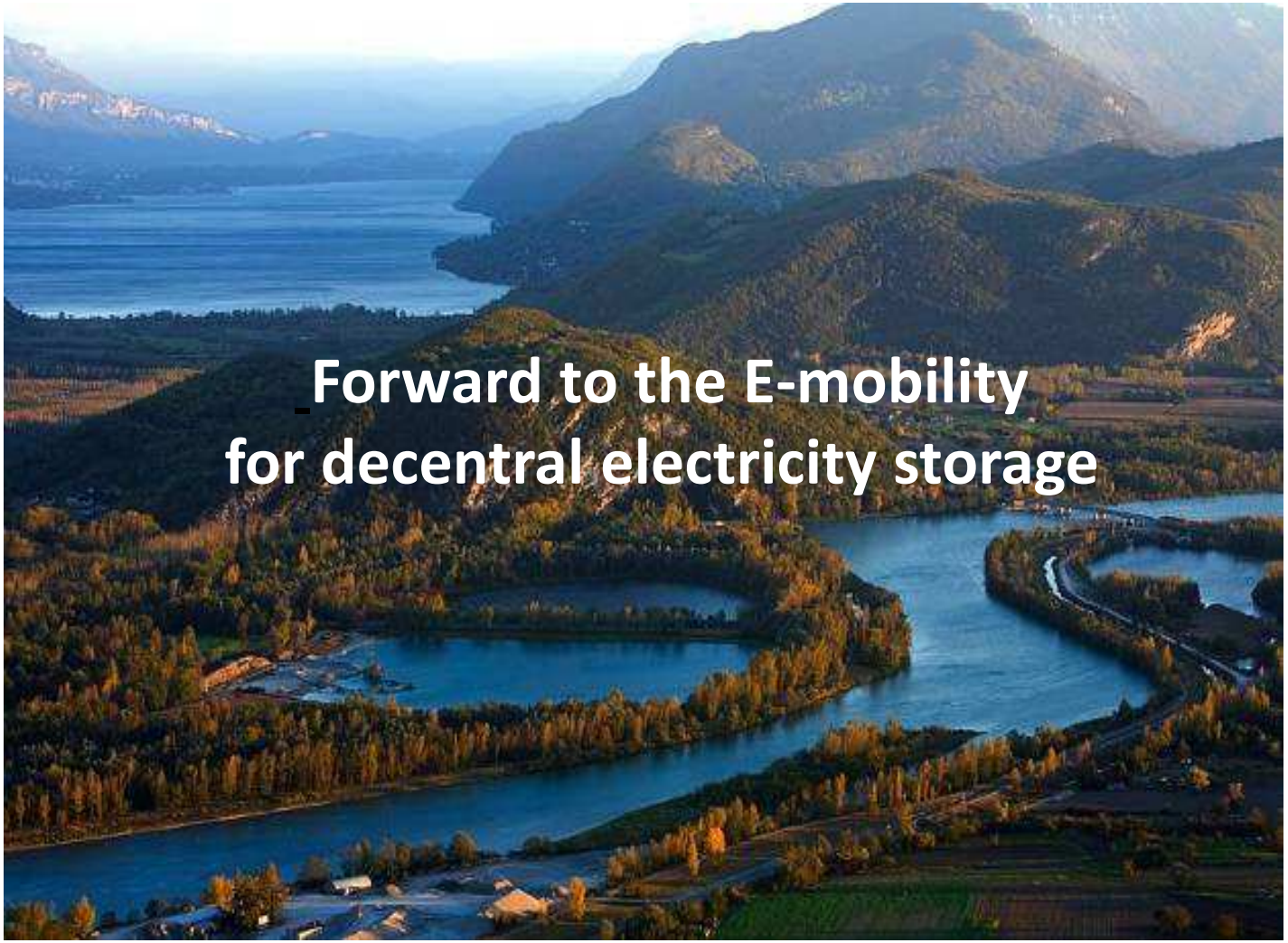
Compagnie Nationale du Rhône
L'ENERGIE A L'ETAT PUR

Energy Platform Workshop 3

Zurich 13 February 2014



Forward to the E-mobility for decentral electricity storage

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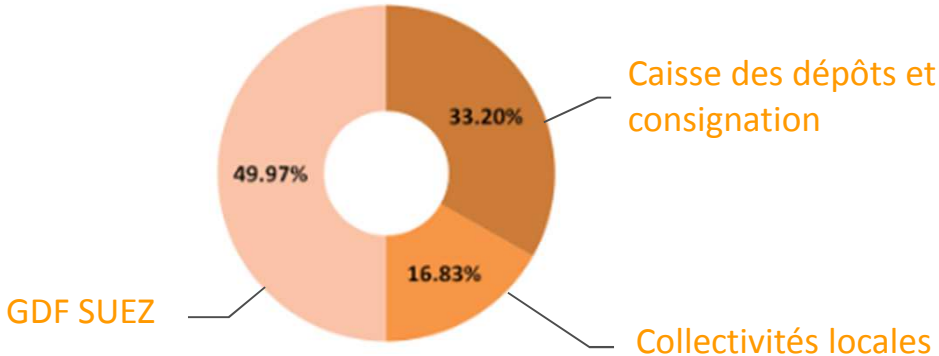
Installed capacity

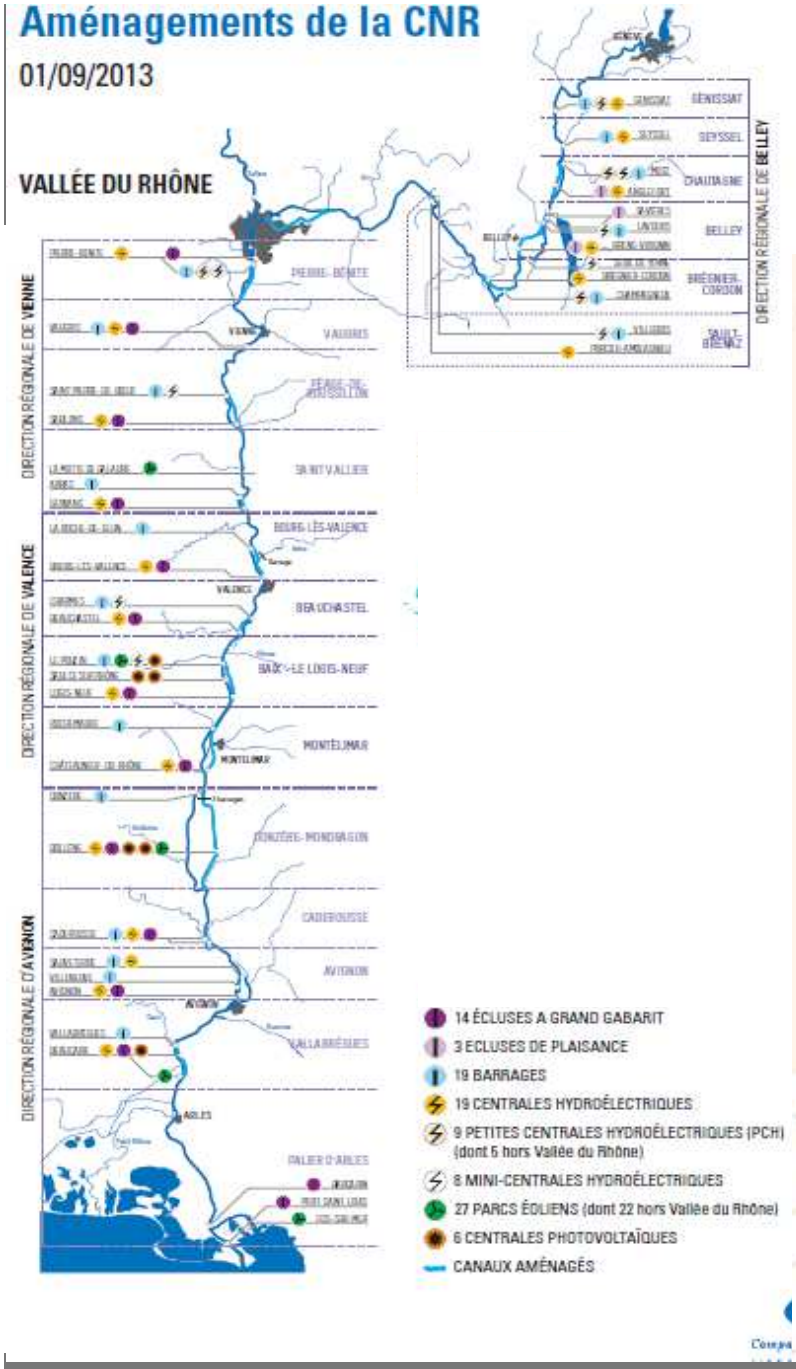
19	Hydropower plants	2976 MW → 14.6 TWh
21	Wind farms	301 MW
4	PV farms	15 MWc
5	SHPP (France and abroard)	33 MW

