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Smart heat pumps How can they support electrification?

Luka De Bruyckere (ECOS), Mente Konsman & Jorrit Nutma (TNO)

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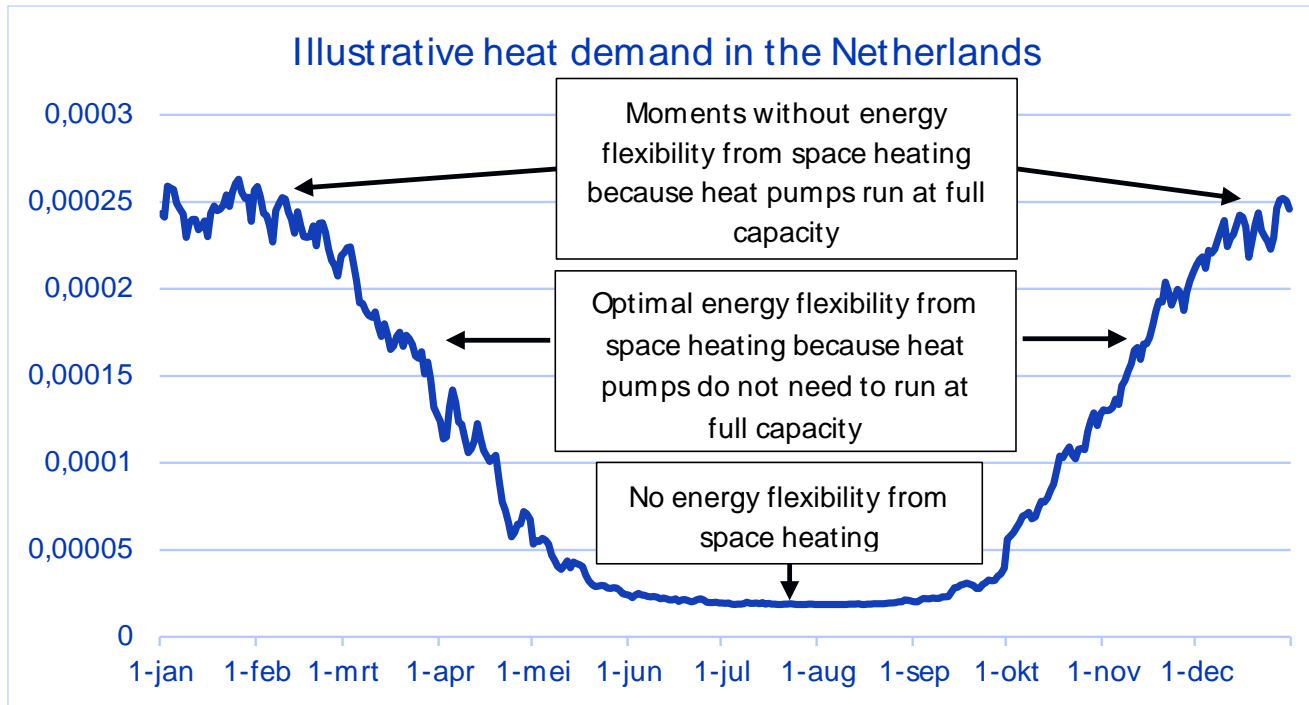
A study on smart heat pumps - context

- Electrification of heating: key for decarbonisation and a **challenge for the grid** (e.g. peak loads)
- EVs are **flexible loads** through smart charging
- Can heat pumps be smart and flexible as well?
 - How can potential barriers to smart HP flexibility be addressed?
 - What standardised communication protocols are needed?

How are heat pumps flexible?

