



# Transport efficiency policies in Spain: Promotion of EVs

ODYSSEE-MURE (IEE Programme)

Kick off meeting, 21<sup>th</sup> June 2010

Juan Larrazábal Roche  
Transport Department

**IDAE**

1



## ENERGY CONSUMPTION IN TRANSPORT SECTOR

- **Transport sector** covers 37,9% of total final energy consumption (2008)
- From 1990 to 2008, energy consumption in the transport sector raised at 77, 2% rate
- **Road transport** covers around 80% of energy consumption in transport sector
- **Cars** represent 15% of the total final energy consumption in Spain.



Oil covers 98,2% of total energy consumption in the transport sector, which represents 65% of crude annual imports.

**KEY PROBLEM: OVERSEAS ENERGY DEPENDANCE 80%**



# ENERGY CONSUMPTION AND EMISSIONS

1 litre of petrol

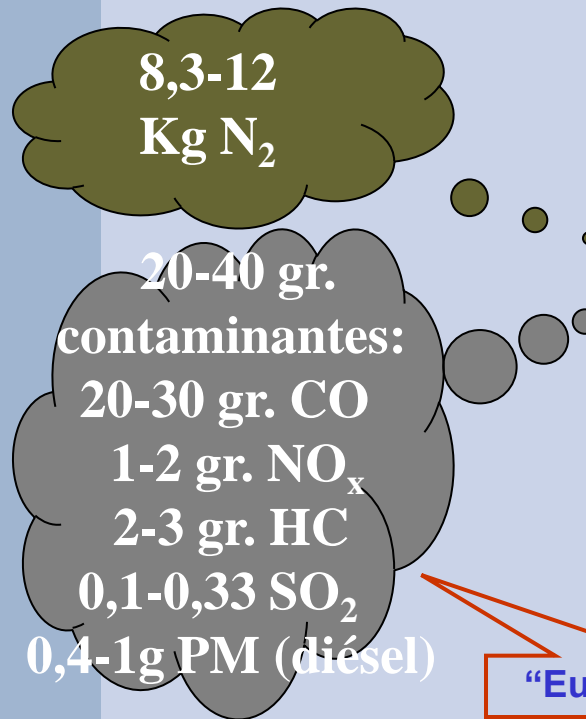


2,35 Kg. CO<sub>2</sub>

1 litre of diesel oil



2,64 Kg. CO<sub>2</sub>



Regulation (CE) N° 443/2009:

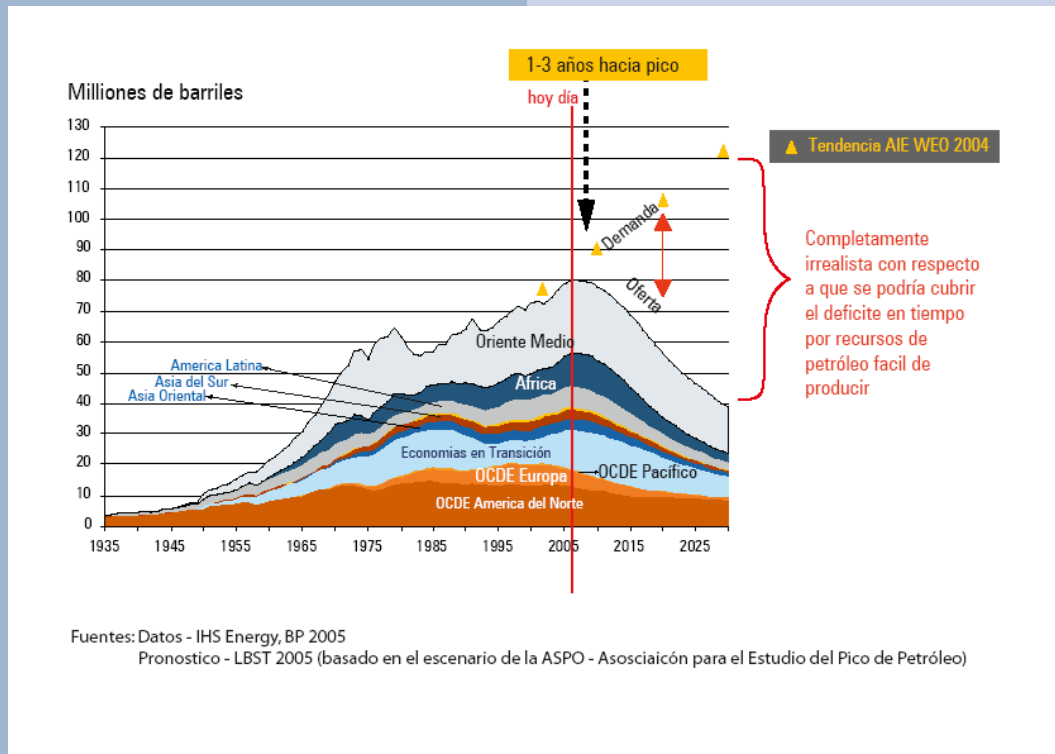
“Euro” regulations

25,4% of total CO<sub>2</sub> emissions in Spain are produced by transport sector (2007)