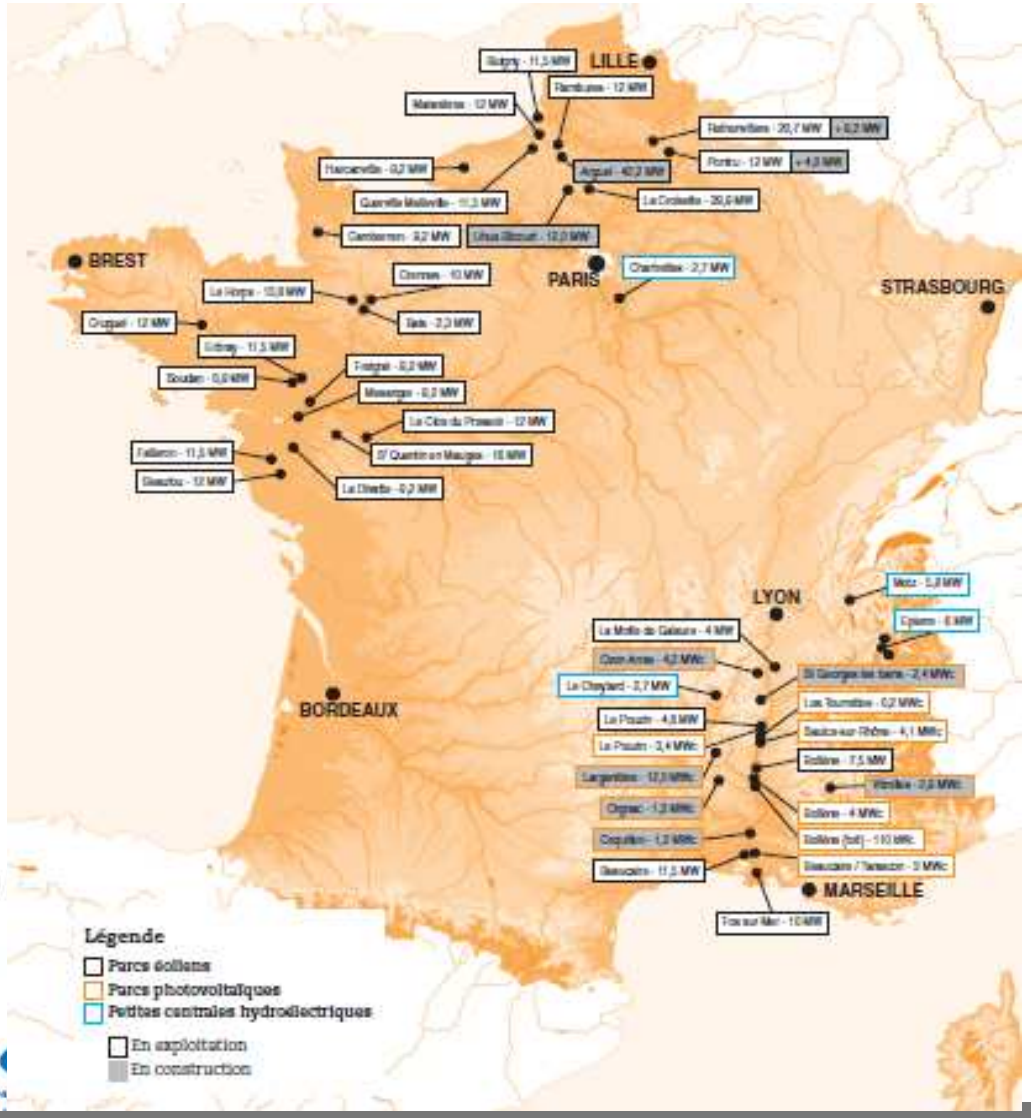
Mostly publicly owned company
Private industrial partner: GDF SUEZ



Energy certified 100 % renewable (Hydro)

CNR's installations



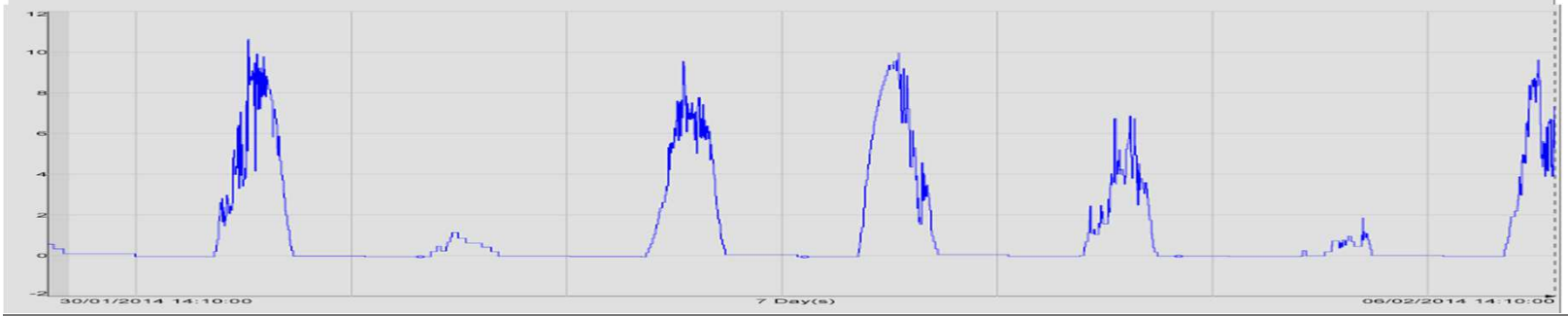


ENR = a volatil energy

Sample : CNR Hydro, Wind and Solar PV plants production

Hydro (HPP Rhône river)

Wind PP



Solar PV

ENR = a risk for the grid

EnR production emergence

→ **Risk and cost for the electric system specialy in alpine electric grid**

Samples of impacts :

1. **Power capacity**
2. **Voltage limits**

Next….

