



VISION ZERO: REVISITING WHAT SWEDEN MEANS BY VISION ZERO AND HOW DO WE GET THERE?

By Sanna Eveby and Maria Håkansson

INTRODUCTION

From being an issue between an individual driver and the police, road safety is rapidly becoming a question concerning organizations worldwide. In 2015, road safety was explicitly included for the first time as part of the global development agenda, and this heightened recognition gave us a new and unique opportunity to accelerate progress. This recognition puts road traffic safety on the same level of global criticality as climate, health and equity issues, and means that road safety can no longer be traded off to promote other needs. Its inclusion among the United Nations Sustainable Development Goals (SDGs) (under **Goal 3: Ensure healthy lives and promote well-being for all at all ages**) also means that road safety is the responsibility of a wide range of stakeholders, both public and private (Figure 1).

Not only do roadway crashes result in the death of 1.2 million people around the world each year and are also the leading cause of death for children and young adults, World Health Organization (WHO) and World Bank (2017) have estimated that the social and economic impacts of road accidents cost countries are around 3-5% of their GDP.

Photo credit: Maria Håkansson, Guidance to Zero, ETC Antwerp, 2024.

This article will be revisiting what Sweden means by Vision Zero. From the birth and principles of Vision Zero, examples are provided of some key interventions based on Vision Zero and for how traffic safety is a dimension of sustainability. This article then provides a look ahead on what the next major steps are.

THE SUSTAINABLE DEVELOPMENT GOALS



Figure 1: United Nations Sustainable Development Goals

THE BIRTH OF VISION ZERO

Vision Zero is a Swedish policy innovation, established in 1995 by a group of road safety experts at the Swedish Road Administration (today the Swedish Transport Administration (Trafikverket-TRV) under the leadership of the Director of Road Safety Claes Tingvall. In October 1997, the Swedish Parliament passed Government Bill 1996/97:137 by a large majority and determined that Vision Zero should form the basis for the work carried out in Sweden on road safety. It received strong political support at an early stage of its development and became widely established thanks to steady cooperation between the various players in the road safety sector.

The starting point for Vision Zero is the ethical standpoint that no one should be killed or suffer lifelong injury because of road traffic. This means that the notion of safety in the road transport system concurs with the values that apply for safety in society as a whole. In the workplace, and within the rail, shipping and air transport sectors, it goes without saying that no deaths should occur as a consequence of accidents.



Figure 2: Vision Zero is a Swedish policy innovation by The Swedish Transport Administration.

Vision Zero can most easily be described in three dimensions or layers (Lindberg and Håkansson, 2017):

- Ethics. People should not have to die in traffic.
- Responsibility. System designers must take into account that people make mistakes.
- Solutions. Finding combinations that work.

The fundamental basis is that life is more important than anything else. The economic benefit of traffic and mobility to society should not have to take precedence over people's lives. Systems cannot and should not be designed to avoid every crash, but they should keep people alive and in full health. Vision Zero, or the Safe System approach, recognizes that road transport is a complex system and that humans, vehicles and the road infrastructure must interact in a way that ensures a high level of safety.

The ones who plan and build roads and vehicles must always account for, and take responsibility for, the possibility that people will make mistakes, and therefore, build protective filters around every person within the transport system. The better the filters, the higher the speed that can be permitted on the road. As such, the entire speed limit system should rely on Vision Zero.

KEY INTERVENTIONS BASED ON VISION ZERO

Since the adoption of Vision Zero, the Swedish Transport Administration has been working closely with researchers, insurance companies, the car- and restraint systems industry and others to find solutions that have the best impact (Figure 2).

Metric speed limits converted to English (rounded)	
30 km/h	20 mph
40 km/h	25 mph
50 km/h	30 mph
80 km/h	50 mph
km/h= kilometers per hour mph= miles per hour	



Photo credit: Maria Håkansson, Road Safety Camera, Guidance to Zero, ETC Antwerp, 2024.

Below are brief descriptions of some of the key interventions that have been implemented in Sweden based on Vision Zero.

