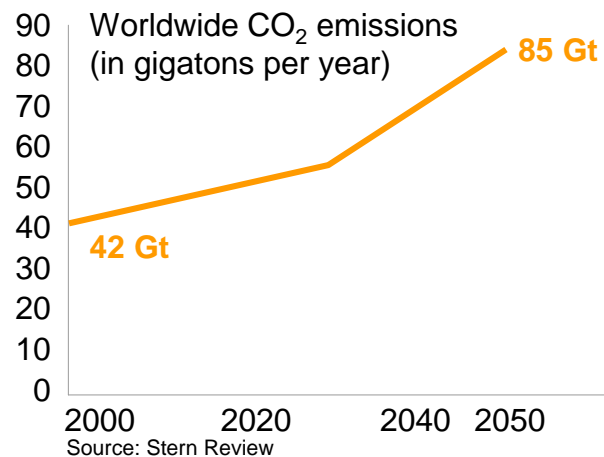
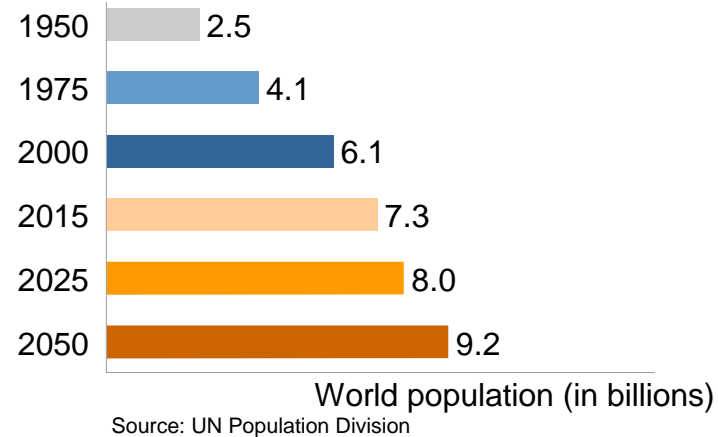


# The future needs the railways. For a cleaner environment.

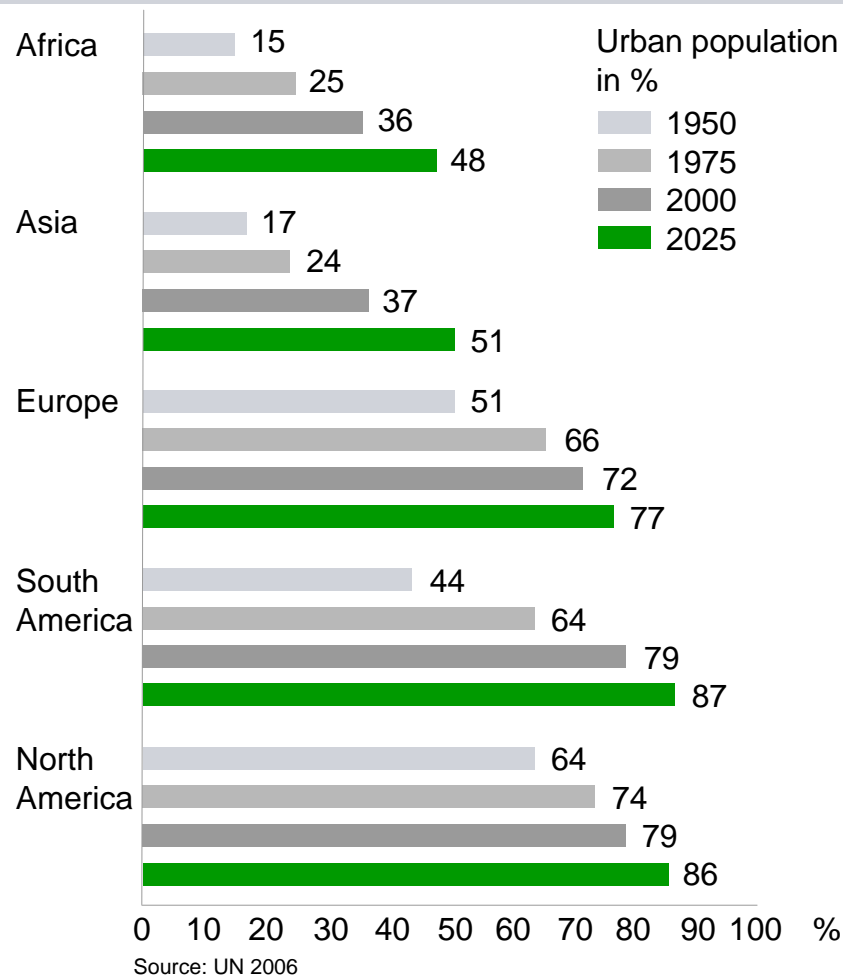
Green mobility.