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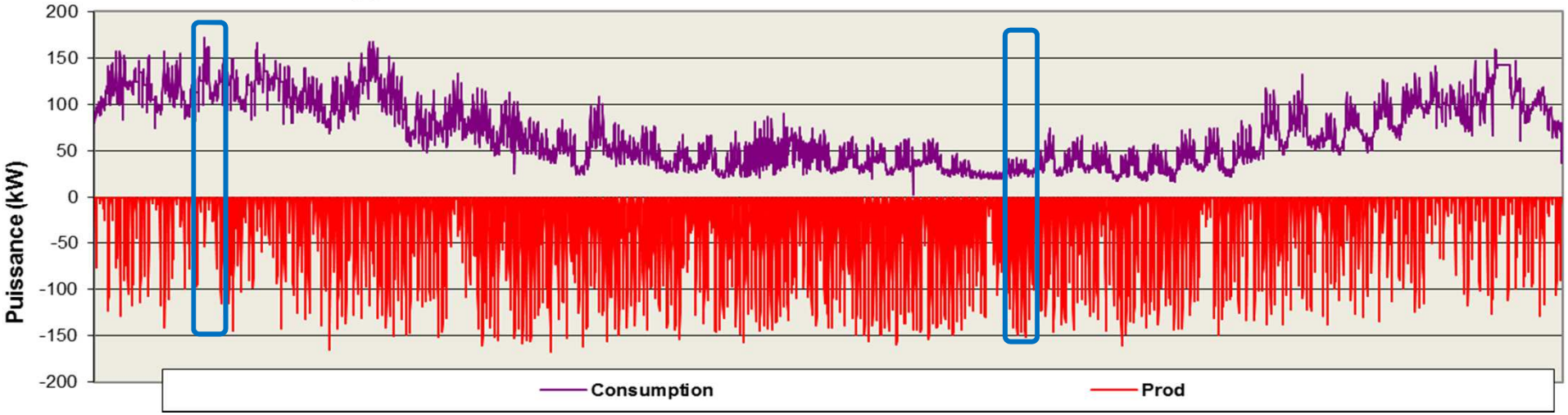
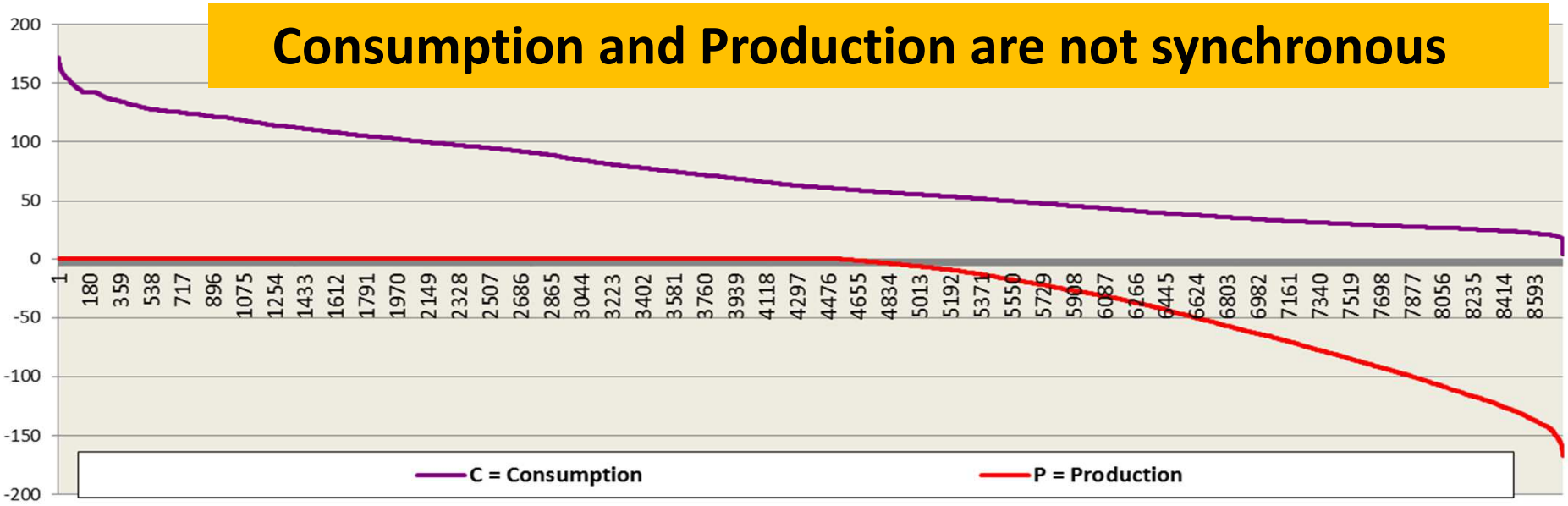
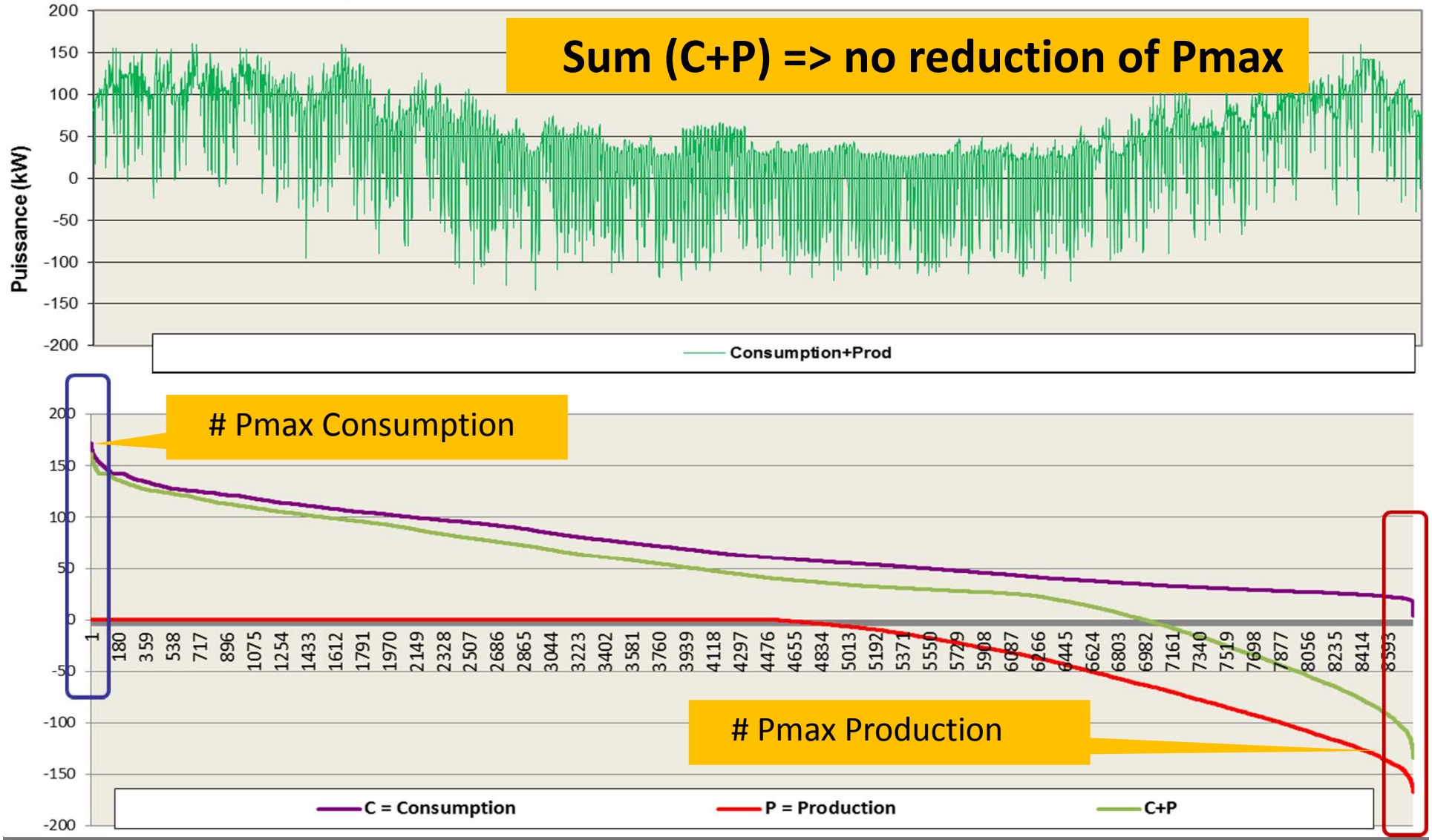
ENR : 1 - grid impact / Pmax



