Sweden needs FFI

Sweden's automotive industry has a huge impact on Sweden's growth

Sweden's automotive industry:

- includes 964 suppliers[1] and employs around 136,400 workers in Sweden[1]
- generates 11% of Sweden's total goods exports[2]
- generates12% of Swedish industry's investments[2]
- is one of Sweden's most R&D-intensive industries[3]
- contributes to knowledge sharing with the entire engineering industry via academia, institutes, and suppliers who are active in multiple engineering sectors.

Source: 1 FKG. 2 SCB Statistics Sweden 2014. 3 BILSweden.

Collaboration is driving development forward

Strategic Vehicle Research and Innovation (FFI), is a partnership between the Swedish government and automotive industry for the joint funding of research, innovation and development. FFI focuses on the areas of Climate and Environment and Safety. The FFI programme generates knowledge and drives innovation as a basis for Vision Zero and the Swedish government's targets concerning a fossil fuel-free vehicle fleet and strong competitive standing internationally. Over 500 unique parties have participated to date.

Vision Zero:
Reduce the number of road injuries and deaths

Fossil fuel-free vehicle fleet:
Reduce the environmental impact of road transports

Highly competitive:
Increase the industry's international competitiveness

«The automotive industry is a driving force for large parts of Sweden's industry. Continued investment in FFI strengthens local industry, helps reduce the number of injuries and fatalities in traffic accidents, reduces environmental impact and generates broad economic benefits for the country.«

CHARLOTTE BROGREN, DIRECTOR GENERAL VINNOVA

Results of FFI's activities (2009 - 2014):

105 PhDs	**266** results from completed FFI projects have been transferred to other advanced projects
119 Licentiate's degrees	**212** have been transferred to product development projects
685 Master's theses	**84** have been launched onto the market.
558 articles published in scientific journals	**61** results from completed FFI projects have been used in government reports, regulations, permit applications and political decisions.

**These figures are estimates for all 385 completed projects based on 165 survey responses received from the projects.*

Research that shows results

Many innovations have helped Sweden achieve its current position as a world-leader in traffic safety and other areas. Through FFI, substantial knowledge has been accrued within industry, universities and research institutes. The initiative allows Sweden to maintain its leading expertise in the fields of traffic safety and climate.

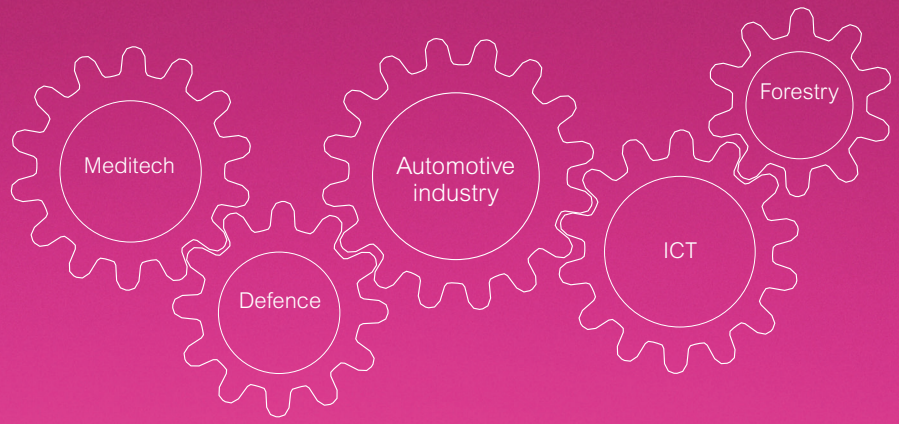
The programme's total budget for 2009-2015 is SEK 6.5 billion, of which SEK 3.6 billion is co-financing from the industry and SEK 2.9 billion is public funding. Academia is the single largest recipient of the public funds allocated to the programme. Up to now 647 FFI projects have been approved, of which 385 have been completed.

«The automotive industry has a key role to play in Europe's transition to a sustainable society. There is plenty of evidence to suggest that academia, in its role as an integrator of education, research and innovation, can improve Sweden's automotive cluster's competitiveness globally.»

KARIN MARKIDES, PRESIDENT,
CHALMERS UNIVERSITY
OF TECHNOLOGY 2006-2015

An important cog in the engineering industry

Sweden's automotive industry has around 1,000 suppliers, most of which are active in multiple engineering sectors. Today, the automotive suppliers industry employs more than 80,000 people. Upward job mobility is difficult to measure, but is significant.



