The background of the slide is a photograph of a dense evergreen forest covering a hillside. In the foreground, a calm body of water reflects the forest and the sky. A layer of mist or fog hangs over the water and the lower part of the forest, creating a serene and atmospheric scene. The sky is a pale, clear blue.

centrica

IREF
Implementation update

OpenADR++ Users Conference, 2023 June 7
Vladimir Vrabel

Agenda

- **Introduction**
- PAS 1878
- Implementation update
- Attention points



Centrica

Centrica PLC is a leading energy services and solutions provider founded on a 200-year heritage of serving consumers.

We are the UK's biggest retailer of zero carbon electricity, serving around 10 million customers across the UK, Ireland and Continental Europe through brands such as British Gas, Bord Gáis Energy, Centrica Business Solutions and Centrica Energy Marketing & Trading.

Centrica is committed to be a Net-Zero company by 2040.

19,738

Employees Worldwide

10m

Residential Customers

CDP A-

Ranking on climate change

Retail



Infrastructure



Trading & Optimisation

Moving towards NZ

Future electricity system be driven by renewables

- More volatile generation
- Flexibility will be needed to match supply and demand

Centrica's mission is driven by

- Bringing small and distributed flexibility to market in a scalable way to support this transition
- Allowing customers to stay in control of their energy consumption and bills.



Our Platform

- Connects all flexible devices to our scalable platform. From 2 kW to multi-MW.
- Multi-market optimization for all assets on site:
 - Local optimization
 - Energy market access (*wholesale & balancing*)
 - Across different assets



