

# ***AUTOMOTIVE*** ***SUMMIT 2014***



Green Mobility Changing the World

19 - 20 June 2014

Bitec Bangna, Bangkok

# ***AUTOMOTIVE SUMMIT 2014***

## **DRIVING INTO THE FUTURE: BMW STRATEGY FOR SUSTAINABLE DEVELOPMENT**

Mr. Gerhard Woerle – Senior Manager Government Affairs

**BMW  
GROUP**



**Rolls-Royce**  
Motor Cars Limited

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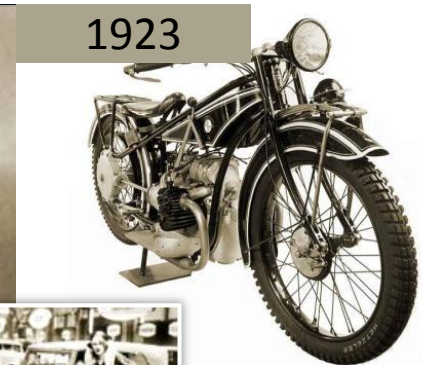
BMW. ALMOST 100 YEARS OF EXPERIENCE.  
MOBILITY HAS ALWAYS BEEN OUR BUSINESS.



1916/1919



1923



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**BMW GROUP.  
THREE STRONG PREMIUM BRANDS.**



Sheer driving  
pleasure



The world's most exciting  
premium small brand



The pinnacle of  
automobile luxury



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**BMW GROUP IS RECOGNIZED AS THE WORLD'S MOST SUSTAINABLE  
AUTOMOTIV COMPANY FOR 8 CONSECUTIVE YEAR. DJS-INDEXES.**



**Dow Jones  
Sustainability Indexes**  
Member 2011/12



**SUSTAINALYTICS**



**FTSE4Good**  
Environmental Leader



MEMBER OF  
THE INVESTMENT REGISTER

**ETHIBEL  
EXCELLENCE**

**CARBON DISCLOSURE PROJECT**

**Corporate  
Responsibility**

**Prime**

rated by

**oekom research**

UNTERNEHMERISCHE  
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- UMWELT
- MITARBEITER
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**SEHR GUT**

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Sustainability throughout the value added chain is inseparable from our corporate self-image. This is the way we choose to take responsibility. Because of our convictions, but also our self-interest, now and in the future."

Dr. Norbert Reithofer, Chairman of the Board of Management of the BMW Group

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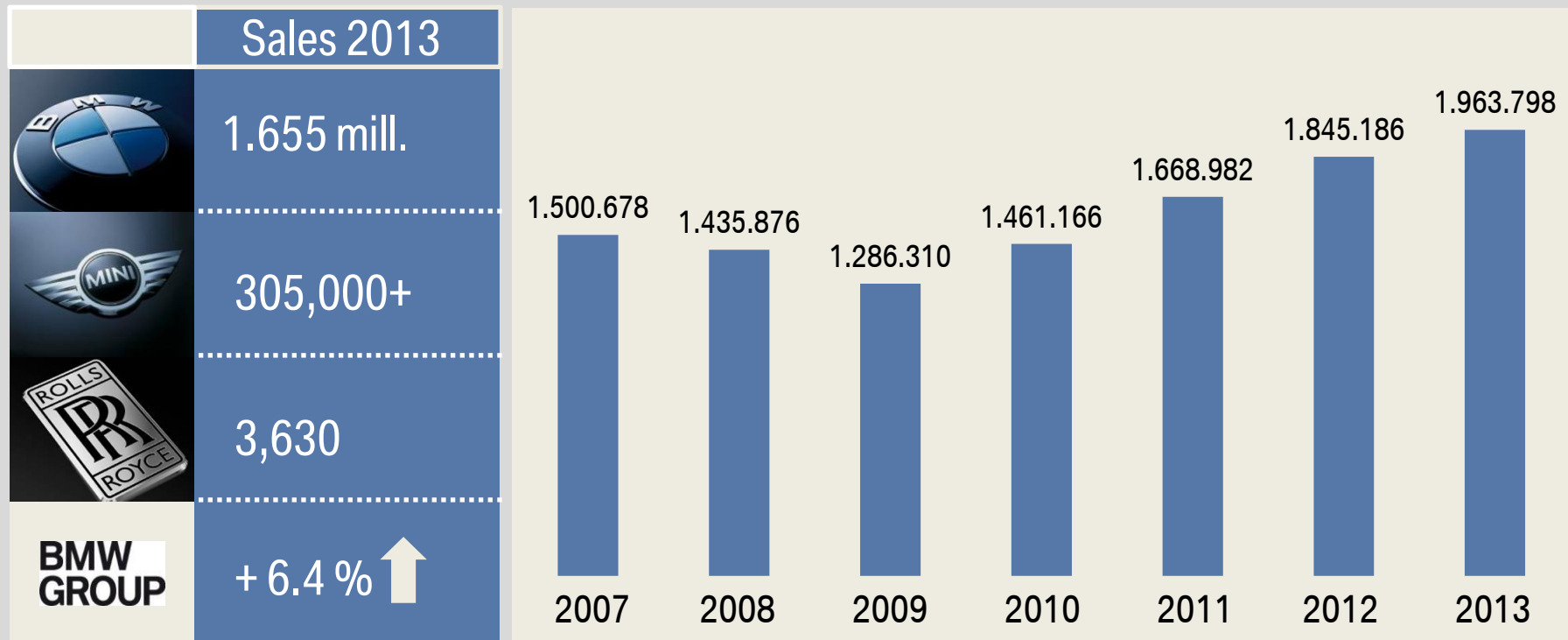
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**CONSISTENT GROWTH.  
RECORD SALES IN 2013.**



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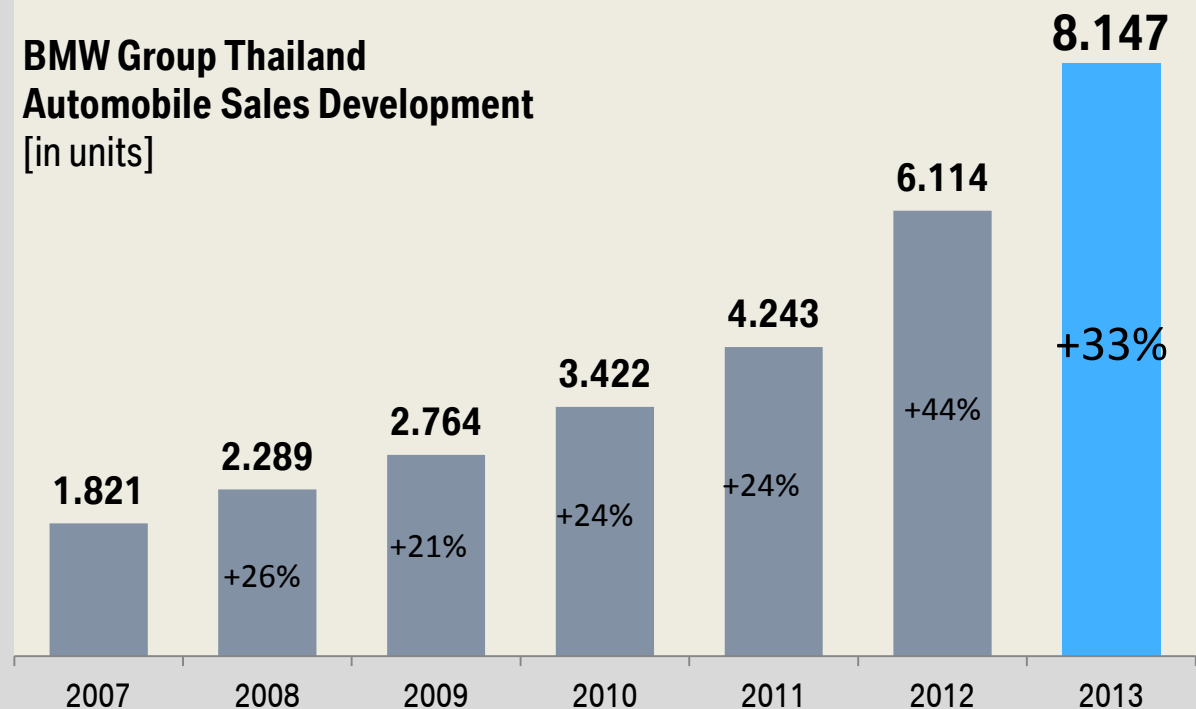
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**BMW  
GROUP**

