AVERE

The European Association for Battery, Hybrid & Fuel Cell **Electric Vehicles**

Electric vehicle sales in Europe
European Electro-mobility Observatory

Bert Witkamp – October 9th, 2014

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The European Electro-Mobility Association

NGO, founded in 1978;
> 1000 direct & indirect members

18 National associations

Member of WEVA

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AVERE Advocacy & content!

Platform for the Electrification of Transport

AVERE Industry Task Force

SUBAT

ELEDRIVE

HarmonHy

IEA INTERNATIONAL ENERGY AGENCY
HYBRID & ELECTRIC VEHICLE IMPLEMENTING AGREEMENT

European Electro-mobility Observatory

Safe DRIVE
ADVANCED HYBRID POWERTRAINS

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EVS27, November 2013, Barcelona

- > 4000 participants
- Scientific conference
- Projects Dissemination
- 350 papers, 250 abstracts
- Exhibition
- Ride and Drive - electric
- Networking – 200 press
- Global: 68% Eur, 20% Asia, 13% Americas

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Vision (EU)

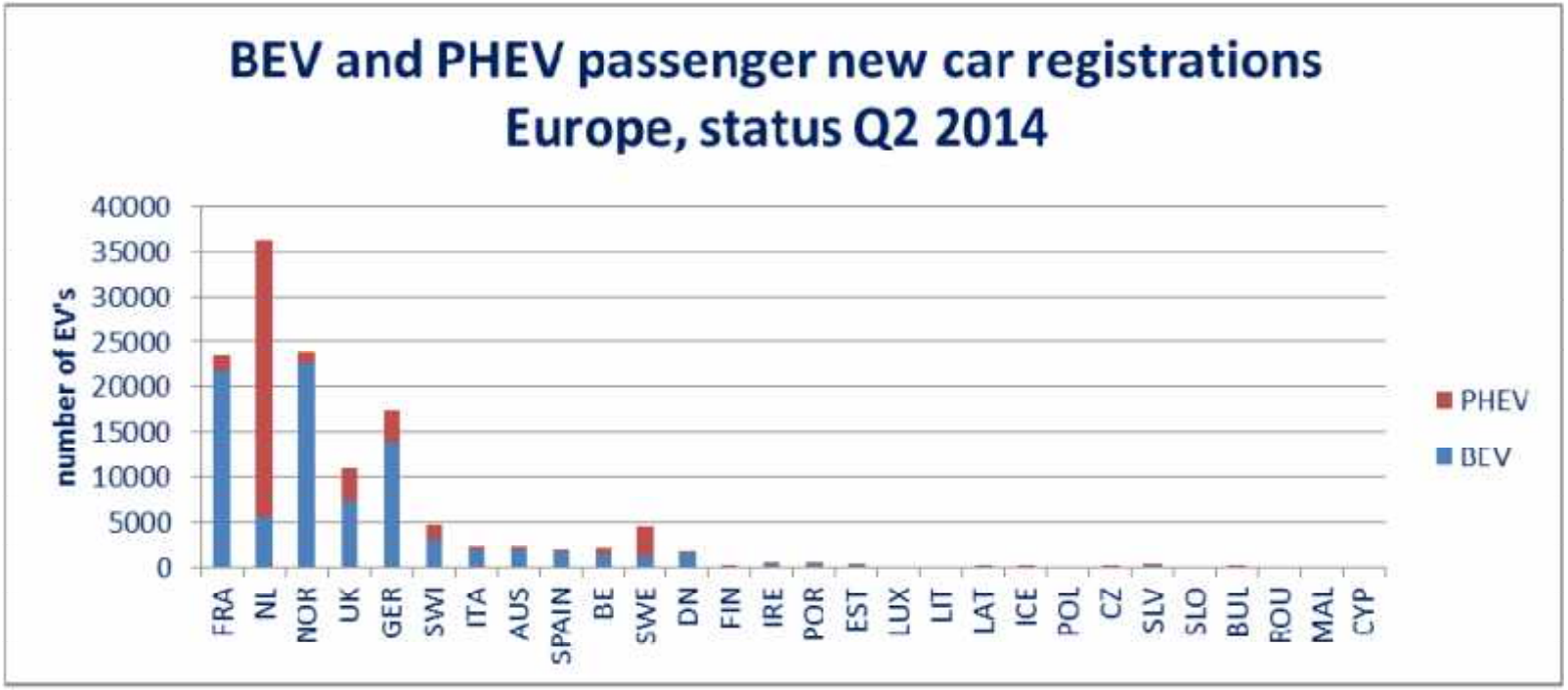
"The EEO is the reference point for information about electromobility in Europe, for battery electric, hybrid and fuel cells, where all interested parties go to find data, information and best practice.

