HOLISDER

HOLISDER

Integrating Real-Intelligence in Energy Management Systems enabling Holistic Demand Response Optimization in Buildings and Districts

Mente Konsman/TNO (mente.konsman@tno.nl)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

Project Partners

13 partners:

- 2 Research Organisations
- 5 Technology Providers
- 4 End Users
- 2 Market Uptake Accelerators

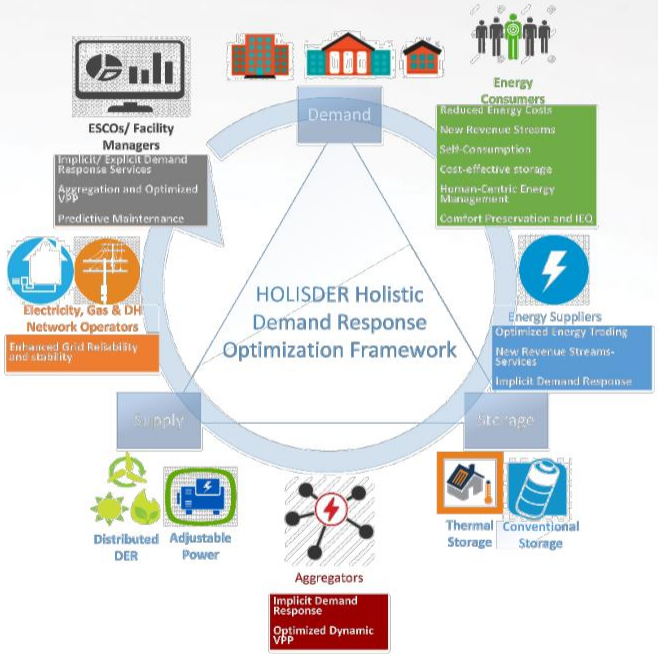
from 9 countries

HOLISDER project

The HOLISDER project introduces a **Holistic Demand Response Optimization Framework** that will enable significant energy costs reduction (~45%) at the building/ consumer side, while introducing **small and medium sized buildings** (residential and non-residential ones) as a major contributor to energy networks' stability through optimized energy management in response to network constraints and conditions.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

HOLISDER concept



- Significant **energy costs savings**
- Creation of **new revenue streams**
- Wide promotion of **self-consumption**
- Utilization of the currently unleashed **storage capacity** of buildings
- Proper tackling of **consumers' reluctance** to participate in **Demand Response**
- Further facilitation of consumers' participation in **energy markets**
- High **replicability** across different building types and systems
- Advanced adaptability to demand response **regulations** around EU Member States
- Enhanced operational **stability and security** of energy networks

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

Pilot sites

HOLISDER framework will be validated in **4 large-scale pilot sites**:




- 2 commercial, 25 residential buildings in **Athens**, Greece
- 3 commercial, 8 residential buildings in **London**, UK
- 2 commercial, 1 residential buildings in **Helsinki**, Finland
- 2 commercial, 44 residential buildings in **Belgrade**, Serbia

Demonstrations will take place in buildings of various typologies (residential and tertiary) in four diverse areas (climatic, demographic) under real operation conditions showcasing the wide replication potential of HOLISDER.
More than **1 600 occupants** in the pilot sites will be actively and directly engaged in the project activities, participating not only in the pilot roll-out, but also in the co-creation and co-design of HOLISDER solutions.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

HOLISDER key enablers

for the introduction of Demand Side Flexibility into energy markets

1. **Consumer Empowerment**
   → consumers as active energy market players reducing their energy bills (45-50%), tackling energy powerty, benefitting from wide range of services and providers

2. **Establishment of end-to-end interoperability**
   → between energy networks, building energy management systems and devices enabling two-way communication, plug-in-play installation and data exchange and integration

3. **New business models for third parties**
   → facilitating consumer involvement, representing tchem in energy market transactions, tackling knowledge bariers

HOLISDER User-Driven Innovation Approach

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

Industrial flex vs. residential/building flex (1/2)

