

An aerial photograph showing a high-speed train traveling along a track that curves through a dense, green forest. The train is positioned on the right side of the track, moving towards the bottom right. To the left of the track is a large, calm body of water with a vibrant turquoise color. The overall scene is bright and scenic, suggesting a natural and sustainable environment.

SIEMENS

Mobility solutions
for a better tomorrow.

Leading sustainable mobility forward

1

The need for sustainable mobility solutions

3

2

Our contribution to the sustainable development of societies

4

3

Future-proofing sustainable mobility

- Enabling positive impacts through our portfolio
- We offer passengers the choice to move sustainably from the first mile to the last

6

9

16

4

How we achieve more with less

- The environmental footprint of our operations
- Sustainable supply chain management

17

17

19



The need for sustainable mobility solutions

Driven by the megatrends of urbanization, digitalization, globalization, and changing demographics, the demand for mobility will continue to increase rapidly. This growth must be achieved against a backdrop of reducing greenhouse gas emissions to mitigate climate change and the depletion of resources within planetary boundaries if we are to create a sustainable society. To achieve that we must take decisive action and adopt sustainability standards that allow the entire mobility value chain's decarbonization and dematerialization.

By 2050

70%

of the world's population will live in cities

3X more passenger movement predicted globally by 2050*, **

More than

30%

of global energy demand from transportation sector**

25% of global greenhouse gas (GHG) emissions from transportation sector**

* The pandemic is predicted not to affect this development in the long run.

** Source: IEA Future of Rail Report.

Our contribution to the **sustainable development of societies**

The United Nations has developed a blueprint for sustainable development based on 17 Sustainable Development Goals (SDGs). These recognize that the challenges of ending poverty and other deprivations such as poor health or low living standards must be allied with strategies that tackle climate change and depletion of resources.

We define sustainable development as the means to achieve profitable and long-term growth while balancing profit, people, and the planet. While all the SDGs are equally crucial for society's global sustainable development, we are aware that we can directly impact some of these whilst we only have an indirect influence on others.



Supporting SDGs through our business activities

We have classified the SDGs according to the high, medium, and low impact of our business activities.

High Impact



Medium Impact



Low Impact



We contribute to the goals of the SDGs in four important ways: through our products and solutions, through the responsible management of our own operations, through our expertise and thought leadership, and through our activities as a responsible corporate citizen.



Future-proofing sustainable mobility

Sustainable transportation systems are the backbone of prosperous economies and these efforts are driven by many regional and municipal authorities who set themselves goals to reduce carbon emissions.

However, adopting strategies that are solely aimed at combating climate change is not sufficient. Authorities must balance **economic, environmental, and societal impacts** to provide seamless, safe, reliable, and sustainable transportation. To achieve these crucial targets requires entire mobility ecosystems to be fully integrated to enable cities to manage mobility comprehensively.



A reliable partner to satisfy customer's demands

We are global entrepreneurs, trusted by our partners to pioneer transportation, moving people sustainably and seamlessly from the first mile to the last. This is achieved through collaboration, working closely with our customers and using our extensive market knowledge and expertise to deliver the innovative solutions that are the cornerstone of any sustainable intermodal mobility infrastructure.

Enabling profitable operations

With our extensive and innovative portfolio we are uniquely positioned to provide comprehensive solutions for both freight transport and passenger travel within and between cities. We can reduce operating costs with our portfolio of rolling stock that offers an unrivalled energy efficiency level backed up by integrated lifecycle management and intelligent infrastructure for rail.

Saving natural resources

All our products are based on an eco-economic strategy, taking into account ecological and economic aspects. They are designed to focus on sustainability and eco-efficiency, because 80 percent of emissions are locked in during the design phase. Our designs concentrate on the dual objectives of increasing energy and material efficiency.

Promoting a modal shift towards public transport

With our digital rail service models, we give passengers good reasons to choose public transportation as their preferred means of travel. These solutions, which cover the entire journey experience, help improve each passenger's environmental footprint and reduce local traffic emissions.





Rail infrastructure



Turnkey projects



Intermodal solutions



Rail services



Rolling stock

Enabling positive impacts through our portfolio

As a company, we support our customers in their drive to decouple their economic performance from the environmental footprint. With rolling stock, rail infrastructure, intermodal solutions, rail services, and turnkey solutions, we support our customers in generalizing carbon-neutral passenger and freight transport, from door to door, in cities, and in-between. We play our part by utilizing energy-efficient products and accelerating alternative propulsion systems that use battery or hydrogen technology. In addition, our customers enjoy the benefits of increased asset value through an extension of the asset's life; this in turn reduces the ecological footprint of their operations.



