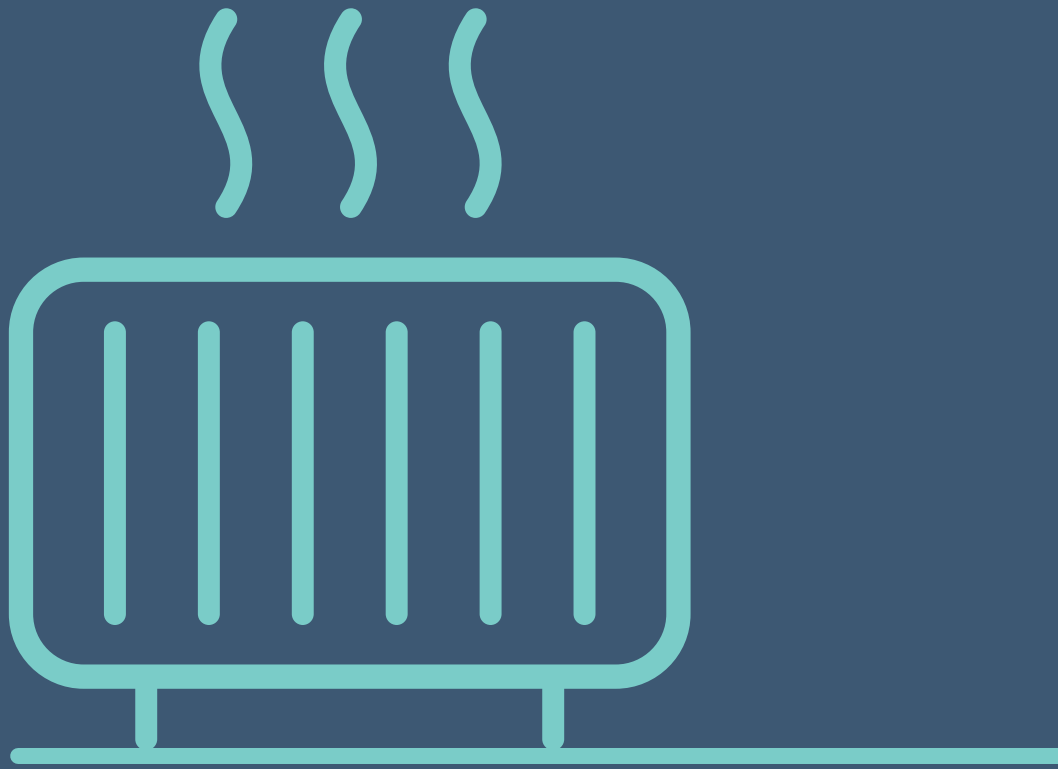
2024 UPDATE

Environmental Protection Agency

Rialtas na hÉireann
Government of Ireland



IRISH GPP CRITERIA: HEATING EQUIPMENT

IRISH GPP CRITERIA: HEATING EQUIPMENT

This document sets out the core and comprehensive GPP criteria for the purchase of heating equipment by Irish public bodies. The criteria cover the procurement of:

- Electric and fuel-driven heat pumps
- Steam systems
- Solar thermal collectors
- Water heaters
- Gas, electric, liquid and solid fuel boilers, including biomass boilers and cogeneration equipment

Under the ***Public Sector Climate Action Mandate***, as set out in Ireland's Climate Action Plan:

The public sector will not install heating systems that use fossil fuels after 2023, in (1) new buildings, and (2) "major renovation" retrofit projects as defined in the Energy Performance of Buildings Directive (EPBD) unless at least one of the following exceptions applies:

- The fossil-fuel use is only through using electricity from the grid.
- There is no technically viable non-fossil alternative (generally only related to applications for a purpose other than space heating).
- The installation of a renewable space heating system would increase final CO2 emissions.
- The fossil-fuel use is provided for backup, peaking, or operational purposes (and makes up less than 10% of annual heating energy).
- Where the direct replacement of existing fossil fuel heating is required for an emergency maintenance purpose.

These criteria have been updated as of April 2024, in line with policy and legislative changes

Note that the following items within these criteria are included in the SEAI Triple E Register, meaning that it is a requirement under Irish law[1] that public bodies only purchase products which meet the Triple E Register criteria (which are incorporated in these GPP criteria):

- Boilers and Hot Water Heaters
- Boiler Controls
- Condensate Recovery Systems
- Biomass Boilers
- Cogeneration equipment
- Heat pumps
- Steam Systems
- Localised Steam Generators
- Solar Thermal Collectors

The criteria are divided into core and comprehensive versions. The core criteria are expected to have minimal effect on costs or verification effort. The comprehensive criteria go beyond the core requirements to target enhanced environmental performance, and may imply some additional costs or verification effort.

The criteria have been developed based on the ***EU GPP Criteria for Water-based Heaters***, the ***SEAI Triple E Register criteria***, relevant Irish and European legislation and a consultation with Irish public bodies and suppliers. Further context for the development of the criteria, and advice on how they can be applied and verified within tender procedures, is given in the accompanying EPA guidance document.

Information on Life-cycle costing for this product group is included ***here***.

[1] Under S.I. No. ***151/2011*** and S.I. No. ***426/2014*** as amended by S.I. No. ***646/2016***. To ensure adequate competition, there is an exception to the requirement to purchase items meeting these criteria where, in the opinion of the public body concerned, there is, or is likely to be, an insufficient amount of equipment which meets the criteria.

WHAT DO THE CRITERIA COVER?

The following table summarises the core and comprehensive GPP criteria for Heating Equipment. A merged cell indicates that the same criteria apply at core and comprehensive levels. The bracketed codes are for the purposes of completing eForms data on Green Public Procurement (BT-774). Further information on eForms is available ***here***.

GPP IMPACT CODES FOR BT-774 IN EFORMS	
biodiv-eco	The protection and restoration of biodiversity and ecosystems
circ-econ	The transition to a circular economy
clim-adapt	Climate change adaptation
clim-mitig	Climate change mitigation

GPP IMPACT CODES FOR BT-774 IN EFORMS	
other	Other
pollu-prev	Pollution prevention and control
water-mar	The sustainable use and protection of water and marine resources

TARGETS FROM BUYING GREENER	RELEVANT IRISH GPP CRITERIA
T8: From January 2025, 100% of all tenders for the public procurement of energy related products, heating equipment, or indoor and outdoor lighting to include a requirement for tenderers to specify recommendations and options for the product, when the product or components of the product comes to the end of life, that consider environmental sustainability, including options for **reuse, repair, and recycling.**	**ALL SECTIONS:** **TS1.** CE marking, Ecodesign, Energy Label and WEEE registration **TS2. / TS5.** Product longevity and warranty **TS6. / TS8. / TS4.** Installation instructions and user information **TS7. / TS9. / TS5.** End-of-life service **AC2.** Extended warranty **CPC2.** Confirmation of WEEE reporting
T9: 100% of all tenders for the public procurement of heating systems to not install **heating systems that use fossil fuels**, in (1) new buildings, and (2) "major renovation" retrofit projects (as defined in the Energy Performance of Buildings Directive (EPBD)) subject to exceptions as specified in the Public Sector Climate Action Plan Mandate 2023.	The requirement for systems not to use fossil fuels may be included as part of the specification for any of the equipment covered by the Irish GPP criteria. In the case of Biomass Boilers, Heat Pumps and Solar Thermal Collectors the systems may be assumed to exclude fossil fuels.

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
A. **BOILERS** (INCLUDING BIOMASS BOILERS, COGENERATION AND TRIGENERATION)	**SC1.** Technical Capacity (clim-mitig; circ-econ; other)	
	TS1. CE marking, Ecodesign, Energy Label and WEEE registration (clim-mitig; circ-econ; pollu-prev; other)	
	TS2. Standing heat losses (clim-mitig)	
	TS3. Minimum energy efficiency (clim-mitig)	**TS3.** Minimum energy efficiency (clim-mitig)
	TS4. Boiler controls (clim-mitig)	
	TS5. Product longevity and warranty (circ-econ)	**TS5.** Product longevity and warranty (circ-econ)
	TS6. Installation instructions and user information (clim-mitig; circ-econ; pollu-prev; other)	
	TS7. End-of-life service (circ-econ; pollu-prev)	
	TS8. Additional requirements for biomass boilers (clim-mitig)	
	TS9. Additional requirements for combined heat and power (clim-mitig)	
	TS10. Additional requirements for trigeneration (clim-mitig)	
	AC1. Life-cycle costs (clim-mitig)	
	AC2. Extended warranty (circ-econ)	
		AC3. Emissions (clim-mitig)
		AC4. Noise emission limits (other)
	CPC1. Environmental performance (clim-mitig; circ-econ; pollu-prev; other)	
	CPC2. Confirmation of WEEE reporting (circ-econ; pollu-prev)	
B. **WATER HEATERS**	**SC1.** Technical capacity (clim-mitig; circ-econ; other)	
	TS1. CE marking, Ecodesign, Energy Label and WEEE registration (clim-mitig; circ-econ; pollu-prev; other)	
	TS2. Product longevity and warranty (circ-econ)	**TS2.** Product longevity and warranty (circ-econ)
	TS3. Minimum energy efficiency (clim-mitig)	**TS3.** Minimum energy efficiency (clim-mitig)
	TS4. Condensate recovery system (clim-mitig)	
	TS5. Gas condensing water heaters (clim-mitig)	
	TS6. Modulating output (clim-mitig)	

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
B. **WATER HEATERS**	**TS7.** Balanced flue (clim-mitig)	
	TS8. Installation instructions and user information	
	TS9. End-of-life service (circ-econ; pollu-prev)	
	AC1. Life-cycle costs (clim-mitig)	
	AC2. Extended warranty (circ-econ)	
		AC3. Emissions (clim-mitig)
		AC4. Noise emission limits (other)
	CPC1. Environmental performance (clim-mitig; circ-econ; pollu-prev; other)	
	CPC2. Confirmation of WEEE reporting (circ-econ; pollu-prev)	
C. **HEAT PUMPS**	**SC1.** Technical capacity (clim-mitig; circ-econ; other)	
	TS1. CE marking, Ecodesign, Energy Label and WEEE registration (clim-mitig; circ-econ; pollu-prev; other)	
	TS2. Product longevity and warranty (circ-econ)	**TS2.** Product longevity and warranty (circ-econ)
	TS3. Design for permanent installation (circ-econ)	
	TS4. Requirements for air source and water source heat pumps (clim-mitig)	
	TS5. Requirements for ground source heat pumps (clim-mitig)	
	TS6. Requirements for heat pump dehumidifiers (clim-mitig)	
		TS7. Primary and secondary refrigerants (clim-mitig)
	TS8. Installation instructions and user information (clim-mitig; circ-econ; pollu-prev; other)	
	TS9. End-of-life service (circ-econ; pollu-prev)	
	AC1. Life-cycle costs (clim-mitig)	
	AC2. Extended warranty (circ-econ)	
	CPC1. Environmental performance (clim-mitig; circ-econ; pollu-prev; other)	
	CPC2. Confirmation of WEEE reporting (circ-econ; pollu-prev)	

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
D. **STEAM SYSTEMS**	**SCI.** Technical capacity (clim-mitig; circ-econ; other)	
	TS1. CE marking, Ecodesign,Energy Label and WEEE registration (clim-mitig; circ-econ; pollu-prev; other)	
	TS2. Product longevity and warranty (circ-econ)	**TS2.** Product longevity and warranty (circ-econ)
	TS3. Condensate recovery systems	
	TS4. Requirements for economisers (clim-mitig)	
	TS5. Requirements for boiler blow-down controls (clim-mitig)	
	TS6. Requirements for flue gas shut-off dampers (clim-mitig)	
	TS7. Requirements for localised steam generators (clim-mitig)	
	TS8. Installation instructions and user information (clim-mitg, cir-econ, pollu-prev, other)	
	TS9. End-of-life service (circ-econ; pollu-prev)	
	AC1. Life-cycle costs (clim-mitig)	
	AC2. Extended warranty (circ-econ)	
	CPC1. Environmental performance (clim-mitig; circ-econ; pollu-prev; other)	
	CPC2. Confirmation of WEEE reporting (circ-econ; pollu-prev)	
E. **SOLAR THERMAL COLLECTORS**	**SCI.** Technical capacity (clim-mitig; circ-econ; other)	
	TS1. CE marking, Ecodesign, Energy Label and WEEE registration (clim-mitig; circ-econ; pollu-prev; other)	
	TS2. Product longevity and warranty (circ-econ)	**TS2.** Product longevity and warranty (circ-econ)
	TS3. Compliance with standards and performance parameters (clim-mitig; circ-econ; other)	
	TS4. Installation instructions and user information (clim-mitig; circ-econ; pollu-prev; other)	
	TS5. End-of-life service (circ-econ; pollu-prev)	
	AC1. Life-cycle costs (clim-mitig)	
	AC2. Extended warranty (circ-econ)	
	CPC1. Environmental performance (clim-mitig; circ-econ; pollu-prev; other)	
	CPC2. Confirmation of WEEE reporting (circ-econ; pollu-prev)	

IRISH GPP CRITERIA – HOW TO READ THE TEMPLATE

Scope	Defines the products and services to which the criteria apply.
Exclusions	Identifies any related products or services which are not covered by the criteria.
References	The primary sources consulted to develop the Irish GPP criteria.
Eco-labels	Type I eco-labels and other labels which address relevant environmental characteristics of the products or services and may be used either to define GPP criteria, verify compliance or both. Labels with equivalent criteria must also be accepted.
Legislation & Standards	Relevant EU and Irish legislation which applies within the sector and International, European or Irish standards which may be referenced in technical specifications (accompanied by the words 'or equivalent').
Notes	Practical tips and advice on applying the criteria, and explanations of the environmental impacts being addressed.
Core Criteria	Criteria which can be applied by any Irish public body and which are expected to have minimal effect on costs or verification effort.
Comprehensive Criteria	Criteria which go beyond the core requirements to target enhanced environmental performance and may imply some additional costs or verification effort.
Selection Criteria	Criteria which operators must meet in order to be eligible for tender submission (in a two-stage procedure) or award (in an open procedure).
Specification	Minimum requirements which all tenders must meet. Where multiple specifications are included in the criteria, these may be used together (recommended) or separately.
Specification – Variant	An optional alternative to the specification, which allows alternative solutions to be considered.
Award Criteria	Criteria which target environmental performance beyond the minimum requirements of the specification. These may be qualitative or quantitative in nature and must be weighted for evaluation. Suggested ranges for weighting of award criteria are included in **[blue brackets]** however it is up to the contracting authority to determine an appropriate weighting based on its priorities and the totality of criteria which it is applying in a specific tender.
Contract Performance Clauses	Clauses which can be inserted into contracts in order to manage environmental aspects and promote progressive improvements in delivery.

