Date
22 September 2023

Ref/Designation
TSF 2020-129

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Impact assessment of simplified national rules for converting vehicles to run on ethanol and methane gas

The Swedish Transport Agency's proposals:

To amend the following provisions to facilitate the conversion of petrol and diesel vehicles to run on ethanol and methane gas:

- The Swedish Road Administration's regulations (VVFS 2003:29) on national type approval of systems, components and separate technical units;

- the Swedish Transport Agency's regulations and general advice (TSFS 2016:22) on cars and trailers towed by cars and put into service on or after 1 July 2010; and

- the Swedish Transport Agency's regulations and general advice (TSFS 2013:63) on cars and trailers towed by cars.

A. General

The Swedish Transport Agency shall promote the achievement of the transport policy objectives and shall focus in particular on contributing to an internationally competitive, environmentally compliant and safe transport system. Conversion of petrol and diesel vehicles to run on ethanol and methane gas[1] is an opportunity to promote the conversion of the vehicle fleet. However, in order to enable conversion, timely rules are required that are practically applicable to larger as well as smaller undertakings and private individuals.

Background

Conversion to ethanol operation

In practice, conversion to ethanol is only possible for petrol vehicles, because ethanol is similar to petrol in its properties. In most cases, conversion to ethanol is simple, provided that the differences in properties compared to petrol are taken into account. Normally, no major changes are required to the existing fuel system and, after a conversion, it is usually possible to run on both fuels or a mixture of these.

[1] The proposed changes include only conversions to run on ethanol and methane gas. Originally, conversion to electricity was also to be included, but this has been excluded since such conversions usually result in a rebuilt vehicle.

When converting to ethanol, the engine's need for fuel is affected, i.e. the fuel to air ratio. This means that the engine control module needs to be reprogrammed to ensure that the engine obtains the right quantity of fuel. In some cases, components of the fuel system may need to be replaced, such as fuel pressure regulator or injector, to maintain the engine's power. With the ‘right’ fuel quantity, the exhaust gas cleaning system and catalytic converter will function and reduce emissions to the levels applicable to the vehicle model.

Conversion to gas operation

Conversion to methane gas operation is possible on both petrol and diesel vehicles.

When a petrol-powered vehicle is converted to run on methane gas, a stand-alone fuel system is installed in addition to the original one for petrol. Normally, it is possible to switch between petrol and methane gas depending on how much there is left in each tank. This is called a bi-fuel system. If the petrol tank is smaller than 15 litres, they are called mono-fuel systems. The ignition system in the vehicle works for both petrol or methane gas.

When a diesel-powered vehicle is converted to run on methane gas, the existing diesel fuel system needs to be used (i.e. a small amount of diesel is needed) to start the combustion of methane gas. Such a system is called a dual-fuel system. Vehicles with this type of system cannot normally run solely on diesel after the conversion, instead both fuels are needed to operate. Since there are two systems that have to work simultaneously, this solution is more costly and not very common among conversions. At present, the technology is mainly used on heavy vehicles.

Since a separate new fuel system is installed during conversion to methane gas, components and gas tanks need to comply with the stipulated requirements, which normally means that they must be type approved.

With conversion, the exhaust gas cleaning system and catalytic converter will work and reduce emissions to the levels applicable to the vehicle model for both fuels.

Conversion kits

When approving a conversion kit, the performance and emission control of the vehicle, which in principle corresponds to engine power and engine size, is important. By enabling the type approval of conversion kits, vehicles with the same performance and emission control, i.e. the vehicles that are part of the same vehicle family, can be converted by virtue of the type approval.

During a type approval, the conversion kit is tested on a parent vehicle belonging to the group of vehicles for which the conversion set is intended (vehicle family). One vehicle family is characterised, inter alia, by engine power and engine volume in the range of 70 to 115 percent compared to the parent vehicle. It is sufficient to demonstrate that the emission control works by means of an emission test at normal temperature, known as the WLTP type 1 test or by an on-board test according to the new RDE test method.[2]

1. What is the problem or the reason for the regulation?

There is a demand for new vehicles powered by renewable fuels, but the availability of such vehicles is limited. Converting petrol and diesel vehicles provides an opportunity to cover that gap in the market. Today, however, the conversion of petrol and diesel vehicles to run on ethanol and methane gas is, in many cases, too complicated and costly, especially for smaller undertakings and individuals. This is primarily due to the fact that existing regulations relating to conversion are not up-to-date. For this reason, the possibility of simpler national rules needs to be reviewed and existing regulations need to be updated.