Onshore Wind



Offshore Wind



Solar



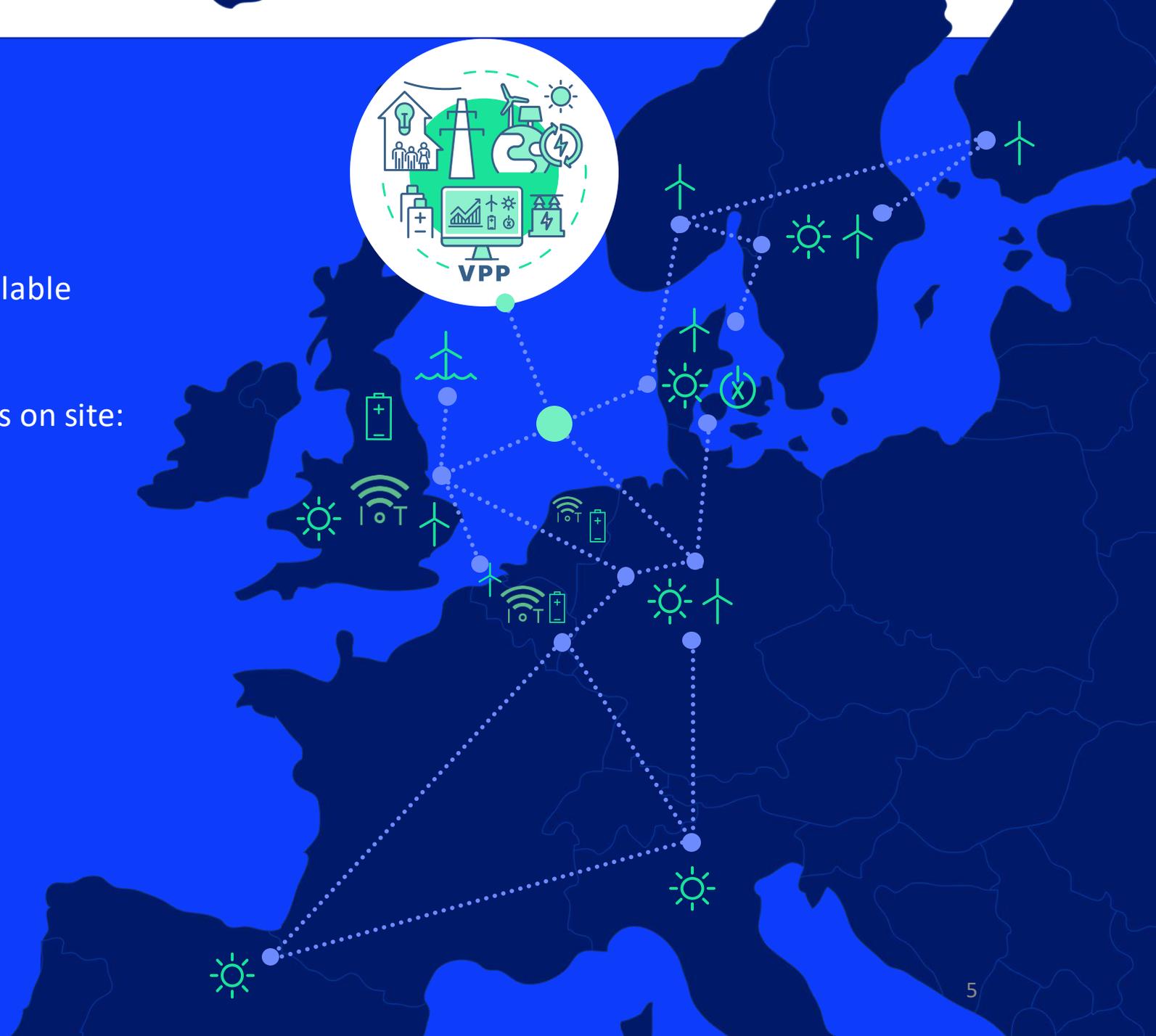
Battery



Electrolysers / PtX



IoT



IREF project

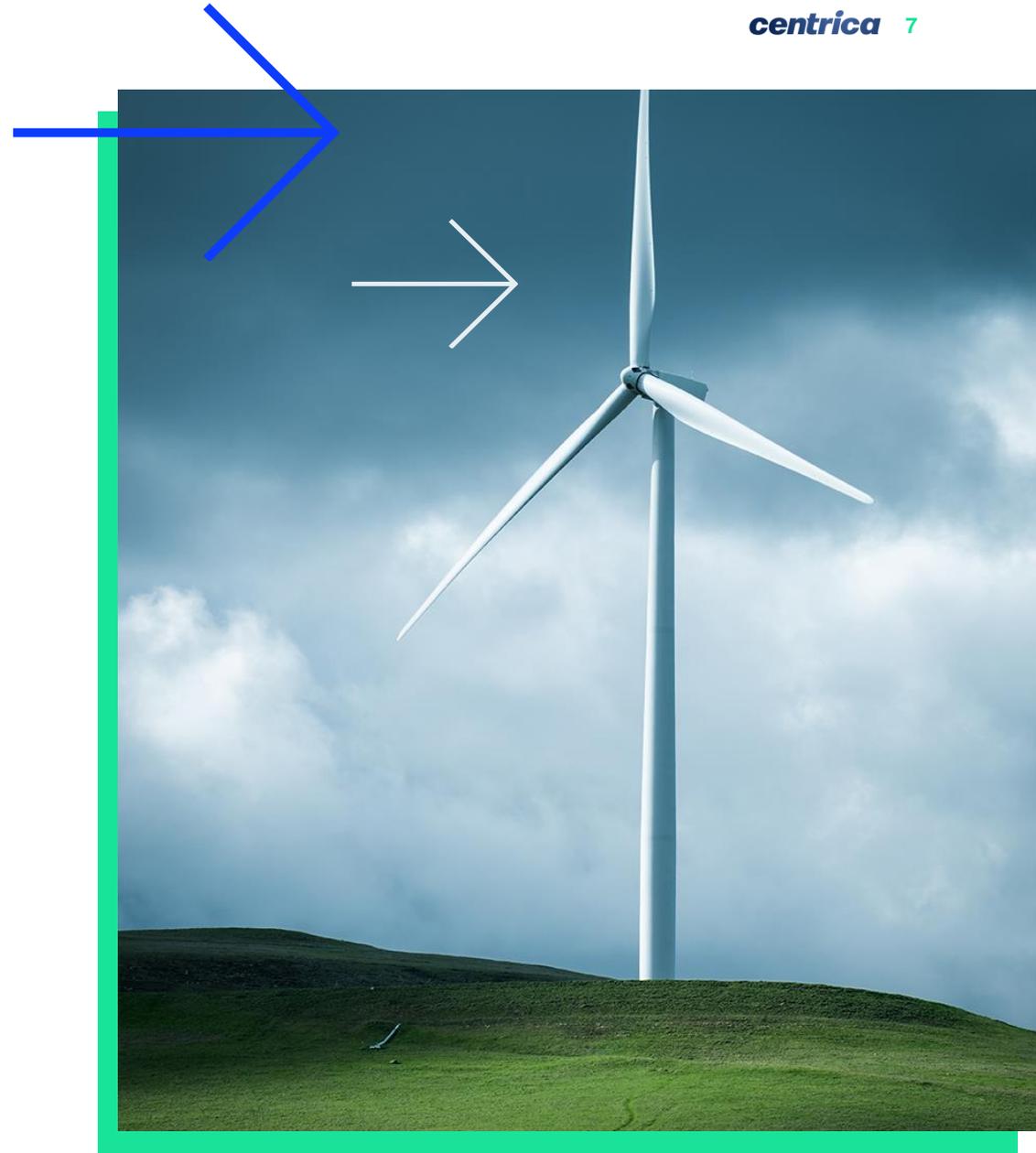
- The DESNZ innovation portfolio comprises ten tracks. The **Interoperable Demand Side Response (IDSR)** programme sits within the Energy Storage and Flexibility track.
- The **Interoperable Residential Energy Flexibility (IREF)** is part of the IDSR program and Centrica is working with partners to:
 - Develop and demonstrate a PAS 1878 compliant solution based on its existing residential Virtual Power Plant (VPP) platform.
 - Support for multiple device types is one of the key outcomes.
 - Gain hands-on experience with **OpenADR** and assess whether it achieves all the desired policy outcomes set out by DESNZ.



Project partners

Technology leaders or partners with an existing rollout in each device category were selected as project partners:

- Heat pumps 
- Space heating 
- Hot water heating 
- EV fleet 



Agenda

- Introduction
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PAS

bsi.

- Publicly Available Specification (PAS)
 - Created in response to an identified market need; very often a request from a sponsor for standardisation that serves the needs of an emergent market, technology,
 - To speed up standardisation
 - Developed by British Standard Institution (BSI)



PAS 1878



Department for
Energy Security
& Net Zero

- PAS 1878
 - Energy smart appliances – System functionality and architecture – Specification
 - Enable standardized control, subject to an explicit consumer consent, of energy smart appliances (ESAs) on an electricity network to
 - match the short-term availability of intermittent RES
 - decrease the peak load on the electrical transmission and distribution networks
 - allow control of electricity network characteristics such as line frequency, system inertia and network voltage; and to
 - allow the offset of short-term market imbalances by controlling flexible load on the network



