A. **Space heaters**

1. **Current situation**

   1.1. **Heat pump**

   - Heat pump definition and requirements as defined in Regulation 813/2013
   (17) ‘heat pump space heater’ means a space heater using ambient heat from an air source, water source or ground source, and/or waste heat for heat generation; a heat pump space heater may be equipped with one or more supplementary heaters using the Joule effect in electric resistance heating elements or the combustion of fossil and/or biomass fuels;

   Heat pump space heaters and heat pump combination heaters, with the exception of low-temperature heat pumps: The seasonal space heating energy efficiency shall not fall below 110 %.

   Low-temperature heat pumps: The seasonal space heating energy efficiency shall not fall below 125 %.

   From 26 September 2015 the sound power level of heat pump space heaters and heat pump combination heaters shall not exceed the following values:

<table>
<thead>
<tr>
<th>Rated heat output ≤ 6 kW</th>
<th>Rated heat output &gt; 6 kW and ≤ 11 kW</th>
<th>Rated heat output &gt; 12 kW and ≤ 30 kW</th>
<th>Rated heat output &gt; 30 kW and ≤ 70 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound power level (LWA) indoors</td>
<td>Sound power level (LWA) outdoors</td>
<td>Sound power level (LWA) indoors</td>
<td>Sound power level (LWA) outdoors</td>
</tr>
<tr>
<td>60 dB</td>
<td>65 dB</td>
<td>65 dB</td>
<td>70 dB</td>
</tr>
</tbody>
</table>

   **Reference design conditions for heat pump space heaters and heat pump combination heaters, temperatures in dry bulb air temperature (wet bulb air temperature indicated in brackets)**

<table>
<thead>
<tr>
<th>Reference design temperature (Tdesign)</th>
<th>Bivalent temperature (Tkiv)</th>
<th>Operation limit temperature (TOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 °C (±11 °C)</td>
<td>maximum +2 °C</td>
<td>maximum −7 °C</td>
</tr>
</tbody>
</table>

   - Information provided to end-users accordingly to regulation 813/2013 (annex 2, table 2), inter alia:
     - \( P_{\text{rated}} \) which corresponds to the maximum heat load that the heat pump, eventually with the help of a backup heater, can cover at a design temperature of -10°C (average climate)
     - \( \eta_s \) which corresponds to the annual energy efficiency of the heat pump while providing \( P_{\text{rated}} \), eventually with the help of a backup heater
     - The heat pump is equipped or not equipped with a supplementary heater (backup heater) (Yes/No)
     - The heating capacity \( P_{\text{sup}} \) of the supplementary heater that is needed to reach \( P_{\text{rated}} \)

   The calculation method in EN 14825 considers:
   If an electrical backup is provided together with the heat pump or if no backup is provided together with the heat pump, then \( \eta_s \) of the heat pump is calculated assuming an electrical backup heater having a COP being equal to 1.

   If a heat pump is equipped with a fossil backup heater, then the \( \eta_s \) of the heat pump is calculating while considering the \( \eta_s \) of the fossil fuel backup heater.

   The calculation method in regulation 813/2013 is not clear. As a matter of fact, it is understood that it is possible to place on the market a heat pump having a \( T_{\text{HV}} \) higher than \( T_{\text{design}} \) to declare that the backup heater is using fossil fuel as driving energy however the backup heater is not delivered together with the product.
   In that event, the \( \eta_s \) value of the backup heater to be considered in the \( \eta_s \) calculation of the heat pump is unknown. The way \( \eta_s \) of the heat pump is to be calculated is unclear.
Whatever the energy used for backup heater and whatever the value of \( P_{sup} \), all heat pumps shall comply with the energy efficiency thresholds.

The information provided allow for a comparison of heat pumps while providing the same service (\( P_{rated} \)) under the same conditions (average climate).

A heat pump may be/is often designed with a supplementary heater in order to minimize the capacity delivered by the thermodynamic cycle so that it can operate with a high energy efficiency on most part of the heating season (minimization of on/off cycle operation); the backup heater is just there to overcome high heating demand at very low outdoor temperatures but with very few occurrences during the heating season.

\[ P_{rated}, T_{biv}, \text{ and } \eta_s \]

(39) ‘bivalent temperature’ (\( T_{biv} \)) means the outdoor temperature declared by the manufacturer for heating at which the declared capacity for heating equals the part load for heating and below which the declared capacity for heating requires supplementary capacity for heating to meet the part load for heating, expressed in degrees Celsius.

