GREY WATER RECYCLING AND ENERGY RECOVERY

A completely integrated circular economy approach

FIRMUS FRANCE

MRI Sources d'expertises

Optimal Solutions GROUPE EDF

SHERPA ENGINEERING

A proven technology

derived from space research with several terrestrial applications

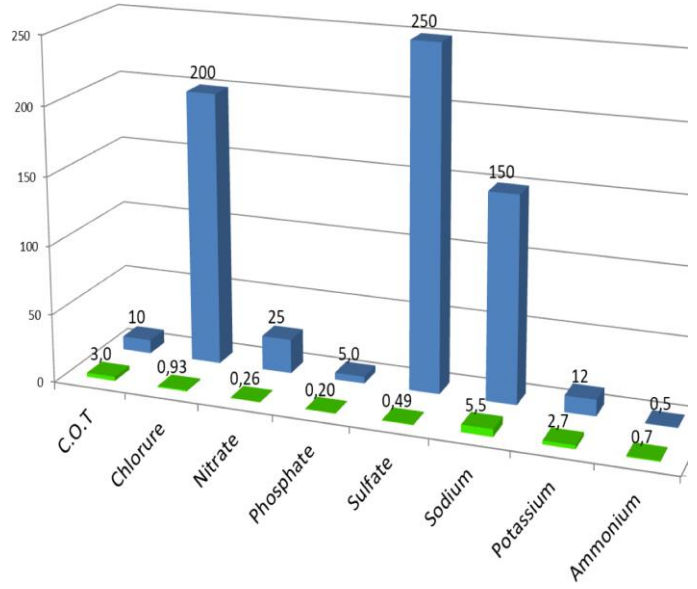
A technology derived from a research work carried out by FIRMUS France for the European Space Agency (ESA)

The design, implementation and operation monitoring of a process in service since 2005 on the French-Italian Antarctic station Concordia

More than 1.200 users since commissioning without any technical or sanitary incident

Results

Paramètres	Unité	Standard "Hygiène" ESA	Eaux grises Valeur Moy 2015-2016	Eau traitée Valeur Moy 2015-2016
C.O.T	mg/L	10	222	3,0
Chlorure	mg/L	200	65	0,93
Nitrate	mg/L	25	0,7	0,26
Phosphate	mg/L	5,0	33	0,20
Sulfate	mg/L	250	25	0,49
Sodium	mg/L	150	117	5,5
Potassium	mg/L	12	19	2,7
Ammonium	mg/L	0,5	15	0,7



Eaux Grises Traitées (litres)	Eau Produite (Litres)	Taux de Recyclage (%)	Eaux Grises produites (l/j/ personne)
4 582 007	3 650 282	80	69

How to enhance this expertise?

A global viewpoint

A consortium to provide a customized optimal solution

FIRMUS FRANCE

Technology
Sizing, design and development of the FGWRS® process

FGWRS: Firmus Grey Water Recycling System

Engineering
System integration and design of the energy recovery solution

Optimal Solutions GROUPE EDF

SHERPA ENGINEERING

Optimization
Modeling, simulation and optimization of the circular system

Legislative
Ensure the compliance with legislation and quality monitoring of the produced water

MRI Sources d'expertises

The development of this recycling process requires a system integration by a expert team

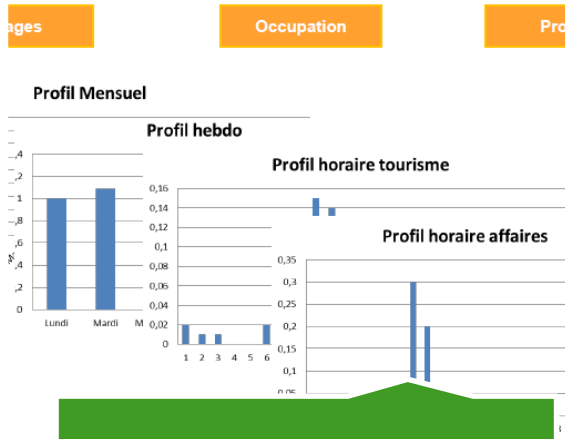
Our vision

Combat against water stress

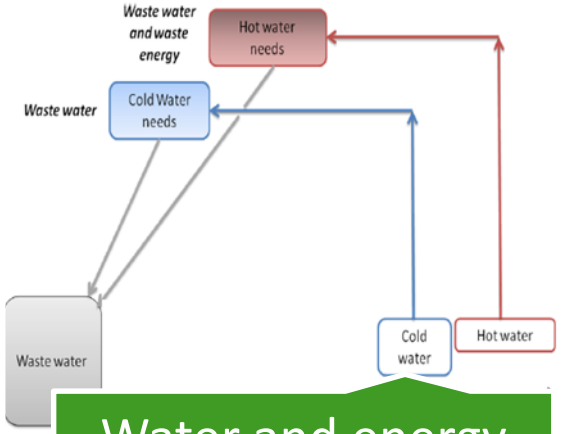
Fight climate change

Contribute to water and energy autonomy

Our approach



Need analysis



Water and energy cycle

- Regulation
- Architectural constraints
- Grey water quality
- Usage and quality of the recycled water
- Recycling rate

