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REPORT

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Exchange Group: Just Transition in the European Car Industry

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Abstract

Hungary has begun to adapt to the transition to electric vehicles (EVs). Its point of departure includes a well-established industry and a relative tightness on its labour market. Government and corporate policies indicate that stakeholders within the country will expand the sector to compensate for the job losses that may stem from the lower labour-intensity of EV production. For instance, attracting developing battery production facilities has been a top government priority. In addition, most stakeholders expect that a gradual transition will grant them the time necessary to adapt. Original equipment manufacturers (OEMs) (e.g. Audi or Mercedes Benz) and Tier 1 suppliers are well-positioned to maintain activities and employment levels, but small- and medium-sized enterprises are at risk. Labour unions tend to focus on day-to-day activities and have been excluded from most planning. They have supported educational and re-skilling programmes, but, beyond this, they have little influence. The direction and pace of the transition is predominantly determined in OEM headquarters and shaped by the unfolding global competition to capture EV markets.

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Comecon	The Council for Mutual Economic Assistance
EUR	euro
EV	electric vehicle
HUF	Hungarian forints
ICE	internal combustion engine
Li-ion batteries	lithium-ion batteries
OEM	original equipment manufacturer
SME	small- and medium-sized enterprises

1 Introduction

Someone must have slandered Joseph K. because even though he didn't do anything bad, he was arrested one morning "Like a dog," he said, as if shame should survive him. When Gregor Samsa awoke one morning from troubled dreams, he found himself transformed into a monstrous bug in his bed. And it was to them as a confirmation of their new dreams and good intentions, when at the end of their journey, the daughter rose first and stretched her young body.

1.1 Developments in the Hungarian automotive industry

Hungary has a long-standing tradition in manufacturing vehicles and automotive components. Prior to the regime change in 1989, the country had extensive capacities and a skilled labour force to manufacture various heavy-duty commercial vehicles (e.g. Rába, Csepel) and buses (e.g. Ikarus) (Gerőcs and Pinkasz 2019a). Output fell sharply in the 1990s as the robust demand from The Council for Mutual Economic Assistance (COMECON) countries dried up by the 2000s. Manufacturing, nonetheless, continues to be an important component of the country's industrial policy and cultural heritage, despite domestically-owned manufacturing declining to a fraction of its former glory. A number of formerly active companies continue to supply automotive parts. Foreign investors also built on this long-standing tradition, which allowed them access an inexpensive but skilled workforce.

Passenger vehicle production appeared in Hungary as foreign companies took greenfield investments in the early-1990s. General Motors' decision to invest in the Szentgotthárd plant was the first such endeavour; Suzuki and Audi soon followed, while Mercedes-Benz somewhat later. By 2020 there were approximately 700 automotive companies active in Hungary (HIPA 2019). The sector's contribution to GDP is 4.5%, slightly below the values in Germany (VDA 2018). Moreover, it directly employed about 160 thousand people and a further 58 thousand indirectly (see table 1). Almost all of the sector's production is exported, accounting for 20% of total exports and 22% of exports to the EU.

Table 1: The Hungarian automotive industry in numbers

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Enterprises (no.)	493	485	498	481	483	484	494	487	491	497	N/A
Direct employment (thousand)	N/A	75.8	87.6	101.1	105.4	122.9	137.1	146.5	157.3	161.1	160.6
Indirect employment (estimation; thousand)	N/A	27.3	31.5	36.4	38.0	44.3	49.4	52.8	56.6	58.0	58.0
Production value (million EUR)	10,666	13,214	15,806	15,481	18,004	21,623	25,007	25,086	25,812	26,498	N/A
Gross value added per employee % of German value	57.5	49.2	47.9	38.6	45.7	42.4	42.9	38.7	39.0	39.1	N/A

Automotive export as % of total intra-EU28 exports	15.7	15.6	16.1	16.6	18.9	21.9	23.8	23.4	21.4	20.7	22.0
Automotive export as % of total exports	14.6	14.4	14.8	15.7	17.6	20.1	22.0	21.9	20.0	19.0	20.0

Source: Authors' calculation based on Eurostat (2021a; 2021b)

The Hungarian automotive sector's output has nearly doubled in the past decade. However, data shows that growth has predominantly been quantitative, as added value declined (see table 1). The trend is reflective of a broader problem in the region; whereby, stakeholders in are limited to play a "supply role" (Barta 2012) i.e. one in which they execute labour-intensive and low value-added tasks in the value chain. This is perpetuated by foreign-owned automotive subsidiaries, which invest selectively in technological upgrades (Gerőcs and Pinkasz 2019b; Szalavetz and Somosi 2019).