According to EN14825, the relation in between \( P_{rated} \) and \( T_{biv} \) is as follow:

\[
P_{rated} = \frac{T_{biv} - 16}{T_{design} - 16} \times \phi(T_{biv})
\]

\( P_{rated} \) and \( T_{biv} \) are strongly linked. Manufacturers have to consider the heating capacity provided by the thermodynamic cycle while choosing \( P_{rated} \).

\( \eta_s \) calculation includes the consumption of the backup heater, the auxiliary mode consumption, the conversion coefficient (PEF) and the correction factors \( F(1) \) and \( F(2) \) where relevant.

\( \eta_s \) is not calculated at each test conditions A, B, C, D, E and F. Only COP is being determined at these conditions.

- Heat pumps not equipped with a backup heater

Heat pumps having a \( T_{biv} \) and/or TOL higher than \( T_{design} \) are not always equipped with a backup heater. However, these heat pumps are not always associated in a package while installed in the field. The following situations can occur:
  - No backup heater is needed as the \( T_{design} \) at the location where the heat pump is to be installed is higher than -10°C and the heating capacity delivered by the heat pump at \( T_{design} \) covers the heat load of the building
  - The heat pump is associated with an existing boiler installed prior the regulation 813/2013 was in place and thus not having any product fiche
  - The heat pump is complemented by a heating appliance that is not in the scope of regulation 813/2013 (stove, air to air heat pump…)
  - The heat pump is associated with a boiler having a product fiche.

In the latter situation, the energy efficiency of the package is recalculated using the energy efficiency provided within the product fiche of both heat pump and boiler. The association of the heat pump and the boiler constitutes a system that may be, or not, managed by an optimized/smart control system. The heat pump and the boiler can be put on the market by two different manufacturers.

1.2. Product encompassing a heat pump and a fossil fuel heat generator

In the current regulations 813/2013 and 811/2013, space heaters have to be either a boiler or a heat pump but cannot be a combination of both unless the boiler is considered as a backup heater (electrical of fossil/biomassfuel).

The situation described in this paragraph corresponds to the situations where a heat pump and a fossil fuel boiler are assembled together, managed by a common control system and sold under a unique model identifier. In that situation, the heat pump and the boiler can be considered as two components, having no model identifier, of a single product placed on the market and bearing a single CE mark.

The following cases can be found on the market:
a. The product is declared as being a heat pump equipped with a fossil fuel backup heater. The product meets all the requirements related to heat pump.

b. Both the heat pump and the boiler fulfil the eco-design requirements and are put separately on the market as products: according to EL regulation 811/2013 each of them is provided with one product fiche corresponding either to the heat pump or the boiler, and the elements of figure 1, figure 3 or figure 4. According to figure 1, 3 and 4, the efficiency corresponding to the supplementary boiler is taken from the fiche. As a consequence, the fiche is needed. In that situation, the product is being placed on the market as a package of a space heater and heat pump space heater.

Each component (heat pump and Boiler) can be tested individually and is individually compliant with eco-design requirement (minimum efficiency, NOx, TOL, $T_{bliv}$...). The product is delivered together with product fiche for both component (heat pump and boiler) and the information contained in either figure 1, 3 or 4.

c. One of the two component cannot be tested individually and/or is not fulfilling the eco-design requirements, thus the heat pump and/or the boiler product fiche cannot be established. In that situation, the product can be declared either as a heat pump or as a boiler. It can also be considered that the product is not covered by the regulation 811/2013.

None of the above-mentioned cases allow to consider in the declared energy performance the benefit coming from the optimized management between heat generators using different energies.

The situation described in a. is not optimal as the $P_{rate}$ of the product is limited.
The situation described in b. is not optimal as the heat pump and boiler declared as products do not exist.
The situation described in c. is not optimal as either the benefit of the heat pump or the boiler is not shown to the end-users or, worst, no comparable energy efficiency information are made available for the end-users.

| As of today, products encompassing a heat pump and a fossil fuel heat generator managed by an optimized common control system are not covered by regulations 813/2013 and 811/2013 |

2. **EN14825**

The possibility to account for a fossil fuel back up heater was introduced in EN14825:2015. Before that, only electrical backup heaters were considered.

