

## Greening the Economy - The Role of Industry



## Bosch: three business sectors

### 2011 key figures\*

**Bosch Group**

- 51.4 billion euros in sales
- 303,200 associates including 38,750 in research and development

**Automotive Technology**

- 59% share of sales
- World's largest supplier of cutting-edge automotive technology

**Industrial Technology**

- 16% share of sales
- World's leading manufacturer of large gearboxes and of powertrain, packaging, and process technology

**Consumer Goods and Building Technology**

- 25% share of sales<sup>1</sup>
- World's largest power tool manufacturer, leading the field in household appliances, heating and cooling, and security systems

<sup>1</sup> Including other segments

\*As of January 24, 2012

**Bosch files 16 patents each working day**



# The Industry as Driver of Green Innovation

automotive



industry



buildings



white goods



- business expertise and experience



- products and solutions



- market access



Bosch well positioned, evolution of our core business



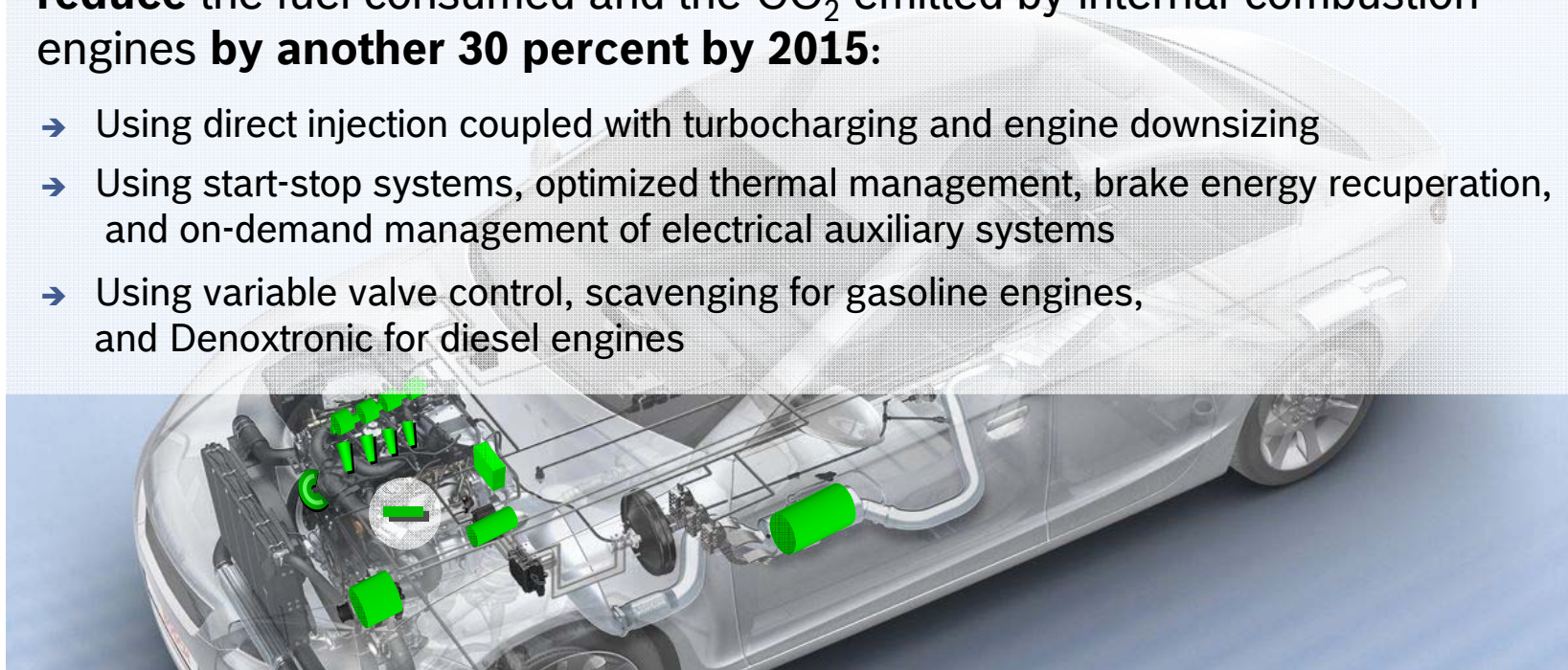


## The Industry as Driver of Green Innovation: Automotive

### Sustainable mobility

The internal-combustion engine will dominate until electrical powertrains establish themselves in larger numbers. Bosch has the technology to **reduce** the fuel consumed and the CO<sub>2</sub> emitted by internal-combustion engines **by another 30 percent by 2015**:

- Using direct injection coupled with turbocharging and engine downsizing
- Using start-stop systems, optimized thermal management, brake energy recuperation, and on-demand management of electrical auxiliary systems
- Using variable valve control, scavenging for gasoline engines, and Denoxtronic for diesel engines



## The Industry as Driver of Green Innovation: Examples

### “Energy Plus” house: decentralized energy conversion

In three steps, a building can be transformed from being an energy consumer to being a producer of heat and electricity:


- Reduce the building’s energy demand
- Meet remaining demand as efficiently as possible
- Generate as much electricity as possible
- Residential buildings become highly efficient, small-scale power stations



- The “Energy Plus” house is absolutely feasible with today’s technology



## The Industry as Driver of Green Innovation: Examples

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- **The Bosch dryer has the world's lowest power consumption – 50 percent lower than other dryers in the highest energy efficiency class A.**
  - **The heat generated in the dryer is always recovered, with virtually no losses – a lasting efficiency gain thanks to the self-cleaning condenser.**



## The Industry as Driver of Green Innovation: Renewables



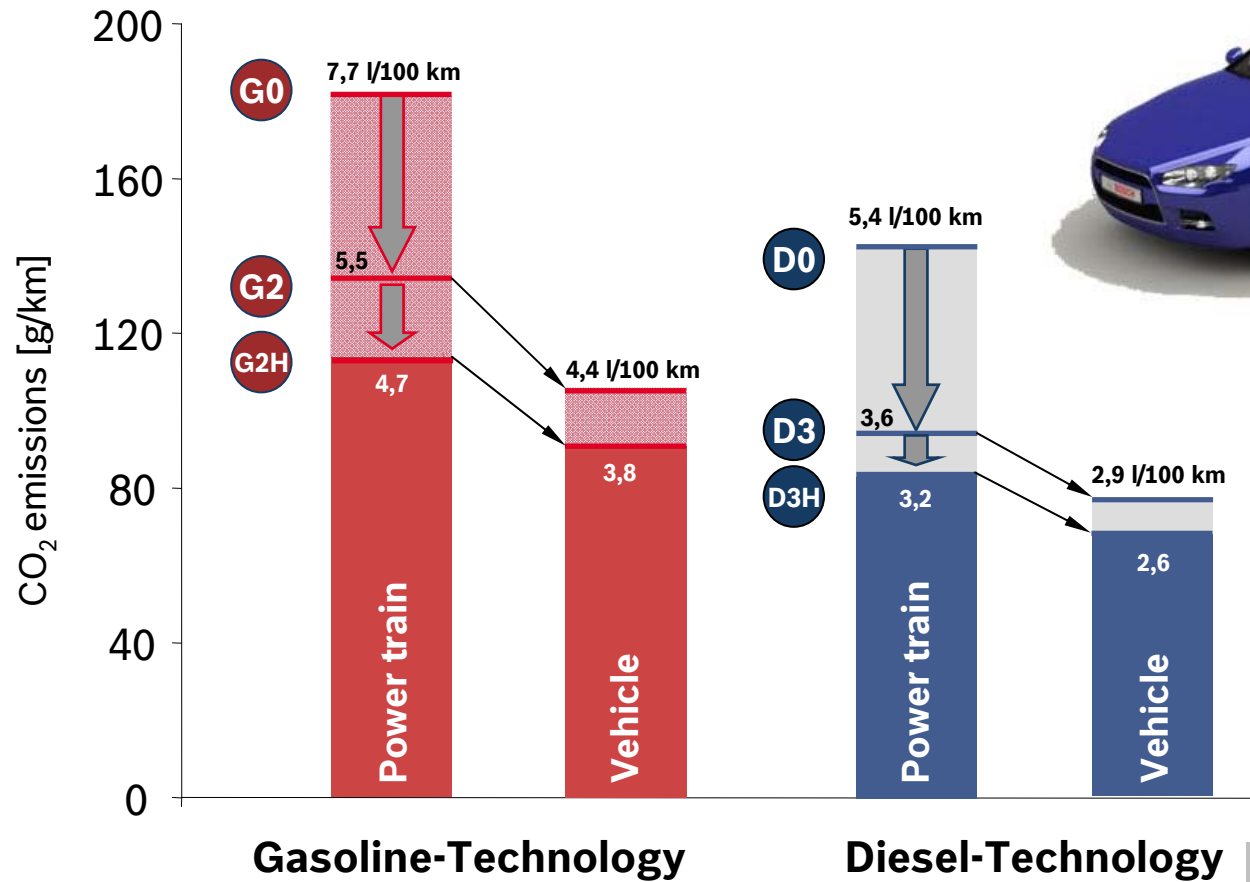
**The transition from the age of oil to a solar future is precisely the kind of challenge that a technology company like Bosch relishes.**

