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I-CVUE»

INCENTIVES FOR CLEANER
VEHICLES IN URBAN EUROPE



Co-funded by the Intelligent Energy Europe
Programme of the European Union.



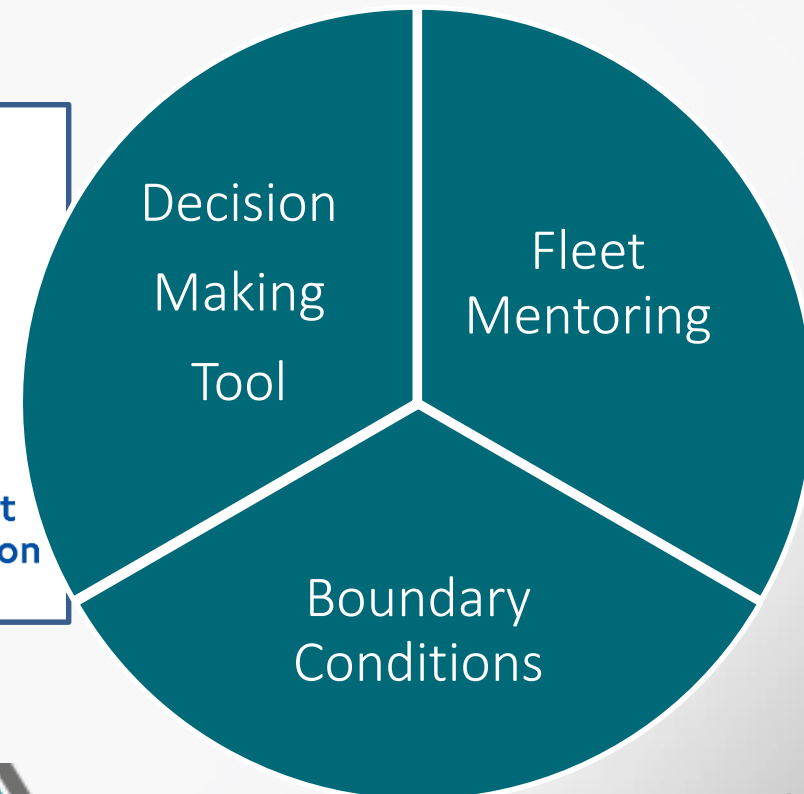
» Introduction

Aim

- Support the uptake of plug-in vehicles across Europe
- Reduce CO2 & other hazardous emissions in urban environments
- Increasing the number of electric vehicles in fleets

Specific objectives

- 1000 EVs
- Business cases for fleets
- Regional authority support
- Decision making tool

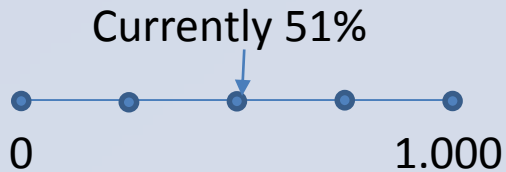


Co-funded by the Intelligent Energy Europe Programme of the European Union.



Fleet Mentoring

Goal for mentoring: replace of 1.000 ICE vehicles with EV's



Currently 59 fleets receive mentoring (each at different stages)

- Large and small company and governmental fleets
- Grey fleets (private cars, compensation for km's by company)
- Professional fleets (Taxi, (small) delivery van's, (light) trucks etc.)

Intensive and flexible approach resulting in a client led service

1 Analyse

2 Typology

3 Calculation

4 Consult

5 Preparation

6 Implemen-tation

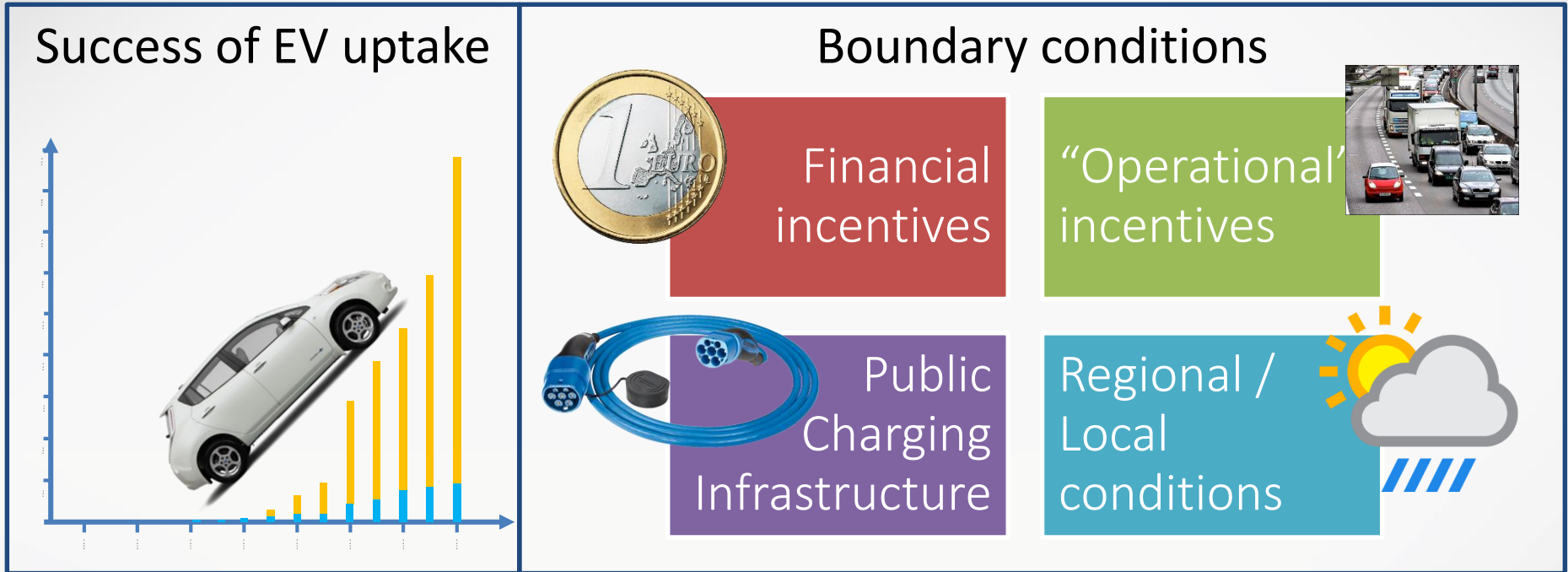
7 Monitor



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» The 4 Boundary Conditions studied

