Public Infrastructure for Electric Mobility in France

BerkeleyLaw Workshop – EV and Global Urban Adoption – Policies & Perspectives from France & California

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Enedis – Who are we?
Enedis, the major DSO of the French distribution system

The majority of the DERs (Distributed Energy Ressources) are connected to the Distribution Grid managed by Enedis
As a Distribution System Operator, Enedis supports the energy transition as a whole & from different sides

Key facts related to the distribution network:

- The network belongs to the municipalities
- They delegate its maintenance, development an operation to distribution network operators
- Enedis is the main operator and is in charge of 95% of the continental network

Our public service mission:

- To connect customers
- To develop and modernise the grid
- To ensure metering for the electricity suppliers
- To carry out repairs and crisis management 24/24 & 7/7
- To assist municipalities with their projects
- To remotely operate the network from 30 regional dispatch centres

Data analysis of consumption/generation

Energy Transition

Large volumes of renewable production

EV and charging infrastructure

Flexible usages (storage, EVs, …)

E-mobility is a key part of the DSO’s role
Enedis a regulated company driven by cost optimisation &

Monitored at

national...The Energy Regulatory Commission (CRE) regulates the French electricity sector. Enedis activity is monitored by the CRE.

... and local levels

The local communities are organizing electricity distribution authorities (AODE). One of the AODE representative is member of the supervisory board of Enedis.
Commitment towards our customers

Despite a number of significant weather hazards, SAIDI was maintained at a low level for the third consecutive year in 2018. This performance reflects our investments efforts over the last few years that are continuing in 2019.

Enedis Target by 2028 – SAIDI:
- 60 minutes on France as a whole,
- 30 minutes in big cities,
- 15 minutes in Paris (current level).

SAIDI (System Average Interruption Duration Index)
(excluding one-off events and transmission grid incidents)
Network Tariff Principles

- **Uniform Tariff on the national territory**: the price is the same throughout the whole country, according to the territorial solidarity principle described in the law of February 10, 2000.

- **Tariff amount**: function of power capacity subscribed and consumed energy.

- **The "postage stamp" principle**: the price is independent from the distance flowed by the energy between the production site and the consumer site (individual solidarity).

- **Seasonal metering (time of use)**: tariff may vary according to seasons, days of the week and/or hours of the day.

- **About 30% of electricity bill, for residential segment**

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<th>Coefficient pondérateur de l'énergie (ci) en € / kWh</th>
<th>HPH</th>
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<td>CU 4</td>
<td>7,34</td>
<td>3,66</td>
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Although population is not very dense, France has a quite good index.

Benchmark by Ceer: Council of European Energy regulators

Source: https://www.ceer.eu/documents/104400/-/-/963153e6-2f42-78eb-22a4-06f1552dd34c
Enedis in a nutshell

- **€ 14,413 bn** revenue in 2018
- **36 million** customers
- Interventions **24 hours a day**
- **38,691** employees
- **410,710** generation facilities connected to the distribution grid in France
France – What do we do for Electric Mobility?
Inspired by CO2 reduction in EU, Electric Mobility Objectives in France

Objectives at national level:
- ban non-zero emissions car sales by 2040
- reach carbon neutrality by 2050
- 2021: average emissions of new cars = 95g CO2/km
- 2022: 5 x more EV sales (compared to 2017)
- 2022: 1 million EV + HEV
- 2022: 1 charging point / 10 EV = 100 000 public charging points
- 2030: 7 millions public and private charging points

EU requirement towards Car manufacturers for 95g CO2/km.
EU incentives for each manufacturer 15% clean cars by 2025 and 30 % by 2030

EU directive 2014 on new cars

(*) EU directive 2014 on new cars
The infrastructure in France as of today

26 155 public charging points (April 2019)
1 public charging point for about 6 EV

2018: 100,000+ charging points at workplaces
Electric Mobility in France, uncertain growth rate: way of life, consumer habit, local politics, policy framework, people flow...

Scenarios by 2035

- Median Enedis scenario to date: 9 M of EV by 2035
- RTE TSO Planning scenario: 15.6 million EVs by 2035
- EDEN scenario(*): 5.1 million EVs by the end of 2030
- NB: Grid impact analysis are on going on various new scenarios

As a reminder: French car fleet (Jan 2019): 32 million private vehicles, 80% of the vehicle fleet
Infrastructure : Incentives

- Tax refund of 30% of total cost of charging infrastructure in private housing

- ADVENIR for Collective housing, public area, company parking lot, green certificates up to 1860 €

- LOM - Mobility Orientation Law (ongoing consultation):
  - Connection cost: 40% network tariff up to 75%.
  - Right for a charging point in collective housing.
  - For some types of new buildings: obligation to pre-equip the parking lots to facilitate the installation of charging points.

http://advenir.mobi/beneficiaires/
Electric Mobility in Paris

- Ban the thermal cars ...
- Develop public transport such as Tramways & electric buses.
- RATP : 50 % of new buses to be clean from 2018 and 100% new Buses to be clean from 2025.
- Cycling pathways across Paris & along the river seine.
- Subsidies Electric Bikes : 400€ - 600€
- Subsidies Electric pre equipments : up to 4000 €

https://www.paris.fr/actualites/la-ville-de-paris-reagit-a-lannonce-de-la-fin-des-vehicules-diesel-et-essence-5178
Enedis – How do we support Electric Mobility?
Enedis, supports electromobility

Enedis’ ambition is to "be" and "be recognized" as an industrial partner of reference by all the players in electric mobility to co-construct the solutions necessary for its large-scale development.
DSO role in Electric mobility development

1. Enedis is **not in charge of charging point operation** neither related services: this activity is open on the market.

