

INFRA SWEDEN 2030

Programme plan

DECEMBER 2018



Challenges and opportunities for transport infrastructure

Sweden's development and prosperity depends heavily on efficient transport and requires a reliable, safe and sustainable transport infrastructure.

Our country's topographic and demographic conditions, with sparsely populated areas and rapidly growing cities, mean that our transport infrastructure is both complex and socially critical in several respects. The stable and long-term financing of our infrastructure is not enough; we also need innovation that results in increased sustainability, increased productivity and more efficient use of transport infrastructure.

Need for a higher pace of innovation

There are many driving forces for a higher pace of innovation in transport infrastructure and these relate to important future tasks such as climate and sustainability activities, digitalisation, new design methods, building automation, new forms of procurement and business models, new ways to determine the condition and remaining life of structures and maintain them, and ways to secure the provision of competence in the industry.

The challenges and opportunities overlap. InfraSweden2030 has divided them into six focus areas in which the programme supports projects dealing with key innovations for the transport infrastructure sector

Freedom from fossil dependence

The government's vision, that Sweden will be one of the world's first fossil-free welfare states and the industry's roadmap for fossil-free competitiveness in the construction sector place completely new demands for innovative solutions in the construction sector. While the vision of fossil freedom shall be realised, there is an increasing demand for transport. All the industry's current and new stakeholders together face a major challenge if the government's and industry's vision is to become a reality.

Cooperating in the innovation programme InfracSweden2030 is an opportunity to pool resources and to seize the potential for development in transport infrastructure.

International collaboration

Research is underway worldwide to develop existing infrastructure and find tomorrow's transport solutions.

Major efforts are being made, for example, to develop safe vehicle solutions and to electrify road traffic. There are also major developmental leaps being made in rail transport.

Although transport infrastructure is a national concern, there are many industry and research initiatives for cooperation at Nordic, European and international level, to which InfraSweden2030's network of stakeholders have access.

A summarised review of relevant R & D programmes in the United States and the EU may be found at the end of the document

InfraSweden2030 addresses the challenges

Vision

In 2030, Sweden has a competitive transport infrastructure sector for climate-neutral transport that addresses society's economic and social challenges

INFRA SWEDEN 2030

Is one of 17 strategic innovation programmes supported by Vinnova, the Swedish Energy Agency and Formas.

The innovation programme is an investment in which industry, the public sector and academia can pool their resources for solutions to global societal challenges and for increased international competitiveness.

Started in 2015 and can continue for up to 12 years depending on its results, which are evaluated every three years.

The programme shall contribute to the development of future transport infrastructure throughout its value chain from design to choice of materials, construction, maintenance, use and decommissioning.

50 per cent financed by Vinnova. The success of the programme is ensured by the sector's stakeholders contributing their own resources and knowledge to both problem formulation and possible innovation.

Involvement of stakeholders in other industries is also of paramount importance for the programme's vision to become a reality.

Objective

To achieve this vision, the programme has three objectives:

Develop innovation for transport infrastructure

The programme shall promote research and development of competitive products and services that shall be in demand nationally and internationally.

Create an open, dynamic and attractive environment

The programme shall promote a creative and interdisciplinary system mindset. The transport infrastructure sector shall be a dynamic industry with good profitability that develops a positive innovation climate.

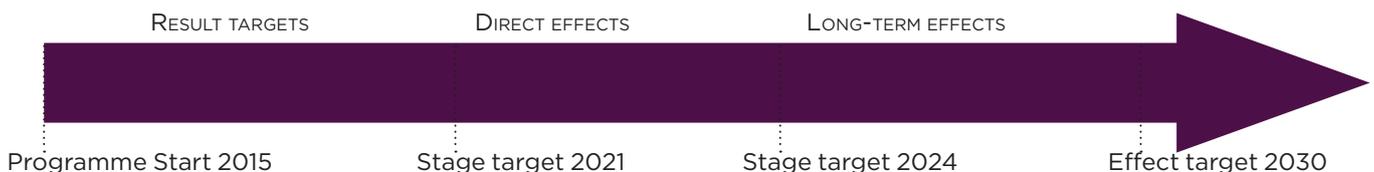
Reduce impacts on the environment and climate

The programme shall, through innovative thinking, contribute to reducing climate and environmental impact from construction, operation and maintenance.

Implementation

InfraSweden2030 identifies and exploits innovation opportunities, knowledge needs and collaborative potential that have a clear influence on future development in transport infrastructure*.

Operations involving open calls, individual strategic projects and activities are run in six focus areas:



Roadmap and effect logic

InfraSweden2030's strategic development and effects are described in the programme's roadmap and effect logic.