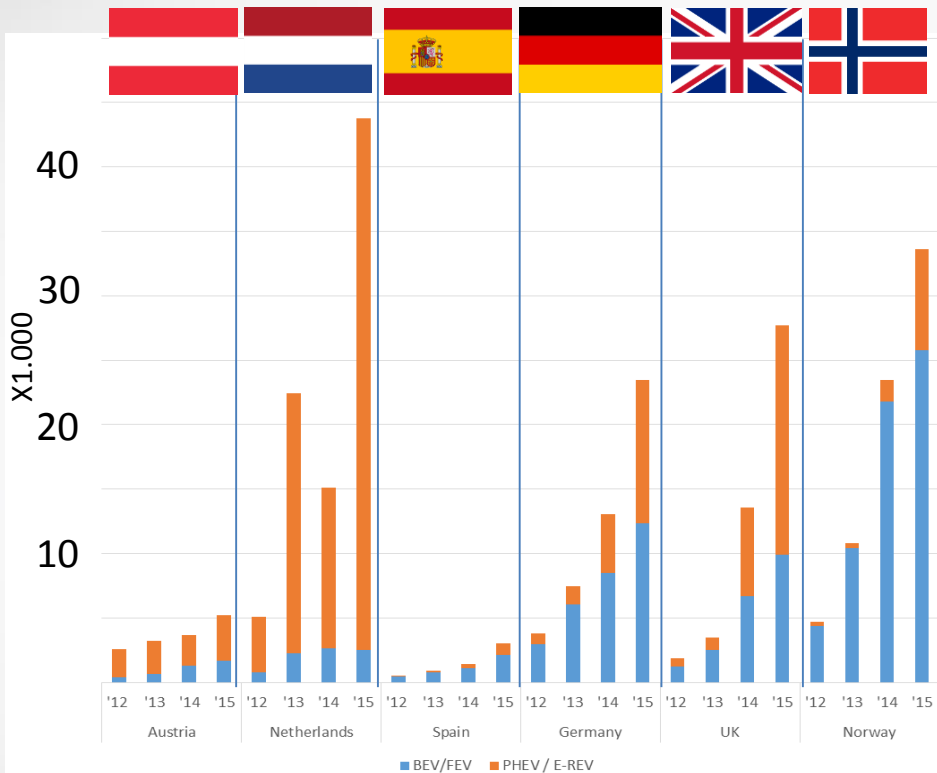


The analysis of the boundary conditions is focused on the **relationships** between the **success of EV uptake** and the **boundary conditions** within each country and the selected regions

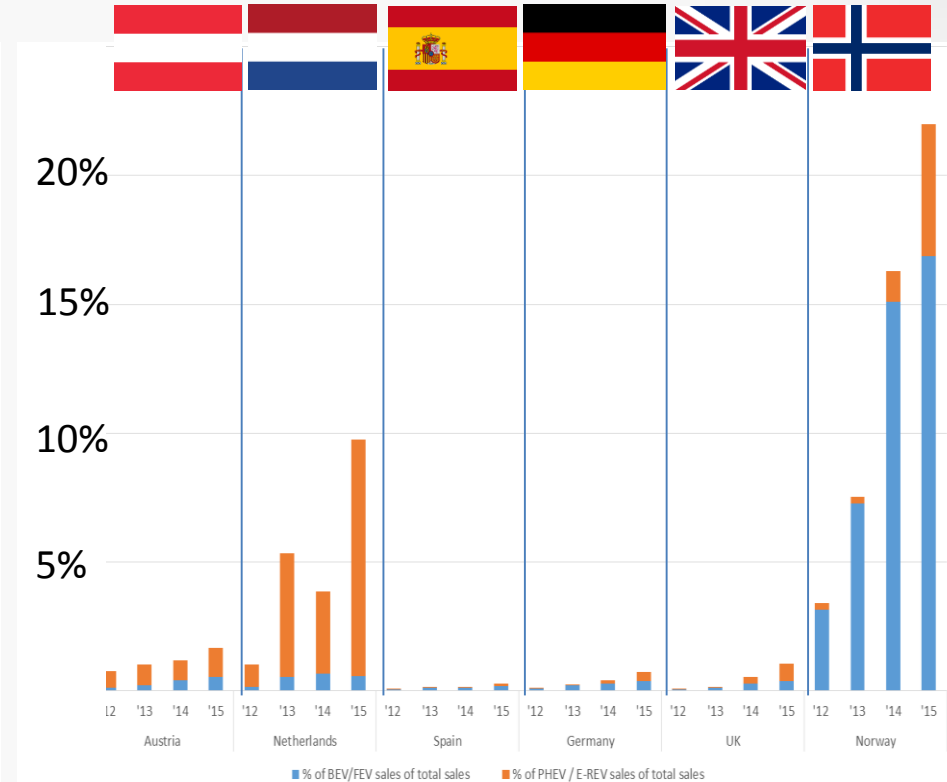


Success of EV uptake

Absolute number of sales of BEV/FEV and PHEV/E-REV per country



Percentages of sales of BEV/FEV and PHEV/E-REV of the total vehicle sales per country



EV's are all electric powered vehicles with a Plug. This includes BEV (Battery Electric Vehicle), FEV (Full Electric Vehicle), PHEV (Plug-in Hybrid Electric Vehicle), E-REV (Extended Range Electric Vehicle)

Examples of National Purchase incentives

Tax break & Subsidy

Fleet buyers: 100%
1st year amortization
→ corporation tax

No purchase
tax for cars
with low CO2
≈ € 2.900

Up to 36% extra
depreciation for
companies (lower
tax on profit)

No purchase tax for BEV ≈ € 5.700
No VAT (usually 25%) for BEV ≈ € 5.800

Cars with CO2 emission
<75g/km: purchase cost
reduction of 35% up to
€ 6.000

Registration tax: 0% for
EV's, normally: 14,75%

€ 2.700 subsidy for EV < 40
km e-range; € 3.700 between
> 40 but < 90 km; € 5.500 >
90 km

No standard fuel
consumption tax
for (PH)EV, NoVA
(registration tax)

