



enabling new Demand REsponse Advanced, Market oriented and  
secure technologies, solutions and business models

# New Demand Response Technologies and Services

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**Workshop on Flexibility 2.1: From Demand Response to  
Renewable Energy Communities , 15<sup>th</sup> March 2021**



The eDREAM project is co-funded by the EU's Horizon 2020 innovation programme under grant agreement No 774478.

- ❑ Title: eDREAM - enabling new Demand Response Advanced Market oriented and secure technologies, solutions and business models
- ❑ H2020 Call: 2020-LCE-2017-SGS (RIA)
- ❑ Duration: 42 months (Jan 2018 to Jun 2021)
- ❑ EU Contribution and Total Costs: € 3.822.125
- ❑ Coordinator: Engineering Ingegneria Informatica S.p.A.
- ❑ Country Coverage: Italy, Greece, Romania, Spain, UK
- ❑ Website: [www.edream-h2020.eu](http://www.edream-h2020.eu)



- ❑ ICT Players/Solution providers: ENG. ATOS, E@W
- ❑ Energy Stakeholders: ASM (DSO), KIWI, EMOT (Aggregators), SVT (ESCO)
- ❑ Academy/R&D: TUC, CERTH, TU

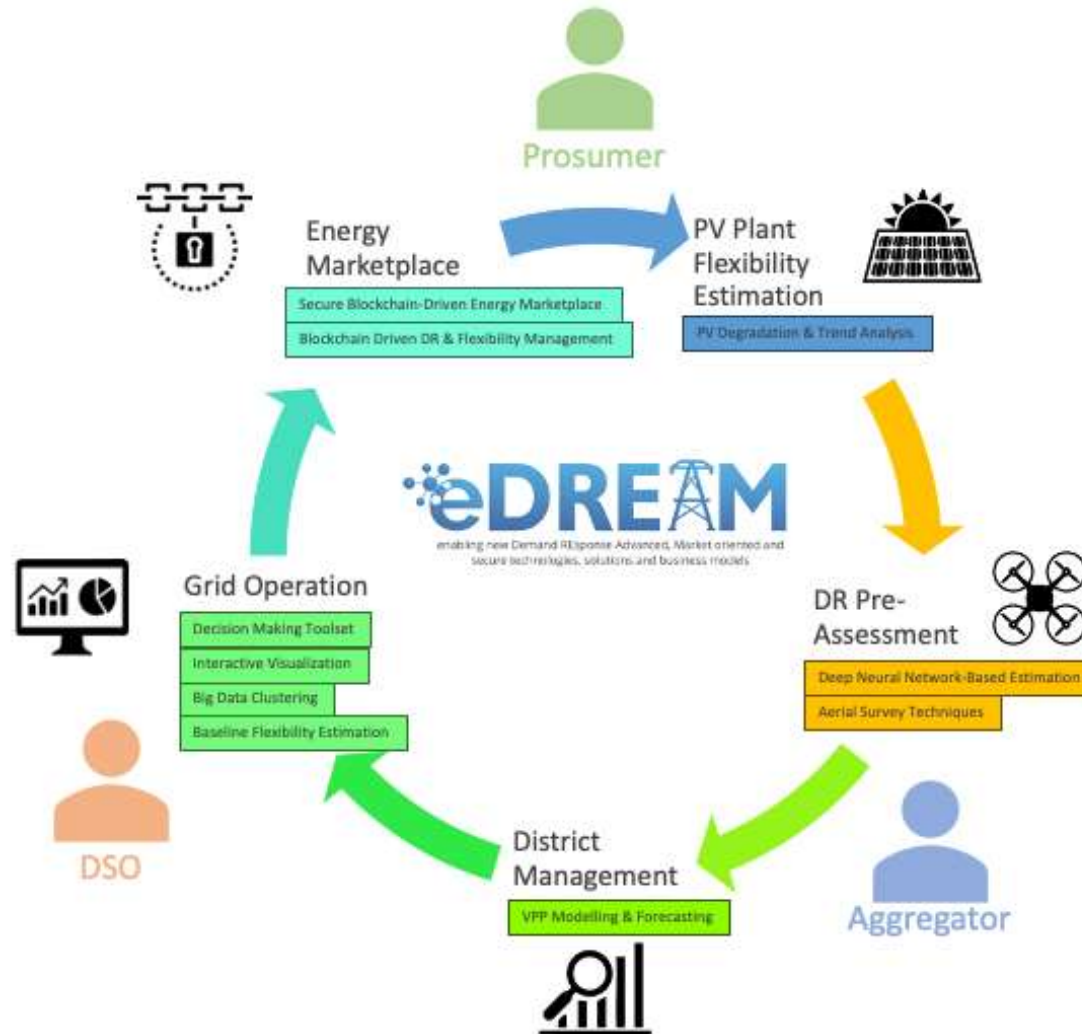
**Integration of smart customers, DERs, Asset Management & DR network planning (UK)**