Sustainable Speeds

No single factor means **more for safety in road traffic than speed**. Since Vision Zero was first introduced in Sweden, an overview has been made of the speed limits on the state and municipal roads. A fundamental principle is that the speeds are to be determined based on the technical standards of the roads and vehicles, so that the tolerance of people against external forces is not exceeded.

In the countryside, median separation and the standard of the roadside areas are decisive factors for the speed limits that are set. This means that only roads with median barriers are given a permissible speed of over 80 km/h, the only exception being roads that carry little traffic.

In urban areas, speed limits shall be adjusted to what the human body can withstand. Therefore, speeds should not exceed 30 km/h in environments where unprotected road users can be hit by a vehicle (TRV 2022:011) (Figure 3).



Figure 4: 2+1-lane road in Sweden. Photo: Guidance to Zero AB



Figure 3: A street in an urban area where the speed is regulated to 30 km/h. Photo: Guidance to Zero AB

Median barriers

Median barriers are being erected on both existing roads as well as newly constructed roads, in order to prevent fatalities and serious injuries due to head-on collisions. They are found on different types of roads, such as both motorways and 2+1-lane roads. 2+1-lane roads have an interchanging sequence of two travel lanes in one direction and one travel lane in the other, (then vice versa) with a barrier between the two directions of travel. (Figure 4). A regular 13-metre (42.6 feet) wide road can be reconfigured to a 2+1 road within the existing roadway width.

When a road is rebuilt to 2+1, it is necessary to find alternatives for the dangerous left turns. It is also important to ensure that there are alternative pathways for pedestrians and cyclists. Unfortunately, the latter is sometimes not prioritized.



Figure 5: A speed-assured pedestrian crossing next to a school in Stockholm, Sweden. Photo: Guidance to Zero AB

Roundabouts

A roundabout has a traffic calming effect and, if a crash does happen, the consequences are less severe (compared to the traffic signal or stop sign controls they replace). When built with this in mind, the roundabout is often smaller and tighter than if it is only focused on the car's accessibility.

Speed-assured streets

In Sweden, the *hastighetssäkrade gator* (speed-assured streets) is the concept of designing the street in such a way that 85 % of the traffic drives below the recommended speed for the street. The Swedish municipalities have worked tirelessly to “speed assure” streets in accordance with Vision Zero. It must be safe to get around on foot and by bicycle, on designated pedestrian and cycle paths or on mixed streets where the speed of the vehicles is adapted to the pedestrians. Figure 5 depicts an example of a speed-assured pedestrian crossing next to a school. The street has a speed limit of 30 km/h.

Road Safety Cameras

Sweden does not have speed cameras, but rather road safety cameras. The aim is to reduce the average speed on the most hazardous roads and in this way decrease the number of fatalities and serious injuries.



Figure 6: Portable Road Safety Camera, here in the city of Västervik, Sweden. Photo: Guidance to Zero AB

Instead of fining as many drivers as possible, the cameras serve as a reminder not to drive too fast. They are designed in a friendly way and the road user is always informed of where the cameras are, with physical information signs as well as digitally. The system (Automatic Traffic Control, ATK in Swedish) is administered by the Swedish Transport Administration and the Swedish National Police Board. At the camera location, the share of vehicles at the national level that exceeds speed limit is low, less than 5 percent. The Swedish Transport Administration's annual survey shows that more than 70 percent of the Swedes are positive to the road safety cameras. This attitude has been so since the beginning of the surveys in 2006 (trafikverket.se) (Figure 6).

ISA (Intelligent Speed Adaptation)

Another effective tool that helps drivers keep the speed limit is ISA (Intelligent Speed Adaptation). ISA is a well-proven technology that helps drivers to keep a speed that complies with the speed limit on the route. If the speed limit is being exceeded, open ISA systems warn the driver by beeping or by vibrations in the accelerator, whereas half-open ISA systems make it more difficult for the driver to accelerate beyond the default speed by, for example, creating resistance in the accelerator. Closed ISA systems, on the other hand, fully prevent the vehicle and driver from exceeding the legal speed limit. There is also the possibility to register data such as speed and transgressions, which allows for post-analysis. In the future, it may also be possible to include varying speed limits in ISA systems, that take into account the surrounding environment at the moment (TRV 2021:092).