Euro I → Euro 5: emissions of pollutants have dropped more than 95%



# THE END OF THE CHEAP ENERGY



## Energy supply problems

**SAVING**

(the best "kW" is the one which is not used)

**DIVERSIFICACION**

(taking place on new technologies)





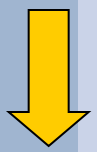
# ACTION LINES IN THE TRANSPORT SECTOR

## CHANGING TO MORE EFFICIENT TRANSPORT MODES



- Urban Mobility Plans
- Transport Plans (activity centres)
- Improving the cuote of Road Colective transport means
- Train promotion
- Short sea shipping promotion

## IMPROVING THE EFFICIENCY OF TRANSPORT MODES



- Road transport fleet renewal
- Airways fleet renewal
- Naval fleet renewal
- Car labelling
- Voluntary agreements

## USING MORE EFFICIENTLY THE TRANSPORT MODES



- Transport infraestructures management
- Road transport fleet management
- Airplane fleet management
- Ecodriving for cars, trucks, planes and trains
- Car sharing/pooling



## ALTERNATIVE FUELS AND TECHNOLOGIES

Fuels	Compared to petrol		Compared to diesel oil	
	% CO <sub>2</sub> emissions	% energy	% CO <sub>2</sub> emissions	% energy
Petrol	0	0	+ 22	+ 24
Diesel oil	- 18	- 19	0	0
LPG (60/40)	- 11	- 3	+ 8	+ 20
Natural Gas	- 25	- 6	- 9	+16
VH petrol	-37	- 37	- 22	- 21

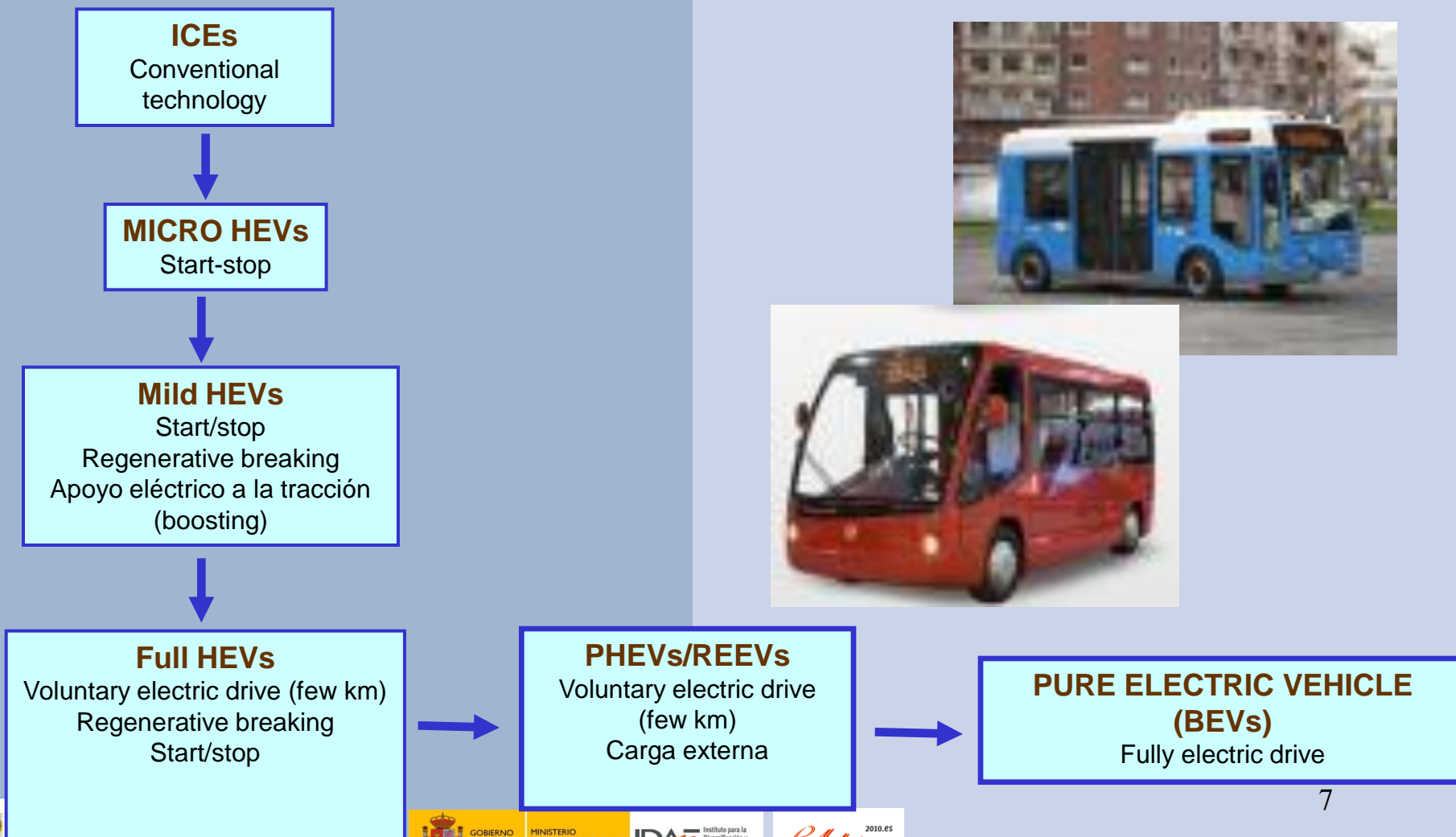
**BIOFUELS:** 1<sup>a</sup> y 2<sup>a</sup> generation...