When products encompassing a heat pump and a fossil fuel boiler managed by a smart and common control system appeared on the market, a join working group TC113/TC109 was created to elaborate an appropriate definition of these products and to define an appropriate testing method to assess their performance. Both definition and tested methods were introduced in EN14825:2018.

3.1.46 **Hybrid heat pump**

*Encased assembly or assemblies designed as a unit consisting of an air/water(brine)/DX-to-water (brine) electrically driven heat pump with a second heat generator using fossil fuel, and managed by a common controller providing an optimized operation of the heat generators for space heating*

$T_{bliv}$ and TOL do not apply to hybrid heat pumps and are replaced by $T_{bl,off}$ and $T_{HP,off}$ which correspond to the temperature where respectively the boiler and the heat pump stops.

Two test methods are described: separate and combined method.

The standard has been developed in order to be applicable to any type of hybrid, independently of the relative heating capacity provided by the thermodynamic circuit and by the fossil fuel burner. In addition both gas and liquid fuel can fed the burner.

The standard could easily be extended to hybrid using biomass fuel boilers

3. **VHK proposal**

3.1. **Analysis of VHK proposal**

VHK proposes two methods that would allow that any type of association of boiler and heat pump to be covered by the regulations implementing eco-design directive and labelling regulation.

Within the proposal, boilers and heat pumps will be tested under the very same conditions and thus the performance declared under these very same conditions.
It is also proposed that there would be no more requirements related to Tbiv and TOL.

A formula is proposed to calculate the thresholds corresponding to each association of any types of heat generators, based on the individual thresholds of the generators weighted by the contribution of each of the generator to $P_{\text{rated}}$.

The understood objectives of the proposal are the following:

- Create a fair playing field among products included within the scope of regulations 813/2013 and 811/2013 and in particular boilers and heat pumps (i.e. same test conditions and same $\eta_s$ calculation method).
- Allow for the possibility to assess the performance of combinations of heat generators. This would open the door to innovative and more efficient combinations.
- Somehow, to extend the scope of regulation 813/2103 to systems (i.e. combination of heat generators) and to “components” (e.g. boilers and heat pumps) constituting these systems. To suppress the current any package fiche?
- Is it intended to create a new package fiche based on the formula?

However, it is not the intention neither to minimize the energy efficiency requirements nor to reduce end-user’s visibility on product efficiency and thus to still allow for comparison in between products / systems.

### 3.2. Reflection on VHK proposal

- $P_{\text{rated}} / \eta_s$

*Both methods use the bin-method for the reference climate as a basis and start from the declared capacity (max. heat output) $P_{\text{rated}}$ at design conditions.*

For boilers, $P_{\text{rated}}$ corresponds to the heat output of the boiler, meaning the heating capacity that is provided by the boiler.

For heat pump, $P_{\text{rated}}$ corresponds to the maximum heat load that the heat pump, eventually with the help of a backup heater, can cover at a design temperature of -10°C (average climate).

It is not understood in the proposal whether it is intended to keep the same definition of $P_{\text{rated}}$ for heat pump. As of today, $\eta_s$ is linked to $P_{\text{rated}}$. Meaning that the declared energy efficiency corresponds to the energy efficiency the heat pump is reaching while providing the annual heating energy required by a building which heat load is $P_{\text{rated}}$. In particular, $\eta_s$ includes the backup heater that might be needed to cover the heat load. While considering a heat pump, the higher is the $T_{\text{biv}}$, the higher is the $P_{\text{rated}}$ and the lower is the $\eta_s$ as more backup is needed to cover the heat load.

The present situation allows to compare energy efficiency of heat pumps while providing the same service, $P_{\text{rated}}$.

The current situation allows to compare only preferential heat pumps, but non-preferential heat pumps—which is an arbitrary concept—do not have to meet the requirements for Tbiv or TOL and can be brought on the market as long as in the same package there is another heat generator. For example, it is allowed to boost the efficiency of a gas boiler (preferential) by a small non-compliant heat pump (non-preferential) to create e.g. a compliant non-condensing boiler. This is not hypothetical but has happened.

In the current regulation this seems not really anticipated (although perhaps it was and that is why the concept of non-preferential heat pump was created?). The question is whether this is a ‘Bad Thing’.

