Department for Energy Security & Net Zero

2nd OpenADR++ Users Conference Europe, Nov 19-20, 2024, London UK

Introduction to IDSR Programme & PAS 1878:1879

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SICE & NZIP

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Net Zero, Nuclear & International

Science & Engineering for Climate & Energy

£1 Billion Net Zero Innovation Portfolio

- Energy Storage and Flexibility
- Future Offshore Wind
- Advanced Nuclear
- Bioenergy
- Industry
- Hydrogen
- Advanced Carbon Capture Usage and Storage
- Greenhouse Gas Removal
- Homes and Buildings
- Disruptive Technologies

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Flexibility Innovation Programme

Integrating systems for Flexibility
Interoperable Demand Side Response Programme
V2X Innovation Programme
Inclusive Smart Solutions Programme

Data and Digitalisation
Automatic Asset Registration
Energy System Digital Spine Feasibility Study
Smart Meter System based IoT Applications
Smart Meter Energy Data Repository
Non-Domestic Smarter Tariff Comparisons

Markets for Flexibility
Alternative Energy Markets
Flexibility Markets Unlocked

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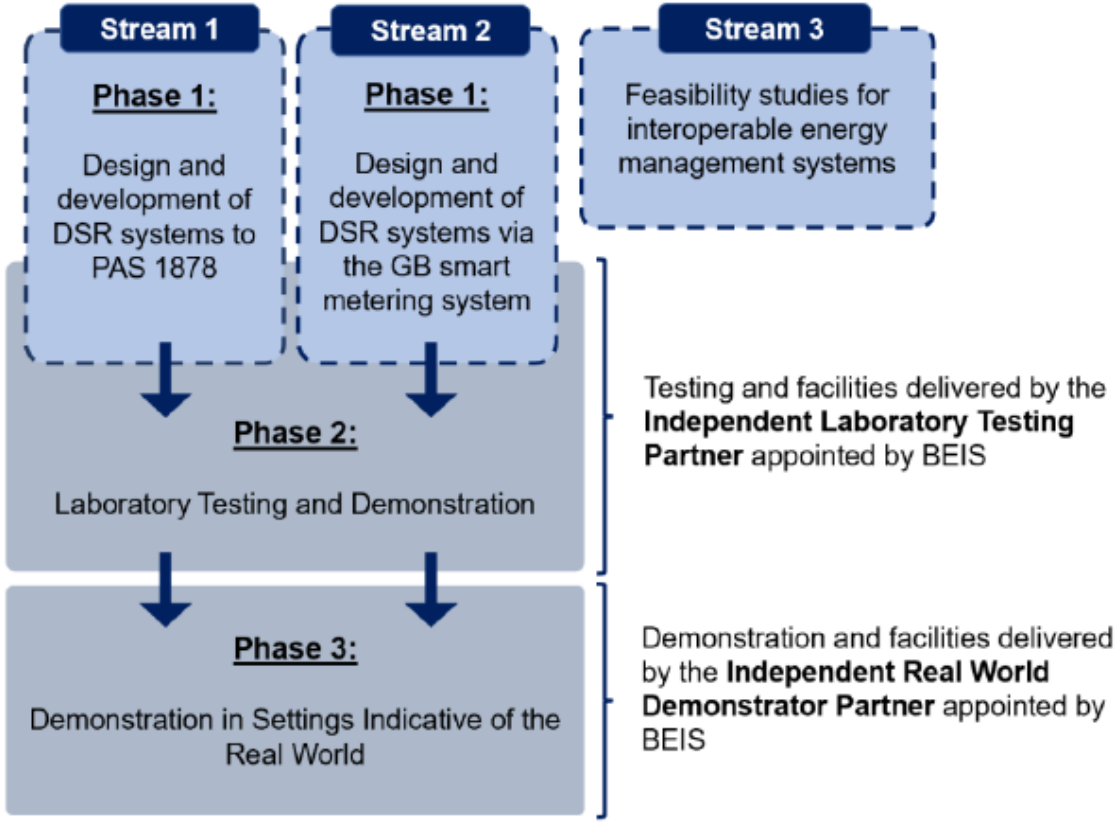
IDSR Programme

Number of projects	11
DESNZ Funding	c.£12.9m
Number of phases	3
Innovation Stage	Proof of concept & Feasibility



Landis+Gyr manage energy better · sysmech · centrica Business Solutions · geo · resillion Assure. Secure. Innovate.