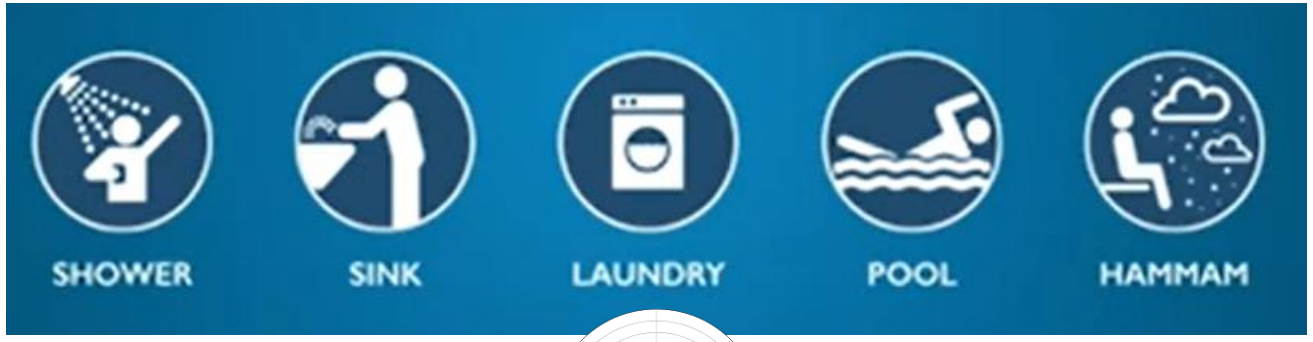
Objectives and constraints

- Occupancy rate (optimist / pessimist)
- Recycling rate
- Usage choice
- Equipment sizing and optimization