Consumption and Production are not synchronous



ENR : 1 - grid impact / Pmax



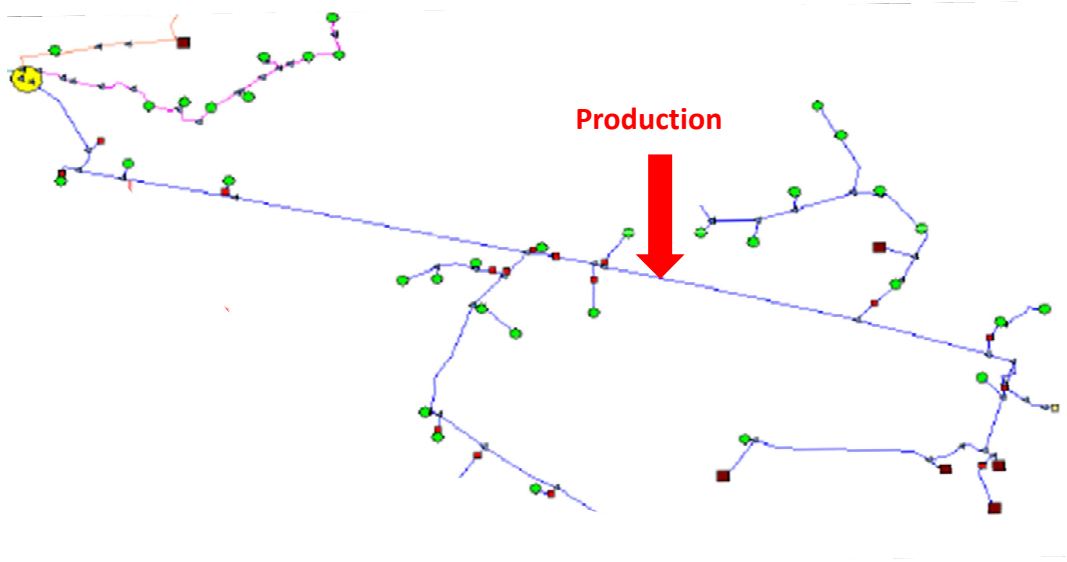
ENR : grid impacts

Sample : HTA(20kV) grid in alpine site

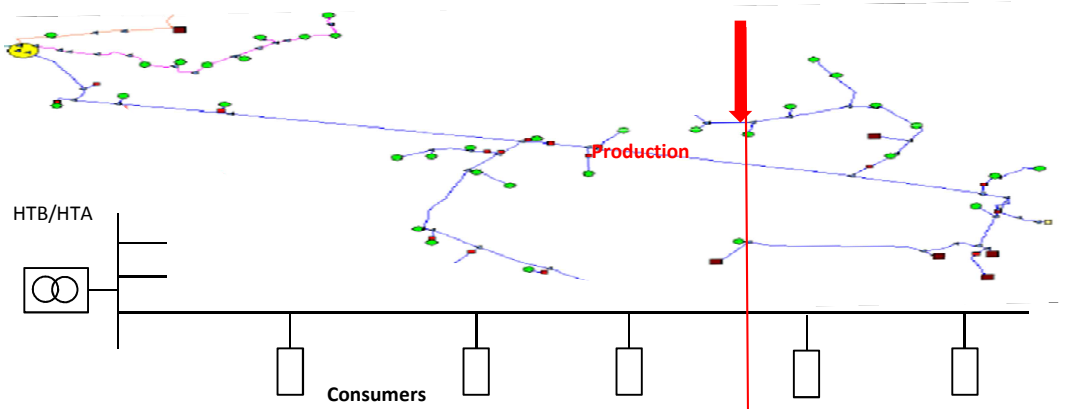
Tree typology :

1 Substation (TR HTB/HTA) + X long feeders + Secondary branches

- First : only consumers
- New : EnR production Unit

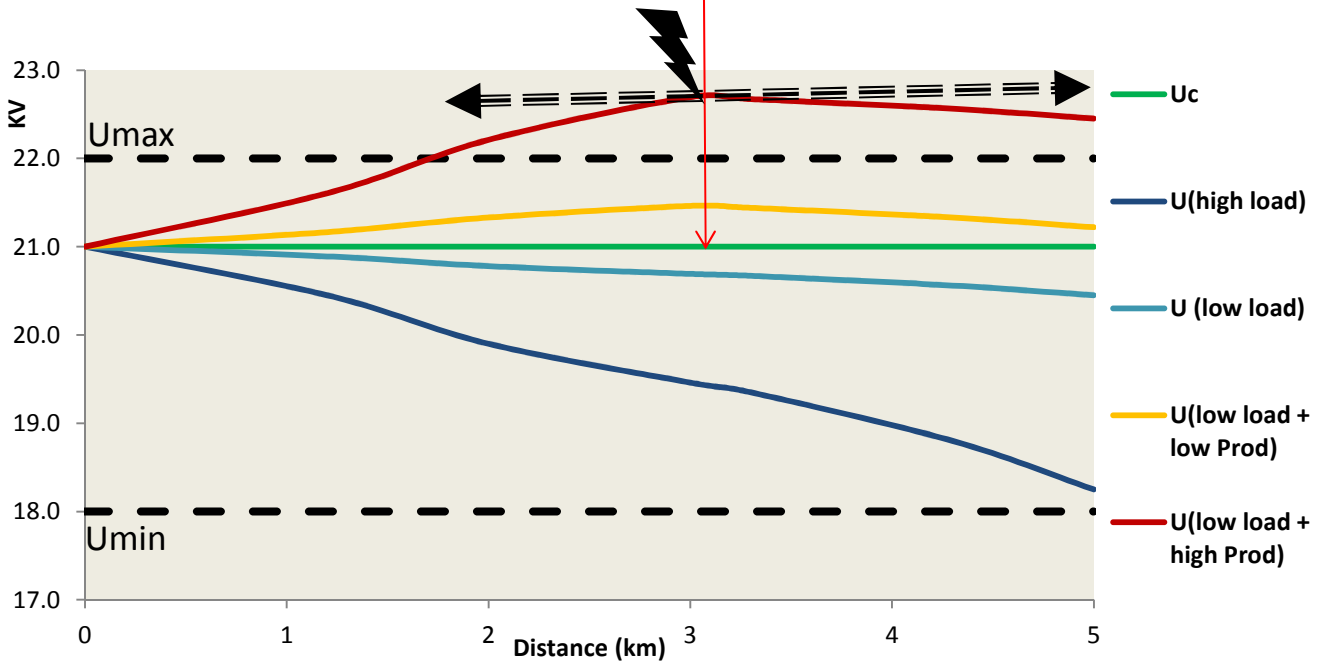


ENR : 2 - grid impact / Voltage



New EnR

Voltage limits problem



ENR / Solutions for the grid

Face to the EnR emergence,
And avoid grid reinforcement, we must develop

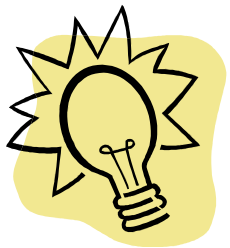
- **STORAGE capacities**
- **SMART-grid** (and first : demand response)

A new storage solution

For an historic hydroelectric producer like CNR

→ **Pumped Storage Hydropower** is the …. obvious solution !

