

**SIEMENS**

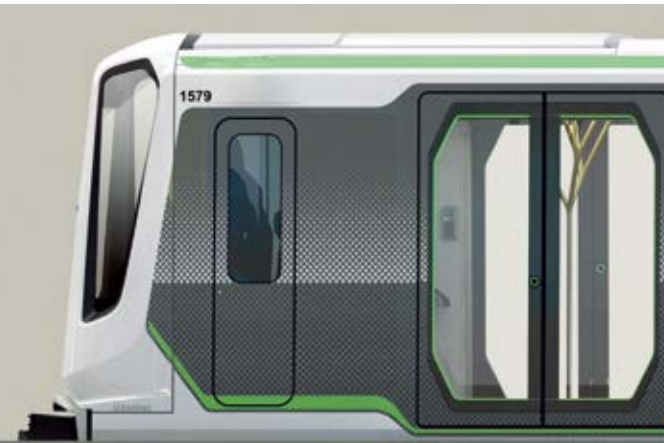


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# Inspiro

Product Environmental Declaration according to ISO 14021 Type II

# Product description

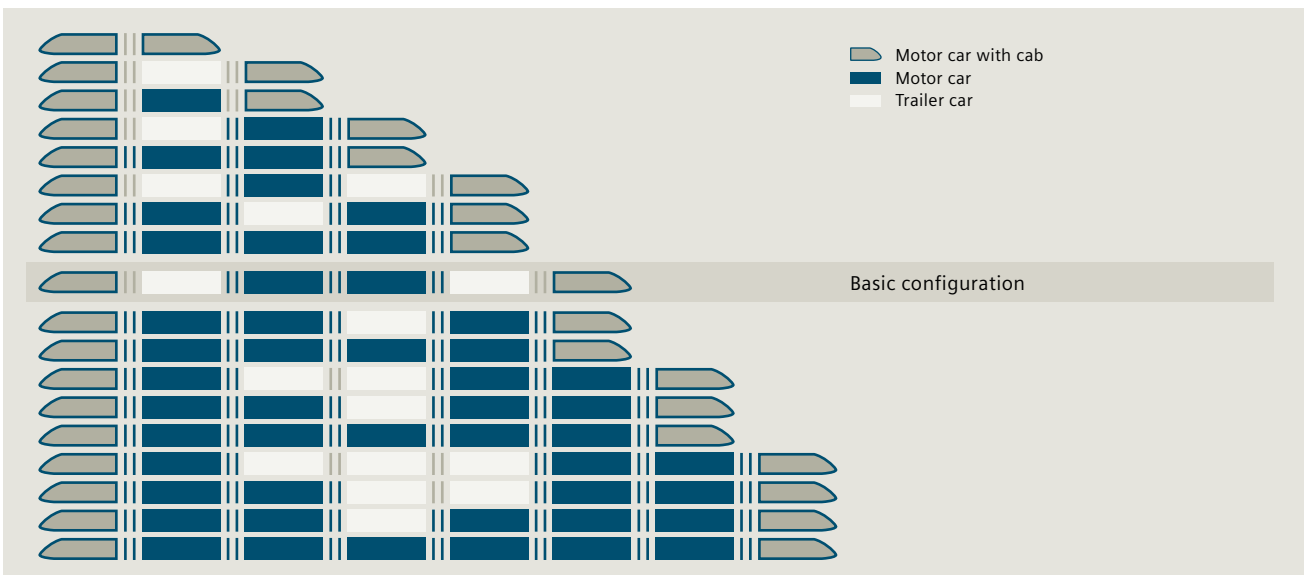


*Inspiro, the metro platform from Siemens, was developed to meet the many different requirements of local public transport in the cities of the future. It is a metro platform that is setting new standards in its class. Environmental concerns were a key factor in developing the Inspiro platform – from environmentally friendly production processes and energy-efficient daily operation to nearly complete recyclability at the end of the lifecycle.*