SCOPE, REFERENCES, LEGISLATION & CERTIFICATIONS/LABELS	
IN SCOPE	Products that are used to generate heat as part of a water-based central heating system, where the heated water is distributed by means of circulators and heat emitters in order to reach and maintain the indoor temperature of an enclosed space such as a building, a dwelling, or a room, at a desired level. The operation of the heat generator can be based on a number of processes and technologies, such as: • Combustion of gaseous, liquid or solid fossil fuels • Combustion of gaseous, liquid or solid biomass (minimum 50 kW output) • Use of the Joule effect in electric resistance heating elements • Capture of ambient heat from air, water or ground source, and/or waste heat • Cogeneration (the simultaneous generation in one process of heat and electricity) • Solar (auxiliary) The maximum output power of the water-based heaters covered by these criteria is 400 kW. Combination heaters are included in the scope of this product group, provided that their primary function is to provide ambient heat. Circulators are included where these are an integral part of the heater. Water heaters based on any of the above technologies are also included.
NOT IN SCOPE	The following products fall outside of the scope of these criteria: • Biomass boilers with an output less than 50 kW; • Heaters for heating and distributing gaseous heat transfer media such as vapour or air; • Space heaters that combine both indirect heating, using water-based central heating system, and direct heating, by direct emission of heat into the room or space the appliance is installed. • Circulators which are supplied separately (e.g. for larger heaters) **NOTE:** Air conditioning units (which may also include heating functionality) and ventilation units are covered by the Irish GPP criteria for Energy-related products, which reflect Ecodesign requirements, the EU Energy Label and the Triple E Register criteria.
ECOLABELS	• EU Energy Label for ***Space and Water Heaters***, ***Local Space Heaters*** and ***Solid Fuel Boilers***
REFERENCE DOCUMENTS	1. European Commission (2014) ***EU GPP Criteria for Water-Based Heaters*** and ***Technical Background Report*** 2. European Commission (2022) ***Assessment of the European Union Green Public Procurement criteria for four product groups*** 3. Office of Public Works (2022) ***Report on Phasing Out Fossil Fuel Heating in Public Sector Buildings*** 4. Sustainable Energy Authority of Ireland (various dates), ***Eligibility Criteria for Triple E Register*** 5. Sustainable Energy Authority of Ireland (2019) ***Biomass Boilers Implementation Guide*** and ***Sustainable Biomass in Ireland*** 6. Sustainable Energy Authority of Ireland (2020) ***Heat Pumps Implementation Guide*** and ***Heat Pumps Operation and Maintenance Guide*** 7. European Commission (2018) ***Guidelines accompanying Regulations 811, 812, 813 and 814/2013 and Regulations 2015/1187 and 1189***

SCOPE, REFERENCES, LEGISLATION & CERTIFICATIONS/LABELS

LEGISLATION & STANDARDS

- ***S.I. 151/2011 European Union (Energy Efficient Public Procurement) Regulations 2011***
- ***S.I. 669/2022 European Union (Energy Labelling) Regulations 2022***
- ***S.I. 454 of 2013 European Union (Ecodesign Requirements for certain energy related products) Regulations***, as amended by ***S.I. 228 of 2016***, ***S.I. 96/2021*** and ***S.I. 671/2022***
- S.I. No. 426/2014 - ***European Union (Energy Efficiency) Regulations 2014***, as amended by S.I. No. ***646/2016*** and ***S.I. 630/2022***
- Directive 2009/125/EC ***establishing a framework for the setting of ecodesign requirements for energy-related products***
- Directive 2012/27/EU ***on energy efficiency***, as amended by ***Directive 2018/2002*** and ***Directive 2019/944***
- ***Directive (EU) 2023/1791 on energy efficiency*** (repealing Directive 2012/27/EU from 12 October 2025)
- Regulation (EU) 2017/1369 ***setting a framework for energy labelling***
- Regulation (EU) 811/2013 ***on energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device***
- Regulation (EU) 2015/1187 ***on energy labelling of solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices***
- Regulation (EU) 812/2013 ***on energy labelling for water heaters and hot water storage tanks***
- Regulation (EU) 813/2013 ***on ecodesign requirements for space heaters and combination heaters***
- Regulation (EU) 814/2013 ***on ecodesign requirements for water heaters and hot water storage tanks***
- Regulation (EU) 2015/1189 ***on ecodesign requirements for solid fuel boilers***
- ***Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment*** (RoHS)
- ***Regulation (EU) No 517/2014 on fluorinated greenhouse gases*** and Commission Implementing Regulation ***(EU) 2018/2066***
- ***Directive 2012/19/EU on waste electrical and electronic equipment*** (WEEE Directive) and ***S.I. 149/2014***, as amended by ***S.I. 233/2019***
- ***Directive 2002/49/EC relating to the assessment and management of environmental noise***

SCOPE, REFERENCES, LEGISLATION & CERTIFICATIONS/LABELS	
NOTES	**EU Energy Label:** A new space or water heater or solid fuel boiler (up to 70 kW) comes with an energy label showing its energy efficiency class. As of 1 January 2019, suppliers (manufacturers, importers or authorised representatives) need to register products requiring an energy label in the ***European Product Database for Energy Labelling*** (EPREL). For individual products, ratings may range from G (least efficient) to A+++ (most efficient). It is also possible to buy a combination of technologies, such as a boiler with a solar hot water storage tank, in order to reach an A+++ energy efficiency rating. A process for updating the Energy Label requirements for ***space and combination heaters***, ***water heaters/storage tanks + solar devices***, ***local space heaters*** and ***air-to-air heat pumps*** is expected to result in new regulations for these products in 2024. **As these requirements had not yet been published at the time of the interim review carried out in 2024, a further update to the criteria in 2025/26 is expected.** The **Ecodesign regulations** set requirements for energy efficiency, nitrogen oxide emission levels, volume for storage water heaters, heat losses from hot water storage tanks, and a range of other criteria. From September 2018 space heater and combination heaters must meet all of the requirements set out in Regulation (EU) 813/2013 and water heaters must meet all of the requirements set out in Regulation (EU) 814/2013. From 1 January 2020 all solid fuel boilers must meet the requirements of Regulation (EU) 2015/1189. A process for updating the Ecodesign regulations for ***space and combination heaters***, ***water heaters/storage tanks + solar devices***, ***local space heaters*** and ***air-to-air heat pumps*** is expected to result in new regulations for these products in 2024. Under the CAP public bodies in Ireland will no longer install heating systems which use fossil fuels, however there are a number of defined exceptions. The GPP criteria for boilers are **technology-neutral**, so that they can be used in tenders for gas, liquid or solid (including biomass) fuel boilers. In some cases, contracting authorities may wish to allow bidders to propose different technologies. Specific requirements apply for biomass boilers, cogeneration and trigeneration based on the Triple E criteria, and these are included in the Technical Specifications.

SCOPE, REFERENCES, LEGISLATION & CERTIFICATIONS/LABELS

NOTES

ENERGY EFFICIENCY REQUIREMENTS FOR PUBLIC PROCUREMENT

Under the Energy Efficiency Regulations (***S.I. 426/2014***) the following rules apply to central government contracts above the EU threshold:

- For products subject to the EU Energy Label, only products belonging to the highest energy efficiency class possible in the light of the need to ensure sufficient competition may be purchased;
- Where a product is not subject to the EU Energy Label but is covered by an Ecodesign Regulation, only products complying with the energy efficiency benchmarks in the relevant Regulation may be purchased;
- For office ICT equipment, only purchase products that comply with the minimum energy efficiency requirements under the Energy Star program;
- Only purchase tyres that comply with the highest fuel energy efficiency class as defined in Regulation (EC) 1222/2009 ;
- In service contracts, require that any new products purchased by service providers partially or wholly for the purpose of providing the service in question comply with the above requirements;
- Only purchase or lease buildings that comply with certain minimum energy performance requirements.

In addition, under ***S.I. 646/2016*** a public body shall only procure equipment which:

- is listed on the SEAI's Triple E Product Register, or
- satisfies the published SEAI energy efficiency criteria for the equipment or concerned, and the public body shall specify this requirement in any documentation describing its procurement requirements.

In 2023, a new Energy Efficiency Directive (2023/1791) was adopted, which extends the obligations for energy-efficiency in procurement across all contracting authorities and entities, when awarding contracts valued above the EU thresholds. The deadline for implementing the new Directive falls in October 2025. Under Article 7 and Annex IV of the Directive, the following requirements will apply:

- The '***energy efficiency first***' principle must be applied in covered procurements;
- For products covered by the EU Energy Label, purchase only products that meet the highest two significantly populated classes of energy efficiency under the relevant label;
- Where a product is not subject to the EU Energy Label but is covered by an Ecodesign Regulation, purchase only products complying with the energy efficiency benchmarks in the relevant Regulation;
- Where a product or service is covered by EU or national GPP criteria with relevance to energy efficiency, make best efforts to purchase only products and services that respect at least the technical specifications set at 'core' level;
- Purchase only tyres that comply with the criterion of having the highest fuel energy efficiency class, as defined in Regulation (EU) 2020/740 ;
- In service contracts, require that any new products purchased by service providers partially or wholly for the purpose of providing the service in question comply with the above Energy Label and Ecodesign requirements;
- Purchase, or make new rental agreements for, buildings that comply at least with the nearly zero-energy level.

Depending on Ireland's transposition of the Directive, additional requirements may apply, for example to take wider sustainability, social, environmental and circular economy aspects in procurement practices.

SCOPE, REFERENCES, LEGISLATION & CERTIFICATIONS/LABELS

NOTES

ECODESIGN AND ENERGY LABELLING

The EU requirements for Ecodesign and Energy Labelling evolve over time and contracting authorities should check to the requirements applicable at the time of tendering. The easiest way to do so is by consulting ***this page***. The requirements included in this criteria document are those which apply as of January 2024. In 2022, the European Commission published a proposal for a new ***Ecodesign for Sustainable Products Regulation*** (ESPR), which will extend Ecodesign regulations to a number of new product categories and broaden their scope.

RENEWABLE ENERGY DIRECTIVE AND ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE

In 2023 significant amendments were adopted to the ***Renewable Energy Directive (2023/2413)***, with the aim of increasing the share of energy from renewable sources in the EU's overall energy consumption to at least 42.5% by 2030. For buildings, the target is for a renewable energy share of at least 49% by 2030. Several of the amendments have direct relevance for procurement of heating systems, for example the changes to the definition of sustainable biomass and requirements for accelerated permitting procedures for renewable energy projects. Further information is available on ***this page***. The revised ***Energy Performance of Buildings Directive*** (not finalised at time of writing) will also have implications for heating systems installed in public buildings.

CIRCULAR ECONOMY

A number of circular economy considerations are relevant when purchasing energy-related products. These include:

- Purchase of refurbished or second-hand equipment where suitable
- Use of recycled materials or components in products
- Design of products to ensure durability, repairability and flexibility in use
- Design of products to ensure recyclability of components and materials
- Extension of service life through maintenance, repair and availability of spare parts
- End-of-life treatment which maximises reuse or recycling of parts and materials

These considerations are reflected in the Irish GPP criteria, in particular through the requirements related to Ecodesign, warranties, installation and user instructions, and end-of-life treatment. Public bodies should ensure that any purchased equipment is from a producer who meets the requirement to be registered with the national registration body for WEEE (***Producer Register Limited***). Further information on Ireland's circular economy strategy can be found here.

RIGHT TO REPAIR – PROPOSED EU LEGISLATION

In March 2023, the European Commission published proposed legislation to create a common set of rules promoting repair of goods. This would help to ensure access to repair services, thus reducing waste and greenhouse gas emissions. While these rules are not yet law, the Irish GPP criteria promote repairability of heating equipment, including under warranty. Further information is available ***here***.

