evs 27

The 27th INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM & EXHIBITION.

Barcelona, Spain
17th-20th November 2013

Public Policy Strategies for Electric Vehicles and for Vehicle to Grid Power

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Organized by Fira Barcelona avele

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In collaboration with EVAAP EDTA

Supported by European Commission

1. Why policy toward EV and V2G?

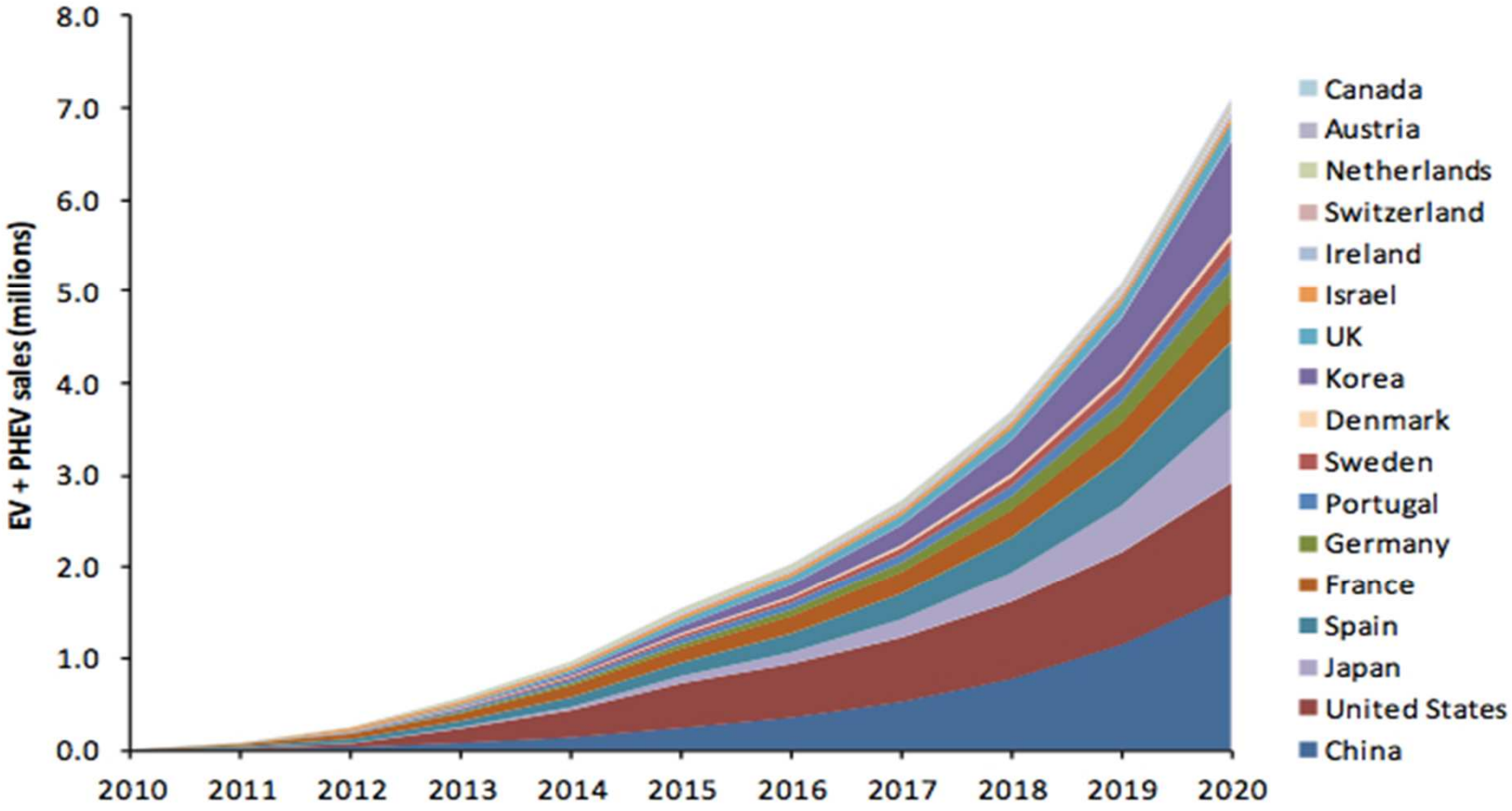
- EV and V2G face Economic Market Failures
  - Positive externalities are not paid at real value
    - CO2 reduction => CO2 markets are not efficient : 4 euros per ton
    - Health benefits by reducing toxic emission => measures?
    - Oil import reduction => saving for purchaser, benefit for society independence?
    - Industrial/Services job and wealth creations
    - Elec Network ancillary services => not adapted yet for EV
    - Plug war standard => far from GSM cooperation
    - …