**SINTHETIC FUELS:** BTL, GTL, CTL,....

**ENERGY VECTORS:** electricity and fuel cell (H<sub>2</sub>)



# ELECTRIFICATION OF THE DRIVE TRAIN:





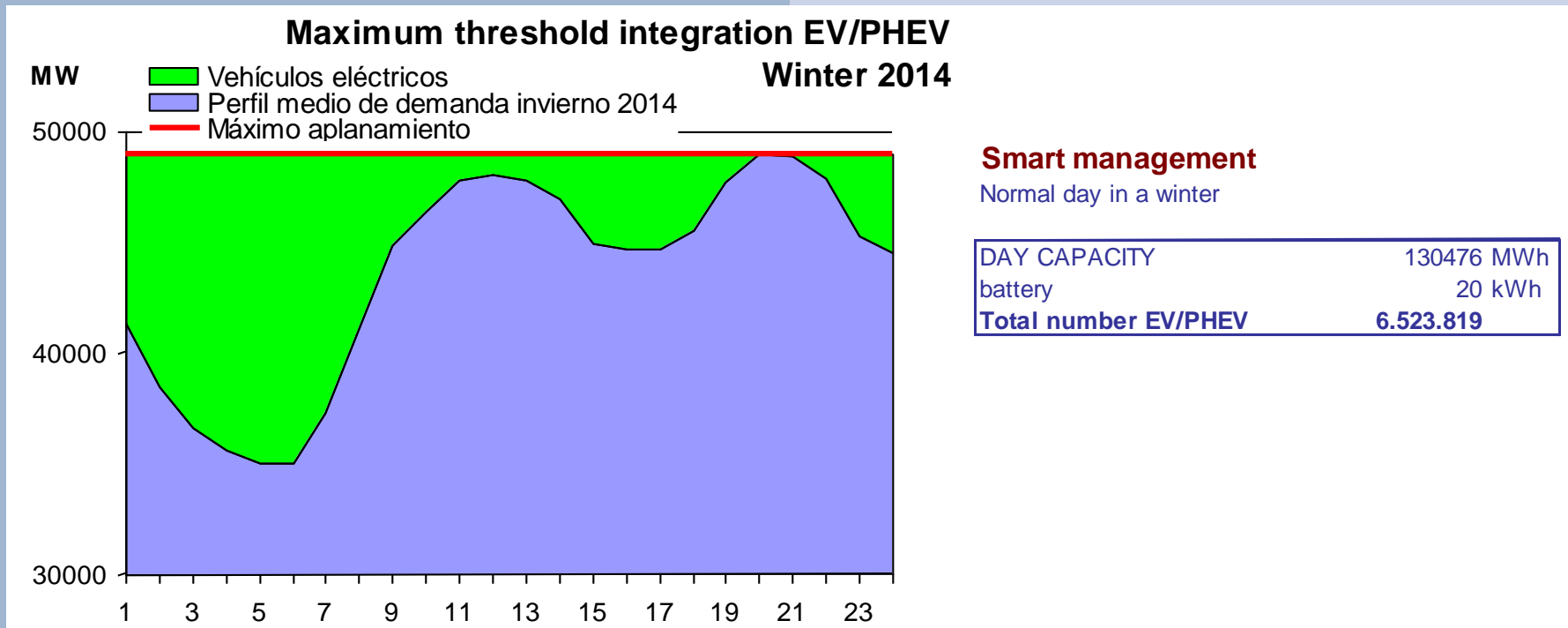
## BENEFITS OF THE ELECTRIC VEHICLE IN SPAIN

- Reduction of energy dependence, specially in oil dependence for the transport sector.
- Reduction of pollutants.
- Reduction of CO<sub>2</sub> emissions: Spanish generation mix of 385g/kwh CO<sub>2</sub> → CO<sub>2</sub> reductions in WTW by around 50%.
- Improvement of the energy efficiency of electric system: leveling of the demand electricity curve (cost reductions and more introduction of renewable energies).
- Energy efficiency: electric vehicle is 60% more efficient than petrol car and 33% more efficient than diesel one.
- For example, considering an annual mobility of 15.000 km, mainly in cities (urban consumption of 8l/100km), for a VE of 15kWh/100km:

EV	Combustion engine	Savings %
0,548 tep/año (15 kw/h)	1,2 tep/year	54,3
1,1 tCO <sub>2</sub> /año (15 kw/h)	3,27 tCO <sub>2</sub> /year	66,3



# POWER SYSTEM CAPAPACITY IN SPAIN



Considering a smart (optimised) management of the system , this could serve the demand for 2014 up to 6,5 million EV/PHEV without any additional inversions made in capacity and transport



## OTHER CONSIDERATIONS FOR EVs

- **Energy consumption:** between 12 kWh/100km (urban cars) and 30kWh/100km (microbuses). Including transport and recharging energy losses (20%), it could ascend up to 15 and 37,5 KWh/100km
- **Range** EVs: lead-gel battery : 80km  
Lithium-ion or Zebra: 200km  
PHEVs: between 20 and 60km (more than 80% of diary trips < 60km)
- **Oriented to** slow charge and in valley hour.
- **Range** (Lithium-ion): around 3.000 cycles (8 years at daily recharging)
- **Time to recharge:** monophasic (between 6 and 8 hours) o triphasic (1hour)  
fast charge: between 20 and 30 minutes at 70-80%
- **EV's Market prize:** around 2,8 times more expensive than conventional ones.
- **Economic savings:** Considering night recharging at 10c€/Kw/h, it should suppose around 1,5€/100km (against 8€/100km for urban use of a conventional one).
- **Impact of EV on renewable energies:** a wind generator of 3MW working 2.200 h/year could recharge 2.350 EVs, avoiding 3,4 M oil litres and 2.585 tCO<sub>2</sub> emissions.



# IMPLEMENTING AGREEMENT IA-HEV

## IA-HEV (IEA)

- Implementing Agreements of the AIE:
  - o Hybrid and Electric Vehicles
  - o Advanced Motor Fuels
  - o Advanced Fuel Cells
  - o Advanced Materials for Transportation
  - o Bio-energy
  - o Hydrogen



## IA-HEV (1993-...)

- o Objective: to produce and share information about HEVs y BEVs
- o Member countries (14): Austria, Belgium, Canada, Denmark, Finland, France, Italy, The Netherlands, Sweden, Switzerland, Turkey, UK, United States and Spain (since the end of 2009)
- o Annexes: Information exchange , Electrochemical systems, Electric cycles, Heavy duty hybrid vehicles, Fuel cell for vehicles, Market deployment and lessons learned, PHEVs, Fuel and technology alternative for busses.



## SPANISH PRESIDENCY OF THE UE

### San Sebastián informal council of EU Ministries (San Sebastián, 7-9 February 2010)

Spanish Presidency proposed UE Ministry of Industries, the convenience of considering EVs as a key matter for Europe and so, the definition of a European Strategy to impulse EVs.

This Strategy should meet the following key areas:

- Effort aimed to achieve a leadership in the **manufacturing of components and batteries**.
- **Energy related issues**: to analyze the generation capacity in the EU for attending EVs deployment in medium and long term.
- **Market and consumer acceptance**: to promote demand through financial support for its acquisition and advantages for the use of this vehicles.
- **Standardization and normative**: it is required an homogeneity in this fields at EU scale.
- **Environmental objectives 2020**: Electrification of vehicles is crucial to reach the commitments and objectives in this field.