HOW CAN THE CRITERIA BE APPLIED AND VERIFIED?

Information about how each of the criteria can be verified is included. The verification methods form an essential part of the criteria and must be included in tender documents to ensure that suppliers are aware of how compliance with the criteria will be assessed. The forms of verification referred to in the criteria include:

- The product **Certificate of Conformity** or **Product Information Sheet**
- A valid **Energy Label** and evidence of the product's registration on the **EPREL database**
- Where the criteria are based on the **SEAI Triple E Register** criteria, inclusion of a specific product on this Register can verify compliance. Alternatively, technical documentation and/or test results which demonstrate compliance with the criteria should be accepted.
- Provision of **test results** based on the specified EN standards for each product type, or equivalent standards.
- Information and instructions from the manufacturer regarding the correct installation, calibration, usage, disassembly, repair and end-of-life treatment for products and their components.

There should be a clear link between all supporting documentation supplied and the product being submitted. This will typically take the form of a product code or product name that can be cross referenced between the submitted product and relevant supporting documentation. If product codes/names have been changed since publication of the supporting documentation, then a record of this must be provided with the supporting documentation supplied. Any deviation from these requirements should result in the supporting documentation not being considered adequate for the purposes of demonstrating compliance with the criteria.

Test Reports

A test report must include the following elements: An outline of the complete test including introduction, details on test conditions and standards applied, the specific model details of the product tested, the steps taken in the test, the results, graphical representations, and a conclusion. All documents should be on headed paper and the document should be officially signed off. All documentation must be in English, or include an adequate translation.

Certification

If certificates are provided, tests must be carried out by an organisation accredited by a national accreditation body recognised via the ***European Cooperation for Accreditation*** or the ***International Accreditation Forum***. All documentation must be in English or include an adequate translation.

Equivalence

Some criteria conditions allow for scientifically equivalent tests and/or standards to be used. In the event that a product has not been designed, manufactured or tested to the specific standard named, then documentation relating to an equivalent internationally recognised standard may be used. In such cases, the onus is on the tenderer to demonstrate satisfactory equivalence of the standards.

According to Article 44(2) of Directive 2014/24/EU, other appropriate means of proof may be accepted where the bidder concerned had no access to test reports, ecolabels, certificates etc. or no possibility of obtaining them within the relevant time limits for reasons which are not attributable to the economic operator. This could include, for example, a technical dossier from the manufacturer. In this case, the bidder must prove that the works, supplies or services it provided meet the requirements or criteria set out in the technical specifications, the award criteria or the contract performance conditions.

Some simple market research in advance of tendering should be sufficient to confirm that suppliers, products and services are available which meet the criteria and verification requirements. One particularly useful source is the ***Topten EU*** website which lists the most energy-efficient products available in a number of categories (including solid fuel boilers, heat pumps, local space heaters and electric water heaters).[2] The ***EPREL database*** can also be consulted to find products based on their energy rating – it provides a distribution of registered models by energy class which can be useful in determining the appropriate minimum energy class to specify. Further information on techniques for market engagement linked to GPP, including legal and practical considerations, is available in ***Module 6 of the GPP Training Toolkit***.

[2] Topten is strictly neutral and independent from manufacturers and retailers, its selection criteria are always published online.

KEY ENVIRONMENTAL IMPACTS – HEATING EQUIPMENT

The key environmental impacts from water-based heaters are associated with their use phase and linked mainly to the fuel source and energy efficiency of the product and related greenhouse gas (GHG) emissions. Greenhouse gas emissions are mainly due to the emission of CO_2 from combustion and potentially – to a lesser extent – refrigerant leakage (for certain types of heating technologies such as heat pumps). Provision of installation instructions and user information has been identified as one of the most important criteria to guarantee optimum environmental performance of water-based heating equipment.

Additional environmental impacts such as acidification, tropospheric ozone and air, water and soil pollution are related to air emissions during operation including nitrogen oxides (NOx), carbon monoxide (CO), organic gaseous carbon (OGC) and particulate matter (PM). Other environmental issues of relevance include noise emissions and the treatment of products at their end-of-life.

KEY ENVIRONMENTAL IMPACTS

- Energy consumption in use phase
- Emissions of greenhouse gases, NO_x, OGC, CO and PM in use-phase, due to fossil fuel combustion or heat pump refrigerant leakage
- Suboptimal performance due to incorrect usage or maintenance
- Air emissions of in use-phase
- Noise in use phase

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GPP APPROACH

- Specify minimum energy efficiency levels, ensure compliance with ecodesign principles and correct installation and commissioning
- Award marks for products with lower GHG and pollutant emissions and use of refrigerants with lower global warming potential
- Require comprehensive user instructions to be provided with products and contract clauses to ensure contractor is responsible for ongoing environmental performance
- Award marks for products with noise emissions below set limits

Please note that the order of environmental impacts above does not necessarily correspond to their importance.

DEFINITION OF TERMS USED IN THE GPP CRITERIA

- **'biomass'** means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.
- **'boiler heater'** means a space heater or combination heater equipped with one or more heat generators using the combustion of gaseous, liquid or solid fuels of fossil origin or from biomass.
- **'cogeneration heater'** means a space heater simultaneously generating heat and electricity in a single process.
- **'combination heater'** means a water-based space heater that is designed to also provide heat to deliver hot drinking or sanitary water at given temperature levels, quantities and flow rates during given intervals, and is connected to an external supply of drinking or sanitary water.
- **'electrically-driven heat pump heater'** means a heat pump heater equipped with one or more heat generators using electricity as a fuel.
- **'electric heater'** means a space heater or combination heater equipped with one or more heat generators using electricity as a fuel.
- **'electric boiler heater'** means a boiler heater equipped with one or more heat generators using the Joule effect in electric resistance heating elements only.
- **'fuel-driven heat pump heater'** means a heat pump heater equipped with one or more heat generators fuelled with gas or liquid fuel of fossil origin or from biomass.
- **'gas boiler heater'** means a boiler heater equipped with one or more heat generators using the combustion of gaseous fuels of fossil origin or from biomass.
- **'gas heater'** means a space heater or combination heater equipped with one or more heat generators fuelled with gaseous fuels of fossil origin or from biomass.
- **'global warming potential'** means global warming potential as defined in Article 2(4) of Regulation (EC) No 842/2006.
- **'heat pump heater'** means a space heater or combination heater equipped with one or more heat generators using ambient heat from an air, water or ground source, and/or waste heat for heat generation.
- **'heater'** means a space heater or combination heater.
- **'heater equipped with external combustion'** means a category of heaters comprising boilers, a-sorption heat pumps and heaters equipped with external combustion engine.
- **'heat generator'** means the part of a heater that generates the heat using one or more of the following processes:
  - combustion of fossil fuels and/or biomass fuels;
  - use of the Joule effect in electric resistance heating elements;
  - capture of ambient heat from an air source, water source or ground source, and/or waste heat.
- **'liquid fuel boiler heater'** means a boiler heater equipped with one or more heat generators using the combustion of liquid fuels of fossil origin or from biomass.
- **'liquid fuel heater'** means a space heater or combination heater equipped with one or more heat generators fuelled with liquid fuels of fossil origin or from biomass.
- **'Nm^3'** means normal cubic metre (at 101.325 kPa, 273.15 K).
- **'package of space heater, temperature control and solar device'** means a package offered to the end-user containing one or more space heaters combined with one or more temperature controls and/or one or more solar devices.
- **'package of combination heater, temperature control and solar device'** means a package offered to the end-user containing one or more combination heaters combined with one or more temperature controls, and/or one or more solar devices.

- **'producer'** is legally defined in the WEEE Regulations (S.I. No. 149 of 2014): it means the person or business that first places the product on the Irish market – for example this may be the importer or manufacturer.
- **'rated heat output'** means the declared heat output of a heater when providing space heating and, if applicable, water heating at standard rating conditions, expressed in kW; for heat pump space heaters and heat pump combination heaters the standard rating conditions for establishing the rated heat output are the reference design conditions, as set out in Regulation (EU) No 813/2013 implementing Directive 2009/125/EC with regard to ecodesign requirements for space heaters and combination heaters.
- **'seasonal space heating energy efficiency'** (ηs) means the ratio between the space heating demand for a designated heating season, supplied by a space heater, a combination heater or a hybrid heater, including temperature control, and the annual energy consumption required to meet this demand, expressed in %.
- **'seasonal space heating emissions'** means:
  - for automatically stoked solid fuel boilers, a weighted average of the emissions at rated heat output and the emissions at 30 % of the rated heat output, expressed in mg/m^3
  - for manually stoked solid fuel boilers that can be operated at 50% of the rated heat output in continuous mode, a weighted average of the emissions at rated heat output and the emissions at 50 % of the rated heat output, expressed in mg/m^3
  - for manually stoked solid fuel boilers that cannot be operated at 50% or less of the rated heat output in continuous mode, the emissions at rated heat output, expressed in mg/m^3
  - for solid fuel cogeneration boilers, the emissions at rated heat output, expressed in mg/m^3
- **'solar device'** means a solar-only system, a solar collector, a solar hot water storage tank or a pump in the collector loop, which are placed on the market separately.
- **'solid fuel heater'** means a space heater or combination heater equipped with one or more heat generators fuelled with solid fuels of fossil origin or from biomass.
- **'solid fuel boiler heater'** means a boiler heater equipped with one or more heat generators using the combustion of solid fuels of fossil origin or from biomass.
- **'solid biomass boiler heater'** means a boiler heater equipped with one or more heat generators using the combustion of solid fuels from biomass.
- **'space heater'** means a device that
  - provides heat to a water-based central heating system in order to reach and maintain at a desired level the indoor temperature of an enclosed space such as a building, a dwelling or a room; and
  - is equipped with one or more heat generators.
- **'standard rating conditions'** means the operating conditions of heaters under average climate conditions for establishing the rated heat output, seasonal space heating energy efficiency, water heating energy efficiency, sound power level, nitrogen oxide (NOx) emissions, carbon monoxide (CO) emissions, organic gaseous carbon (OGC) emissions and particulate matter.
- **'temperature control'** means equipment that interfaces with the end-user regarding the values and timing of the desired indoor temperature, and communicates relevant data, such as actual indoor and/or outdoor temperature(s), to an interface of the heater such as a central processing unit, thus helping to regulate the indoor temperature(s).
- **'water-based central heating system'** means a system using water as a heat transfer medium to distribute centrally generated heat to heat emitters for the space heating of buildings, or parts thereof.
- **'WEEE'** means waste electrical and electronic equipment.

DEFINITION OF PRODUCTS INCLUDED IN THE SEAI TRIPLE E REGISTER

- **Biomass boilers** provide an efficient, automatic method of generating hot water, steam or other heat-transporting fluids, using carbon-neutral biomass as the fuel source. Biomass boilers are considered to incorporate ancillary equipment such as control systems, fuel-feed systems, fans and grit arrestors.
- **Boilers** combust fuel to provide heating through a closed loop hot water system delivery medium. Boilers can also indirectly heat water for on-site use. The equipment consists of the boiler and/or burner.
- **Boiler Controls** are defined as specifically designed equipment that maximise the energy efficiency of new and/or existing boiler and burner plant.
- **Co-generation** is defined as highly energy efficient equipment which can simultaneously generate a combination of heat, cooling energy and usable electrical power in a single thermodynamic process and which is intended primarily for on-site use.
- **Condensing boilers** are boilers fitted with condensate recovery systems.
- **Condensate recovery systems** are defined as equipment which is specifically designed to efficiently recover condensate from steam installations in order to maximise their overall energy efficiency.
- **Heat pumps** are defined as equipment that is designed to transfer heat from a heat source (such as ground, water or ambient air) to a heat sink (such as indoor air or a water-based heating system) using a refrigeration system.
- **Instantaneous gas fired water heaters** combust fuel to provide hot water on demand, whereby the water used is heated directly by the unit. They also have the facility to recover heat from the flue gases to maximise the heat output.
- **Localised Steam Generators** are defined as equipment that rapidly and efficiently produces pressurised steam on demand primarily for on-site use, by use of a cold-water feed through the combustion of fuel in a burner.
- **Solar thermal collectors** are defined as renewable energy equipment which transforms solar radiation directly into thermal energy.
- **Steam systems** are defined as equipment specifically designed to maximise the energy efficiency of a boiler and/ or a heating system as a whole.
- **Oxygen trim controls** are controls which automatically monitor the oxygen or carbon monoxide concentration in boiler flue gases and vary the air and fuel supply to the burner to limit excess or low oxygen concentrations in the fuel/ air mix.
- **Burner systems** are designed to provide boiler modulation and combustion control through the use of digital microprocessor-based systems with the aim of optimising energy use. They include new burners with controls and retrofit burner control systems.
- **Sequencers** are boiler controls which optimise fuel usage by managing the firing sequence of different boilers to ensure that the most efficient boiler(s) are selected to match the prevailing load conditions.
- **Energy meters** are meters which can track boiler performance and report boiler system efficiency to the user.

GPP CRITERIA FOR HEATING EQUIPMENT

SUBJECT MATTER
Supply of heating equipment with low environmental impact

A BOILERS (INCLUDING BIOMASS BOILERS AND COGENERATION)

CORE CRITERIA	COMPREHENSIVE CRITERIA

SELECTION CRITERIA

SC1. **Technical Capacity** *[where installation is included in the contract]*

Candidates must demonstrate that suitably qualified and experienced personnel will undertake the installation of the equipment and any ancillary works.