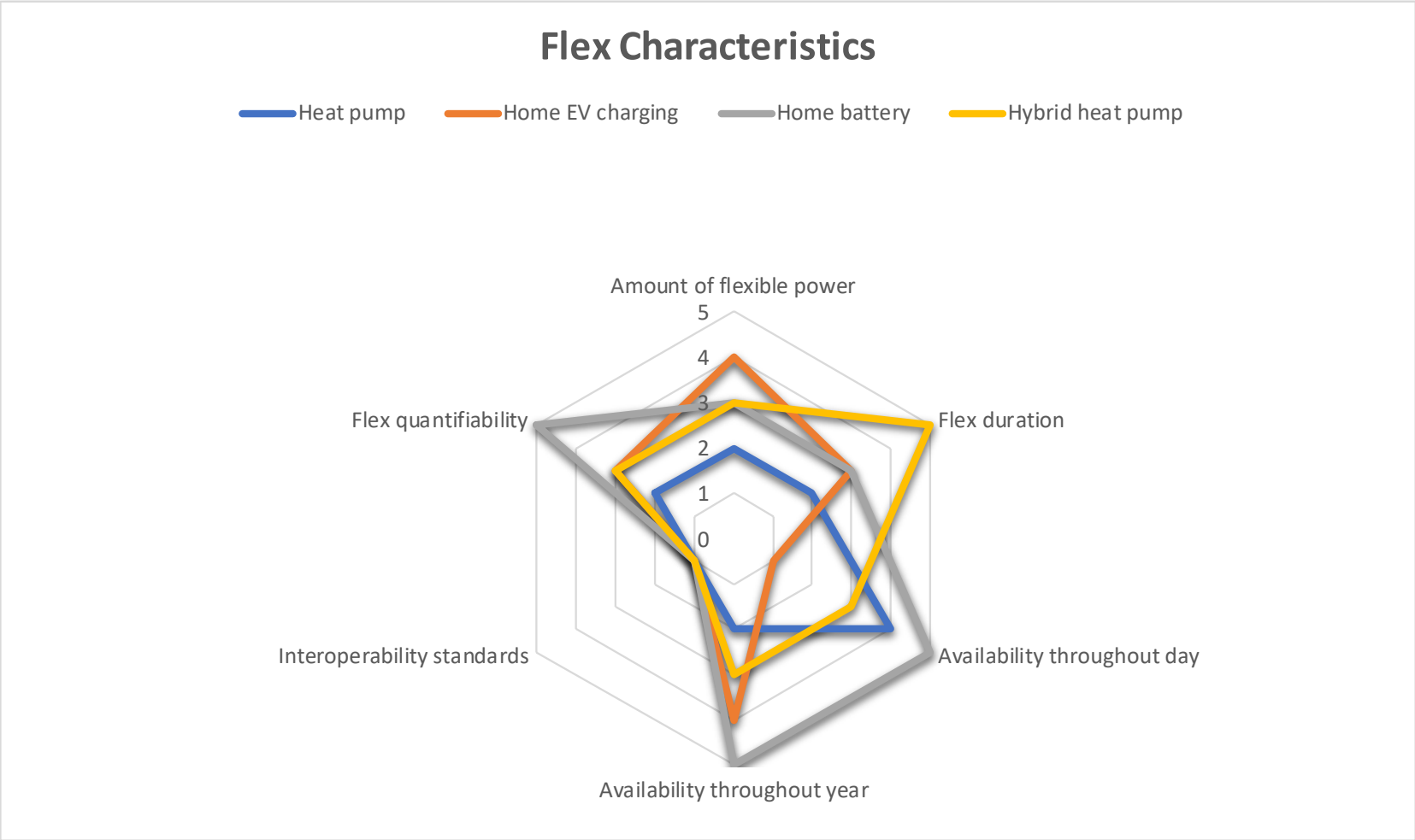
- Space heating
 - Allowing a small range around a temperature setpoint
 - Amount of flexibility will depend on house/building
- DHW
 - Vary the “SoC” of the hot water buffer
 - A larger buffer provides more flex, but is less efficient
- Disinfection
 - Freely schedule disinfection cycle

Seasonal flexibility of heat pumps



- Heat pumps are not flexible in winter, but at the same they put a lot of stress on the grid
- Most flexible during spring and autumn

HP flex in relation to other devices



“Smart” heat pumps are needed...