Everything that is relevant about electromobility in Europe should be found under the EEO portal, whether directly or through links. For each country and region, the EEO should provide the most complete and detailed information possible."

Getting data is easy, getting reliable information hard

- E-mailing contacts does NOT work
  - People from contact list do not respond, changed positions, do not have easy access to all data, priority issues,…
- EEO scope: vehicles, charging infrastructure, legislation/incentives, generic information
  - AVERE focussed on vehicles
- Countries use different categories
  - E.g. no distinction hybrid / PHEV, quadricycles in passenger car reporting, no distinction BEV / REEV version BMW,…
- Official statistics are on new car registrations as are other sources
  - Norway has imported 3000 – 4000 BEV's (risk of double counting)

National data collection EV: EEO scope



Data sources: several sources per country

- IEA (IA-HEV) contacts
- Internet (mostly several sites per country)
- **National registration websites**
- **AVERE National Sections**
- **other contacts**

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Deep dive all electric vehicle sales in Norway, including imported cars

Electric Vehicles in Norway: total on the road at July 2014

L		**Motor vehicles with less than four wheels**
L1e	500	A two-wheeled vehicle with an engine < 50 cm³ and speed not exceeding 50 km/h.
L2e	157	A three-wheeled vehicle <50 cm³ and speed not exceeding 50 km/h.
L3e	67	A two-wheeled vehicle > 50 cm³ or maximum design speed exceeding 50 km/h.
L5e	4	A vehicle with three wheels >50 cm³ or maximum design speed exceeding 50 km/h.
L6e	227	A vehicle with four wheels <350 kg, excl batteries in case of electric vehicles, speed <45 km/h, and <50 cm³ ,<4 kW
L7e	1678	A vehicle with four wheels, other than L6, <400 kg (550 kg for vehicles for carrying goods), excl batteries,<15 kW.
M		**Power-driven vehicles having at least four wheels and used for the carriage of passengers**
M1	29389	Vehicles used for the carriage of passengers <=eight seats in addition to the driver's seat. (Passenger car)
M3	9	Vehicles used for the carriage of passengers, <=eight seats in addition to the driver's seat, and< 5 tonnes. (Bus)
N		**Power-driven vehicles having at least four wheels and used for the carriage of goods**
N1	733	Vehicles used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes. (Pick-up Truck)
N2	2	Vehicles used for the carriage of goods and having a maximum mass > 3.5 tonnes but < 12 tonnes. (Commercial Truck)
	32766	**total all above categories**

In addition other categories like off road and special machines available
In the ned, all information is somewhere!

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BEV sales Utility and Quadricycles

data as indication

2014	1619	Renault Kangoo ZE	BEV	UTILITY
	101	Nissan e-NV200	BEV	UTILITY
	198	Goupil G3	BEV	UTILITY
	179	Peugeot Partner EV	BEV	UTILITY
	115	Citröen Berlingo EV	BEV	UTILITY
	2212	TOTAL		
	813	Renault Twizy	BEV	QUADRICYCLE
2013	4871	Renault Kangoo ZE	BEV	UTILITY
	516	Goupil G3	BEV	UTILITY
	5387	TOTAL		
	2730	Renault Twizy	BEV	QUADRICYCLE
2012	4300	Renault Kangoo ZE	BEV	UTILITY
	0	Nissan e-NV200	BEV	UTILITY
	4300	TOTAL		
	5527	Renault Twizy	BEV	QUADRICYCLE

TOTAL UTILITY	11899
TOTAL QUADRICYCLE	9070

Utiltity vehciles mainly in France, Twizy in many countries

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Does EEO provide the information we need?