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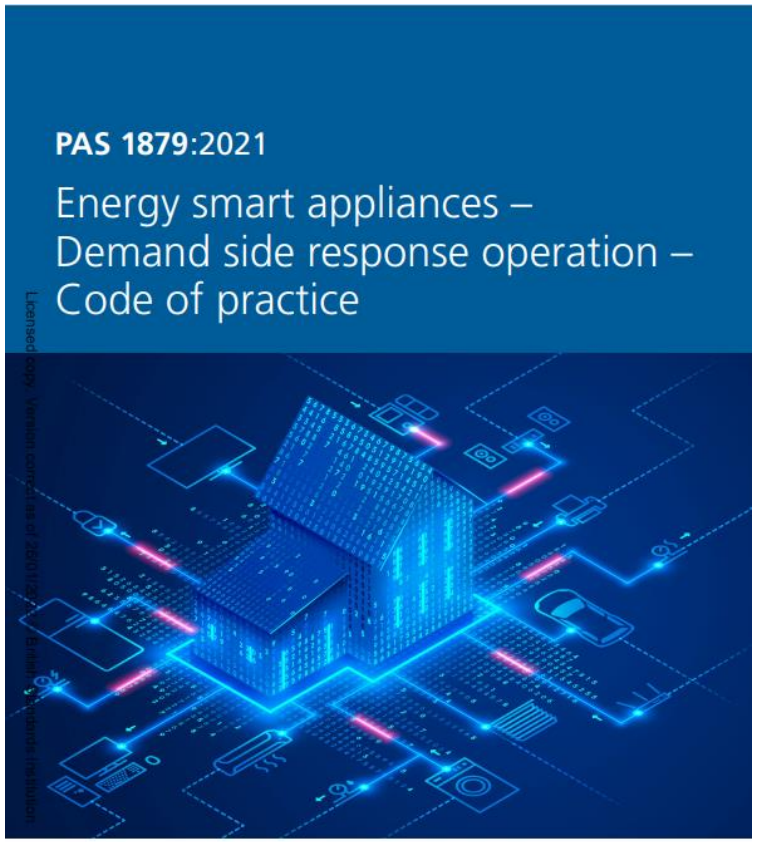
PAS 1878 & 1879

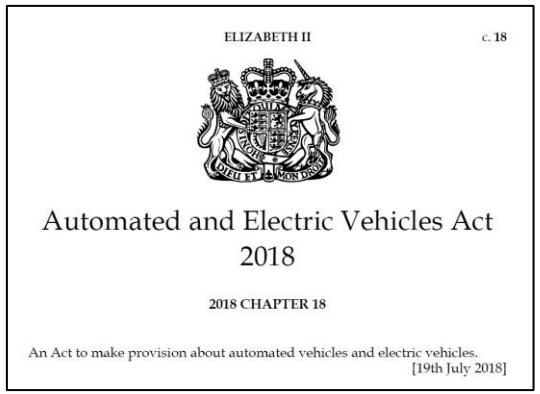


Objectives

- Standardisation helps to **lower costs** and **promote innovation** ir technologies, while **accelerating the uptake** of **secure and interoperable** smart products and services

- Develop **technical specifications** which could be referenced anc required by **future regulations** and would enable certification

- Demonstrate **UK leadership** on the international stage, by promoting published standards for **international adoption**



ELIZABETH II c. 18

Automated and Electric Vehicles Act 2018

2018 CHAPTER 18

An Act to make provision about automated vehicles and electric vehicles.
[19th July 2018]

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Approach: Scope

Principles

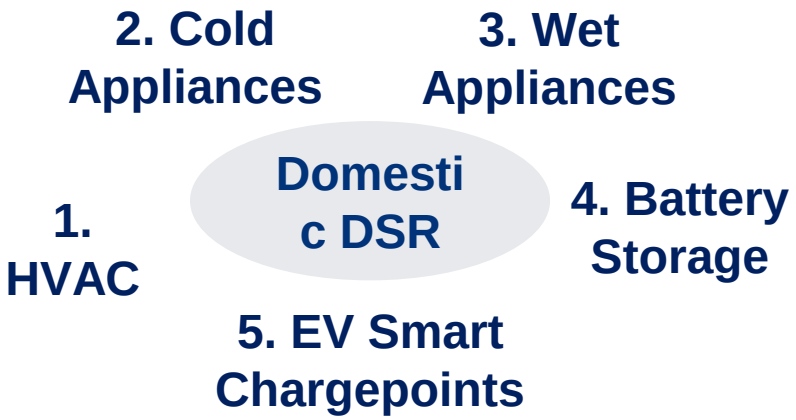
- **4 policy principles** underpin the standards, developed in consultation with industry stakeholders

Compatibility

- **Compatibility** with, but no mandate of, the GB Smart Metering system
- Alignment with **existing international** standards where **possible**

Innovation

- Specify only the **minimum requirements** to deliver DSR in line with 4 Policy Principles, which **allows innovation** on top



Policy Principles	
1. Interoperability	the ability of an ESA to work seamlessly across any DSR service operated by any system player.
2. Data privacy	the secure storing of data on the device or with any controlling party.
3. Grid-stability	the prevention of outages on the grid caused by erroneous operation of ESAs.
4. Cyber-security	the prevention of unauthorized access to an ESA by third-parties.