Fitters and service personnel must be fully trained and qualified. Training should comprise the following elements *[select all which are relevant]*:

- Assembly, installation and commissioning of the specific products covered by the contract
- Pressure testing of components
- Electrical testing of equipment
- Testing controls and meters
- Ensuring safety devices are correctly installed and working
- Operational testing of individual components of the system (e.g. boiler, fluid transfer pumps, distribution system)
- Testing the whole system under a range of normal operating conditions
- Adjustment of the equipment to energy-efficient settings
- Air emission measurement techniques
- Technical and legal documentation for the products (certificate of conformity, commissioning and test reports).

Verification: Candidates must submit evidence that the personnel directly responsible for installation and any ancillary works have relevant experience, qualifications and training in relation to each of the above aspects. This may be in the form of a list of relevant contracts carried out over the previous three years, references, CVs, training records and/or other evidence of qualifications and experience.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS1. CE marking, Ecodesign, Energy Label and WEEE registration

All equipment and/or components must be CE marked as required by the applicable EU directive(s) and/or regulations.[3] They must also comply with the applicable Ecodesign and EU Energy Label Regulations.[4] The producer must be registered with the relevant producer registration body for waste electrical and electronic equipment.

Verification: Tenderers must provide the product Declaration of Conformity and Energy Label confirming compliance with the above requirements. Evidence of the product's entry in the EPREL database should be provided. Evidence of the producer's WEEE registration must be provided.

TS2. Standing heat losses

Standing heat losses must not exceed 2% of the rated boiler output.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS3. Minimum energy efficiency

3.1 Gas, dual fuel, and oil-fired boilers

The boiler must meet the performance criteria set out in the below table:

Fuel Type	Turndown Ratio	Test Point (% of Maximum Nominal Input)	Net Thermal Efficiency %
Gas fired or dual fuelled	≥4.0:1	30	≥108.0%
		100	≥97.0%
Oil fired	≥3.33:1	30	≥101.0%
		100	≥95.0%

TS3. Minimum energy efficiency

Boilers must be rated as the highest available efficiency class according to the applicable EU Energy Label ratings at the time of supply.

Verification: A copy of the energy label for the proposed product(s) and product information sheet showing compliance with the above requirement must be submitted with the tender.

NOTE: Procurers may wish to review the energy ratings of products meeting their specifications on the EPREL database or Topten website.

[3] For example, ***Regulation (EU) 2016/426 on appliances burning gaseous fuels***. Further information on CE marking is available ***here***.

[4] For example, Regulation (EU) 813/2013 ***on ecodesign requirements for space heaters and combination heaters*** and Regulation (EU) 811/2013 ***on energy labelling of space heaters, combination heaters, packages of space heaters***. Note that space heaters between 70 and 400 kW must fulfil Ecodesign requirements even though they are not covered by the energy labelling regulation.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS3. **Minimum energy efficiency** (continued)

Net thermal efficiency test data must be presented to 1 decimal place.
A condensing oil boiler with a net thermal efficiency of 94.5% at 100% of its maximum rated output would be deemed to fail.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation which confirms compliance with the above requirements must be provided.

3.2 Biomass boilers

Biomass boilers burning wood chips or wood pellets must achieve the thermal efficiency levels set out in the below table:

Boiler rating	Thermal efficiency	
	Chips	Pellets
50-150 kW	≥85%	90%
>150-500 kW	≥86%	91%
>500 kW	≥87%	92%

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation which confirms compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS4. **Boiler controls**

[Note – the applicable control criteria will depend upon the type of system specified/proposed]

4.1 Oxygen Trim Controls

4.1.1 Equipment must contain the following elements:

- Electronic Oxygen (or Carbon Monoxide) sensor designed for fitting in the boiler flue near the boiler
- Boiler temperature or pressure sensor
- Actuated air supply control damper
- Actuated valve on fuel supply
- Control panel which takes a reading from the sensor and adjusts the air supply damper and fuel supply accordingly.

4.1.2 Overall equipment must be accurate to minimum accuracy of ± 1% excess oxygen ("overall" refers to the "sum of errors" across the system)

4.1.3 Controls must permit integration with burner management systems.

4.1.4 There must be the capability to output to BMS or other equivalent control system.

4.2 Burner systems

4.2.1 Burners must have microprocessor-based controls that are capable of continuously modulating burner output in response to measured temperature or pressure values over a turn-down ratio as appropriate below:

- Gas (≥ 1,200kW): ≥4 to 1
- Oil (≥ 1,200kW): ≥2.5 to 1
- Gas or dual fuel (<1,200kW): ≥3 to 1
- Oil (< 1,200kW): ≥2 to 1

NOTE: *Turn-down ratio is a measure of the range within which the burner can be adjusted. Turn down of 4 to 1 indicates adjustment in the range 25% to 100%.*

4.2.2 The microprocessor must control the air/fuel ratio to limit Oxygen levels in exhaust gasses to the following levels:

- 3% O_2 at 100% rated boiler output
- 4% O_2 at 50% rated boiler output

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS4. **Boiler controls** (continued)

4.2.3 CO levels in the exhaust gases must be less than 20 ppmv for all boilers over all turn-down ratios.

4.2.4 All valves and dampers must be fitted with precision servomotors.

4.2.5 The burner must be fitted with an air damper which is fully closed on burner shutdown.

4.2.6 All burner fans must be fitted with VSD control on the fan motor.

4.2.7 Oil fired burners must comply with the performance criteria set out in IS EN 267, or scientific equivalent.

4.2.8 Gas fired burners must comply with the performance criteria set out in IS EN 676, or scientific equivalent.

4.3 Sequencers

4.3.1 The sequencer must be microprocessor based and use sensors to measure heating system flow and return temperatures.

4.3.2 The sequencer must be able to control and isolate a minimum of two boilers. It must have the capability of storing and consulting individual control parameters for each connected boiler. It must select the appropriate boiler(s) based on the optimum efficiency of the whole system.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS5. **Product longevity and warranty**

Repair or replacement of the boiler and each of its components must be covered by the warranty terms for a minimum of **four years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required.

Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.

TS5. **Product longevity and warranty**

Repair or replacement of the boiler and each of its components must be covered by the warranty terms for a minimum of **five years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required.

Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS6. **Installation instructions and user information**

The equipment must be supplied with installation instructions and user information in printed (on the packaging and/or on documentation accompanying the product) and/or in electronic format, which include the following:

a. Information on the energy consumption of the boiler

b. Full installation instructions, including:

   i. instructions specifying that the heater shall be installed by fully trained fitters;

   ii. any specific precautions that shall be taken when the boiler is assembled or installed;

   iii. instructions specifying that the control settings of the boiler ('heating curve') shall be adjusted properly after installation;

   iv. if applicable, details on the emission values of the flue gas during the operating phase and how the boiler should be adjusted to minimise them. In particular, the recommendations should mention that:

      - the boiler shall be adjusted with the aid of gauges for measuring CO, O_2 or CO_2, NOx, temperature and soot to ensure that none of the threshold values provided for in the specifications are exceeded;
      - holes shall be made for measuring gauges in the same location as used in laboratory testing;
      - measurement results shall be recorded in a form or diagram, one copy of which is retained by the end user;

   v. for boilers with low flue gas temperature, instructions specifying that the system shall be equipped with corrosion retarding technology;

   vi. for condensing boiler technology, instructions specifying that the chimney shall be protected against condensate with low pH;

   vii. information on who the fitter can approach for guidance on installation;

c. Operating instructions for service personnel;

d. User information, including:

   i. references to competent installers and service personnel;

   ii. recommendations on the proper use and maintenance of the boiler, including the correct fuels to be used and their appropriate storage for optimum combustion and the regular maintenance schedule to keep;

   iii. advice on how users can minimise the environmental impact of the boiler, in particular information on use to minimise energy consumption;

   iv. if applicable, information on how the measurement results should be interpreted and how they can be improved.

   v. information about which spare parts can be replaced;

e. Recommendations on appropriate disposal at the product's end-of-life.

f. Information on the disassembly of the product with an exploded diagram labelling the main components and identifying any hazardous substances in these components in the form of a list of materials identifying material type, quantity used and position.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS6. **Installation instructions and user information** (continued)

g. End-of-life recommendations and options for the product and its components, that consider environmental sustainability, including options for repair, reuse and recycling.

Verification: A copy of the installation instructions and user information which will be supplied with the equipment must be provided in electronic format as part of the tender.

TS7. **End-of-life-Service**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive, for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Functional testing, servicing, repair and upgrading to prepare products or components for re-use;
- Dismantling for component re-use, recycling and/or disposal.

Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU (as amended) and with reference to the list of components for selective treatment.

Verification: The tenderer must provide details of the arrangements for collection, preparation for re-use, and recycling/disposal. This must include valid proof of the producer's registration with the national registration scheme for WEEE.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS8. **Additional requirements for Biomass Boilers**

In addition to the applicable requirements under the Ecodesign regulations and other technical specifications, the following technical requirements apply:

8.1 Minimum output of 50kW

8.2 Must be equipped for automatic operation without the need for permanent supervision. This shall include:

- Automatic start-up and shut-down
- Ability to operate in slumber mode and restarting when the heating load demands
- Automatic fuel loading commensurate with the heat/steam demand
- Automatic ash removal
- Automatic control of the burning rate commensurate with the heating demand.

8.3 Must incorporate a system to automatically prevent burn-back through the fuel-feed system

8.4 Must incorporate a fault-reporting system which should be capable of remotely communicating a fault. The parameters to be monitored shall include:

- Fuel shortage or blockage
- Boiler shut-down
- Boiler hot water/thermal fluid outlet temperature or steam pressure
- Flue gas temperature

8.5 To facilitate automatic tube-cleaning, the boiler must incorporate a mechanical or pneumatic system for heat-exchanger cleaning on the gas side.

8.6 Must incorporate an automatic system to 'trim' the combustion air commensurate with the oxygen content of the flue gases so as to minimise 'stack' losses caused by excess air.

8.7 Must incorporate a system to prevent over-heating of the water in the boiler in the event of a mains electricity failure.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS9. **Additional requirements for Combined Heat and Power (CHP)**

In addition to the applicable requirements under the Ecodesign regulations and other technical specifications, the following technical requirements apply:

9.1 The CHP unit must be a packaged unit with the power generation section and heat recovery section contained within a single enclosure, and should consist of a single prime mover.

9.2 Units must have a minimum overall efficiency (thermal + electricity) greater than or equal to 78%, calculated on a gross calorific value or HHV basis, when the unit is operating at 100% output (electrical).

9.3 The unit must have installed software to record levels of electricity and heat generated over a running period.

9.4 The CHP Unit must include one main heat output system i.e. a system recovering heat from the prime mover and the exhaust gasses, and must have no inbuilt, or integral, facility to dump high grade heat.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS10. **Additional requirements for Trigeneration**

In addition to the applicable requirements under the Ecodesign regulations and other technical specifications, the following technical requirements apply:

10.1 The heat and power element of the trigeneration system must comply with the criteria for CHP units set out in TS8.

10.2 The absorption chiller must use the CHP heat source as its primary energy input and should be an “indirect fired” absorption chiller.

10.3 The absorption chiller must have a minimum coefficient of performance (COP) of 0.7

10.4 The units must have installed software to record levels of cooling achieved.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	

AC1. **Life-cycle costs**

The cost of each valid and responsive tender will be evaluated on the basis of total life-cycle costs (LCC). Tenderers are required to complete the spreadsheet included in the tender documents with the requested data regarding their products. This information will be used to calculate LCC and the tender with the lowest life-cycle cost will be awarded **[X]** marks, with other tenders being scored according to the following formula:

$$\text{Score Tender A} = \textbf{[X]} * \frac{\text{Lowest LCC}}{\text{LCC}_{\text{TENDER A}}}$$

Verification: The completed spreadsheet must be submitted with the tender and where indicated, supporting documentation verifying the data must be provided. The data entered in the spreadsheet regarding costs, energy consumption, time to replacement and other parameters will become binding under the contract with the successful tenderer.

NOTE: *Contracting authorities may choose to evaluate LCC using an existing template, or based on their own bespoke template. In either case, certain information such as the evaluation period, energy costs and cost of maintenance/replacement (if not included in the tender) will need to be completed by the contracting authority. See* ***section on life-cycle costing*** *for further information.*

AC2. **Extended warranty**

Up to **[X]** marks will be awarded to tenders offering a product warranty in excess of the minimum period required under TS5. Full marks will be awarded to the tender offering the longest warranty period, with other offers being scored proportionately.

Verification: Tenderers must provide a copy of the warranty terms offered for the product. Where the extended warranty has an additional cost this must be clearly indicated within the pricing schedule.