There are four OEMs that manufacture vehicles or engines in Hungary: Audi, Opel, Suzuki, Mercedes-Benz (see table 2). Opel has a long-standing presence in Hungary, but its future is in limbo. This is because it has developed capacities to manufacture ICEs and there is no indication of how it will adapt to produce EVs or components for EVs. The Suzuki plant in Hungary is the firm's only European facility. It houses various parts of the manufacturing process (e.g. assembly, welding), making it less susceptible to the electrification of vehicles. It has also begun to adapt to a changing environment by adding mild hybrid vehicles into its portfolio, which are to be followed with full hybrids and EVs – the timelines for the introduction of the latter two are unclear. Audi's factory produces two million internal combustion engines, but it has expanded its portfolio electric motors production since late-2018 – 5% of sales were linked to electric motors in 2020. Lastly, Mercedes-Benz has produced a fairly stable number of vehicles, which has expanded to include hybrids as well.

Table 2: OEM output in Hungary

		2015	2016	2017	2018	2019	2020
Audi	Cars	159,842	122,975	105,491	100,000	164,817	155,157
	ICE	2,022,520	1,926,638	1,965,165	1,954,301	1,968,742	1,661,599
	E-engine	0	0	0	9,453	90,367	87,343
Mercedes-Benz	Cars	180,000	190,000	190,000	190,000	190,000	160,000
Opel	ICE	511,000	630,000	486,000	313,000	350,000	NA
Suzuki	Cars	185,000	211,266	170,000	175,000	177,718	NA

Source: Authors' compilation based on financial reports (mainly annual reports) and press releases

1.2 Current and future legislative developments

Hungarian economic policy and relevant regulations have been supportive of automotive investments since the 1990s. This continued following Hungary's accession to the EU, which allowed for further national and supranational subsidies to be channelled into the sector (Záborszky 2019). Large investments received significant non-repayable state support. Subsidies have been nominally quite high in a regional comparison; although, slightly lower than Visegrád Four counterparts on a per capita basis (Éltető and Antalóczy 2017). Employment regulations have also attracted foreign investment. The most recent manifestation of this was the introduction of the Overtime Law (Law CXVI. of 2018), the so-called "Slave Law", which increased yearly overtime limits from 250 to 400 hours and granted employers greater flexibility over the schedules of workers. The Law was broadly seen to be supported by automotive multi-national corporations who were its main beneficiaries. Such interventions are a part of a broader set of regulations that curb the rights of employees (Kovács 2019).

The government has also proposed laws and decrees that allow for the establishment of Special Economic Zones to facilitate economic investments. These strip municipalities of their autonomy over investments taken in their vicinity and muzzle local residents as well. They effectively centralise control over investment decisions (hvg.hu 2020a). These legal regulations have come hand-in-hand with lax environmental and health regulations as well. Such low standards support the establishment of lithium-ion battery production facilities. A sector closely associated with the future of mobility and one which the Hungarian government has actively backed.

2 Challenges driving the transformation of the car industry

2.1 Climate change and environmental considerations

The climate considerations reconfiguring the Hungarian automotive industry are widely-acknowledged as legitimate goals. Effectively none of the interviewees questioned the need to reduce emissions, environmental damage, or material throughput; albeit, the pace and form of change was debated. The transformation – like most processes in Hungary – are externally driven. Emission standards and EV targets are EU-imposed, while the production of vehicles has been prompted by shifts in OEM strategies – decisions that were taken in headquarters abroad, such as Ingolstadt, Germany or Hamamatsu, Japan.

EVs are generally supported, but many stakeholders still question whether EVs are indeed green in comparison to ICE vehicles. Interviewees, especially representatives of NGOs as well as ICE vehicle and component manufacturers, recurrently questioned if EVs offered gains in terms of CO2 emissions, given their lifecycle emissions. Multiple interviewees also noted the negative environmental impact of manufacturing Li-ion batteries. They cited word-of-mouth accounts of the environmental malpractices maintained by typically East Asian Li-ion battery manufacturers in the country. These have been highlighted by investigative journalists as well (see e.g. Bodnár 2019; Fazekas 2021). Others pointed out that battery manufacturing is extremely energy-intensive and that knowledge related to recycling used EV parts is inferior to the know-how to recycle conventional cars.