## The challenge of climate change



- n Increasing growth in the world population and global economy
- n Corresponding depletion of natural resources and increase in environmentally-harmful emissions
- n Without counter measures: increase in annual CO<sub>2</sub> emissions to around 85 gigatons in 2050

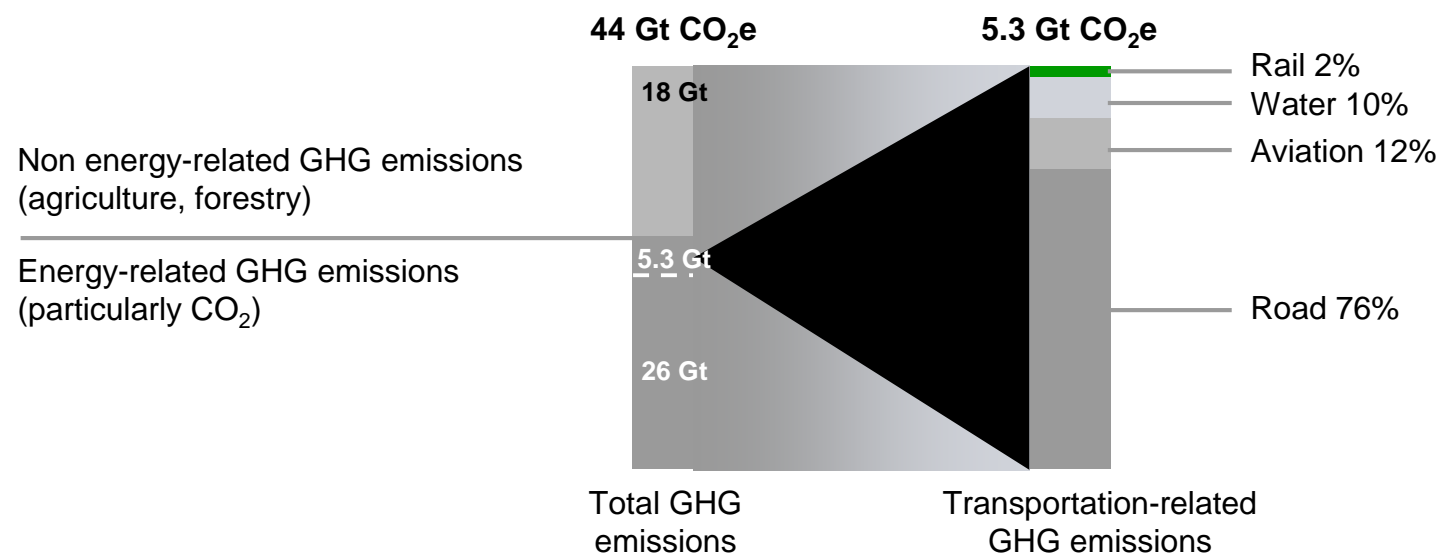
## The challenge of urbanization



n The spread of urbanization calls for attractive, environmentally-friendly and economic transportation solutions in order to ensure the competitiveness and appeal of urban regions in the long term

# Energy-efficient products and solutions for long-term environmental compatibility

- n With its solutions portfolio, Siemens can directly impact around 26 gigatons of the annual energy-related CO<sub>2</sub> equivalents (CO<sub>2</sub>e) of greenhouse gas (GHG) emissions
- n Around 5.3 gigatons of this can be ascribed to transportation-related emissions
- n At around 2%, railways account for the smallest component of all transportation modes