1.1 Today's regulation

The Swedish Transport Agency's regulations for conversion can be found in

- the Swedish Road Administration's regulations (VVFS 2003:29) on national type approval of systems, components and separate technical units;
- the Swedish Transport Agency's regulations and general advice (TSFS 2016:22) on cars and trailers towed by cars and put into service on or after 1 July 2010; and
- the Swedish Transport Agency's regulations and general advice (TSFS 2013:63) on cars and trailers towed by cars.

VVFS 2003:29

Appendix 5 to VVFS 2003:29 regulates type approval of conversion kits. Today, the regulations only allow for the approval of conversion kits for conversion to ethanol operation for older vehicles up to and including Euro 4 emission class. This means that vehicles that are converted to ethanol, and are newer than about ten years, cannot be approved with national type approved conversion kits, but instead have to comply with emission requirements regulated in TSFS 2016:22 (see below). The same applies to vehicles to be converted to run on methane gas (TSFS 2013:63 for older cars).

[2] Real driving emissions, a test method for real world emissions regulated in EU Regulation 715/2007.

TSFS 2016:22

The requirements on the quality and equipment to be met by a vehicle placed in circulation on or after 1 July 2010 are set out in TSFS 2016:22. If an individual vehicle is modified by conversion to run on another fuel, the vehicle shall comply with the regulations' requirements. TSFS 2016:22 refers to Regulation (EC) No 715/2007 of the European Parliament and of the Council on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) as regards requirements for emissions from newer vehicles of Euro 5 and Euro 6 emission class. The requirements of the Regulation are addressed to vehicle manufacturers and must be met in order to have a vehicle model's emissions approved. For conversion to methane gas, the regulations also refer to UNECE R115[3].

TSFS 2013:63

For older vehicles registered for the first time before 1 July 2010, requirements on the quality and equipment are set out in TSFS 2013:63. The requirements for emissions that a conversion kit under Appendix 5 to VVFS 2003:29 must meet when converting to ethanol operation are also contained in this Code of Statutes. For vehicles up to and including Euro 4 emission class, the regulations refer to the emission requirements in Council Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by emissions from motor vehicles.

Conversion kits for vehicles put into service before 1993 do not require tests that are so exhaustive, a simple idling test is sufficient to ensure that the catalytic converter still works after conversion.

1.2 Limited opportunities to convert

It is possible to convert vehicles today. The requirements related to this are set out in TSFS 2016:22 and TSFS 2013:63 respectively, but the possibilities are limited for newer vehicles (Euro 5 and Euro 6) as there is no possibility for type approval of conversion kits for these in VVFS 2003:29. For this reason, during conversion it is required that these vehicles comply with the requirements of TSFS 2016:22, which refers to the requirements of EU Regulation 715/2007. For Euro 5 vehicles put into service before 1 July 2010, the corresponding requirements are set out in TSFS 2013:63. Since the requirements of the EU regulation are comprehensive and complex, it makes it difficult for undertakings and practically impossible for a smaller undertaking and individual vehicle owners to demonstrate compliance with requirements.

[3] An international regulation where Sweden cannot refuse the approval of a converted vehicle, if the conversion has been done with a type approved system.

The emissions requirements in the EU regulation are aimed at vehicle manufacturers that want to get a new vehicle model type approved, which are comprehensive and impose requirements on how the emission control equipment is to be designed. The manufacturer tests a type vehicle that represents all vehicles that are part of the vehicle family, that is to say, the vehicles produced by the manufacturer under the type approval. An individual vehicle owner or a small undertaking that develops conversion kits shall not make modifications to the emission control equipment, but shall only demonstrate that it works with another fuel. With regard to the extent of the modification resulting from a conversion and the fact that individual vehicle owners and smaller undertakings do not have the same financial resources as a vehicle manufacturer has for carrying out tests, it is not reasonable to impose the same requirements on a conversion as on the development of a new vehicle model.

Since the vehicle manufacturer has already developed and has the basic emission control approved, not all emission requirements of the EU Regulation are relevant to the modification resulting from a conversion. Therefore, it is sufficient to demonstrate that the emission control system is still working and reduces emissions to the levels that were emitted by the original vehicle (without conversion kit).

2. What is to be achieved?

The aim is to make it easier for undertakings that develop conversion kits as well as undertakings and individual vehicle owners that carry out conversions to demonstrate that the requirements are met during conversion to run on ethanol and methane gas.

The emission requirements to be met by a converted vehicle are already available in TSFS 2016:22 or TSFS 2013:63, but the regulatory changes allow the use of conversion kits also for newer vehicles (Euro 5 and Euro 6). In cases where, for example, an individual vehicle owner wishes to convert their vehicle, the approval is facilitated during registration inspection, since it is sufficient to have a certificate showing that the conversion kit used complies with the requirements set by the regulation.