Seat Belt Reminders

In the mid 1990's, it was found that the use of seat belts among car occupants killed in traffic accidents in Sweden was only 40%, despite a high level of general seat belt use. This inspired a group representing government, research, insurance companies, and the car and restraint systems industry to study the problem. They found that traditional educational and informational measures would only have a marginal effect, since the non-users in most cases were positive or very positive towards wearing seat belts. Instead, a specification of requirements for a seat belt reminder was developed and later included in the Euro NCAP (The European New Car Assessment Programme) protocol. Today, seat belt reminders (SBR) are standard equipment in most car models in Europe. In a study from 2008, Lie et al showed that the seat belt rate was 97,5% in cars with SBR and 85,8% in cars without.



Photo credit: Maria Håkansson, Speed Assured Streets, Guidance to Zero, ETC Antwerp, 2024.

Alcolocks and sobriety controls

Companies and organizations use alcolocks in their vehicles to ensure that their drivers are sober behind the wheel. This enables them to quality-assure their transportation services. Anyone suspected of DWI (Driving While Intoxicated) may apply to participate in an Alcohol Interlock program for offenders instead of losing their driving license. New technology has made it possible to implement fast sobriety controls, with limited presence of police or other supervision authorities, in strategic locations such as ports or other border crossings.



Photo credit: Maria Håkansson, Guidance to Zero, ETC Antwerp, 2024.

VISION ZERO'S IMPACT TO-DATE

In 2023, 229 persons died in road traffic accidents in Sweden. The number of fatalities per year is less than half compared to 1997, when the government bill on Vision Zero was passed. Most of the fatal accidents occur on national roads, the most common types of accidents being encounters/overtaking and single accidents. Accidents resulting in serious injuries differ from fatal accidents. Single accidents involving bicycles and rear-end accidents involving passenger cars constitute two major accident groups that together account for just over half of the number of serious injuries. If slipping and falling accidents among pedestrians in the road environment were to be included in the definition of road accidents, it would be the most common type of accident with serious injuries (TRV 2024:091). The reduction in the number of seriously injured people is more difficult to account for, as hospitals have been required to report to the Swedish Traffic Accident Data Acquisition, Strada, only since 2021.

Going forward, in its annual analysis of road safety development 2023 (TRV 2024:091), the Swedish Transport Administration assesses that the intermediate targets for 2030—to reduce the number of fatalities compared to 2020 by half—will be difficult to achieve, and that extensive efforts are needed immediately. The speed compliance needs to increase further, more roads need median barriers, a large number of intersections and an even larger amount of pedestrian and bicycle passages need to be rebuilt, operation and maintenance of pedestrian and bicycle paths need to be improved, and the use of bicycle helmets needs to increase to 80 percent.

In its conclusions, the Swedish Transport Administration also states that a new base speed in urban areas of 40 km/h is a prerequisite for achieving a safe urban environment, and that 30 km/h is secured in areas where vulnerable road users are mixed with car traffic. The speed limit of 50 km/h must be replaced by 30 or 40 km/h in all urban areas, a total of just over 11,000 km of roadways.



Figure 7: A child on their way from school on a snowy November day, Stockholm. Photo: Guidance to Zero AB

A study by the Stockholm Environment Institute at the University of York (Whitelegg and Haq, 2006) examined the Swedish Vision Zero policy and found that it both captures the public mood and the professional view of WHO, and that there is no significant economic barrier to move towards Vision Zero. “It is possible to do much better and it is possible to visualise a world with zero deaths and zero serious injuries.” Whitelegg and Haq also highlight that Vision Zero contributes to a sustainable society by having a positive impact in areas such as walking and cycling, reducing obesity and reducing inequalities in health and social exclusion.