Department for
Business, Energy
& Industrial Strategy



Overview

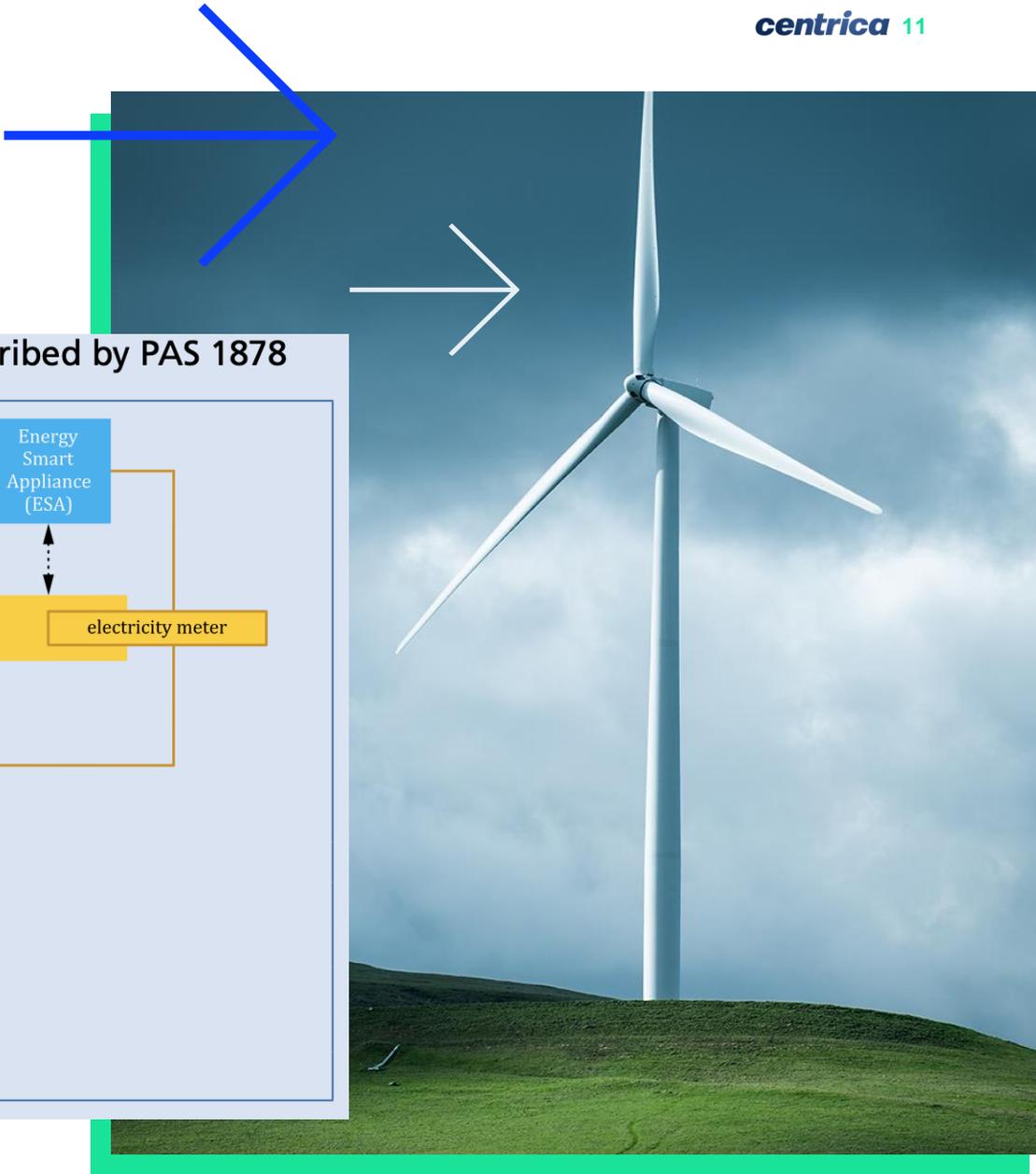
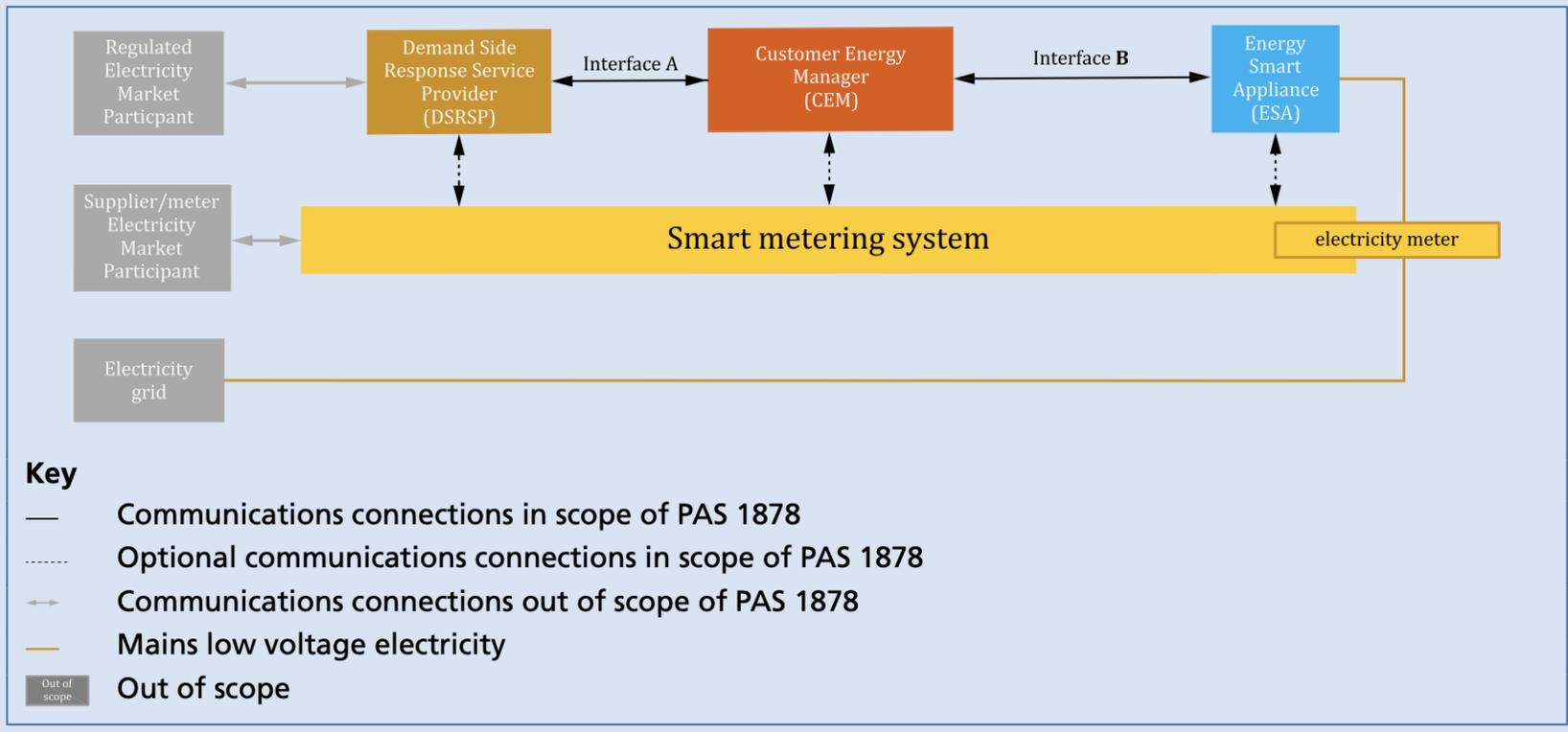