Source: IEA World Energy Outlook, Vattenfall, Siemens

# We care for attractive and clean railway systems: Green mobility.

**SIEMENS**

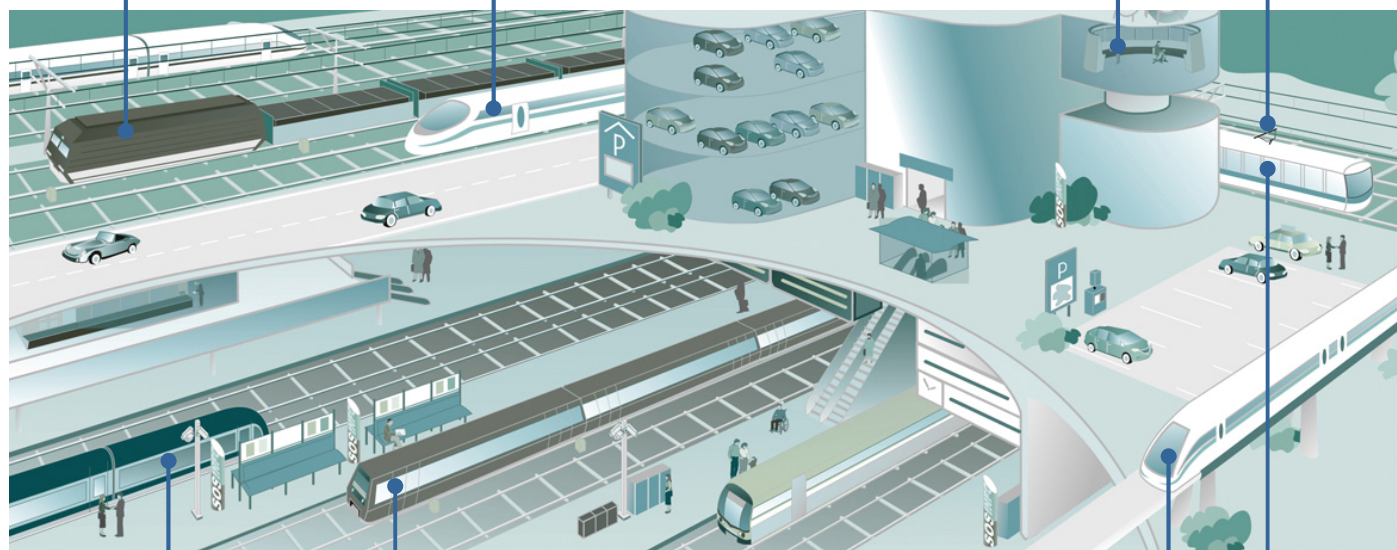
## Intelligent solutions for more environmental sustainability:

**Eurorunner**  
13 dB(A) quieter  
and up to 16%  
more economical

**Velaro**  
Only 0.33 liter of fuel  
per seat per 100 km

**ZLS 901**  
**Route setting system**  
Fewer stops mean lower  
energy consumption

**Sitras SES**  
Saves up to 300 tons  
CO<sub>2</sub> due to recovered  
braking energy



**Syntegra trucks**  
Energy-efficient, oil-  
free and lightweight

**Metro Oslo**  
With 95% recyclability,  
valuable to the end

**Transrapid**  
75% cleaner than  
an airplane at  
400 km/h

**Combino Plus**  
Eco-friendly large space  
streetcar for congestion-  
free city traffic

## Sprinter Lighttrain



- n Energy savings up to 30% through regenerative braking system
- n Flexible train configurations
- n Water-soluble paints and solvent-free coatings
- n Wooden floors from sustainable forestry
- n Environment-friendly refrigerant in the HVAC systems
- n Recycling rate > 90 %
- n Halogenfree cables and insulation

## The new environment-friendly trains from NS

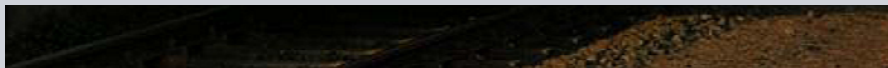


## Desiro ML regional trains



- n Flexible train configurations
- n Inter-operability
- n Recycling rate 96.8 %
- n Water-soluble paints and solvent-free coatings
- n Reduced cost of disposal

**Environment-friendly right from the start**



## Velaro high-speed trains



- n Converted energy consumption of only 0.33 liter of fuel per seat per 100 km with 100% occupancy
- n Mineral oil replaced with alternative, environmentally-compatible coolant in the transformers (with Velaro E for example)
- n Wooden floors from sustainable forestry
- n Environment-friendly refrigerant in the HVAC systems

**Only 0.33 liter per seat over 100 km**





## Metro Oslo



- n 94.7% recyclable components and materials
- n 30% lower energy consumption than previous model due in part to lightweight construction and regenerative brakes
- n Environmental labeling to ISO 14021 standard