## RESULTS OF BMW GROUP THAILAND IN 2013. RECORD SALES FOR THIRD CONSECUTIVE YEAR.

	Sales 2013
	7,536 (+34%) ↑
	611 (+22%) ↑
BMW Group Automobile	8,147 (+33%) ↑
BMW Motorrad	400 (+38%) ↑

### BMW Group Thailand Automobile Sales Development [in units]



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BMW GROUP THAILAND.  
CKD PORTRAIT WITH EXPANSION TO INCLUDE BMW 3 SERIES GT,  
BMW 1 SERIES, BMW X5 AND BMW F800 R IN 2014.



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**BMW GROUP THAILAND MANUFACTURING IN 2014.**  
THE ONLY PLANT WITHIN BMW PRODUCTION NETWORK WORLDWIDE  
PRODUCING THE THREE BRANDS, BMW, MINI AND BMW MOTORRAD.



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## MEGATRENDS FOR THE FUTURE OF MOBILITY.



### Environment

Climate change and the subsequent effects



### Urbanisation

By 2030, over 60 % of world population  
will live in cities



### Politics and Regulations

CO<sub>2</sub> - and fleet regulations,  
Restrictions on imports

## DRIVING CHANGE IN MOBILITY

### Economics

Shortage of resources, increase in the price of  
fossil fuels



### Culture

Sustainable mobility as part of a modern urban  
lifestyle; assumption of social responsibility



### Customer Expectations

Changing values



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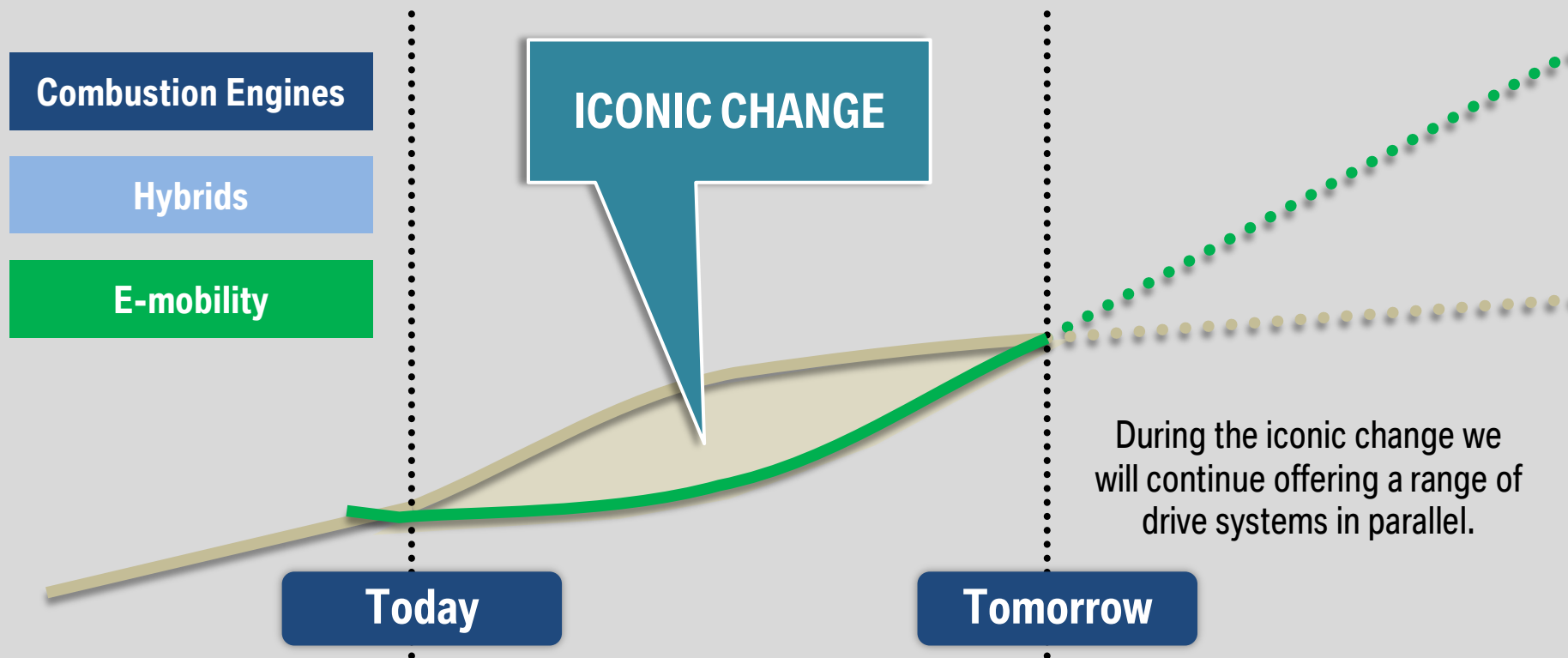
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WE ARE AT A POINT OF ICONIC CHANGE.



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**FURTHER REDUCTION OF CO<sub>2</sub> EMISSIONS THROUGH A STRATEGY  
INVOLVING BOTH EVOLUTION AND REVOLUTION.**

## EVOLUTION

Efficient combustion engines  
Innovative technologies



## REVOLUTION

Alternative drive trains  
Mobility services



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## BMW GROUP'S EFFICIENT DYNAMICS STRATEGY.



Today

- Optimisation of fuel consumption and emissions.
- Lightweight construction.



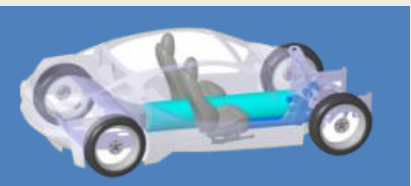
Today

- Full and mild hybrid vehicles.
- Initial step towards electrification of the drivetrain.
- Plug-in Hybrid drive-trains.



Today

- First limited electric vehicle production in 2008.
- MINI E on the road since 2009.
- BMW ActiveE in 2011.
- Introduction BMW i3 in Thailand in March 2014



Future

- Commitment to and validation of technology.
- Focus on crucial components, optimisation of powertrain components (fuel cell and ICE).
- Improvement of hydrogen storage and efficiency.

BMW Group's drive strategy provides a **broad technology spectrum** for today and the future.

Combustion engine

Hybrid technology

E-vehicle

Hydrogen

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## BMW EFFICIENT DYNAMICS. WE CONSIDERED ALL PHYSICAL INFLUENCES ON CO2 REDUCTION.