Parametric study and scenarios

Key Features

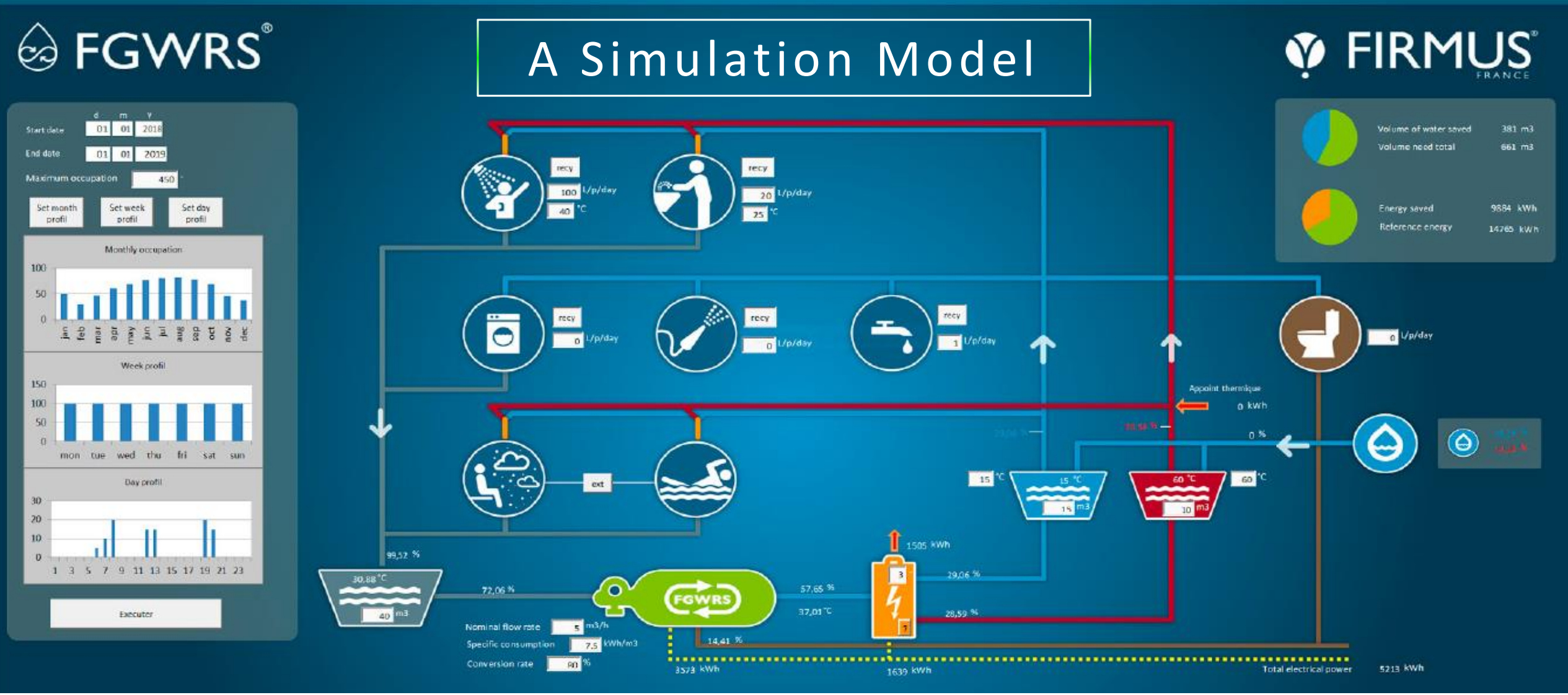
Resources



Usage

- Recycle up to 80% of grey waters to obtain hygienic quality water for toilets and the sanitary network
- Optimize profitability through energy recovery to contribute to the building heating needs
- Achieve a significant savings potential both in terms of operating costs and use of the resource.
- Allowing reuse for all purposes, except drinking (1% of the daily needs) thanks to the quality of the produced water

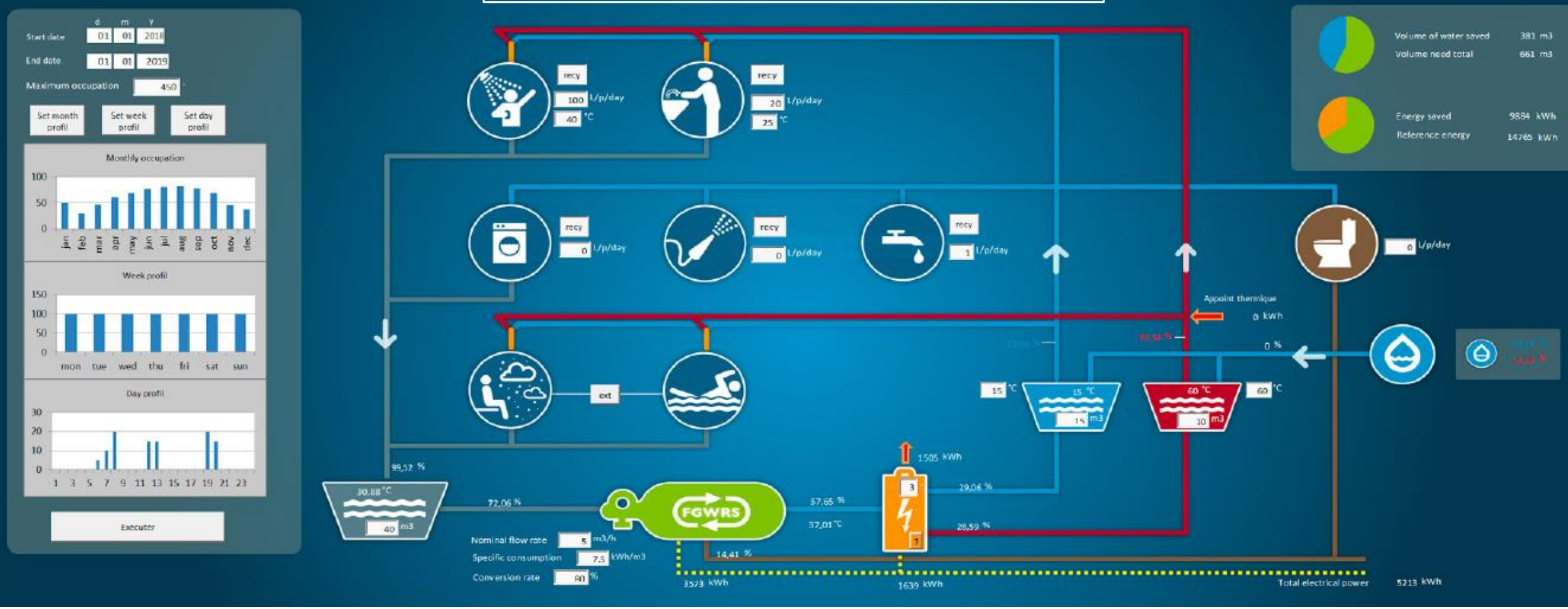
A Simulation Model



Design phase

- Design and validate the control system
- Design and optimization of the energy management system
- Sizing: FGWRS, storage, heat pump