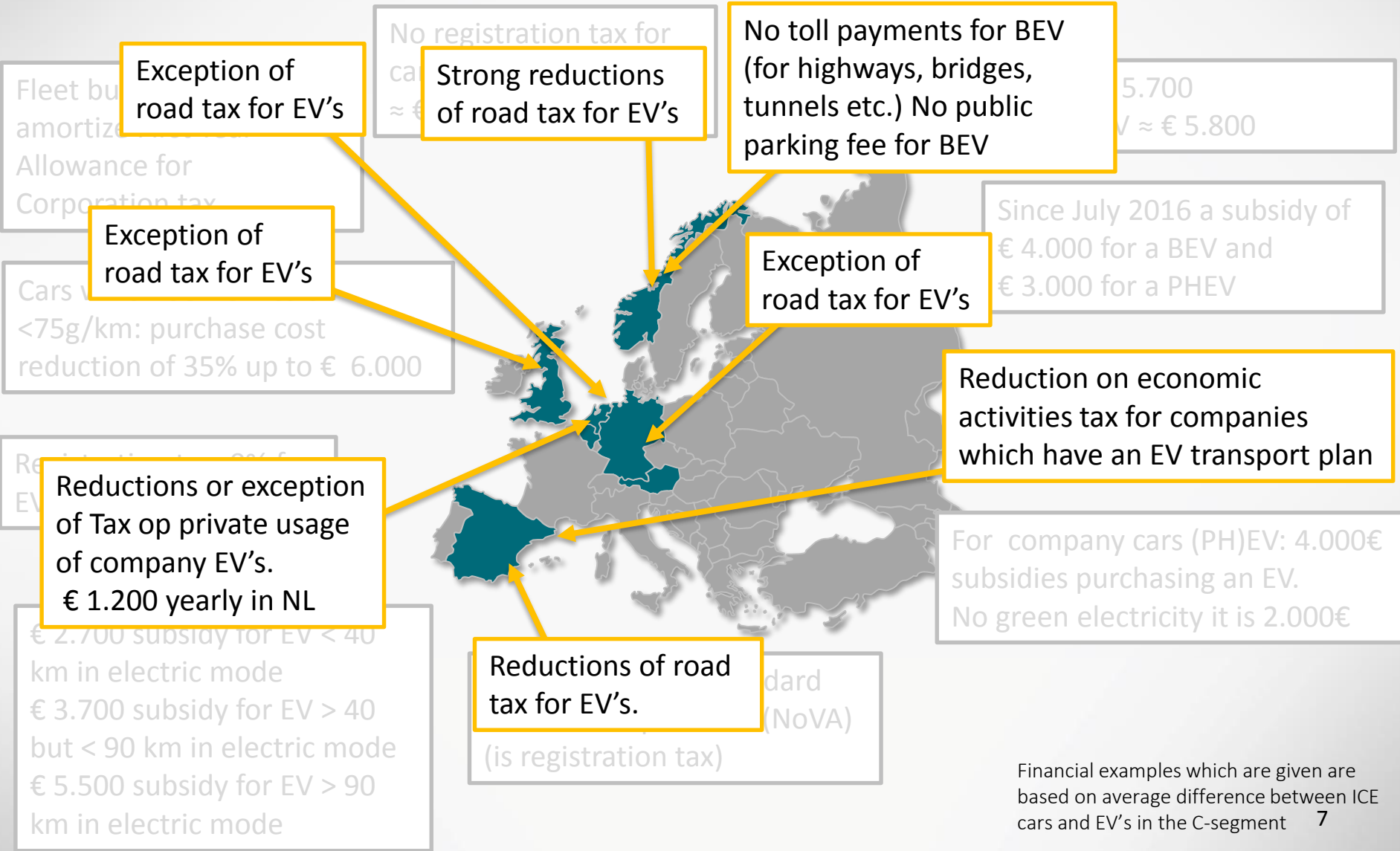
For companies VAT
on EV's deductible

7/2016: 4.000 subsidy for
BEV and € 3.000 for PHEV

For company cars (PH)EV: 4.000€
subsidies purchasing an EV.
No green electricity it is 2.000€

Financial examples which are given are
based on average difference between ICE
cars and EV's in the C-segment 6

Examples of National Operational incentives



Financial examples which are given are based on average difference between ICE cars and EV's in the C-segment 7

Segments selected for TCO calculations

- Financial incentives
- Non-financial incentives
- Public Charging Infrastructure
- Regional/Local conditions