### Engine

- Direct fuel injection
- DI2 lean stratified
- Piezo injectors
- High Precision Injection
- Turbo
- Twin Turbo
- Variable Twin Turbo
- Downsizing



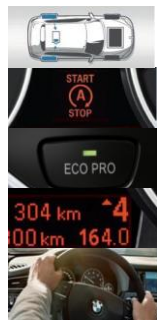
### Gearbox

- gearbox efficiency
- gearbox spacing



### Energy management

- Auto Start Stop function
- Brake Energy Regeneration
- Electr. Assist
- Electr. Driving
- demand-controlled drive
- Electr. waterpump
- Electr. steering
- AC compressor decoupling
- Electr. Driving dynamic systems



### Aerodynamic

- air flow
- wheel/ wheelhouse
- Active aerodynamics

### Rolling resistance

- Tires with reduced rolling resistance
- electrical brake system
- optimized wheel bearing



### Lightweight construction

- specified lightweight construction
- Materials
- Production



### Thermal management

- demand-controlled component cooling
- Fast heat-up
- Insulation
- Friction reduction
- Efficient climate control



### Energy carrier

- Fuel
- Diesel
- Alternative fuels
- GTL, BTL

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**BMW Group's „120G FLEET“.**  
**39 BMW GROUP MODELS COME WITH A MAXIMUM OF 120 G CO2/KM.**

							
<b>BMW 114d 5-Door</b> 70 kW / 95 hp 4,1 l / 109 g	<b>BMW 116d 5-Door</b> 85 kW / 116 hp 4,1 l / 109 g	<b>BMW 116d 5-Door*</b> 85 kW / 116 hp 3,8 l / 99 g	<b>BMW 118d 5-Door</b> 105 kW / 143 hp 4,1 l / 109 g	<b>BMW 120d 5-Door</b> 135 kW / 184 hp 4,2 l / 110 g	<b>BMW 114d 3-Door</b> 70 kW / 95 hp 4,1 l / 109 g	<b>BMW 116d 3-Door</b> 85 kW / 116 hp 4,1 l / 109 g	<b>BMW 116d 3-Door*</b> 85 kW / 116 hp 3,8 l / 99 g
							
<b>BMW 118d 3-Door</b> 105 kW / 143 hp 4,1 l / 109 g	<b>BMW 120d 3-Door</b> 135 kW / 184 hp 4,2 l / 110 g	<b>BMW 218d Coupé</b> 105 kW / 143 hp 4,2 l / 111 g	<b>BMW 316d</b> 85 kW / 116 hp 4,3 l / 114 g	<b>BMW 318d</b> 105 kW / 143 hp 4,3 l / 114 g	<b>BMW 320d</b> 135 kW / 184 hp 4,4 l / 117 g	<b>BMW i3</b> 125 kW / 170 hp / 250 Nm 0 l / 0 g	<b>BMW i3 Rex</b> 125 kW / 170 hp / 250 Nm 0,6 l / 13 g
							
<b>BMW 320d*</b> 120 kW / 163 hp 4,1 l / 109 g	<b>BMW 316d Touring</b> 85 kW / 116 hp 4,5 l / 119 g	<b>BMW 318d Touring</b> 105 kW / 143 hp 4,5 l / 119 g	<b>BMW 320d Touring*</b> 120 kW / 163 hp 4,3 l / 112 g	<b>BMW 418d Gran Coupé</b> 105 kW / 143 hp 4,5 l / 119 g	<b>BMW 518d</b> 105 kW / 143 hp 4,5 l / 119 g	<b>BMW 520d</b> 135 kW / 184 hp 4,5 l / 119 g	<b>BMW 318d GT</b> 105 kW / 143 hp 4,5 l / 119 g
							
<b>BMW X1 sDrive20d*</b> 120 kW / 163 hp 4,5 l / 119 g		<b>MINI One</b> 75 kW / 102 hp 4,6 l / 108 g	<b>MINI One D</b> 70 kW / 95 hp 3,4 l / 89 g	<b>MINI Cooper D</b> 85 kW / 116 hp 3,5 l / 92 g	<b>MINI Cooper</b> 100 kW / 136 hp 4,5 l / 105 g	<b>MINI Cooper D Cabrio</b> 82 kW / 112 hp 4,0 l / 105 g	<b>MINI Cooper SD Cabrio</b> 105 kW / 143 hp 4,5 l / 118 g
							
<b>MINI One D Clubman</b> 66 kW / 90 hp 3,9 l / 103 g	<b>MINI Cooper D Clubman</b> 82 kW / 112 hp 3,9 l / 103 g	<b>MINI Cooper SD Clubman</b> 105 kW / 143 hp 4,4 l / 115 g	<b>MINI One D Countryman</b> 66 kW / 90 hp 4,4 l / 115 g	<b>MINI Cooper D Countryman</b> 82 kW / 112 hp 4,4 l / 115 g	<b>MINI Cooper SD Roadster</b> 105 kW / 143 hp 4,5 l / 118 g	<b>MINI Cooper SD Coupé</b> 105 kW / 143 hp 4,3 l / 114 g	<b>MINI Cooper D Paceman</b> 82 kW / 112 hp 4,4 l / 115 g

Fuel consumption [l/100km] EU test cycle

\* EfficientDynamics Edition

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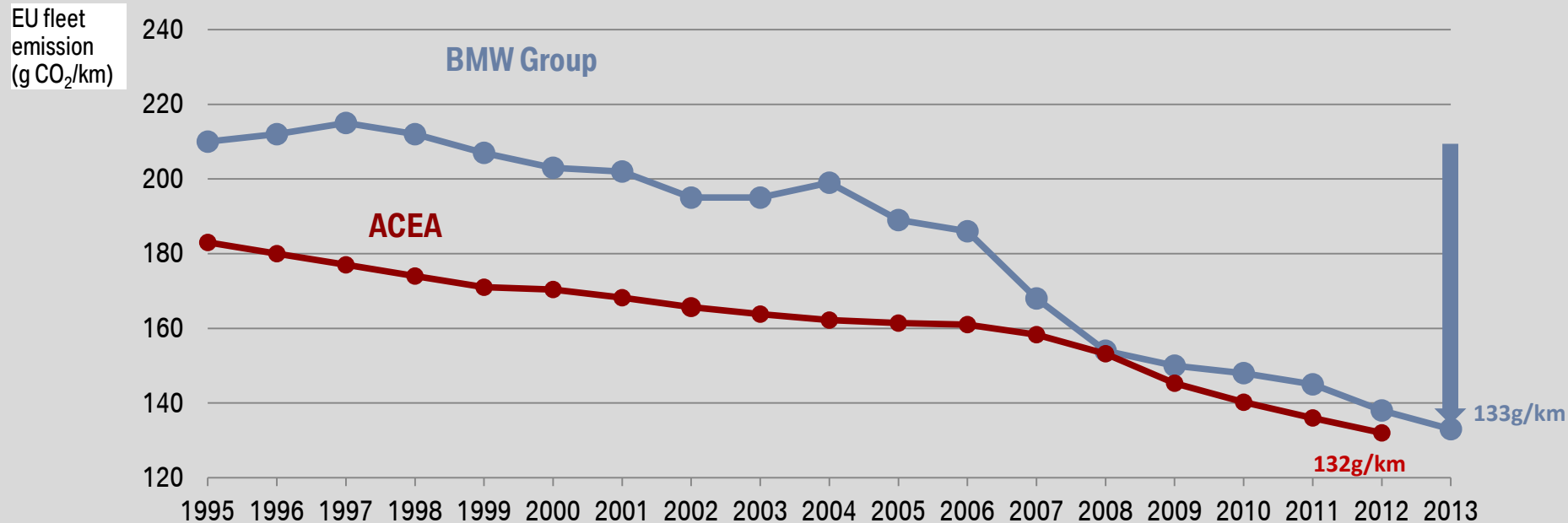
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GROUP**

**COMPARISON OF CO<sub>2</sub> FLEET REDUCTIONS IN EUROPE.  
BMW HAS ALREADY ACHIEVED A GREAT DEAL – AND WILL ALSO MEET FUTURE TARGETS.**

BMW Group has more than fulfilled its contribution to the **ACEA commitment** to reduce fuel consumption by 25 % from 1995 to 2008.



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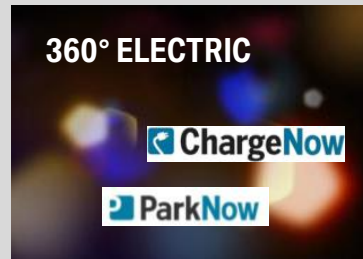
**BMW  
GROUP**

**360° ELECTRIC IS AN ESSENTIAL PART OF BMW'S E-MOBILITY STRATEGY.**

A comprehensive portfolio of custom tailored services offers BMW i customers a new way of individual mobility.