AC3. **Emissions**

NOTE: *The Ecodesign regulations set maximum emission levels. This award criterion targets improved emissions performance beyond the legal requirements.* ***NB if emissions are monetized for inclusion in life-cycle costing under AC1 this criterion should not be applied.***

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	AC3. **Emissions** (continued) Up to **[X]** marks will be awarded based on the verified level of emissions of greenhouse gases, particulate matter, nitrogen oxides, organic gaseous compounds and carbon monoxide. For each of these emissions categories which is relevant based on the fuel type, full marks will be awarded to the tender offering the lowest emissions in that category, with other offers being marked proportionately. The maximum number of marks available for each emissions category will depend upon the number of relevant categories for that fuel type, with the total available marks being divided evenly amongst the relevant categories.[5] **Verification:** Tenders must state the emissions for each of the relevant categories based on the fuel type of their product, calculated in accordance with the methodologies set out in Annex 1. Test results demonstrating that these levels have been attained must also be provided, based on an applicable international or European standard for the product type.
	AC4. **Noise emission limits** **NOTE:** *The Ecodesign regulations set maximum noise emission levels. This award criterion targets improved performance beyond the legal requirements.* *This award criterion is recommended to be applied in the procurement of boilers that are to be installed in noise-sensitive buildings, e.g. hospitals and schools, according to the scope of Directive 2002/49/EC relating to the assessment and management of environmental noise.* Up to **[X]** marks will be awarded based on the noise emissions of the boiler. The unit of measurement shall be given in dB(A) or dB(C), as appropriate. The tests must be conducted according to a relevant international or European standard, at standard rating conditions and rated heat output. Full marks will be awarded to the tender offering the lowest noise emissions, with other offers being marked proportionately. **Verification:** Tenderers must state the noise emissions of the product and provide test results demonstrating the A-weighted sound power level limit value and, where applicable, C-weighted sound power level limit value.

[5] If the fuel type is specified in the tender documents, then the contracting authority should state the relevant categories here and the marks available for each. Note that PM emissions are only relevant for solid fuel boilers (including biomass boilers).

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	

CPC1. **Environmental performance**

This clause should be adapted to the specific nature of the contract and the scope of any maintenance/repair/warranty commitments. It is important that it includes a specific requirement to test environmental performance at regular intervals and assigns responsibility for this activity.

The contractor is responsible for ensuring that the levels of environmental performance, including energy efficiency, indicated in its tender are met both at the point of installation/commissioning and during the *[entire operating lifetime of the boiler]/[warranty period]*. Where this is dependent upon specific usage instructions and maintenance activities these must have been clearly highlighted in the tender. Regular inspections and testing of the equipment to ensure compliance will be carried out *[specify the schedule for these and whether the contractor is responsible for the cost]*.

Where the inspections or tests indicate that the designated levels of environmental performance are not being achieved, the contractor is responsible for *[repairing and/or replacing the equipment and any components]/[the costs of such work carried out by the contracting authority's nominated agent]*. The maximum time period for remedying any default in environmental performance shall be *[7 working days]* from the date on which the fault is identified. Where required by the contracting authority, the contractor must provide suitable alternative heat sources during the repair period.

CPC2. **Confirmation of WEEE reporting**

To be applied in conjunction with TS7.

At the time of submitting an invoice in respect of any products supplied under the contract, the contractor must provide evidence that the producer has reported these products to the national registration body, in accordance with S.I. 149/2014 (as amended) on waste electrical and electronic equipment. This may be in the form of a link showing the producer's up-to-date registration with the national registration body.

B WATER HEATERS

CORE CRITERIA	COMPREHENSIVE CRITERIA

SELECTION CRITERIA

SC1. **Technical Capacity** *[where installation is included in the contract]*

Candidates must demonstrate that suitably qualified and experienced personnel will undertake the installation of the equipment and any ancillary works.

Fitters and service personnel must be fully trained and qualified. Training should comprise the following elements *[select all which are relevant]:*

- Assembly, installation and commissioning of the specific products covered by the contract
- Pressure testing of components
- Electrical testing of equipment
- Testing controls and meters
- Ensuring safety devices are correctly installed and working
- Operational testing of individual components of the system (e.g. boiler, fluid transfer pumps, distribution system)
- Testing the whole system under a range of normal operating conditions
- Adjustment of the equipment to energy-efficient settings
- Air emission measurement techniques
- Technical and legal documentation for the products (certificate of conformity, commissioning and test reports).

Verification: Candidates must submit evidence that the personnel directly responsible for installation and any ancillary works have relevant experience, qualifications and training in relation to each of the above aspects. This may be in the form of a list of relevant contracts carried out over the previous three years, references, CVs, training records and/or other evidence of qualifications and experience.

TECHNICAL SPECIFICATIONS

TS1. **CE marking, Ecodesign, Energy Label and WEEE registration**

All equipment and/or components must be CE marked as required by the applicable EU directive(s) and/or regulations.[6] They must also comply with the applicable Ecodesign and EU Energy Label Regulations.[7] The producer must be registered with the relevant producer registration body for waste electrical and electronic equipment.

Verification: Tenderers must provide the product Declaration of Conformity and Energy Label confirming compliance with the above requirements. Evidence of the product's entry in the EPREL database should be provided. Evidence of the producer's WEEE registration must be provided.

[6] For example, ***Regulation (EU) 2016/426 on appliances burning gaseous fuels***. Further information on CE marking is available ***here***.

[7] For example, ***Regulation (EU) 811/2013 on energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device*** and Regulation (EU) 813/2013 on ***ecodesign requirements for space heaters and combination heaters***

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
TS2. **Product longevity and warranty** Repair or replacement of the water heater and each of its components must be covered by the warranty terms for a minimum of **four years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. **Verification:** Tenderers must provide a copy of the warranty terms which includes the above requirements.	TS2. **Product longevity and warranty** Repair or replacement of the water heater and each of its components must be covered by the warranty terms for a minimum of **five years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. **Verification:** Tenderers must provide a copy of the warranty terms which includes the above requirements.
TS3. **Minimum energy efficiency** The Net Thermal Efficiency tested at full load must meet or exceed the following levels: **Storage and non-storage instantaneous water heaters** ≥ 102% **Non-storage circulator water heaters** ≥ 93% **Verification:** Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation which confirms compliance with the above requirements must be provided.	TS3. **Minimum energy efficiency** Water heaters must be rated as the highest available efficiency class according to the applicable EU Energy Label ratings at the time of supply. **Verification:** A copy of the energy label for the proposed product(s) and product information sheet showing compliance with the above requirement must be submitted with the tender. **NOTE:** Procurers may wish to review the energy ratings of products meeting their specifications on the EPREL database or Topten website.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS4. **Condensate recovery system**

Hot water heaters must be fitted with a condensate recovery system which meets the following requirements:

Component	Requirements
Steam Traps	The steam trap must be one of those defined in EN 26704 Classification of automatic steam traps, or scientific equivalent.
	Steam traps must be designed and manufactured in accordance with IS/EN 26948 Production and performance characteristic tests for automatic steam traps, or scientific equivalent.
	Steam traps must include the Failure Monitoring measures: • Failure sensor located in the steam trap or in suitable device adjacent to it • Output from sensor either to an intermediate device which communicates with a control system or directly to control system • Output to BMS, DCS, Delta V or other equivalent control system
Deaeration Tanks	Equipment must be capable of achieving a minimum dissolved oxygen concentration of 5 ppb by weight or less
	Equipment must be rated for total removal of dissolved carbon dioxide.
	Low vent losses must be less than or equal to 22.4 kg/h of steam/air mixture per 1,000 kg/h of deaerator capacity
	Equipment must allow rapid load changes of boiler for which designed – minimum of 5% of boiler rating in 30 seconds.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS5. **Gas condensing water heaters**

5.1 Gas condensing water heaters must comply with all the requirements in the standard EN 89 "Gas-fired storage water heaters for the production of domestic hot water", or scientific equivalent.

5.2 Gas condensing water heaters with atmospheric burners must comply with EN 26/A1 "Gas-fired instantaneous water heaters for sanitary uses production, fitted with atmospheric burners (Including Corrigendum 1998)", or scientific equivalent.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation which confirms compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS6. **Modulating output**

Non-storage water heaters must have the capability to vary their hot water output in response to changes in water demand, without initiating a purge cycle.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation which confirms compliance with the above requirements must be provided.

TS7. **Balanced flue**

Units with a rated output less than 70kW must have a balanced flue.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation which confirms compliance with the above requirements must be provided.

TS8. **Installation instructions and user information**

The equipment must be supplied with installation instructions and user information in printed (on the packaging and/or on documentation accompanying the product) and/or in electronic format, which include the following:

a. Information on energy consumption

b. Full installation instructions, including information on who the fitter can approach for guidance on installation;

c. Operating instructions for service personnel;

d. User information, including:
   i. references to competent installers and service personnel;
   ii. recommendations on the proper use and maintenance of the equipment
   iii. advice on how users can minimise the environmental impact of the equipment, in particular information on use to minimise energy consumption;
   iv. if applicable, information on how the measurement results should be interpreted and how they can be improved.
   v. information about which spare parts can be replaced;

e. Information on the disassembly of the product with an exploded diagram labelling the main components and identifying any hazardous substances in these components in the form of a list of materials identifying material type, quantity used and position.

f. End-of-life recommendations and options for the product and its components, that consider environmental sustainability, including options for repair, reuse and recycling.

Verification: A copy of the installation instructions and user information which will be supplied with the equipment must be provided in electronic format as part of the tender.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS9. **End-of-life-Service**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive, for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Functional testing, servicing, repair and upgrading to prepare products or components for re-use;
- Dismantling for component re-use, recycling and/or disposal.

Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU (as amended) and with reference to the list of components for selective treatment.

Verification: The tenderer must provide details of the arrangements for collection, preparation for re-use, and recycling/disposal. This must include valid proof of the producer's registration with the national registration scheme for WEEE.

AWARD CRITERIA

AC1. **Life-cycle costs**

The cost of each valid and responsive tender will be evaluated on the basis of total life-cycle costs (LCC). Tenderers are required to complete the spreadsheet included in the tender documents with the requested data regarding their products. This information will be used to calculate LCC and the tender with the lowest life-cycle cost will be awarded **[X]** marks, with other tenders being scored according to the following formula:

$$\text{Score Tender A} = \textbf{[X]} * \frac{\text{Lowest LCC}}{\text{LCC}_{\text{TENDER A}}}$$

Verification: The completed spreadsheet must be submitted with the tender and where indicated, supporting documentation verifying the data must be provided. The data entered in the spreadsheet regarding costs, energy consumption, time to replacement and other parameters will become binding under the contract with the successful tenderer.

NOTE: *Contracting authorities may choose to evaluate LCC using an existing template, or based on their own bespoke template. In either case, certain information such as the evaluation period, energy costs and cost of maintenance/replacement (if not included in the tender) will need to be completed by the contracting authority. See* ***section on life-cycle costing*** *for further information.*

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
AC2. **Extended warranty** Up to **[X]** marks will be awarded to tenders offering a product warranty in excess of the minimum period required under TS2. Full marks will be awarded to the tender offering the longest warranty period, with other offers being scored proportionately. **Verification:** Tenderers must provide a copy of the warranty terms offered for the product. Where the extended warranty has an additional cost this must be clearly indicated within the pricing schedule.	
	AC3. **Emissions** **NOTE:** *The Ecodesign regulations set maximum emission limits. This criterion targets improved emissions performance beyond the legal requirements.* ***NB If emissions are monetised for inclusion in life-cycle costing under AC1 this criterion should not be used.*** Up to **[X]** marks will be awarded based on the verified level of emissions of greenhouse gases, particulate matter, nitrogen oxides, organic gaseous compounds and carbon monoxide. For each of these emissions categories which is relevant based on the fuel type, full marks will be awarded to the tender offering the lowest emissions in that category, with other offers being marked proportionately. The maximum number of marks available for each category will depend upon the number of relevant categories for that fuel type, with the total available marks being divided evenly amongst the relevant categories.[8] **Verification:** Tenders must state the emissions for each of the relevant categories based on the fuel type of their product, calculated in accordance with the methodologies set out in Annex 1. Test results demonstrating that these levels have been attained must also be provided, based on an applicable international or European standard for the product type.

[8] If the fuel type is specified in the tender documents, then the contracting authority should state the relevant categories here and the marks available for each. Note that PM emissions are only relevant for solid fuel boilers (including biomass boilers).

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	AC4. **Noise emission limits** **NOTE:** *The Ecodesign regulations set noise emission limits. This criterion targets improved noise performance beyond the legal requirements.* *This award criterion is recommended to be applied in the procurement of water heaters that are to be installed in noise-sensitive buildings, e.g. hospitals and schools, according to the scope of Directive 2002/49/EC relating to the assessment and management of environmental noise.* Up to **[X]** marks will be awarded based on the noise emissions of the water heater. The unit of measurement shall be given in dB(A) or dB(C), as appropriate. The tests shall be conducted according to a relevant international or European standard , at standard rating conditions and rated heat output. Full marks will be awarded to the tender offering the lowest noise emissions, with other offers being marked proportionately. **Verification:** Tenderers must state the noise emissions of the product and provide test results demonstrating the A-weighted sound power level limit value and, where applicable, C-weighted sound power level limit value.
CONTRACT PERFORMANCE CLAUSES	
CPC1. **Environmental performance** *This clause should be adapted to the specific nature of the contract and the scope of any maintenance/repair/warranty commitments. It is important that it includes a specific requirement to test environmental performance at regular intervals and assigns responsibility for this activity.* The contractor is responsible for ensuring that the levels of environmental performance, including energy efficiency, indicated in its tender are met both at the point of installation/commissioning and during the *[entire operating lifetime of the water heater]/[warranty period]*. Where this is dependent upon specific usage instructions and maintenance activities these must have been clearly highlighted in the tender. Regular inspections and testing of the equipment to ensure compliance will be carried out *[specify the schedule for these and whether the contractor is responsible for the cost]*. Where the inspections or tests indicate that the designated levels of environmental performance are not being achieved, the contractor is responsible for *[repairing and/or replacing the equipment and any components]/[the costs of such work carried out by the contracting authority's nominated agent]*. The maximum time period for remedying any default in environmental performance shall be *[7 working days]* from the date on which the fault is identified. Where required by the contracting authority, the contractor must provide suitable alternative heat sources during the repair period.	