Sharing knowledge with the entire engineering industry

The research and development conducted within FFI is important in helping strengthen renewal and innovative capacity in the automotive industry. What's more, other areas of Sweden's engineering industry adopt the advances made in the automotive industry, transforming them into new services and products. There are many examples of this, everything from production processes in healthcare to communications systems in satellites.*

**Source: FKG*

«The suppliers are active throughout the entire industrial sector and are working at full speed on the transport system of the future; an important cog in the paradigm shift towards digitization.«

FREDRIK SIDAHL,
MANAGING DIRECTOR AT FKG

647 widely diverse development projects

STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

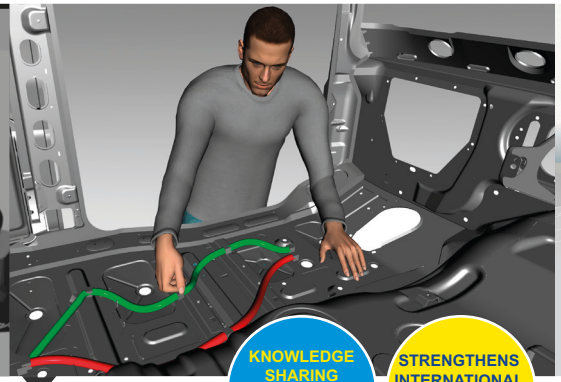
FOSSIL-FREE VEHICLE FLEET

VEV – Volvo Energy Efficient Vehicle

Description: The project's objective is to increase transport efficiency for long-distance transports by 50 per cent and reduce emissions by 30 per cent. The project involves the entire vehicle, i.e. tractor and trailer.

Results: The project will run for five years, concluding in 2016 with the construction of a demonstrator to show that the project's objectives have been met in physical tests. Simulations of the technical improvements to this point show that the project will achieve its objective.

Collaborators: AB Volvo, Lund University, Chalmers University of Technology, Parator, SSAB EMEA, ÅF and SKAB. VEV is a bilateral project conducted in collaboration with the US Department of Energy's SuperTruck programme. (US partners are not listed here.)



KNOWLEDGE SHARING *with the engineering industry*

STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

CROMM – Creation of Muscle Manikins

Description: A simulation tool is being developed that can determine whether interaction between a human, product and production system is ergonomically sound and to visualize a possible working pattern that minimises the load on the individual.

Results: This will result in a support tool for identifying and communicating potential ergonomic risks early in development processes for products and production systems. The tool is useful in the automotive industry for studying the work conditions of assemblers, vehicle operators and service staff. The technology has also been tested in the marine and healthcare sectors.

Collaborators: Chalmers University of Technology, Franhoufer Chalmers Centre, University of Skövde, University West, Scania, AB Volvo, Combitech, IAC, Volvo Car Group and Virtual Manufacturing.

FOSSIL-FREE VEHICLE FLEET

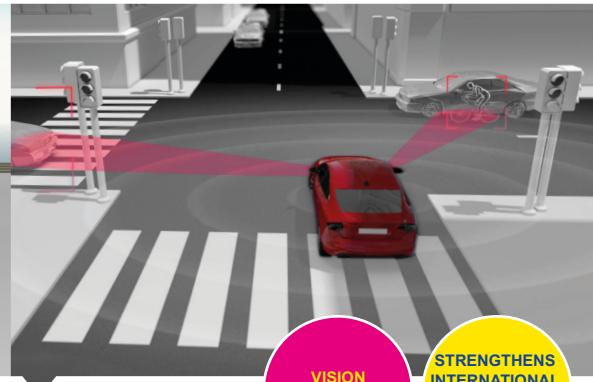
STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

Slide In

Description: This involves the development of a technology for the continuous transfer of electrical energy to moving vehicles on roads. The technology makes it possible for clean electric vehicles to drive unlimited distances with only modest requirements for on-board electrical energy storage capacity. This advancement builds on both existing and new technologies, using both conductive and inductive technologies for energy transfer.

Results: Both inductive and conductive solutions have been developed in technical demonstrations on closed test tracks and are now ready for demonstration on public roads. The technology has been developed for heavy vehicles, but is also suitable for passenger vehicles.

Collaborators: AB Volvo, Scania, Alstom, Bombardier, Lund University and Chalmers University of Technology.



VISION ZERO

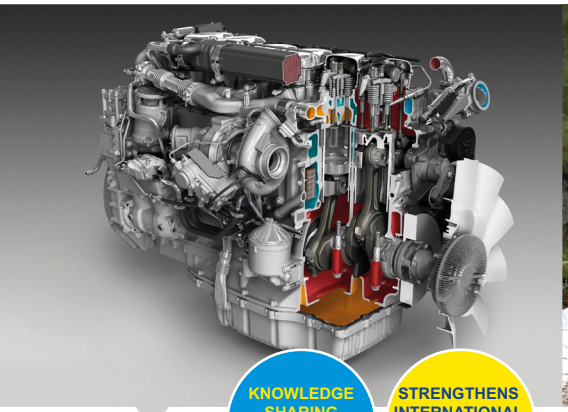
STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

Non-Hit Car & Truck

Description: Improved safety functions and an expanded range of features increase the need for information generated by sensors. New sensors are added to support new features and existing features can also be improved. A major challenge is finding ways to combine and share this information between the growing number of available sensors in a vehicle.

