Saft Energy Storage System Solutions & Product Range

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Saft positioning

- Focus utility scale, power oriented applications
  - Renewable integration, power oriented
  - Ancillary Services (Frequency regulation)
  - Micro-Grids

- Saft strengths:
  - End to End **system** capability
  - **High Power** capability, charge and discharge
  - Superior energy **throughput** for stacking applications
  - Long **operational lifetime**
  - Best **Efficiency** and **Availability**
  - **Complex** applications and **difficult environments**

Product/Application match

Self-consumption behind-the-meter	Demand response Peak demand reduction	Microgrids	Ancillary services	Renewable integration	Peak load management

Intensium Mini

Small ESS for utilities

Intensium Max

Medium to large ESS for utilities

Intensium® Max+ 20 product range

	Intensium Max 20E	Intensium Max 20M	Intensium Max 20P
Energy (kWh)	1 180	1 090	700
Continuous discharge power (kW)	2 300	2 400	3 300
Continuous charge power (kW)	900	2 300	3 000
Nominal voltage (V)		771	
Voltage range (V)		630 – 867	
Dimensions L x W x H (m)		6,1 x 2,4 x 2,9	
Weight (t)		19,5	

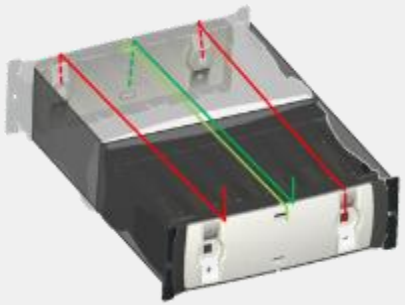
Intensium® Max+ 20 Generation 3

VL45E/41M/30P cell

NMC/NCA blend technology

Module Synerion® 24E/M/P

- Gemini module (2 x Synerion modules in series)
- Rated voltage 48V



Energy Storage System Unit (ESSU)

- 15 Gemini modules in serie (30 Synerion modules)
- 1 BMM/ESSU for charge/discharge control

Container

- 18 ESSU in //
- Voltage 630-861V
- 1 MBMM for all BMMs control

Flexible Intensium Mini system

- An advanced energy storage solution
  - Flexible power-to-energy ratio
    - 24E (Energy) Module)
    - 24M (Medium Power Module) or
    - 24P (High Power Module)

	Syn24E	Syn24M	Syn24P
Discharge Power (kW)	220	235	380
Energy (kWh)	120	112	78

  - … With a wide range of energy & power allowing up to 4 systems in //
    - from 78 to 480 kWh of energy capacity
    - from 220 to 1520 kW of power

Energy Storage installations by September 2016

***Saft* ESS has about 100 MW installed…. (Eq. 85 MWh) with 90 Intensium Max containers**

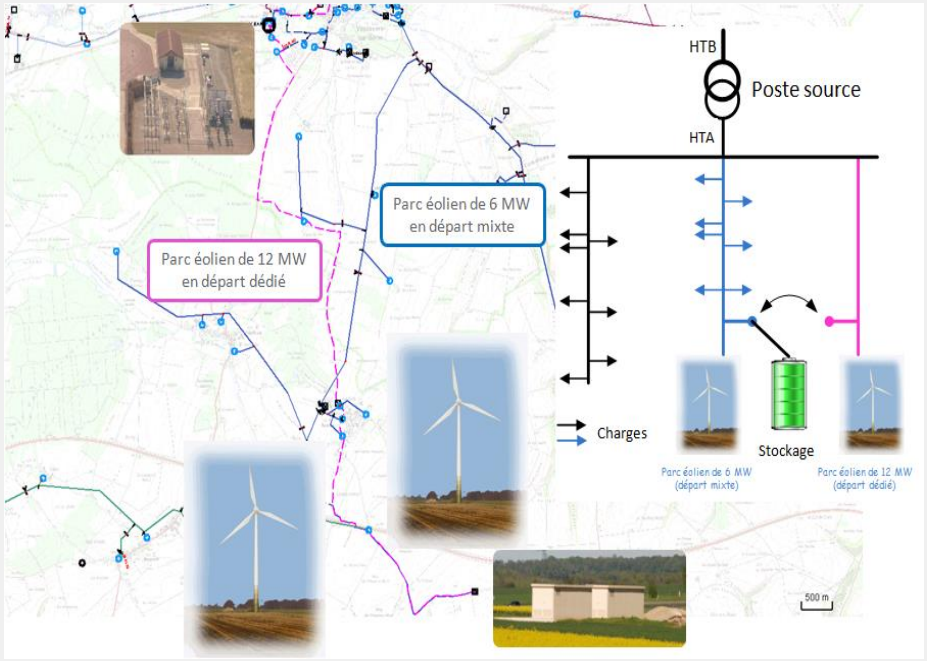
VENTEEA demonstration project

- VENTEEA is a project focused on the integration of large wind generation within MV distribution networks.