Despite lingering questions around sustainability, there is an external push to shift towards EVs from OEM headquarters. This receives ample backwind from the government to maintain the relevance of Hungarian automotive manufacturing in European and global value chains. Thus, government officials and most executives we spoke to were well aware of electrification in the transportation sector and anticipated a full shift to EVs driven by EU policy. In contrast, labour union representatives were not as convinced about these outcomes and highlighted that the ICE versus EV (versus other technologies) debate is not yet settled, given limitations linked to infrastructure, range, costs, etc.

2.2 Digitization and electrification

The Hungarian automotive landscape has been slow to change. EV's are supported by generous government subsidies and receive tax breaks and other perks. In principle, they are popular within society as well. However, their high costs inhibit consumers from buying them, limiting their diffusion. The number of pure EVs registered has been climbing on a yearly basis in Hungary, reaching over five thousand in 2020 (Antalóczy 2021). However, this still only amounted to 2.4% of all registered vehicles. Who the owners are is also quite specific, since the vast majority of EV owners prefer to charge their cars in their homes. This entails that those who live in suburbs or rural areas tend to purchase electric vehicles, despite various entities expanding charging infrastructure in urban areas quite rapidly. All-in-all the electrification of the transportation sector in Hungary has surpassed a number of expectations and is quite dynamic in its expansion, but still in its infancy. This is unlikely to change overnight, given the still relatively high barriers of entry – compare the costs of a new EV with a used ICE vehicle, the latter of which is still dominant among Hungarian vehicle registrations. Therefore, it is important to emphasise that the production and demand for EVs in Hungary are on parallel

tracks. Output targets larger, foreign markets, while domestic demand is marginal and currently does not influence manufacturing.

2.3 Digitization and automation in production

The role of automation is rising within Hungary, but within confines. Manufacturing plants have different profiles and thereby various limitations as to what they can automate. Most OEM plants are already highly automated, decisions which were prompted by both profitability and the short supply of labour. The deployment of advanced technologies resulted in some labour substitution by robots and the internal reallocation of employees to somewhat different tasks. Hungarian automotive companies in foreign ownership are the pioneers of digitalisation and implementation of collaborative robots. Dirty, dull (high-precision and repetitive), and dangerous tasks, such as handling, painting, welding, process monitoring, and quality control have been replaced by factory automation solutions. Many remaining tasks, most importantly assembling vehicles or more complex parts, simply cannot be fully automated or is still far too expensive to do so. There are, however, efforts to automate in-plant logistics, a highly labour-intensive activity. Interviewees were unanimous in their expectations that automation will not lead to mass unemployment in the short- to mid-term. They expect labour to be absorbed in other segments, re-trained or, in a worst case scenario, the labour market may slightly loosen compared to its current state.

3 Just transition pathways

3.1 Expected changes in the industrial sector

Rapidly tightening EU regulations suggest that automotive manufacturing will shift from ICE vehicles to EVs. Interviewees underscored that they expected the transition to unfold gradually. They suggested that ICE vehicles and their hybrid variants will remain dominant in the mid-term (i.e. in the 2020s), despite the spectacular rise of EVs. The extent and the timing of change varies based on EU and government policies as well as the global competition between OEMs that support the uptake of EVs. On the output side, the strategic decisions of OEMS will shape the focus of manufacturing plants and production clusters surrounding them.

Audi has already begun to manufacture electromotors, while Mercedes-Benz and the planned BMW facility also anticipate to place a rising emphasis on manufacturing hybrids and EVs. Suzuki is still developing its adaptation plans. An interviewee from the firm remarked that their relative lag is because they focused on developing low cost, lightweight, and efficient ICE vehicles. This led Suzuki to only introduce mild-hybrids and postpone focus on EV production.

Interviewed executives noted that is unclear when a full-flung shift to EV manufacturing will be dictated by OEM head offices. In the interim, the only thing they can do is develop flexible manufacturing capacities that would enable a relatively quick adoption to abrupt change in strategy in forthcoming years.