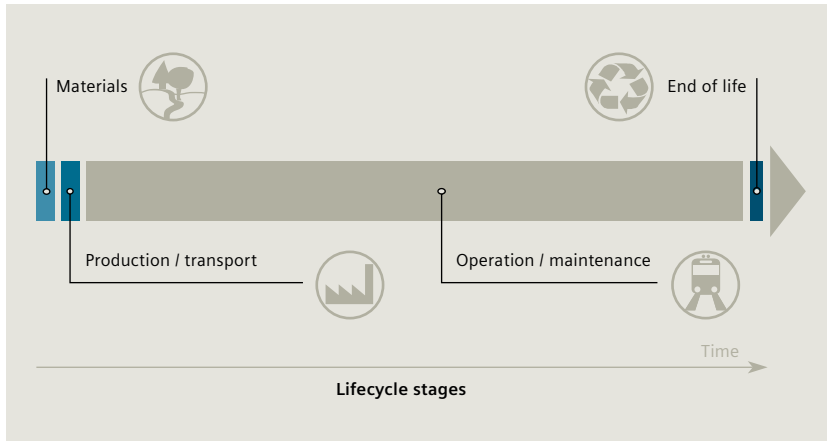
**The Siemens Environmental Mission Statement – responsibility in action**

For Siemens, protecting the environment is not only sound business practice and part of our duty as a good corporate citizen, but is also a key success factor for our company. We fulfill these commitments with advanced manufacturing processes, innovative products and the highest environmental management standards. Our goal is to conserve natural

resources in all areas of the company and in doing so to protect the environment. This approach is based on the EHS strategy as a key element of Siemens' EHS principles. Rigorous, innovative environmental management that goes beyond the legal requirements is an integral part of our business processes – and plays a key role in our sustainable company development.



# Description of the lifecycle stages



**From raw material extraction to disposal: In developing the Inspiro platform, special attention was paid to reducing the impact on the environment throughout the product's entire lifecycle.**



## Raw materials

This stage covers all materials used to construct the Inspiro platform. All processes and effects on the environment were taken into account, from extracting the raw materials to manufacturing semi-finished products.



## Production and transport

This stage covers all materials, energies and fuels used in the manufacturing process. The lifecycle data was taken from the EHS report (fiscal 2011/2012) of the Siemens production facility in Vienna. This data was assigned to the Inspiro according to defined allocation methods. Treatment of the production waste materials was also taken into account.

Delivery to the end customer was estimated on the basis of a distance of 600 kilometers; the vehicles were transported by rail.



## Operation and maintenance

The energy consumption shown is calculated on the basis of realistic operating conditions. Fully loaded and with an energy recovery rate of 42 percent, the energy consumption is 9.6 Wh per kilometer and passenger. Operation over a 30-year period of use was based on an annual mileage of a total of 120,000 kilometers.

The trains are operated with the average European energy mix. The materials required for maintenance and the disposal of waste materials were taken into account on the basis of the preventive maintenance plan.



## End of Life

The calculation for the final lifecycle stage was based on a theoretical recycling process involving pretreatment, dismantling and shredding according to the "UNIFE Recyclability and Recoverability Calculation Method for Rolling Stock." This made it possible to show the recyclability and recoverability of the Inspiro, taking into account its current dismantling and recycling characteristics.

# Environmental key figures

Technical data of the Inspiro Metro platform (basic configuration)	
Train configuration	6-car train 66% motorization
Car body material	Aluminum
Traction power supply	750 V DC, 3rd rail
Car length, with / without cab (over coupler)	20.1 m / 19.4 m
Car width (over door step)	2.77 m
Gauge	1,435 m
Maximum speed (operational)	80 km/h
Passenger capacity per train (7 pass./m <sup>2</sup> )	1,450 passengers
Seats per train	256



**Depiction of the key environmental figures makes it possible to compare products in relation to their environmental compatibility. The calculated key figures apply to the basic configuration of the Inspiro platform and to the intended operation conditions.**

## Test object

The environmental declaration was prepared on the basis of Inspiro platform in its basic configuration. Refer to the table above for the technical data. A product environmental declaration according to ISO 14025 Type III, including an eco balance sheet according to ISO 14040, will be available based on customized operator requirements.

## Material composition

We comply with the requirements according to the UNIFE Railway Industry Substance List throughout the entire supply chain. This ensures that no banned materials or substances are used that could harm humans and the environment.

In its basic configuration, the Inspiro metro platform has a total mass of 160.5 metric tons and consists of 84 percent metal materials such as steel and aluminum (see fig. 1 and 2).