VISION ZERO AND THE GLOBAL GOALS FOR SUSTAINABLE DEVELOPMENT

Vision Zero as a dimension of Sustainability

The Global Goals for Sustainable Development, the SDGs, are absolute, just like Vision Zero, and indivisible. Road safety plays a vital role for the 2030 Agenda for Sustainable Development, both as a target in itself (SDG Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accident) and as an enabler for other targets to create the sustainable people-centered traffic systems that we are aspiring to. A sustainable transport system is safe, fossil-free, noise-free, accessible, compact, space-efficient and keeps the air clean.

The holistic approach needed to reach goals and targets that are integrated and indivisible is both a challenge and a major opportunity in creating significantly more attractive urban environments. Just like with Vision Zero in the area of road safety, all affected players need to commit to working for tomorrow’s transport system to be free from noise and fossil fuels and pollution. Society must also be accessible to everyone, regardless of age, finances, gender, or other factors that can play a role in the possibility of moving around. It is important to be sensitive and to really listen to, and plan for, all citizens rather than just a part of the population (Lindberg and Håkansson, 2017).

Transport planners need to let go of the forecast-controlled planning and, to a much higher extent, work with goal-oriented planning. In the research project Sustainable Co-creation (Håkansson et al, 2018), AFRY (Swedish consultant company) developed a goal-driven process based on a co-creational iterative back-casting to systematically try out different solutions to achieve the goals.

“Sustainable urban planning which promotes a modal shift towards safe walking and cycling and access to public transport can lead to health benefits from increased physical activity, reduced ambient air pollution and lower noise exposure” (WHO, 2023).

Vision Zero as a dimension of Health, safety and active mobility

WHO also acknowledges safety as a key component of active lifestyles [Editor’s note: celebrated in a featured article in WTPP 29:1 May 2024]. According to WHO, physical inactivity is a leading contributor to global mortality. It is estimated that between four and five million deaths per year could be averted if the global population was more active. Global estimates of physical inactivity indicate that, in 2016, 27.5% of adults and 81% of adolescents did not meet the 2010 WHO recommendations. Trend data shows a limited global improvement during the past decade (WHO, 2020).

Active mobility such as walking and cycling allows individuals to incorporate physical activity into daily life. Therefore, active mobility is in line with the SDGs. However, active mobility is not without risks. Globally, pedestrians represent about 20 % of all fatalities within the road transport system and cyclists represent 5% (WHO, 2023). The European Commission estimates that for every person killed in road traffic crashes, an additional five suffer serious injuries. In the European Union (EU), pedestrians represent the road user group with the highest proportion of accidents resulting in hospital admission. A study found that the main part of injuries among pedestrians in Sweden were due to a fall (Kjeldgård et al, 2021). The elderly are overrepresented when it comes to pedestrian falls, and they are also more prone to get fractures when falling.

In Sweden, with several months of winter every year, many falls among pedestrians and bicycle accidents are related to snow and ice. (Figure 7.) Days with rain followed by falling temperatures or freezing rain have been found to generate three-fold higher numbers of falls (Kjeldgård et al, 2021). The gravel used to prevent slipping due to ice, is also causing accidents when pedestrians and cyclists slip on it, especially in the spring before it has been swept up. In addition, the cold causes frost damage and potholes. The neglected maintenance on primarily the municipal streets and pedestrian and bicycle paths mainly affects pedestrians and cyclists.

Under the leadership of the Swedish Transport Administration, 33 authorities and actors have indicated what they intend to do over the next four years improve road safety, which were compiled in Action Plan for Safe Road Traffic 2022–2025 (TRV 2022:051). Among the 250 measures that the relevant authorities and actors intend to implement during the period, many address the safety for pedestrians and cyclists.

When encouraging active mobility, it is vital to also take action to ensure that walking, cycling and public transport is safe. The most prominent urban planners, such as Jane Jacobs and Jan Gehl, have long stressed the importance of starting with the human dimension, when choosing street types and traffic solutions. People must be able to move comfortably and safely in cities on foot or by bicycle, and when traffic solutions are adopted; special consideration must be given to children, the young, the elderly and people with disabilities. Quality for people and pedestrian safety must be key concerns (Gehl, 2010).



Photo credit: Maria Håkansson, Guidance to Zero, ETC Antwerp, 2024.