**Highly innovative  
technologies**



**Comprehensive  
Portfolio of Services**



**BMW i**

„The future belongs to those who dare to venture.

We cannot ignore the need for new approaches – especially when circumstances are changing “

*Dr. Norbert Reithofer (CEO), April 2013*

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**BMW  
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## THE BMW i3 AND THE BMW i8.



Vehicle: **BMW i8**  
Purpose Design Roadster  
LifeDrive Lightweight Concept  
2 + 2 Seater  
Drive-train: Small combustion engine  
Plug-in Hybrid plus electric engine  
Battery: Lithium-Ion battery  
Liquid cooling

Vehicle: **BMW i3**  
Purpose Design  
LifeDrive Lightweight Concept  
4 Seater  
Drive-train: Electric engine  
Battery: Lithium-Ion Battery  
Liquid Cooling

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## THE BMW i3. THE MOST PROGRESSIVE CONCEPT FOR SUSTAINABLE URBAN MOBILITY.



- 0-100 km/h in 7,2 s (~ MINI Cooper S)
- 0-60 km/h in 3,7s (~ BMW M3)
- Energy consumption equivalent to 1.5 l fuel / 100km (20-30% better than any other electric vehicle)
- Curb mass (DIN): 1195kg ( 250 to 550 kg less than conventional electric vehicles)
- „One pedal operation“ reduces brake pedal usage by 90%
- Range of up to 160 km;  
300 km with an optional Range Extender
- Turning radius: 4.9 m  
(10% better than a MINI)

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THE BMW i8.  
THE BEST OF TWO WORLDS.



- 2+2 seater with pioneering body style
- Drag coefficient: 0.26
- Curb weight: 1,490 kg through revolutionary LifeDrive-Architecture with CFRP and aluminum
- Plug-in-Hybrid-System is the next level of EfficientDynamics
- 1.5 liter 3-cylinder turbo engine with 170 kW/231 hp power and 320 Nm torque
- Electric Motor with 96kW/131 hp power and 250Nm torque
- 0-100 km/h: 4,4 s
- $V_{max}$ : 250 km/h
- Fuel consumption: 47.6 km/litre

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**SUSTAINABILITY DEFINES THE PRODUCT LIFE CYCLE.  
CONSIDERATION OF THE ENTIRE VALUE CHAIN.**

New vehicle concepts



New materials and  
recycling



Production concept of the  
future



New electric drivetrain



Integrated approach of BMW i



New processes



Employees



Pioneering design



New customer focus

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## POTENZIAL ELECTRIC CAR CUSTOMERS HAVE QUESTIONS...

Do I need a Wallbox?

Who **installs** my  
**Wallbox**?

Is electric driving really  
**emissions-free**?



What if I don't have a  
privat **charging spot**?

Where is the next **public  
charging** facility?

Can I **reserve** a charging  
station?

I sometimes need a car  
for **long-distance trips**!

What if I prefer the **train**  
instead of running into a  
traffic jam?

What if I run out of  
**power**?

Is my **range** sufficient to  
reach my destination?

Will my **battery** stay  
healthy?



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**BMW i PROVIDES ANSWERS THROUGH ITS HOLISTIC  
APPROACH – 360° ELECTRIC.**

## HOME CHARGING

„CONVENIENT CHARGING AT HOME“

BMW i WALLBOX  
E - INSTALLATION  
GREEN ENERGY



## PUBLIC CHARGING

„ON THE ROAD“

ACCESS, BILLING & PAYMENT FOR  
PUBLIC CHARGING STATIONS  
PARK & CHARGE OFFERS OVER NIGHT



## FLEXIBLE MOBILITY

„A NEW MOBILE LIFESTYLE“

ADD-ON MOBILITY  
CARSHARING OFFERS  
E.G. DRIVENOW  
CONNECTED DRIVE  
INTERMODAL TRAVEL CONCEPTS



## ASSISTANCE SERVICES

„PROVIDE ASSURANCE“

CONNECTED DRIVE-  
E-NAVIGATION  
CONNECTED DRIVE-  
E-REMOTE APPS  
MOBILITY ASSISTANCE  
MAINTENANCE & REPAIR



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## TOWARDS SUSTAINABLE MOBILITY. BMW i MOBILITY SERVICES PORTFOLIO.

### Flexible Use

#### DriveNow



### Parking

#### ParkNow

#### Park@myHouse



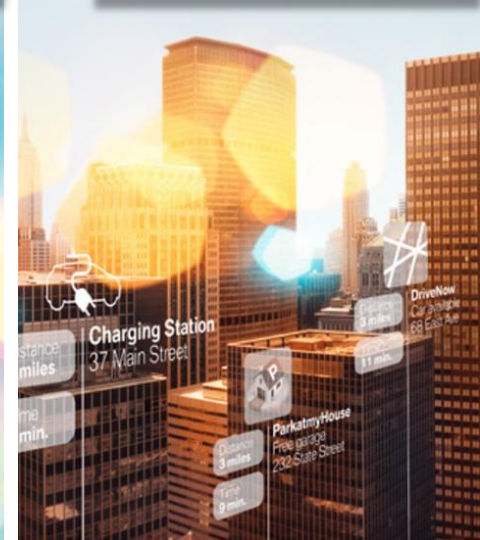
### Information and intermodal routing

#### MyCityWay



### Securing innovation and acceleration

#### BMW i Ventures



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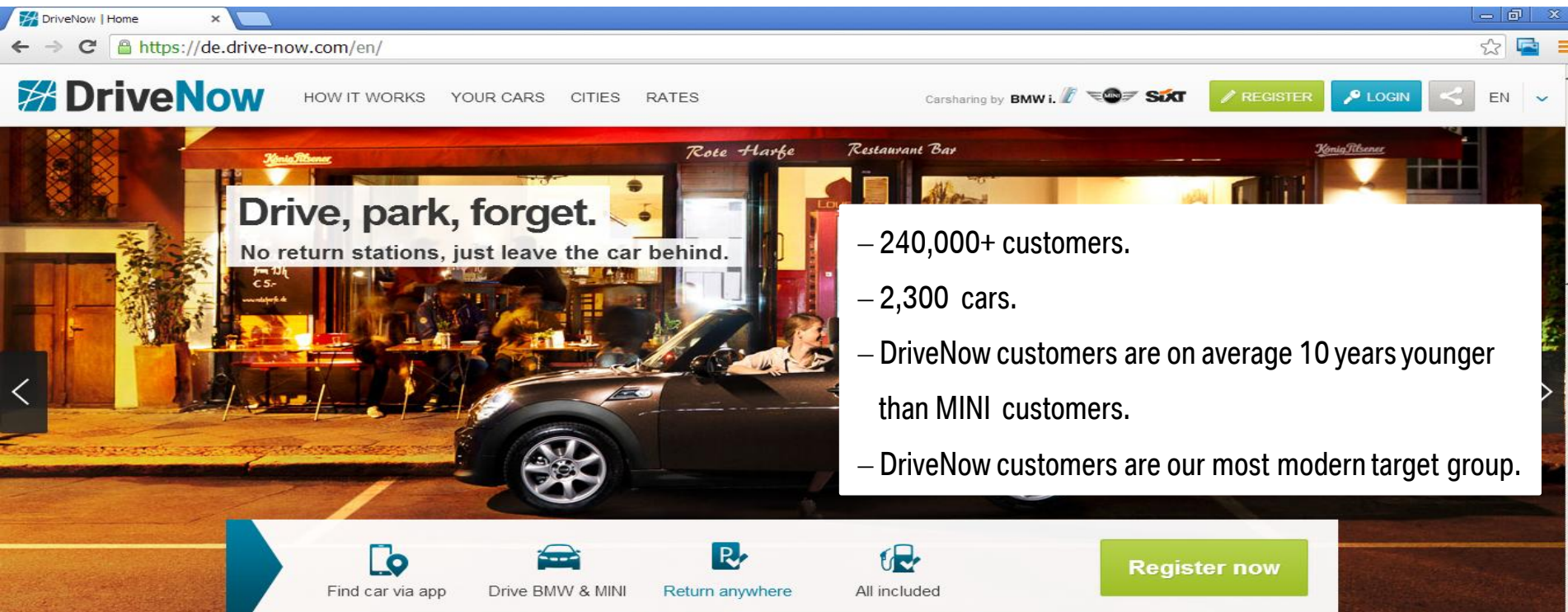
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DRIVENOW IS THE FIRST ALL PREMIUM,  
FREE FLOATING CAR SHARING OFFERING FROM THE BMW GROUP.



