Mission for the French Government on Automotive Industry & Mobility

Xavier Mosquet - Patrick Pelata

14 FEBRUARY 2019
Purpose of our Mission

"Propose measures to reinforce the attractiveness and competitiveness of France and Europe in the future of Automotive and Mobility"
3 major transformations at the core of our Mission

Shift to electrification
Rise of autonomous driving
Development of mobility services
With the most advanced regulations on CO2 emissions, Europe is a key market for electromobility

**CO\(_2\) / km targets**
(cars, NEDC)

- **EU**
- **US**
- **China**

**NEV sales targets**
(cars)

- China: 3-4% in 2020
- California: 3-4% in 2020, 8-9% in 2025

Source: BCG, ICCT  
Note: in the EU, objective set at 147g/km for light commercial vehicles in 2021 (125g/km in 2025 and 101.5g/km in 2030)
BEVs & PHEVs sales expected to grow strongly in Europe, e.g. plan is to increase by 55%/year in France by 2022

Forecast BEV & PHEV sales in France (passenger cars & light commercial vehicles)

Shift to electrification

More than 10% penetration from 2021

Source: PFA
Note: assumed total market equals to 2.55M vehicles from 2019
## Shift to electrification

**Strong & stable incentives key to trigger market growth, France with one of the first & highest bonus in Europe**

<table>
<thead>
<tr>
<th>National financial incentives</th>
<th>No VAT¹ &amp; purchase tax</th>
<th>No purchase tax²</th>
<th>€6 000</th>
<th>€4 000³</th>
<th>€4 000</th>
<th>Max €6 500⁴</th>
<th>€6 500⁵</th>
<th>Max €6 500⁴ &amp; no purchase tax⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free road tolls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free public car parks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to dedicated lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>California</td>
</tr>
<tr>
<td>(bus lanes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Beijing &amp; Shanghai)</td>
</tr>
<tr>
<td>Registration quota exemptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEV shares in 2018 sales</td>
<td>31%</td>
<td>5.4%</td>
<td>1.4%</td>
<td>1.0%</td>
<td>0.7%</td>
<td>3.3%⁷</td>
<td>1.4%</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

| Source: BCG         | Note: 1. 25% 2. 10-30% 3. Vehicles <60k€ 4. Depending on range 5. Tax credits 6. 3% 7. 10-15% in Beijing & Shanghai 8. Passenger cars + trucks, ~10% in 30 Californian cities |
Network of charging infrastructure developing in Europe

Publicly available charging points

| # of PACP¹ (K units) | 37 | 27 | 25 | 19 | 12 |

Multiplication by 4 expected to reach 100k units in 2022

# of plug-in vehicles per charg. point

~4 ~6 ~8 ~9 ~20

Charging at home & at work, key for end users

~80% of owners charging at home

Charging at work developing

180k private charging points already installed (at home & at work)

Source: EAFO, IEA

1. Publicly Available Charging Points
Global battery market for mobility to reach €45bn by 2027

Significant opportunities along value-chain for France & Europe...

... and for foreign players

Multiple projects announced in Europe recently

Source: BCG
France highly attractive for foreign investments in mobility & batteries

Key attractiveness criteria

- Large and growing market
- Highly-skilled talents
- Network of suppliers
- Investment support

France well positioned

- Strong outlook in BEV/PHEV
- Major OEMs & Suppliers
- World-class engineers & technicians; productive manufacturing workforce
- New Labor Law to simplify social dialogue
- Competitive incentives (e.g. CIR¹)
- Central geographic location in Europe

Source: BCG
1. Research tax credit
Shift to electrification

France committed to support transformation

✓ Consistent **Financial Incentives** since 2008 & multiannual trajectory up to 2022, to be provided in the next few months

✓ Plan **to develop non-financial incentives** for EV drivers - e.g. reserved parking, lane

✓ Proactive strategy to foster **expansion of EV charging points** at home, at work and in the streets

✓ **Communication campaign** on EV benefits, including unified internet portal

✓ Major European project for **building battery cells industry** (€700m investment) and fostering recycling

✓ Support to **foreign battery projects**, with custom recruiting & training
3 major transformations at the core of our Mission

- Shift to electrification
- Rise of autonomous driving
- Development of mobility services
Two different paths towards autonomous vehicles

- Level 5
- Level 4
- Level 3
- Level 2

Highways, Valet Parking...

% of Metropolitan Areas

Everywhere
Autonomous vehicles (L4/5) could reach 1 to 3m units WW by 2025, with Europe a key market.
Many layers of hardware and software required to develop Autonomous Vehicles

Complex and evolving technology

AV software & hardware stack

- Decision-making
- Recognition of the driving scene
- Driving scene modelling & probabilistic evolution prediction
- Location & possible itineraries
- Merge
- Shape and motion recognition
- Location & possible itineraries

- HD map
- Connectivity
- Cybersecurity

European players are well placed on the sensor layer, e.g.

- Drive4U unveiled with Valeo cameras, radars, laser scanners, ultrasonic sensors, ...

- Self-driving shuttle unveiled with Bosch radars, ultrasonic sensors, localization SW, ...