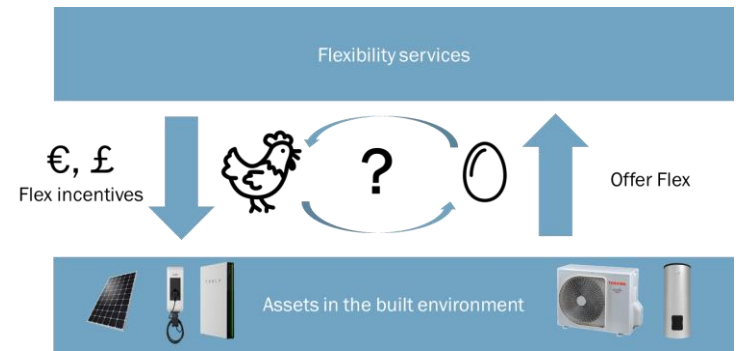
- Connected
 - Either local or cloud-based connectivity
- Provides additional services (web-based or via an app)
 - E.g. tariff based optimization
- (Remotely) updatable
 - Rollout of new functionality
- Many OEMs try to build their own ecosystem by using proprietary solutions

...that support interoperable protocols

	Readily deployable	Adoption by manufactures	Support for use-cases currently known	Forward compatibility	Optional vs mandatory features
SG Ready	-	++	-	--	+
EN 50491-12-2 (S2)	-	--	++	++	+
EN 50631 (EEBUS)	+	+/-	+	-	+/-
OpenADR ⁴	++	+	+/-	+/-	-
OpenTherm	+/-	+/-	-	-	-

- No clear winner yet...

Main barriers

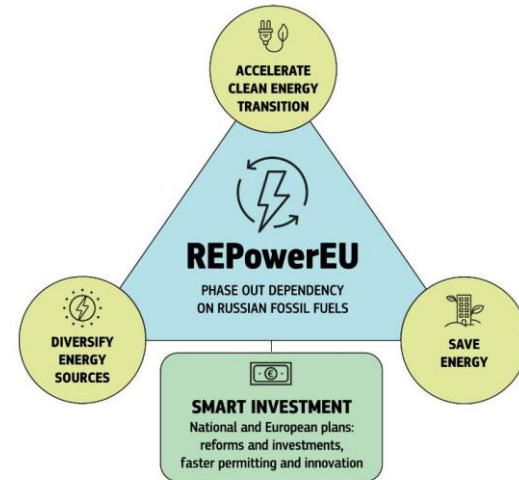


- OEM's are not always interested in interoperable solutions
 - E.g. heat pumps protocols are still very much proprietary
 - Many OEM's will not allow 3rd parties to exploit the flexibility of their devices
- End users are not yet asking for this
- Voluntarily market uptake of (an) interoperable standard(s) is expected to be very slow and will still take many years (> 5 to 10 years)