**And we continue to invest in more innovative technologies, to make zero-emission power generation even more cost-effective.**



# The Industry as Driver of Green Innovation: Automotive

## CO<sub>2</sub>-Reduction with Vehicle Technology



**Vehicle package**

Roll resistance:	-1/3
Weight:	-10%
Air resistance:	-14%

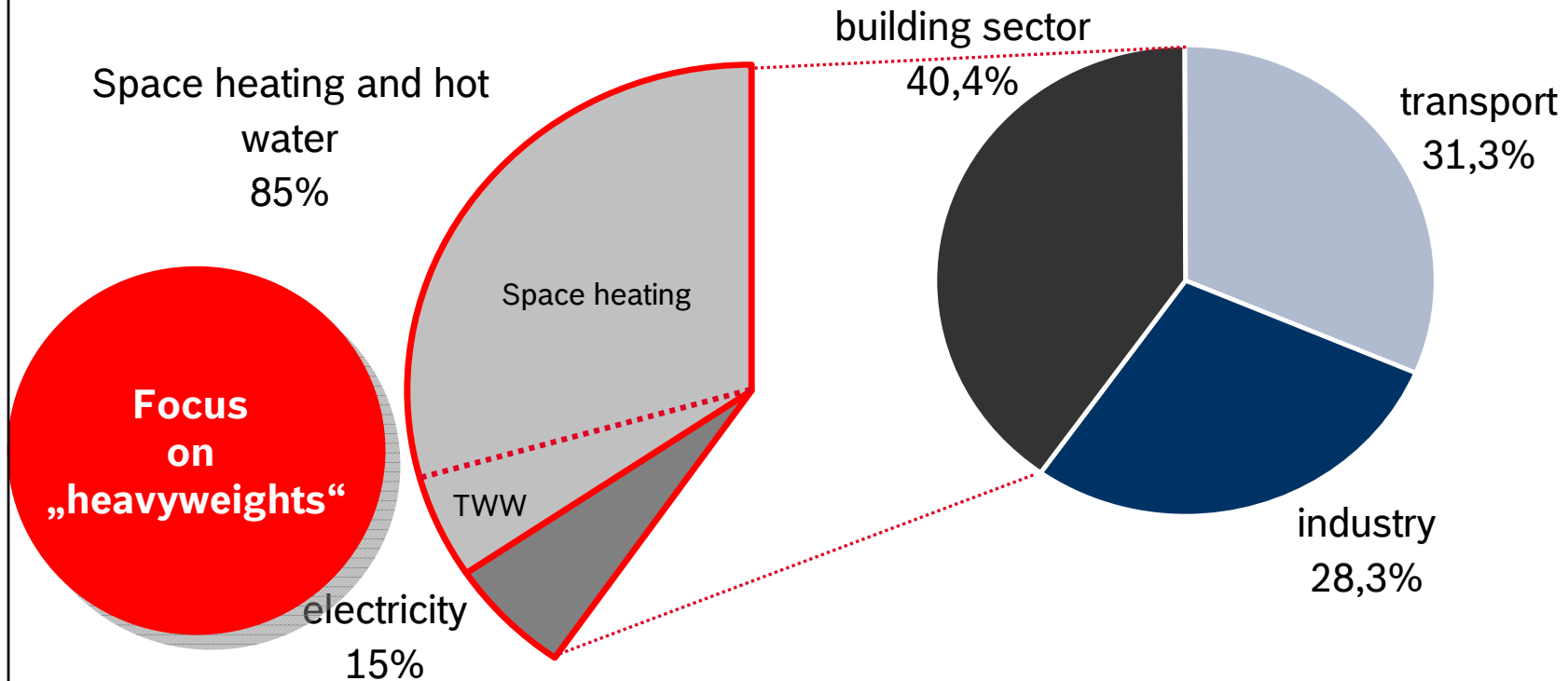
Vehicle weight: 1400kg, 100 kW, NEFZ  
 G0-G2,D0-D3: HS/ G2H,D3H: AT