Energy- and resource-efficient transportation

The transport sector's contribution to climate change must be reduced significantly to keep global warming below 2°. We play our part by continuing to mitigate emissions through rail infrastructure electrification, automation, and improving energy efficiency. However, rail vehicles' energy use still indirectly causes CO₂ emissions if the electricity used does not come from 100 percent renewables.

For rail operators, **energy consumption** is the largest proportion of their operating costs and a significant contributor to emissions. We can reduce energy consumption and material use through energy-efficient and weight-optimized design. For non-electrified railtracks we provide carbon neutral passenger transportation via our battery or hydrogen powered trains, and for freight traffic our Vectron Dual Mode.

CARBON
NEUTRAL IF
100%

powered by renewables.

BELOW
2°

Big changes need to be made in order to keep global warming controlled.

Energy-Efficient Rolling Stock

– Examples

Velaro Novo

Pushing the boundaries of efficiency



-30%
energy consumption

-1,375t
CO₂ per train and year

-20%
investment needed

Vectron Dual Mode Locomotives

Bridging the gap to electrification



100%
flexible due to 2 systems: electric and diesel

-53%
maintenance and energy costs*


-950t
CO₂ per train and year*

*Example application: Vectron Dual Mode compared to pure diesel operation with an average annual mileage of 150,000 kilometers and 4,000 operating hours per freight locomotive.

Mireo Platform

The evolving role for hydrogen



 "Winner of the German Sustainability Award in Design 2021"

25%
less energy consumption than previous models

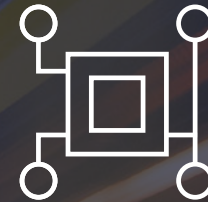
95%
recycling rate at the end of the lifecycle

H₂ available with alternative technologies: **hydrogen (H₂) and battery drive**

Lifecycle management for long-term success



Our strategy optimizes the customer's maintenance and operations over the entire lifecycle by modernizing and retrofitting existing rolling stock.



Our digital solutions reduce the environmental and socio-economic burden with sensor-data-driven predictive maintenance models that help to maintain or repair rail vehicles ensuring 100 percent system availability.

With a lifecycle management approach for rolling stock and rail infrastructure developments, we enhance long-term business success for our customers.

This helps reduce the consumption of natural resources while improving the customer's profitability by prolonging the life of valuable assets.





The benefits of **lifecycle management** with the Railigent® application suite

Reducing emissions with Velaro E in Spain

Shifting traffic between Madrid and Barcelona from air to rail was a major success. Spain's Velaro E high-speed train covers the 625-km route in less than 2.5 hours and has been providing passengers with reliable service on this route for years. We were able to increase the number of train passengers by more than 30%, taken over from plane, ensuring 100% system availability thanks to our predictive maintenance solution – only 1 out of 3,000 trips was noticeably delayed in 3 years. Overall, we managed to reduce greenhouse gas emissions between the two metropolitan areas by more than 29,000 tons of CO₂ equivalent (CO₂e) per year.

100%
system
availability

29,000t
CO₂e reduction

30%
more
passengers



Digitally enhanced rail infrastructure and electrification

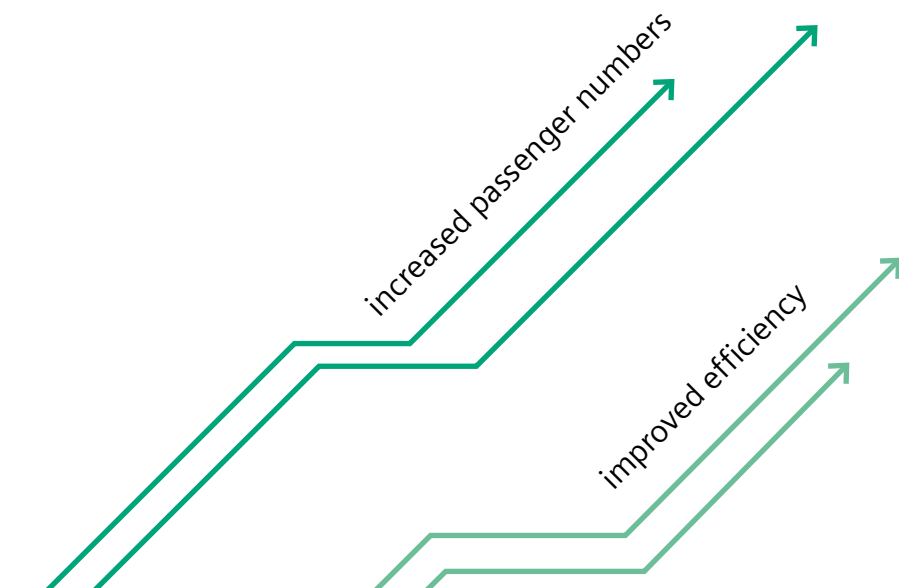
We enable enhanced communication between the rolling stock and rail infrastructure with our digital solutions for mainline and mass transit railways, as well as freight transport. This data allows an intelligent network that tracks the trains efficiently, allowing schedules to be adjusted. Capacity increases significantly, and both safety and reliability are improved. This reduces operational costs for our customers and for passengers, it creates trust and ensures fast and efficient travel. A solid foundation to foster sustainable passenger and freight transport.