Figure 1 – Logical DSR architecture and communications connections described by PAS 1878



Interfaces

- Interface A
 - Between DSRSP and CEM
 - Based on OpenADR 2.0b (XML)
- Interface B
 - Between CEM and ESA
 - Provider specific
- Interface C
 - Between CEM and HEMS
 - Optional

Figure F.1 – Alignment of Annex F to the OpenADR protocol definition

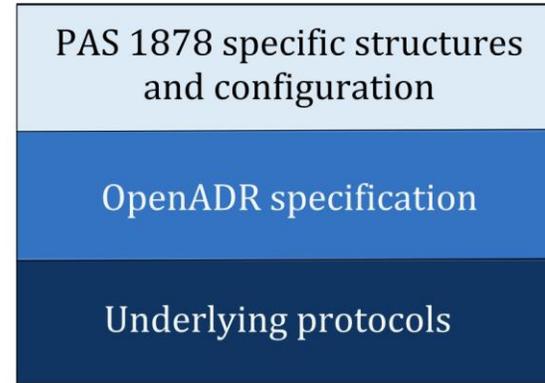
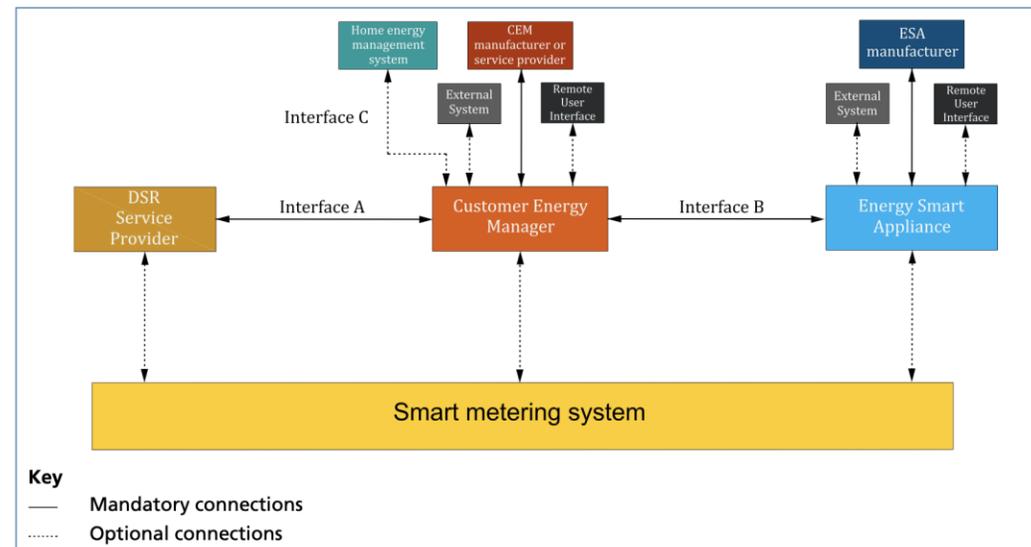


Figure 6 – Communications interfaces

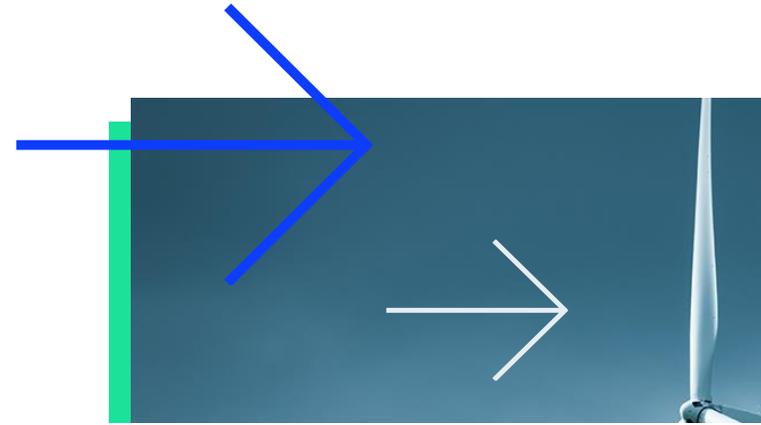
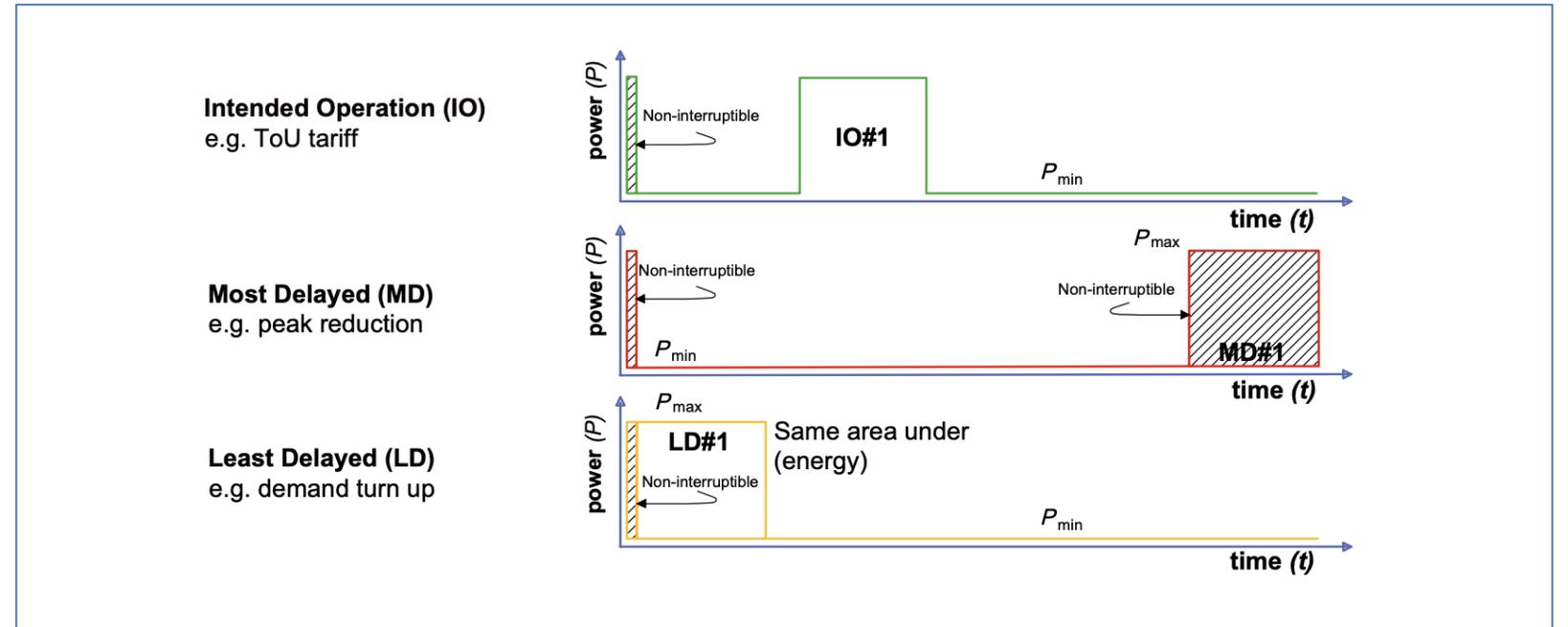