## The Industry as Driver of Green Innovation: Buildings

# Building sector offers biggest potential for emission reductions



Just the replacement of inefficient heating systems in the building sector would result in emission savings of 55.000.000 t CO<sub>2</sub>

Source: BDH, Primärenergie, Zahlen für Deutschland

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**BOSCH**

# The Industry as Driver of Green Innovation

## Increase in efficiency of household appliances








Substantial increases in efficiency (electricity/water) through technical innovation

Source: BSH Bosch und Siemens Hausgeräte GmbH



# The Industry as Driver of Green Innovation: Buildings

## Rexroth 4EE: Saving energy in the industry

 <b>understand systemic interdependencies</b>	<b>Efficient Components</b>  Products and systems with optimised degrees of efficiency	<b>Energy Recovery</b>  Energy recovery and storage of energy surplus	<b>Energy on Demand</b>  Demand oriented use of energy, stand-by modus	<b>Energy System Design</b>  Overall systemic analysis; efficient planning and simulation of projects, adequate consultation
	<b>Possible savings</b>			
	<b>10 – 15 %</b>	<b>30 %</b>	<b>60 %</b>	<b>70 %</b>





## The Industry as Driver of Green Innovation: Renewables

Energy storage as a vital part of an intelligent, decentralized infrastructure

- Important role of energy storage in an intelligent, decentralized infrastructure: predicted demand in 2050: 20 GW / 55 TWh (Source: Leitstudie 2010)  
Global market volume in 2030: 15 GW/a (Source: Bosch)
- With the development of different technologies until marketability, present costs of 0,3-0,4 EUR/kWh can be cut in half
- Systems in combination with photovoltaic installations allow a producer consumption of 60 %
- Competition between technologies ist still undecided

Sufficient market volume is to be expected whenever market design and financial framework is determined