Discrepancies between the approaches of OEMs in Hungary can partially be explained by long-term strategies and their target markets. Suzuki competes in less premium segments in contrast to its German counterparts, leading it to adapt costly technologies at a slower pace. Shifts may be accelerated by EU policies that force OEMs to meet fleet-wide CO_2 targets. Interviewees expected EU intervention to accelerate, but they see it as a gradual process and suppliers interviewed posited that they would be able to adapt. A key implication of these shifts is the further decoupling of domestic automotive manufacturing and the domestic transportation market. The pre-existing tendency for OEMs to produce for exports can accelerate, unless domestic demand for EVs is not substantially boosted.

Interviewees affiliated with suppliers noted that the transition to EVs led to the elimination of some components, but it simultaneously introduced demand for others. How incumbent suppliers are able to “align” their activities to a changing landscape is crucial to their profitability. This may prompt sell-offs as companies seek to divest from activities that they do not deem future-proof. For example, Bosch sold its plant in Miskolc specialised in manufacturing automotive starters and other ICE engine components to Chinese investors (Szepesi 2017).

Alignment also entails the diversification of the local product mix to include EV-specific products and components. There has already been a wave of investment into battery manufacturing, including a number of Asian firms that have established battery (or battery component) manufacturing plants in Hungary. These have provided some new jobs, but interviewees noted that, while their pay is relatively high, the labour conditions and environmental standards are quite low.

3.2 Expected changes in employment

Interviewees argued that changes in employment will be gradual. There is little need to sound alarm bells. They are unsure at what pace automation and the shift to EVs will take place,

which also ensures that corporations and employees have sufficient time to adapt to a new environment. Currently, there is relative labour scarcity in Hungary. This is not unmanageable as noted by multiple OEM executives, but it pressures manufacturers to provide fairly competitive wages (still substantially below those in Western Europe), benefits, and a better working environment. They also need to "import" employees from countries to the East, anywhere from Ukraine all the way to Vietnam. Labour shortages have also prompted investments into automation which can substitute low-skilled workers. Declining sales during the COVID-19 pandemic and global integrated circuit shortages somewhat eased the tightness of the labour market and led to layoffs, but output has since rebounded, as have labour needs.

The labour market is even tighter with regard to skilled workers, given the lack of sufficiently qualified individuals with necessary technical skills. This continues to partially stem from the lack of government-backed education programmes. There are signs of positive change as some new recruits receive better on-sight and in-school training. The latter has been based on companies and municipalities cooperating with (community) colleges and other educational institutions to ensure necessary training programmes.

Despite labour shortages for the time's being, interviewees recognise that automation and a transition to EVs enhances the shift in demand from low- to high-skilled workers. Higher EV output would generally reduce labour-intensity in the long-term, but during the transition two parallel systems will remain: both ICE and EV manufacturing. The two make for high labour demand.

Suppliers interviewed anticipate that they will remain competitive and thus maintain current output, but they were not sure how changes would impact employment. Interviewees assumed that layoffs and plant closures would mainly impact Tier 2 and Tier 3 suppliers, specialised in manufacturing ICE-specific components (e.g. gearboxes, fuel tanks and piping, exhaust systems)[1]. Several interviewees underscored that OEMs (and their local subsidiaries) and Tier 1 suppliers (these are global companies themselves with subsidiaries in Hungary) have already begun to anticipate changes by introducing digital solutions, accumulating necessary skills, and aligning their product mix to increase the share of future-proof products. Thus, the changes have not yet led to layoffs, but, if the trend accelerates, they may.

Local OEM subsidiaries do not anticipate substantial layoffs. They consider their plants to offer exceptionally competitive terms to manufacture vehicles. Audi, for instance, expects to produce more EV drivetrains, which can compensate for the reduction in necessary labour force per unit, maintaining overall employment levels. Other majors, such as Mercedes-Benz, Suzuki, and (planned) BMW are reliant on processes that are not expected to be affected by a shift in drivetrains.