Data

Table 7 – Information passed from the ESA to the DSRSP via the CEM during normal operation

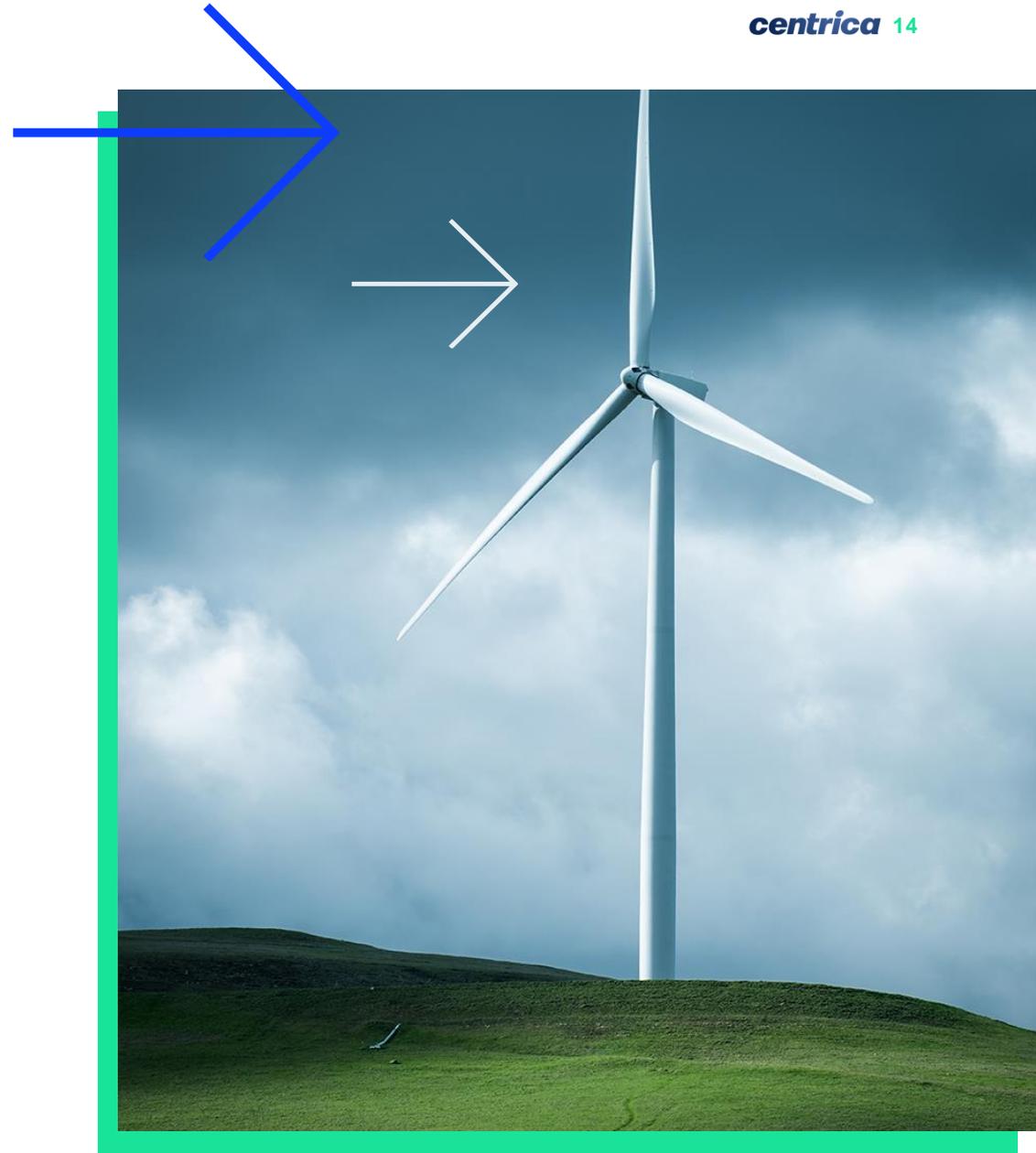
Information element	Mandatory/ Optional	Note
Flexibility offers	M	
Actual power profile	M	M only if type supported or selected by DSRSP
Actual instantaneous power value	M	M only if type supported or selected by DSRSP
Flexibility offer request acknowledgement	M	Contains the flexibility offer identifier
Cancel flexibility offer	M	Interface B only (see 5.3.5.2.5)
Entering failsafe	M	
Free text	O	DSRSP specific