But now …… not really accessible



New idea : **Electric Vehicules are still emerging**

EV = Battery = electricty storage

But EV = an other risk for the grid !

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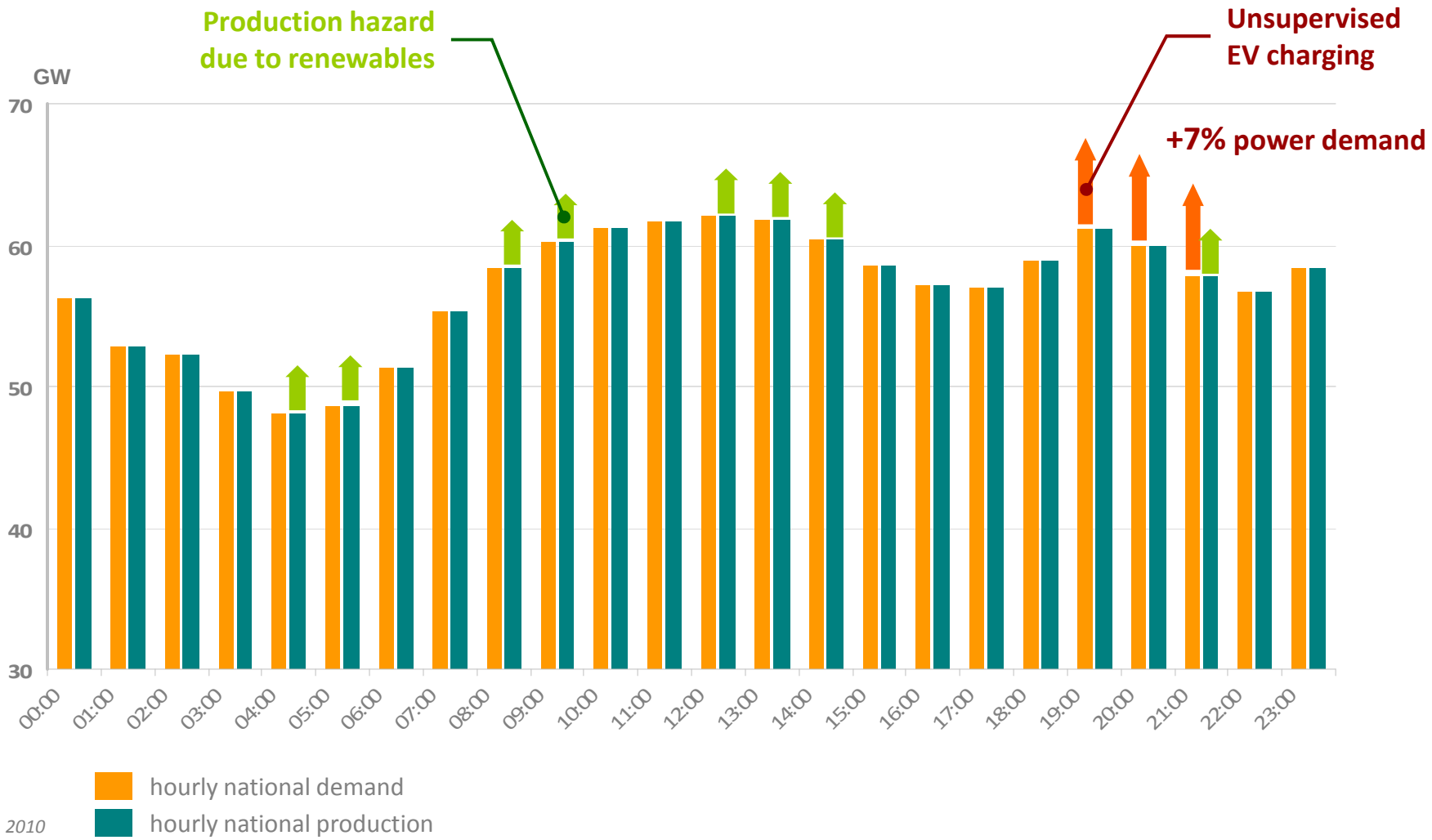
Impacts and risks of unsupervised EV-charging

