

PLAN.
INNOVATE.
ENGAGE.



ETIP SNET

EUROPEAN
TECHNOLOGY AND
INNOVATION
PLATFORM

SMART
NETWORKS FOR
ENERGY
TRANSITION

“ Digitisation of the electricity system and Customer Participation”

‘APC 2020’ Citizens Photovoltaics' self-consumption for H2020



November 15th 2019



Description of the project

Name: 'Citizen Photovoltaic Self-Consumption for the 2020 in north of France'

Consortium:

- "Arts et Métiers" Science and Technologies engineering school
- "Solaire en Nord" citizen's north of France association

Budget: global : 220 k€ / Region's funding's : 68%

Overarching objectives:

- Keys points for photovoltaic self-consumption of citizen's development
 - ✓ Reach 50% without energy storage
 - ✓ Reach 70% with energy storage
 - ✓ Integrate inhabitant's compartments in self-consumption simulation's models



Key exploitable results addressing energy system integration

Result 1:

- Adapting PV's Power Peak to houses consumption = **50% SC can be reached**

Result 2 :

- Acting of Inhabits = decrease **3 to 5 %** electrical consumption to enhance self-consumption

Result 3:

- Adding stationary battery and hot water tank Storage coupled with Electric vehicle charging = **70% SC can be reached**

Result 4:

- **A decrease of 20%** of CO₂/year emissions and electrical bill is possible

Result 5:

- **Estimation of 10 000 km/ year** ; EV rating km in full SC electric motion

TUNING SELF CONSUMPTION PARAMETERS



Block Parameters: Profile

PV Plant Heating Customer Electric Vehicle EV Price and CO2 Battery

Facility PV 300Wp

Orientation: South (S)

Tilt: 30.0 90.0

Nr: 300Wp Panels: 7

City: Lille

Level of shadow: Less

ON OFF Stationary Battery Powerwall .Value

OK Cancel Help Apply

Block Parameters: Profile

Profile customer APC (mask)

Profile customer project APC 2020

- PV Plant
- Customer
- Heating
- Eco motion
- Electric Vehicle
- Battery

PV Plant Heating Customer Electric Vehicle EV Price and CO2 Battery

Stationary Battery Powerwall

Capacity of stationary battery Powerwall kWh: 2.5 10.0

Charging Power kW: 0.0 1.0 0.4

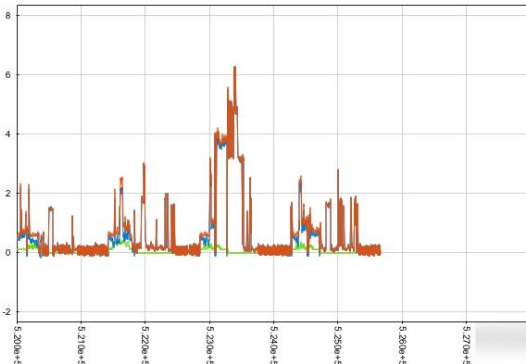
Discharge Power kW: 0.0 1.0 0.25

OK Cancel Help Apply

SCADA RESULTS

APC 2020

■ Production PV ■ Rest ■ Conso total

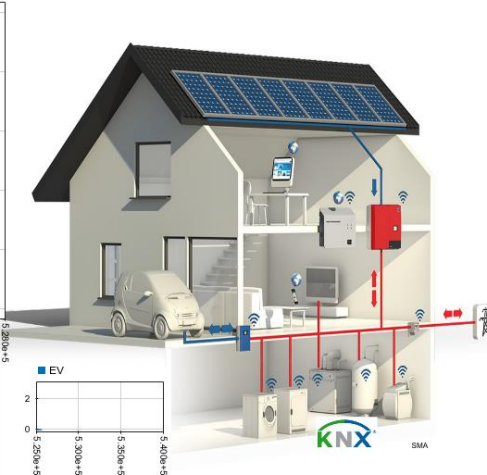


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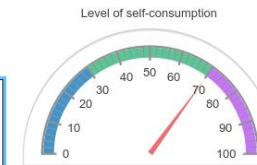
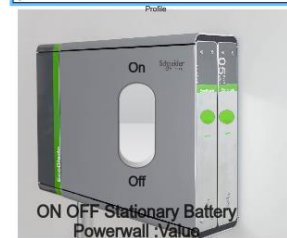
EV rating km
100% electric

1146.099999999...

EV charge kWh



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70.22
Level of self-consumption %

903.5
112.3
1129
338.2
25 % progress of price

Price_EDF_PV_rest_battery €

351.7
47.76
659.9
356
87.63 % progress of CO2

CO2_EDF_PV_rest_battery [kg]

-637.8
Grid overplus [kWh]

70%

- SC Pv 2,4 kWp
- EV+Battery+Water Tank
- Eco motion: Yes

60%

- SC Pv 2,4 kWp
- EV+Water Tank
- Eco motion: yes

55%

- SC Pv 2,4 kWp
- Water Tank
- Eco motion: Yes

53%

- SC Pv 2,4 kWp
- Eco motion: yes

50%

- SC Pv 2,4 kW
- Eco motion: no

Lessons learned

- +Best house Storage :** piloted Hot water tank (cost & CO2)
- +4 Citizens Profiles** ‘willing PV’ on their House
- + Citizen motion** to decrease its consumptions
- +Scalable Lab Modelization** ‘from the House to the City’
- +EV Charging from PV in house :**
 - Decreasing family greenhouse gas
 - thanks to fuel replacement with photovoltaic
- In 2020, Li-Ion battery** is non-sense (Cost , CO2)