Although many may have a view that only the very best electric heat pumps should be allowed, the study team proposes to explore a more empathic approach, especially for the existing buildings where often a proper switch from boiler to heat pump is technically not feasible or prohibitively expensive. Consumers living in existing buildings, especially when faced with an emergency situation (boiler breakdown in winter), choose a replacement like-for-like to have the space heating available within days. In such a situation, gas-boilers may be replaced by better gas-boilers or oil-boilers by better oil-boilers (only in rare cases oil is now also replaced by gas following local measures), but already something relatively simple as a change of chimney-liner for a condensing boiler seems to pose—in the perception of consumers and installer—huge problems and leads to evasion of the rules or extra requests for exemptions for e.g. C4 or C8 boilers.

On the other hand, as mentioned by Viessmann, a hybrid space heater gives better security of energy supply. At the moment the electricity grid-capacity is nowhere near what it should be to accommodate 100% or even 30% ownership of electric heat pumps for space heating. Furthermore, even if by 2050 grid-capacity in the EU is high
enough—which is unlikely—there is always the problem of unpredictability of solar and wind based electricity which might force temporary energy shifts.

In VHK proposal, it is understood that the calculated $\eta_s$ would be the energy efficiency reached by the heat pump, without accounting for any backup heater.

It is not decided yet if and how the energy efficiency of heat pumps—as a single heat generator—should be evaluated. If the heat pump capacity is large enough to meet Prated at Tdesign (TOL<-10 °C) there is obviously no problem. If the capacity is not large enough then the manufacturer should lower the Prated. This is the same as for e.g. a gas-boiler. If it is not technically feasible for the heat pump to deliver any significant output Prated at -10 °C then the heat pump is not fit-for-purpose and cannot be placed on the market as a central hydronic space heater. But it can be brought on the market as a hybrid, i.e. in combination with another heat generator as an integrated or modular (to be placed on the market only in combination) package. It can be debated if one could (explicitly or implicitly) allow stand-alone heat pumps for Warm Climates, i.e. with a TOL at +2°C and with efficiency according to the Warm Climate bin-method.

It is not understood to which $P_{rated}$, $\eta_s$ will be related to and it is not understood how comparison in between heat pumps will be possible.

- Energy efficiency limit

Example calculation of Ecodesign minimum efficiency: At the (new pef corrected) Ecodesign limit value for a HT heat pump of 130%, the maximum Tbiv is 2 °C and TOL is -7 °C and thus the heat pump contribution (without backup) to the load looked-up from table A is 60% (from 16 °C to Tbiv) plus 19% (0.5 x Tbiv to TOL), resulting in 79% load-contribution for a heat pump with those Tbiv and TOL values. Assume that the remaining 21% of the load will be filled in by an electric boiler with an efficiency of 43%. The resulting minimum seasonal space heating efficiency for the package becomes thus (79% * 130%) + (21% * 43%) = 91% + 9% = 100%

As of today, the energy efficiency threshold for such a system is 130% (new PEF).

Is it the intention to replace the actual energy efficiency thresholds listed in regulation 813/2013 by a calculation formula?

In principle, yes, that is the current line of thought.

The situation exists where the heat pump part and the boiler part cannot be tested individually and thus shall be tested as a black box (combined method). In this event, the share of the heat load covered by the heat pump cannot be differentiated from the one covered by the boiler. How the threshold will be calculated in that situation?

It may be assumed that the energy input (gas, oil or electric) to each single heat generator can be measured at each test point (for the separate method, or throughout the whole bin-cycle in the combined method) and thus the relative fraction of each generator, boiler(s) and/or heat pump(s), can be used to establish the Ecodesign limit.

3.3 Products / components part of a system

As of today, regulation 813/2013 only addresses products, while regulation 811/2013 addresses systems (packages) as well as products. Within regulation 811/2013, the systems are made of products already CE marked, and thus, fully compliant with regulation 813/2013.

It can be understood that VHK proposes to extend the regulation 813/2013 to “component” inter alia to newly defined heat pump for which there is no requirement related to TOL and Tbiv and for which eventually the declared heating capacity and energy efficiency do not correspond to the current $P_{rated}$ and associated $\eta_s$. In other words, it is understood that it is proposed to extend the regulation 813/2013 to heat pumps and boilers that are meant to be assembled on site to make a system capable of providing the heat load needed by the building, $P_{rated}$. Energy efficiency and heating capacity of each component would be declared by the manufacturer, and a method allows for the calculation of the energy efficiency of the system.