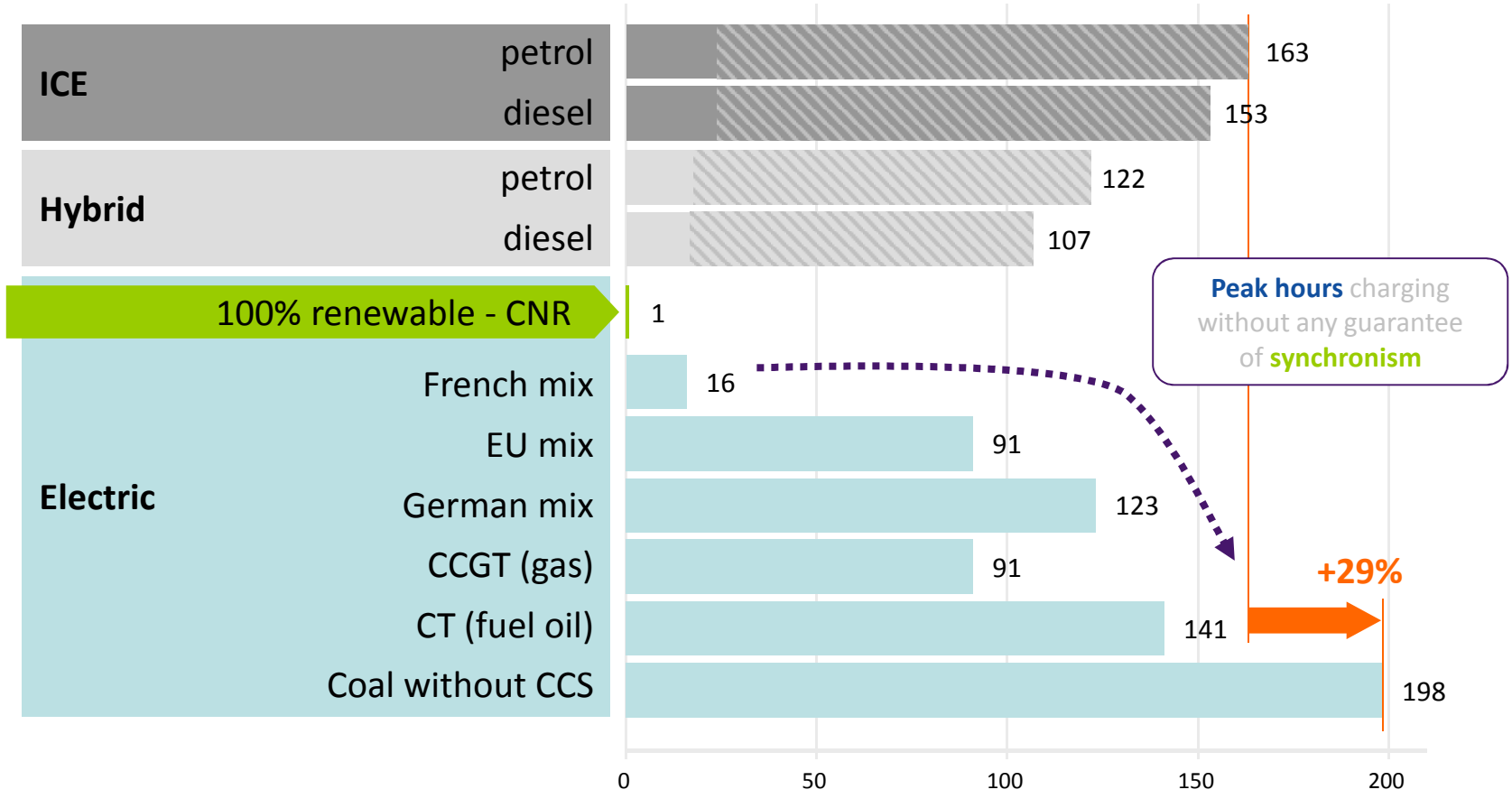


Source: RTE, 2010

Impacts and risks of unsupervised EV-charging

Well-to-wheel greenhouse gas emission, by motorisation type

unit: gCO2eq/km



Source: IFP, 2011

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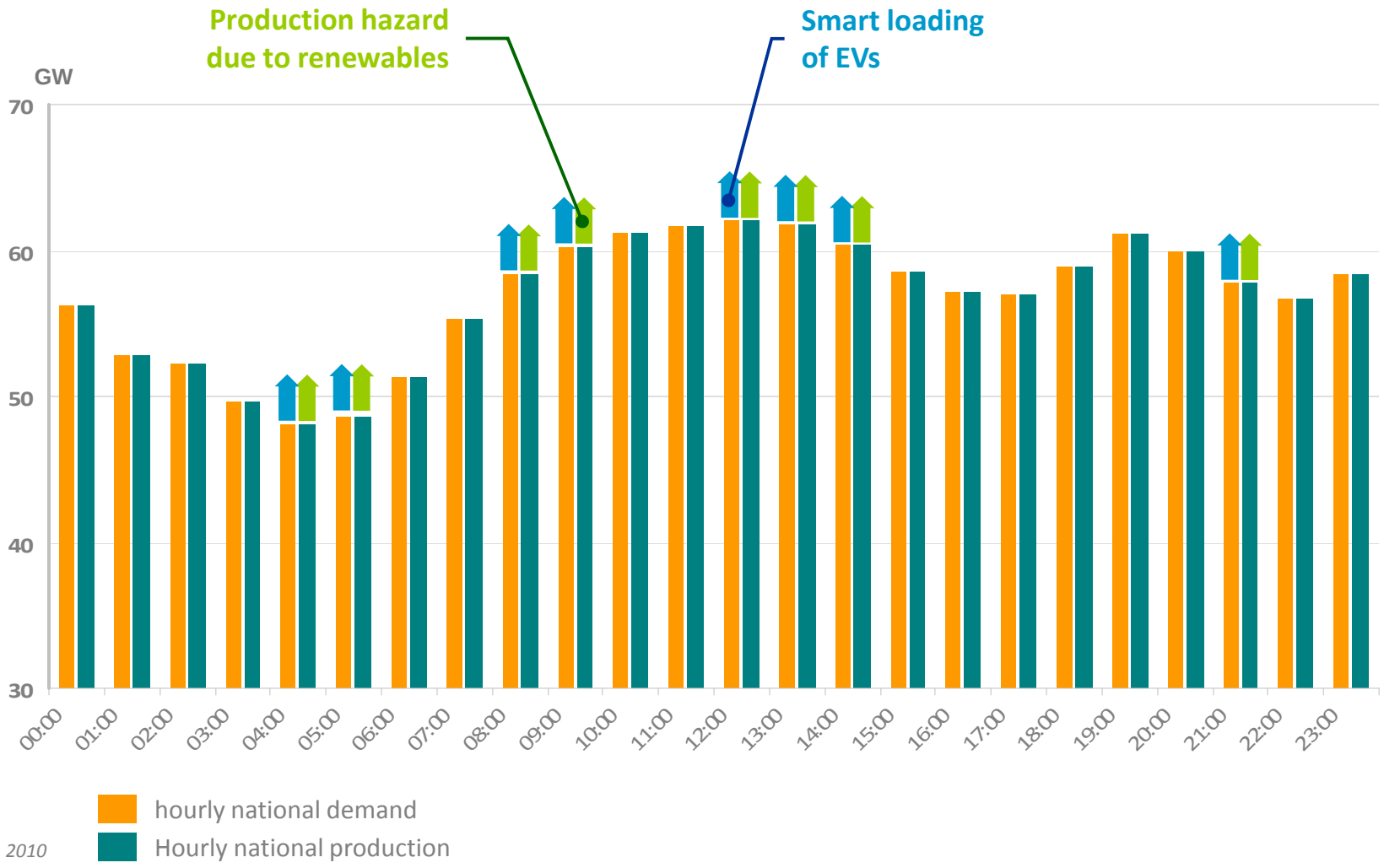
Impacts and risks of unsupervised EV-charging



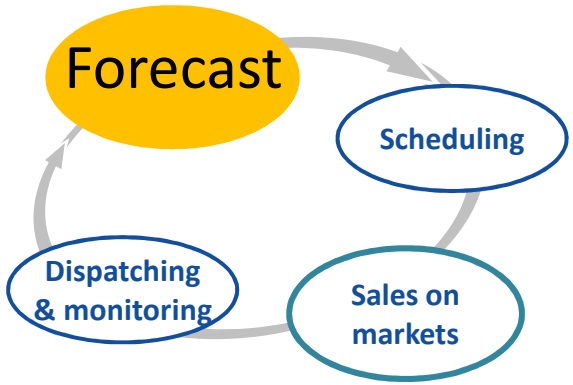
Source: RTE, 2010

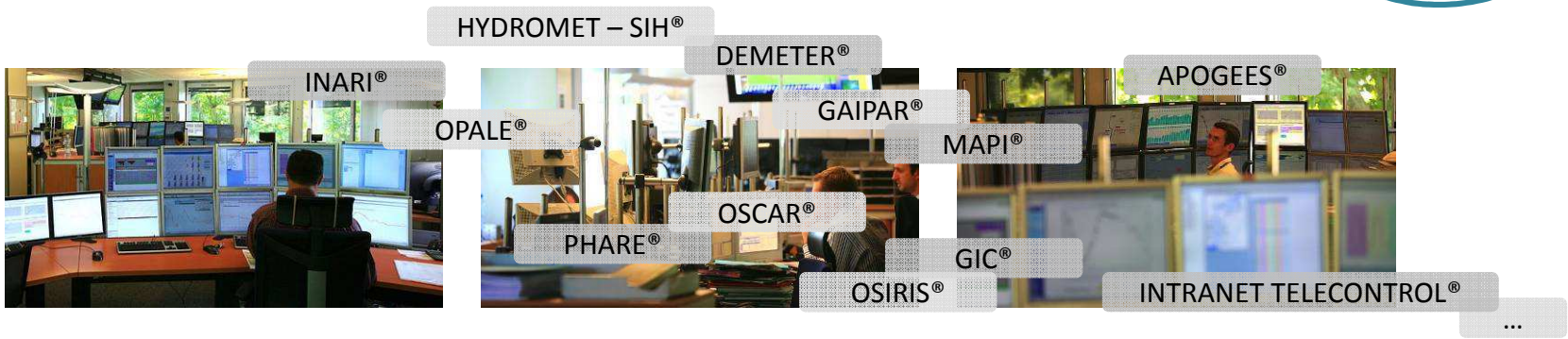
CNR an unique expertise in energy management