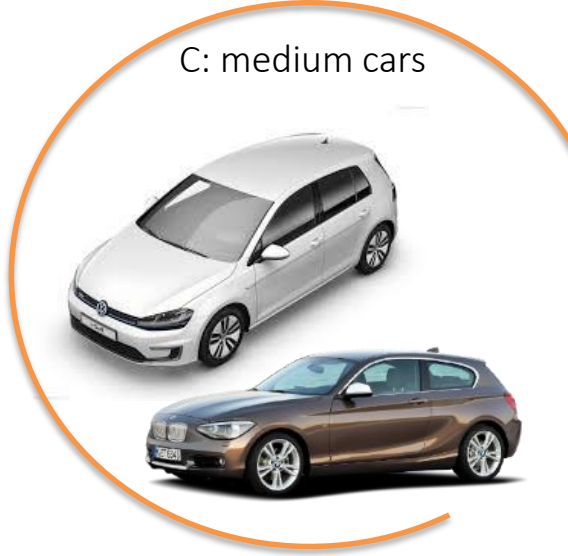
A: mini cars



B: small cars / supermini



C: medium cars



D: large cars



E: executive cars



N: delivery van



Decision support model

Difference in purchase and TCO

C: medium cars
4y ownership



12.000km/y

Purchase

13.879 8.098 10.861 20.479 10.530 6.134

TCO

5.372 2.564 5.861 12.810 1.583 10.481



24.000km/y

Purchase

11.459 5.691 9.526 17.209 7.642 283

TCO

8.544 3.442 4.887 9.531 4.467 8.544



Red means ICE is cheaper than EV

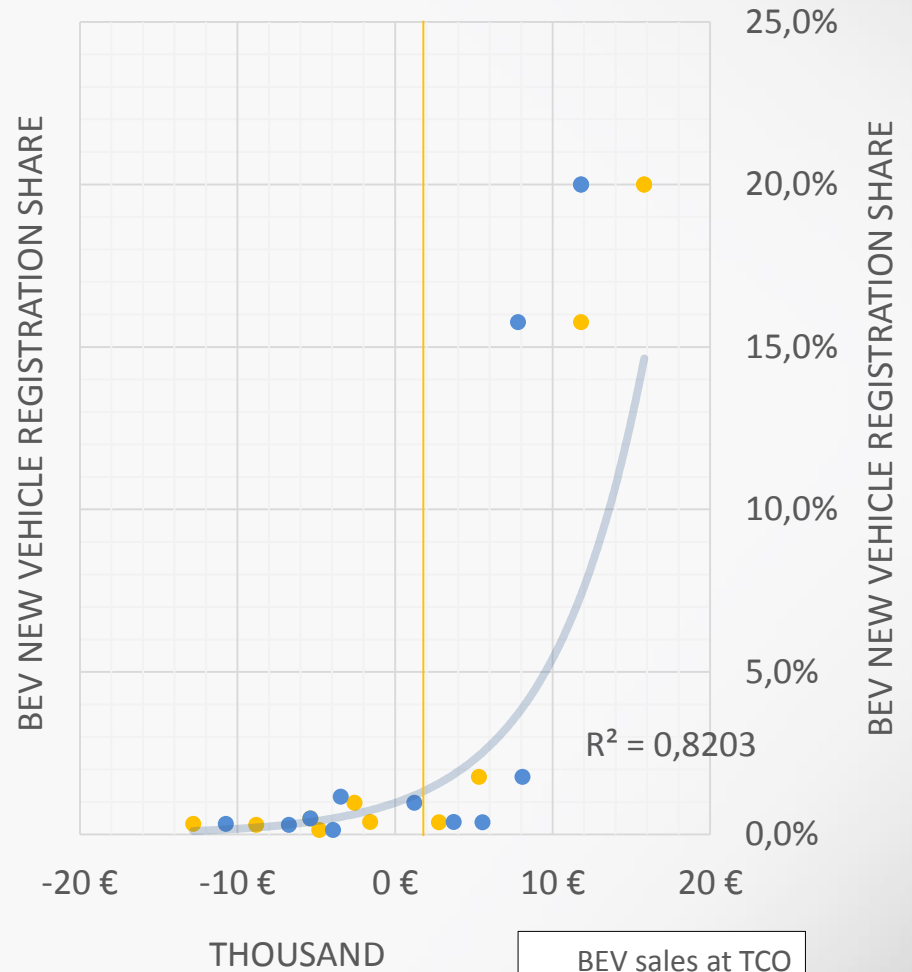
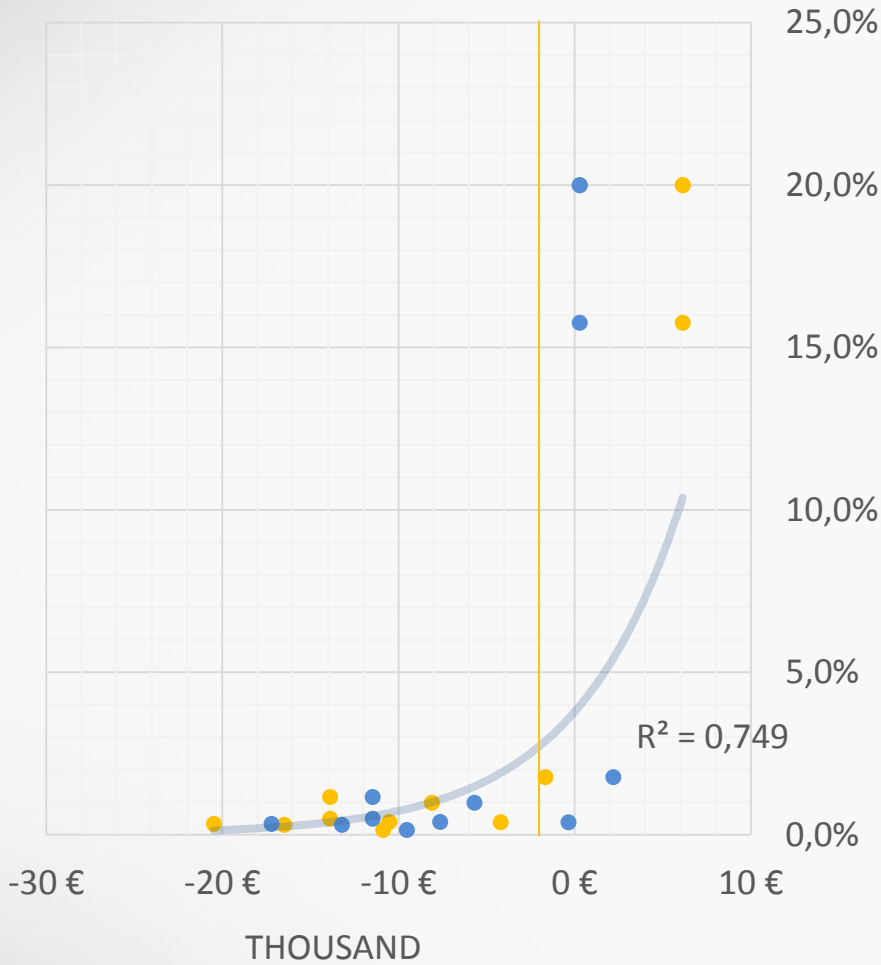
Green means EV is cheaper than ICE



Price elasticity – normal scale

BEV VS GASOLINE VEHICLE PURCHASE SURCHARGE

BEV VS GASOLINE VEHICLE TCO SURCHARGE



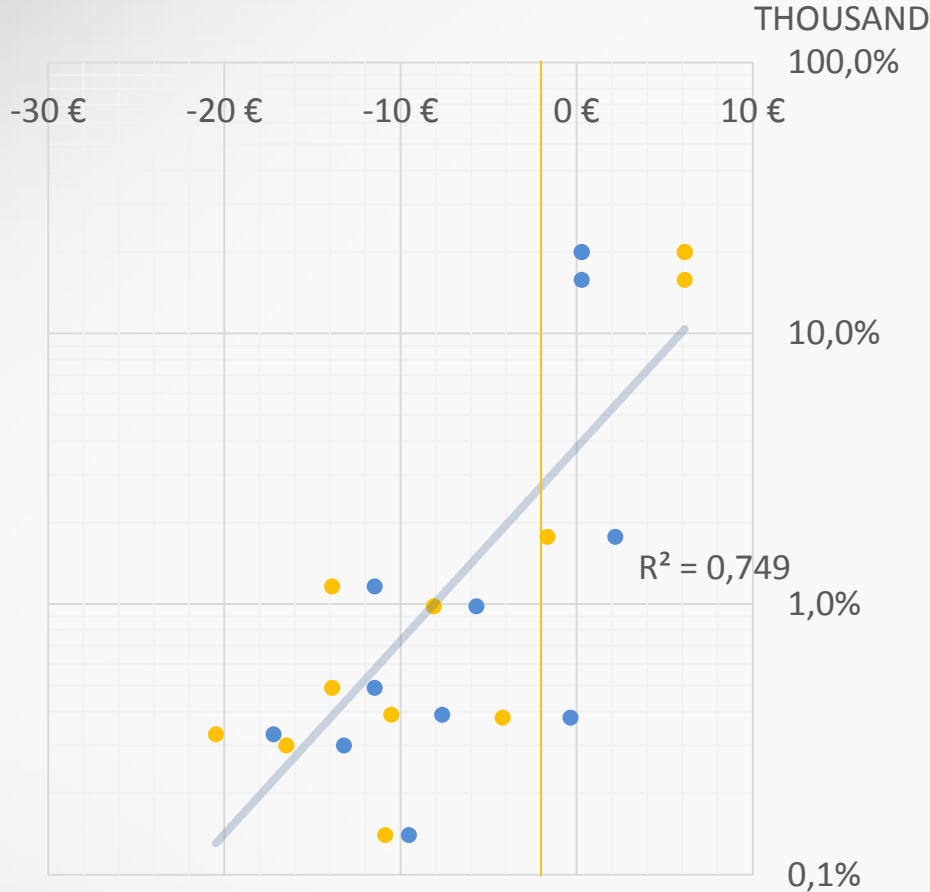
BEV sales at TCO (dis-)advantage:

- Private
- Business

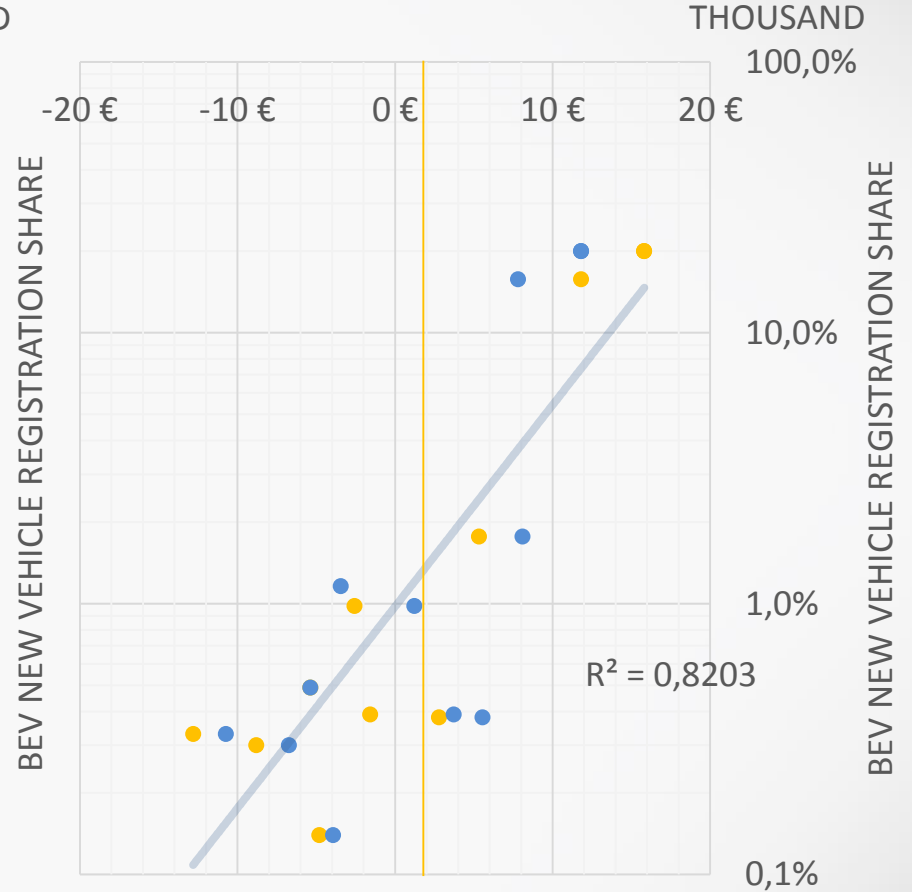


Price elasticity - Logarithmic scale

BEV VS GASOLINE VEHICLE PURCHASE SURCHARGE



BEV VS GASOLINE VEHICLE TCO SURCHARGE



BEV sales at TCO (dis-)advantage:

- Private
- Business



» Critical success factors

Is a positive business case a guarantee for sales.....? No!

- Private buyers decision heavily influenced by purchase price (companies focus on TCO)
- Uncertainties: Battery lifetime (perception); Accelerated technology innovation (more range at equal or lower cost) → Residual value
- Usage needs define the sales hurdle: Inability to do all travels (one-car-fits-all) → Alternative modalities or rentals needed
- Charging infrastructure, in most countries many hurdles still to overcome: Interoperable, right locations / dense network, right speed

Examples where EV's do well::

- 2 car household → replacing 1 car by EV for daily commute
- Car sharing systems. EV has strong advantages over ICE (charging)
- Predictable, stable use, which can be planned: Distribution, company pool cars, etc.



» Analyses of impact of regional/local incentives

Operational incentives



Examples of regional EV incentives

Grants / subsidies

Bus lanes/Taxi lanes/HOV Lanes

Toll payments on Bridge / Tunnel/ Highways / Ferry

Environmental zones/Congestion tax

Better / cheaper / free parking spots for EV's

Cheap / free charging

Rollout of charging infrastructure

Support/initiate Electric vehicles scheme's

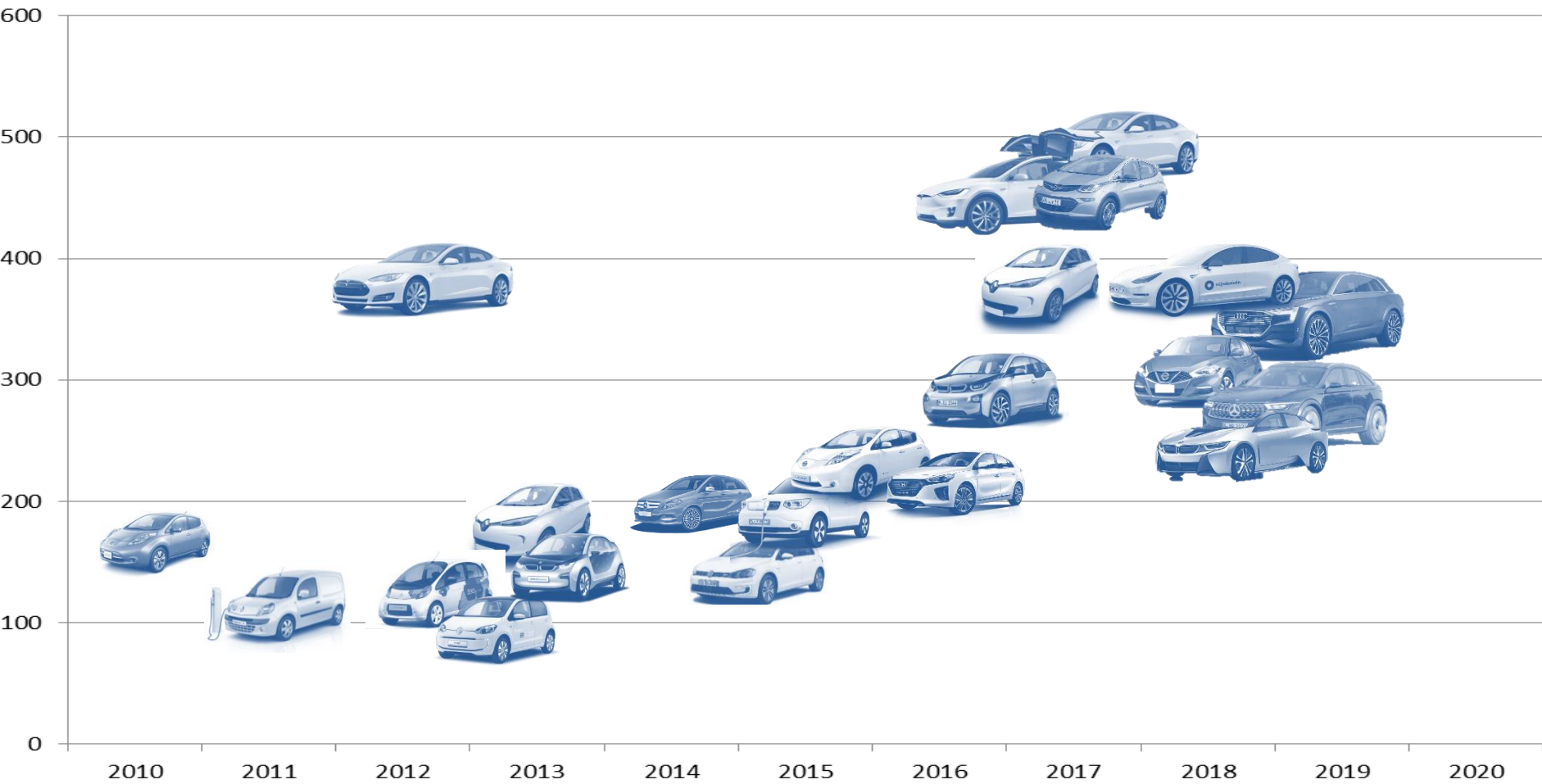
Support EV uptake at taxi's (priority pick-up locations)