VVFS 2003:29 needs to be expanded with the option to type approve conversion kits even for newer vehicles and conversion kits for conversion to methane gas. The regulations are adapted by the proposal to facilitate conversion, since the option is provided to recognise other countries' nationally approved conversion kits. It should be possible to use these as a basis for a type approval issued by the Swedish Transport Agency.

By facilitating the approval of converted vehicles, there are potentially more vehicles that can be converted and accelerate the transition and reduce the climate impact of road traffic.

3. What are the alternative solutions?

3.1 Impact if nothing is done?

If nothing is done, it will continue to be complicated for undertakings that develop conversion kits and carry out conversions, as well as for individual vehicle owners who want to convert an existing vehicle, because comprehensive and costly emission tests are needed at present to demonstrate compliance with requirements.

Euro 5 and Euro 6 vehicles have more extensive and complex requirements, which generally require an exemption or decision from the Swedish Transport Agency in order to get a converted vehicle approved for use in traffic. If interest in conversion increases, it will require more resources from the Swedish Transport Agency to handle applications for exemption.

3.2 Alternatives that do not involve regulation

Requirements for equipment and quality are already contained in the Swedish Transport Agency's regulations. Alternatives that do not involve regulation have the same impact as in section 3.1.

3.3 Regulatory alternatives

Proposed regulatory changes:

- In VVFS 2003:29, Appendix 5 is revised to include requirements for conversion kits for conversion to ethanol and methane gas that can be installed on newer vehicles. The option to approve conversion kits based on other countries' nationally approved systems is also introduced. This presumes that the country's requirements for conversion kits correspond to those set in Sweden.
- TSFS 2016:22 is being revised to allow vehicles to use conversion kits that are type approved or comply with the requirements of a new revised Appendix 5 of VVFS 2003:29.
- TSFS 2013:63 is being revised to allow older vehicles also to use conversion kits that are type approved or comply with the requirements of a new revised Appendix 5 of VVFS 2003:29. In addition, the year of first registration for a simpler test procedure is moved forward in time, both for conversion to ethanol and to methane gas. Vehicles put into service for the first time before 2001 only need to carry out idling tests to ensure that the catalytic converter is still working. The year 2001 was

chosen because it is the transition between Euro 3 and Euro 4 for passenger cars.

We do not consider that there is any relevant alternative regulation that fulfils the purpose other than the one proposed.

4. Who will be affected?

Those affected by the proposal are:

- undertakings that develop conversion kits;
- undertakings that install conversion kits;
- municipalities and regions that have policies on the use of renewable fuels;
- individual vehicle owners wishing to convert their vehicle;
- inspection companies, and
- the Swedish Transport Agency.

5. What are the impacts of the regulation?

5.1 Enterprises

(X) The regulation is not deemed to significantly impact the working conditions, competitiveness or other conditions of companies. All consequences for enterprises are therefore described under 5.1.

( ) The regulation is deemed to significantly impact the working conditions, competitiveness or other conditions of enterprises. Therefore, the impact assessment does not contain a description under 5.1, but all the consequences for enterprises are described in Section C.

Proposed regulation is intended to facilitate and reduce costs for undertakings (large and small) that develop conversion kits and carry out conversions as well as individual vehicle owners who want to convert their vehicle. We do not see any obvious negative consequences of the regulatory proposal, nor has anything been highlighted in the consultation that we have had with the industry.

There are already conversions to both methane gas and ethanol. Inspection companies already have procedures for how to carry out inspections. However, with the proposed amendment, they will need to be informed of the new requirements and possibly update internal instructions.

5.2 Citizens

The proposal will benefit those citizens who want a more climate-friendly alternative to fossil fuels, but who, for various reasons, cannot or do not want to switch to a new vehicle.

Otherwise, the regulatory proposal has no consequences for citizens in general because it is not mandatory.

5.3 The State, regional authorities or municipalities

Since government agencies, regions and municipalities need to respond to different forms of environmental requirements during the use of vehicles, the proposal provides a wider selection of available vehicles that comply with those provisions.

The Swedish Transport Agency may have a slightly increased workload with an increased type approval activity. The Swedish Transport Agency also needs to develop new text codes for converted vehicles and, possibly, update the road traffic register. Overall, the increased costs are judged to be low.

In addition, we do not consider that the proposed regulation entails any increased costs for the state, regions or municipalities.

5.4 Environment

Since the proposed regulation facilitates the approval of converted vehicles, it means that there are potentially more vehicles that can be converted. More converted vehicles help accelerate the transition and reduce the climate impact of road traffic.

5.5 Externalities

The external effects are described under 5.4 Environment.

6. What is the impact of the regulatory alternatives considered and why are the regulations considered to be the best alternative?