Core competency : management of power generation

Unique expertise and **integrated management** of **stochastic renewable energy sources**

- Multidisciplinary integrated skills & know-how : engineering, environment, exploitation, maintenance etc.
- Fully-automated management of production through custom IT-tools developed by CNR
- Strong partnership R&D programs





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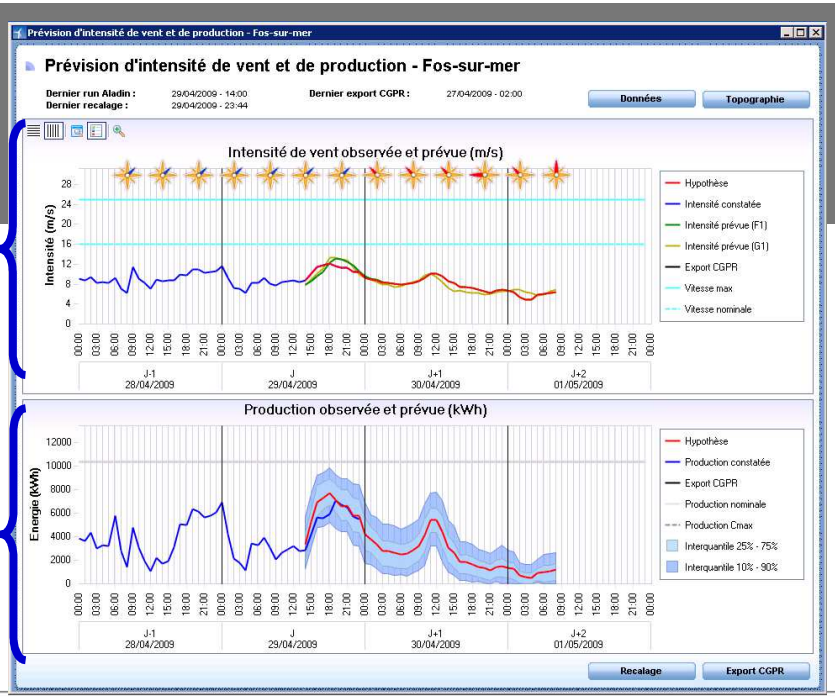
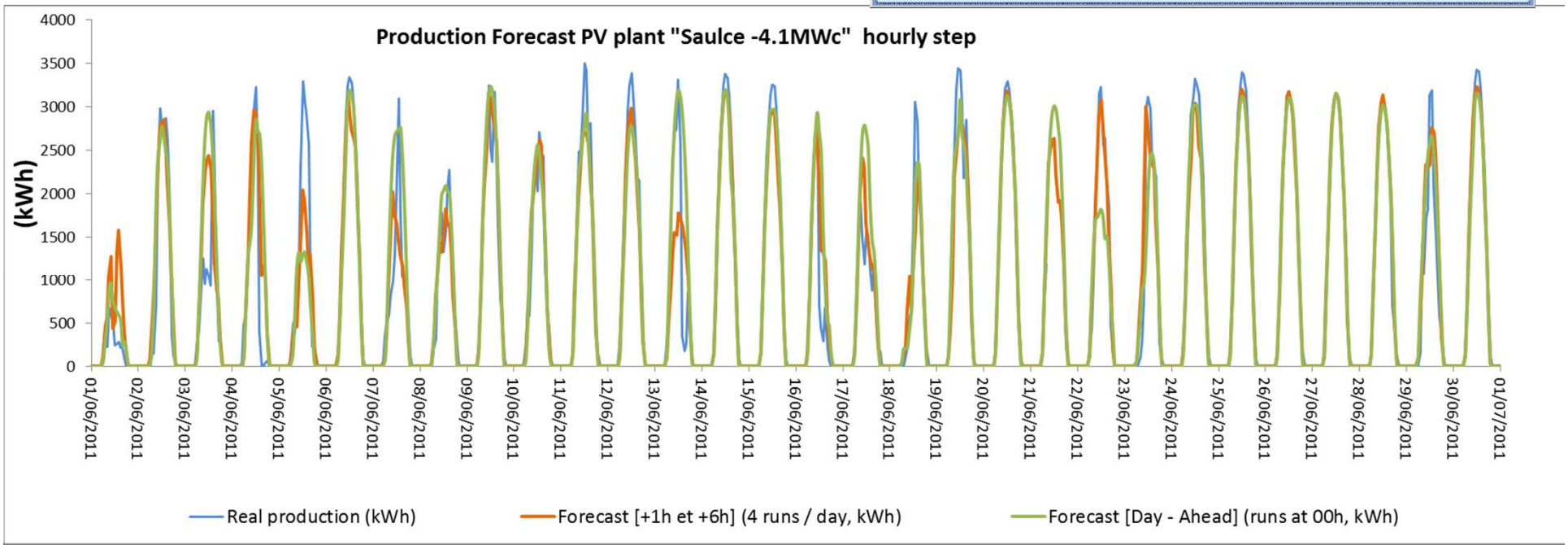
Focus

Platform APOGEES ®

Local wind speed

Wind farm production



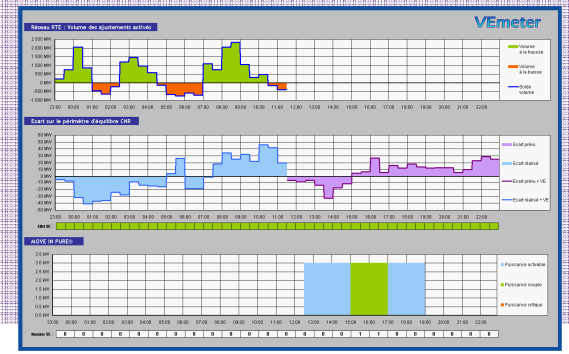


Move in Pure® concept

The smart-charging for EVs

100% renewable electricity production

Charge/Load management



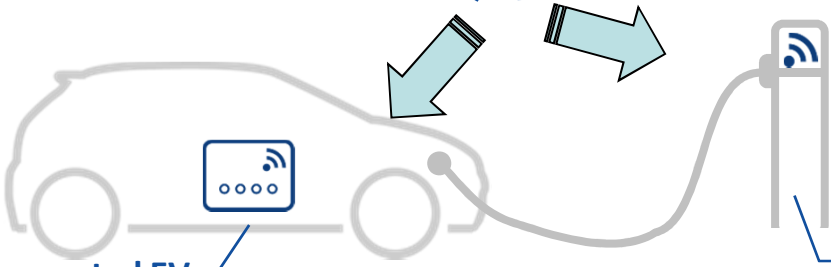
4 **Notification, Billing**

Need **1**

User interface

Consumption log & meter readings **3**

2 **Individualized charge instructions**



Connected EV
(embedded box or native equipment)

Communicating infrastructure

Move in Pure®, for a coherent and sustainable e-mobility

An certified 100% renewable electricity

EV is totaly **« zero emission »** from well to wheel

An synchronous EV recharge and volatil ENR production

Benefits to :