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Approach: Process

British Standards Institution (BSI)

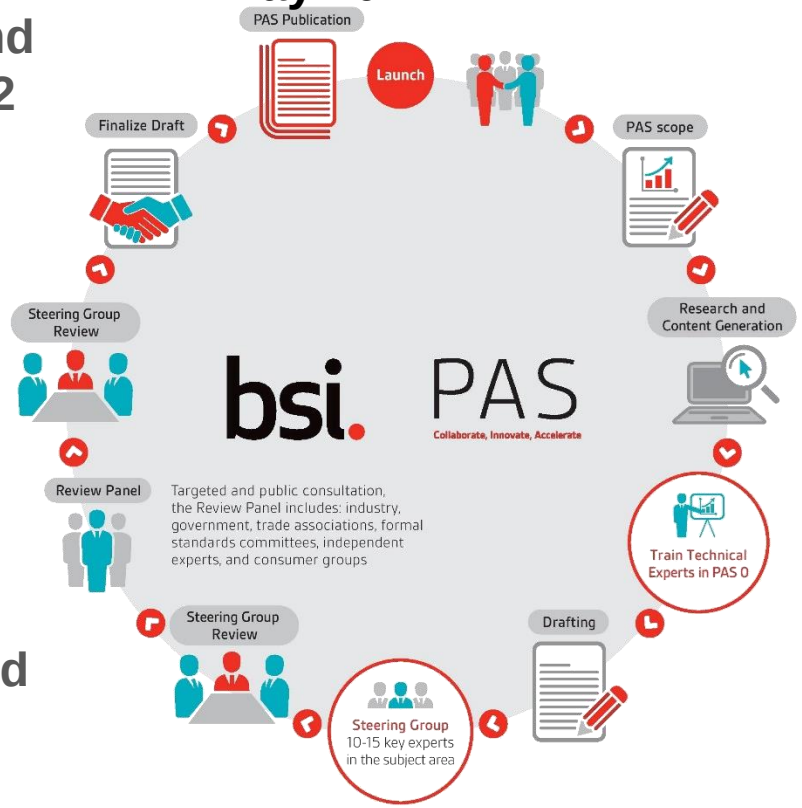
- A **standardised technical framework**, covering both **ESAs and DSR** for end-to-end system across **2 PASs**
- Developed in an **industry-led** process, with expert **Steering Groups** and a programme level Strategic Advisory Group
- Producing **PASs** (publicly available specification) in a **fast-track** standards process, which is **updated** every **2 years**

PAS 1878 Appliance-side: "**ESA specification for classification**"

PAS 1879 Grid-side: "**DSR framework for operation**"

integration

May 2021



BSI ESA Programme		
40+ Organisations (9 Trade Associations)		
ABCB	Energy UK	Newcastle Uni (EV)
ADE	ESC	NG ESO
APPLiA	ESSAC	Ofgem
BEAMA	EVET	OVO/Kaluza
BSI Assurance	Flexitricity	Pearlstone Energy
Carbon Co-op	Geo	Samsung
CBI	Hive	Schneider Electric
Citizens Advice	HMG	SMMT
CPIN	Innovate UK (EV)	Sustainability First
CRED	Kiwipower	Tech UK
CSO Confidential	Landis+Gyr	UKAS
EDF Energy	Moixa	UKERC
ENA	NCSC	WPD
Also 120+ individuals on Invited Review Panel		

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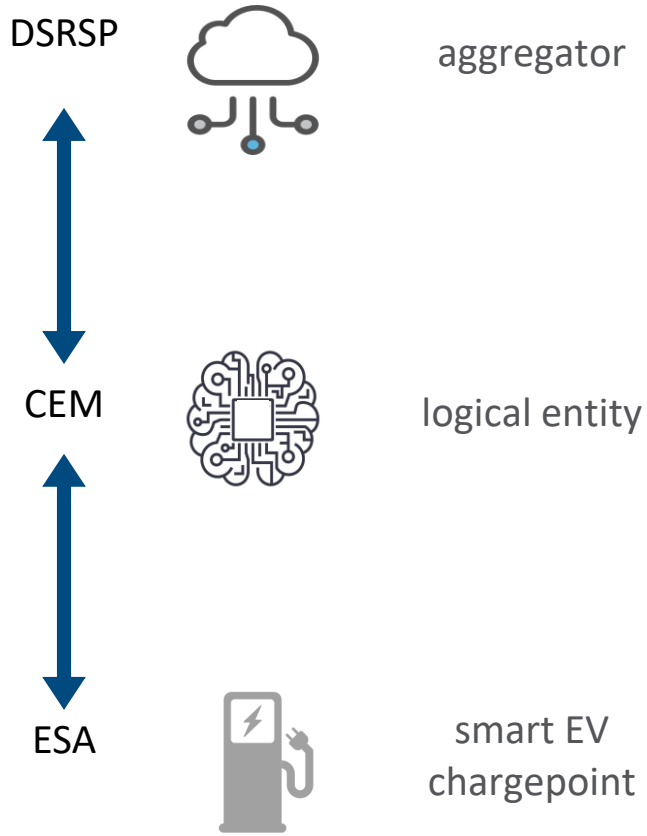
Definitions – DSRSP, CEM, ESA