DriveNow | Home

https://de.drive-now.com/en/

**DriveNow** HOW IT WORKS YOUR CARS CITIES RATES

Carsharing by BMW i. MINI S&K

REGISTER LOGIN

EN

**Drive, park, forget.**  
No return stations, just leave the car behind.

- 240,000+ customers.
- 2,300 cars.
- DriveNow customers are on average 10 years younger than MINI customers.
- DriveNow customers are our most modern target group.

Find car via app Drive BMW & MINI Return anywhere All included

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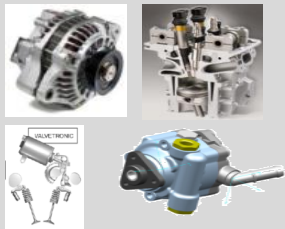
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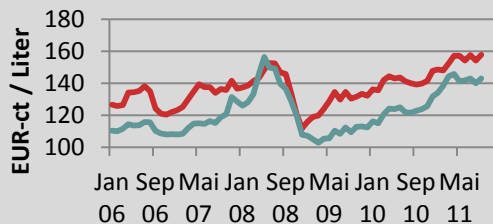
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## VEHICLES TAX SCHEME – OPTIONS. CO2 REDUCTION IN EUROPE – SUPPLY AND DEMAND SIDE.

### Supply Side: technological progress / product offer



### Demand Side: CO2 based taxation / fuel prices

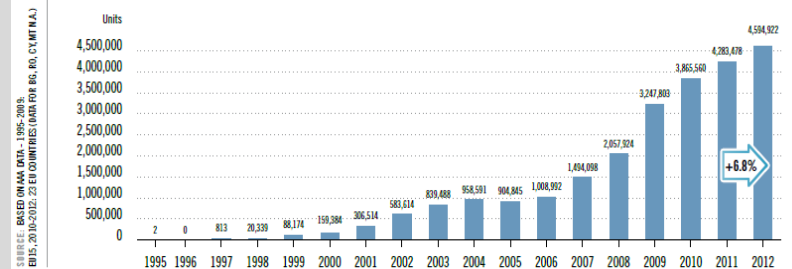


CO2 based taxation schemes  
(19 out of 28 MS)

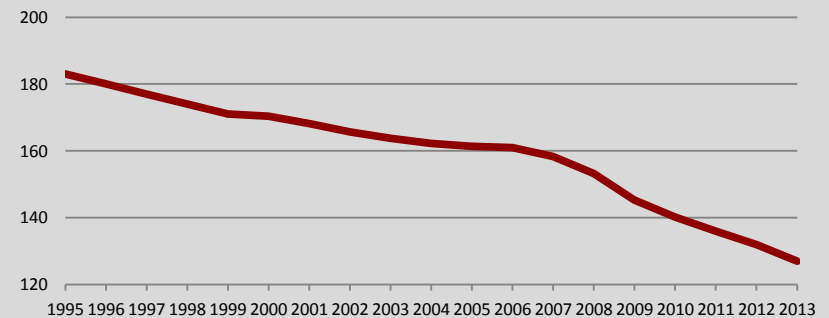
Fuel price developments  
(e.g. Germany)

Effect  
in EU

Demand for passenger cars ≤ 120g CO2/km | 1995-2012



ACEA



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## PASSENGER CARS TAX SCHEME – OPTIONS. CO2 BASED TAXATION PREFERRED.

1. The car industry **is committed to reduce CO2** emission and to increase efficiency.
2. The **tax system is the most powerful instrument** to steer the market towards efficient vehicles.  
We support putting an **equal price tag on each gram of CO2**.
3. CO2 is the preferred parameter, because it has a direct link to vehicle efficiency, other than ccm, price, etc.
4. **Benefits** as such:
  - **Reduction of emissions** because of faster fleet renewal, the environmental goals of the government will be supported and the **dependency on oil imports will decrease**.
  - State-of-the-art **technologies** will be introduced faster, expensive fuel saving technologies are paying off for the customer.
  - The auto industry will have a **predictable framework** for introduction of efficient vehicles.
  - **Customers** are getting a clear signal towards investments in fuel efficient vehicles.

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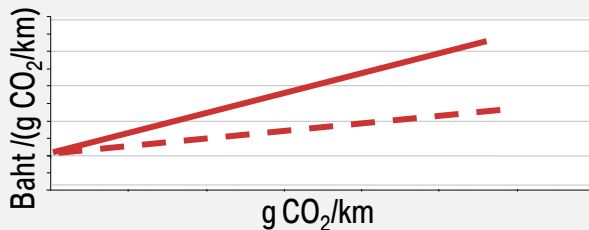
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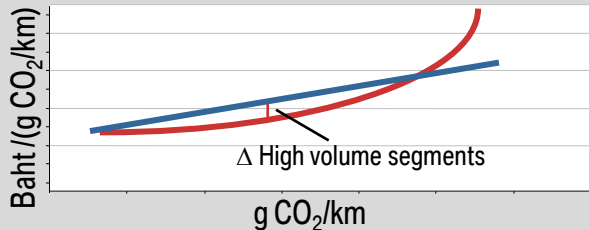
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## VEHICLE TAX SCHEME – OPTIONS. PRINCIPLES OF A CO<sub>2</sub> BASED TAXATION SCHEME.



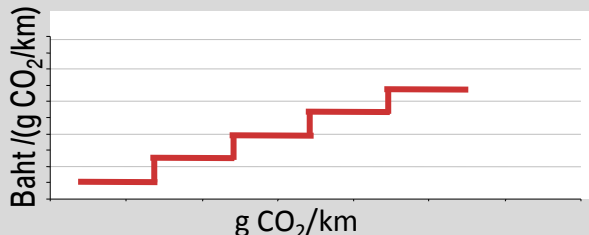
### Preferred linear option:

- Direct proportional system: equal burden on each gram CO<sub>2</sub>/km
- Incentivation for all vehicle segments to invest in fuel saving technologies. (No discrimination for special vehicle segments, classes or technologies)
- Equal general condition for technology research and development
- Principle of equality: Every owner will be charged same amount for each gram CO<sub>2</sub>.



### ~~Progressive option:~~

- ~~Target: fuel consumption reduction focussed on a special segment, political target group.~~
- ~~Overproportional high burdens on vehicles with low overall volumes and indirect credits to high volume segments.~~
- ~~No incentive for high volume segments to invest in fuel economy technologies.~~



### ~~Stepwise option:~~

- ~~No stimulation of optimization within a specific step.~~
- ~~Trade-off „Emission/ Fuel Consumption“ could lead to upgrade/ downgrade into next step. E.g. increase of CO<sub>2</sub> about 1g because of higher emission standard leads to perverse tax effect.~~
- ~~2 vehicles with 1 gCO<sub>2</sub>/km difference are facing high differences in tax (communication problem)~~
- ~~Products for the world market cannot be optimised for all stepwise systems~~