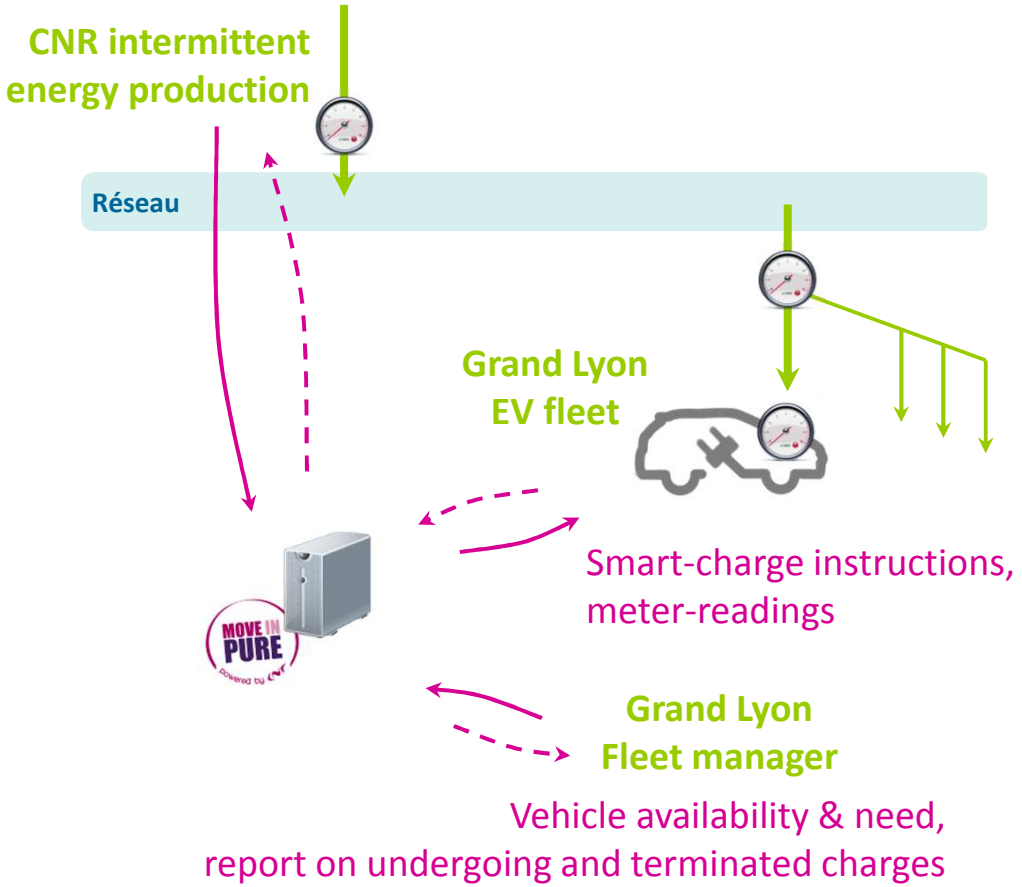
- ✓ **EnR emergence integration**
- ✓ **Electric system balancing and safety**

Opens the way to

- ✓ **Avoid /limit cost for grid reinforcement**
- ✓ **Smart-grid**
- ✓ **EV recharge bill optimisation**
- ✓ **Customer environmental responsability by totaly clean mobility**
- ✓ **Electric roaming**....not only a roaming for EV Charge service

Move in Pure®
Last achievement

GRANDLYON communauté urbaine



12 connected charge spots

8 EVs

Smart-charging daily
form time of plugging to 7am

No additionnal equipment
software based solution

Fully operational
since mid-january 2013

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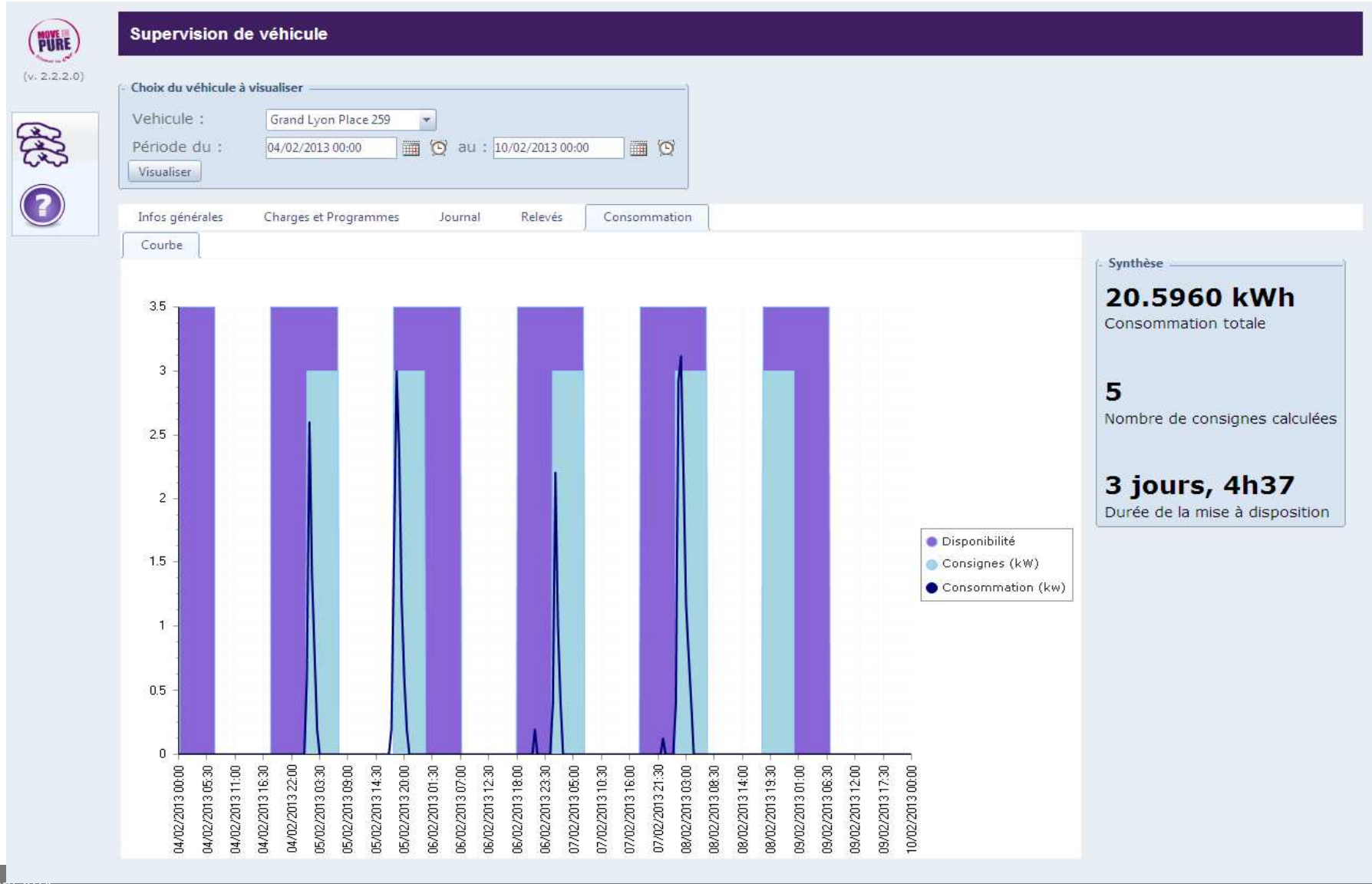
Le Grand-Lyon – first ERVE

Smart recharge during Week N° 6 at Charge point « 259 »



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Merci de votre attention