DSR Service Provider (DSRSP)
- An organization providing **demand-side** related **energy management services** to electricity system operators, electricity utilities and electricity generators

Consumer Energy Manager (CEM)
- A **logical entity**, that can be **physical or virtual**, which deals with **flexibility information** and requests
- **Translates** between the **DSRSP** and the **ESA**

Energy Smart Appliance (ESA)
- An internet **connected** device that can **modulate or shift** its **electricity** consumption in **response** to **signals**.



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System Architecture – Part 1

2 DSR service types:

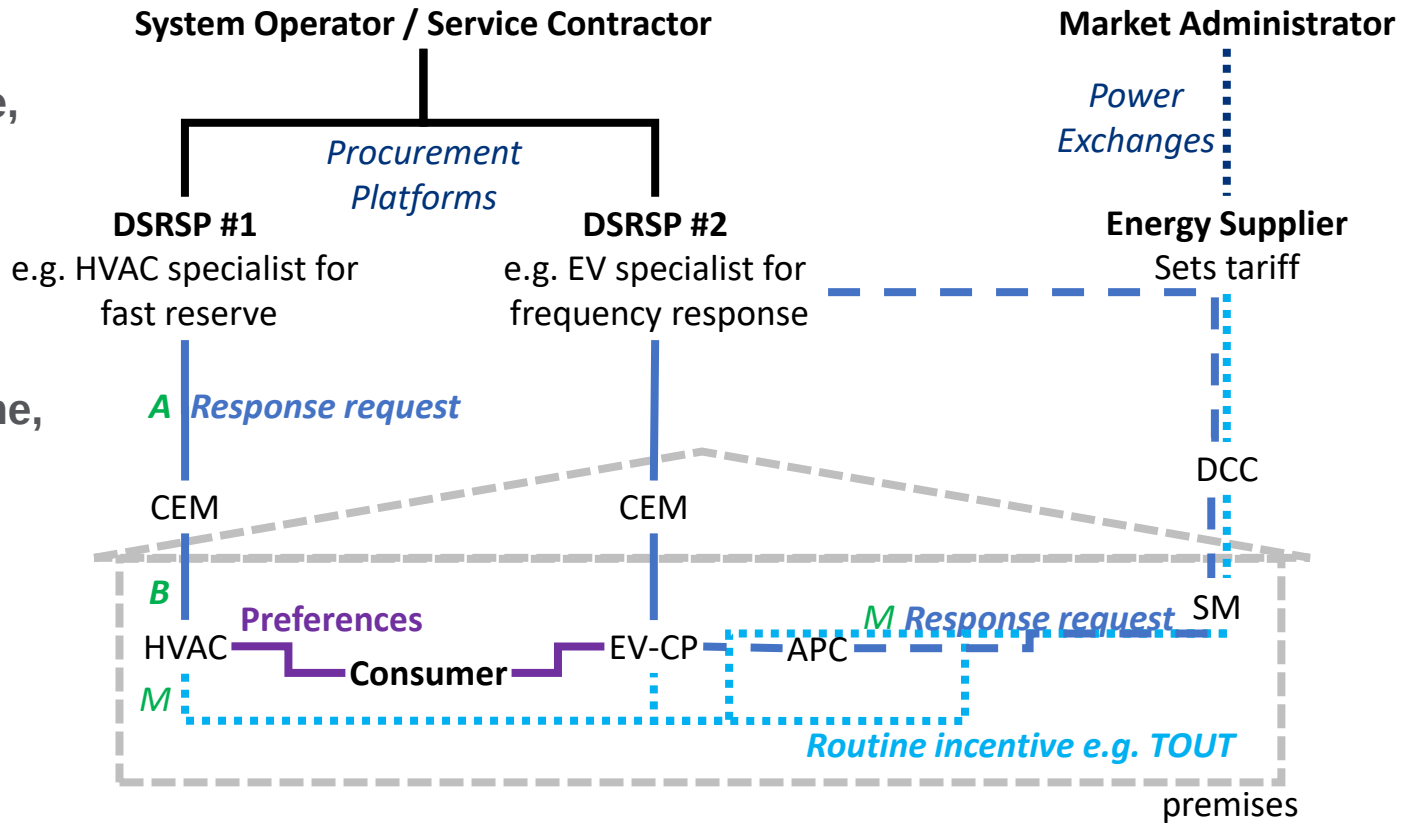
- **Routine** DSR
  Operate based on **incentives** set in **advance,** often **multi-party market signals**

  e.g. TOUT incentive via **Supplier**

- **Response** DSR
  Operate based on **requests** made in **real time,** often due to firm **bi-lateral contracts**

  e.g. grid FR request via **DSRSP**

PAS **specifies** how **response requests** are sent/received, but how **routine incentives are optimised** against is left to **innovation**