REPowerEU

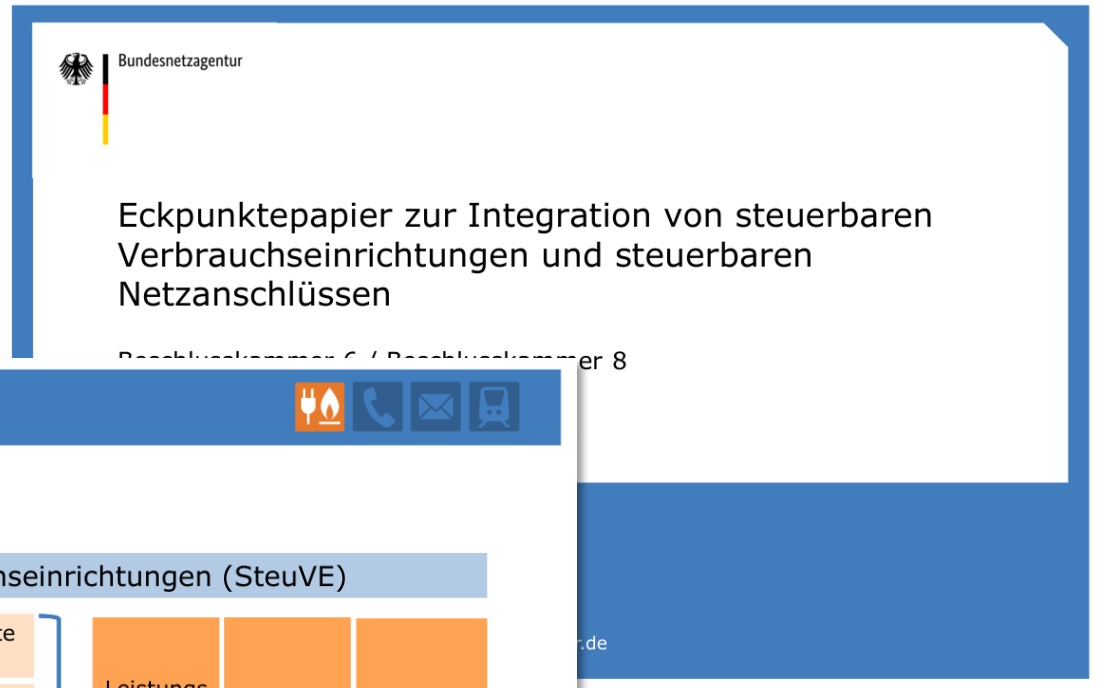
- Ambitious goals with respect to heat pumps:
 - 2026: 20 million | 2030: 60 million
- Voluntarily market uptake of an interoperable standard will be too slow
- Big risk that the majority of those 60 million heat pumps will not be smart enough
 - Life-time expectancy is 15 to 20 years

→ Limited flex availability for many years to come!



Can regulation provide a break-through?

- EnWG § 14a



Eckpunkte

Zielmodell

Steuerbare Verbrauchseinrichtungen (SteuVE)			
Nicht-öffentlich zugängliche Ladepunkte für Elektromobile	} Leistungs- bezug (P_{max}) > 3,7 kW	} Anschluss Nieder- spannung	} In- betrieb- nahme ab 1.1.2024
Wärmepumpenheizungen (inkl. Zusatzheizung)			
Anlagen zur Erzeugung von Kälte			
Stromspeicher (Bezugsrichtung)			

(Aufzählung abschließend)

Standards versus regulation

Headline	Standards	Regulation
Technical specifications	State of the art	Defined by legislators or only essential requirements
Application	Voluntary	Mandatory
Responsible person	Interested stakeholders	Legislator
Development process	Openness & transparency	Depends on institution
Decision making	Consensus	Democratic
Revision	Every 5 years & easy	Foreseen in text or decided later, but burdensome

Legislation on EU level is preferable



- Prevent specific regional solutions
 - The market for OEM's is international
 - Too costly to implement and maintain different solutions
 - Hinders interoperability
- European energy flexibility standards already exist
 - EN 50631 (EEBUS) and EN 50491-12-2 (S2)
- Find the right balance between speed of introduction and an interoperable and future-proof solution

Conclusions for a decarbonized heating and energy system

- The flexibility of HPs can **reduce reliance on fossil fuels**
 - Extra electricity demand is often powered by fossil fuels
 - ⇒ spreading demand for electricity reduces these peak loads
 - ⇒ more demand can be supplied by the same grid capacity
- A **future-proof, interoperable and harmonised protocol** is needed to use the flexibility potential of smart HPs
- EU legislation is the preferred route to such harmonised standard

Questions?

Thank you

Luka De Bruyckere • ECOS

Mente Konsman & Jorrit Nutma • TNO



Environmental Coalition on Standards

c/o WeWork
Rue du Commerce 31
1000 Brussels, Belgium

+32 2 899 7680
info@ecostandard.org

www.ecostandard.org



@ECOS_Standard



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