The roadmap with objectives (effect target 2030) and milestones (stage targets 2021 and 2024) is a plan to navigate by in the operational activities. Each focus area has its effect targets and stage targets

The effect logic shows how the programme's targets and effects according to the roadmap are to be achieved with the aid various initiatives and activities. In other words, the impact logic takes the roadmap further by showing how the available funds, specified targets and expected effects in InfraSweden2030 are interlinked.

* In InfraSweden2030, transport infrastructure means infrastructure for land-based transport such as walking, cycling, vehicular traffic and rail traffic.

Land constructions within ports and airfields can be included in InfraSweden2030 but not the main infrastructure for shipping and aviation.

One year of InfraSweden2030

The projects supported by InfraSweden2030 can cover a variety of areas, such as design solutions, productivity, business forms, condition assessment and operation and maintenance.

Projects carried out within the framework of the programme are based on a specific focus area but can of course give a bearing for more focus areas. InfraSweden2030 has developed project support to help projects as far as possible to achieve innovation.

THE YEAR IN INFRA SWEDEN 2030

- Seminars, Workshops, Individual Strategic Projects
- Open Call, Information Meetings
- Project Conference, Members Meeting
- Annual Meeting, Open House



Organisation and management

Work at operational level is carried out by the programme office, management group and focus area groups.

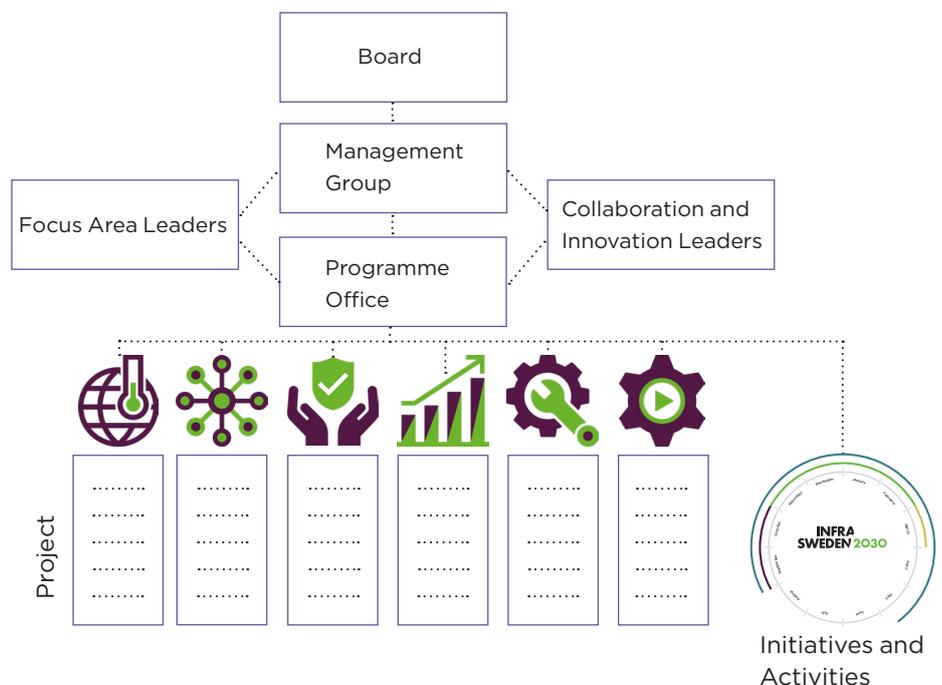
The programme office at KTH includes the functions programme manager, operational coordination, communication and administration.

The management group consists of members from different fields within the industry, such as business, government and academia.

The programme's overall governance is done by the members themselves by electing the programme board at the members' meeting. The members of the board who are recruited from the member organisations are proposed by the nomination committee, which consists of representatives of the programme coordinator, the business sector and a purchasing organisation such as the Swedish Transport Administration.

Since the aim of the programme is to develop innovations in collaboration, knowledge of the processes and methods that lead to this is of great importance. For this reason, collaboration and innovation leaders with good knowledge of transport infrastructure participate in many of the programme's activities.

InfraSweden2030's organisational structure and routines for management and control are described in the document "Governance - roles and responsibilities". The document has been prepared by the programme office and adopted by the programme board.



Focus area

Climate-neutral transport infrastructure



Initiatives and activities within the focus area aim to reduce the climate impact of the entire life cycle of transport infrastructure by promoting the development and demonstration of innovative methods, working methods, products and tools.