**European Strategy to promote clean and efficient vehicles**



# ACTIVATION PLAN FOR ENERGY EFFICIENCY 2008-2011: MOVELE PROJECT

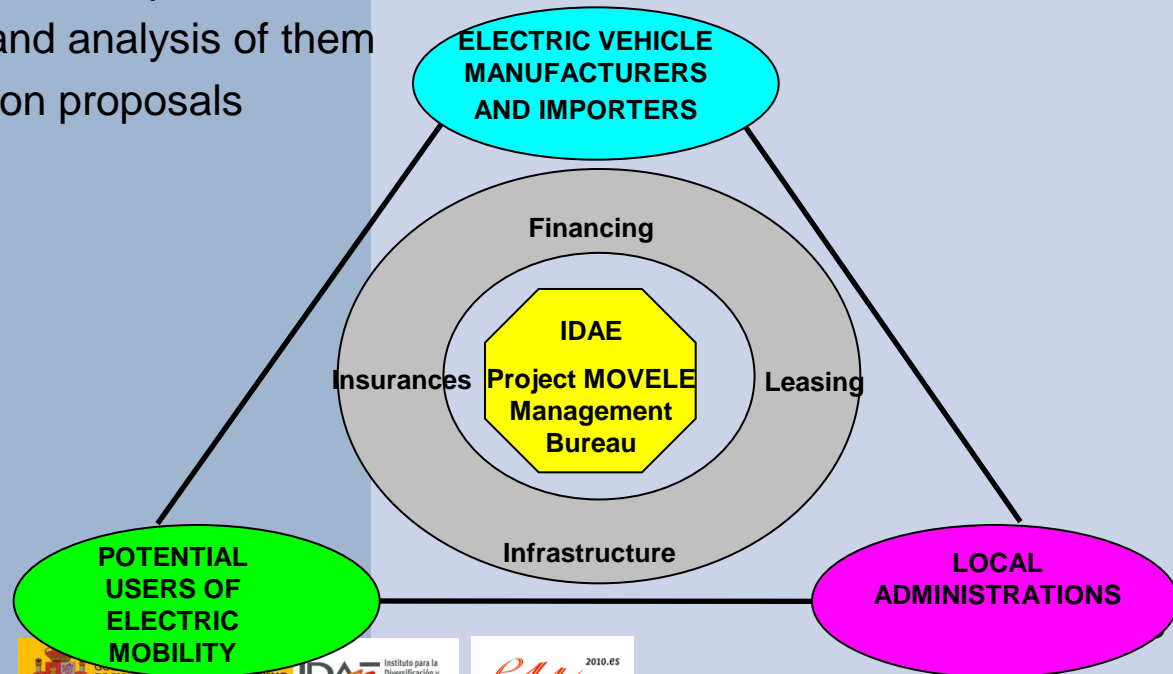


## OBJECTIVES

- Introduction of **2,000 EVs in Spanish cities**
- Disposal of recharging networks for public use.
- Gathering technical results and analysis of them
- Normative and standardization proposals
- Political guidelines