EV's in governmental fleets

Car Allowance Rebate System

- The relation between the uptake of EVs in certain regions and the financial incentives within these regions are not easily linked (EV's are registered at leasing companies)
- The local policies/incentives create micro-environments with a substantial impact on national figures
- The impact will be measured the workshops, interviews & surveys

» Growth of available models/range of BEV's (incl. future expectations):



» Main conclusions

- More room for incentives for countries with high purchase tax
 → The polluter pay principle! (See NO + NL)
- For substantial impact on EV uptake, financial incentives need to:
 - Minimize the purchase price premium (EV – ICE)
 - Create a TCO advantage over ICE (overcome the obstacles and limitations of EV)
- Above threshold uptake-effects of incentives become progressive, below threshold effects are minimal (price elasticity)
- Tremendous impact of daily advantages like road/parking priorities and recurring toll-cost
- Dense network of (public) chargers satisfying the needs of EV drivers and matching the characteristics of their cars: Right locations, available & accessible, affordable prices and right charging speed.

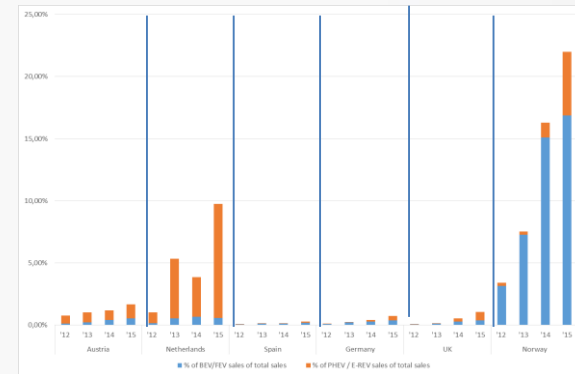


Financial incentives

Non-financial incentives

Public Charging Infrastructure

Regional/Local conditions



» Decision support model

Calculation model to identify business cases for EV's

Fleet managers

Fleet level

- TCO calculation tool including monetary incentives
- Easy to use, fast to access, full of expert knowledge, still flexible to use
- To compare plug-in electric vehicles to conventional reference vehicles

Policy makers

National level

- Possibility to analyze regional conditions for EVs (e.g. free parking etc.)
- Transfer of incentives between regions or countries

Work in progress: Extrapolate the benefits of incentive policies

- Consider first & secondary vehicle market
- Available as web service and report



Please go to
the website and
register at
icvue.eu

Decision support model – fleet managers

Market Potential Su | Results | https://icvue-dsm.maxapex.net/apex/f?p=ICVUE:RESULTS:7805986274869::NO:600:P600_SIM_ID:637

I-CVUE INCENTIVES FOR CLEANER VEHICLES IN URBAN EUROPE DECISION SUPPORT MODEL

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Account Home Data Simulation Results Transfer

Simulation results

Summary

The Total Costs of Ownership of the alternative vehicle are **2465 € higher** than those of the conventional vehicle. You may save up to 4.41 tons of CO₂ emissions during the ownership period using the alternative vehicle instead of the conventional one.

Total Costs of Ownership

This simulation compares two A-segment vehicles (i.e. Mini car: e.g. Smart). The conventional vehicle Reference_NL_A_Petrol has a Petrol engine, whereas the alternative car Reference_NL_A_Electric is a Battery Electric Vehicle (BEV). The simulation is based on an ownership period of 4 years in Netherlands. An annual mileage of 15765 km(s) was specified. No profit tax reliefs are considered in this calculation due to private or public ownership of the vehicle. Cost control scenario Reference_company_private determines which costs are considered and their distribution in this calculation.

Comparing the monthly depreciation cost, those of the alternative vehicle are **dramatically higher** (312 €₂₀₁₆ per month) than those of the conventional vehicle (143 €₂₀₁₆ per month). Note that depreciation costs strongly depend on the resale value, which in turn depends on the period of ownership, annual mileage and the powertrain.

The alternatively powered vehicle has **significantly lower** energy cost (47 €₂₀₁₆ per month) compared to the conventional vehicle (64 €₂₀₁₆ per month). Energy cost per km of the conventional car develop from .057 €/km in 2016 to .062 €/km in 2019, whereas the same costs for the alternative vehicle range from .018 €/km in 2016 to .019 €/km in 2019. It was assumed that for trips that exceed the Battery Electric Vehicle's range (including your charging strategy, if specified) a conventional vehicle is used with identical fuel consumption to Reference_NL_A_Petrol. Energy cost and total CO₂ emissions of the alternative vehicle were adjusted accordingly.

Costs for a fully comprehensive insurance, maintenance and repair as well as motor vehicle taxes (annual cost) sum up to 128 €₂₀₁₆ per month and are **significantly lower** than the same costs for the conventional vehicle (159 €₂₀₁₆ per month).

No miscellaneous cost items were considered.

All costs for owning and operating a vehicle reduce a company's profit and thus result in a tax relief. These savings are **dramatically higher** for the alternative vehicle (161 €₂₀₁₆ per month) than for the conventional car (91 €₂₀₁₆ per month). In dependence of the cost distribution, the driver of the vehicle has to pay for benefit in kind and or other costs. An employee income tax rate of 42% is considered in this calculation. The driver of the vehicle would pay a **dramatically lower** amount of money for the alternative vehicle (30 €₂₀₁₆ per month) than for the conventional car (64 €₂₀₁₆ per month). These costs do not count against the owner of the vehicle and are thus considered as 'Third-party costs'.