**With 95% recycling rate, valuable to the end**

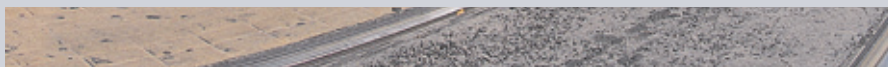


## Avenio 100% low-floor streetcars



- n Energy savings up to 30% through regenerative braking system
- n No wear on brake linings due to electric braking
- n Over 90% recyclable
- n Reduced noise emission

**Eco-friendly space saver for congestion-free urban traffic**



## Eurorunner ER20 - the diesel-electric locomotive



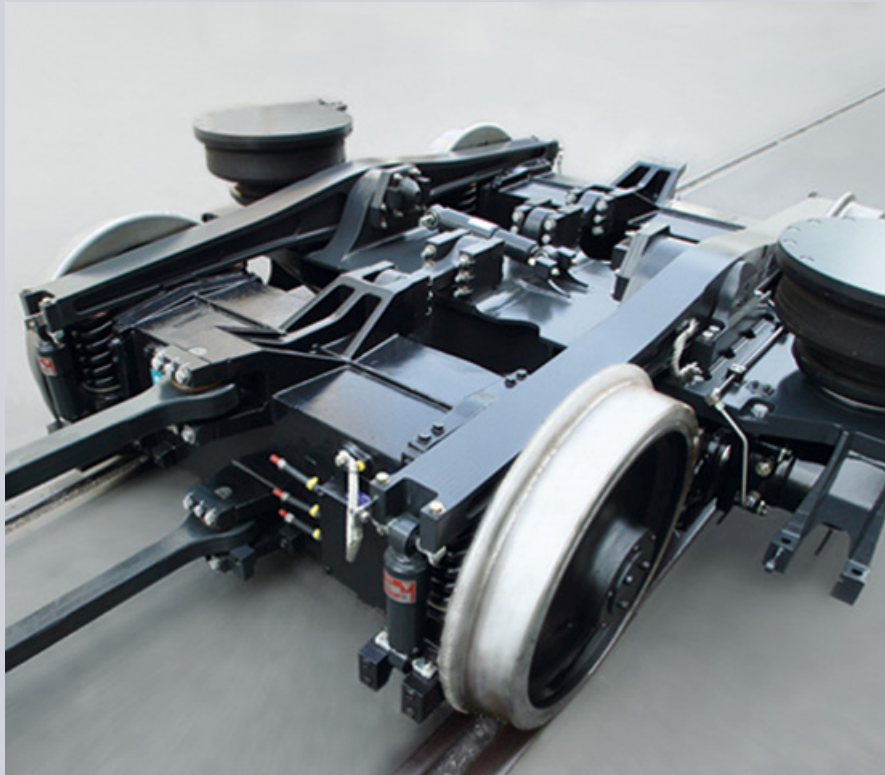
Compared with previous models:

- n Noise emission reduced by up to 13 dB(A)
- n Up to 16% fuel savings
- n Up to 70% reduced pollutant emission
- n Around 10 t less fine particulates calculated over the lifecycle

**13 dB(A) quieter and up to 16% more economical**



## Syntegra bogie



- n Fully-integrated traction, running gear and braking technology
- n Energy-savings up to 26%, e.g. through
  - Elimination of gearbox
  - Lightweight construction
  - Regenerative brake system
- n Fewer emissions (oil, braking dust, abraded matter, noise)
- n Wear-resistant and easy maintenance

**Energy-efficient, oil-free and lighter in weight**

## Sibac ES mobile energy storage system



**Stores valuable braking energy**

- n Reduced pollutant and noise emission
- n Recovery and storage of braking energy for acceleration
- n Up to 30% reduced primary energy import
- n Annual CO<sub>2</sub> emissions reduced by 50 t (e.g. in a triple-articulated Combino Plus)
- n No overhead lines required e.g. for crossing city squares or underpassing structures

## We are committed to sustainability



UITP Charter on Sustainable Development



THE GLOBAL COMPACT



- n Active member in important national and international organizations
- n Listing in the Dow Jones Sustainability Index for the eighth time in succession
- n Global certification of Siemens' EH&S standards for projects, development and production sites according to:
  - n ISO 14001
  - n OHSAS 18001

**Thank you for your attention!**