**Secure micro-grid environment for participation in blockchain driven DR programs (Italy)**

**Lab-based validation of technologies and tools (Greece)**



- ❑ **Objective:** Successful deployment of DSR technologies that consider Virtual Power Plants as well as decentralized approaches, towards achieving a reduction in peak grid demand and real savings for final consumers
- ❑ **What has been done?** eDREAM project is demonstrating a closed-loop demand response framework, designed to maintain the real-time balance of supply and demand in a decentralised environment
- ❑ **eDREAM new demand response technologies and services:**
  - ❖ **Techniques for Demand Response and Energy Flexibility Assessment**
    - ✓ Electricity and Virtual Power Plants: Modelling & forecasting
    - ✓ Baseline Flexibility Estimation
    - ✓ Multi-building DR characterisation through thermal, optical and LIDAR information fusion, and DR Aerial Survey Toolkit
  - ❖ **Next-generation of Demand Response Services for Aggregators and Customers**
    - ✓ Decision Making and DR Services Optimization Toolset
    - ✓ PV/RES Degradation & Trend Analysis
    - ✓ Big data Clustering techniques for Load Profiling and Customer Segmentation
    - ✓ Interactive visualization platform based on graph analytics for Decision Support System and DR Strategies Optimization
  - ❖ **Blockchain-enabled decentralised network control optimisation and Demand Response verification**
    - ✓ Blockchain Driven DR and Flexibility Management
    - ✓ Secured Blockchain-driven Energy Market



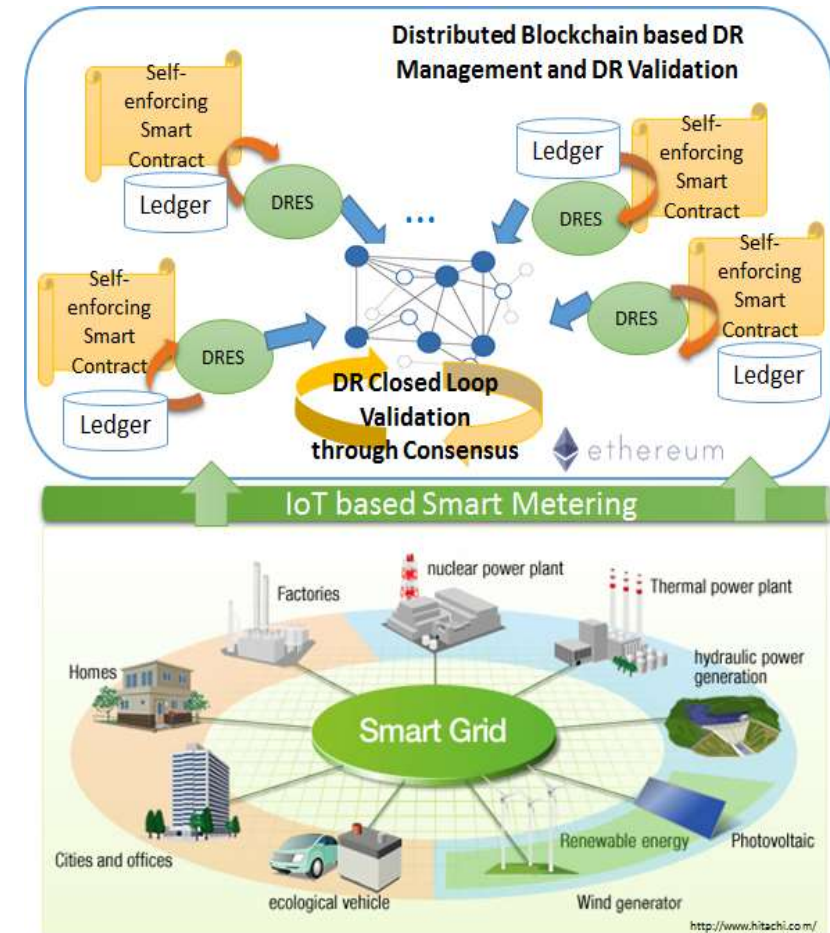
- In the overall eDREAM context has been identified three high-level use cases:
  - Prosumers flexibility aggregation via smart contract;
  - Peer-to-peer local energy trading market via smart contract;
  - Virtual Power Plant (VPP) in energy community.

