


Faculty of Automation and Computer Science


Boosting DR through increased community-level consumer engagement by combining data-driven and blockchain technology

H2020 Bright

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Presentation Outline


Barriers for DR Programs Uptake

Bright Concept for Energy Community

- Big data & ML for finer grain energy and flexibility forecasting
- Cross Sector Services Multi Values Stacking
- Self-governance of customers in communities / cooperatives for reliable flexibility delivery
- Bright pilot sites



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Barriers for DR Programs Uptake

Technological barriers: due to the lack of secured interoperable solutions which enable assets flexibilization retrofiting and solutions to support the shift from traditional centralized DR programs to more decentralized privacy preserving ones driven by the consumer needs.


Regulatory barriers: where the minimum threshold for DR participation is too large for allowing larger participation of DR small scale flexible assets and such threshold is different country-wise

Organizational barriers: insufficient end user community engagement. Overall, actual implementations of DR programs do not involve at the largest possible extent the communities of local energy consumers as social environment where individual consumers may find beyond-economic motivation to be enrolled in DR programs.

Humans barriers: end users are mostly reluctant to give full control of their data to aggregators/VPPs, since they would rather prefer to keep full control of their assets not to compromise their privacy.



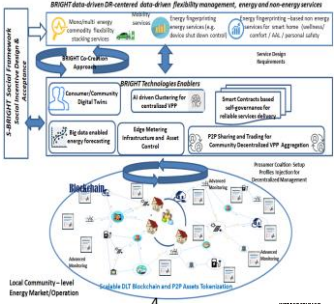
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Bright Concept for Energy Community

Innovative approach combining

- **social science** for understanding and community-level beyond-economic incentive;
- **consumer and community DTs** by integrating data-driven preferences and behaviour modelling with energy prediction;
- **DLT/blockchain/smart contracts** technology enablers aimed to implement P2P trading/sharing mechanisms for supporting decentralized P2P VPP;
- **cross-domain value stacking service design and innovative business modelling** at the interplay among different energy carriers, different energy stakeholders, different domains.



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CERCETAREA SI TRANSFERUL TEHNOLOGIC LA UTCN

Big data & ML for finer grain time series energy and flexibility forecasting

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Objectives

- Big data enabled forecasting tool to predict energy values at finer grain time and energy scales (households, communities, etc.)
- Consider non energy related features (i.e. social aspects, behind the meter data) and DT models integration for improving the prediction results

Methodology

- Ensemble-based techniques, hybridization of deep learning solutions, DT models integration, use non energy vectors as features
- Develop the big data & ML infrastructure

DT Model Simulation

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CERCETAREA SI TRANSFERUL TEHNOLOGIC LA UTCN

Cross Sector Services Multi Values Stacking

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Methodology

- Leverage on DT models' outcomes to combine cross sectors services
- Potential services electricity, heat, water distribution, mobility (electric cars), comfort, social
- Multi-criteria approach for involving energy and non-energy vectors
- Hybrid optimization heuristics to construct collations of prosumers in virtual communities to deliver combinations of cross sector services

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CERCETAREA SI TRANSFERUL TEHNOLOGIC LA UTCN

Self-governance of customers in communities / cooperatives for reliable flexibility delivery

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Methodology

- Direct injection the output of the hybrid optimization heuristics for cross sector combination of services

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CERCETAREA SI TRANSFERUL TEHNOLOGIC LA UTCN

Bright Pilot Sites

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- Pilot Case 1 (Belgium):** Local energy cooperative Multi-market Centralized Aggregation for value stacking flexibility services
- Pilot Case 2 (Netherlands):** Lab based Early Stage Validation (The Netherlands): Digital Asset Marketing for unstacked CDS
- Pilot Case 3 (Italy):** Local Energy Community: Clean Energy Community Community-on-the-Move: Personalized aggregation for virtual CDS integration
- Pilot Case 4 (Greece):** Virtual Community: Decentralized Aggregation and new energy smart home A/E and safety services
- Pilot Case 5 (Denmark):** Virtual Community: Centralized Aggregation and new energy smart home A/E and safety services

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Bright Identity Card

- **ID:** 957816/2020
- **Lifetime:** 01.11.2020 – 01.11.2023
- **Program:** LC-SC3-EC-3-2020: Consumer engagement and DR
- **Budget:** 5.877.633 Euro (Total); **504.375 Euro (UTCN-DSRL)**

- **One Large Enterprises: Engineering**, leading in advanced ICT, with 10.500 employees.
- **A variety of energy stakeholder, fully covering the energy value chain**, including one of the largest European-wise **independent aggregator (Centrica, CEN)**, **one supplier (W+V)**, **one DSO (ASM) as power network operator**, **one ESCO (DuCoop)**, which oversees a **Local Energy Cooperative**
- **Industry: ISKRAEMEKO (ISKRA)** as one of the largest providers of smart metering solutions in Netherlands and Germany;
- **Specialized SMEs: Emotion (EMOT)**, a leading-edge EVs fleet provider, **ComSensus (COM)**, **SunContract (SUN)**, one of the most successful European P2P DLT/Blockchain providers, **CyberEthicsLab (CEL)**, bringing cutting-edge know how on privacy, and **DOMX**
- **3 leading-edge Research & Academy Institutions (TNO, TUC, IMEC)**
- **Association of Consumers, APC**, which, as member of **BEUC, the European**

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