Altogether, the Total Costs of Ownership are **slightly higher** for the alternative vehicle (327 €₂₀₁₆ per month) than for the conventional car (275 €₂₀₁₆ per month). However, the total well-to-wheel CO₂ emissions, which include emissions from the production and distribution of electricity and fuel, during the period of ownership are **dramatically lower** for the alternative vehicle (2.6 t CO₂) than for the conventional car (7.01 t CO₂). The saved amount of CO₂ emissions corresponds^[1] to a forest area of 3037 m². Additionally, the alternative vehicle **reduces noise pollution** (especially at the low driving speeds in cities), and eliminates the local pollutant emissions, e.g. NO_x and particulates.

^[1]Goldfinger S., Oursler A. (2009) Footprint Factbook Africa 2009, Global Footprint Network Oakland

You might find a business case for your fleet with our EU-funded mentoring

The graph below shows, for the whole ownership period, total costs and important cost components calculated with the present value method. All values are given in €₂₀₁₆. Thus, these numbers include cost of money for each item, i.e. the missed profit due to lost interest rates for the investments has been accounted for.

Result of one test:
ICE (P) vs EV in A segment
Netherlands
15.000km/y
4 year ownership

TCO EV > TCO ICE (P)
EV is more expensive
Delta: € 2.465



Navigation
Overview



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Decision support model – fleet managers

Market Potential Su x Results x
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I-CVUE INCENTIVES FOR CLEANER VEHICLES IN URBAN EUROPE DECISION SUPPORT MODEL

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Simulation results

Summary

The Total Costs of Ownership of the alternative vehicle are **4685 € lower** than those of the conventional vehicle. You may save up to **2.81 tons** of CO₂ emissions during the ownership period using the alternative vehicle instead of the conventional one.

Total Costs of Ownership

This simulation compares two **C-segment** vehicles (i.e. Compact car: e.g. VW Golf). The conventional vehicle **Reference_NL_C_Diesel** has a Diesel engine, whereas the alternative car **Reference_NL_C_Electric** is a Battery Electric Vehicle (BEV). The simulation is based on an ownership period of **4 years** in Netherlands. An annual mileage of 15765 km(s) was specified. No profit tax reliefs are considered in this calculation due to private or public ownership of the vehicle. Cost control scenario **Reference_company_private** determines which costs are considered and their distribution in this calculation.

Comparing the monthly depreciation cost, those of the alternative vehicle are **significantly higher** (395 €₂₀₁₆ per month) than those of the conventional vehicle (304 €₂₀₁₆ per month). Note that depreciation costs strongly depend on the resale value, which in turn depends on the period of ownership, annual mileage and the powertrain.

The alternatively powered vehicle has **marginally lower** energy cost (39 €₂₀₁₆ per month) compared to the conventional vehicle (42 €₂₀₁₆ per month). Energy cost per km of the conventional car develop from .037 €/km in 2016 to .042 €/km in 2019, whereas the same costs for the alternative vehicle range from .032 €/km in 2016 to .033 €/km in 2019.

Costs for a fully comprehensive insurance, maintenance and repair as well as motor vehicle taxes (annual cost) sum up to 160 €₂₀₁₆ per month and are **dramatically lower** than the same costs for the conventional vehicle (309 €₂₀₁₆ per month).

No miscellaneous cost items were considered.

All costs for owning and operating a vehicle reduce a company's profit and thus result in a tax relief. These savings are **significantly higher** for the alternative vehicle (198 €₂₀₁₆ per month) than for the conventional car (162 €₂₀₁₆ per month). In dependence of the cost distribution, the driver of the vehicle has to pay for benefit in kind and/or other costs. An employee income tax rate of 42% is considered in this calculation. The driver of the vehicle would pay a **dramatically lower** amount of money for the alternative vehicle (37 €₂₀₁₆ per month) than for the conventional car (139 €₂₀₁₆ per month). These costs do not count against the owner of the vehicle and are thus considered as 'Third-party costs'.

Altogether, the Total Costs of Ownership are **significantly lower** for the alternative vehicle (396 €₂₀₁₆ per month) than for the conventional car (493 €₂₀₁₆ per month). However, the total well-to-wheel CO₂ emissions, which include emissions from the production and distribution of electricity and fuel, during the period of ownership are **dramatically lower** for the alternative vehicle (3.76 t CO₂) than for the conventional car (6.57 t CO₂). The saved amount of CO₂ emissions corresponds^[1] to a forest area of 1935 m². Additionally, the alternative vehicle **reduces noise pollution** (especially at the low driving speeds in cities), and eliminates the local pollutant emissions, e.g. NO_x and particulates.

^[1]Goldfinger S., Oursler A. (2009) Footprint Facebook Africa 2009, Global Footprint Network Oakland

Good news: You can save money and the environment at the same time!
»Request EU-funded mentoring for your fleet now

The graph below shows, for the whole ownership period, total costs and important cost components calculated with the present value method. All values are given in €₂₀₁₆. Thus, these numbers include cost of money for each item, i.e. the missed profit due to lost interest rates for the investments has been accounted for.