German automotive OEM interviewees also noted that they adapted the mandate of their headquarters in that they will not reduce overall employment. Although, it is unclear who "employees" are, since they do not always include various "contractors" which OEMs were quick to lay-off during the COVID-19 pandemic, for instance. The latter may be in a more precarious position during times of layoffs. Nonetheless, to maintain current employment levels, German OEMs have three options: (1) increase output, (2) involvement in non-impacted areas, or (3) deepen production. The first option may run into capacity barriers and pits OEM subsidiaries against one-another. The second runs a similar risk. The third entails that OEMs will look to execute processes in-house that had been supplied by Tier 1, 2, and 3 stakeholders – what specifically they internalise is to be defined according to necessity and economic rationale. This, however, effectively externalises the social costs and the responsibility of employment. OEMs seemingly maintain their commitments and their social

[1] For example, Wescast Hungary, an exhaust system manufacturer under Chinese ownership, has already started to cut the number of its workforce by hundreds of employees (hvg.hu 2020b).

responsibility of employing people, while suppliers would go under and the government would have to deal with their employment.

Much like OEMs and suppliers, labour unions also do not anticipate large-scale layoffs. Instead, they expect that the labour market will restructure itself. They recognise the rising demand for high skilled labour and the decline of low skilled positions.

3.3 Strategies for a Just Transition

3.3.1 Political strategies: Recommendations from ministers and/or political parties on how to manage the transformation

This section discusses two parallel but intertwined sets of strategies: domestic EV diffusion and automotive manufacturing. The legal framework for Hungary's national electromobility strategy is set by the Jedlik Ányos Plan (JÁT) 2.0 – a 2018 update of the original plan launched in 2015. The original plan envisaged the establishment of a basic charging infrastructure and introduced support measures to accelerate the diffusion of EVs. Interviewees were mostly satisfied with its impact, as EV adoption was boosted by generous public incentives. These included exemption from the registration fee, road tax, and other tax allowances as well as free parking and free charging (the latter of which was recently phased out). Buyers of EVs received HUF 1.5–2.5 million (approximately EUR 4,200–7,000) in a lump sum subsidies for cars with a sticker price below HUF 11 million (approximately EUR 31,000). This facilitated the uptake of EVs, but given their relatively high costs, measures disproportionately supported middle- to high-income households, while it has also led to market distortions. There is a consensus that they gradually need to be phased out.

Infrastructural readiness for EVs is deemed satisfactory – and improving – by interviewees. Although, they acknowledged that the country has blind spots in Borsod, Nógrád and Somogy counties. An interviewee pointed out that publicly available infrastructure may not be the prime impediment to the diffusion of these vehicles, since the overwhelming majority of Hungarian EV owners charge their cars at home anyway. Nonetheless, as ownership increases public infrastructure is set to become increasingly important as urban residents that cannot charge at home purchase EVs.

Interviewees noted that price signals should become more important in shaping when people charge their vehicles. Prices need to reflect momentary demand and supply of electricity, discouraging EV charging during peak demand within the day. This is an especially challenging endeavour when charging at home, since household electricity prices are regulated in Hungary. Raising electricity prices is a sensitive political issue and quite unlikely. However, in its current form, the system benefits those that are wealthy enough to buy EVs with a further subsidy through inexpensive electricity prices they have access to in their homes. Prices should thus reflect costs and not enable EV owners to benefit from cross-subsidisation ensured by other consumers.

The government has deployed three further strategies pertinent to the transition: the Hungarian National Battery Strategy, the Zalazone test track, and National Green Bus Strategy. The Battery Strategy is currently being developed by the government and chimes with its existing ambitions to support battery manufacturers in gaining a foothold in Hungary. Zalazone provides a testing area for autonomous vehicles, aimed to facilitate innovation. The National Green Bus Strategy is aimed to provide EUR 100 million between 2022–2032 to support the diffusion of electric buses. This programme also aims to support the domestic manufacturing of electric buses. This allows for job creation and greens public transportation as well – key measures necessary to allow a just transition to unfold.

The government has also adapted a strategy to support innovation and meet the arising needs of a transportation sector in transition. When negotiating the conditions of the BMW plant – slated to launch operations in 2023 or 2024 – it explicitly requested BMW to manufacture EVs Hungary. The government has also continuously provided automotive manufacturers with financial support to boost innovation, provide additional jobs, or support the companies in times of crisis. Multiple interviewees noted that such government subsidies were ultimately aimed to support jobs, but journalists have shown how funds are disproportionately large compared to other sectors and they are distributed in an opaque manner (Bucsky 2020). With these, the government's strategy is to keep automotive manufacturers in Hungary and lure further e-mobility actors. Although, the sustainability of such support in a post-COVID setting is questionable.