Agenda

- So we need smart policies to internalize positive externalities for EV
  1. Credible commitment toward acquisition of the EV => stable over time commitment
  2. Definition of EV charging choices
  3. Evolution of the grid rules and associated remunerations
  4. Management of R&D effort in the pre-commercial phase.

2. Policies for electric vehicle purchasing

Goals are ambitious



2. Policies for electric vehicle purchasing

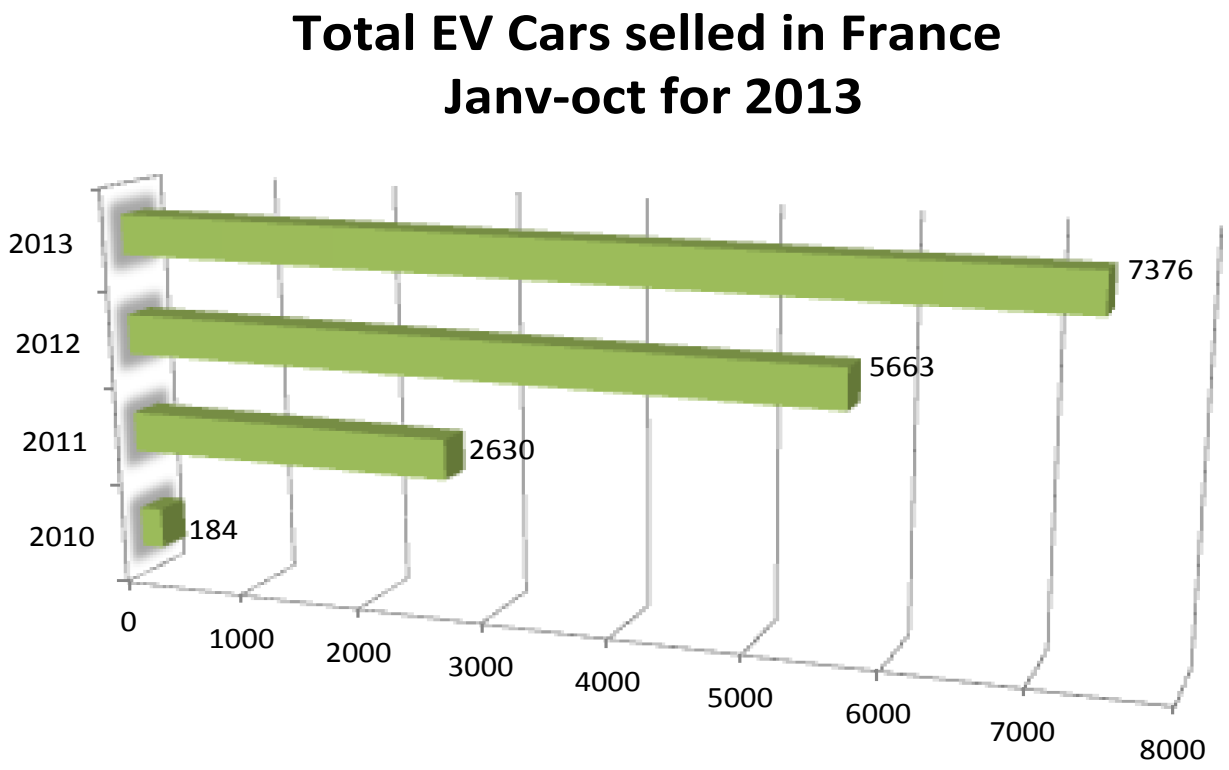
Subsidies toward EV purchasing	
France	7 000 €
Germany	0 €
Spain	6 000 €
UK	5 000£
USA	7500$