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	

CPC2. **Confirmation of WEEE reporting**

To be applied in conjunction with TS9.

At the time of submitting an invoice in respect of any products supplied under the contract, the contractor must provide evidence that the producer has reported these products to the national registration body, in accordance with S.I. 149/2014 (as amended) on waste electrical and electronic equipment. This may be in the form of a link showing the producer's up-to-date registration with the national registration body.

C HEAT PUMPS

CORE CRITERIA	COMPREHENSIVE CRITERIA

SELECTION CRITERIA

SC1. **Technical Capacity** *[where installation is included in the contract]*

Candidates must demonstrate that suitably qualified and experienced personnel will undertake the installation of the equipment and any ancillary works.

Fitters and service personnel shall be fully trained and qualified. Training should comprise the following elements *[select all which are relevant]*:

- Assembly, installation and commissioning of the specific products covered by the contract
- Pressure testing of components
- Electrical testing of equipment
- Testing controls and meters
- Ensuring safety devices are correctly installed and working
- Operational testing of individual components of the system (e.g. boiler, fluid transfer pumps, distribution system)
- Testing the whole system under a range of normal operating conditions
- Adjustment of the equipment to energy-efficient settings
- Air emission measurement techniques
- Technical and legal documentation for the products (certificate of conformity, commissioning and test reports).

Verification: Candidates must submit evidence that the personnel directly responsible for installation and any ancillary works have relevant experience, qualifications and training in relation to each of the above aspects. This may be in the form of a list of relevant contracts carried out over the previous three years, references, CVs, training records and/or other evidence of qualifications and experience.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
TS1. **CE marking, Ecodesign, Energy Label and WEEE registration** All equipment and/or components must be CE marked as required by the applicable EU directive(s) and/or regulations. They must also comply with the applicable Ecodesign and EU Energy Label Regulations.[9] The producer must be registered with the relevant producer registration body for waste electrical and electronic equipment. **Verification:** Tenderers must provide the product Declaration of Conformity and Energy Label confirming compliance with the above requirements. Evidence of the product's entry in the EPREL database should be provided. Evidence of the producer's WEEE registration must be provided.	
TS2. **Product longevity and warranty** Repair or replacement of the heat pump and each of its components must be covered by the warranty terms for a minimum of **four years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. **Verification:** Tenderers must provide a copy of the warranty terms which includes the above requirements.	TS2. **Product longevity and warranty** Repair or replacement of the heat pump and each of its components must be covered by the warranty terms for a minimum of **five years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. **Verification:** Tenderers must provide a copy of the warranty terms which includes the above requirements.
TS3. **Design for permanent installation** All heat pumps must be designed for and include fittings for permanent installation. **Verification:** Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.	

[9] For heat pumps: ***Regulation (EU) 811/2013 on energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device*** and ***Regulation (EU) 813/2013 on ecodesign requirements for space heaters and combination heaters***

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS4. **Requirements for air source and water source heat pumps**

4.1 The heat pump must incorporate an electrical or gas-fired internal combustion engine refrigeration system.

4.2 The heat pump must meet the performance criteria set out in Table 1 below for:

- Coefficient of performance (COP) across the range of connected capacities and including 100% (full load) in heating mode
- Energy efficiency ratio (EER) across the range of connected capacities and including 100% (full load) in cooling mode, where the product is designed to provide cooling

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS5. **Requirements for ground source heat pumps**

5.1 The heat pump must incorporate an electrical or gas-fired internal combustion engine refrigeration system.

5.2 The heat pump must be designed to use an indirect, closed-loop ground heat exchanger.

5.3 The heat pump must meet the performance criteria set out in Table 1 below for:

- Coefficient of performance (COP) across the range of connected capacities and including 100% (full load) in heating mode
- Energy efficiency ratio (EER) across the range of connected capacities and including 100% (full load) in cooling mode, where the product is designed to provide cooling

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS6. **Requirements for heat pump dehumidifiers**

Dehumidifiers must:

6.3 Incorporate an electrically driven refrigeration system that is designed to remove water vapour from the surrounding atmosphere, as the air is recirculated through the product.

6.4 Recover both sensible heat and latent heat released during dehumidification, and use it to heat the air as it leaves the product and or for other useful purposes (such as water heating).

6.5 Incorporate a control system that monitors the relative humidity of the surrounding atmosphere, and automatically switches off dehumidification, or modulates the rate of dehumidification, when the relative humidity falls below a preset value.

6.6 Have a dehumidification capacity that is greater than or equal to 0.625 litres per hour.

6.7 Not be designed to be connected to compressed air systems.

6.8 Have a dehumidification efficiency rate (DER) equal to or greater than the thresholds set out in Table 2 below, which depend on the dehumidification capacity (C) of the product.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

Tables and Notes

Product Category	Heating mode (COP)	Cooling mode (EER)
Air Source		
Air-to-water	> 4.00	> 3.10
Air-to-Air packaged	> 3.20	> 2.80
Air-to-Air split and multi-split	> 3.70	> 3.30
Air-to-Air gas engine driven (GED)	> 1.30	> 1.10
Ground Source		
Brine-to-water heat pumps	> 4.00	> 3.20
Water Source		
Split and multi-split heat pumps	> 4.10	> 3.50

Table 1 – Performance thresholds for heat pumps

Dehumidification capacity (C) (Litres/hour)	**Dehumidification efficiency ratio** (DER) (Litres/kWh)
≥0.625 < 1.5	≥1.40
≥1.5 and <2.3	≥1.80
≥2.3	≥2.30

Table 2 – Performance test points for heat pump dehumidifiers

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

Tables and Notes

NOTES: Energy Efficiency Ratio (EER) in the context of heat pumps is an index used to indicate the efficiency of the equipment in cooling mode and is calculated as follows:

$$EER = \frac{\text{Net Cooling Capacity (kW)}}{\text{Effective Power Input (kW)}}$$

Coefficient of Performance (COP) in the context of heat pumps is an index used to indicate the efficiency of the equipment in heating mode and is calculated as follows:

$$COP = \frac{\text{Net Heating Capacity (kW)}}{\text{Effective Power Input (kW)}}$$

For the avoidance of doubt test data should be presented to two decimal places. As an example, in Table 1 an Air-to-water heat pump with a heating mode COP of 4.00 would be deemed to fail.

TS7. Primary and secondary refrigerants

Primary refrigerant

The global warming potential over a 100-year period (GWP100) of the primary refrigerant shall not exceed a value of 2000. GWP100 values are those set out in Annex I to ***Regulation (EU) No 517/2014***. The GWP100 values of refrigerants shall be calculated in terms of the 100-year warming potential of one kilogram of a gas relative to one kilogram of CO2. For those refrigerants that are not covered by the Regulation (EU) No 517/2014, sources of references for the GWP100 values should be those defined in Annex 1.1(7) to Regulation (EU) No 206/2014.

Secondary refrigerant

In the case of space heaters using a secondary refrigerant, the design of these heaters shall not be based on secondary refrigerant, brine or additives classified as environmentally hazardous or constituting a health hazard within the meaning of ***Regulation (EC) No 1272/2008***, and installation instructions shall clearly indicate that substances classified as environmentally hazardous or constituting a health hazard shall not be used as a secondary refrigerant.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	TS7. **Primary and secondary refrigerants** (continued) **Verification:** Tenderers must provide a declaration of compliance with this criterion, together with the names of all refrigerant(s) used in the product and their GWP100 values.

TS8. **Installation instructions and user information**

The equipment must be supplied with installation instructions and user information in printed (on the packaging and/or on documentation accompanying the product) and/or in electronic format, which include the following:

a. Information on energy consumption

b. Full installation instructions, including information on who the fitter can approach for guidance on installation;

c. Operating instructions for service personnel;

d. User information, including:
   i. references to competent installers and service personnel;
   ii. recommendations on the proper use and maintenance of the equipment
   iii. advice on how users can minimise the environmental impact of the equipment, in particular information on use to minimise energy consumption;
   iv. if applicable, information on how the measurement results should be interpreted and how they can be improved.
   v. information about which spare parts can be replaced;

e. Information on the disassembly of the product with an exploded diagram labelling the main components and identifying any hazardous substances in these components in the form of a list of materials identifying material type, quantity used and position.

f. End-of-life recommendations and options for the product and its components, that consider environmental sustainability, including options for repair, reuse and recycling.

Verification: A copy of the installation instructions and user information which will be supplied with the equipment must be provided in electronic format as part of the tender.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS9. **End-of-life-Service**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive, for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Functional testing, servicing, repair and upgrading to prepare products or components for re-use;
- Dismantling for component re-use, recycling and/or disposal.

Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU (as amended) and with reference to the list of components for selective treatment.

Verification: The tenderer must provide details of the arrangements for collection, preparation for re-use, and recycling/disposal. This must include valid proof of the producer's registration with the national registration scheme for WEEE.

AWARD CRITERIA

AC1. **Life-cycle costs**

The cost of each valid and responsive tender will be evaluated on the basis of total life-cycle costs (LCC). Tenderers are required to complete the spreadsheet included in the tender documents with the requested data regarding their products. This information will be used to calculate LCC and the tender with the lowest life-cycle cost will be awarded **[X]** marks, with other tenders being scored according to the following formula:

$$\text{Score Tender A} = \textbf{[X]} * \frac{\text{Lowest LCC}}{\text{LCC}_{\text{TENDER A}}}$$

Verification: The completed spreadsheet must be submitted with the tender and where indicated, supporting documentation verifying the data must be provided. The data entered in the spreadsheet regarding costs, energy consumption, time to replacement and other parameters will become binding under the contract with the successful tenderer.

NOTE: *Contracting authorities may choose to evaluate LCC using an existing template, or based on their own bespoke template. In either case, certain information such as the evaluation period, energy costs and cost of maintenance/replacement (if not included in the tender) will need to be completed by the contracting authority. See* ***section on life-cycle costing*** *for further information.*

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	

AC2. **Extended warranty**

Up to **[X]** marks will be awarded to tenders offering a product warranty in excess of the minimum period required under TS2. Full marks will be awarded to the tender offering the longest warranty period, with other offers being scored proportionately.

Verification: Tenderers must provide a copy of the warranty terms offered for the product. Where the extended warranty has an additional cost this must be clearly indicated within the pricing schedule.

CONTRACT PERFORMANCE CLAUSES

CPC1. **Environmental performance**

This clause should be adapted to the specific nature of the contract and the scope of any maintenance/repair/warranty commitments. It is important that it includes a specific requirement to test environmental performance at regular intervals and assigns responsibility for this activity.

The contractor is responsible for ensuring that the levels of environmental performance, including energy efficiency, indicated in its tender are met both at the point of installation/commissioning and during the *[entire operating lifetime of the boiler]/[warranty period]*. Where this is dependent upon specific usage instructions and maintenance activities these must have been clearly highlighted in the tender. Regular inspections and testing of the equipment to ensure compliance will be carried out *[specify the schedule for these and whether the contractor is responsible for the cost]*.

Where the inspections or tests indicate that the designated levels of environmental performance are not being achieved, the contractor is responsible for *[repairing and/or replacing the equipment and any components]/[the costs of such work carried out by the contracting authority's nominated agent]*. The maximum time period for remedying any default in environmental performance shall be *[7 working days]* from the date on which the fault is identified. Where required by the contracting authority, the contractor must provide suitable alternative heat sources during the repair period.

CPC2. **Confirmation of WEEE reporting**

To be applied in conjunction with TS9.

At the time of submitting an invoice in respect of any products supplied under the contract, the contractor must provide evidence that the producer has reported these products to the national registration body, in accordance with S.I. 149/2014 (as amended) on waste electrical and electronic equipment. This may be in the form of a link showing the producer's up-to-date registration with the national registration body.

D STEAM SYSTEMS

CORE CRITERIA	COMPREHENSIVE CRITERIA

SELECTION CRITERIA

SC1. **Technical Capacity** *[where installation is included in the contract]*

Candidates must demonstrate that suitably qualified and experienced personnel will undertake the installation of the equipment and any ancillary works.

Fitters and service personnel must be fully trained and qualified. Training should comprise the following elements *[select all which are relevant]:*

- Assembly, installation and commissioning of the specific products covered by the contract
- Pressure testing of components
- Electrical testing of equipment
- Testing controls and meters
- Ensuring safety devices are correctly installed and working
- Operational testing of individual components of the system (e.g. boiler, fluid transfer pumps, distribution system)
- Testing the whole system under a range of normal operating conditions
- Adjustment of the equipment to energy-efficient settings
- Air emission measurement techniques
- Technical and legal documentation for the products (certificate of conformity, commissioning and test reports).

