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LARGE-SCALE ELECTRIFICATION OF SWEDISH TRANSPORTS: ANALYSING POLICY AREAS OF CONCERN

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Introduction and methods

Climate objectives in the European Union as well as in Sweden call for a transition of renewable energy and a large-scale electrification. Initially of road traffic, see Fig. 1, and later also shipping and aviation.

In this study, we aim to identify how a large-scale electrification of Swedish transports affects different areas in society and to highlight important issues to consider for the transition to an electrified transport system to succeed. Main questions for the study are:

- What actors and systems will be of importance in a large-scale electrified transport system compared with today?
- Which consequences will arise?

As the rate of transition and choice of paths affect the consequences, our analysis also includes a discussion on aspects and drivers of transition based on previous research.

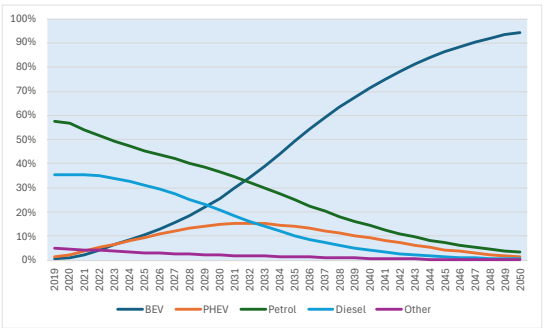

Figure 1. A quantification of the transition for the fleet of passenger cars.

System boundaries are delineated by the key components infrastructure, vehicle/craft and fuel as well as ancillary services needed for their maintenance like production, distribution, service, education, etcetera. An overview of changes concerning road traffic in the present system compared to the future system is presented in Fig. 3 and 3. Key components are shown in the inner circle and ancillary services in the middle circle. The outer circle shows areas in society where consequences will occur. Both the consequences in present areas and assumed future areas are of concern.

Road traffic "Current situation"

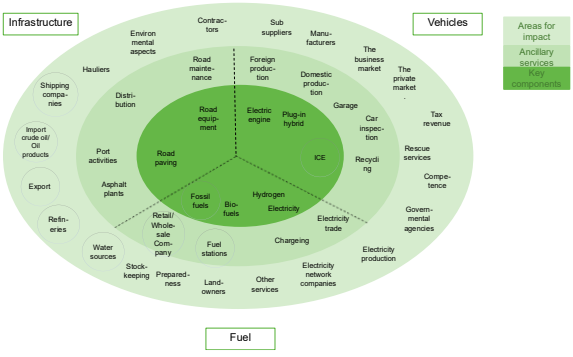

Figure 2. Overview of road traffic in the present system. Disappearing areas are marked with a circle.

Road traffic "2045"

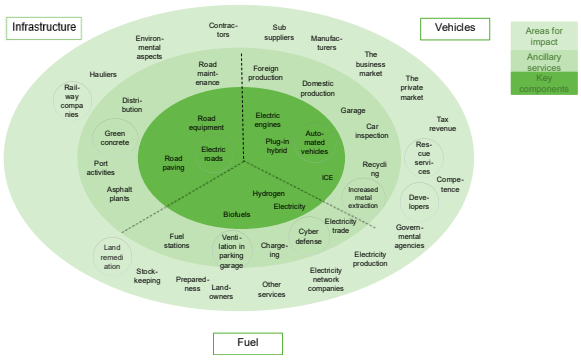

Figure 3. Overview of road traffic in 2045. Up-coming areas concerning future systems are marked with a circle.

Policy areas of concern

How can policymakers implement measures to promote and maintain a balanced transport system? Our results point to several issues and policy areas where policy is needed.

- The introduction of electric vehicles on the world market could entail changes in the established pattern of vehicle production and trade.
- Reduced petroleum dependency will have consequences for actors in the maritime transport sector and will also affect the shipping of petroleum products by road. This might change the evolution of transport mileage for goods.
- A phase-out of fossil fuels and associated vehicles may necessitate changes in tax bases if the State is to be able to fund the welfare system.
- As the customer base for fuel stations shrinks, challenges for other services may arise in certain sparsely populated areas.
- Transport and energy systems have traditionally been separated in terms of both actors and business models. New and as-yet unknown issues will arise as new markets are developed.
- So-called energy hubs and road vehicles could both assume important roles in terms of energy storage. Additional measures may be required from the public sector to support this opportunity.
- In practice, the electrical power supply for the transport system is part of the power supply for the entire society. This means that, as opposed to the situation previously, the prioritization of fuel use within the transport sector in crisis situations must be weighed against other needs within our society. The public sector needs to take these and other aspects of vulnerability into account in the process of electrifying the transport system.
- The electrification of the transport system will entail a greater need for collaboration and cooperation between levels and sectors. The more efficient the coordination, the greater the resilience when crises arise.
- Innovation-critical metals and minerals are a basic precondition for the large-scale electrification process. The access to these needs to be secured in such a way that our overall societal objectives also can be achieved.
- In a major transition to an electrified transport sector, continual monitoring will be essential to ensure that the process progresses in a manner consistent with transport policy objectives. What new factors might be important to consider?

Concluding remarks

The interplay between megatrends, policy instruments and technologies in existing systems will affect how the transition takes place, as will the levels of maturity attained by new technologies. Clearly defined goals and long-term policy instruments leading to large-scale electrification are already in place, primarily via the Fit for 55 package, as are the technologies needed to electrify road transport on a large scale. However, sudden disruptions and new trends may result in deviations from the technology choices initially planned for by society. Early introduced technologies might become transitory and all investments in new technologies will not become large-scale. The development curve might not be straightforward. Transition rate will vary at different geographical levels and consequently also the appearance of consequences and policy areas of concern.