And meet with Expansive Tools

OR VAT exemption

2. Policies for electric vehicle purchasing

Results For France



2. Policies for electric vehicle purchasing

Results For Norway

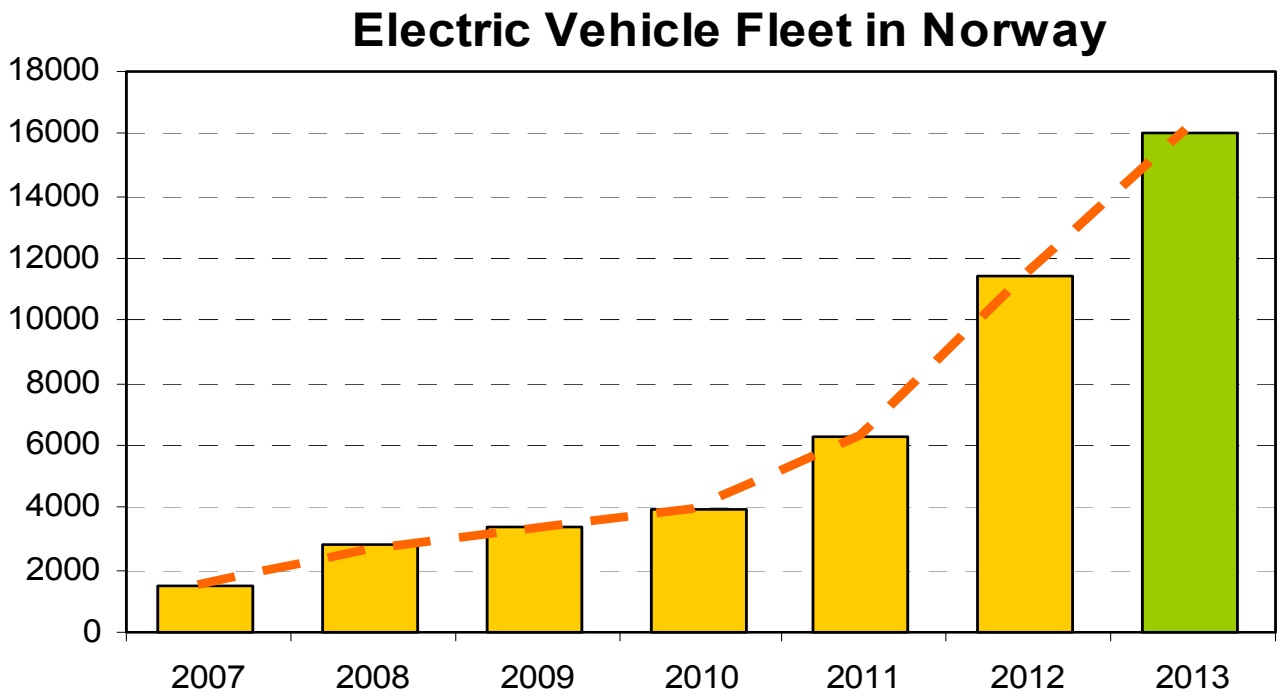


Figure 2

2. Policies for electric vehicle purchasing

- Lessons from innovation literature: generous subsidies are not for ever… actual EU debate about RES-E
  - Consistency matters (program for 4-5 years)
  - Recalibration need to be done on a clear and transparent basis => guaranty incentive effect over time
    - Risk of stop and go policies => disorganisation and race over subsidies
  - Company strategies also impact on public policy sustainability
    - Premium market (Tesla) / Minimum possible costs (Renault) / Integrated model Car sharing (Autolib)
  - Tools : Lump-sum (7000€) or VAT exemption(19,6%)?
    - Lump-sum positive effect on low cost car (under 36k€)
    - VAT exemption have more impact on expensive cars (more than 36k€)

3. Policies for charging stations

Table 4: EVSE power capacity and charging duration for a 22 kWh battery

EVSE capacity		Charging duration at 80% of the battery capacities
(1φ) 230 V – 16 A	3,7 kW	~ 5 hours
(3φ) 400 V – 16 A	11 kW	~ 2 hours
(1φ) 230 V – 32 A	7,4 kW	~ 3 hours
(3φ) 400 V – 32 A	22 kW	~ 1 hour
(3φ) 400 V – 63 A	43 kW	~ 30 min
(3φ) 480 V – 63 A	52 kW	~ 25 min
(DC) 500 V – 100 A	50 kW	~ 25 min