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System Architecture – Part 2

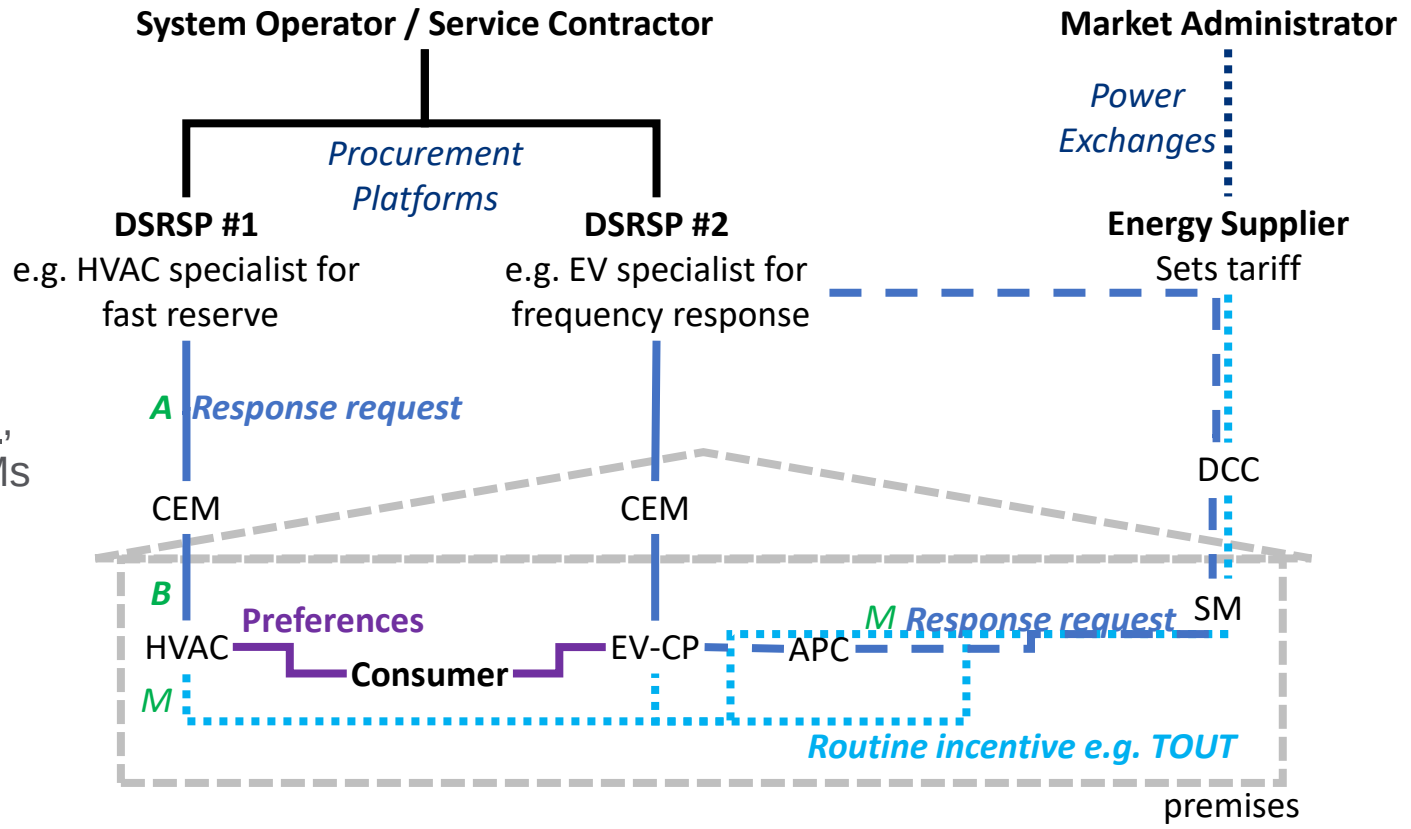
Interface	Specified?
A	Yes - OpenADR
B, and other optional interfaces (e.g. **M**)	Cyber security requirements only

3 interfaces:

- **A** - **Interoperable**, specified for **any DSRSP**
  - **OpenADR**
- **B** – **Proprietary**, can be ESA specific
  - e.g. can be **OCPP for EV-CP**
- **M** - (optional) for GB Smart Metering

ESA must be **supplied with CEM** as a **minimum**, but this does **not restrict 3rd party** provided CEMs