Enabling safe rail operations around the globe

Siemens Mobility's digital interlocking technology is a milestone in the digitalization of rail infrastructure, ensuring safety, allowing higher capacity, and improving punctuality. A dispatcher's switching commands are transmitted to points, signals, and track contacts digitally via network technology. It can check that rail sections are free, determine routes, and provide information on movement requests and train speeds. This operational efficiency has a positive impact on sustainability.

Improving efficiency with **automated** **train operations**

Running trains at a higher frequency increases passenger numbers, which is essential if network capacity and efficiency are to be improved. However, this can be both expensive and challenging to resource with available trains and staff. Automated Train Operations (ATO) systems in conjunction with CBTC and ETCS technologies enable passenger and freight trains to be operated in a more cost-efficient way while improving punctuality, and reducing maintenance and downtime costs.



increased passenger numbers

improved efficiency

We offer passengers the choice to move sustainably **from the first mile to the last**

We create smart sustainable mobility ecosystems by seamlessly combining public transport and new, shared mobility services. Safe, seamless, and easy transportation from a single source is our vision for **Mobility as a Service (MaaS)**.

For every transportation mode with our digital solutions, passengers receive the tailored support they need. This includes intermodal route planning before departure to simplified booking, ticketing, and payment to the most up-to-date travel information during the journey itself. Our offerings serve passengers, mobility providers, and operators, creating a basis for new business models and opening new revenue opportunities through an expanded multi- and intermodal offering.

Sustainable

MaaS reduces the carbon footprint with low-emission modes of transport

Dynamic

New mobility services expand the mobility landscape

Variable

MaaS trip planner combines multiple modes of transport, incl. car/bike sharing, carpooling, and demand-responsive transport

Modular

MaaS apps can be implemented in steps due to modular software

User-friendly

User experience is key to an app's success and requires constant development



MaaS

How we achieve more with less

The environmental footprint of our operations

We have set ourselves the target to become carbon-neutral well ahead of 2030 and strive to become our industry's benchmark in environmental, social, and governance. By 2020, we had already reduced our emissions by more than 50 percent compared to the 2014 baseline. Almost all of our sites already utilize 100 percent green electricity.*

Our key approach for continual improvement of our energy efficiency and recycling rate: managing low emissions in production sites and offices through the efficient use of green energy as well as enhanced waste management, which also aims at reducing the waste for landfill every year.

The Siemens Sacramento Rail Hub is almost entirely powered by a 2 megawatt solar installation.

Almost all
of our sites use
100%
green electricity*

Already more than
50%
of emission reduction**

* In unregulated energy markets.

** Of our own direct and indirect emissions in 2020 compared to 2014.

Steps to a sustainable future



Saving natural resources

Global economies use more than one and a half times the earth's resources each year. The efficient use of materials and energy throughout the value chain are crucial to save our natural resources.

1

2



3

Circular economy

Applying circular economy principles, we can extend our products' lifecycles by focusing on repairability, reusability, or refurbishment.

Achieving more with less

Our ambition is to develop eco-efficient solutions with the goal of decoupling economic growth from consumption of resources. With our eco-design principles we aim to increase not only the material efficiency and the share of recycled materials, but also avoid the usage of toxic materials.

Sustainable supply chain management

Our sustainability strategy does not end at our factory walls. We are aware of our influence and responsibility and ensure that our supplies match our sustainability goals. This decarbonization of our supply chain is based on the visibility and transparency of CO₂ emissions. We are active participants in Railsponsible, an industry initiative focused on sustainable procurement. Sustainability will become an integral element of our sourcing strategy in the future, with external supplier audits of our strategic suppliers becoming part of that process.