Cheaper per unit

Costly per unit

3. Policies for charging stations

- Every existing 3kW plug is a charging point!
  - Lot of plugs are in place at home & work
  - Substitution effect appears (home-work)
- Should public actor invest for infrastructure?
  - Burning issues and political choices
  - What is the rational of public investment in this dimension?
    - Car sharing experiment => no need (Autolib is 3kW plug * 4000 plugs…) in delimited zones where demand is high (Paris – Bordeaux – Lyon…).
    - Privately owned cars (but Urban car or nationwide car / Large or small batteries?)

4. Policy for grid services from EV

Sources	Analyzed region	Participated market	Net Profit €/Month/Vehicle	Regulation power	Battery/ Vehicle constraints
Kempton and Tomic 2005	USA	Regulation up and down	112-165	10-15 kW	Electric drive vehicles
Tomic and Kempton 2007	USA, Four different control areas	Regulation down (Th!nk City) Regulation down and up (Toyota RAV4)	4.3 – 43 (Th!nk City) 6 – 64 (Toyota RAV4)	6.6 kW	100 Th!nk City vehicles (Nicd) ,252 Toyota RAV4 (NiMH)
Larsen et.al. 2008	Denmark	Secondary and Tertiary control	6 – 160	power: 2 kW, 20 kW, 20 kW	EDV: Capacity: 5 kWh, 5 kWh, 20 kWh,
Camus et.al. 2009	Portugal	Secondary and Tertiary control	18	3.5 kW	Plug-in Hybrid and electric vehicles
Andresson et.al. 2010	Sweden/ Germany	Control energy market	30 – 80 (Germany, coal fired power plants) -19 – 7 (Sweden, Hydro power plants)	3.5 kW	Plug-in hybrid EV (10 kWh , Maximum depth of discharge 20 %) Charging and discharging efficiency are 94 %.
V2G-Strategies 2011	Austria	Secondary and Tertiary control	-7.32 – 63.94	10.5	Electric Vehicles (16 kWh, 24 kWh, 48 kWh)