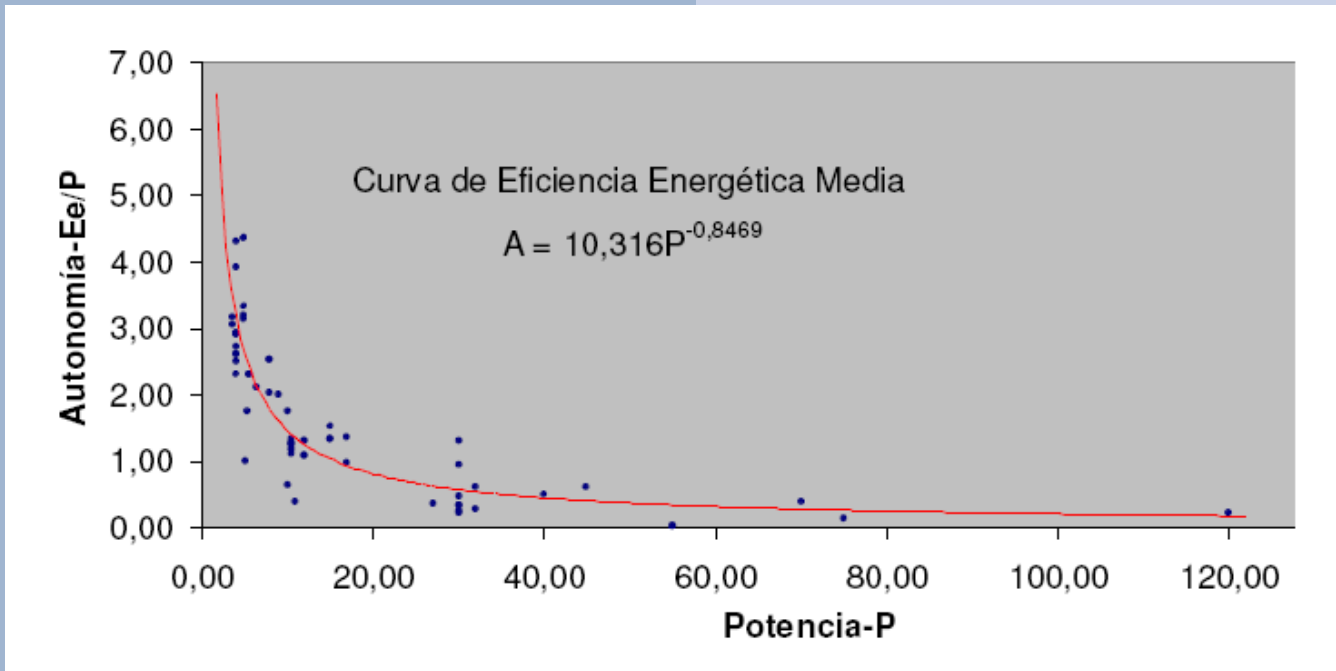
## CHARGING POINTS

<b>Total:</b>	<b>546</b>
Madrid:	280
Barcelona:	191
Sevilla:	75





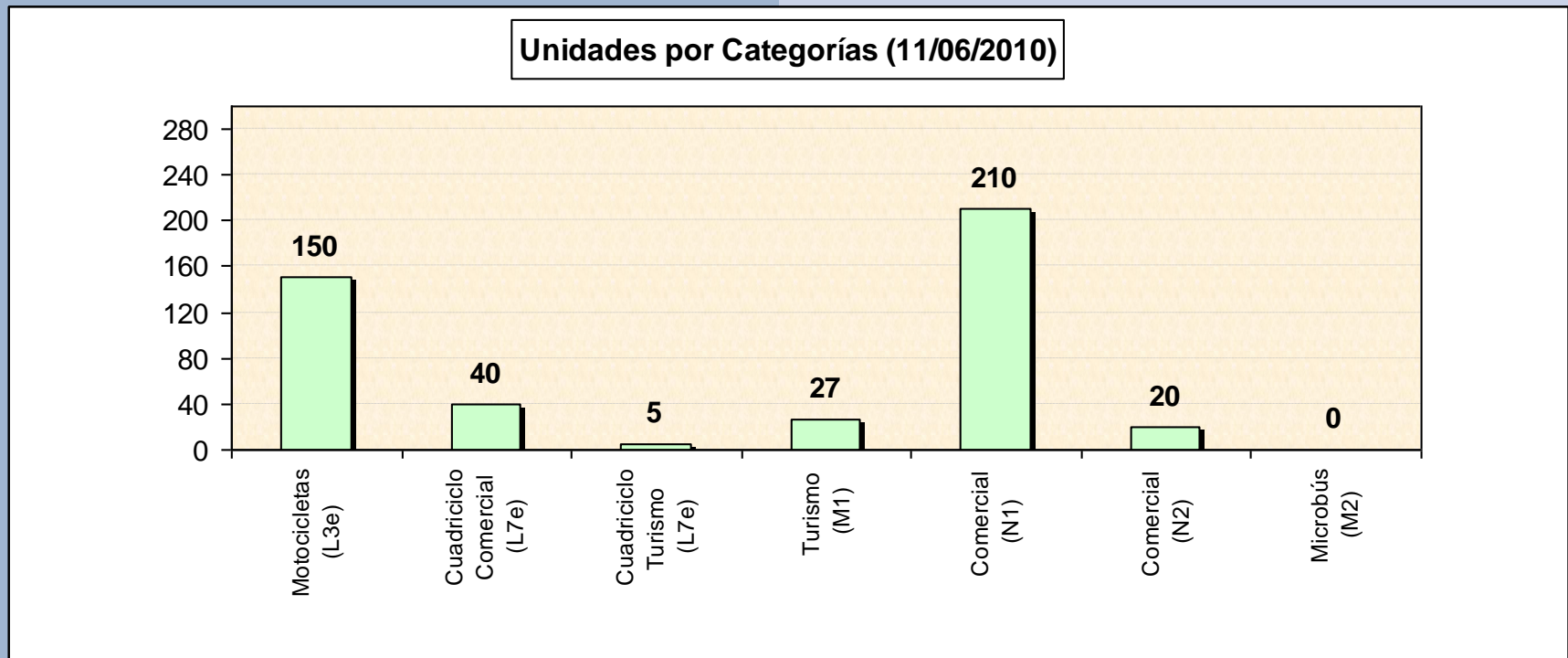
# FINANCIAL SUPPORT



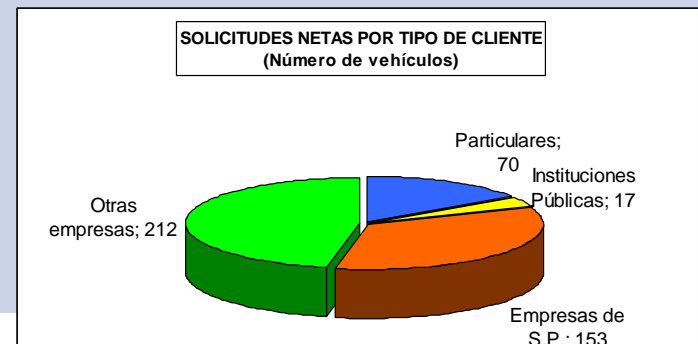
Categoría (Según Directivas 2002/24/CE y 2001/116/CE, anexo II)	Límite de ayuda con relación a la Curva de eficiencia energética media	
	Superior (20% del precio del vehículo)	Inferior (15% del precio del vehículo)
Motocicletas (L3e) .....	1.200 €	750 €