GLOBAL MINISTERIAL CONFERENCE: SAVING LIVES BEYOND 2020

The Academic Expert Group for the 3rd Global Ministerial Conference on Road Safety in Stockholm 2019 proposed a set of nine recommendations in “Saving Lives Beyond 2020: The Next Steps” (TRV 2019:209). The recommendations, which cover a range of interdisciplinary categories, are based on the 2030 Agenda, and they show how road safety is a shared responsibility between public and private stakeholders. The recommendations form the basis for the “Stockholm Declaration on Road Safety” as well as “The UN General Assembly Resolution for Global Road Safety” (A/74/299).

The nine recommendations are:

1. Sustainable practices and reporting

When we talk about the Safe System approach within road safety we talk about the vehicle, speeds, infrastructure, post-crash care and the road users. In a traditional approach to road safety, the responsibility lies on the government and on the road users, but businesses and enterprises of all sizes can, and should, contribute to road safety in line with a range of the Sustainable Development Goals. The recommendation is that these organizations provide annual public sustainability reports including road safety disclosures, and that they require the highest level of road safety according to the Safe System principles in their internal practices, in policies concerning the health and safety of their employees, and in the processes and policies of the full range of suppliers, distributors and partners throughout their value chain or production and distribution system.

As a result of this recommendation, FIA (Federation Internationale de l’Automobile) developed an index to rate organizations’ work within road safety. The Index is based on existing SDG principles and is designed to guide organizations in their aim to reduce all road traffic related injuries within their entire value chain (FIA, 2024). (Figure 8).



Figure 8: FIAs logo for the Road Safety Index they have developed.

2. Procurement

Prioritizing road safety in procurement practices of corporations and governments could have far-reaching effects. If we look at the organization’s total operation, we see that a lot of the production and procurement takes place in other parts of the world, often in low-income countries. (Figure 9). By taking responsibility for their full value chains, organizations can improve the lives of those who are at greatest risk for a range of threats including motor vehicle crashes. The social influence of procurement, if directed to incentivize sustainable practices and investments—including road safety—is substantial. The main recommendation for procurement is that all tiers of government and the private sector prioritize road safety in all decisions, including the specification of safety in their procurements.



Figure 9: Garbage pick-up outside a hotel in Koh Lanta, Thailand. Photo: Guidance to Zero AB

3. Modal Shift

This recommendation aims at making the decision-makers within public infrastructure planning utilize public transport and mobility policies to increase active mobility. Active mobility means a decreased dependency on personal motor vehicles for transport and increased use of safer, cleaner, and healthier alternatives. According to the World Health Organization, insufficient physical activity is the fourth leading risk factor for global mortality and is on the rise in many countries. Insufficient infrastructure adds risks to pedestrians, but perceived security is an equally important question to address.

4. Child and youth health

Motor vehicle crash deaths remain the leading cause of death globally for ages 5-29. Another substantial risk to child health, lack of physical activity, is also related to road safety in that the safety of roads affects decisions about when and where children will walk or bicycle.

Both road safety and the frequency of physical activity could be improved by a few common measures. The recommendation is that cities and road authorities examine the routes frequently traveled by children to attend school and other activities, identify needs, including changes that encourage active modes such as walking and cycling, and incorporate Safe System principles to eliminate risks along these routes. (Figure 10)

5. Infrastructure

Each component of the system - people, vehicles, the road and the environment - are important. Road design is, however, the most powerful means for achieving high levels of system safety. In-depth crash investigations have shown strong interactions between the roles of vehicles, road infrastructure and road users in contributing to serious crashes. The investigations indicate that road infrastructure factors are most strongly linked to crash fatalities (Stigson et al, 2008). In a Safe System, roads are designed according to their function to ensure safety for all road users. The recommendation is that governments and road authorities allocate sufficient resources to upgrade existing road infrastructure. The infrastructure upgrades could also include digital resources.