It is not understood how the $P_{rated}$ of the system will be calculated.

In case the system is constituted by the manufacturer and placed on the market as such, the energy efficiency threshold is calculated using the proposed formula and the product can only be placed on the market in case the energy efficiency reached is above the combined weighted threshold.
How the threshold will be determined for product where boiler and heat pump cannot be tested independently?

See answer above

In case the components are placed separately on the market, which energy efficiency thresholds will apply individually to each component? As eco-design directive is being part of the CE marking, is it the installer that will be in charge of affixing the CE marked on the final assembly after he has verified that the system meets the minimum eco-design requirements? Shall the installer be able to apply the formula to the system he will constitute from the two separated boiler and heat pump component? How can he determine the contribution of each generator from the information provided?

Today, the theoretical option exists that the installer can bring on the market a central hydronic space heater with components (heat generators, heat exchangers, valves, controls, etc.) that he buys from various manufacturers and place this new product on the market. In practice, for various technical, legal and economical reasons, this did not happen: Designing and programming sophisticated controls for heat-pump/boiler hybrids is complex, the package should be CE-marked and the laboratory tests required for the technical optimization and CE-marking make it an extremely expensive process even for large installer firms.

In practice and at the very most, the installers add a solar thermal panel to a new or existing (combi-)product, with or without relabeling, or similarly simple extensions. This possibility of adding a solar panel (or similar simple extensions) is to be maintained in one way or another. However, for the new regulation it is no longer assumed that installers will place on the market CE-marked new products of their own. In other words, we assume that the installer can only buy compliant CE-marked products, e.g. a heat pump or a boiler or a hybrid with necessary controls and peripherals, from a manufacturer. It is the manufacturer that will take care of the CE-marking, i.e. the compliance with Ecodesign labels and Energy Label ratings and not the installer.

Here is an example that illustrated what is understood from VHK proposal:

Let’s assume a heat pump “1” placed on the market having a TOL = +3°C and T_{biv} = +5°C. Let’s assume that this heat pump “1” provides 5kW at +3°C and 5.5kW at +5°C. According to the current definition of $P_{\text{rated}}$, $P_{\text{rated}}$ would be equal to 13kW and the energy efficiency while the heat pump is operating, that is to say in between +3°C and +16°C. Thus, the energy efficiency will not reflect the performance achieved while providing 13kW but only the energy achieved for providing part of the load.

Let’s assume another heat pump “2” having a $T_{biv} = -10°C$ and a $P_{\text{rated}} = 13kW$. It is quite likely that the energy efficiency of this heat pump “2” will be lower than this of the heat pump “1”. However, this heat pump “2” can provide the full service, $P_{\text{rated}}$. In fact, the comparison in between these two heat pumps is not possible.

Indeed, they cannot be compared. But the purpose is not to compare heat pumps but to compare central hydronic space heaters. The first heat pump is not a central hydronic space heater, because it cannot deliver the required performance, so another heat generator is needed to qualify. The second heat pump is a 13 kW central hydronic space heater and can thus be compared with other central hydronic space heaters, even if they are not heat pumps.

How installers and end-users will be able to make the difference in between products, that are capable of providing the full service, and components that are to be part of a system to cover the heat load? How the declared energy efficiency will be comparable if the provided load percentage is not equivalent in between products?

In principle, the end-user is not interested in the components of a central hydronic space heater, as long as it does the heating job, is affordable to buy & install and is robust & energy-efficient, i.e. saves the planet and his/her energy bill. Furthermore, as central hydronic space heaters are often bought in an emergency situation, he/she wants it fast. Thus, the end-user will want to make a simple comparison between products with the same function, without worrying about what is inside.

How the minimum requirements related to NOx emissions and acoustic will be set?

That is still to be determined. For NOx we imagine it can be done similarly as today. For max. indoor/outdoor noise power of heat pumps we have asked input from stakeholders/experts.
It would be really useful if VHK could provide detailed energy efficiency and threshold calculation examples (with intermediate calculations) for the following situations:

- **a)** A heat pump not equipped with any backup heater but which $T_{biv}$ is higher than -10°C
- **b)** A combination of a heat pump and a boiler sold under a unique model identifier and tested according to the combined method
- **c)** A combination of a heat pump and a boiler sold under a unique model identifier and tested according to the separated method
- **d)** A heat pump and a boiler sold separately and combined on site by the installer.