Figure 10 – Representation of the three required profiles



Agenda

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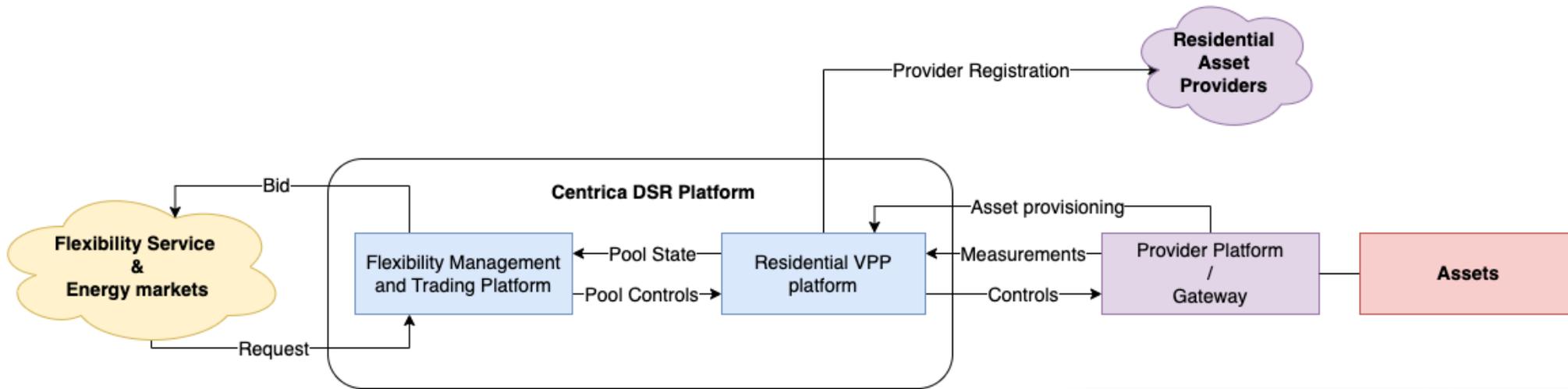


Centrica DSR Platform ...

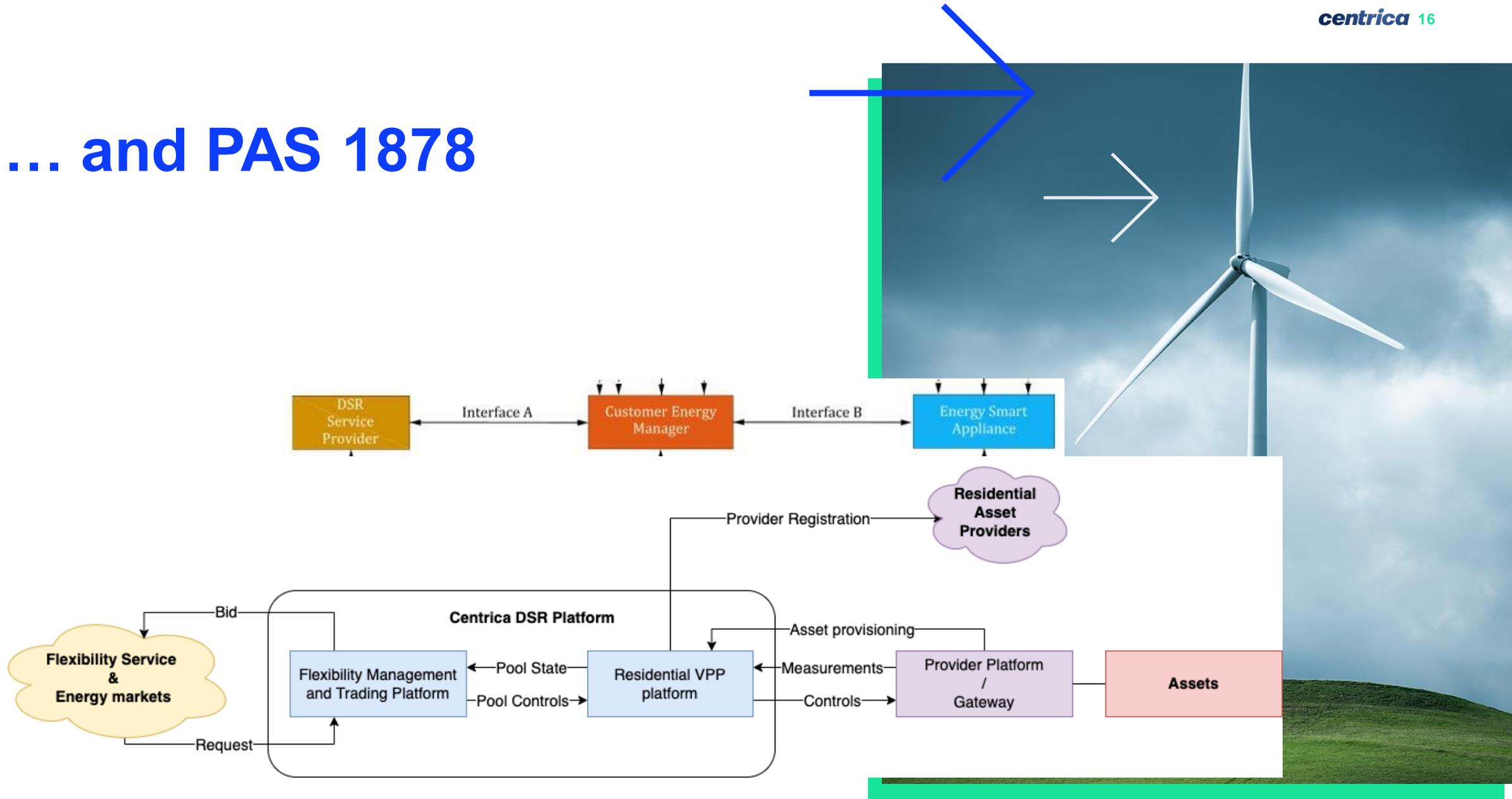
- Trading platform
- Industrial VPP platform
- **Residential VPP platform**



Fig. 1 Overview of OpenADR communication.

