



Electromobility, Alternative Fuel Infrastructure, “Power of Cities”,
EAFO (*European Alternative Fuel Observatory*) project

Bert Witkamp, AVERE
CIVITAS Forum, October 8th, 2015, Ljubljana

Why do we want

SUSTAINABLE TRANSPORT ?

Clean transport is not a “CO2-only” issue anymore!

An integrated approach is needed, certainly after “Dieselgate”



Main problems to fix (Policy Drivers)

1) Energy supply at risk

Oil accounts for 94% of transport fuels, causing an enormous EU import bill of up to one billion Euros a day.

2) GHG emissions reduction necessary

According to the White Paper on Transport 2011, the sector has to reduce 60 % of its CO2 emissions by 2050 (benchmark 1990).

3) Air quality and congested infrastructure

New and clean forms of mobility need to be established.

4) Competitiveness of EU industry

Growth and jobs can be created by restoring world leadership of the EU transport industry.



Existing legislation to support Clean Fuels

Renewable Energy Directive (2009/28)

10% share of Renewable Energy Sources in motor fuels required by 2020

Fuel Quality Directive (2009/30)

Reduction of CO2 intensity of fuels by 6% by 2020

Clean Vehicles Directive (2009/33)

Public procurers of vehicles have to take into account energy consumption, CO2 and pollutant emissions

Regulation of pollutant emissions through EURO standards

Regulation of CO2 emissions:

- Cars: 130g/km by 2015; 95g/km by 2020
- Light Duty Vehicles: 175 g/km by 2017

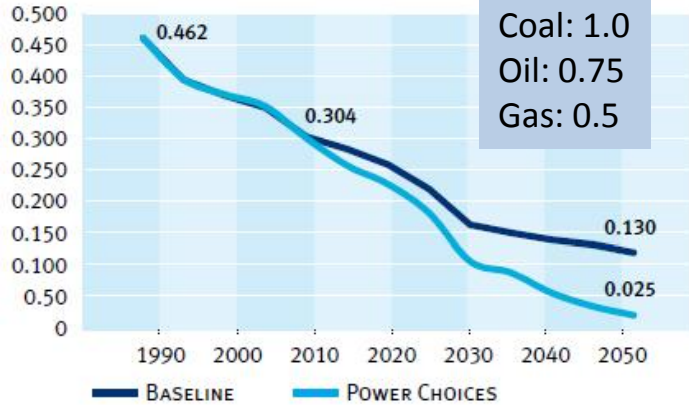
June 2015, G7: objective is to get out of fossil fuels!

All 4 EU “problems to fix” are tackled through a transition to renewable energy & electric drive *and there is no alternative*

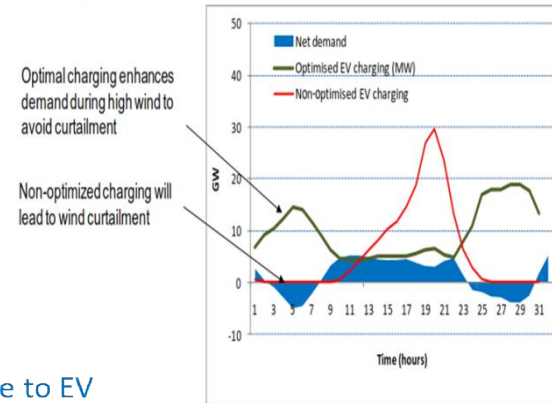
1. **Renewable energy** is local and eliminates fossil fuel imports, *oil, gas, coal*
2. **Renewable energy** reduces CO2 emissions by (virtually) 100%
3. **Electric drive:**
 - ✓ Has 0% tailpipe emission (GHG + air quality !)
 - ✓ Very suitable for clean public transport and light vehicles (congestion!)
4. Switch to **renewables + electric drive** : stimulates economy & creates jobs
 - ✓ It will happen anyway, better be leader than laggard
 - ✓ Fast transition to electric drive (in China) threatens European car exports and profits
 - ✓ Renewables create employment directly (more labour intensive!)
 - ✓ Elimination of fossil fuels creates jobs indirectly because capital remains in Europe

Large scale EV - smart charging using low / zero CO2 power will improve power asset utilisation, benefit consumers and society!

CARBON INTENSITY OF THE POWER SECTOR
(IN T CO₂/MWH NET)



- There is enough capacity in the grid to meet a fully electrified fleet at 100% if they charge outside peak hours. The issue is the peak demand.



➤ Reduction of energy bill

- Cost saved on energy due to EV consumption
- No need to increase subscription and connection power

➤ Better TCO based on “off peak” cheaper tariffs

AVERE

Good news or bad?

EV DEPLOYMENT 2010 - 2015

Electric vehicles: where we stand in 2015

The outlook has never been so positive

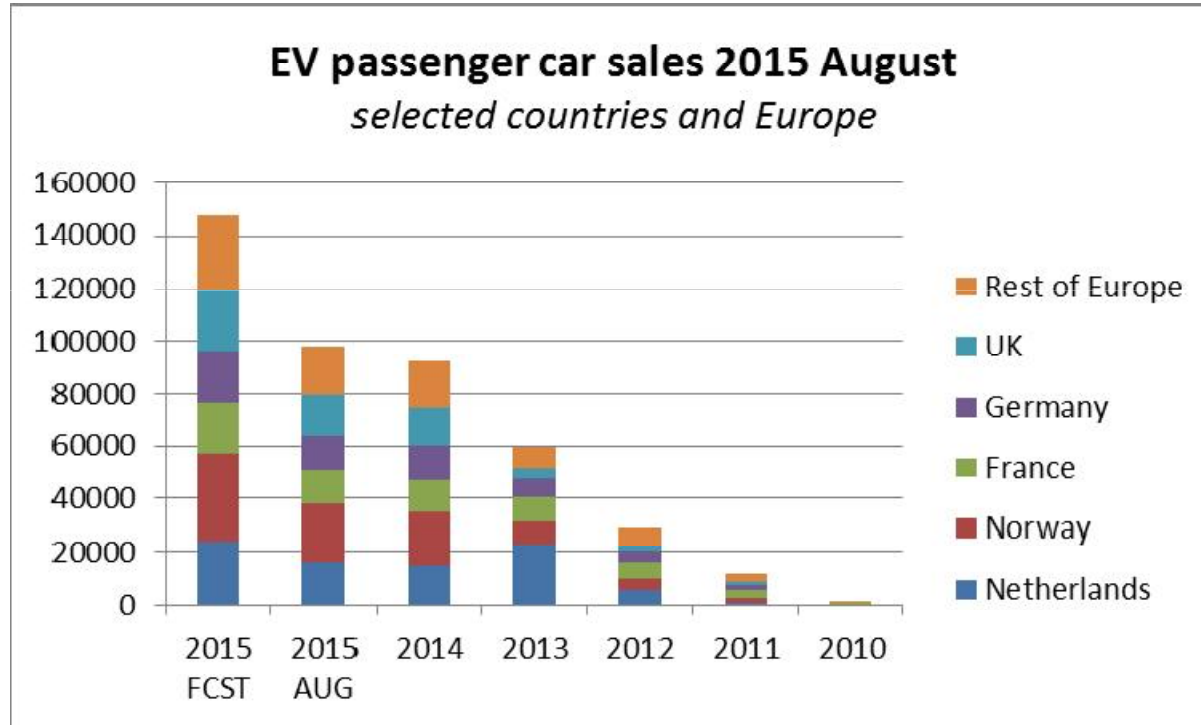
- ✓ **> 1 million plug-in EV's (passenger cars!) on the road in September 2015, growth +/- 50%/year**
- ✓ **Several 250+ km e-range mid sized models announced for 2016-2017**
- ✓ **Several luxury 400-600 km e-range vehicles announced for 2016-2019**
- ✓ **In Norway EV's have become mass market in 2015**
- ✓ **Battery prices falling more rapidly than predicted and will continue to do so**
- ✓ **Electric buses, small delivery vans, Light Electric Vehicles are entering the market**
- ✓ **Model offering expanding very rapidly, almost all major OEM having 1 or more EV's (BEV, PHEV, REEV, FCEV) in portfolio, outsiders are entering market (BEV!)**
- ✓ **Synergy between renewable energy – energy storage – electric vehicles becomes more evident**