Sustainable spare part production with 3D printing

To help maintain existing assets, complex legacy spare parts can be produced by scanning and creating a 3D drawing that can be delivered through 3D printing. This technology promotes the circular economy by improving material efficiency, lowering weight, and reducing waste. This allows the required spare parts inventories to be reduced.

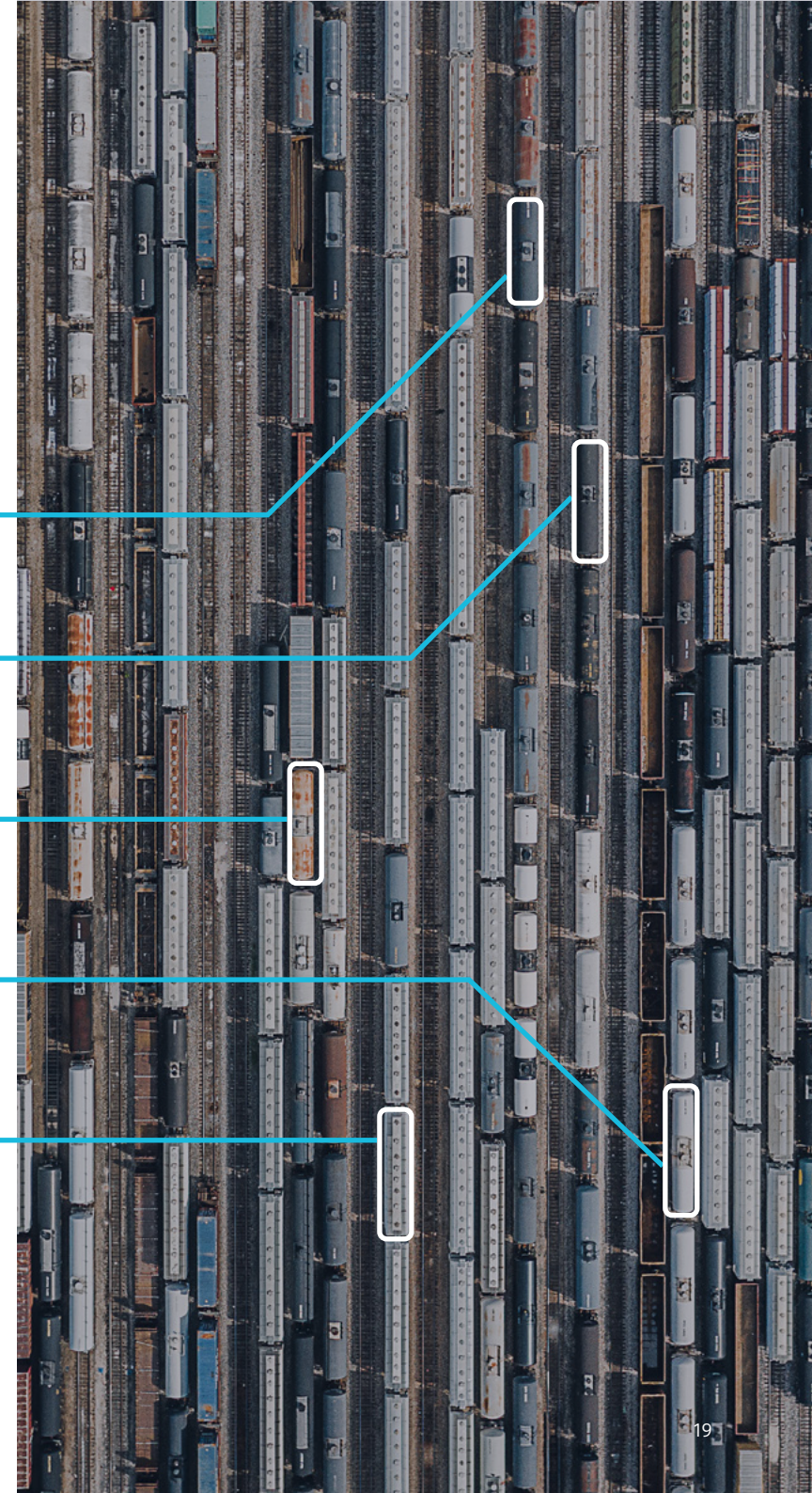
Decarbonization
in the supply chain

CO₂ reduction@
suppliers program

Sustainability
implementation as integral
part in **sourcing decisions**

Perform
ESA audits

Railsponsible
participation



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