User **subscribes individual ESAs** to a DSR service, allows **specialist DSRSPs** for specific ESAs



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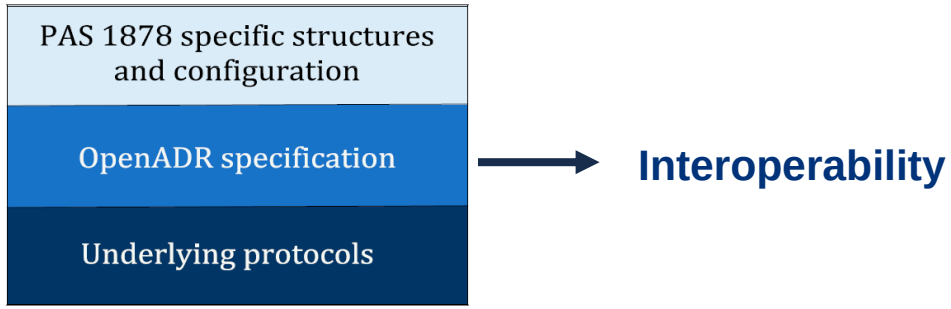
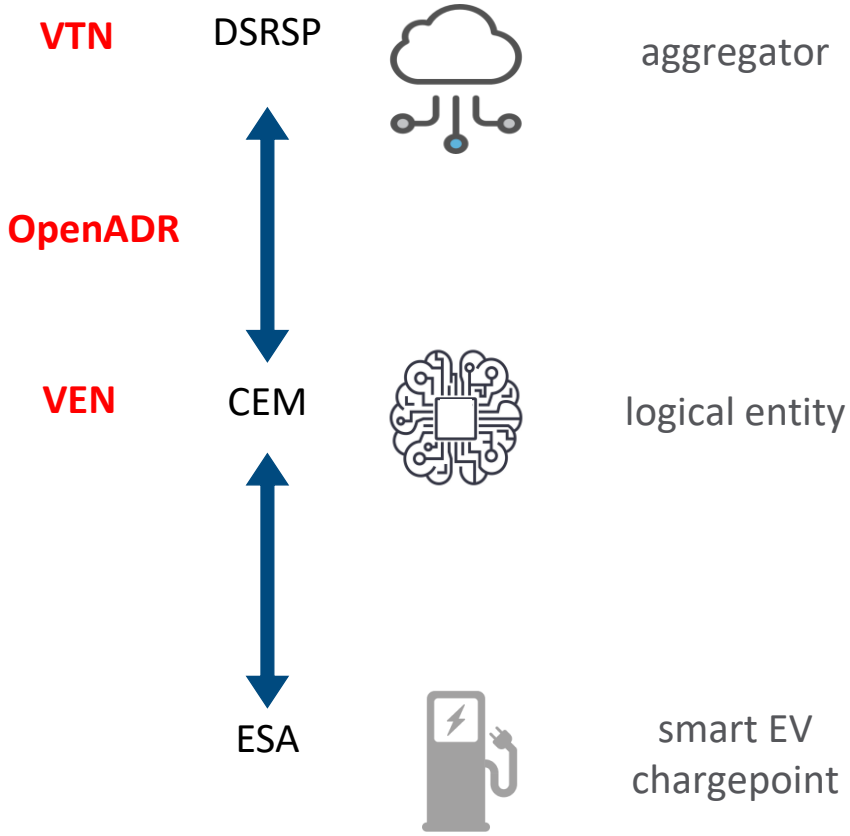
Interface A

- PAS 1878 mandates that any implementation of Interface A shall support the use of **OpenADR**
- The use of OpenADR guarantees interoperability and therefore **enables consumer choice**
- PAS 1878 provides a structure that is mapped on to the OpenADR protocol





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System Operation – Part 1

A **hierarchy of DSR operation** is defined, with consumer preferences always respected:

- **Routine** Mode
  - This is **baseline** DSR operation
  - The ESA controls electricity consumption according to the **consumers wishes** and any **external incentives** e.g. TOUT or grid CO2 intensity
- **Response** Mode
  - This **overrides** the baseline during a **response request**
  - The ESA controls electricity consumption according to the **consumers wishes** and **DSRSP's chosen flexibility option**, e.g. for frequency response
- **Consumer** override Mode
  - Additional **manual override** (*note: their **preferences** are **already** built in)*
- **Failsafe** protections Mode

- **Cyber security requirements** are also specified. Grid stability risks mean they **go beyond IoT** security but employ **well established industry best practice**. e.g. authentication, encryption, updates, ETSI EN 303 645