BUT:

- **Maximum range of full electric vehicles is still too limited for all uses**
- **Charging infrastructure still needs to be further developed**
- **Electric vehicles are rapidly decreasing in price but still more expensive than ICE alternatives**
- **Deployment of EV's remains limited to a few countries and limited vehicle types**
- **Electric vehicle awareness at consumer level is still very limited and mostly based on old data**

EV's on the road in Europe (M1 cars, models > 2007)

Norway and Netherlands above 50,000 EV's



2010 – 2014:

**In 5 years: 200 x more
EV's on the road !**

2014: 92,500

2015: Jan-August: 98,000

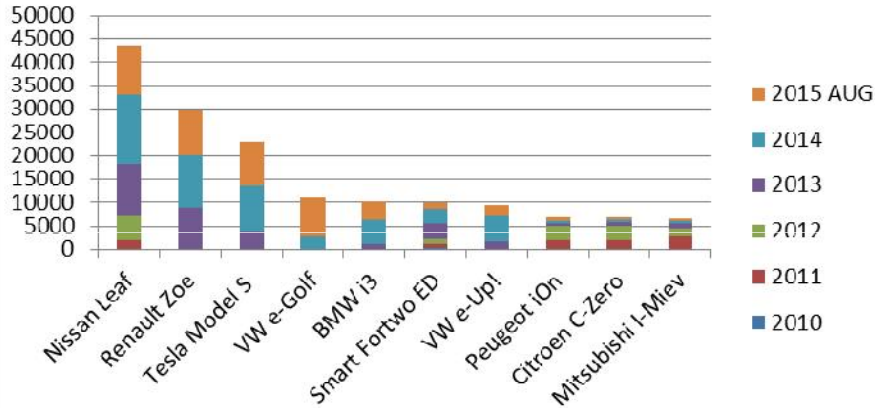
2015 FCST: 147,000

(+ 60% versus 2014)

EV's 2010-2014: market of few models & segments

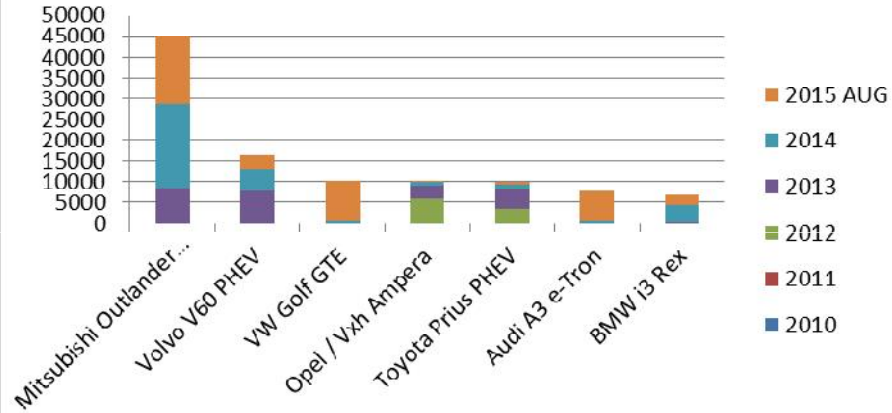
BEV cars with cumulative sales > 5000

representing > 90% of all EV's sold in Europe 2010 - 2015



PHEV & REEV cars sold > 5000

representing > 90% of all PHEV/REEV sold 2010-2015



>90% of all EV's sold in Europe 2010-2015:

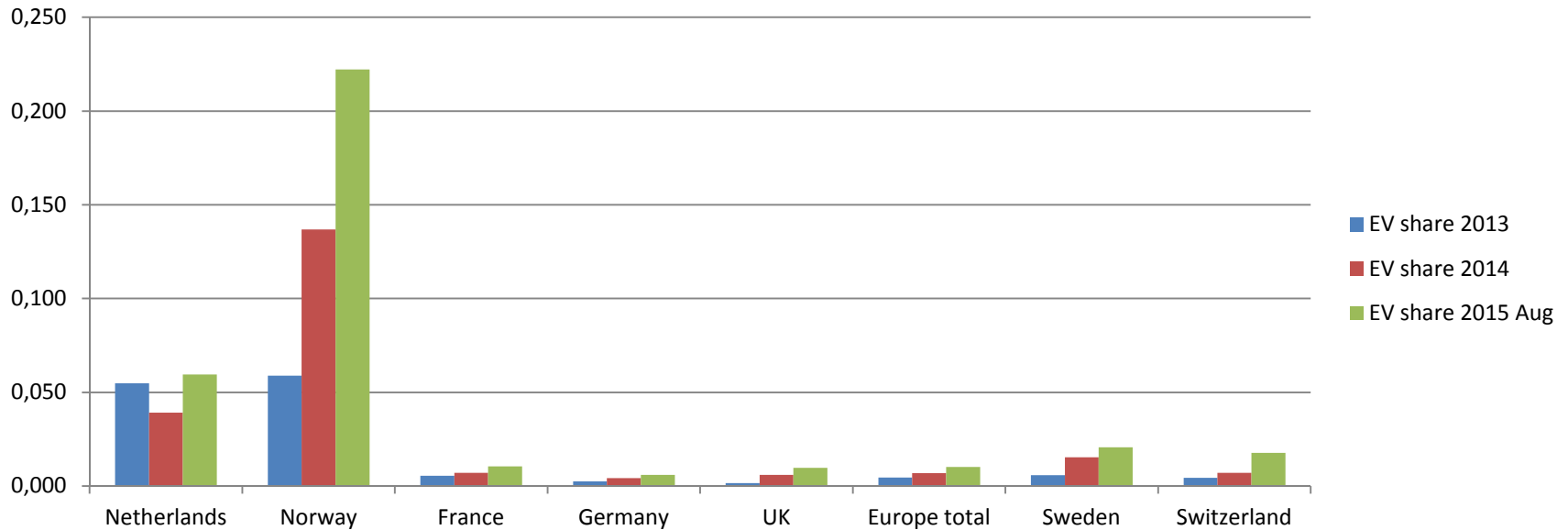
10 BEV models and 7 PHEV/REEV models

In Europe there are a few hundred car models on sale

EV passenger cars 2015: Norway = mass market & share in Europe > 1%

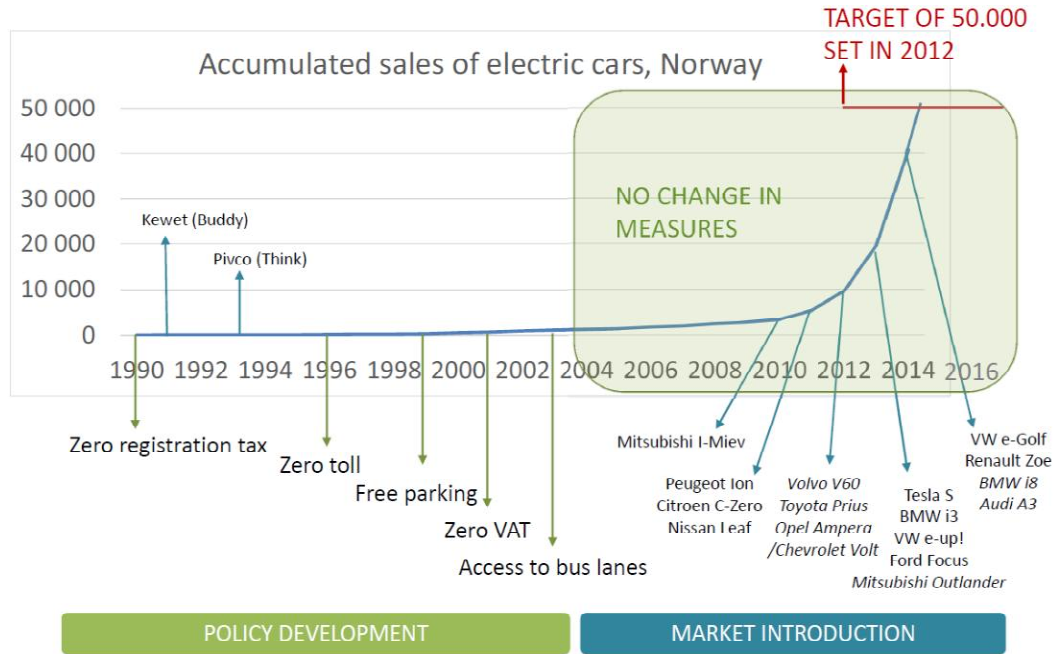
EV passenger car market share 2013-2015 August

Europe > 1% in 2015 cum August

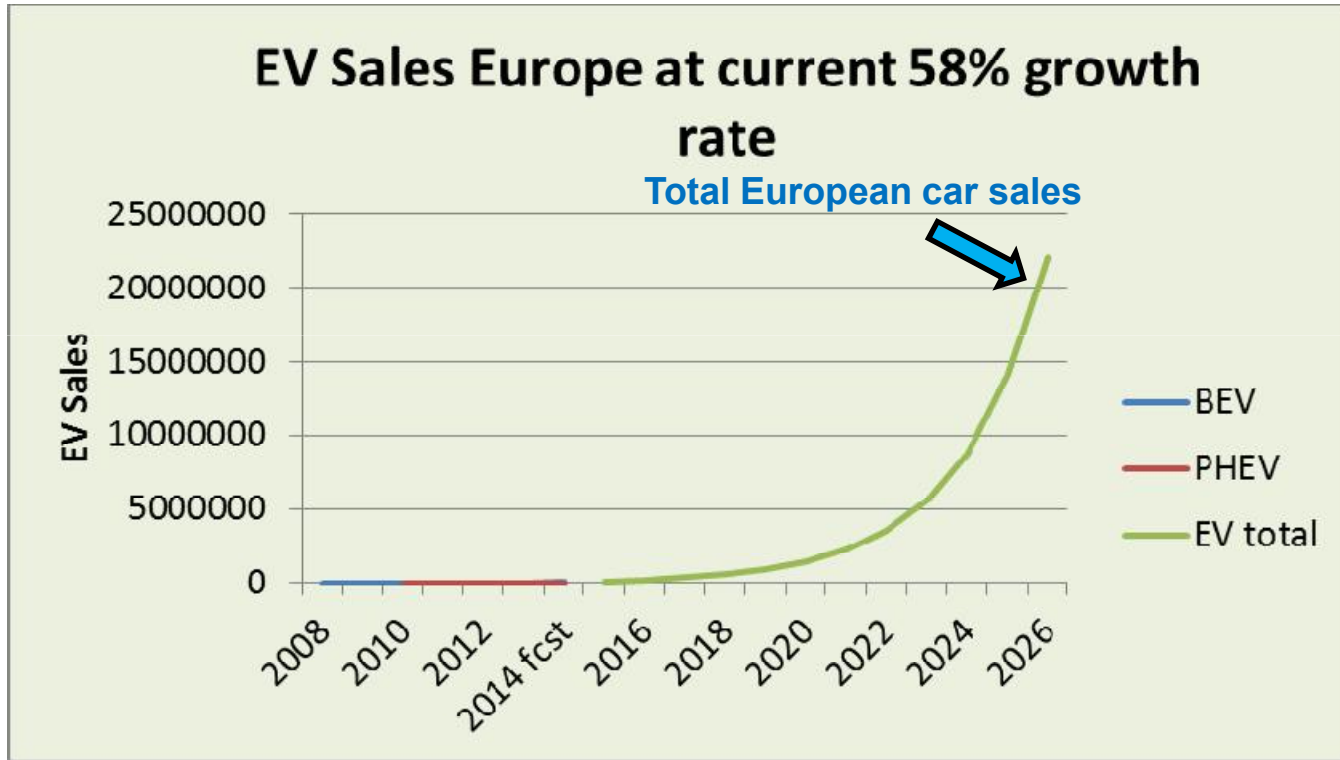


How Norway has reached EV mass market: *widely supported EV policies & clear vision for the future*

Development of policy and sales



In 2025 all cars sold in Europe are EV's?



New Electric Vehicles being announced (or rumoured)

300, 400, 500+ km e-range! & PHEV becoming basic offering

Chevrolet Bolt: 55 Pre-Production Cars Made And Exceeding 200 Mile Range Target

- **300+ km range (EPA): 2016 – 2018,**
\$ 30 – 40k
 - Tesla Model III, 2017
 - GM Chevrolet Bolt. 2016
 - Ford
 - Audi
 - Nissan (Leaf) upgrade
 - BMW (i3) upgrade
 - VW e-Golf upgrade
 -
- **FEV luxury cars (“Tesla fighters”)**
 - Audi R8 e-tron, 2016, 450 km, 92 kWh;
 - Audi Q6 e-SUV
 - BMW i5, 2019
 - Jaguar (SUV)
 - Landrover
 - Porsche 717
 - Volkswagen (500 km range by 2020)
 - Toyota Mira FCHEV
 - Tesla Model X, 2015
 -



Honda hedges its alternative-fuel bets at 2015 Detroit auto show

In addition to a new hydrogen fuel-cell model coming next year, Honda outlines its plans for new battery and hybrid cars by 2018.

Nissan developing 200-mile electric vehicle

By Matt Berg, Detroit Free Press 11/13/15 2:07 pm EST

Battery-breakthrough: Nissan poised to take range off the table

November 13, 2015 By Matt Berg



Mercedes boss: The car is becoming a smartphone on wheels

The Coming Era of Long-Range Electric Cars

Volkswagen expects 500km battery range by 2020

But Volkswagen says we won't have to wait long until all-electric cars are a reality, and that a range of between 500 and 600km is possible by as early as 2020. Speaking at the French round of the WRC in Strasbourg this week, VAG head of powertrain development, Dr Heinz-Jakob Neusser, told media outlets including motoring.com.au that the plug-in hybrid (PHEV) technology currently employed is merely a stop-gap on the way to all-electric mobility.