Cuadriciclos Pesados (L7e) .....	3.500 €	2.000 €
Turismo/Comercial (M1 y N1) Híbridos enchufables (M1 y N1).	7.000 €	5.000 €
Microbuses (M2) Comerciales < 6.500 kg (N2) .....	20.000 €	15.000 €



# MOVELE'S CURRENT STATUS



Total vehicles (11th June) : 452





## AGREEMENTS WITH REGIONAL ADMINISTRATIONS (E4)

### SUPPORT FOR VEHICLE RENEWAL:

#### EVs

- Motorbikes (more than 4kW): up to 750€
- Cars (M1) and commercials (N1) and cuadricycles (L7e): up to 15% of their market prices, with a maximum of 7.000€.
- Buses and trucks: up to 15% of their market prices, with a maximum of 50.000€.

#### PHEVs

- Cars with minimum electric range of 32 km (PHEV >20: Plugged-in Hybrid Electric Vehicle 20 miles or more.) Supporting: up to 7.000€.

Leasing, renting and other financing mechanisms accepted)

### RECHARGING POINTS

Charging points: up to 30% of the inversion costs, with a maximum of 60.000€



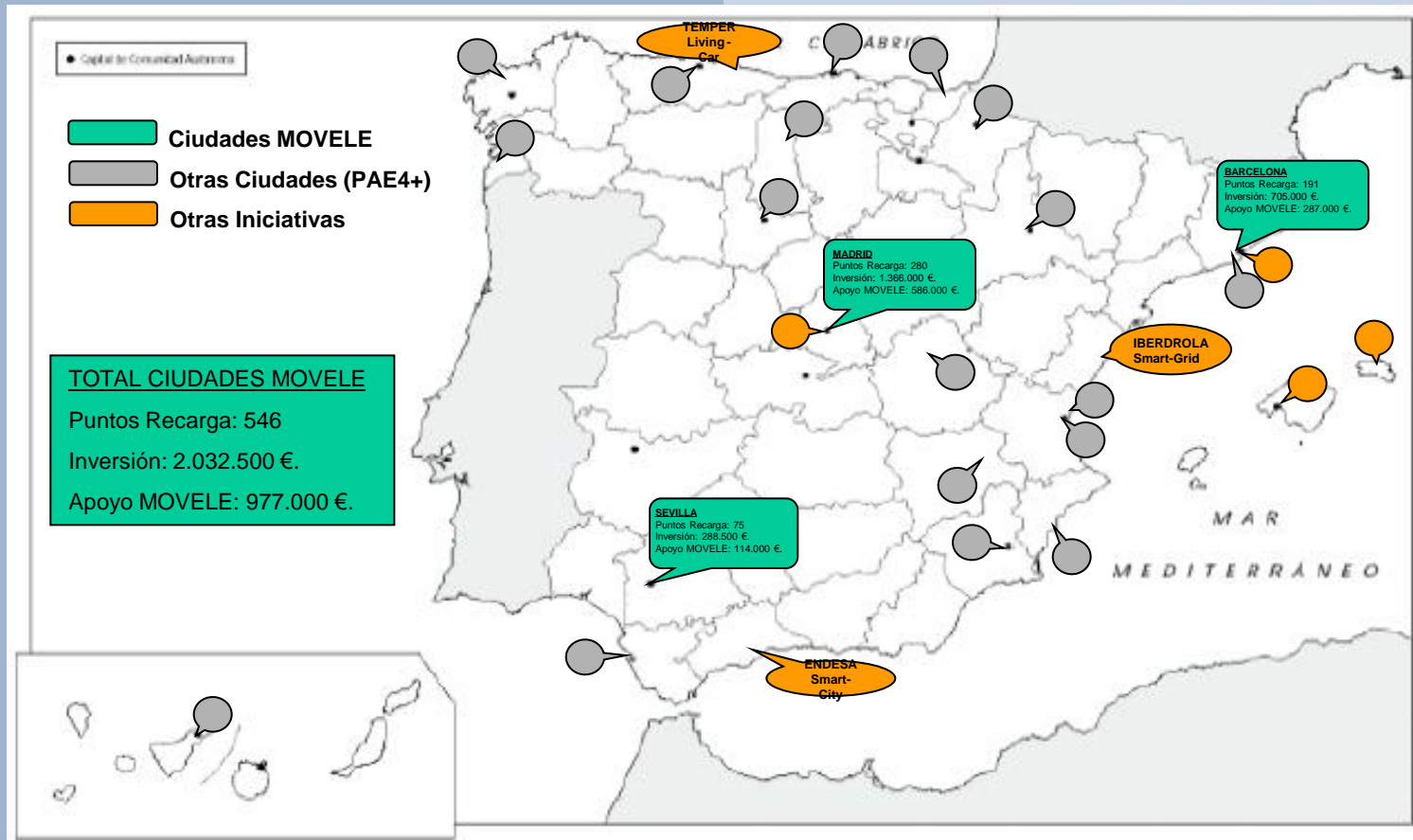
## AGREEMENTS WITH REGIONAL ADMINISTRATIONS (E4)