The state has some influence on how local actors adapt to the global transition and it has shown a propensity to lend its support to a transportation sector in flux. The reach of state policy is, however, limited and it is uncertain whether it can and should intervene in processes that may resolve themselves within value chains. The government has little influence on the strategic decisions OEM's take. Moreover, its ability to back Hungarian companies classified below Tier 1 is quite limited, despite multiple attempts to support SMEs. This, combined with the German automotive industry's slow response to electrification, has fuelled its anxiety over the future of German automotive manufacturing. Its response has been to welcome investors from the Far East, diversifying the economy of the country.

3.3.2 Entrepreneurial strategies: Which new products can/are currently already being switched to by automotive companies and suppliers

When discussing entrepreneurial strategies, we distinguish four clusters of firms in Hungary: (1) OEMs without local manufacturing capacities, (2) OEMs and (essential) Tier 1 suppliers, (3) Tier 2 and Tier 3 suppliers, and (4) new, EV-specific component manufacturers. The first cluster encompasses OEMs without local facilities, engaged in motor vehicle trade and related services, such as Nissan and Porsche. These companies actively promote a transition to electromobility, in-part due to the profitability of EVs a number of which they have made available in Hungary. They are also involved in various endeavours that support the shift, but have no stakes in ensuring a just transition in terms of domestic manufacturing.

Most of the second cluster (OEMs and Tier 1 suppliers) have begun to produce EVs and related parts. The largest plants – Audi and Mercedes-Benz – and their suppliers have begun to embrace the transition; albeit, reluctantly. As a part of this, they have developed production and assembly lines that allow for EV and hybrid manufacturing. How Suzuki will reconfigure its activities is less clear, since the Hungarian plant and Suzuki as whole has only begun to focus on manufacturing mild hybrids. Nonetheless, interviewees did not expect the firm to run into substantial trouble in forthcoming years. Opel is the most challenging case, as there is no clear indication of whether and how the plant would adjust to a changing landscape. The future of Audi, Mercedes-Benz, Suzuki, and the planned BMW plants was largely deemed future-proof by interviewees. These firms have been upgrading their Hungarian facilities and have also made the necessary complementary investments (e.g. skills, digital assets, machinery) to remain competitive.

The third cluster comprises Tier 2 and Tier 3 suppliers that may be hit hard by the ongoing transformation. The subsidiaries of global companies, whose production is exclusively ICE-related may be closed down, relocated, or sold. Such firms can only hope that the transition will be prolonged. The group at the highest risk and with the broadest socio-economic ramifications are domestic-owned suppliers of OEMs' local subsidiaries – typically SMEs. These have sought to innovate, increase efficiency, etc., but many of those that operate with low added value are poised to face financial hardship. This may be worsened by OEMs' plans

to deepen their manufacturing to sustain jobs, which would decrease the role of suppliers and render a number of jobs redundant. If the precarious position of Tier 2 and 3 suppliers increases, so does the instable position of employees due to the low rates of unionisation and a limited social safety net.

Finally, the fourth cluster consists of new – mostly Asian investors – acquiring divested plants or taking greenfield investments in battery manufacturing and other parts of the EV supply chain. These decisions allow them to gain a strong foothold in the EU and establish themselves in the automotive supply chain. The interest and investment of majors, such as Samsung or SK Innovation, are leading Hungary to become a European hotspot for battery production. The output of these plants are not exclusively, but heavily oriented to providing batteries for the automotive sector.

3.3.3 Trade union strategies: What do unions propose in face of the upcoming changes

The role of unions in the Hungarian automotive sector is mixed. Their role is based on Hungary accepting the German institutional model for organising the sector, but it is not rooted in local political economics as is the case with Germany. This leads their power to ebb and flow. They are also not prevalent across the board and even those that exist substantially differ in their ability to mobilise the workforce around strategic causes. For instance, the power of the Audi Union is strong, but this is not the case with Mercedes-Benz, where worker comprise three unions. Moreover, unions in general typically focus on pressing topical issues that need to be urgently resolved – the most important of which is getting their members their deserved wages on time.

Union influence has, however, been leverage to effectuate change a number of times by mobilising their base. A long-term observer of union activity noted that, for instance, the Trade Union for Audi Hungary's recent strike is a textbook case in how to organise a successful strike (also see: Stubnya 2019). Another recent case was the Hungarian Metalworkers' Federation's (VASAS) – a trade union representing the interests of workers in the automotive, electronics, metal and machinery industries – ability to pressure Suzuki to pay higher wages (Váczi 2020).