Chevy Bolt debut: GM will unveil a concept version of its Chevy Bolt at the NAIAS today. Wall Street Journal reports. The EV is said to come with a 200-mile range and at a price of around 30,000 dollars. The Tesla Model 3 rival is set to launch by 2017.

Tesla announces Model III: Musk's next electric car will cost £30,000, be 20% smaller and have a range of 200 miles



310- To 373-Mile Electric Cars By 2020, Says VW Exec

LG Chem Aims for Affordable, Long-Range Battery by 2017

GM is Working on an Affordable, 200-Mile All-Electric Chevrolet

Audi Bringing 300-Mile EV To Detroit Auto Show

GM is talking about a 200-mile EV based on the Sonic

Ford May Build a Tesla-Rivaling Long-Range Electric Car

Dr Heinz-Jakob Neusser, Volkswagen's head of powertrain development, thinks that electric cars with over 300 miles of range aren't too far off. The foundation of his argument is that the energy density of electric car batteries has been improving rapidly and will continue to do so.

"I expect the next generation in 2015-17 will increase to around 300 km (186 miles) and the following step will be around 500-600 km (310-372 miles)," Dr Neusser said when discussing the VW e-Golf.



BMW's hydrogen fuel cell vehicles will begin testing in the near future - but advances in battery technology may mean that they never reach production, according to the firm's sales and marketing boss, Ian Robertson.

In addition, Robertson indicated that he could now envisage a time in the future when investment in internal combustion engine technology switched to battery and electric motor advances. "At some point in the future the technologies will switch over," he said. "When the crossover comes and the focus becomes electricity, the rate of learning will accelerate even faster," he said. "Relatively, that

Future Nissan LEAF Envisioned With 338 Miles Of Range

"We are the leaders and we frankly intend to continue to be the leaders," Croston said.

He added: "Generations of EVs coming are going to get better, less costly, lighter, more autonomous."



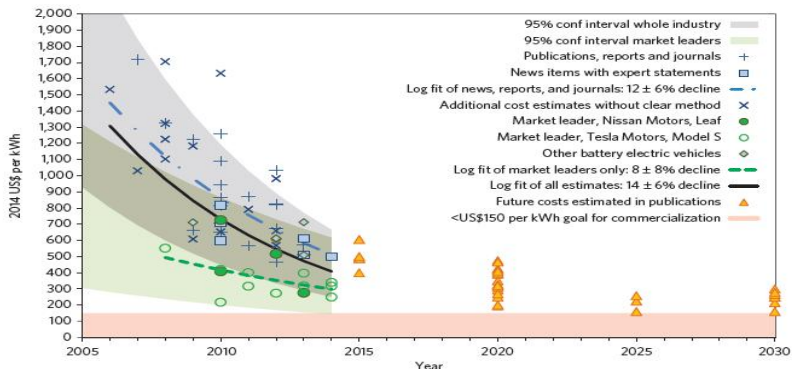
The drivers for transition: where do we stand?

- ✓ Full transition to renewable energy will happen
- ✓ Electric drive is the most energy efficient and silent form of transport
- ✓ Electric drive is 0 tailpipe emission and lowest overall (LCA) impact
- ✓ People like electric drive and do not go back (to ICE)
- ✓ Models with ranges from 200-600 km: 2016 - 2019

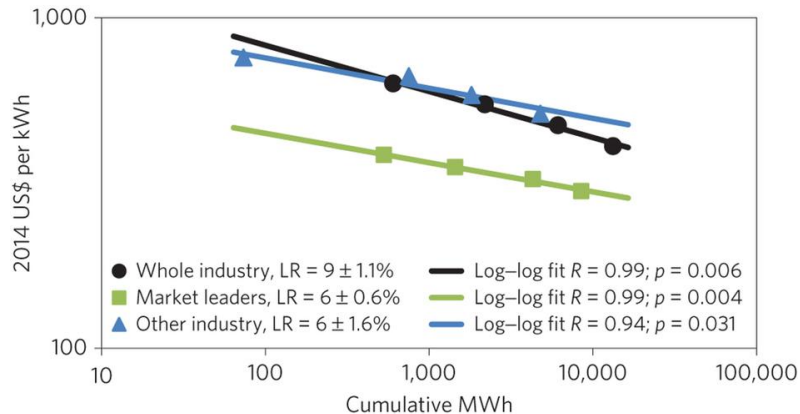
But when and how are

EV'S BECOMING ECONOMICALLY ?

Battery cost decreases faster than predicted



Ref: Bjorn Nykvist and Mans Nilsson, 2

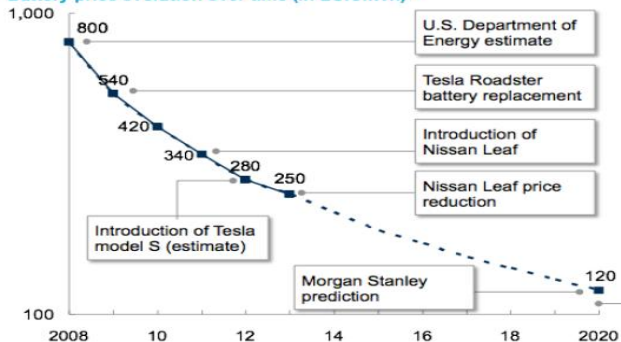


+ EV's will need less kWh/km!

Electric Cars To Cost Same As, Or Less Than ICE Within A Decade

Deutsche Bank, Dec 2014

Battery price evolution over time (in EUR/kWh)¹

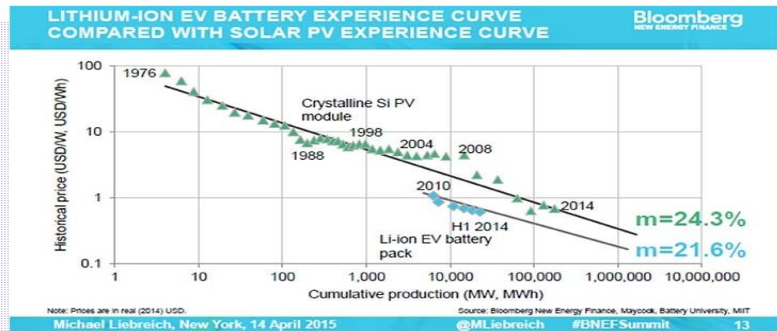


Drivers for price drops

- Improved battery technology
- Decreasing material costs
- Improved production process
- Economies of scale of upcoming mass production

"We would be disappointed if it would take us 10 years to reach to 75 EUR/kWh"
 Elon Musk
 Chief architect of Tesla

Electric Car Battery Costs Are Falling as Fast as Solar Panel Costs



Sources: BNEF, Maycock, Battery University, MIT

Chevrolet Bolt battery cells to cost "industry-leading" \$145 per kWh



GM goes on to state that they expect a lowering of the costs of EV battery cells to \$100 per kilowatt-hour by 2022 which will allow EVs to compete with vehicles fuelled by petroleum.

Analyst: Tesla will reduce battery cost 50% by 2020

Posted October 2, 2015 by [Charles Morris](#) & filed under [Newswire](#), [The Tech](#).

"Lowering battery cost via changes to cell chemistry and Gigafactory scale benefits are critical determinants of Tesla's ability to sell an affordable Model 3 starting at \$35K," Dolev wrote. "Our detailed battery component cost analysis details a path to 50%+ reduction in battery pack cost to \$125/kWh by 2020."