Alternative options to the regulation, which meet the objective, other than the one proposed have not been identified.

7. What authorisation is the Agency's right to make decisions based on?

Authorisation is provided in Chapter 8, Section 16 of the Vehicle Ordinance (2009:211), Sections 3 and 12 of the Emission Control Ordinance (2011:345) and in Section 3 of the Accreditation and Conformity Assessment Ordinance (2011:811).

8. Is the regulation consistent with or does it exceed the obligations arising from EU law or other international rules?

The proposal contains requirements for vehicles already in service. There are currently no requirements in the EU that are set for vehicles once they have been put into service.

For this reason, the proposal contains no requirements that are stricter than when the vehicles were put into service by means of an EU whole vehicle type approval.

New vehicles shall comply with the requirements set out in Regulation (EU) 2018/858 of the European Parliament and of the Council[4] (the framework Regulation). The Member State has the possibility to impose, on a case-by-case basis, alternative requirements provided that these are relevant to the road safety and environmental characteristics of vehicles. The proposal regulation is aligned with the requirements that Sweden is obliged to have for national approvals of new vehicles under Articles 42 and 45 of the framework Regulation. For this reason, the proposed regulation does not go beyond the obligations arising from EU legislation, which is why they are deemed to be compatible with EU law. Nor are they contrary to other international rules.

The rules constitute technical requirements with alternatives to harmonised EU regulation for new vehicles. For this reason, the proposed regulations are deemed to be subject to the notification obligation, under the Ordinance (1994:2029) on Technical Rules.

The proposed regulation does not impose any new requirements on service providers, so the proposals do not need to be notified under the Ordinance (2009:1078) on Services in the Internal Market.

The proposal does not contain any requirements that involve regulation of professions, so no notification under the Act (2016:145) on the Recognition of Professional Qualifications or proportionality test pursuant to the Ordinance (2020:757) on Proportionality Testing in case of New or Changed Requirements for Professional Qualifications needs to be made.

The proposal does not contain any data localisation requirements, which is why notification is not required, according to Article 4(2) of Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14

[4] Regulation (EU) 2018/858 of the European Parliament and of the Council on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC.

November 2018 on a framework for the free flow of non-personal data in the European Union (the Data Flow Regulation).

9. Does special consideration need to be given regarding the date of entry into force, and is there a need for special information initiatives?

There is no need to give special consideration to the date of entry into force and there is no need for specific information activities.

B. Transport policy effectiveness

The overall goal of Swedish transport policy is to ensure a socio-economically efficient and long-term sustainable transport supply for citizens and businesses throughout the country. Under the overall goal, there are performance objectives and health, environment and safety (HES) objectives with a number of prioritised areas.

The performance objective is to create accessibility for people and goods. The design, functioning and use of the transport system shall help provide everyone with basic accessibility, with good quality and usability, as well as contribute to the development dynamic across the whole country. At the same time, the transport system must uphold the value of equality, meaning it must meet the transport needs of both men and women in equal measure.

The HES objective concerns health, environment and safety. The design, functioning and use of the transport system shall be adapted so that no one is killed or seriously injured. It shall also contribute to the overall generational goal for the environment and achieving the environmental quality goals, as well as contribute to increased health.

10. How does the regulation affect the performance objective?

The proposal does not affect the performance objective.

11. How does the regulation affect the HES objective?

The proposal may have an impact on the HES objective respecting the environment. The regulation facilitates conversion to alternative fuels, which in the event of increased interest would contribute to reduced emissions from fossil fuels. Safety is not deemed to be affected since the same requirements are imposed on retrofitted vehicles as on factory-built vehicles.

C. Summary of impacts

Affected party	Impacts that cannot be calculated		Estimated impact (SEK thousands)	Comment
	Advantages	**Disadvantages**	**+ / -**	
Enterprises	Reduced costs for testing and administration.			More equal competition between vehicle manufacturers and undertakings carrying out conversions.
Citizens	Lower cost of conversion. Greater choice of vehicles for renewable fuels.			
The State etc.	Greater opportunity to meet environmental requirements for vehicle use.			
Externalities	More vehicles in the fleet that can run on renewable fuels.			
Total	In total, the proposal reduces costs for the use of renewable fuels.	Since the proposal is an optional and not a mandatory requirement, there are no significant disadvantages.		

D. Consultation

There is no requirement for external consultation in this area. However, there have been consultations with undertakings that carry out conversions, undertakings that develop conversion kits, as well as the inspection industry and relevant authorities to gather knowledge in the field. In addition, the external consultation round will be part of the consultation.

If you have any questions regarding this impact assessment, or any opinions you would like to share, please contact us:

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