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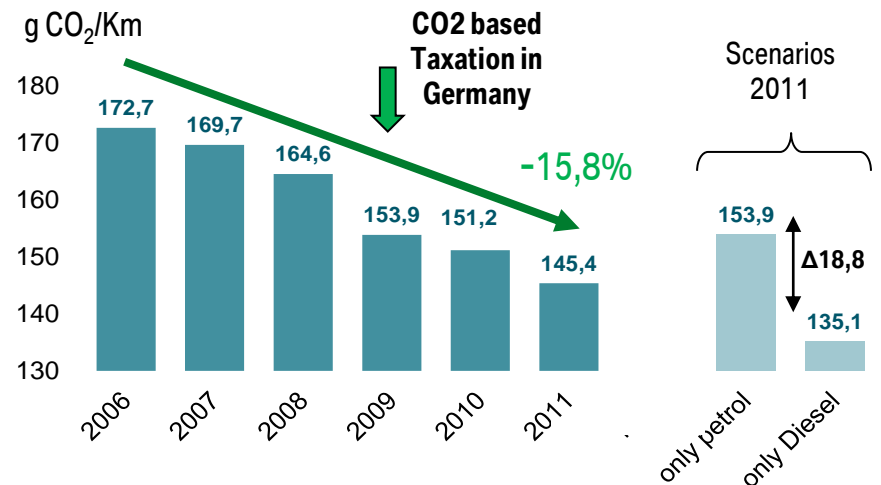
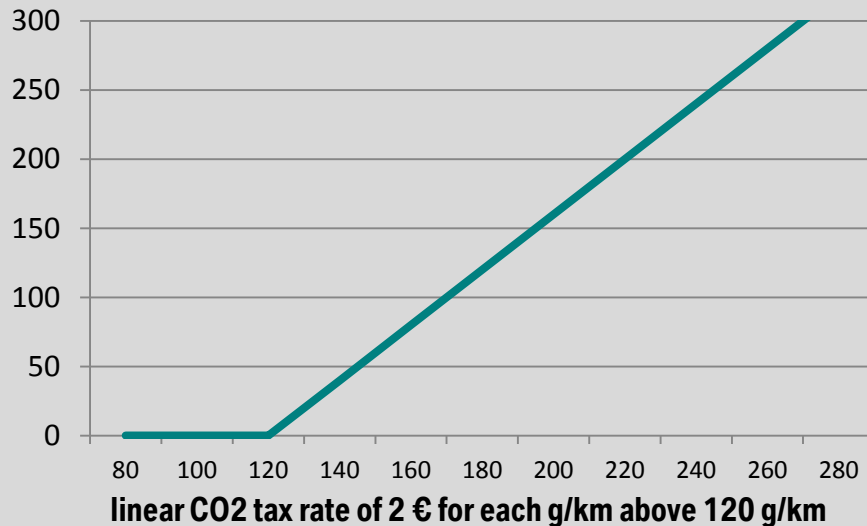
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## VEHICLE TAX SCHEME. EXAMPLE FOR A LINEAR CO<sub>2</sub> BASED TAX AND ITS EFFECT.



CO<sub>2</sub>-based annual circulation tax (ACT). By setting a price tag for CO<sub>2</sub> emissions customers get a clear signal buying fuel efficient vehicles.

Calculation of CO<sub>2</sub> tax



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## TAX SYSTEM IN THAILAND.



### GREENER TAX

Vehicle type	Current auto tax structure			New auto tax structure			
	Engine(HP)	Rate (%)			Rate (%)		
		E10	E20	E85	CO <sub>2</sub>	E10/ E20/ NGV	Hybrid
Passenger car	≤ 2,000 cc	30	25	22	≤ 100 g/km	-	10
	2,001-2,500 cc	35	30	27	101-150g/km	30*	25
	2,501-3,000 cc	40	35	32	151-200g/km	35	30
	> 3,000 cc	50	50	50	> 200 g/km	40	35
Pickup passenger vehicle/ double-cab, space-cab pickup	≤ 3,250 cc	20/12 - /3.18			≤ 200g/km	25*/12/5/3.18	
	> 3,250 cc	50			> 200g/km	30/15/7/5.18	
					> 3,250 cc	50	
Eco Car (petrol/ diesel)/E85	1,300/1,400	17			≤ 100g/km	14*/12	
Electric vehicle/ fuel cell/hybrid	≤ 3,000 cc	10			101-120g/km	17/17	
		10				10	
	3,000 cc	50			> 3,000 cc	50	
NGV - OEM	≤ 3,000 cc	20				50	
	> 3,000 cc	50				50	

\* The rate is applicable if the required safety standards are met

\*\* Based on CO<sub>2</sub> only

POSTgraphics



The introduction of a CO<sub>2</sub> metric is an important step in the right direction. But as the tax is based again on retail price and has only 4 tax bands, the optimum is not yet reached:

- The bandwidth of 50g makes no difference of e.g. a car with 101g/km or 150g/km – a enormous difference in terms of technology → **solution: smaller steps / linear function?**
- The retail price base even puts a disincentive on buyers, who like to invest in high efficient, but more expensive cars → **solution: pure Baht/CO<sub>2</sub> logic?**
- With purchase tax rates between 30% and 40% the entry hurdle to replace an old, inefficient car with a new, efficient and clean one is as high as before. → **solution: phase-in of an annual tax instead of a purchase tax?**

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## VEHICLES TAX SCHEME – OPTIONS. COMPARISON EXCISE TAX VS. CO<sub>2</sub> EMISSION.

TODAY

	CO2	Taxrate	Excise Tax (Baht)
BMW 320d	117g	30%	387.000
BMW 320i (E20)	138g	25%	298.000

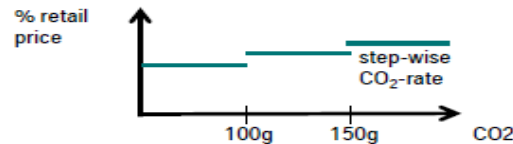
320d: -15% CO<sub>2</sub>, +19% excise tax



Actual plans 2016 (101-150 g/km → 30% for E10/E20)

	CO2	Tax rate	Excise Tax (Baht)
BMW 320d	117g	30%	387.000
BMW 320i (E20)	138g	30%	387.000

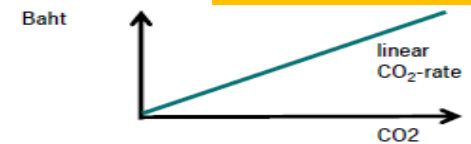
320d: -15% CO<sub>2</sub>, same excise tax  
(if same base price, tbc)



Linear system (every gram CO<sub>2</sub> cost the same)

	CO2	Tax rate	Excise Tax (Baht)
BMW 320d	117g	2686 Baht/g	314.262
BMW 320i (E20)	138g	2686 Baht/g	370.668

320d: -15% CO<sub>2</sub>, -15% excise tax  
(2686 Baht/g = example)



Budget neutral!!

The actual Excise Tax (based on CIF price) does not have any steering effect to buy efficient vehicle.  
A linear system has a much stronger effect driving the market towards fuel efficient vehicles than a stepwise system.

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## WOULDN'T TAX CREDITS FOR ECO-INNOVATION TECHNOLOGIES (OFF-CYCLE MEASURES) MAKE SENSE? ANALOGY TO SAFETY CREDITS.

Technologie	Data source	Reduction Value
<b>Efficient air conditioning system</b>		
Efficiency improvement	US table for AC components	PC: max. 3.1 g/km LDT: max. 4.5 g/km
Leakage reduction	Calculation as a function of: - leakage amount (acc. to SAE J2727) - global warming potential (GWP)	max. 3.9 g/km (belt driven compressor) max. 5.9 g/km (electric compressor) (R134 a)
Thermal control	US Table for glazing, active seat ventilation, solar reflective paint, active / passive cabin control	PC: max. 1.9 g/km LDT: max. 2.7 g/km
<b>Tire Pressure Monitoring System</b>	Definition of boundary conditions based on studies by tyre manufacturers	1.0 g/km
<b>Stop/Start</b>	US table containing off-cycle credits for car categories (standard, large, ...)	PC with electric heater: 1.0g/km LDT with electric heater: 1.7g/km
<b>Efficient alternator</b>	Calculation formula depending on speed: Against baseline $\eta_A = 67\%$ with real world Watt consumed 750 W	Approximately 1.5 g/km
<b>Efficient lightning</b>	US table predefined CO <sub>2</sub> saving per light	Max. 0.6 g/km
<b>Active Transmission Warm-Up</b>	US table containing off-cycle credits for car categories (standard, large, ...)	PC: 0.9g/km LDT: 2.0g/km
<b>Active Engine Warm-Up</b>	US table containing off-cycle credits for car categories (standard, large, ...)	PC: 0.9g/km LDT: 2.0g/km
<b>Active aerodynamic measures</b>	Calculation formula depending on drag coefficient (CD) reduced	PC: $19.36/1.6 \times CD$ reduced g/km LDT: $33.16/1.6 \times CD$ reduced g/km

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## ELECTRIC MOBILITY: FRAMEWORK CONDITIONS AND INCENTIVES.