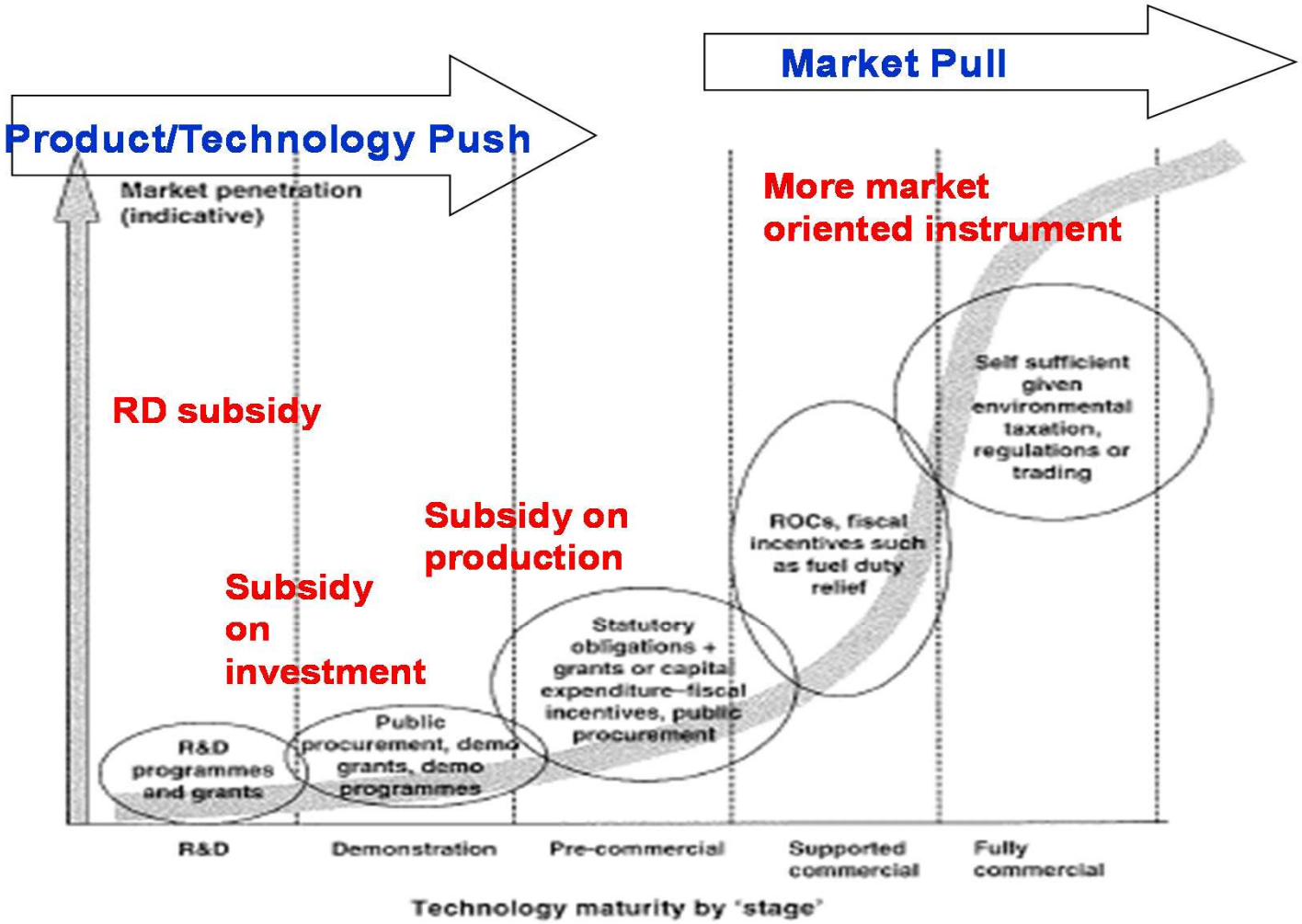
4. Policy for grid services from EV

Mean energy costs and regulation revenue per EV and per year with Market based price in France is about

Year	2004	2005	2006	2007	2008	2009	2010	2011
Energy cost (€)	67	111	106	79	151	87	128	128
Regulation revenue (€)	230	233	231	227	226	228	231	232

With Peak and Off Peak regulated tariffs, the mean regulation revenue per year and per EV is then €133 for 260 working days.

5. Policy for EV key components research



5. Policy for EV key components research: EU action & fundings

Topics	EC Projects Acronyms	Funding [€]
V2G Technology	G4V, SMARTV2G, POWERUP	10,577,830
ICT	ECO-FEV, ECOGEM, EVADER, SAFEEV, MAENAD, AVTR	22,959,138
Electrical Vehicles	SAFEDRIVE, ELCAR, ID4EV, EUNICE, COSIVU, ALIVE, E-LIGHT, DEMOTEST-EV, ASTERICS, CORE, DELIVER, eFuture, ELVA, EM-SAFETY, E-VECTOORC, FUEREX, FURBOT, HEMIS, HI-WI, ICE, LIBRALATO, NoWaste, ODIN, OPTIBODY, OPTIMORE, STRAIGHTSOL, WINN	130,054,402
Battery Technologies	ELIBAMA, SUPERLIB, EASYBAT, SMART-LIC, AMELIE, APPLES, AUTOSUPERCAP, ELECTROGRAPH, EUROLIION, GREENLION, LABOHR, NECOBAUT, SMARTBATT, SOMABAT, STABLE	85,278,467
Charging Infrastructure	FASTINCHARGE, UNPLUGGED, V-CHARGE, TELLISYS, V-FEATHER	22,699,907
Electricity Distributer	WIDE-MOB	3,882,841
Electromobility	e-DASH, SMARTOP, CASTOR, Green eMotion, ELVIRE	69,800,060

Conclusion

	More favorable and costly	Less favorable
Action Toward EV cost	VAT (large cars) Lump-Sum (Small ones)	Nothing
Action toward Infrastructure	50 kW nation wide net (gasoline stations?)	Home and Work 3kW existing
Action VtoG	Changing grid rules to allow remuneration	No change
Action toward R&D	Adapt R&D to commercial stage	No funding or badly calibrated one

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