2. Enedis is providing charging point **connections** and **metering** activities, while reducing the cost through different solutions:
   - Advising on **Place to connect** (to lower network congestion therefore avoiding costs surplus)
   - Advising on **Contract to connect**: by providing different options (for power availability) including options for local flexibilities, or collective connection (sharing costs between operators)
   - Supporting **smart charging** implementation for national peak shaving through smart metering signals transmission (to lower the consumption electricity bill)
   - Supporting Collective **Self Consumption** through data processing (metering)
   - Acting as a **Reference for Electric Mobility Integration** on the French territories as a whole.
A major stake for EV development

90% of EV are charged at home

44% of French families live in collective housing
12.6 million

Existing car parks are not designed to supply power for EVSE
Solutions exist ... but some are more evolutive than others

Connection to the personal electric installation of the flat not recommended except for small buildings

Connection to the common services: **evolutivity of this configuration depends on power availability of the common services supply**

Connection to a specific delivery point dedicated to the EVSE supply: **evolutive**

Individual EVSE delivery point connected to an electric feeder: **evolutive**
Generic requirements have been established in collaboration with prefect Vuibert’s working group. They were published in the official websites of French ministries for Energy transition and Econcomics in November 2018.
Electric Mobility is not only about cars

Bus Fleets: ~17,000 Buses in France
The 100% clean bus objective in 2025 (Energetic Transition Law)
Numerous projects undertaken on the electrification of the fleet and depots

Tramway/metro/train:
use cases already electrified
which are increasing with new tramway lines.

232,000 LCVs (Light Commercial Vehicles) in France
Depot refilling (1st experiment in progress)
Acceleration of electrification (targets/standards for pollution limits in city centres)

60,000 taxis (including 18,000 in IDF)
Early stage discussions

Long drive
• Flixbus: Paris-Amiens line 100% Elec
• Prospective, early stage discussion

Trucks - no short-term foreseen
2030 - 30% reduction in CO2 emissions (European regulations)
1st estimates

Boats - achievements and projects
Marseille: La Méridionale, electrical connection of boats at the dockside (several tens of MW)
Toulon: by 2020, Corsica Ferries will be able to recharge at the dockside with electricity
« e-Buses project », in partnership with RATP

RATP is electrifying 2/3 of its bus depots: Enedis – RATP partnership will allow to:
• Design solutions with our partner
• Manage / co-manage projects with our partner
• Realize and deploy tasks in the perimeter covered by Enedis

Enedis is developing simulation tools to assess the impact of EV deployment on grid planning

Focus on the impact of e-bus depots
• Simulate a realistic e-bus depot load profile based on real bus schedules
• Evaluate the peak shaving potential thanks to smart charging strategies taking into account the bus operator’s constraints.

Charging curves at an overnight park with and without charge piloting

- Natural Charging strategy
- Controlled Charging strategy
Enedis – How do we anticipate the future?
Understanding the geography of possibly disrupting factors

Need for more accurate assessment of EVs future deployment for a better matching between RES generation for local Consumption optimisation

**Example of Paris Area**

**Grey scenario**
- Economic (+1.5%/year) and demographic growths
- Development of renewables, energy efficiency and electric transport
- Development of EV and PHEV

**Green scenario**
- Economic (+1.5%/year) and demographic growths
- Significant energy transition efforts
- Strong development of EV and PHEV
2019 R&D program

Enedis R&D scope of work includes studies, lab and field tests, Proofs of Concepts, standardization and support to pilot projects.

- Anticipating EV deployment and its impact on grid planning
- Mastering power quality issues at grid-charger interface
- Assessing innovative charging solutions
- Designing and testing smart charging solutions
- Understanding new business models around e-mobility and flexibility
- Supporting pilot projects and field experiments
Few examples of Enedis’ projects with innovative EV use cases

In progress
1. So MEL So Connected
   DR Nord Pas de Calais
2. SMAC
   DR Champagne-Ardenne
3. PF données R&D SUD
   DR Provence Alpes du Sud

In preparation
a. Démonstrateur aVEEnir
   DR Sillon Rhodanien et DR Provence Alpes du Sud
b. FlexMob’île
   Belle île

European projects
1. Interflex
2. Smart Boarder Initiative
3. EVIA – FLEX E

Achieved
1. Lyon Smart Community
   DR Sillon Rhodanien
2. GreenLys
   DR Sillon Rhodanien
3. Greenfeed
   DR Provence Alpes du Sud
4. IRVE sur EP
   DR Pays de la Loire
5. Infinidrive
   Enedis périmètre France
6. OPT’IRVE
   DR Sillon Rhodanien
7. Seinergy’Lab
   DR IDF Ouest
8. BienVEnu
   DR Paris, IDF Ouest, IDF Est
AVENIR Project in Smart charging, V2G & Standardisation: Gathering the whole value chain actors in Electric Mobility
Thank you for your attention