Verification: Candidates must submit evidence that the personnel directly responsible for installation and any ancillary works have relevant experience, qualifications and training in relation to each of the above aspects. This may be in the form of a list of relevant contracts carried out over the previous three years, references, CVs, training records and/or other evidence of qualifications and experience.

TECHNICAL SPECIFICATIONS

TS1. **CE marking, Ecodesign, Energy Label and WEEE**

All equipment and/or components must be CE marked as required by the applicable EU directive(s) and/or regulations. They must also comply with the applicable Ecodesign and EU Energy Label Regulations. The producer must be registered with the relevant producer registration body for waste electrical and electronic equipment.

Verification: Tenderers must provide the product Declaration of Conformity and Energy Label confirming compliance with the above requirements. Evidence of the product's entry in the EPREL database should be provided. Evidence of the producer's WEEE registration must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
TS2. **Product longevity and warranty** Repair or replacement of the equipment and each of its components must be covered by the warranty terms for a minimum of **four years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.	TS2. **Product longevity and warranty** Repair or replacement of the equipment and each of its components must be covered by the warranty terms for a minimum of **five years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.

TS3. **Condensate recovery system**

Boilers must be fitted with a condensate recovery system which meets the following requirements:

Component	Requirements
Steam Traps	The steam trap must be one of those defined in EN 26704 *Classification of automatic steam traps, or scientific equivalent.*
	Steam traps must be designed and manufactured in accordance with IS/EN 26948 Production and performance characteristic tests for automatic steam traps, or scientific equivalent.
	Steam traps must include the Failure Monitoring measures: • Failure sensor located in the steam trap or in suitable device adjacent to it; • Output from sensor either to an intermediate device which communicates with a control system or directly to control system; • Output to BMS, DCS, Delta V or other equivalent control system.
Deaeration Tanks	Equipment must be capable of achieving a minimum dissolved oxygen concentration of 5 ppb by weight or less.
	Equipment must be rated for total removal of dissolved carbon dioxide.
	Low vent losses must be less than or equal to 22.4 kg/h of steam/air mixture per 1 000 kg/h of deaerator capacity.
	Equipment must allow rapid load changes of boiler for which designed – minimum of 5% of boiler rating in 30 seconds.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS4. **Requirements for Economisers**

4.1 Thermal Efficiency

- Condensing: Minimum of 9% increase in the net boiler thermal efficiency for which it is designed
- Non-condensing: Minimum of 3% increase in the net boiler thermal efficiency for which it is designed

4.2 Economiser performance must be measured using EN 308 "Heat exchangers Test procedures for establishing performance of air to air and flue gases heat recovery devices", or scientific equivalent.

4.3 It must be declared what boiler fuel the economiser is suitable for use with.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS5. **Requirements for Boiler Blow-down Controls**

5.1 The device must include automatic control of boiler base blowdown valve in addition to manual bottom blowdown valve.

5.2 It must continuously monitor the % TDS level in boiler water at steam level.

5.3 It must only allow blowdown when TDS concentration exceeds a minimum allowable level to maintain the TDS level below a set limit.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS6. **Requirements for Flue Gas Shut-off Dampers**

6.1 The damper must have automatic control and operation. Damper to close after post combustion purge operation.

6.2 Damper to be to gas tight in accordance with DIN 25 414 or scientific equivalent.

6.3 Safety interlocks to be included to prevent boiler firing when damper is closed.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS7. Requirements for Localised Steam Generators

7.1 Minimum Net Thermal Efficiency of 90% at full load in accordance with BS 845: Part 1: 'Methods for assessing thermal performance of boilers for steam, hot water and high temperature heat transfer fluids – Part 1 Concise Procedure', or scientific equivalent.

7.2 Localised rapid steam generators must comply with the acceptance tests set out in I.S. EN 12952-15 "Water-tube boilers and auxiliary installations. Acceptance tests", or scientific equivalent.

7.3 Standing losses – 2% or less of boiler rated output.

7.4 Steam generation time (steaming rate) – maximum 8 minutes.

7.5 Incorporated burners must comply with the relevant ***Triple E Register criteria for Boiler Controls***.

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and diagrams which confirm compliance with the above requirements must be provided.

TS8. Installation instructions and user information

The equipment must be supplied with installation instructions and user information in printed (on the packaging and/or on documentation accompanying the product) and/or in electronic format, which include the following:

a. Information on energy consumption

b. Full installation instructions, including information on who the fitter can approach for guidance on installation;

c. Operating instructions for service personnel;

d. User information, including:

- **i.** references to competent installers and service personnel;
- **ii.** recommendations on the proper use and maintenance of the equipment
- **iii.** advice on how users can minimise the environmental impact of the equipment, in particular information on use to minimise energy consumption;
- **iv.** if applicable, information on how the measurement results should be interpreted and how they can be improved.
- **v.** information about which spare parts can be replaced;

e. Information on the disassembly of the product with an exploded diagram labelling the main components and identifying any hazardous substances in these components in the form of a list of materials identifying material type, quantity used and position.

f. End-of-life recommendations and options for the product and its components, that consider environmental sustainability, including options for repair, reuse and recycling.

Verification: A copy of the installation instructions and user information which will be supplied with the equipment must be provided in electronic format as part of the tender.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS9. **End-of-life-Service**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive, for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Functional testing, servicing, repair and upgrading to prepare products or components for re-use;
- Dismantling for component re-use, recycling and/or disposal.

Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU (as amended) and with reference to the list of components for selective treatment.

Verification: The tenderer must provide details of the arrangements for collection, preparation for re-use, and recycling/disposal. This must include valid proof of the producer's registration with the national registration scheme for WEEE.

AWARD CRITERIA

AC1. **Life-cycle costs**

The cost of each valid and responsive tender will be evaluated on the basis of total life-cycle costs (LCC). Tenderers are required to complete the spreadsheet included in the tender documents with the requested data regarding their products. This information will be used to calculate LCC and the tender with the lowest life-cycle cost will be awarded **[X]** marks, with other tenders being scored according the following formula:

$$\text{Score Tender A} = \textbf{[X]} * \frac{\text{Lowest LCC}}{\text{LCC}_{\text{TENDER A}}}$$

Verification: The completed spreadsheet must be submitted with the tender and where indicated, supporting documentation verifying the data must be provided. The data entered in the spreadsheet regarding costs, energy consumption, time to replacement and other parameters will become binding under the contract with the successful tenderer.

NOTE: *Contracting authorities may choose to evaluate LCC using an existing template, or based on their own bespoke template. In either case, certain information such as the evaluation period, energy costs and cost of maintenance/replacement (if not included in the tender) will need to be completed by the contracting authority. See* ***section on life-cycle costing*** *for further information.*

CORE CRITERIA	COMPREHENSIVE CRITERIA

AWARD CRITERIA

AC2. **Extended warranty**

Up to **[X]** marks will be awarded to tenders offering a product warranty in excess of the minimum period required under TS2. Full marks will be awarded to the tender offering the longest warranty period, with other offers being scored proportionately.

Verification: Tenderers must provide a copy of the warranty terms offered for the product. Where the extended warranty has an additional cost this must be clearly indicated within the pricing schedule.

CONTRACT PERFORMANCE CLAUSES

CPC1. **Environmental performance**

This clause should be adapted to the specific nature of the contract and the scope of any maintenance/repair/warranty commitments. It is important that it includes a specific requirement to test environmental performance at regular intervals and assigns responsibility for this activity.

The contractor is responsible for ensuring that the levels of environmental performance, including energy efficiency, indicated in its tender are met both at the point of installation/commissioning and during the *[entire operating lifetime of the boiler]/[warranty period]*. Where this is dependent upon specific usage instructions and maintenance activities these must have been clearly highlighted in the tender. Regular inspections and testing of the equipment to ensure compliance will be carried out *[specify the schedule for these and whether the contractor is responsible for the cost]*.

Where the inspections or tests indicate that the designated levels of environmental performance are not being achieved, the contractor is responsible for *[repairing and/or replacing the equipment and any components]/[the costs of such work carried out by the contracting authority's nominated agent]*. The maximum time period for remedying any default in environmental performance shall be *[7 working days]* from the date on which the fault is identified. Where required by the contracting authority, the contractor must provide suitable alternative heat sources during the repair period.

CPC2. **Confirmation of WEEE reporting**

To be applied in conjunction with TS9.

At the time of submitting an invoice in respect of any products supplied under the contract, the contractor must provide evidence that the producer has reported these products to the national registration body, in accordance with S.I. 149/2014 (as amended) on waste electrical and electronic equipment. This may be in the form of a link showing the producer's up-to-date registration with the national registration body.

E SOLAR THERMAL COLLECTORS

CORE CRITERIA	COMPREHENSIVE CRITERIA

This product category includes the following:

Flat Plate Collectors: *A solar thermal collector which has its absorber laid in a box, insulated at the rear and sides, and with a transparent cover on top. The heat transfer media can be water (with or without antifreeze) or air.*

Evacuated Tube Collectors: *A solar thermal collector comprising a series of tubes that contain an absorber area and into which vacuum is created to provide insulation. The heat transfer media is typically water (with or without antifreeze).*

SELECTION CRITERIA

SC1. **Technical Capacity** *[where installation is included in the contract]*

Candidates must demonstrate that suitably qualified and experienced personnel will undertake the installation of the equipment and any ancillary works.

Fitters and service personnel must be fully trained and qualified. Training should comprise the following elements *[select all which are relevant]:*

- Assembly, installation and commissioning of the specific products covered by the contract
- Pressure testing of components
- Electrical testing of equipment
- Testing controls and meters
- Ensuring safety devices are correctly installed and working
- Operational testing of individual components of the system (e.g. boiler, fluid transfer pumps, distribution system)
- Testing the whole system under a range of normal operating conditions
- Adjustment of the equipment to energy-efficient settings
- Air emission measurement techniques
- Technical and legal documentation for the products (certificate of conformity, commissioning and test reports).

Verification: Candidates must submit evidence that the personnel directly responsible for installation and any ancillary works have relevant experience, qualifications and training in relation to each of the above aspects. This may be in the form of a list of relevant contracts carried out over the previous three years, references, CVs, training records and/or other evidence of qualifications and experience.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
TS1. **CE marking, Ecodesign, Energy Label and WEEE registration** All equipment and/or components must be CE marked as required by the applicable EU directive(s) and/or regulations. They must also comply with the applicable Ecodesign and EU Energy Label Regulations. The producer must be registered with the relevant producer registration body for waste electrical and electronic equipment. Verification: Tenderers must provide the product Declaration of Conformity and Energy Label confirming compliance with the above requirements. Evidence of the product's entry in the EPREL database should be provided. Evidence of the producer's WEEE registration must be provided.	
TS2. **Product longevity and warranty** Repair or replacement of the equipment and each of its components must be covered by the warranty terms for a minimum of **four years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.	TS2. **Product longevity and warranty** Repair or replacement of the equipment and each of its components must be covered by the warranty terms for a minimum of **five years** from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least **ten years** from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative heat sources where required. Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.

CORE CRITERIA	COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS3. **Compliance with standards and performance parameters**

3.1. The solar thermal collector must be tested to one of the following European standards, or scientific equivalent:

Solar Collectors

EN 12975-1 (Part 1 General Requirements) AND EN 12975-2 (Part 2 Test Methods)

OR

Factory Made Systems

EN 12976-1 (Part 1 General Requirements) AND EN 12976-2 (Part 2 Test Methods)

3.2 Tenderers must state the thermal collector performance parameters including optical efficiency (n0), first order heat loss coefficient (a1) and second order heat loss (a2) which allow the annual power output to be calculated according to the following formula:

Power output (q) = $A*(n0*G - a1*dT - a2*dT^2)$ [W]

with the operation conditions:

- G: Solar irradiance on collector plane [W/m^2]
- dT: Temperature difference between collector mean fluid temperature and ambient air temperature [K] (Kelvin)

And the collector performance parameters:

- n0, optical efficiency (combined efficiency of the transparent cover and the absorber) [-]
- a1, First order heat loss coefficient (heat loss coefficient at collector fluid temperature equal to ambient temperature [W/K]
- a2, Second order heat loss coefficient (temperature dependent term of heat loss coefficient) [W/K^2]

And the collector area:

- A: Collector area corresponding to the performance parameters – in this case, the aperture area is used as the reference area.

NOTE: to facilitate comparisons with other products the following standard values will be used:

G: 900 W/m2 dT:50K A: $1m^2$

Verification: Products which are included on the ***Triple E Register*** will be deemed to comply. Alternatively, technical documentation and test results/certification which confirm compliance with the above requirements must be provided.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	

TS4. **Installation instructions and user information**

The equipment must be supplied with installation instructions and user information in printed (on the packaging and/or on documentation accompanying the product) and/or in electronic format, which include the following:

a. Information on energy consumption

b. Full installation instructions, including information on who the fitter can approach for guidance on installation;

c. Operating instructions for service personnel;

d. User information, including:

   i. references to competent installers and service personnel;

   ii. recommendations on the proper use and maintenance of the equipment

   iii. advice on how users can minimise the environmental impact of the equipment, in particular information on use to minimise energy consumption;

   iv. if applicable, information on how the measurement results should be interpreted and how they can be improved.

   v. information about which spare parts can be replaced;

e. Information on the disassembly of the product with an exploded diagram labelling the main components and identifying any hazardous substances in these components in the form of a list of materials identifying material type, quantity used and position.

f. End-of-life recommendations and options for the product and its components, that consider environmental sustainability, including options for repair, reuse and recycling.

