PEGASUS SUMMER SCHOOL

Saint Julien-en-Quint microgrid project

2018 May 31st
Pilot site: Saint-Julien-en-Quint

- Rural village in the south of the Natural regional park of Vercors
- Specific context:
  - Remote mountainous area
  - Power outages
  - Local community with high goals regarding RES
- Support from Territoire Energie Drôme (local grid utility)
- Local partners: Municipality of St Julien, grouping of municipalities of Diois, natural regional park of Vercors, DSO Enedis
Pilot site: Saint-Julien-en-Quint

45 consumers connected to the local substation

Objectives

- Develop RES plants to propose local electricity to the consumers
- Assess storage solutions to enable short islanded mode operation if needed
French new regulatory framework

- Law on « collective self-consumption »
  - Published in 2017
  - Possibility for a producer to sell directly electricity to local consumers if they belong to a same LV grid section and are linked through a local entity.

Diagram:
- Complementary provider
- Consumers
- Producers
- Sale contract
- Local entity
- Agreement
- DSO
Methodology

Data measurement → Data collection → Data extraction and treatment → Data storage and analysis

July 2017 → July 2018 → July 2019

With the support of:

Auvergne Rhône-Alpes
Énergie Environnement

territoire d’énergie
DRÔME - SDED

La Région Auvergne-Rhône-Alpes
Measurements

- Data collection from July 2017 to July 2019
- 10 min timestamps
- Reconstruction of the missing or wrong data
- 31 buildings

- Detailed monitoring on electric boards when building owners agree
- Light monitoring on electronic meters (LED impulse sensors) and disc meters (optical sensors)
Electricity consumptions

- Agricultural: 16%
- Unknown: 9%
- Residential: 11%
- Offices: 64%

Electricity consumption: 180 MWh / an

P max: 50,294 kW
P min: 6,493 kW
Median value: 19,379 kW
Grid modelling and scenarios

- 5 scenarios:
  - Maximum PV production
  - Self-consumption optimized
  - Load control
  - Storage
  - Off-grid

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PV capacity</th>
<th>SCR</th>
<th>SSR</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 – Full PV</td>
<td>234 kWc</td>
<td>25.5%</td>
<td>38.9%</td>
<td>153%</td>
</tr>
<tr>
<td>S2 – Optimized self-consumption</td>
<td>36 kWc</td>
<td>85.9%</td>
<td>22.3%</td>
<td>26%</td>
</tr>
<tr>
<td>S3 – Load control</td>
<td>36 kWc</td>
<td>94.8%</td>
<td>24.6%</td>
<td>26%</td>
</tr>
<tr>
<td>S4 – Storage</td>
<td>36 kWc</td>
<td>97.3%</td>
<td>25.3%</td>
<td>26%</td>
</tr>
<tr>
<td>S5 – Off-grid</td>
<td>48 kWc</td>
<td>97.5%</td>
<td>33.8%</td>
<td>34.6%</td>
</tr>
</tbody>
</table>
Key figures

Consumption 180 MWh / an

PV plant 30 kWpc

20 – 25% coverage of annual needs

SUMMER

WINTER
Local governance

Public bodies
- Municipality (St Julien-en-Quint)
- Grouping of municipality (CC du Diois)
- Regional natural park (PNR Vercors)

- Local Association (ACOPREV)

- Citizen-owned local cooperative

- Local DSO (ESDED)

- National DSO (Enedis)

Actors involved in the project
Community investment model

- Citizens
- Others ethical and socially responsible investors
- Local companies
- Local authorities

Facilitator
Design office

Local company « Centrales Villageoises »

Shareholders
Energy sale
Dividends
New projects

Roof lease for solar panels
Invests

TERRITORY

1st phase
1st operation

New operations: activity growth

2nd phase PV
Other RES project

With the support of:

Auvergne-Rhône-Alpes
Énergie Environnement

La Région Auvergne-Rhône-Alpes

Europa
Community microgrid model

Local consumers (shareholders of the energy community)

Public distribution network

RES production

Energy community (local cooperative)

Invest and operate PV plants

Smart-meters

Buy electricity from local production

Buy additional electricity

Electricity provider

Electricity provider / aggregator

Buy excess energy

With the support of:
Business model

- **Producer**
  - Charges
  - Investment
  - Subsides
  - Revenues (energy sale)

- **Consumer**
  - External provider bill
  - Local bill
  - Present bill

- Participate through local cooperative

With the support of:
Business model for the producer

Local cooperative

Investments
- Feed-in tariff PV plants
- Self-consumption PV plant

Charges
- Maintenance

Revenues
- Energy sale
- Subsides
  - from 8 to 12 c€/kWh
  - 12 c€/kWh

With the support of:
Business model for the consumers

Composition of the electricity bill

- Annual standing fees (€/an)
- Consumptions (€/kWh)
- Taxes

Impact of collective self-consumption
Example for the 1st year with a local tariff of 8.5 c€/kWh

The results depend on strong hypothesis made on the theoretical providers' commercial offers.

6 kVA Base tariff consumer

9 kVA TOU tariff

With the support of:
Taking into account electricity price inflation

Base tariff 6 kVA

TOU tariff 9 kVA

Temporary results

+3%

+5%
Next steps

• Adapt the business model for each consumer
• Discuss with providers about their commercial offers
• Realize investments
• Disseminate the lessons learnt for PEGASUS project and enable the reproduction of the model in other sites
CONTACT:

Noémie POIZE:
noemie.poize@auvergnerhonealpes-ee.fr
Tel: 04 72 56 33 56

THANK YOU