E-mobility adoption pathways in France, Germany and Norway

Comparative analysis of macro-environmental factors for knowledge transfer and best practice identification

Eglantine Kunle, Christine Minke, Jens zum Hingst, Martin Faulstich

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Agenda

- Sustainable mobility
- Adoption path comparison
- Why these differences?
Sustainable mobility

Share of European GHG

- Transport
- Industry
- Agriculture
- Waste management
- Fuel combustion

Share of European transport GHG

- Road
- Aviation
- Maritime
- Others

Eurostat, 2015
Average CO₂ emissions in g/km from new passenger cars

- Germany
- France
- Norway

Eurostat
Sustainable mobility
Sustainable mobility

Vehicle lifecycle CO$_2$ emissions in g/km

- Most efficient ICE
- BEV France
- BEV Germany
- BEV Norway

- Vehicle manufacturing
- Tailpipe emissions
- Upstream fuel cycle emissions
- Lithium-ion battery manufacturing

Adapted from Hall, Dale; Lutsey, Nic (2018): Effects of battery manufacturing on electric vehicle life-cycle greenhouse gas emissions. ICCT.
Analysis framework

National adoption identification
- Transport sector emissions
- EV market share
- New EV registration

Selection of informative national pathways

Adoption path and macro-environmental factor interaction

Country A

Country B

Country C

Comprehensive macro-environmental adoption factors review
- Political
- Technological
- Business
- Socio-cultural
- Environmental
Agenda

- Sustainable mobility
- Adoption path comparison
- Why these differences?
Market share comparison

TU Clausthal
New registration comparison
Electric vehicle fleet and political goals

Number of electric vehicles

- 2017 actual fleet
- 2020 political goal

Statista.com; challenges.fr; cleantechnica.com; elbil.no; tresor.economie.gouv.fr; theicct.org
Car industry

Number of fully electric models by make

- Peugeot
- Citroen
- Bolloré
- Renault
- Volkswagen
- Porsche*
- Mercedes
- BMW
- Audi*

*upcoming
Agenda

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Electric car stock and model availability

Electric car stock in thousands of cars

- Mitsubishi I-Miev
- Bolloré Bluecar
- Toyota Prius
- Opel Ampera
- Chevrolet Volt
- VW e-Golf
- Renault Zoe
- BMW i8
- Audi A3
- Mitsubishi Outlander
- Peugeot Ion
- Citroen C-Zero
- Nissan Leaf
- Tesla S
- BMW i3
- VW e-up!
- Ford Focus
- SmartForTwo
- Mercedes Benz B
- Volkswagen Golf
- Volkswagen Passat
- BMW X5
- BMW 2-series
- Mercedes Benz C
- Volvo XC90
- Mercedes Benz GLE
- BMW i3 PHEV
- Mercedes Benz S
- Tesla Model X
- Hyundai IONIQ
- Mercedes Benz GLC
- BMW 3-series
- Audi Q7
- BMW 7-series
- Kia Optima
- Mercedes Benz E
Monetary subsidy

Average of financial incentive as % of net EV price

- Norway: 50%
- Germany: 10%
- France: 20%

McKinsey 2017
Tietge et al.: Comparison of leading electric vehicle policy and deployment in Europe. (2016) ICCT
## Exemplary calculation: Renault ZOE Life 41kWh

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<td>End price</td>
<td>28150 €</td>
<td>29426 €</td>
<td>24852 €</td>
</tr>
</tbody>
</table>
Fuel prices

Gasoline price in €/Liter

Norway: 1.5€
Germany: 1.2€
France: 1.1€

Electricity prices in €/kWh

Households:
Norway: 0.2€
Germany: 0.4€
France: 0.3€

Industry:
Norway: 0.1€
Germany: 0.3€
France: 0.2€

Fuel price in € per 100km

Norway (ICE): 5L/100km
Germany (ICE): 6L/100km
France (ICE): 7L/100km

Norway (EV): 20kWh/100km
Germany (EV): 22kWh/100km
France (EV): 24kWh/100km

100% home charging

EUROSTAT; globalpetrolprices.com
Public charging points

Directive 2014/94/EU
Deployment of alternative fuels infrastructure:
In 2020 1 point per 10 cars

McKinsey 2017; STATISTA; bdew.de; eafo.eu; avere-france.org; fleetcarma.com; ecologique-solidire.gouv.fr
A matter of time?

National action plan for the electrification of road transport

1990
Purchase tax exemption

2000
VAT exemption

2010
Bonus/malus

Electric mobility act
Energy transition law for green growth

2020
Bonus

Indirect incentives
Conclusions & outlook

- Early significant monetary incentive
- National simple and unified plan
- New mobility patterns