- EEO only gives the total number of vehicles (one data point)
- No time stamp of data
- Limited number of updates per year
- No vehicle model breakdown
- No totals for Europe
- No download possibilities
- Vehicles are the “easy” part!
- Getting reliable data on charging infrastructure is much more difficult in most countries
  - In general no registration for charging stations
  - Competing sites in most countries

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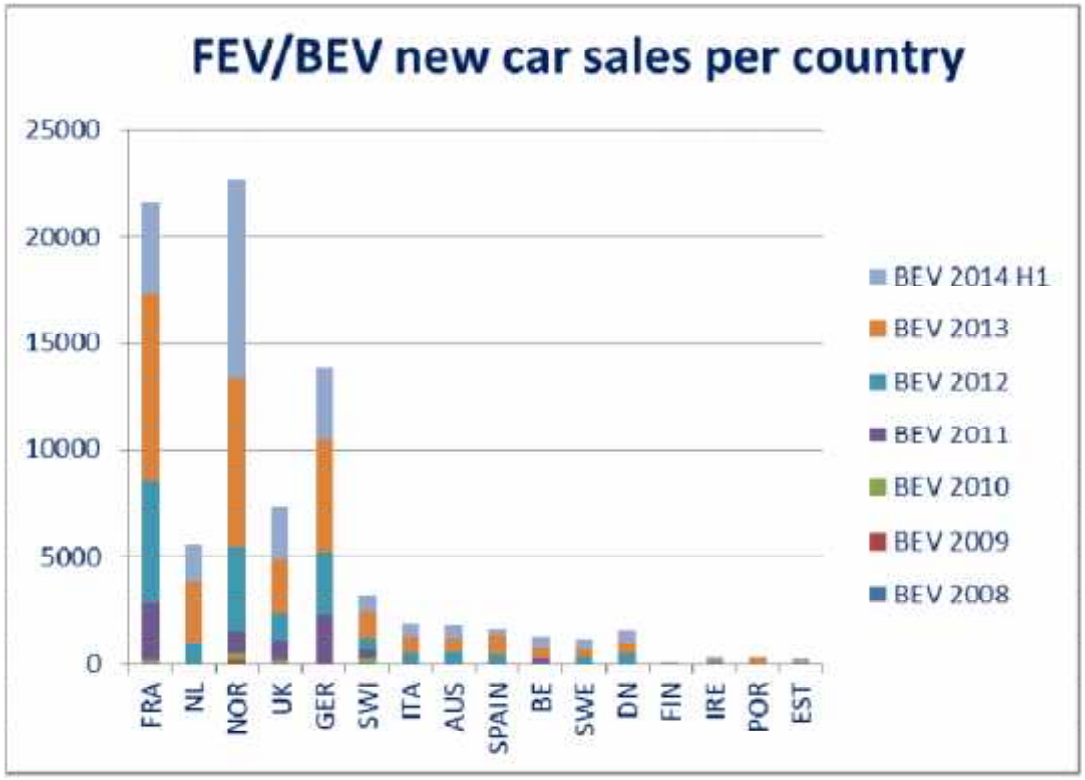
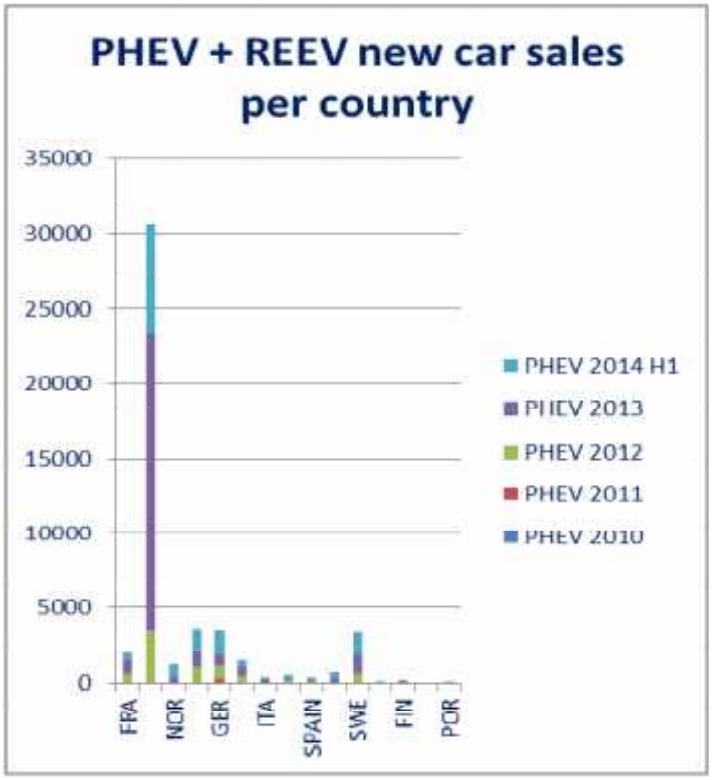
Providing historic data points shows the dynamics over time, providing information and insights