ADEME
Agence de l'Environnement et de la Maîtrise de l'Energie

Key facts and figures:

- 1 existing wind farm 12 MW (dedicated MV feeder)
- 1 existing wind farm 6 MW (non dedicated MV feeder with 1500 customers)
- 1 HV/MV transformer (63/20 kV - 20 MVA)
- 130 secondary substations
- 10 partners (23.5 M€ - 3 years until **June 2016**)



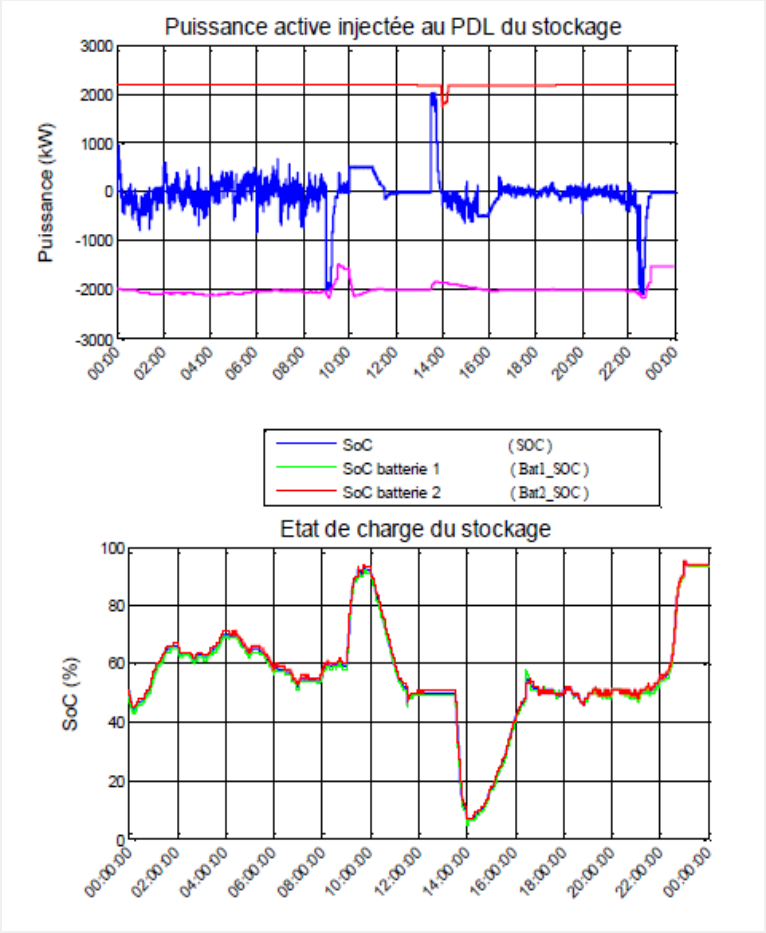
VENTEEA tested services

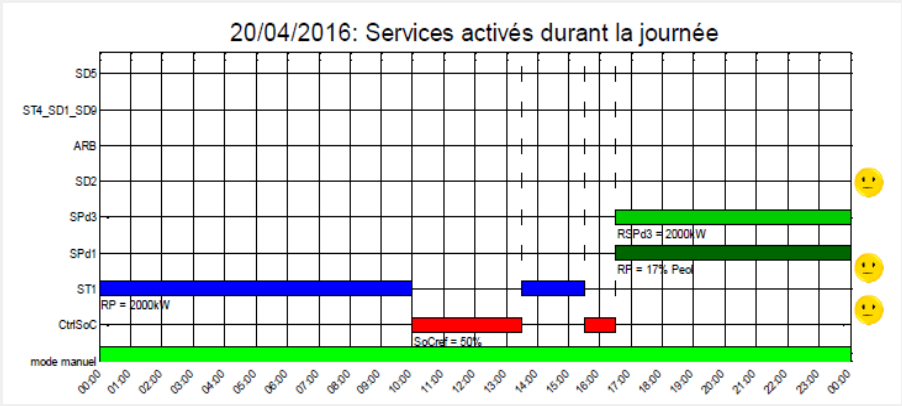
- VENTEEA has tested 12 different services for 4 different stakeholders

Stakeholder	Service
TSO	TSO1 – Participation in primary frequency control
DSO	DSO1 – Distribution peak shaving DSO2 – Local voltage control DSO3 – Contingency grid support DSO5 – Reactive power support DSO9 – TSO fees optimization
DG operator	DG1 – Support to the provision of ancillary services DG2 – Smoothing of short-term output fluctuations DG3 – Generation peak shaving DG4 – Energy time-shifting DG5 – Capacity firming
DESS operator	ARB – Time-of-use energy arbitrage

Complex applications: multi-services

- Combination of applications: 20/04/16 , VENTEEA
  - Wind curtailment avoidance (SPd3)
  - Frequency regulation by WP (SPd1)
  - Frequency regulation for TSO (ST1)
  - SOC management
- Up to 400% capacity throughput per day
- Modelling is critical
  electrical / thermal / ageing





Conclusions of VENTEEA project

1. Combine several services in a single day, sometimes two services simultaneously.
2. Up to 400% throughput per day
3. Overall energy efficiency of 85%
4. 12 services tested succesfully
5. Multi-services approach planned day-ahead tested and validated
6. Qualification by RTE (French TSO) to participate in frequency regulation market

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Thank you for your attention