Effect target 2030

InfraSweden2030 has clearly contributed to halving the climate impact of transport infrastructure throughout its life cycle as well as creating good conditions for climate-neutral transport in Sweden. Swedish stakeholders in transport infrastructure are exporting climate-smart solutions to a global market in significant quantity.

EXAMPLES OF INNOVATION AREAS

Reuse and resource efficiency

Develop new methods and materials to reduce the climate impact of transport infrastructure from construction, operation and maintenance. For example, these could involve improving resource efficiency and increasing the reuse of materials. It may also be about new methods and technologies that can upgrade the ageing transport infrastructure so that lifetime and durability can be increased.

Planning and control to reduce climate impact

Develop innovative solutions that take into account the entire lifecycle perspective when planning roads and railways/runways. Optimise the lifetime and use of existing and additional transport infrastructure to minimise the climate impact of the transport system. This includes solutions for flexibility and the use of multi-function infrastructure.

Energy recovery

Develop sustainable and efficient technological solutions that make it possible to make use of hitherto untapped energy.

Electrified roads

Develop sustainable solutions for the design, maintenance and increased performance of electrified roads. By developing electrified transport infrastructure for different vehicle types, carbon dioxide emissions can be reduced.

Focus area

Interlinked transport infrastructure



The area focuses on new value-creating processes, solutions and services that are made possible by the infrastructure being connected to other parts of the transport system. Examples are services for more efficient operation and maintenance of infrastructure and services for efficient utilisation of transport infrastructure. The aim is to increase the precision of all measures through efficient use of information and new technology.



Effect target 2030

InfraSweden2030 has contributed to a significantly increased value of existing transport infrastructure through deeper integration between the various stakeholders in the transport system. Citizens and businesses in Sweden have a more efficient transport system and a more predictable level of service. Swedish companies are successful suppliers of commercialised new solutions in the growing international services market.

EXAMPLES OF INNOVATION AREAS

Smarter maintenance

Society's expenses for the maintenance of transport infrastructure are extensive. Innovations that use interconnection to lead to more efficient maintenance results in both increased cost-effectiveness and reduced disruption for both road and rail systems.

Smarter planning and control

Building new infrastructure is costly and often has significant environmental consequences. By reusing information between different stakeholders in the transport system, new solutions and services can be developed for more efficient use of existing infrastructure. Examples of this are prioritisation and control of different layers of traffic flows in a common but limited infrastructure.

Service exports

In Sweden, there are many companies in a position to reach out, together with smaller companies, with new solutions and services in Interlinked Transport Infrastructure on the international market.

Focus area

Construction solutions and methods



This area covers everything from developing innovative and functional materials to construction and building methods for designing smart and green transport infrastructure.



Effect target 2030

InfraSweden2030 has clearly contributed to the development of new materials, methods and processes for smart and green transport infrastructure.

EXAMPLES OF INNOVATION AREAS

Materials and construction solutions

New challenges, such as climate change and more limited use of natural resources, require innovation and development to enable infrastructure to meet the need for transport in a sustainable manner. New materials and tools for construction design create great opportunities for designing infrastructure from a lifecycle perspective.

Construction methods

Many of the components used in transport infrastructure have a high density and are therefore heavy. This makes production difficult and energy-intensive and the products difficult to handle and transport. New materials and methods could reduce environmental impact, reduce maintenance needs, increase productivity and improve the working environment.

Today's rapid development of digital tools provides great opportunities to work with active design and quality tracking directly in the field during construction.

Built-in sensors on construction machines can for example provide direct information in real time about the strength of the structure and how it corresponds to the prerequisites from the design stage.

By industrialising and automating parts of the construction process and by varying the material choices (for example, with composite materials) a more controlled building environment can be created for different components. This has the potential to prolong the structure's durability and to be able to reduce the construction time and thereby traffic disruption during construction.

Focus area

Increased productivity



In this area, the focus is on the prerequisites for managing and allocating resources to areas where they provide the greatest societal benefit and increased focus on sustainable and smart solutions. InfraSweden2030 shall promote the choice of solutions (product, process and tools) that are most effective and sustainable from a societal perspective and give the supplier market the right commercial conditions.



Effect target 2030

InfraSweden2030 has clearly contributed to increasing the productivity and competitiveness of Swedish transport infrastructure so as to create a culture of learning organisations where follow-up is natural.

EXAMPLES OF INNOVATION AREAS

Productivity-enhancing measures

Develop productivity-enhancing measures in the form of new technologies and processes that reduce cost over the entire lifecycle and/or improve quality. This can be done by increasing the degree of robotisation as well as with an ever increasing computing power that collects, communicates and evaluates data over the lifecycle.

Develop functional requirements

Develop and standardise functional requirements for products and processes that create incentives for sustainable development, smart infrastructure and increased productivity.