Navigation
Overview 

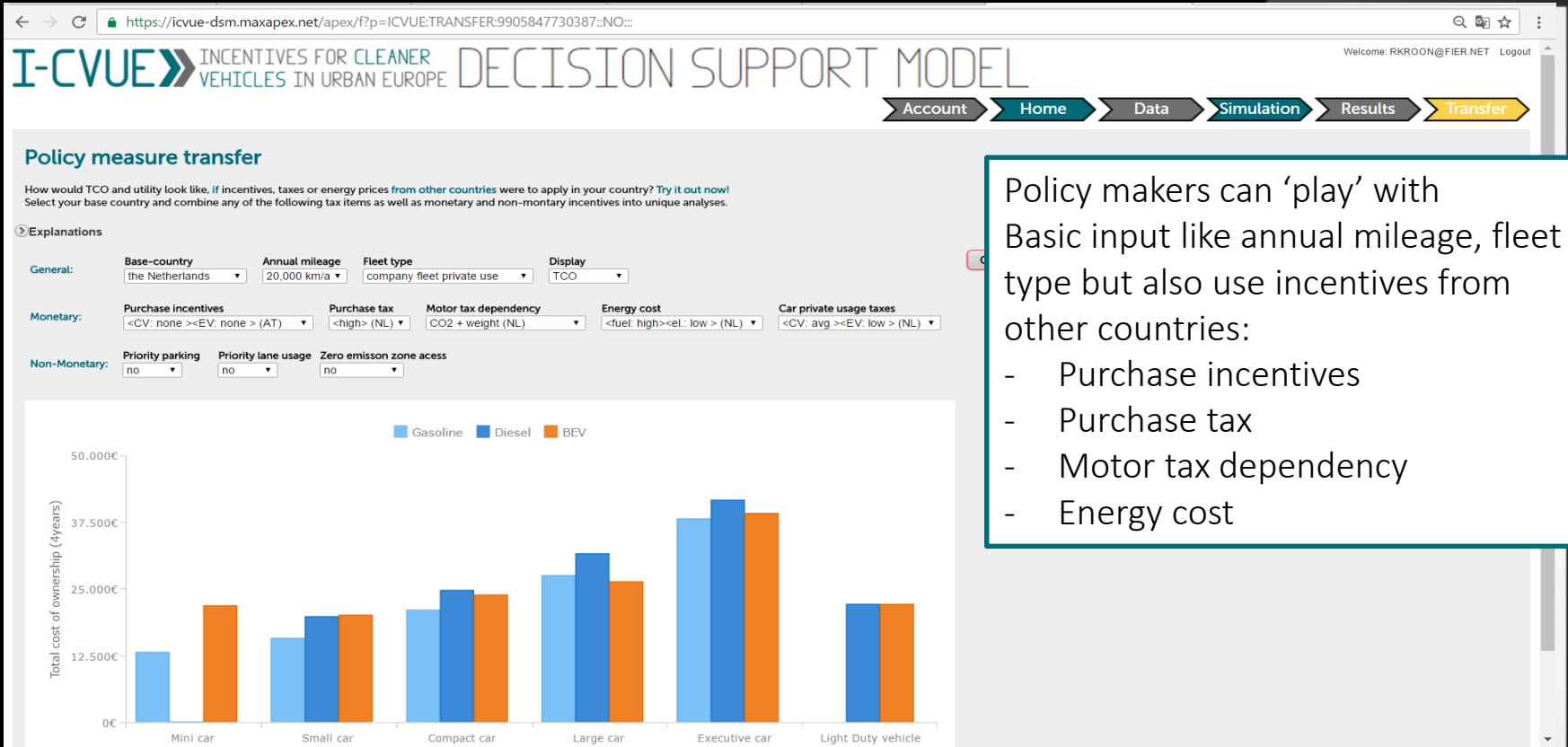
Result of one test:
ICE (D) vs EV in C segment
Netherlands
15.000km/y
4 year ownership

TCO EV < TCO ICE (D)
Delta: € 4.685



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Decision support model – Policy makers



Policy makers can 'play' with Basic input like annual mileage, fleet type but also use incentives from other countries:

- Purchase incentives
- Purchase tax
- Motor tax dependency
- Energy cost



Decision support model – Policy makers

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I-CVUE INCENTIVES FOR CLEANER VEHICLES IN URBAN EUROPE **DECISION SUPPORT MODEL**

Account Home Data Simulation Results Transfer

Policy measure transfer

How would TCO and utility look like, if incentives, taxes or energy prices from other countries were to apply in your country? Try it out now!
 Select your base country and combine any of the following tax items as well as monetary and non-monetary incentives into unique analyses.

Explanations

General: Base-country: the Netherlands, Annual mileage: 20.000 km/a, Fleet type: company fleet private use, Display: Extrapolate

Monetary: Purchase incentives: <CV: none ><EV: none > (NL), Purchase tax: <high> (NL), Motor tax dependency: CO2 + weight (NL), Energy cost: <fuel: high><el: low > (NL), Car private usage taxes: <CV: avg ><EV: low > (NL)

Non-Monetary: Priority parking: no, Priority lane usage: no, Zero emission zone access: no

Plugin Electric Vehicle potential by fleet type and vehicle size

Mini car	minimal	minimal	minimal	minimal	minimal
Small car	minimal	minimal	minimal	minimal	minimal
Compact car	minimal	minimal	minimal	minimal	minimal
Large car	low - average	high	minimal	high	high
Executive car	minimal	minimal	minimal	minimal	minimal
Light Duty vehicle	high	high	high	high	
	rental	logistics	public service	company car	private

- Extrapolation of EV market potentials
- Analyze the short-term market potentials of EV's , differentiated by vehicle size and fleet type
 - Extrapolate effects of legislative changes on PEV market uptake.



Decision support model – Policy makers

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How would TCO and utility look like, if incentives, taxes or energy prices from other countries were to apply in your country? Try it out now!
Select your base country and combine any of the following tax items as well as monetary and non-monetary incentives into unique analyses.

Explanations

General: Base-country: the Netherlands, Annual mileage: 20,000 km/a, Fleet type: company fleet private use, Display: Extrapolate

Monetary: Purchase incentives: <CV: 1,500€><EV: 5,500€> (ES), Purchase tax: <high> (NL), Motor tax dependency: CO2 + weight (NL), Energy cost: <fuel: high><el: low > (NL), Car private usage taxes: <CV: high><EV: free> (AT)

Non-Monetary: Priority parking for EVs, Priority lane usage for EVs, Zero emission zone access for EVs only

Plugin Electric Vehicle potential by fleet type and vehicle size

	rental	logistics	public service	company car	private
Mini car	minimal	minimal	minimal	minimal	minimal
Small car	low - average	high	minimal	low - average	high
Compact car	high	high	high	high	high
Large car	very high	very high	very high	high	very high
Executive car	minimal	minimal	minimal	minimal	minimal
Light Duty vehicle	very high	very high	very high	very high	

Extrapolation of EV market potentials

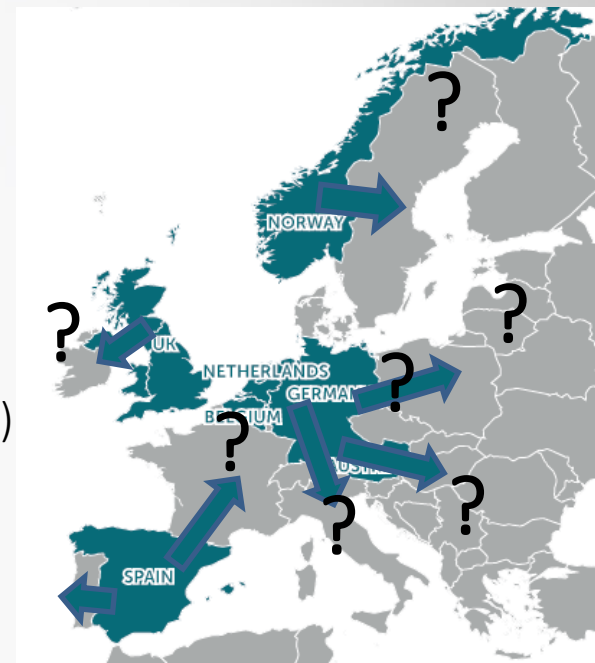
- Analyze the short-term market potentials of EV's , differentiated by vehicle size and fleet type
- Extrapolate effects of legislative changes on PEV market uptake.



I-CVUE

Invitation for cooperation

- Contact us if interested in
 - Further expansion of the study (add your country e.g.)
 - The continuation of DSM tool
 - Interested in EV policy (advice)
 - Etc.



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