Passenger cars: excluding utility vehicles and quadricycles like Twizy

Breakthrough has happened in 2012-2013!

Why these patterns? How sustainable? Lessons learned?

Which OEM's are leading?

These are some of the questions where we need the answers!

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New car registration is NOT EV's on the road

Used EV import to Norway:

OEM	before 2013	2013	2014
Nissan		810	1490
Peugeot		75	85
Citroen		65	53
VW			41
Ford		14	32
Mitsubishi		72	21
Renault		5	15
BMW			12
Think		4	5
Smart		6	5
Tesla		4	4
Fiat		3	2
Toyota			2
Piaggio			1
Tazzari			1
S U M	**up to 1300**	**1058**	**1769**

Detailed analyses of Norwegian data:

- +/- 4000 more EV's on the road then sold as new car
- check on where these cars have come from is ongoing
- France has major part (Leaf)
- Motivation: cashing in on french subsidy (several 10's of millions €)
- Causes distortion of view EV implementation

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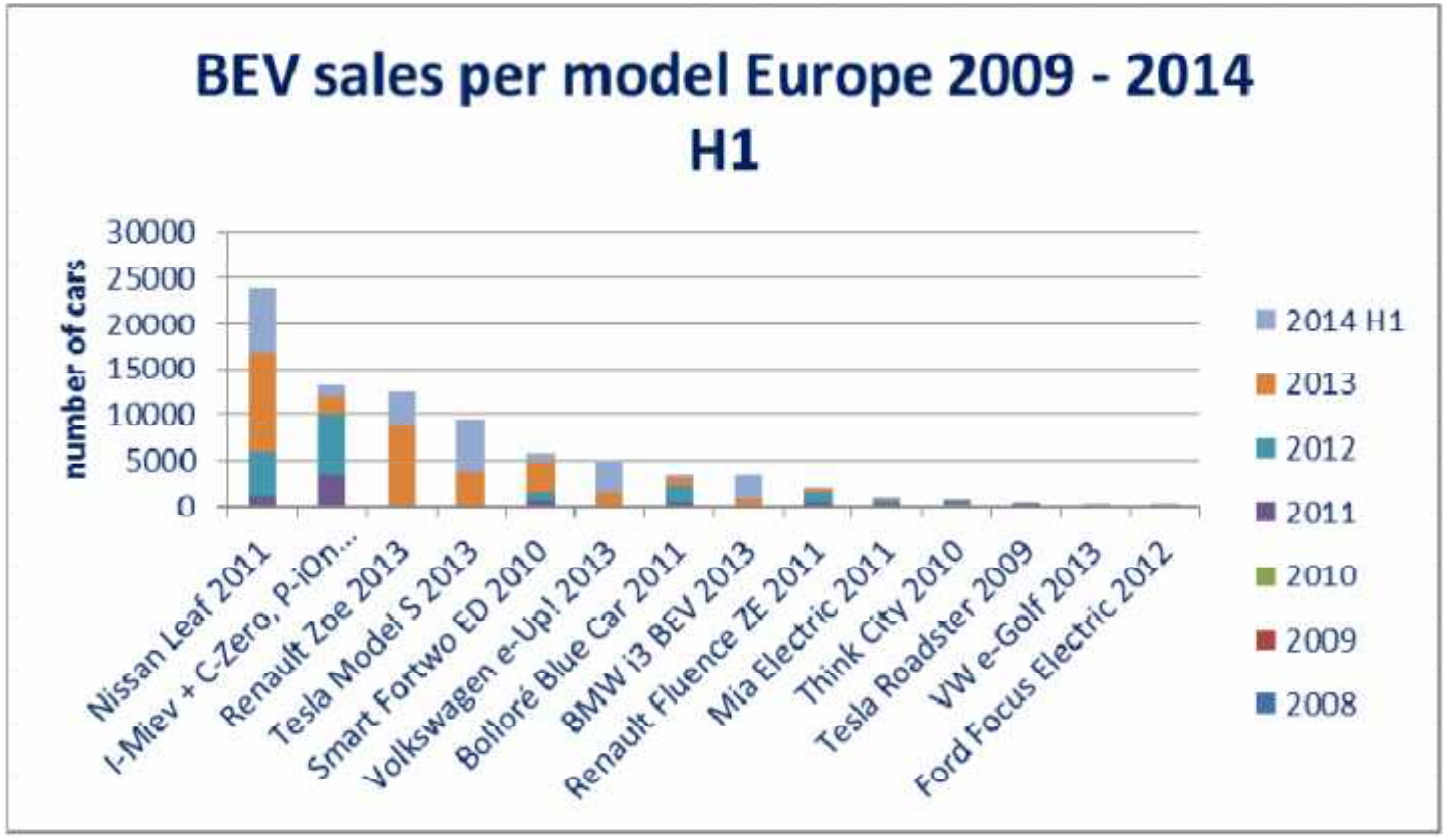
BEV sales: from EV pioneers to OEM's



- More than 40 models introduced in the market since 2008
- Only 9 models with cumulative sales > 1000
- Many test cars, compliance cars, R&D showcases?!