Fastned prepares for 300 kW charging

Posted September 28, 2015 by [Charles Morris](#) & filed under [Newswire](#), [The Infrastructure](#).

Audi says its [E-tron Quattro](#), planned for 2018, will be able to charge at 150 kW, and Porsche says its [Mission-E concept](#) can handle 300 kW (Tesla's Superchargers, the fastest publicly available today, deliver up to 135 kW at some locations).

POWER OF CITIES

Paris's first attempt at car-free day brings big drop in air and noise pollution

Vehicle ban, applied to just 30% of French capital, showed encouraging results - but new report says nation has far to go



On the périphérique, the annual average NO₂ has reached 150 µg/m³ .
Well above the EU limit of 40µg/m³ .

[Airparif](#), which measures city pollution levels, said levels of nitrogen dioxide dropped by up to 40% in parts of the city on Sunday 27 September.

Bruitparif, which measures noise, said sound levels dropped by half in the city centre.

ULTRA LOW EMISSION ZONES

CHANGING THE NARRATIVE ON 'RANGE' FROM 'HOW FAR...'
TO 'WHERE CAN YOU GO?'



VISION FOR THE WORLD'S FIRST BIG CITY
ULEZ BY 2020

LIKELY TO BE LINKED TO NEW EURO 6
EMISSIONS STANDARDS

PUBLIC CONSULTATION TO DEFINE
DETAILED PLANS

MORE CITIES IMPLEMENT LEZs AND
STRICTER EMISSIONS CONTROLS ARE ADOPTED IN EXISTING ZONES

Mayor Garcetti (Los Angeles)



AP Photo

IN THE ARENA

How Cities Can Save the Planet

U.S. and Chinese cities are leading the way to a global climate deal.

By ERIC GARCETTI | September 29, 2015

- “While some may be daunted by the scale of these challenges, I think they actually furnish a unique opportunity to effect meaningful change.”
- **“As mayors, it is our mandate to create more livable cities, but it is our calling to build a more livable world.”**
- **“municipalities and localities pull the levers of transportation, energy, land use and development — all of which can be used as tools to promote sustainability”**
- “we can chart a clear course toward greener public transit, less reliance on coal and greater energy conservation. Then, we can actually deliver on it.”
- “the cities in our two countries are ground zero in the fight against climate change”

Los Angeles christens Tesla police car, will lease 288 plug-in vehicles

Posted September 16, 2015 by [Charles Morris](#) & filed under [Newswire](#), [The Vehicles](#).



"When we laid out our [Sustainable City pLAn](#), we promised that 50% of new city fleet vehicles purchased each year would be EV by 2017," Garcetti said. "Now we're fulfilling that promise ahead of schedule."

The new plug-ins will be used by the city's police, fire, water and power and general services departments, and are expected to save around 41% on operating costs.

"You can see right here behind me, the future," Garcetti said, pointing at the Tesla and BMW. "Our goal is to one day go from gas-powered to battery electric in our squad cars. And if we do that, the impact could be national in scale. LA could lead the way to help transform not just our department, but other departments and cities around the country."

EV's in Port of Rotterdam



Ref: ECT, APM Terminals, APTS VDL & Terberge

Zero Emission Bus (ZEB)



car2go



car2go provides "ON DEMAND" transportation that is unlike other conventional car-sharing business models



car2go, Mercedes-Mobility, etc.



Feature	car2go	Mercedes-Mobility
1. No reservation	✓	✓
2. No lock-in	✓	✓
3. 100% electric fleet	✓	✓
4. No parking restrictions	✓	✓
5. No insurance	✓	✓
6. No maintenance	✓	✓
7. No cleaning	✓	✓
8. No damage	✓	✓
9. No parking fees	✓	✓
10. No traffic fines	✓	✓

Electric vehicles are already today at many places cost effective

Total Cost of Operation (functional)

Spijkstaal e-Ecotruck

already lower TCO in 2014



Component	Electric	Internal Combustion
Investment cost	€ 100,000	€ 150,000
Operating cost	€ 10,000	€ 20,000
Maintenance	€ 5,000	€ 15,000
Energy	€ 10,000	€ 30,000
Insurance	€ 5,000	€ 10,000
Tax	€ 5,000	€ 10,000
Residual value	€ 50,000	€ 30,000
Total TCO	€ 135,000	€ 265,000

42377.421 Verscillen

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Zero Emission City Distribution (ZES)



Zero Emission Taxes



Air pollution debate in UK

“Just because air pollution is invisible, it’s almost as if successive governments have felt they can just afford to ignore it. They haven’t taken it seriously enough, but this is an absolute public health crisis. It’s nothing less than that. We need this government now to treat it as such.”

About 29,000 deaths in the UK are hastened by inhalation of minute particles of oily, unburnt soot emitted by all petrol engines and an estimated 23,500 by the invisible but toxic gas nitrogen dioxide (NO₂) discharged by diesel engines.

Tory lobbying against air pollution laws smells of political corruption
George Monbiot



The UK government’s bid to weaken EU laws to limit toxic pollution wouldn’t appear in any manifesto. It reveals a party working in the interests of corporate coal rather than the public

The power of cities !

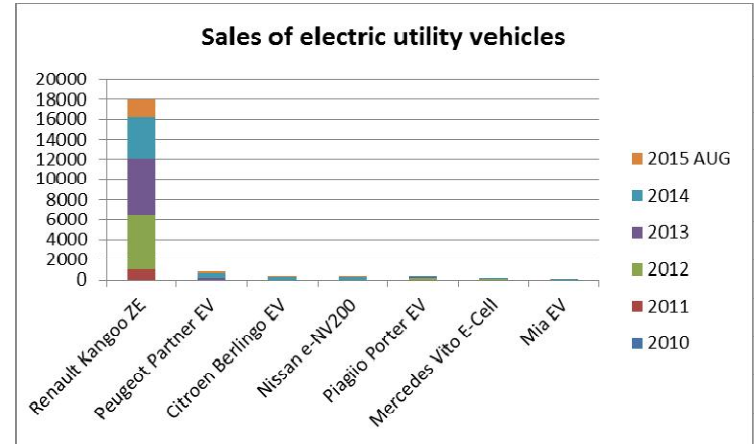
- **Clean air and noise = REAL problem, not a luxury!**
- **Need (more) public transport , less pollution & less noise:**
 - Electric buses + charging infrastructure
 - Total cost of ownership ?! (but finance needed)
 - Link to renewal of contracts
 - Electric small delivery trucks & vans
 - Night deliveries?
 - Electric taxis + charging infrastructure
 - Link to licenses ?!
 - Zero / low emission zones
 - Electric vehicles = 100% lower emission + low noise
- **Less congestion:**
 - Light Electric Vehicles: scooters, motors, quadricycles,...
 - Night deliveries

Where are the electric vehicles for cities??