6. Safe vehicles across the globe

Vehicle safety technology has proven to be effective both in preventing crashes and in saving lives when crashes happen. Vehicle safety systems serve an important role in a Safe System, in that they accommodate for human error and limits crash forces. Regulation can be effective in establishing minimum levels of vehicle safety. A voluntary industry could also be effective if it were widely adopted by manufacturers. The recommendation is that vehicle manufacturers, governments and fleet purchasers should ensure that all vehicles produced for every market be equipped with recommended levels of safety performance and that the highest possible levels of vehicle safety performance be required for vehicles used in both private and public vehicle fleets.



Figure 10: Children on their way to school. Photo: Guidance to Zero AB

7. Zero speeding

Speed management is essential to reductions in crashes, serious injuries and fatalities.

In a Safe System, designers specify speed limits based on evidence of vehicle and road safety and the assumption that drivers and other road users will make errors. When an error happens, vehicle and road design can also help avoid a crash. However, speed determines the amount of energy that must be managed in a crash and even the best vehicle and road designs have limits.

The relationship between speed and the probability and severity of crashes has been well researched.

In general, higher speeds increase both the likelihood of crashing and the severity of an accident (Elvik, 2013). Studies have shown that relatively small changes in travel speeds can result in substantial changes in death or injury in crashes (Elvik, 2009).

The recommendation is that businesses, governments and other fleet owners practice a zero-tolerance approach to speeding.

8. 30 km/h

Safe vehicle and road design features are especially critical in urban areas where vulnerable road users, including pedestrians, bicyclists and motorcyclists, are a constant part of the road user environment. A maximum speed limit of 30 km/h in urban areas is widely supported by researchers and safety experts to provide adequate protection for vulnerable road users. Reducing urban speeds to 30 km/h has a range of additional benefits such as noise reduction and more active mobility. (TRV 2019:209) For the protection of vulnerable road users and to achieve sustainability goals addressing livable cities, health and security, the recommendation is that a maximum speed limit of 30 km/h be mandated in urban areas unless strong evidence exists that higher speeds are safe. (Figure 11).



Figure 11: The speed limit of 30 km/h is boosted by painting it on the road and writing school under it. Photo: Guidance to Zero AB

9. Technology

The role of advanced technology in improving road safety in high-income countries has been well discussed. Advanced vehicle safety technologies are among the most effective of all automotive safety devices. Stimulating the development of safety technology that would be appropriate for low-income countries is a leadership challenge. Auto manufacturers will need to commit to installing the devices in the appropriate vehicles, and governments will need to create a demand by enacting necessary safety standards. The recommendation is that corporations and governments need to incentivize the development, application and deployment of technologies to improve all aspects of road safety from crash prevention to emergency response and trauma care, with special attention given to the safety needs and social, economic and environmental conditions of low- and middle-income nations.

GOING FORWARD: DEVELOPMENT OF A ROAD SAFETY INDEX

Research and theories regarding road safety continue to develop. As just described, the 3rd Ministerial Conference on Road Safety shone a light on the link between the Safe system principles and occupational health and safety. Now the Academic Expert Group has gathered again, preparing for the 4th Ministerial Conference on Road Safety in Morocco 2025. During that conference, FIA plans to present the first major companies that have certified within the FIA Road Safety Index.

The Road Safety Index developed by FIA covers the organizations' entire value chain and looks at the commitment and engagement of top management as well as the footprint coverage. The next parts of the index are going to cover Planning, Monitoring and Safety Culture Management. On all these parts occupational health and safety plays a vital role as well as which demands for road safety the organization puts in their procurements.

CONCLUSION

Vision Zero is an example of how absolute goals drive innovation. For almost 30 years, a large number of stakeholders from the public, private and academic sectors in Sweden have worked together towards the same goal. The key interventions mentioned in this article are examples of measures based on Vision Zero. They have yielded results, but Sweden still needs to do more to achieve Vision Zero.

Today, the challenge is to succeed in working holistically with several goals at once and to understand how traffic safety is linked to everything from climate goals to active mobility and occupational health and safety. The fact that the number of stakeholders who take responsibility for their road safety footprint is growing is encouraging.



Photo credit: Maria Håkansson, Guidance to Zero, ETC Antwerp, 2024.

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