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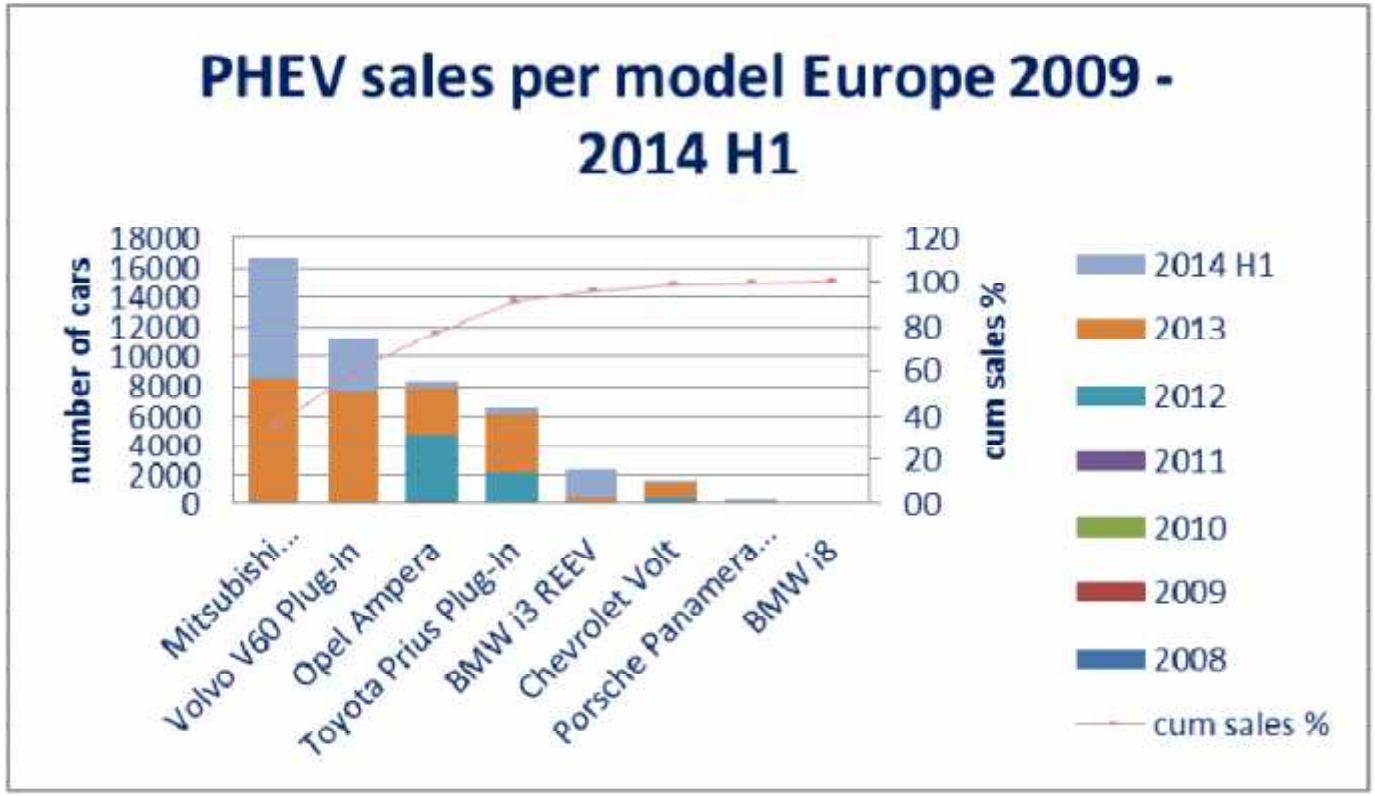
PHEV: 3 models, REEV: 2 models!



PHEV and RE-EV:

- Few models (13 in total)
- +/- 2 years on the market only
- NL 2/3 of all sales "give-away cars"

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Top 5 BEV sales per year

2008	**Think**	**66**
2009	**Top 5 total: 141 = 100%**	
	Think	93
	Mitsubishi I-Miev	
	Citroën C-Zero	24
	Peugeot iOn	
	Tesla Roadster	13
	Fiat Fiorino	11
2010	**Top 5 total: 546 = 80%**	
	Think	243
	Mitsubishi I-Miev	
	Citroën C-Zero	100
	Peugeot iOn	
	Smart For Two	97
	Tesla Roadster	74
	Mini Electric	50
2011	**Top 5 total: 5.699 = 79%**	
	Mitsubishi I-Miev	
	Citroën C-Zero	3255
	Peugeot iOn	
	Nissan Leaf	1132
	Smart For Two	511
	Renault Fluence	402
	Bolloré Bluecar	399
2012	**Top 5 total: 15.573 = 96%**	
	Mitsubishi I-Miev	
	Citroën C-Zero	6583
	Peugeot iOn	
	Nissan Leaf	4883
	Bolloré Bluecar	1950
	Renault Fluence	1211
	Smart For Two	946
2013	**Top 5 total: 28.887 = 88%**	
	Nissan Leaf	10895
	Renault Zoë	8729
	Tesla Model S	3877
	Smart For Two	3309
	Mitsubishi I-Miev	
	Citroën C-Zero	2077
	Peugeot iOn	
2014 (6 mo.)	**Top 5 total: 22.435 = 88%**	
	Nissan Leaf	6942
	Tesla Model S	5533
	VW e-Up!	3602
	Renault Zoë	3594
	BMW i3 (BEV est	2764