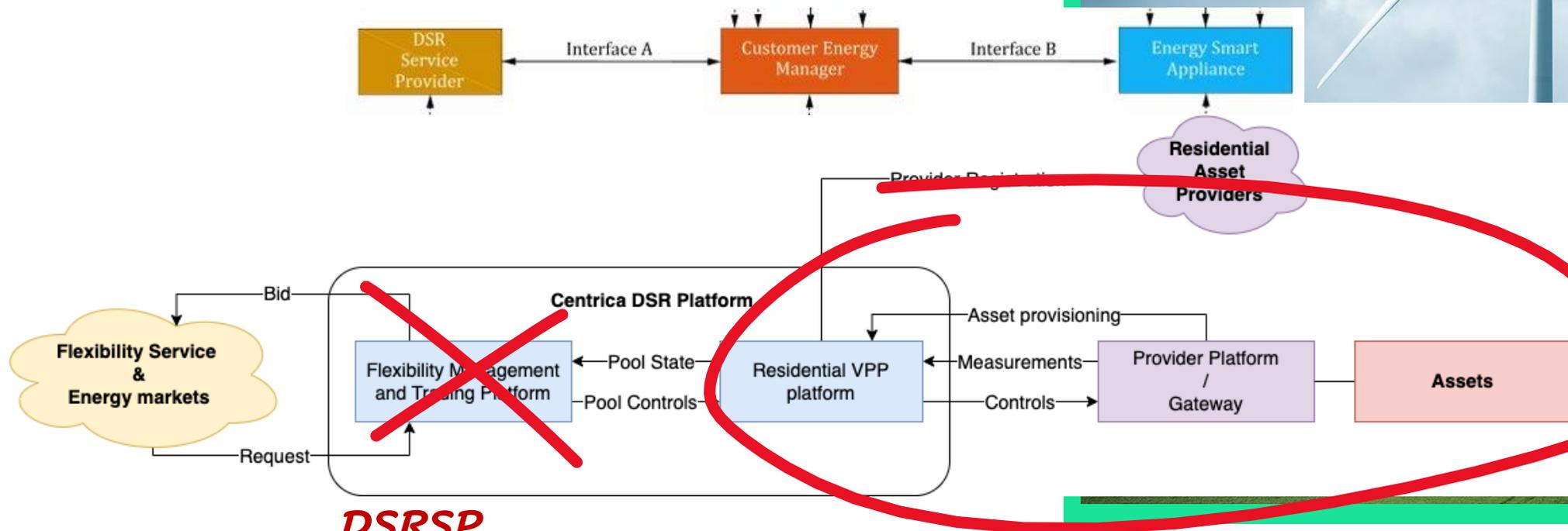


... and PAS 1878



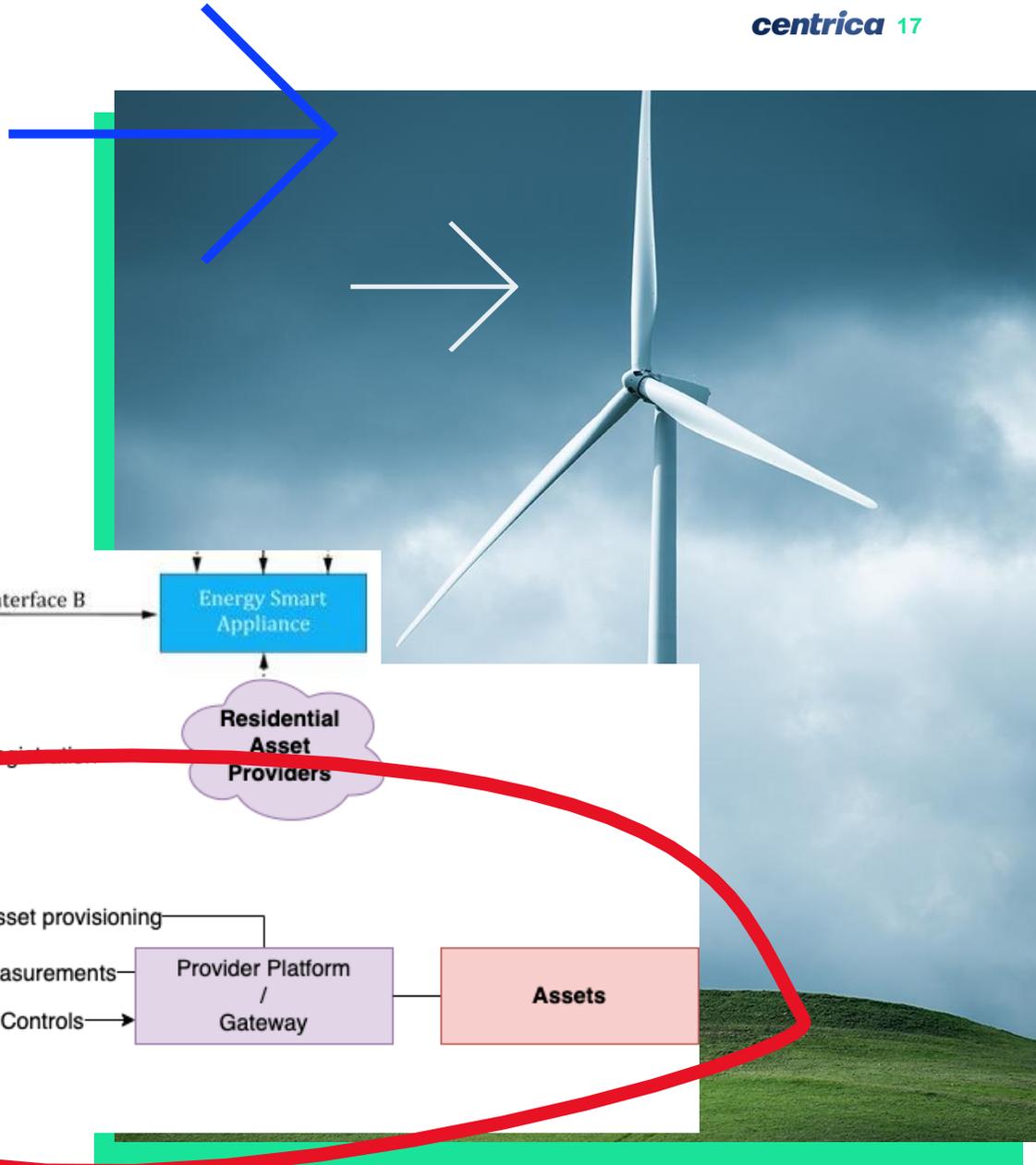
IREF

- Develop and demonstrate PAS 1878 compliant solution based on existing residential VPP platform (Interface B)