Results: Frameworks are being developed for managing all the sensors that will be needed as vehicles become more advanced. A 360-degree view of a vehicle's surroundings is currently being developed. The vehicles receive information that enables them to evaluate the possible alternatives in each traffic situation, meaning that collisions are avoided. Project results are visualized using demonstration vehicles.

Collaborators: AB Volvo, Volvo Car Group, Mecel, HiQ, ÅF and Chalmers University of Technology.



KNOWLEDGE SHARING *with the engineering industry*

STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

Research on the Competitive Production of Low-friction Components

Description: Emission targets and the need for environmentally-friendly materials give rise to a need for new solutions for producing efficient internal combustion engines. Applied Nano Surfaces Sweden (ANS) has developed a cost-effective method for creating low-friction surfaces on steel and cast iron.

Results: The FFI project has shown that the process can successfully treat valve mechanism components industrially, with very good results in the form of reduced wear and friction. The method has been developed for heavy-vehicle components, but is also used on passenger vehicles, compressors, pumps, drills and other industrial equipment.

Collaborators: Applied Nano Surfaces Sweden (ANS), Gnutti Carlo Sweden, Scania and Halmstad University.

STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

BiFi – Load Bearing Information through Vehicle Intelligence

Description: First, postal vans were used to gather information. From these data, a vehicle-based model was then produced for assessing load bearing capacity and identifying sections of road with inadequate bearing capacity due to ground thawing and heavy rain, for example.

Results: By having advance knowledge about roads with deficient load bearing capacity, haulers and others can avoid using these, thus improving transport efficiency and reducing environmental impact. The method can be developed to create monitoring tools for identifying roads and areas in need of repair and maintenance and also makes it possible to review the effectiveness of past maintenance. The results can be used by haulage companies, transport organisations, vehicle manufacturers and national and international road maintenance associations.

Collaborators: Semcon, Klimator, Trafikverket Swedish transport adminstration, Foreca, Posten and Posti.

VISION ZERO

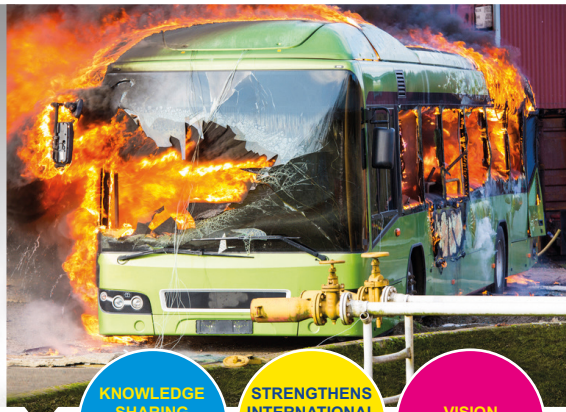
STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

iQMatic – SCANIA Autonomous Transport Solutions

Description: This autonomous transport system consists of a high-grade, automated command centre and a fleet of fully autonomous, heavy, driverless carriers. A fully functional prototype system is used daily for intensive research and for developing functions such as automatic logistics planning and issuing orders. On the vehicle side, new research findings from the fields of robotics and artificial intelligence are being implemented to allow the autonomous carriers to carry out their tasks safely in all environments, situations and weather conditions.

Results: The autonomous transport system improves productivity and environmental performance by ten per cent each and reduces the cost of transportation by 40 per cent. Knowledge sharing between industry and universities is significant.

Collaborators: Scania, Saab AB Security and Defence Solution, Autoliv, KTH and Linköping University.



KNOWLEDGE SHARING *with the engineering industry*

STRENGTHENS INTERNATIONAL COMPETITIVE-NESS

VISION ZERO

Fire Detection and Fire Alarms in Heavy Vehicles

Description: This project investigates the properties of motor engine compartments so that fire detection systems and fire alarms can be optimally developed to suit these settings. Better detection systems can provide faster warnings in the event of fire and, in certain cases, can also provide warnings before fire breaks out, such as in cases of overheating and smoke formation.

Results: These alarm systems can also be used in other types of vehicles (e.g., planes, trains and ships) and in the mining industry. The standard has been adapted to comply with international vehicle law. There has also been knowledge sharing from the foreign companies.

Collaborators: Volvo Buss, Volvo Lastvagnar, Volvo CE, Scania, Trygg-Hansa, Länsförsäkringar, Folksam, LKAB, Swebus Express, Göteborgs Spårvägar, Transportstyrelsen, SP and three Swedish and three foreign suppliers of detection and alarm systems.

VINNOVA Information VI 2015:06 • ISSN 1650-3120