Top 5 data show:

Only few cars dominate Market (>80%)

Rapidly changing domination

Some models are designed As EV (BMW i3, Tesla, Bluecar, Think)

- Allows for optimal battery pack design
- Lighweight materials for improved range

Only limited coverage of overall car segments

- overall market share does not say much

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Development of BEV sales in Europe

- **Early adopters and selected OEM's: 2008 – 2011:**
  - Nissan, Mitsubishi, Mercedes (Smart), Renault, Mia , Think, Tesla
  - 200 EV's in 2009, +/- 900 in 2010 and around 7.500 in 2011
  - Less than 10 models up to 2010, around 20 models in 2011 (including test / compliance / publicity cars from other automakers)
- **Followers in 2012 – 2014: VW, BMW, GM (Opel), Ford**
  - Smaller SME's dissappear with exception of Tesla, early OEM's strengthen position mostly
  - 2012: 16k, 2013: 33k, 2014 H1: 26k BEV sales
  - Number of OEM and models increasing
  - Incentives to stimulate further product and market development?
- ***After 2016 – 2017: Preparation of policies, legislation to stimulate OEM's to produce and sell EV's??***

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Often heard: "Electric Vehicles are small urban vehicles serving a niche market": *and what about Tesla?*

Tesla has already shattered many of the industry's deep-rooted convictions...

- That it is almost impossible for a newcomer to break into the automotive business
  - Tesla became the #2 EV seller in the U.S. in 2013
- That practical EVs must be limited to a range of 100-150 miles
  - Tesla designed and produced a >240-mile EV, which is 2-3X the range achieved by everyone else
- That EVs are more suitable as small urban vehicles
  - Tesla is producing and selling a large luxury EV
- That EVs are hard to sell and that customers will not pay extra $ for them
  - In 2013, in the U.S., Tesla sold more $90k+ sedans than well-established brands such as Mercedes and BMW
- That EVs imply a financial loss for carmakers
  - Tesla almost broke even during the first year of mass production

Tesla 85 kWh battery pack:
< 25% of vehicle value

Small compact 20 kWh
pattery pack > 50%
of vehicle value

Why are OEM's not following the same approach?
New (EV) technology introduction in high end luxury cars, and then reduce costs for mass market introduction

Source:Advanced Automotive Batteries, September 2014

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EV sales in Europe and some thoughts

BEV 2008	87
BEV 2009	194
BEV 2010	877
BEV 2011	7547
BEV 2012	17856
BEV 2013	32686
BEV 2014 H1	25566
total BEV	**84813**
PHEV 2010	21
PHEV 2011	265
PHEV 2012	7496
PHEV 2013	25222
PHEV 2014 H1	15112
total HPEV-REEV	**48116**
EV 2008	87
EV 2009	194
EV 2010	898
EV 2011	7812
EV 2012	25352
EV 2013	57907
EV 2014 H1	40678
total EV Europe	**132928**

Very high % growth: people want to buy

Some say breakthrough, exploding growth

Other say failure, less than 1% market
but what is segment market share?

Separate facts from stories: EEO

Deep dive in details needed:

Why which development?
Where do the cars come from?
OEM's?, Countries?
And the batteries ?!
Who is buying?
Who is selling and who is not?

INPUT for policies, incentives, analyses,….

EEO Objective: Same transparency for Infrastructure, Incentives, Programmes …!