Verification: A copy of the installation instructions and user information which will be supplied with the equipment must be provided in electronic format as part of the tender.

TS5. **End-of-life-Service**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive, for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Functional testing, servicing, repair and upgrading to prepare products or components for re-use;
- Dismantling for component re-use, recycling and/or disposal.

Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU (as amended) and with reference to the list of components for selective treatment.

Verification: The tenderer must provide details of the arrangements for collection, preparation for re-use, and recycling/disposal. This must include valid proof of the producer's registration with the national registration scheme for WEEE.

CORE CRITERIA	COMPREHENSIVE CRITERIA

AWARD CRITERIA

AC1. **Life-cycle costs**

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$$\text{Score Tender A} = \textbf{[X]} * \frac{\text{Lowest LCC}}{\text{LCC}_{\text{TENDER A}}}$$

Verification: The completed spreadsheet must be submitted with the tender and where indicated, supporting documentation verifying the data must be provided. The data entered in the spreadsheet regarding costs, energy consumption, time to replacement and other parameters will become binding under the contract with the successful tenderer.

NOTE: *Contracting authorities may choose to evaluate LCC using an existing template, or based on their own bespoke template. In either case, certain information such as the evaluation period, energy costs and cost of maintenance/replacement (if not included in the tender) will need to be completed by the contracting authority. See* ***section on life-cycle costing*** *for further information.*

AC2. **Extended warranty**

Up to **[X]** marks will be awarded to tenders offering a product warranty in excess of the minimum period required under TS2. Full marks will be awarded to the tender offering the longest warranty period, with other offers being scored proportionately.

Verification: Tenderers must provide a copy of the warranty terms offered for the product. Where the extended warranty has an additional cost this must be clearly indicated within the pricing schedule.

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	

CPC1. **Environmental performance**

This clause should be adapted to the specific nature of the contract and the scope of any maintenance/repair/warranty commitments. It is important that it includes a specific requirement to test environmental performance at regular intervals and assigns responsibility for this activity.

The contractor is responsible for ensuring that the levels of environmental performance, including energy efficiency, indicated in its tender are met both at the point of installation/commissioning and during the *[entire operating lifetime of the boiler]/[warranty period]*. Where this is dependent upon specific usage instructions and maintenance activities these must have been clearly highlighted in the tender. Regular inspections and testing of the equipment to ensure compliance will be carried out *[specify the schedule for these and whether the contractor is responsible for the cost]*.

Where the inspections or tests indicate that the designated levels of environmental performance are not being achieved, the contractor is responsible for *[repairing and/or replacing the equipment and any components]/[the costs of such work carried out by the contracting authority's nominated agent]*. The maximum time period for remedying any default in environmental performance shall be *[7 working days]* from the date on which the fault is identified. Where required by the contracting authority, the contractor must provide suitable alternative heat sources during the repair period.

CPC2. **Confirmation of WEEE reporting**

To be applied in conjunction with TS5.

At the time of submitting an invoice in respect of any products supplied under the contract, the contractor must provide evidence that the producer has reported these products to the national registration body, in accordance with S.I. 149/2014 (as amended) on waste electrical and electronic equipment. This may be in the form of a link showing the producer's up-to-date registration with the national registration body.

LIFE CYCLE COSTING

Life cycle costing (LCC) is a technique that can be used to estimate the total cost of ownership for heating equipment, as well as environmental externalities such as CO_2 emissions.[10] It is a method for making effective, long-term investment decisions since some cost aspects may not be immediately apparent to the decision maker, e.g., a higher initial investment may be required to achieve lower life-cycle costs, based on lower energy costs and improved durability with associated longer lifespans and lower repair costs. When externalities are taken into consideration, LCC is particularly relevant to achieving an improved environmental performance.

In addition to applying the GPP criteria set out in this document, it is recommended that contracting authorities carry out a comparison of life-cycle costs for the different heating equipment options either prior to or during the tender process. LCC can be included as part of award criteria under Article 68 of Directive 2014/24/EU. Further information on how to conduct LCC comparisons can be found in the EPA guidance document and on the ***EU GPP website***.

For heating equipment, life-cycle impacts depend most on the use phase, particularly energy consumption in use. Purchase costs account for a comparatively small part of the total life-cycle cost of the products. A number of available studies on cost considerations in GPP have concluded that higher purchasing prices are usually compensated for by lower operating costs for products where energy consumption is a major cost factor. A typical example is found in high-efficiency heating installations. During the whole life cycle of the heating installation, one study[11] found that approximately 95% of the total costs were determined by operating costs. Public procurement decisions based only on the purchase price will likely lead to mis-investment. The technical background report associated with the EU GPP criteria[12] presents a detailed life-cycle cost analysis of water-based heaters. The data analysed indicate life-cycle cost savings of up to 16% for the smaller boiler size classes and 34-46% for the largest sizes. As this study was carried out in 2011, it is expected that additional life-cycle cost savings are available with the best available technologies currently on the market.

The choice of fuel type will have a strong influence on the overall life-cycle costs of heating equipment. The SEAI regularly publishes cost comparisons for different fuel types in Ireland and this information will be useful for LCC calculations.[13] The SEAI has also created a ***Cost Indicator for Biomass Boilers in Business*** and ***Energy Savings Calculator for Boiler Replacement Projects*** which are useful tools to assist with LCC at the planning stages.

[10] Further information on LCC, including the possibility to account for externalities, is included in the EPA guidance document accompanying these criteria.
[11] "Costs and Benefits of Green Public Procurement in Europe", Öko-Institut e.V. and ICLEI, 2007
[12] Joint Research Centre (2011) *Development of European Ecolabel and Green Public Procurement Criteria for Water-based Central Heating Generators. Draft Report. Product definition, market analysis and technical analysis*. Available at: ***http://susproc.jrc.ec.europa.eu/heating/stakeholders.htm***
[13] For example, see ***https://www.seai.ie/publications/Commercial-Fuel-Cost-Comparison.pdf***

ANNEX: METHODS FOR CALCULATING EMISSIONS

1. Seasonal space heating emissions shall be calculated as follows:

Table 2. Calculation of seasonal space heating efficiency

Type of solid fuel boiler	Formula
Manually stoked solid fuel boilers that can be operated at 50% of the rated heat output in continuous mode, and automatically stoked solid fuel boilers	$E_s = 0.85 \times E_{s,p} + 0.15 \times E_{s,r}$
Manually stoked solid fuel boilers that cannot be operated at 50% or less of the rated heat output in continuous mode, and solid fuel cogeneration boilers	$E_s = E_{s,r}$

Where

- E_s are the seasonal space heating emissions.
- $E_{s,p}$ are the emissions of respectively particulate matter, organic gaseous compounds, carbon monoxide and nitrogen oxides measured at 30% or 50% of rated heat output, as applicable.
- $E_{s,r}$ are the emissions of respectively particulate matter, organic gaseous compounds, carbon monoxide and nitrogen oxides measured at rated heat output.

2. GHG emissions shall be calculated following the TEWI formulae as set out in ***Table 3*** (the formula depends on the heat generator technology). Each TEWI formula may consist of two parts, one depending solely on the heater efficiency (expressed in terms of the seasonal space heating energy efficiency, η_s) and the fuel carbon intensity (represented by the β parameter), and the second part (only applicable to heat pump heaters) depending on the greenhouse gas emissions due to refrigerant leakage. The GHG emissions from the refrigerant leakage depend on the global warming potential (GWP100) of the refrigerant and the refrigerant leakage during the use phase (expressed as an annual leakage rate, ER, in percentage of the total mass of the refrigerant per year) and at end-of-life (expressed as a percentage of the total mass of the refrigerant, α).

Table 3. TEWI formulae by heat generating technology

Heat generator technology	**TEWI formula** (g CO_2-equivalent/kWh heating output)
Boiler heaters	$\frac{\beta_{fuel}}{\eta s}$
Heat pump heaters	$\delta \times \frac{\beta_{fuel}}{\eta_s} + (1 - \delta) \times \frac{\beta_{elec}}{2.5 \times \eta_s} + \frac{GWP_{100} \times m \times (ER \times n + \alpha)}{P \times h \times n}$
Cogeneration heaters	$\frac{\beta_{fuel}}{\eta_{thermal}} - \frac{\eta_{el} + \beta_{elec}}{\eta_{thermal}}$
Package of heaters	$(1 - S_{HP}) \times \frac{\beta_{fuel}}{\eta_{s,B}} + s_{HP} \times (\delta \times \frac{\beta_{fuel}}{\eta_{S,HP}} + (1 - \delta) \times \frac{\beta_{elec}}{2.5 \times \eta_s} + \frac{GWP_{100} \times m \times (ER \times n + \alpha)}{P \times h \times n}$

The main parameters in the TEWI formulae above are described in Table 4.

Table 4. Main parameters for computing the TEWI formulae

Parameter	Description of parameter	Units	Constant value or test to be performed to obtain parameter
β_{elec}	GHG emission intensity of electricity	[g CO_2-equivalent/kWhelec]	384
β_{fuel}	GHG emission intensity of the fuel used by the heater	[g CO_2-equivalent/kWhgas]	See ***Table 5***
η_s	Seasonal space heating energy efficiency	[-]	To be tested and declared by the applicant (Criterion 1)
$\eta_{s,b}$	Seasonal space heating energy efficiency of the boiler heater part for average climate conditions	[-]	To be tested and declared by the applicant (Criterion 1)
$\eta_{s,HP}$	Seasonal space heating energy efficiency of the heat pump heater part for average climate conditions	[-]	To be tested and declared by the applicant (Criterion 1)
$\eta_{thermal}$	Thermal efficiency	[-]	See ***Table 6***
η_{el}	Electrical efficiency	[-]	See ***Table 6***
δ	Proxy	[-]	= 0 if electrically-driven heat pump = 1 if fuel-driven heat pump
GWP_{100}	Global warming potential (effect over 100 years)	[g CO_2-equivalent/g refrigerant, over 100-year period]	According to Annex I to Regulation (EC) No 842/2006
m	Refrigerant mass	[g]	To be declared by the applicant
ER	Refrigerant loss per year	[%/yr]	A value of ER = 3.5 %/yr shall be used.
n	Lifetime	[yr]	A value of n = 15 shall be used.
α	Refrigerant loss at end of life (disposal loss)	[%]	A value of α = 35 % shall be used.
p	Design load	[kW]	To be declared by the applicant
h	Full load operating hours	[h/yr]	2000
S_{HP}	Share of heat output from the heat pump heater part over the total heat output	[-]	To be declared by the applicant

Table 5 describes how to evaluate parameter βfuel in the TEWI formulae above depending on the fuel used by the heater. In case the boiler is designed for a fuel not listed in the table, the closest match of fuel shall be selected, based on the origin (fossil or biomass) and form (gaseous, liquid or solid) of the fuel used.

Table 5. Parameter β_{fuel} (GHG emission intensity) to compute the TEWI formulae

Fuel used by the heater	GHG emission intensity	Value (g CO_2-equivalent/kWhgas)
Gaseous fossil fuels	$\beta_{fuel} = \beta gas$	202
Liquid fossil fuels	$\beta_{fuel} = \beta oil$	292
Solid fossil fuels	$\beta_{fuel} = \beta coal$	392
Gaseous biomass	$\beta_{fuel} = \beta bio\text{-}gas$	98
Liquid biomass	$\beta_{fuel} = \beta bio\text{-}oil$	149
Wood logs	$\beta_{fuel} = \beta bio\text{-}log$	19
Wood chips	$\beta_{fuel} = \beta bio\text{-}chip$	16
Wood pellets	$\beta_{fuel} = \beta bio\text{-}pellet$	39
Blends of fossil fuels and biomass	β_{fuel} = weighted average derived from the sum of the weight fractions of the individual fuels multiplied by their GHG emission parameter	Σ (Fuel X % × $\beta_{fuel\ X}$) + (Fuel Y % × $\beta_{fuel\ Y}$) + … (Fuel N % × $\beta_{fuel\ N}$)

Table 6 describes how to evaluate parameters ηthermal and ηel in the TEWI formula for cogeneration heaters.

Table 6. Parameters $\eta_{thermal}$ and η_{el} to compute the TEWI formula for cogeneration heaters

Parameter	Expression
$\eta_{thermal}$	$\eta_{thermal} = \eta_s$ 2.5 x η_{el}
η_{el}	For cogeneration space heaters not equipped with supplementary heaters $\eta_{el} = \eta_{el,CHP100+Sup0}$
	For cogeneration space heaters equipped with supplementary heaters $\eta_{el} = 0.85 \times \eta_{el,CHP100+Sup0} + 0.15 \times \eta_{el,CHP100+Sup100}$
	Where: • η_s means the seasonal space heating energy efficiency as defined in Regulation (EU) No 813/2013 • η_{el} means the electrical efficiency as defined in Regulation (EU) No 813/2013 • $\eta_{el,CHP100+Sup0}$ means the electrical efficiency at rated heat output of cogeneration space heater with supplementary heater disabled, as defined in Regulation (EU) No 813/2013 • $\eta_{el,CHP100+Sup100}$ means the electrical efficiency at rated heat output of cogeneration space heater with supplementary heater enabled, as defined in Regulation (EU) No 813/2013

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

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