DSRSP
(using Python
OpenLEADR)

CEM <- Interface B -> ESA



Assets



EV chargers (BG)



Hot water tanks (Mixergy)



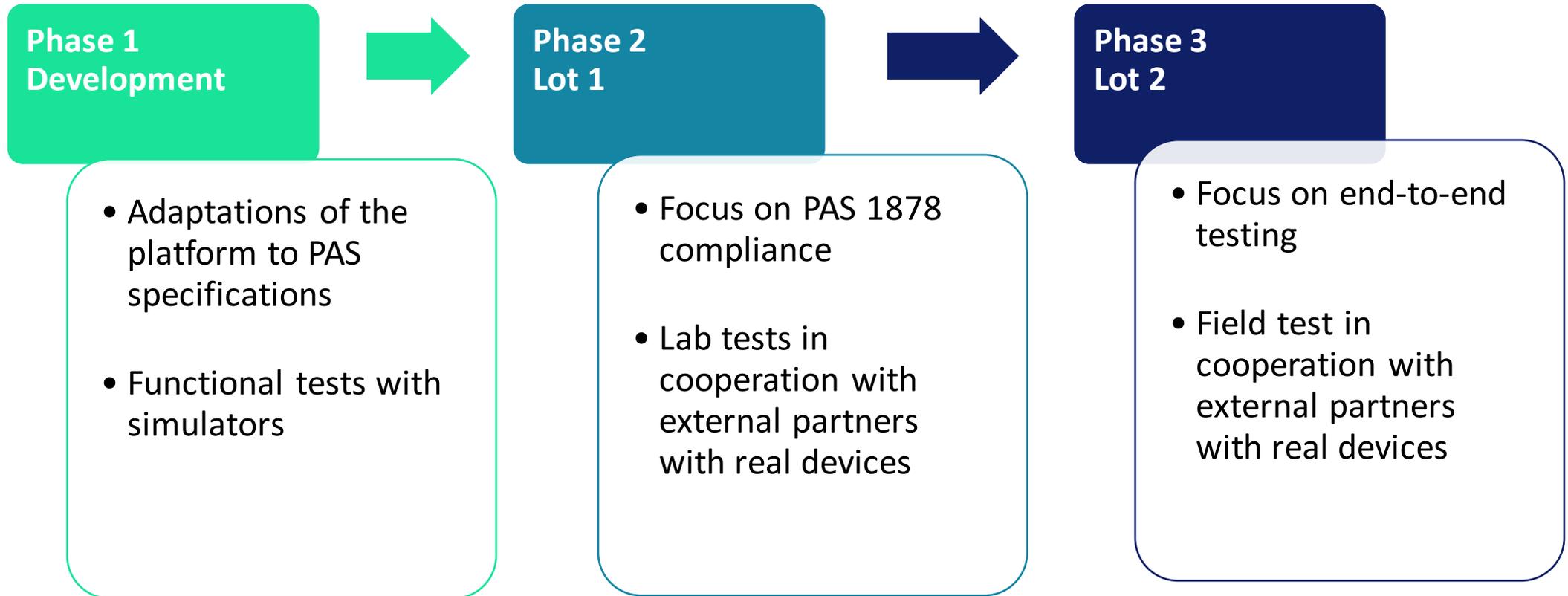
Heat pumps (Daikin)



Storage heaters (Glen Dimplex)



IREF Timeline

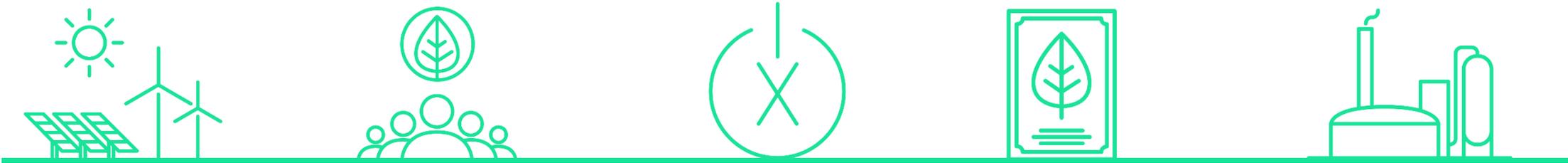


Agenda

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Attention points



On-site optimisation vs DSR

For sites with solar or grid constraints, taking certain actions with one device will have an impact on others (e.g. if an EV is charging from solar, a battery will not be able to charge).

A Home Energy Management System (HEMS) would typically be responsible for this on-site optimisation and will likely also communicate over OpenADR.

The interplay between a HEMS and a DSR Service Provider will have a significant impact on the total benefit. Privacy, information sharing, and coordination need to be carefully considered.

Opportunity cost

Delivering DSR is always a trade-off between doing something and something else. In a world with more variable energy tariffs (e.g. linked to a Day-Ahead price), the assumption of a flat tariff rate will no longer hold for a significant subset of consumers.

DSR Service Providers will need information to make them aware of the cost impact of their activities on consumers, and to ensure that market actions can be correctly priced.

If information to allow this is not made available, the DSR Service Provider would need to make conservative assumptions (and price high) potentially increasing the cost and reducing the benefit of any DSR activity.

Customer UX

Customer UX is key to the uptake of new technologies and propositions. This is not part of OpenADR, but will have a significant impact on the success of interoperability.

Consumers are likely to have multiple interoperable flexible devices within their home. If switching each would require a different app, procedure or settings, the policy goal of a fully competitive DSR market will likely not be met.

Thank you!