- Passenger cars: limited models
- Buses: all alternative fuels, electric/hydrogen 1st or 2nd generation only, very small numbers
- Utility vehicles: very limited # models, small
- Light, heavy trucks: made to order, converted
- Other specialised vehicles: made to order, converted

Virtually no vehicles available:

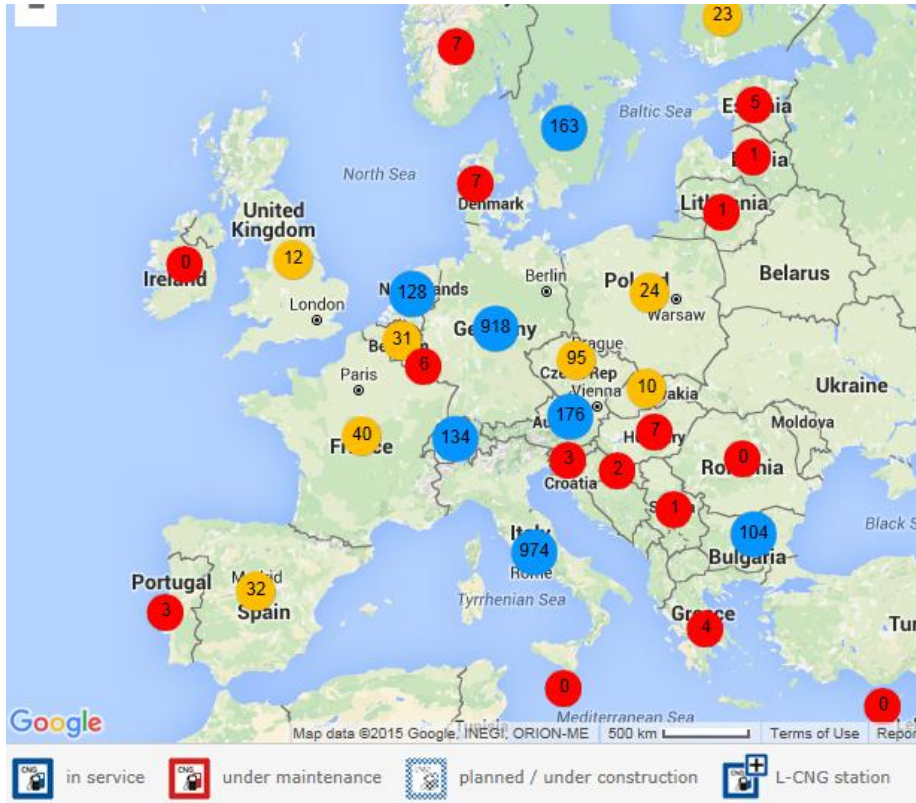
- No interest from OEM's
- Market demand small, not transparent
- Coordinated approach, purchasing??



Infrastructure Alternative Fuels

+ EV BEST PRACTICES FROM STAKEHOLDERS

Natural Gas Infrastructure: filling stations

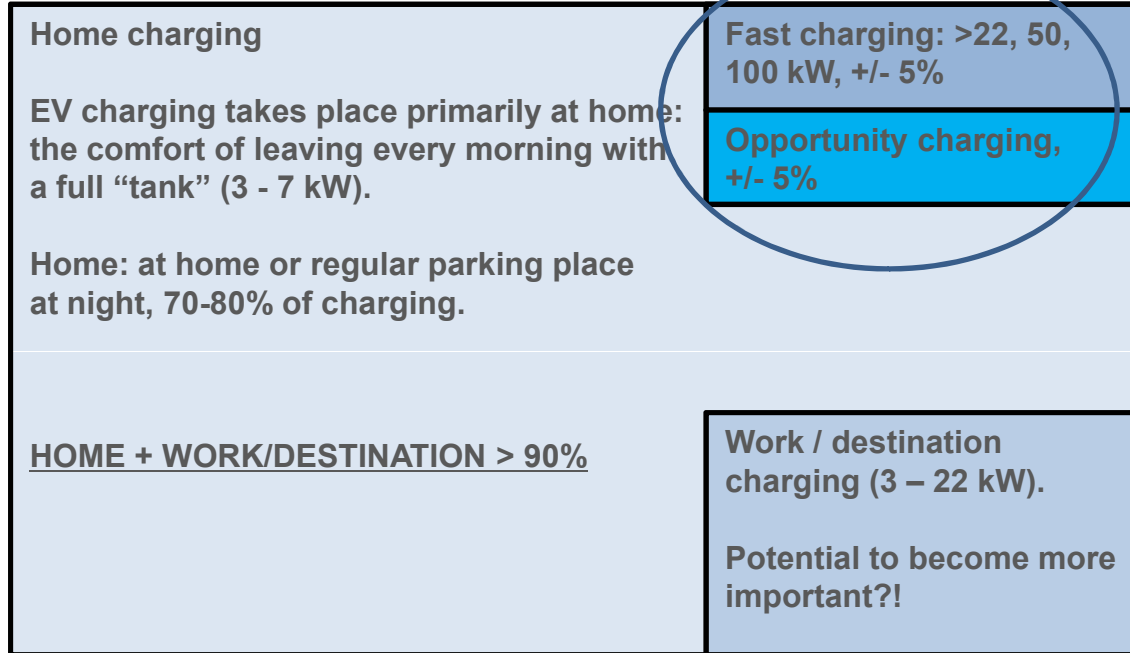


	CNG stations				% of total CNG stations in the area
	Total	Public	Private	Planned	
EU	3280	2619	661	210	
EFTA	165	156	9	5	

Also: 42 L-CNG stations + 36 LNG stations in EU + EFTA

EV charging is uncomparable with gas/liquid “filling up”