### SUPPORT FOR ELECTRIC NETWORK STATIONS

	Estimated budget	PAE4+ support
Investment concept	Euros	Euros
Covered charging point	1.000	1.000
Civil works associated	1.000	
Exterior charging point	3.500	2.000
Civil works associated	1.000	
Battery substitution point	66.666	10.000
Engineering/charging point	2.000	400
Communication Campaign	6.000	6.000



# PUBLIC CHARGING NETWORKS





# PUBLIC CHARGING NETWORKS: DATABASE

**Mapa** **Satélite** **Relieve**

**Current numbers:**  
**Number of cities: 17**  
**Instalations: 45**  
**Charging points: 134**

POWERED BY

Dirección:   Pulsa en la barra para mostrar la información de puntos cercanos

<http://www.idae.es/PtoRec/>




GOBIERNO DE ESPAÑA  
MINISTERIO DE INDUSTRIA, TURISMO Y COMERCIO

IDAIE Instituto para la Diversificación y Ahorro de la Energía

eu 2010.ES

# GOOGLE TOOL FOR USERS



**Fecha Actualización**

**Punto de Recarga**

**Dirección: Calle y No.**

**Descripción del Punto**

**Página de Descarga**

**Herramienta Cómo Llegar**

**Ubicación Geográfica del Punto de Recarga**



## INTEGRAL PLAN IN SPAIN TO IMPEL EVs (I)

**Electric vehicle Summit** organized by National Government in November 2009: sign of a Memorandum of understanding in which was defined a workgroup on several issues on EVs, coordinated by Ministry of Industry, Tourism and Commerce.

A 4 months work: 29 companies, 8 associations, 2 public entities, 6 ministries, National Federation of town councils (FEMP) and Regional Administrations.



Spanish Government presented on 6<sup>th</sup> April 2010 the **Integral Plan to impel EVs**.

**Objective:** to put a million HEVs and EVs/PHEVs on road for 2014 and consolidate a leadership position in the implementation of EVs.

**Why?** Because it suppose an opportunity for industry, technology (systems and components), environment and energy.



## INTEGRAL PLAN TO IMPEL EVs/PHEVs (II)

### STRATEGY TO IMPULSE EVs 2010-2014

#### 4 Key action lines :

1. Promotion of the demand :250.000 EVs/PHEVs on road for 2014 (85% fleets and 15% private use). Maximum support: 6.000€ per vehicle.
2. Industrialization and R&D&I: to support R&D&I and maximize the industry of components and equipments for EV and to establish factories to produce EV/PHEV
3. Infrastructures and Energy demand management: 343.510 charging points for 2014.
4. Horizontal programmes: to promote EVs and inform potential users and citizens about real situation, to establish training programmes for professionals and to identify and overcome legal barriers



## ACTION PLAN TO IMPEL EV, 2010-2012

**Budget:** 590M€

**15 Measures** divided in 4 action lines:

- Promotion of the demand: 4 measures.  
Budget: 240M€
- Industrialization and R&D&I: 3 measures.  
Budget: 313M€
- Infrastructure and Energy management: 4 measures.  
Budget: 35M€
- Horizontal programmes: 4 measures.  
Budget: 2M€

**Objectives 2012:**

- Vehicles on road: 70.000 vehicles
- Infrastructure: 108.850 charging points



# Thanks you for your attention