Increase an industrial mindset throughout the construction process

Stimulate an increased industrial mindset that permeates the entire construction process from the early stages to the management stage. This is a precondition for the long-term and continuous development of productivity and innovation in the transport infrastructure.

Create routines for follow up and evaluation

Monitoring and evaluating operations is a prerequisite for creating a learning organisation that makes use of past experiences so as to improve the work.

Develop business models

Develop contracts, as well as forms of business and procurement, that allow the market's resources to be used in the most efficient way. This is about giving contractors and technical consultants a greater degree of freedom to think new, for example through the transparent management of alternative tenders or other innovative forms of procurement.

Focus area

Condition assessment, operating and maintenance methods



In this area, the focus is on developing new, objective methods for measuring and analysing installation conditions and new, innovative solutions for more sustainable maintenance of transport infrastructure now and in the future.



Effect target 2030

InfraSweden2030 has clearly contributed to innovative technological solutions and efficient planning and follow-up tools based on modern digitalisation technologies such as Big Data, IoT and AI having contributed to proactive, sustainable and productive maintenance. With many new specialist companies in the field of condition assessment, operation and maintenance, a more dynamic market has been created.

EXAMPLES OF INNOVATION AREAS

IT-based operating and maintenance methods

In this area, the focus is on identifying, collecting and analysing relevant information, so that an optimised operational and maintenance strategy can be achieved. Today there is tremendous development in the field of IT, such as digitalisation, interconnection, connectivity, as well as analysis of Big Data, which could be implemented and rationalise future systems. For example, information collected from sensors in vehicles or fixed installations can be used to refine decision support so that more cost- and energy-efficient maintenance activities can be developed.

New tools and calculation models for condition assessment

This area is about developing new and modern tools for measuring and analysing changes in condition. Technological advances contribute to new and improved condition assessments based on refined computational models and testing in laboratories and on site. As a basis for developing condition indicators and functional requirements, there is also a need for more knowledge about the impact of the infrastructure's condition on transport (accessibility, travelling time), passengers (safety and comfort) and the environment (health and environment).

Maintenance of the transport infrastructure of the future

This area is about adapting condition assessment and maintenance to the development of, for example, automated vehicles, electrified freight transport and high-speed trains, but also adapting to climate change. Technologies and methods of operation and maintenance that provide reduced climate impact and minimise transport disruption are also important areas.

Focus area

Increased competence and attractiveness



InfraSweden2030 's vision is dependent on the infrastructure sector being able to attract and develop skilled employees. Through this focus area, InfraSweden2030 wishes to support innovation projects that have a stated purpose of increasing competence and attractiveness.



Effect target 2030

InfraSweden2030 has clearly contributed to the transport infrastructure sector being regarded as open, dynamic and attractive, known for interesting and stimulating work.

EXAMPLES OF INNOVATION AREAS

Future provision of competence

This area is about supporting initiatives aimed at developing and establishing structures that encourage the continuous recruitment of new young resources to the industry. These can be activities that lead to school children coming into contact at an early stage with research, innovation and important societal challenges for the industry. This could also be about better collaboration between school and business or different types of collaboration with established networks and activities such as We_change, Tekniksprånget, Ingenjörsvägen and Teknikcollege.

Diversity and equal opportunity

The transport infrastructure industry, as well as the entire building and construction sector, need to be developed in terms of diversity and gender equality. In order for the industry to be considered modern, dynamic and attractive in the future, it must be more equitable and inclusive. Diversity and equality lead to a better recruitment base, broader collective competence and a more attractive and stimulating working environment. Dynamic and inclusive teams create more innovation and contribute to increased profitability.

This area is about supporting, in various ways, initiatives that promote diversity and equality and that attract more women to the transport infrastructure industry.

Global outlook

Sweden, the industry and research initiatives

There is considerable international research and development in transport infrastructure that concerns InfraSweden2030

USA

EAR

Since 1993, the Federal Highway Administration (FHWA) has been running the Exploratory Advanced Research Program (EAR), which finances research in the long term. At present, the programme has selected four areas where change is considered necessary so that the road transport system can address future challenges and where there is potential for significant improvements. These are co-operative systems for vehicles and roads, road materials, traffic users' behaviour and choice of transport, technology and methods for evaluating the operation and performance of the road system, as well as sustainability and energy efficiency of road construction, operation and maintenance.

NCHRP

The National Cooperative Highway Research Program (NCHRP) for applied research in the field of road infrastructure, founded in 1962 and administered by the Transportation Research Board (TRB) in the USA: This is a collaboration between states in the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration.