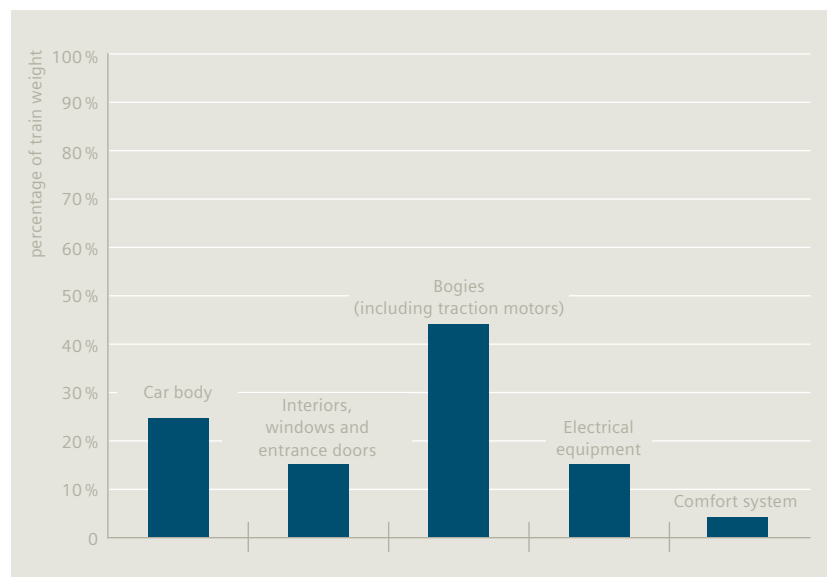
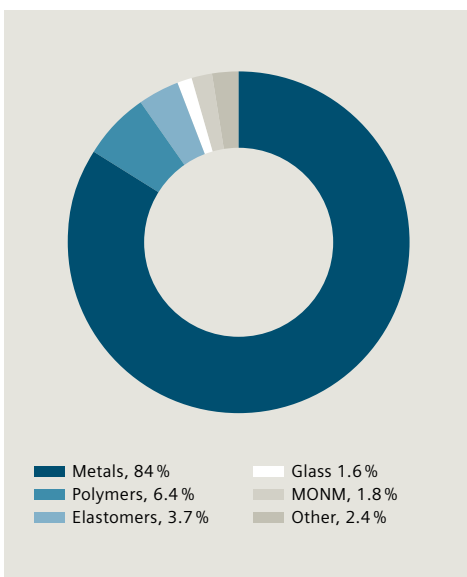


Figure 1: Material composition of the Inspiro metro

Figure 2: Mass assignment to the main product groups

### Greenhouse warming potential

The greenhouse warming potential describes the global warming caused by greenhouse gases, such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>).

Under the described conditions for the lifecycle phases, the greenhouse warming potential of the Inspiro is 5.3 grams of CO<sub>2</sub> equivalent per kilometer and passenger over the entire lifecycle (see fig. 3). The largest portion by far of these emissions (5.1 grams of CO<sub>2</sub> equivalent per kilometer and passenger) is generated during operation.

The energy mix used to operate the metro is crucial for the emissions volume: If a large portion of this power is generated from renewables, the Inspiro's emission potential can be reduced even further.

### End of life

Due to the use of natural and recyclable materials, the Inspiro is 94.8 percent recyclable, 92.2 percent of the materials will be recycled and 2.6 percent recovered by incineration in caloric powerplants (see fig. 4). This reduces the greenhouse warming potential to 13.57 metric tons of CO<sub>2</sub> equivalent.

### Fire safety

The Inspiro platform was designed according to the fire safety requirements under EN 45545/DIN 5510. It is equipped with fire alarms and temperature sensors, allowing fire to be detected at an early stage.

### Emissions comparison

Thanks to the Inspiro's high efficiency, the greenhouse gas emissions during the operating phase are much lower than in private transportation (source: Ecoinvent, Version 01.02.2011, 100 % capacity utilization). Compared to a car with an internal combustion engine, the Inspiro reduces greenhouse gas emissions by as much as 88 percent per passenger (see fig. 5).