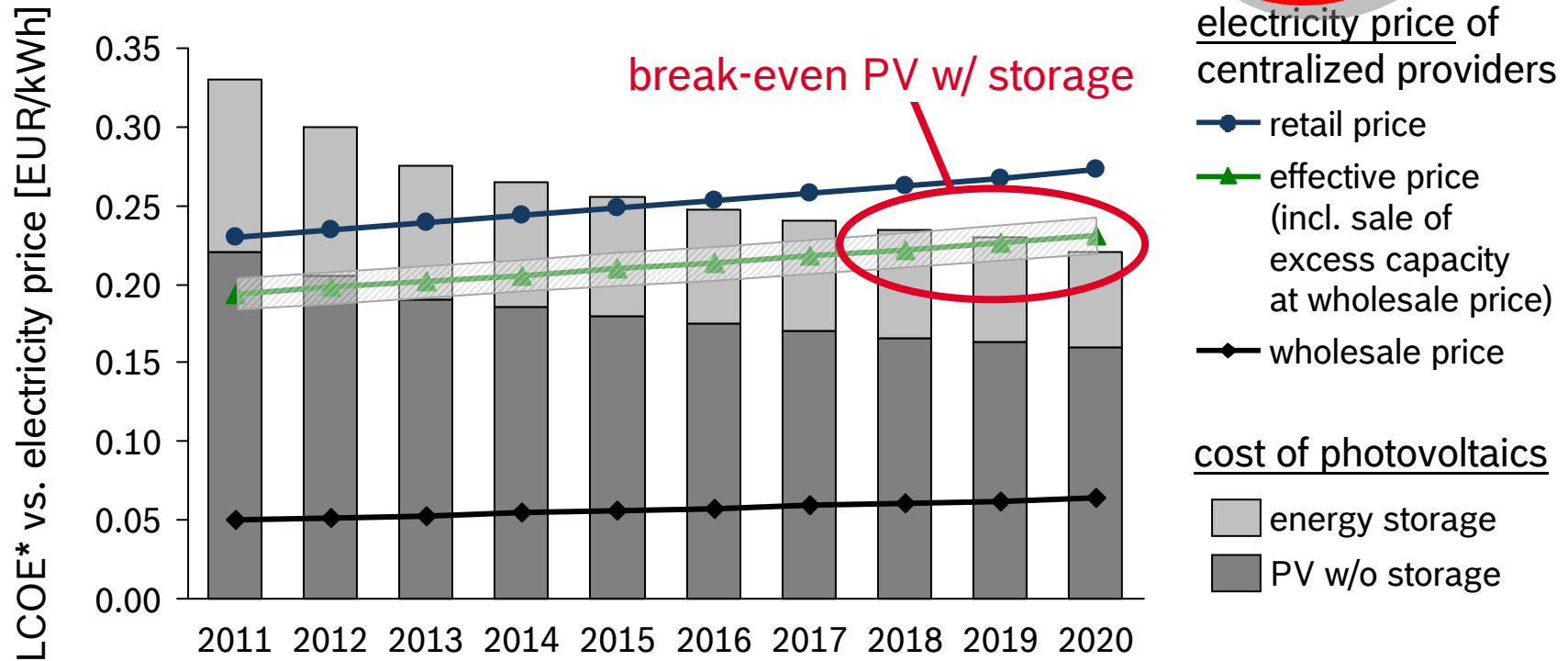
Need for  
„smart  
regulation“



**Need for  
the right  
Market  
Design**

## Opportunities of photovoltaics

example: Germany



Over the medium term, PV will be competitive for residential applications!

# The Industry as Driver of Green Innovation

## The Study of the Think Tank „Öko-Institute“

### Content

<http://www.oeko.de/oekodoc/1449/2012-032-en.pdf>

### 1. Technological developments in four strategically important fields:

- A. Buildings of the future
- B. Energy efficiency of industrial applications
- C. Power generation from Wind and PV
- D. Energy Storage as part of an intelligent and decentralized energy infrastructure

### 2. Political Instruments for realizing the Energy turnaround



Dezentral, ressourcenschonend, effizient:

Bausteine einer zukunftsfähigen Energieversorgung





## The Industry as Driver of Green Innovation

### Key Findings of the Study

**The energy turnaround is feasible:** the right vision is a „moderate decentralized“ structure of power generation and its use

Many **Technologies** are available

- Creation of new RES capacities are needed and possible
- Energy **efficient buildings** must be pushed with the help of new instruments
- **Industrial applications** play a key role in improving energy efficiency
- Development of **Energy Storage** and **Grids** needs specific incentive schemes
- Regulatory **incentives** for energy efficiency today are not enough focused
- Right **market design** is decisive for a **cost-efficient** implementation



### Bosch Summary

- **Existing technologies** also have a high potential of CO2 Reduction and Energy Saving (e.g. Diesel and Gasoline Technologies)
- Focus should be on the “**heavyweights**” of energy use and emission reduction
- Involving **consumers** and stakeholders is of utmost importance
- **Systemic interdependencies** need to be understood
- „**Smart**“ regulation is needed
- New **Energy Market Design** is key for integrating RES



**Thank you very much for your attention!**

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