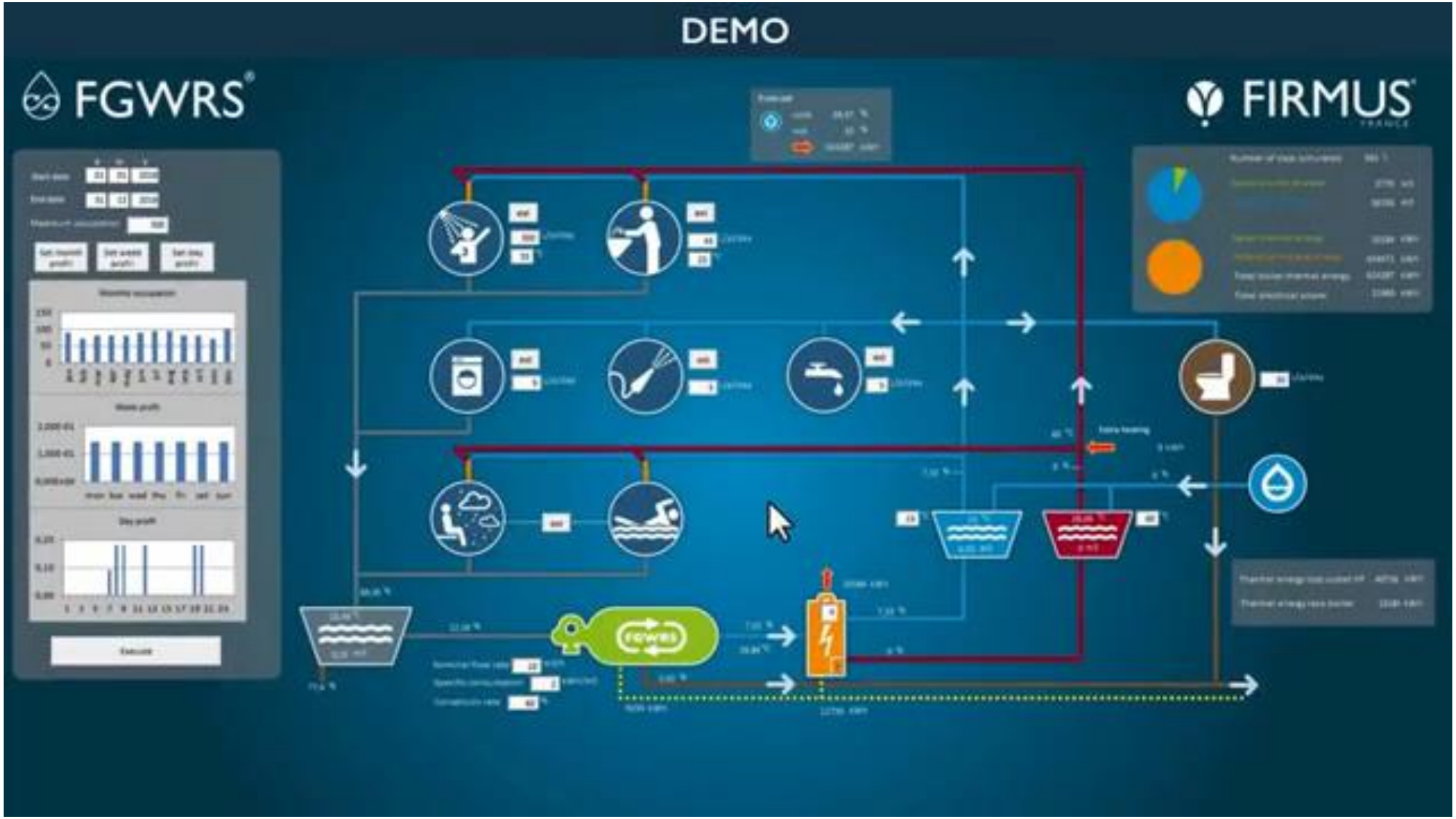
A Simulation Model



Exploitation phase

- Simulate the operational scenarios
- Evaluate consumption and profits for several configurations and architectures
- Master and manage a complex, multi-view, circular system
- Improved communication and collaborative work

Demo



Thank you

FOR YOUR INTEREST

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