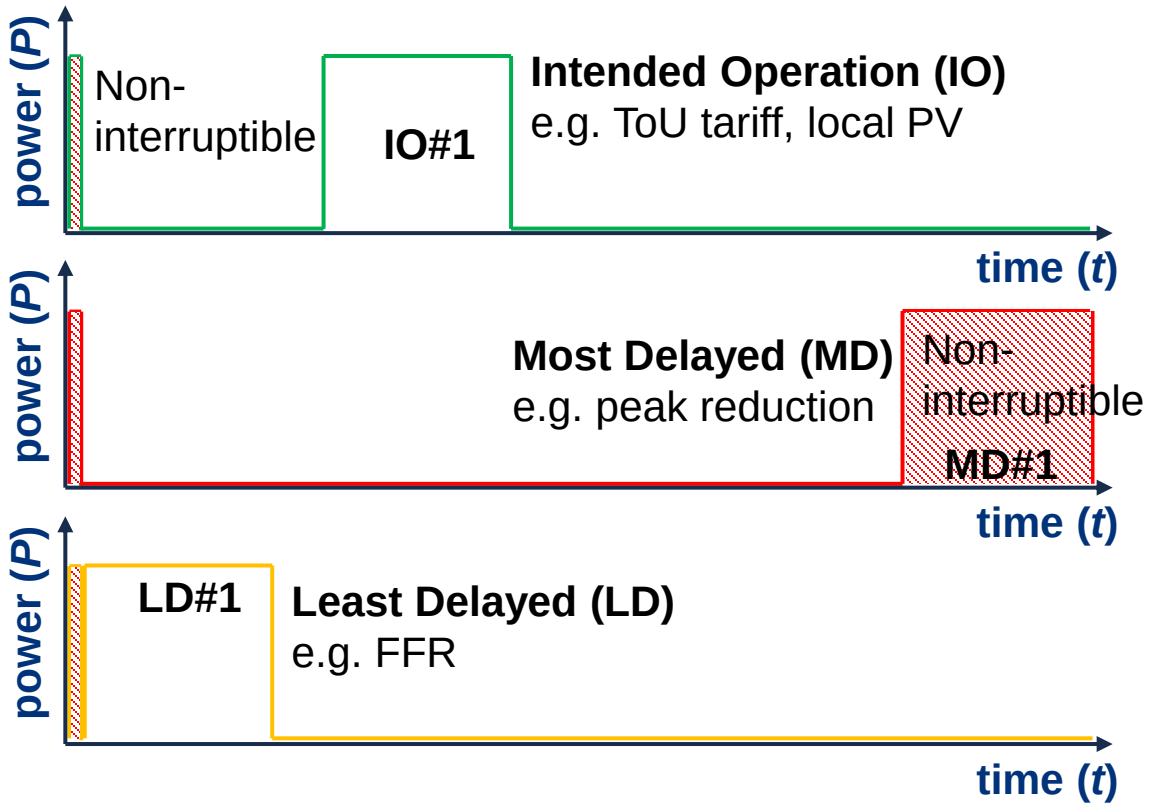
- During a Response request, the DSRSP will **statistically request flexibility** from **~100,000 devices** which makes the system **more resilient** as some **non-response is expected**.

System Operation – Part 2

- A **ESA creates** flexibility offers as **power profiles (P vs T)**, based on **consumer preferences**, appliance operation and any external incentives.

- At a **minimum 3** power profiles:
  - **(1) Intended Operation** (IO)
    - Consumers preferences baseline
    - Runs in **Routine** mode
  - **(2) Most Delayed** (MD)
    - Consumers preferences with maximum delay
    - **Option** for **Response** mode
  - **(3) Least Delayed** (LD)
    - Consumers preferences with minimum delay
    - **Option** for **Response** mode

- The 3 profiles are **updated whenever their status changes** and sent to the DSRSP, so the **DSRSP keeps a live merit order** for response requests.