**BONUS**



### Monetary Incentives

Direct financial incentives for the EV owners

- Purchase incentive for electric vehicles.
- Reduction / waiver of registration and/ or circulation tax.
- Reduction / waiver of consumption tax.
- Company car incentive.
- Subsidy for the installation of the wall-box.

- Tax bonus/purchase incentive in France, max. 6300€;
- Tax exemption (annual tax, registration etc.), various examples from the EU;
- Free charging, free usage of toll roads in Norway

### Non-Monetary Incentives

Qualitative and indirect support for EV usage

- Use of privileged lanes (e.g. bus or car sharing lane).
- Exclusive parking for electric vehicles; free parking and/ or free charging.
- Preferential treatment for inner city toll systems.
- Exemption from congestion charges.

- Using fast lanes in California,
- Free usage of bus lanes in Oslo
- Preferential inner city access in London,
- Free inner city parking in Prague
- Immediate license plate in Beijing

### Framework Conditions

Measures to support the environment for EVs

- Availability of public charging infrastructure.
- Awareness due to public demonstration and research projects.
- Public initiatives and cooperations supporting the uptake of EVs.
- Public procurement programs for EV fleets.

- 2.7 charging points per km<sup>2</sup> in Oslo
- subsidies for private charging box in UK (2.500 £)
- writing down allowance for infrastructure, new buildings obligations (charging spots) in France

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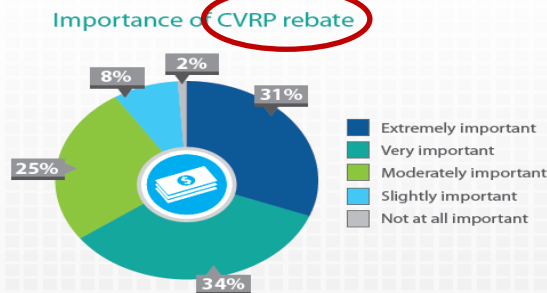
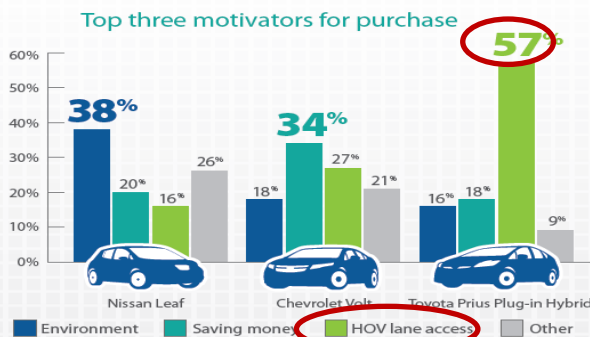
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## DECISIVE CUSTOMER FACTORS BUYING AN ELECTRIC VEHICLE. CALIFORNIA PLUG-IN ELECTRIC VEHICLE DRIVER SURVEY.

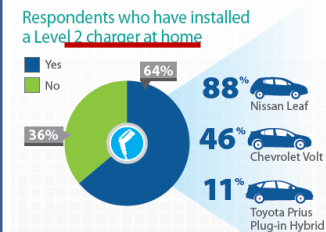
### Non- fiscal measures to overcome customer constraints buying an electric vehicle:



**59%** said having HOV lane access was extremely or very important in their decision to purchase a PEV



**84%** are displaying an HOV sticker on their vehicle



**46%** of respondents had access to workplace charging

Of those who had workplace charging **74%** had free access

- moving faster through congestion (extra lanes for electric drive)
  - reducing high purchase cost
  - having access to charging infrastructure
- are key support factors for EV success!**

Source: Survey conducted May 2013 by the California Center for Sustainable Energy

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**MOST IMPORTANT INCENTIVE FOR CUSTOMERS:  
USE OF CAR POOL LANES TO SAVE HOURS OF TRAVEL TIME EVERY DAY.**



ILEV Standard  
(BEV, CNG)



AT PZEV vehicles  
(PHEV with  
SULEV II, ZeroEvap)



Qualifying Vehicles for Clean Air Vehicle Decals

Manufacturer	Make & Model	Exhaust Standard	Fuel Type	Engine Size (L)	Engine Family Number	Sticker Color
<b>2014 Model Year Vehicles</b>						
BAF Technologies	E350 Club Wagon, E350 Van, E250 Van, E150 Club Wagon, E150 Van	SULEV	CNG	5.4	EBAFT05.45HK	
BAF Technologies	F350 Pickup, F350 Pickup DRW, F350 Cab Chassis, F350 Bed Delete, F350 Bed Delete DRW, F250 Pickup, F250 Bed Delete	SULEV	CNG	6.2	EBAFT06.27HL	
BMW	i3 EV	ZEV	Electric	n/a	EBMXV00.013B	
Cadillac	ELR	TZEV*	Plug-in Hybrid	1.4	EGMXV01.4088	
Chevy	Spark EV	ZEV	Electric	n/a	EGMXV00.0001	
Chevy	Volt	TZEV*	Plug-in Hybrid	1.4	EGMXV01.4011	
Chevy	Volt	TZEV*	Plug-in Hybrid	1.4	EGMXV01.4088	
Fiat	500e	ZEV	Electric	n/a	ECRXV00.05PR	
Ford	C-Max Energi	TZEV*	Plug-in Hybrid	2.0	EFMXV02.0V2P	
Ford	Fusion Energi	TZEV*	Plug-in Hybrid	2.0	EFMXV02.0V2P	
Ford	Focus EV	ZEV	Electric	n/a	EFMXV00.0VAE	
Honda	Accord Plug-in Hybrid	TZEV*	Plug-in Hybrid	2.0	EHNXV02.03H2	
Honda	Civic Natural Gas	ATPZEV	CNG	1.8	EHNXV01.8CDT	
Honda	FCX	ZEV	Hydrogen	n/a	EHNXV00.0AET	
Honda	Fit EV	ZEV	Electric	n/a	EHNXV00.0BET	
Impco	G2500 Express, G3500 Express, G2500 Savana, G3500 Savana	SULEV	CNG	6.0	E28XT06.0CDA	
Landi Renzo	E350 Cutaway, E350 Wagon, E350 Van, E250 Van, E150 Wagon, E150 Van	SULEV	CNG	5.4	ELDRT05.4A11	
Mitsubishi	i-MiEV	ZEV	Electric	n/a	EMTXV00.0EWB	
Nissan	LEAF	ZEV	Electric	n/a	ENXSV0000LLA	
Roush	E350 Wagon, E350 Van, E250 Van, E150 Wagon, E150 Van	SULEV	LPG	5.4	ERJIT05.45HK	
Smart	Fortwo Electric	ZEV	Electric	n/a	EMBXV00.0ED1	
Tesla	Model S (85 kWh and 60 kWh battery)	ZEV	Electric	n/a	ETSLV00.0L1S	
Toyota	Prius Plug-in	TZEV*	Plug-in Hybrid	1.8	ETYXV01.8HCU	
Toyota	RAV4 EV	ZEV	Electric	n/a	ETYXV00.0D09	