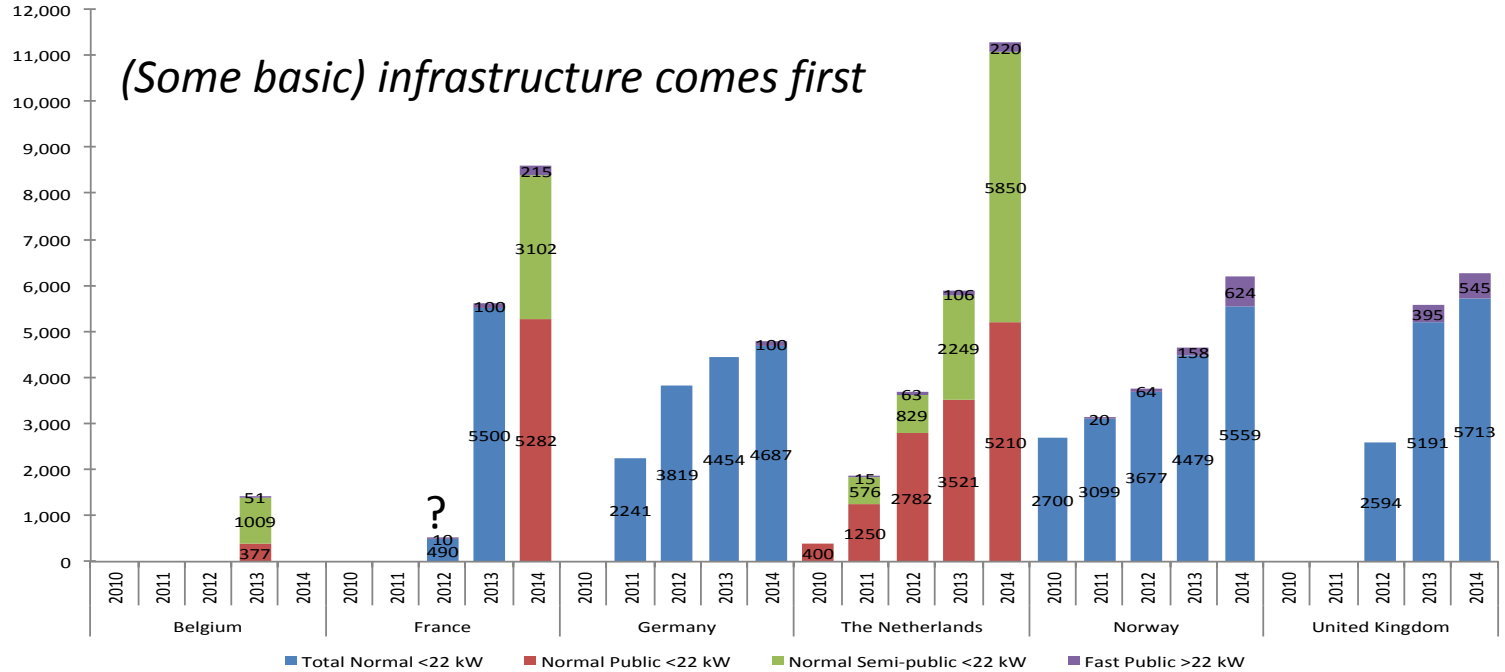
imagine full gas tank every morning



Only 10% of charging is “comparable” to tanking liquid / gas fuels:

Battery Electric Vehicles can provide unmatched convenience!

Charging points (outlets): Evolution Last 5 Years in UK, NL, FR, DE, BE, NO



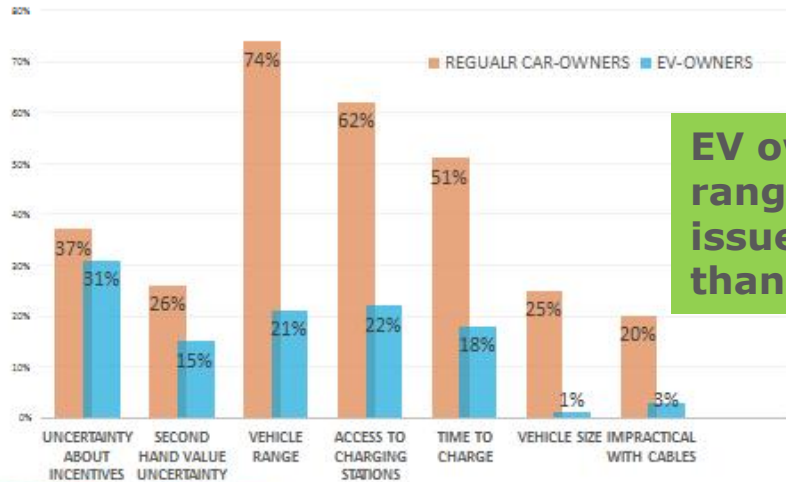
- Remarks :

- NL leads in EC
- France high share of public (63%)
- Difficult to get data in some countries, lack of availability and consistency (e.g. Belgium)

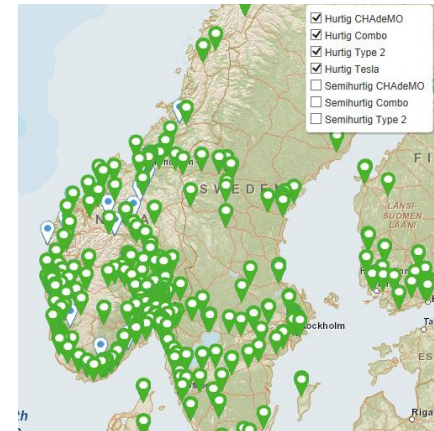
Norway: semi and fast charging: 275 stations with 550 fast chargers > 43 kW

- ▶ Key issue for Norway:
 - ▶ More chargers, around the country – both fast, semi and normal + all standards.
 - ▶ Support charging in apartment buildings.
 - ▶ Must be easy to understand and to use.
 - ▶ Robustness – several fast chargers at the same place (so that they can be trusted).
 - ▶ Consumer friendly payment solutions (common system) + international access.
 - ▶ Competition – monopoly is no good

Degree of expressed disadvantages with BEVs



EV owners perceive range and charging issues as less important than ICE owners

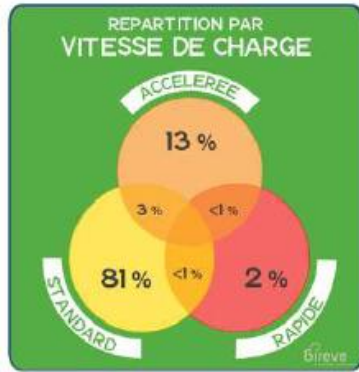


Chargers > 43kW

France: from 10,000

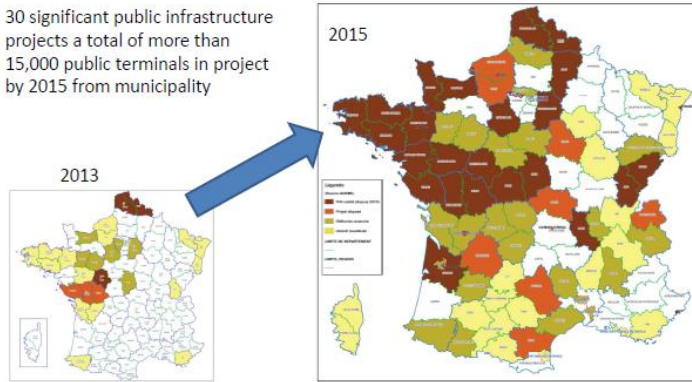
municipality Projects
Evolution 2013 – 2015

to 100,000 charge points



September 2014
 8600 charge points
 2% 50kW DC
 13% 22KW AC
 81% 3,5 KW AC

30 significant public infrastructure projects a total of more than 15,000 public terminals in project by 2015 from municipality



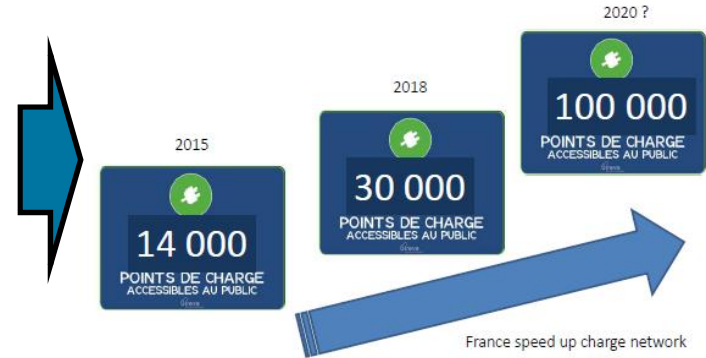
Bolloré 16 000 7kW charge points
2016- 2019

La CNR 52 quick charge
2015- 2017

EDF 200 quick charges on motorway
2015 à 2017.

Private actors plan to develop 20 000 to 30 000 by 2018

Développement of public charge network in France



Operators that have a national dimension and guaranteed balance on the territories and interoperability to be labeled as "national operators" (no rent to pay for occupying the public territory).

Best Practice TEN-T Fast Charging stations/posts

50% EU – 50% Industry (OEM's, Utilities, other)

2013-EU-92043-S

European Long-distance Electric Clean Transport Road Infrastructure Corridor (ELECTRIC)

This project aims to create an open access fast charging corridor along major highways connecting Sweden, Denmark, Germany and The Netherlands to allow green travel between these countries.