*profiles can include **frequency response capability**

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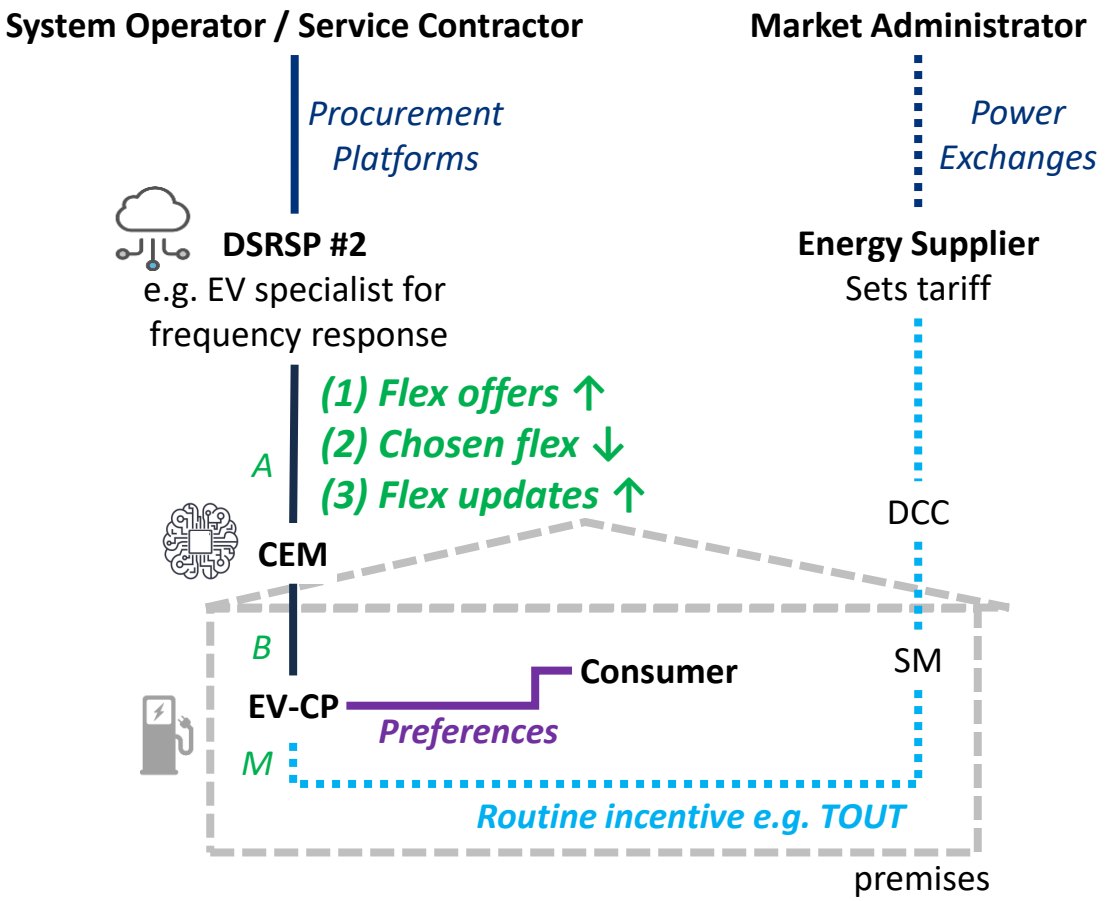
Worked Example (illustrative)

- During **Routine Mode**, the **ESA** regularly creates and sends **power profiles** to the DSRSP, the route is:

  (1) ESA>CEM>DSRSP
- The ESA sends **updates** whenever the flexibility **status changes.**
- During a **DSR Response request**, the DSRSP selects an appropriate **power profile** and **duration time** and sends the **chosen flexibility** to the **CEM** for the **ESA to implement**, the route is:

  (2) DSRSP>CEM>ESA
- The DSRSP keeps a live merit order of **pre-registered power profiles**, so a **single request** delivers a DSR response, enabling fast response **high-value DSR services**.
- During **Response Mode**, the **ESA** regularly sends **active power and power profile updates** to the DSRSP, the route is:

  (3) ESA>CEM>DSRSP
- The ESA sends **updates** whenever the flexibility **status changes** and in accordance with the **technical requirements** of the **DSR service**.
- The DSRSP can then call **more/less DSR response** from its **live merit order** as necessary to meet system requirements.
- When the DSR **request period ends**, after duration time, **Routine Mode** operation can **resume**, e.g. optimised for **TOUT** from **Smart Meter**.



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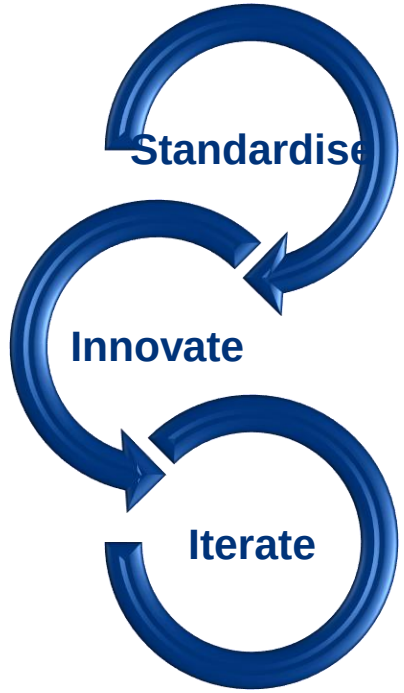
PAS 1878 Revision (PAS 1878:2025)

- As a result of the Interoperable Demand Side Response (IDSR) innovation programme, there is now industry experience in using the standard to build ESA (Energy Smart Appliance) and Demand Side Response (DSR) systems.
- This industry feedback from the IDSR programme and elsewhere has identified areas within the standard that would merit clarification and amendment to reflect technological developments, as well as to bring the standard into alignment with other standards in the field.
- The PAS 1878 revision is underway, targeting publication of a revised standard in November 2025.

Targeting publication November 2025



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Thank you – Q&A

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