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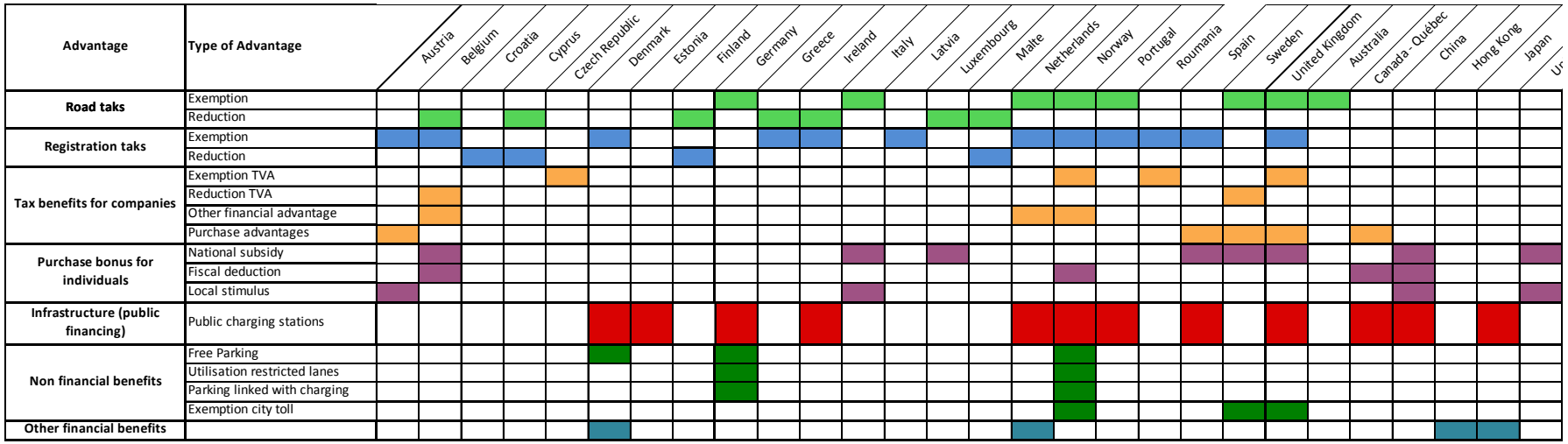
How to get EV's on the road?

Incentives and subsidies



Incentives analyses is ongoing!

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EV and electricity generators

Edison Electric Institute (June 2014): Transportation Electrification:

- "Electrification Is Our Biggest Opportunity"
- "Electric Utilities Need Transportation Electrification"
  - Time of Use: Off-peak price signals incent EV users to change behavior and shift load to the extent possible, minimizing grid impacts.
  - Increasingly, EVs have built in smart charging capabilities that can delay the onset of charging to preset off-peak times. Eventually, price signals from the smart grid can be used to optimally position EV charging load.
  - Current tariffs offer rates as low as 3-4¢/kWh off-peak to EV users. There are very substantial benefits to off-peak pricing, delaying, and saving large capital costs for system upgrades by smoothing daily demand for electricity. **An analysis of 17 US EV tariffs, compiled by the EV Project, revealed a 70% difference in kWh cost from peak to off-peak.**

- **Research from the Pacific Northwest National Laboratory states that approximately 160 million vehicles could be powered solely from existing off-peak generating capacity.**

- **EV's and CO2 emissions:**
  - EV = ZERO tailpipe emissions of any kind!
  - Calculation per country : -35% emissions as compared to EU average!
  - EV + green energy (opportunity OEM?!) = Zero overall emssions!

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A VISION from industry

- FedEx Chairman and CEO Fred Smith states:

"Early results confirm that the costs of operating and maintaining electric vehicles are significantly less than those for traditional internal combustion-engine vehicles. In some cases we've achieved savings of 70% to 80%. So we are making a start at FedEx, but it is not enough when it comes to the question of combating our nation's dependence on oil.

What we need to protect our nation is the environment to create in a few short years an entirely new transportation system with millions, and then tens of millions,of electric cars and trucks." (2011)

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