Having examples might be helpful for a better understanding of the proposal.

To briefly recap:

- **a)** Can be used in a hybrid but cannot be sold as a central hydronic space heater, unless the rule-makers decide on an exception.
- **b)** $Prated$ is the declared output at $T_{design}$ (-10°C for the average climate). In the combined ‘black box’ method following a continuous test-cycle with the full bin-related load profile, the energy input to each heat generator (boiler and heat-pump) is measured and the fractions used as a multiplier for the limits of the single heat generators. Instead of a continuous test-cycle with the full bin-related load profile, the combined method can also use the 4+2 test points from EN 14825.
- **c)** $Prated$ is the declared output at $T_{design}$ (-10 °C for the average climate). In the separate method the heat pump and the boiler capacities (kW) and efficiencies (COP) are established separately at each of the 4 Average Climate test points (+ Osize for the boiler) + (for heat pump only: $T_{biv}$ and TOL). From the test results and following the bin-table, the efficiency and also the Ecodesign efficiency limit can be calculated. [details will be elaborated]
- **d)** A heat pump and a boiler sold separately, presumably with each their own CE-mark and Energy Label, can be combined on site by an installer whereby the installer will be responsible/liable for the physical connection and control of the two products and the manufacturer is responsible/liable for the CE-marked two central hydronic space heaters. What the installer cannot do, at least not without going through the whole CE-marking test procedure, is change –beyond the instructions of the manufacturer for which it is tested—the manufacturers’ heat pump or boiler.

### 3.4. Recommendations

The possibility to combine boilers and heat pumps in systems should be offered in the revised regulation 813/2013 because these systems exist and will probably spread into the market. However, revised regulation 813/2013 should maybe be limited to products and systems placed on the market and not be extended to “components” that are to be assembled on the field by installers.

Indeed.

A way to go could be to let the heat pump definition as it is and to introduce a new product type which includes product where several heat generators are assembled by the manufacturer and placed on the market under a unique model identifier.

It is advised to define a fixed threshold in order to make fair comparison with other heat generators.

As mentioned, we think that the regulations should not be concerned with the efficiency of components at all, but instead only with the seasonal efficiency of the central hydronic space heater. If the functionality of the latter can be done with one ‘heat generator component’ (boiler or heat pump or ??) then the efficiencies of component and space heater are the same. If not, then the efficiency (and Ecodesign limit) will be a compound value.

EN14825 is already providing several methods to measure the energy efficiency of products made of a heat pump and a fossil fuel boiler.

EN14825 could be extended to cover other types of assemblies than these already covered.

Indeed. EN14825 can be the basis for defining test conditions etc.. But it is important to get all stakeholders, especially the boiler-side but also CHP, solar thermal, possibly ventilation heat recovery, controls, etc... We are discussing here only the general principles but there are many details that need to be addressed.
The energy efficiency threshold for a heat pump having a backup heater should not be calculated according to the proposed formula otherwise, products already banned from the market will be allowed again.

In our view, the objective is not only or necessarily to make more efficient components (e.g. heat pumps or boilers), but to make more efficient central hydronic space heaters that people will want to buy. In existing buildings where the boiler brakes down, not many end-users are prepared to wait weeks/months instead of days and pay 3 to 10 times more for a heat pump than for a simple like-for-like boiler replacement.

In addition, the possibility could be offered to installer to calculate the energy efficiency of heat generators assembled on the field, each of them being compliant with regulation 813/2013 according to the separate method proposed by VHK.

B. Combination heaters
Which rules will apply to combination heaters?
- How association of combination heaters or association of space heater and combination heater will be tested?
- In case thresholds become technology specific, how the thresholds for association of generators will be defined?

In case domestic hot water function is dealt with in a separate regulation that these of space heating function, how the association of combination and space heater will be considered?

In the WG4-meeting on (combi) water heaters in January you promised to come back with a definition and proposal for the limits of a combi heat-pump. We would very much welcome that input because it will be decisive in how we should deal with the above questions for a combi heat pump.