- Examples of industrial energy flexibility sources
  - Greenhouses with CHP
  - Cold stores
- Observations
  - This is already being done
  - Relatively high margin per unit
  - Custom control technology developed for every unit
  - Process is well known and very predictable
- Conclusion
  - Already profitable

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

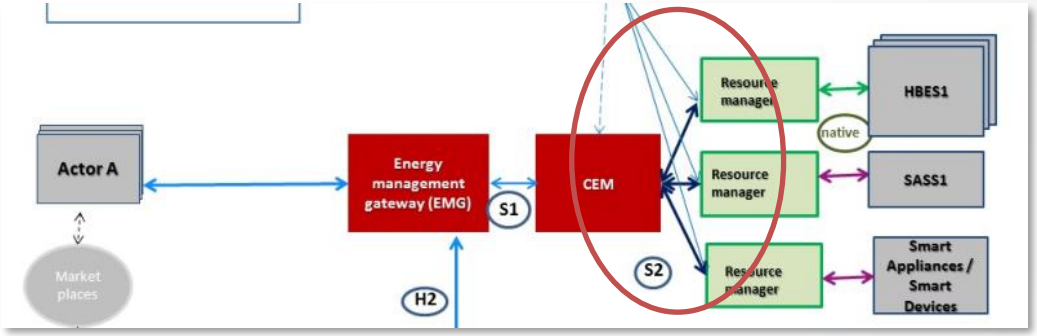
Industrial flex vs. residential/building flex (2/2)

- Examples of residential/building flexibility sources
  - Heating, Ventilation and Air Conditioning (HVAC)
  - Electric Vehicle (EV) charging
- Observations
  - Currently in development
  - Many makes and models of devices providing energy flexibility
  - Many units, but very low margin per unit
  - Energy flexibility is made available by ‘best effort’; no guarantees!
- Conclusion
  - If we want to scale up, we need to…
  - Minimize cost of supporting additional models of devices
  - Minimize installation and operation cost per unit
  - **We need automated and standardized solutions**

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 768614.

HOLISDER Standardization activities

- Participation in CLC/TC 205/WG18
  - Home and Building Electronic Systems (HBES)/Smart Grids
  - Development of the S2 standard (prEN50491-12-2)
    - Energy flexibility of smart devices
    - Almost finalized: currently in enquiry phase



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 50491-12-2

August 2020

ICS

English Version

General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS) - Part 12-2: Smart grid - Application specification - Interface and framework for customer - Interface between the Home / Building CEM

Exigences générales relatives aux systèmes électroniques pour les foyers domestiques et les bâtiments (HBES) et aux systèmes de gestion technique du bâtiment (SGTB) - Partie 12-2 : Réseau intelligent - Spécification d'application - Interface entre le gestionnaire d'énergie pour le client (CEM, Customer Energy Manager) et le gestionnaire de ressources pour foyers domestiques/bâtiments - Modèle de données et échange de messages

To be completed

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2020-10-30.

It has been drawn up by CLC/TC 205.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2020 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

How is flexibility expressed in S2? (1/2)

- Basic energy flexibility patterns
  - Limit production or consumption
  - Shift production or consumption in time
  - Pause a task
  - Alternative energy profiles
  - Power Modulation
  - Buffer energy
  - Store energy
  - Switch energy type

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

How is flexibility expressed in S2? (2/2)

S2 Control Types →

Energy Flexibility Patterns →

	Power Envelope Based Control	Power Profile Based Control	Operation Mode Based Control	Fill Rate Based Control	Demand Driven Based Control
Limit production or consumption	●				
Shift production or consumption in time		●			
Pause a task		●			
Alternative energy profiles		●			
Power modulation			●	●	●
Buffer energy				●	
Store energy				●	
Switch energy type				●	●

- Energy flexibility patterns typically do not occur in isolation
  - Devices can combine these patterns in different ways
- S2 control types model the interdependencies of energy patterns
  - Devices will be mapped to a control type to expose their flexibility to the CEM/EMS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614.

HOLISDER

Follow us on:

www.holisder.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614