Part of the project will be dedicated to a study on interoperability, the framework for a sustainable infrastructure set up and network planning. The pilot project will install a total of 155 chargers along the main motorways: 30 in The Netherlands, 23 in Denmark, 35 in Sweden and 67 in Germany.

The new electric vehicle transport road will help accelerate electric vehicle uptake in northern Europe and will serve as best practice to other European countries.



A project to connect Austria, Slovakia, Slovenia, Germany and Croatia is in the making (TEN-T)

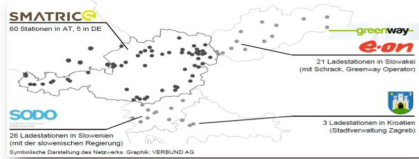
Fast Charging Cross Border Infrastructure for Electric Vehicles, Connecting Austria, Slovakia, Slovenia, Germany and Croatia 2013-EU-92069-S (26040482)

Verbund as project leader, various automakers are participating..



6 Member States (AT, DE, FR, HR, SI, SK) working for a total of **115 multi-system chargers**

- Austria 60
- Slovenia 26
- Slovakia 21
- Germany 5
- Croatia 3



Source: Verbund, <http://www.verbund.com/cc/de/news-presse/news/2014/10/08/emobilitaet-schnellladnetzwerk-roaming>

Corridor: 50 k€/station
200 stations, 9.7 mio €

Electric: 54 k€/ charger
155 chargers, 8.4 mio €

Central Eur.: 62 k€/charger
115 posts, 7.0 mio €

RCN: 100 k€/stations
74 stations, 7.3 mio €

+ 554
Chargers, stations, posts,..?
Fast, Rapid, ...?
Cost learning curve?

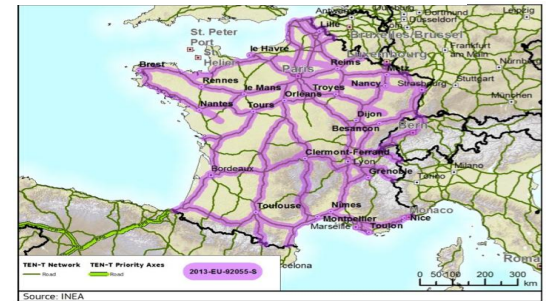
Rapid Charge Network, The UK & Ireland (TEN-T)

An EU-funded trial of 74 fast charging stations covering over 1,100 km along major UK and Irish road network routes



CORRI-DOOR

2013-EU-92055-S



Charging is not only about cars ! *best practice buses ?*



Electricity: Göteborg
3 full electric buses
Several hybrid
Regular line
1 indoor station!



Schiphol deploys 35 electric buses

35 electric buses started operating today at Amsterdam Airport Schiphol to transport travellers from aircraft to gate. Each bus has its own charging point at the airport, making Schiphol the biggest charging station for electric buses in Europe.



Future Fast Charging (networks)

but the future is already almost here.....

- Expanding the capacity of the network : increase locations + scale stations to capacity
- Fast charging locations also near cities for “apartment” charging?
- Power increase?!: longer EV range = higher charging power for “fast charging”:
2 hours drive = 240 km = 40-70 kWh , charge in 20 minutes > 100 kW
- Charging for buses and trucks: > 200, 400,..kW needed?
- Sustainable business models possible?

An EU Commission project

EAFO

EUROPEAN ALTERNATIVE FUEL OBSERVATORY

Vision and objectives

www.eafo.eu (register per October 15th, 2015 !)

- The vision for the European Alternative Fuels Observatory is that it is 'the' reference point for information about alternative fuels in Europe, where all interested parties go to find data, information and best practice. The primary short-term focus is on battery electric, hybrid and fuel cells. The secondary longer-term focus is on natural gas and other alternative fuels.
- Geographically speaking the Observatory should cover the EU Member States, the EEA Member States (Norway, Iceland, Switzerland, Lichtenstein) and Turkey.
- The Observatory should integrate all relevant data, information, publications and tools.
- National level data:
 - Passenger cars: update monthly
 - Buses, trucks, light electric vehicles: every 3 months (if data available)
 - Infrastructure: every 3 months
 - Legislation, incentives: updated when it changes

EAFO City AF factsheets

- Purpose of city factsheet is to inform other cities on alternative fuel developments
- To learn from each other
- To provide best practices & contacts
- To provide data at Country and European for dissemination and analyses
- *And of course to make some publicity as well*

Develop together with cities !!

Cities: Alternative Fuel Vehicles

- AFV's used in car sharing or similar programmes
- AFV's used for communal activities (city captive fleet)
- Taxis
- Buses
- Scooters (?) + other 2/3 wheeler categories
- City delivery vehicles
- Lease vehicles (e.g. including 6 / 7 wheel contracts)
- Vehicles in off road applications (e.g. airports, harbours) within (Metropolitan) areas

Cities: Infrastructure

- Chargers: type of chargers & quantity (stations, positions)
 - Public charging infrastructure
 - Semi public charging infrastructure
 - Home & apartment charging infrastructure
 - Charging facilities for buses, taxis, other vehicles
- NG/Hydrogen filling stations
- Projections 2016 - 2020

Cities: Policies & Incentives

- Incentives and for people having no access to home chargers
- Incentives for companies to use electric vehicles / build charging infrastructure
- Parking fees for EV's
- Special lane access
- Zero emission zone
- Zero emission taxi schemes
- Light electric vehicles schemes or incentives
- Initiatives together with business community
- Special regional or city level incentives etc.
- Vision statement on sustainable transport Mayor

Are we driving the future?

SCENARIO > 2020 & VALLEY OF DEATH

A scenario starting after 2020

Technology transitions are rarely foreseen by industry insiders and (so-called) experts

- Around 2025: EV's likely to be the lowest cost vehicles
- The mass scale transition to electric drive may start within a decade
 - All passenger vehicles: light, EV's fit for use: 100 – 500+ km range
 - Ultra fast charging *if needed* at similar speed as filling up tank!
 - Buses, vans & light trucks, special vehicles for cities, off-road etc.
 - Later, heavy duty long range trucks will be electric drive as well (autonomous!)
 - *In transition phase hybrid versions and NG vehicles as well ?!*
- *In 2030 all cars sold are electric?*
 - *At a certain moment, people will not buy old technology anymore*

Crossing the EV Valley of Death

will require political leadership

We can and need to provide credible and clear information on the EV use and cost potential to our politicians, policymakers, industries and citizens!

The next 5 years will be determining in whether the still fragile and vulnerable EV can reach its full potential quickly!

**Chancellor Angela Merkel, Berlin June 15th 2015: “we realise that the deployment of EV’s will not happen without support”
AND “it can not be that Germany builds & exports EV’s and does not sell them at home”**

Policymakers and politicians:

BRUSSELS SKETCH

Beware Europe's automotive-political complex

The VW emissions scandal dredges up uncomfortable questions about German influence in Brussels.

By **TIM KING** | 9/24/15, 11:50 AM CET | Updated 9/30/15, 3:23 PM CET

Will act and champion EV development and deployment :

1) If and when they are convinced of the value of doing so

AND

2) They believe it is a realistic option with a good chance of success!

AND

3) They can take distance from the short term interest of industry and are willing to focus on the long term economic interests and development of the technologies of the future

“We should stop thinking about this (decarbonisation) as a cost but as an investment moving together to a much better future”

Commissioner Violeta Bulc

Brussels, June 18th, 2015 @

Conference “Driving Road Decarbonisation Forwards”