US players have an edge on the planning and decision-making layers
- Waymo as a pioneer & leader
- Uber, GM Cruise, Aptiv, Argo AI, Aurora also positioned

- Daimler also a pioneer, BMW strongly investing

China: Baidu “open” platform
**An outstanding leader ... stimulating a whole industry**

<table>
<thead>
<tr>
<th>AV fleets tested</th>
<th>≈ 600</th>
<th>~100</th>
<th>N/A</th>
<th>~200</th>
<th>~75</th>
</tr>
</thead>
<tbody>
<tr>
<td># of KMs driven</td>
<td>&gt; 20 M</td>
<td>N/A</td>
<td>N/A</td>
<td>~5M</td>
<td>N/A</td>
</tr>
<tr>
<td># of KMs simulated</td>
<td>&gt; 10 B</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Experimentation conditions</td>
<td>Driverless on open roads with passengers</td>
<td>open roads with wide perimeter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td>1st approval delivered by California for driverless tests with passengers in 2018</td>
<td>Launch of a robo-taxi service in San Francisco (for its employees) in 2017</td>
<td>1st pioneer, also with trucks &amp; platooning. Commercial service planned in 2019 in San Jose</td>
<td>Progressive test resumption following on fatal accident in Arizona in March 2018</td>
<td>Launch with Lyft of a robo-taxi service in Las Vegas in January 2018</td>
</tr>
</tbody>
</table>

3 key drivers: favorable regulation, a leading IA player, a wealth of funding

Source: BCG
Europe can leverage its Automotive players, Tech startups and AI skills

**Strong automotive players**
- Major OEMs
  - DAIMLER
  - FCA
  - PSA
  - GROUPE RENAULT
  - VOLKSWAGEN GROUP
- Tier 1 suppliers
  - BOSCH
  - Continental
  - faurecia
  - Valeo
- Self-driving shuttle makers
  - EASY MILE
  - NAVYA

**Tech SMEs and startups**
- Multicore intelligent processor:
  - Kalray, ...
- Driving simulation: AV Simulation,
  - ESI, MSC Software, ...
- Cybersecurity: Wavestone,
  - Quarslab, Prove&Run, Ygoko, ...
- Positioning: Geoflex, AI4Geo,
  - Geodata diffusion, Sysnav, M3S
  - Systems, F4Maps, ...
- Sensors: Prophesee, Arcure, Global Sensing Technologies, Terra 3D, ...

**World-class research in AI**
France committed to support transformation

- Ambitious target: make France the leading European country for AVs
- Deployment of a full-scale on-demand autonomous transport services by 2021
- Fostering the creation of a common European database on driving scenarios
- Support to industry R&D in key areas such as algorithm certification
- Framework for AV testing (PACTE) and for establishing permanent transport services from 2020 (Mobility Act)
3 major transformations at the core of our Mission

- Shift to electrification
- Rise of autonomous driving
- Development of mobility services
Shared mobility to gain broader adoption over time

Shared Mobility is needed ...

- **On demand mobility grows** because there was a customer need for that

- **Congestion is high and grows**: TomTom congestion index from 31% in 2008 to 38% in 2016 for Paris. NYC average speed -18% in 4 years (Uber, Lyft and e-commerce delivery)

- **Autonomous cars** could make it worse

- **Cities will regulate AV fleets** and push towards Shared Autonomous Vehicles and Public Transport and multi-modality, MaaS, etc

... and will increase over time

Share of on-road passenger miles WW (%)

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>3%</td>
<td>4%</td>
<td>9%</td>
<td>18%</td>
</tr>
</tbody>
</table>

As one of the most advanced countries in mass transit, France expected to be a key playground for shared mobility

Source: BCG
Pure players and OEMs building positions, which will support market development and prepare AV fleets

<table>
<thead>
<tr>
<th>Car-sharing</th>
<th>Ride-hailing</th>
<th>MaaS</th>
<th>Parking services</th>
<th>Ride-sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlphaDiy</td>
<td>mytaxi</td>
<td>moovit</td>
<td>Parkmobile</td>
<td>Zity</td>
</tr>
<tr>
<td>ReachNow</td>
<td>kapten</td>
<td>moovit</td>
<td>JustPark</td>
<td>BlaBlaCar</td>
</tr>
<tr>
<td>DriveNow</td>
<td>Blacklane</td>
<td>moovit</td>
<td>gotaparil</td>
<td>payczphone</td>
</tr>
<tr>
<td>DAIMLER</td>
<td>CAR EGO</td>
<td>FREE2MOVE</td>
<td>ParkNow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TURO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSA</td>
<td>FREE2MOVE</td>
<td></td>
<td>gotaparil</td>
<td></td>
</tr>
<tr>
<td>GROUPE</td>
<td>ZITY</td>
<td></td>
<td>payczphone</td>
<td></td>
</tr>
<tr>
<td>RENAULT</td>
<td>HOBBY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volkswagen</td>
<td>We Share</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure players</td>
<td>zipcar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>drivy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SnapCar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uber</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DiDi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ola</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>lyft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>moovit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOIA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>marcel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolis are entering the game</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Collaboration with them on multi-modality, regulations, planning, simulations, MaaS will become essential

Source: BCG