White Paper on the Training Needs for Electromobility

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Background on Electromobility Training

Tens of thousands of professionals will need to take on roles in the expansion of electromobility in the coming decade in most countries. Few have so far anticipated the scale and complexity of the change and the need for training of individuals for demanding roles as administrators and decision-makers.

In the early phase of electromobility, decisions and the preparation of bases for decision making have fallen on a relatively small group of individuals with a strong background in their respective sectors.

Decisions about the development of electric vehicles have been made by management teams in auto companies, decisions to install chargers have been made by utilities or by operators of charging infrastructure, and decisions to subsidise electric car purchases and installations of chargers have been made by ministers or by managers at national authorities.

Administrators and decision makers at some regional governments have monitored development, started projects to support aspects of it, or contributed financially to pilot projects.

Consulting companies have been hired to analyse specific issues related to electromobility.

No authority, NGO, or private company has taken an overview of the entire transformation to describe the full range of activities needed, make activity plans or budgets for the entire transformation, or analysed the training needs.

A New Situation Emerging Across the World

The EU has decided to ban the sales of new petrol and diesel cars from 2035 and a similar decision is in preparation in California.

Gradually, over the coming decade, the development and production of petrol and diesel vehicles is going to be phased out and all development and production resources in the auto industry will become focused on electric vehicles and to some extent hydrogen fuel cell vehicles, but the latter are not likely to become competitive in the coming decades. The only combustion engine cars that will be sold after 2035 will be ones that will be driven using synthetic fuels.

At the same time as auto companies and their suppliers are going to focus resources on the development and production of electric vehicles, countries will have to build the systems necessary to facilitate the expansion of fleets of electric vehicles. This includes, for example:

- The large-scale expansion of charging infrastructure to cover the needs to charge a large share of all vehicles in countries, regions, and municipalities on a daily basis.
- A special focus on the possible need to install extensive electric road systems (ERS) to reduce the need for stationary chargers and charging and reduce the size of batteries needed in vehicles.
- The expansion of power production to cover the same needs, in addition to the needs created by other efforts to electrify industry or implement hydrogen-based transportation or production.

- The reinforcement of power grids to facilitate the supply of electricity to parts of grids where the capacity is insufficient to cover emerging needs.
- The development of services, businesses, and in some cases companies to supply the services that will become necessary.

All of the above will require extensive competence development and training of professionals and students.

A Growing Need for Competence and Resources

Activities to build the systems necessary for large-scale electromobility are insufficient to cater to the needs of vehicle owners and drivers in the coming years. The consulting company McKinsey estimates that even to realise the most conservative scenario, 10,000 fast chargers need to be installed every week in Europe until 2030. The rate of installation in 2022, when the study was made was 1,600 per week.[1]

In addition to fast chargers most vehicles will be charged at normal speed destination chargers at night and some during the day. With vehicle fleets in the near future approaching 50 percent or 70-80 percent of all vehicles in different countries, even more normal speed chargers will be needed than fast chargers. Only in Sweden some 3,000 normal speed chargers will need to be installed every week until 2030, perhaps more.

The expansion of electric road systems can reduce the number of stationary chargers needed, both fast and normal speed ones. However, extensive systems of electric roads cannot be in place until 2035 or later. To meet ambitious deadlines decisions about the large-scale expansion of electric road networks need to be made in the next few years to be able to start installations in 2028 or 2029. In Sweden, for example, the applications for planning permission and the planning processes take some three years after the financing has been arranged and the decision to go ahead with the expansion has been made.

The need for resources for these expansion activities have not been quantified, but substantial training needs will inevitably arise through the process.

Training and Change Needs

A number of areas will require substantial change programmes and training efforts.

- People involved in the development of combustion engines, including transmission and exhaust systems and other systems specifically related to petrol and diesel vehicles will be made redundant. This process has already started, as Volvo Cars have announced that they are making 1,300 employees redundant.
- People involved in the production of combustion engines and their components will also be made redundant.

In some parts of Europe about 20 percent of employees work in the auto industry and a significant share of them work with the development and production of engines and parts. The number of man-hours for the production of an electric car amounts to only 30 percent compared to the hours needed

[1] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/europes-ev-opportunity-and-the-charging-infrastructure-needed-to-meet-it

to make a petrol or diesel car, which means that many will find it difficult to find new positions in the auto industry.

A number of areas will experience growth and the need for competent personnel will increase:

- The production of chargers and electric road systems and the components of those.
- The installation of chargers and electric road systems.
- Project management for development and installation projects in the above areas.

Entirely new roles will emerge, and a large number of employees will be needed to fill these.

- Electrification strategists will be needed to plan the expansion of electromobility overall and in different areas.
    - Strategists will be needed to plan the expansion on the national level, plan the expansion of, for example ERS, calculate the need for stationary chargers under different ERS scenarios, and, for example, develop incentive programmes, pricing systems, and forecast training needs and dimension budgets.
    - There will also be a growing need for strategists to forecast the need to expand power generation and plan for the expansion of generation resources, develop policies and incentive and tax systems. The same will be true for the high-level planning of the reinforcement of power grids. Ministries and authorities, industry organizations, and other organizations and companies will need to forecast these developments.
    - On the regional and local levels there will be a need for strategists to forecast the needs to expand charging infrastructure and the needs to expand power grids. These roles are at present almost non-existent and the number of employees with this type of competence is very rare in regions, and municipalities, NGO's, and all other parts of society. This is due to the fact that there has never been a need to plan the expansion of charging and power infrastructure across municipalities and power grids in the way that will become necessary in the near future.
    - Companies will need electrification strategists to plan the increasing adoption of electric transportation and forecast the changes that will be needed and the impact the possibly higher transportation cost will have on cost, profits, and operations. To adopt electric transportation chargers or electric tracks will have to be installed at loading docks, and tracks or cables may be needed in other places on industry premises to facilitate charging.

Electrification strategists will primarily have roles as administrators and decision makers in organizations and have a background from business, economics, or social sciences.

- Electrification architects will be needed to turn the strategies into reality. They will be engineers or technicians with an overview of expansion and installation opportunities and needs across geographies. They will be well-versed in different technologies and will often work closely together with electrification strategists in the development of strategies and plans. They will develop project plans together with engineers and project managers, who in their turn, will be responsible for their execution.

Training Needs

It is difficult to determine the volume of resources that will be needed, but the numbers are going to be significant. Even with the present demand for installation resources, Sweden and other countries are experiencing shortages of such resources. Still, the planning of the expansion to electromobility has only started and, according to the McKinsey report, the investment in fast chargers is lagging behind.

The training of electricians, project managers, and installation workers for large-scale ERS projects has not started.

The planning for the significant training needs that will arise as the auto industry ceases to develop and produce combustion engines and their parts to instead turn their focus 100 percent to electric vehicles has also not started.

In the case of the training of electrification strategists and architects there are no training programmes or courses available and there are few professionals that have an experience to make them suitable for roles as strategists and architects. Due to the rapid development of electromobility with charging infrastructure, ERS, and the need to expand power infrastructure as a consequence of the growth of electric vehicle fleets that need to be considered, few people have even started to consider the effects of electromobility on the labour market, training and education systems, or society overall.

Still, several of these types of professionals will be needed at each national authority responsible for aspects of the transformation, municipality, utility, and in larger companies. They will be needed in many small and medium-sized companies as well that will be directly or indirectly involved in the change.

The number of people who will be needed in the above types of positions in the coming decade will amount to tens of thousands in any country and hundreds of thousands in Europe and the United States each, and the planning for this has not started.