Union focus on short-term matters limits their ability to focus on the long-term and develop cross-continental solidarity. An observer of unions and a representative of Audi's labour union, were amongst those who noted that union leaders are engaged with day-to-day struggles to ensure wages and the enforcement of workers' rights – a task which has intensified during the COVID-19 crisis. These preoccupations limit their ability to focus on long-term planning and strategizing. This was confirmed by others as well. A former senior figure in the government noted that unions typically become involved when companies plan layoffs, but are not involved in long-term issues. Although, our findings suggest that unions' preparation for long-term trends and challenges varies.

A VASAS representative remarked that they have been systematically preparing to meet the challenges stemming from the shift to EV production. He noted that the union monitors market and regulatory developments, and conducts regular brainstorming sessions to redefine their role and respective strategies. In the era of an overall transformation of the automotive industry, he sees trade unions' role shifting from incrementally improving or at least preserving the *status quo* to shaping ongoing developments so that they do not deviate from a still acceptable channel.

Union leaders and other executives all noted that to develop production and labour strategies they need sufficient insight into the technological trends and trajectories OEMs are pursuing. While a move to producing hybrids and EVs has begun, the Audi union representative noted that within the union there is still disagreement as to which technology will prevail (EV vs ICE/hybrid). They are not sure whether there will be a shift to EVs, at what pace this will take

place, and what other technologies (e.g. hydrogen or natural gas-propelled vehicles) will play a role in the transition. This uncertainty is not only an issue for unions, but also subsidiaries of OEMs, and suppliers. OEM headquarters provide them with little foresight to develop and adapt adaptation strategies. Suppliers frequently only see a few months ahead, OEMs may have insights regarding the next 4–5 years, but unions have little to no understanding about long-term corporate plans.

Trade unions and other stakeholders have begun to prepare for a shift in employment. The well-organised blue-collared workers that have forged a strong community is disappearing. This is coupled with a shift towards demand for more highly educated workers, which are in short supply. Unions have vocalised the problem, but there is no concerted effort to address it. Action should be taken by the state and corporations, but they have done so inadequately. Unions would like to add this to their agendas, since it would reduce job losses in the future and improve working conditions in the present. However, they do not have sufficient resources and have little ability to participate in the discussions between the government and company executives on the matter. This is a problem for union participation as well, since the cleavage between low- and high-skilled workers is deepening, the latter of which have less interest in union participation. This is linked to an age-based divide as well. Multiple union representatives noted that they need to develop strategies to reach out to “individualistic” and “not motivated” younger generations to ensure the continued functioning and influence of unions.

An important area of change in trade unions’ strategy concerns the scope of their activity, which is expanding. Previously, it was typically limited to advocacy to improve wages and working conditions as well as meeting legal requirements regulating their operations. They are now engaged in communicating their new values, which are broad in their scope ranging from health to environmental concerns and they have appeal to many employees. For example, a union representative lamented that the working conditions and environmental footprint of new lithium-ion battery manufacturing plants – non-unionised and typically owned by Asian investors – are terrible, albeit wages are decent. They see it as a part of their mandate to hold the companies they are affiliated with responsible to minimising environmental destruction or other negative externalities, including the over-exploitation of the labour forces and avoiding the race-to-the-bottom situation Asian investors are driving in Hungary.

4 List of interviewees

Non-anonymous interviews:

Reizer, Levente 2021. Interview with Levente Reizer, Leader of e-mobility related activities, PR and External Relations Manager at Nissan, February 2021.

László, Zoltán 2021. Interview with Zoltán László, President of Hungarian Metalworkers' Federation, February 2021.

Kövi, Róbert 2021. Interview with Róbert Kövi, E-mobility Project Manager at Porsche Hungária, February 2021.

Pukler, Gábor 2021. Interview with Gábor Pukler, Founder of the Future Mobility Alliance, February 2021.

Balogh, Szabolcs 2021. Interview with Szabolcs Balogh, Managing Director of MVM Mobiliti, February 2021.

Karaszek, Szabolcs 2021. Interview with Szabolcs Karaszek, Director of Human Resources at BorgWarner Oroszlány, February 2021.

Anonymous interviews:

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