**Blockchain Distributed Ledger** has been adopted for storing energy transactions and for enabling Demand Response (DR) flexibility services at a microgrid level in a secure and trustful manner.

## Smart Contract

- Blockchains like Ethereum: scripts Turing complete language, deployed and run within the blockchain nodes;
- Enables the automatic control of single prosumers or consumers, controlling the neighborhoods market of energy and energy services, guaranteeing stability and security to the whole grid;
- Transactions trackable and tamper-proof on distributed systems without the need for centralized monitoring.

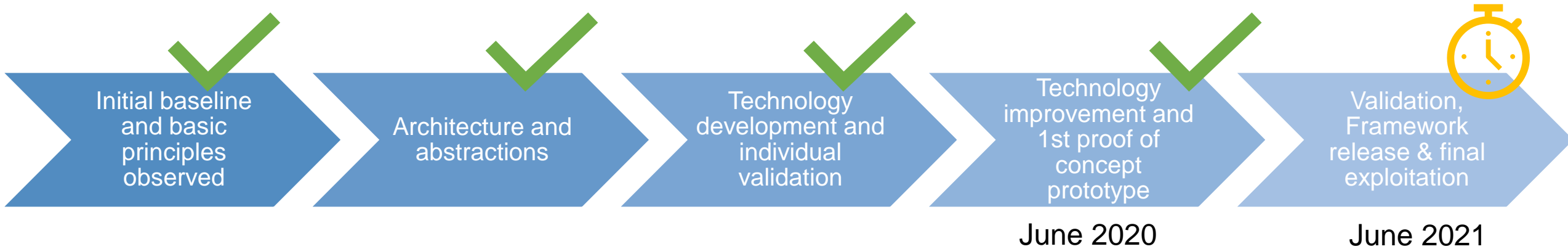
**Proof of Authority:** network aims to achieve distributed consensus through a number of blockchain actors within the ecosystem to which are given the power to validate transactions and ultimately decide whether new blocks will be added to the blockchain or not.



- **Flexibility Marketplace** has been designed exploiting **smart contracts** for energy prosumers registration through **token implementation** and **energy trading rules** definition;
- Each participants in the flexibility marketplace have to be equipped with a **smart metering device**, able to store the monitored data in the blockchain distributed ledger;
- **Decentralized flexibility marketplace** is managed by a dedicated smart contract, collecting flexibility requests and offers and matching them together. Once the bids and offers are accepted, the agreed amount is stored in the blockchain.
- **Prosumers smart contracts** act as a decentralized control mechanism, continuously monitoring the expected energy profile against the actual monitored energy values, penalizing the prosumers violating the smart contract and rewarding the prosumers that provide the flexibility.
- **Aggregators** use the available flexibility of its prosumers to inform DSO about the possibility to solve congestion point in the grid by exploiting the available flexibility







Video presentation of eDREAM Tools: <https://edream-h2020.eu/webinar-recording-new-demand-response-technologies-and-services/>

Thank you!



**Atos**

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