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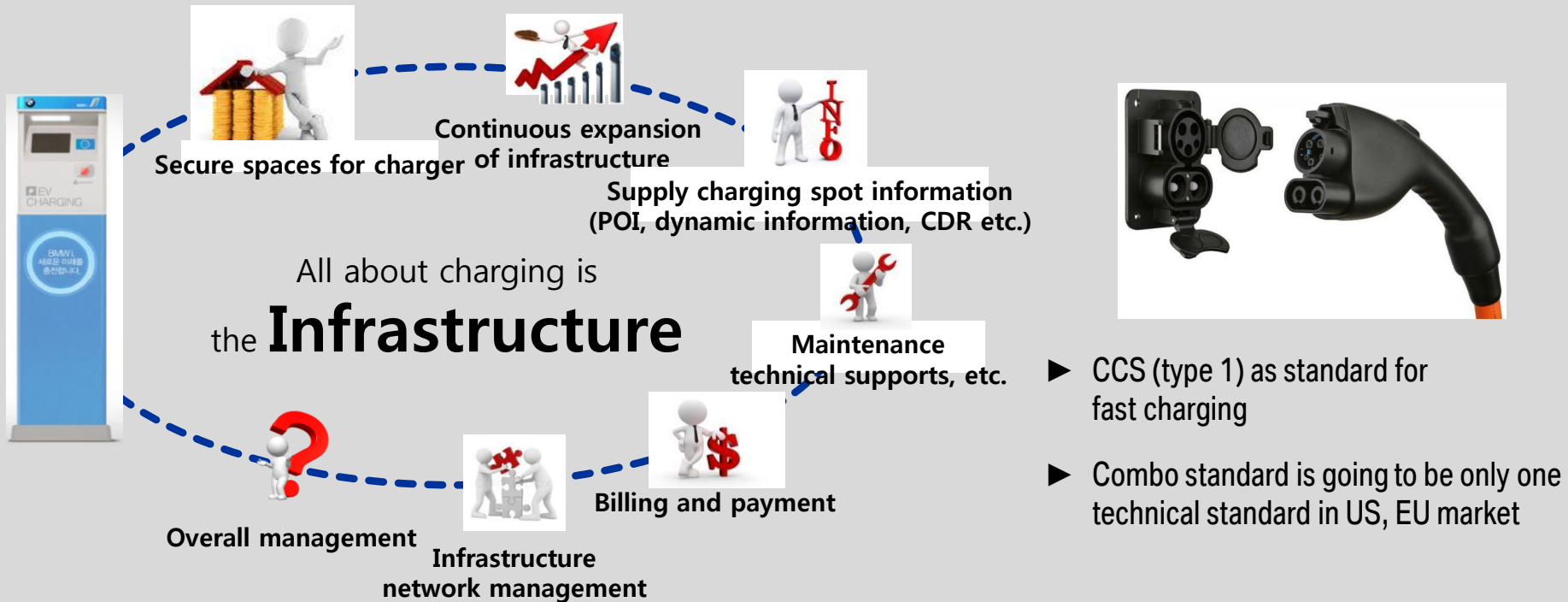
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**KEY FACTORS FOR SUSTAINABLE EXPANSION OF INFRASTRUCTURE.  
PROVIDING A STABLE BUSINESS ENVIRONMENT AND STANDARDISATION.**



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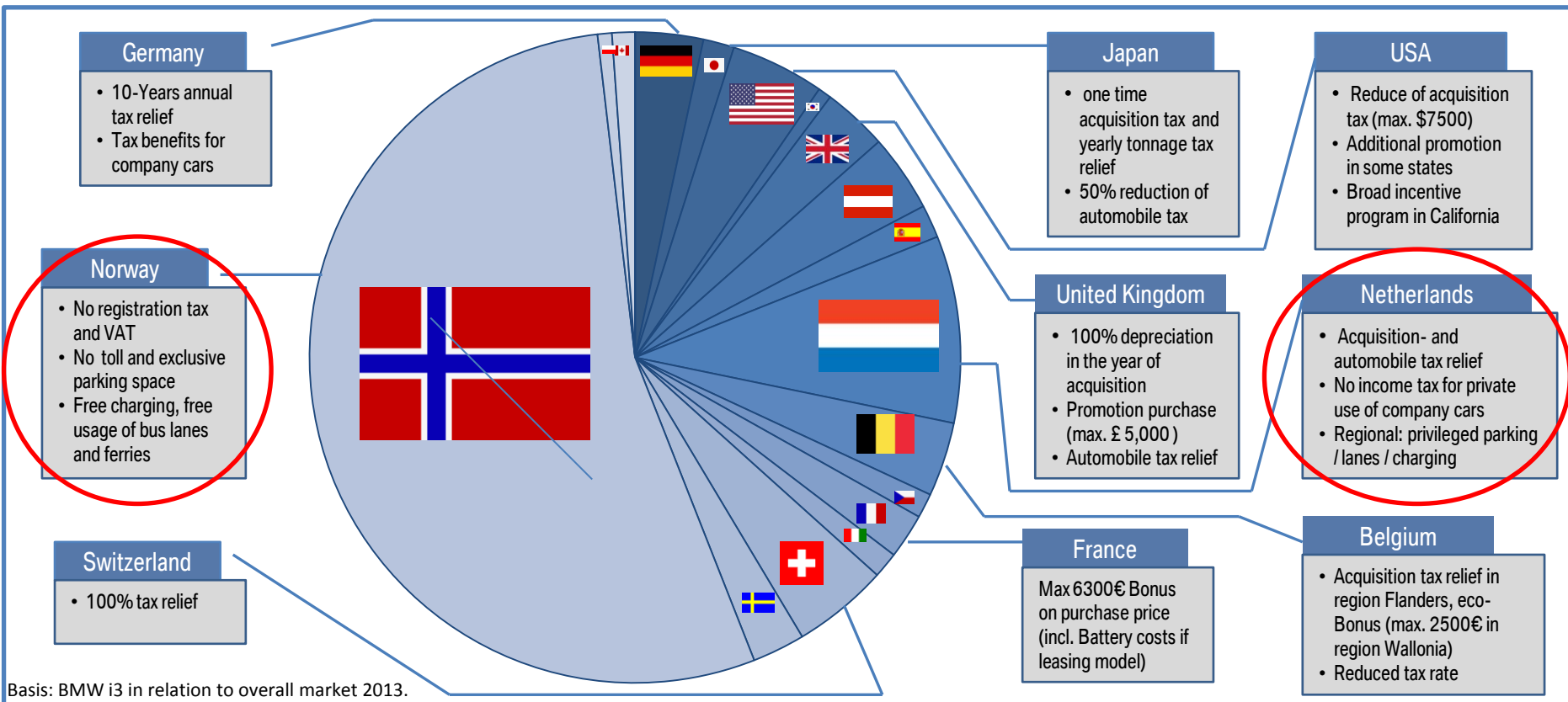
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**OVERALL PACKAGE AND NATIONAL STRATEGY IS DECISIVE FOR E-MOBILITY SUCCESS.**



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## DRIVING INTO THE FUTURE. SUMMARY.

1. The BMW Group is committed to a **sustainable development** and works pro-actively with governments and stakeholders around the world on long-term solutions for the mobility of the future.
2. Electric mobility as well as hydrogen – both from renewable sources – are playing a major role in the **decarbonisation of the transport sector** and will also help to improve the air quality in mega-cities.
3. The BMW Group has demonstrated her commitment to **CO<sub>2</sub> reduction** and to a leading position in fuel-saving technologies.
4. The **tax system is the most powerful instrument** to steer the market towards more efficient vehicles. BMW therefore supports putting an equal price tag on each gram CO<sub>2</sub>.
5. **Purchasing taxes being a high hurdle for fleet renewal.** To replace old, inefficient cars with high emissions, purchasing taxes should be reduced massively and being replaced (budget neutral) by an annual tax system based on environmental parameters.
6. A lot of **common efforts** between auto industry, government and energy providers are necessary to bring alternative drive trains successfully to the markets.

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