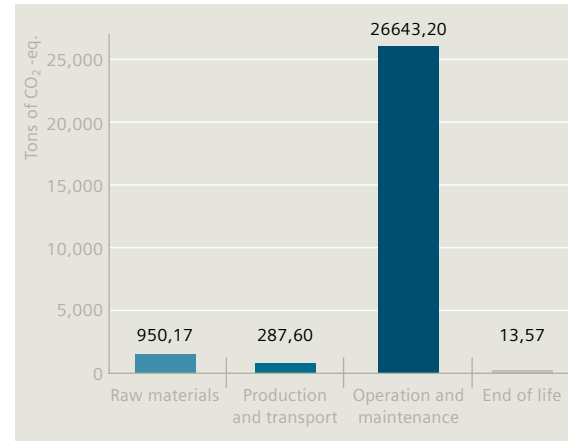


Figure 3: Greenhouse warming potential of the Inspiro during the different lifecycle stages

### Noise and vibration development

The outdoor noise level generated by a passing train is 82 dB(A) at a distance of 7.5 meters from the center of the track, while the indoor noise level within the passenger compartment is 68 dB(A) at a speed of 80 km/h, according to ISO 3095 (outdoor noise) and ISO 3381 (indoor noise). The outdoor and indoor noise development and the vibrations generated during operation are minimized with regard to passenger comfort and the residents living near railway tracks.

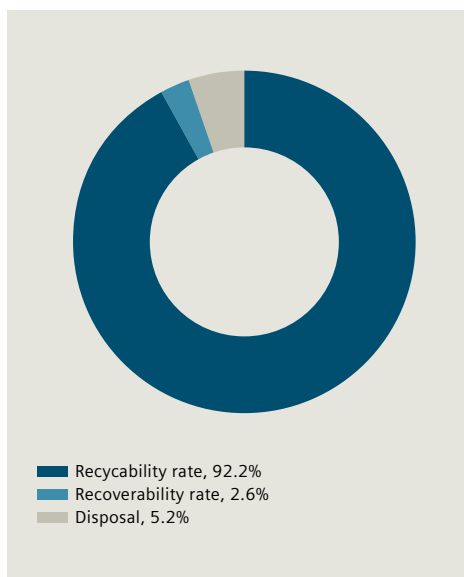


Figure 4: End of life behaviour of the Inspiro metro platform

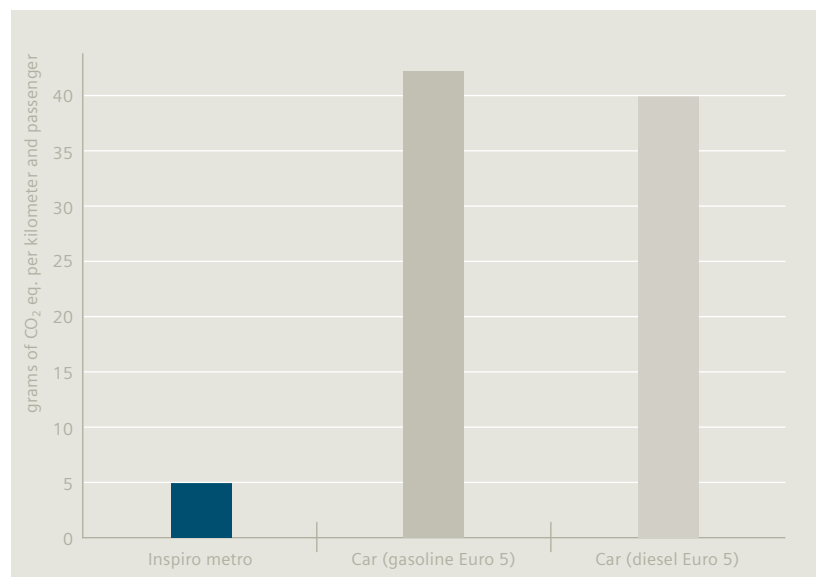


Figure 5: Comparison of greenhouse gas emissions between the Inspiro and modern cars



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For Siemens, protecting the environment is not only sound business practice and part of our duty as a good corporate citizen, but is also a key success factor for our company. With innovative manufacturing methods and products as well as high environmental management standards, we work to fulfill these commitments to environmental protection throughout the world. In all company units and in all countries where we are active, our goal is to protect the environment and conserve natural resources. The foundation for our activities is the EHS strategy, which is part of the EHS principles. Rigorous, innovative environmental management is an integral part of our business processes. It goes beyond the legal requirements and plays a key role in our sustainable company development.

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