IDEA

Innovations Deserving Exploratory Analysis (IDEA) is financed by federal and state organisations in the fields of road, rail and public transport. The aim is to find and support innovations and untested concepts that have difficulty raising their initial finance. The programme is open to all, even foreign citizens who do not operate in the USA. IDEA is administered by TRB on behalf of the financiers and consists at present of three active sub-programmes: NCHRP Highway IDEA; Rail Safety IDEA; Transit IDEA.

TPF

The Transportation Pooled Fund (TPF) Program is a joint research fund in which the states, the Department of Transportation, the Federal Highway Administration (FHWA) and other interested organisations jointly contribute funds to research that they are interested in. Foreign stakeholders (both public and private) can participate in the projects. Projects must be supported by either a US state or the FHWA.

EUROPE

Horizon 2020

The EU's ongoing research and innovation framework programme, with total funding of nearly SEK 80 billion during 2014 - 2020. Horizon 2020 has four priority areas in the field of transport research: Making the transport system more sustainable; Making the transport system more seamless; Maintaining the competitiveness of the transport sector; Making transport research responsive.

Shift2Rail

Shift2Rail was formed 2014 and shall coordinate and administer all railway research funded by the EU. Shift2Rail presently consists of 71 member organisations that are spread across most of Europe. The Swedish Transport Administration leads and coordinates the Swedish part of Shift2Rail. There are five priority areas, which are also called innovation programmes: cost-effective and reliable trains, traffic management and signalling systems, cost-effective and robust infrastructure, information technology and freight traffic. There is also a programme for issues that are common to more than one of the areas.

Global outlook

Sweden, the industry and research initiatives

EUROPE

CEDR TRP

CEDR (Conference of European Directors of Roads) is a platform for collaboration and promotion of improvements to the road system and its infrastructure as an integral part of a sustainable transport system in Europe. CEDR's five focus areas are: Digitalisation and innovation; The environment and resilience; Safety, operation, mobility and performance; Resources and management of assets; Standardisation and harmonisation. CEDR Transnational Research Programme (TRP) is an annual call for the purpose of producing research results that can be implemented by CEDR members and contribute to a safe, sustainable and efficient road network throughout Europe. The research is funded by the members on a voluntary basis and participation is open to all juridical persons established in a European country.

ERA-NET Plus Infravation

ERA-NET Plus Infravation is a transnational collaboration aimed at developing innovations in the field of road infrastructure. The coordinator of ERA-NET Plus Infravation is Rijkswaterstaat in the Netherlands.

FEHRL Forever Open Road (FOR)

The Forum of European Highway Research Laboratories (FEHRL) has initiated Forever Open Road (FOR) in order to create next-generation roads that can meet future requirements for reliability, accessibility, maintenance, safety, the environment, health and costs. FOR is a concept that is intended to bring together the best of what

we have today and the best of what is to come. The purpose of the concept is to develop the fifth generation road, the key areas of which are: The Adaptable Road; The Automated Road; The Climate Change Resilient Road. The concept applies to both construction and maintenance and can be applied to all types of roads regardless of region or country.

ERTRAC

The European Road Transport Research Advisory Council (ERTRAC) is the European Technology Platform (ETP) for road transport. Within the EU collaboration, there are several technology platforms in different areas. These are supported by the European Commission and aim to develop research and innovation agendas and roadmaps at both national and European level. The platforms function as independent units and are self-financing. ERTRAC Strategic Research Agenda is implemented through roadmaps that present subjects in research, development and the dissemination of innovations.

ERRAC

The European Rail Research Advisory Council (ERRAC) was established in 2001 to promote and work for research and innovation in railways in the EU. It is the European Technology Platform (ETP) for railways. ERRAC works with all kinds of railways and rail transport, which include freight transport, passenger transport, high-speed rail lines and both regional and urban trams and light railways.

STRIA

The Strategic Research Innovation Agenda (STRIA) describes future transport research and innovation priorities for reducing carbon dioxide emissions in the European transport sector. Together with EU member states and transport stakeholders, STRIA aims to establish common priorities to support and accelerate research, innovation and implementation processes leading to significant technological changes in the transport sector. STRIA comprises roadmaps in a number of transport research areas.

NUVit

Networking for Urban Vitality (NUVit) is a European roadmap focusing on integrating multimodal mobility, infrastructure and physical planning. A number of case studies and practical examples have been collected in NUVit that demonstrate the infrastructure planning and land use challenges identified by the network.

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Med stöd från

VINNOVA
Sveriges innovationsmyndighet

 **Energi**myndigheten

FORMAS 

Strategiska
innovations-
program