Barriers to innovation deployment

Real model with high precision (1min/1 year)

- Adaptable solution
- Integration of
- Human behavior
- Simulation of Every Houses uses
- Customer self-supply
- Respect of Grid codes: export limiting performance (net export limit)
- Multiple profil-user data collected
- Limited the export of power to the grid

- Solutions for 50% to 70% SC
- EV integration in the houses
- Smart home systems development
- House energy management System



- Compatibility of different supplier
- Real data acquisition from all User
- Higher SC needs higher complexity of the systems
- Everybody is not ready for this solution

- Cost of The smart solution
- Environmental regulation (CO2)
- Global Offer of companies (Mitsubitchi, ...)

Deployment prospects of the most promising solutions

- 1) Mockup Scale 1:1 and simulations : PV carport in our court for studying and teaching students



- 2) **Replication and scaling** up of APC 2020 know how on Solar Decathlon 2019:

- Makes the French team win the energy balance contest
- Participate to the winning of the all competition for the french TEAM ' Habiter 2030 '



Needs for future R&I activities coming out of the project

Looking for “Smart city projects”

- Improve energy management of the Buildings with higher self-consumption PV level and management of 20 EV chargers
- Contribute of energy efficiency to climate, Count effect of behavioral approach and social practices
- The role of EE and demand-side response in the energy transition

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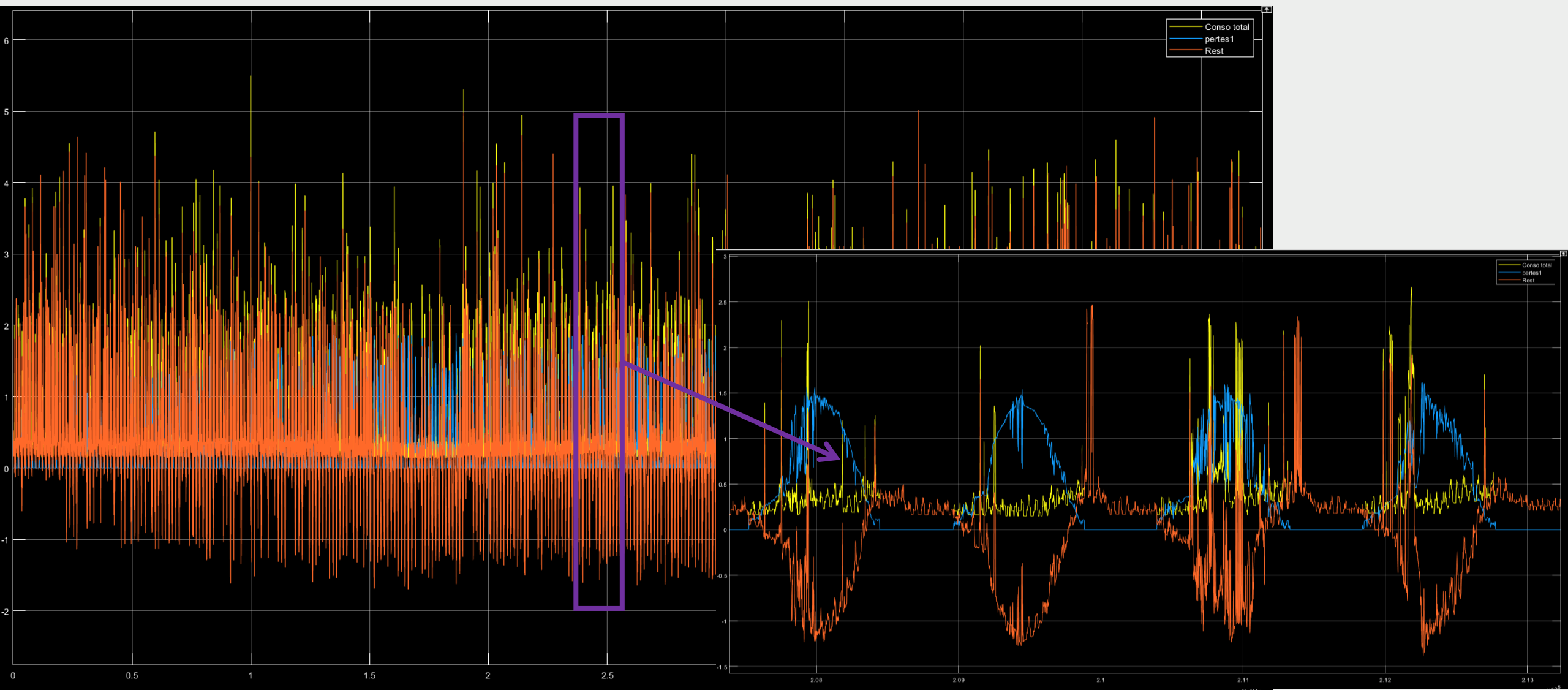
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“THANK YOU – DISCUSSION”



Detailed SCADA RESULTS





Detailed SCADA RESULTS

