

More than Just (a) Transition: navigating the post-carbon economy in left-behind regions

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What is a “just transition” in auto?

- Coming decade will see far-reaching changes on the global automotive industry.
 - Bans on ICE vehicle sales starting 2030/2035
 - Shift to fully electric vehicles
 - Introduction of autonomous and self-driving vehicles
 - Changes in vehicle use patterns, especially in urban areas
- Emden et al. (2021) define a Just Transition as:
 - *“securing the future and livelihoods of workers and their communities in the transition to a low-carbon economy. It is based on social dialogue between workers and their unions, employers, and government, and consultation with communities and civil society”* (ibid.).

Business

Bosch workers protest against factory closures, job cuts

By Victoria Waldersee



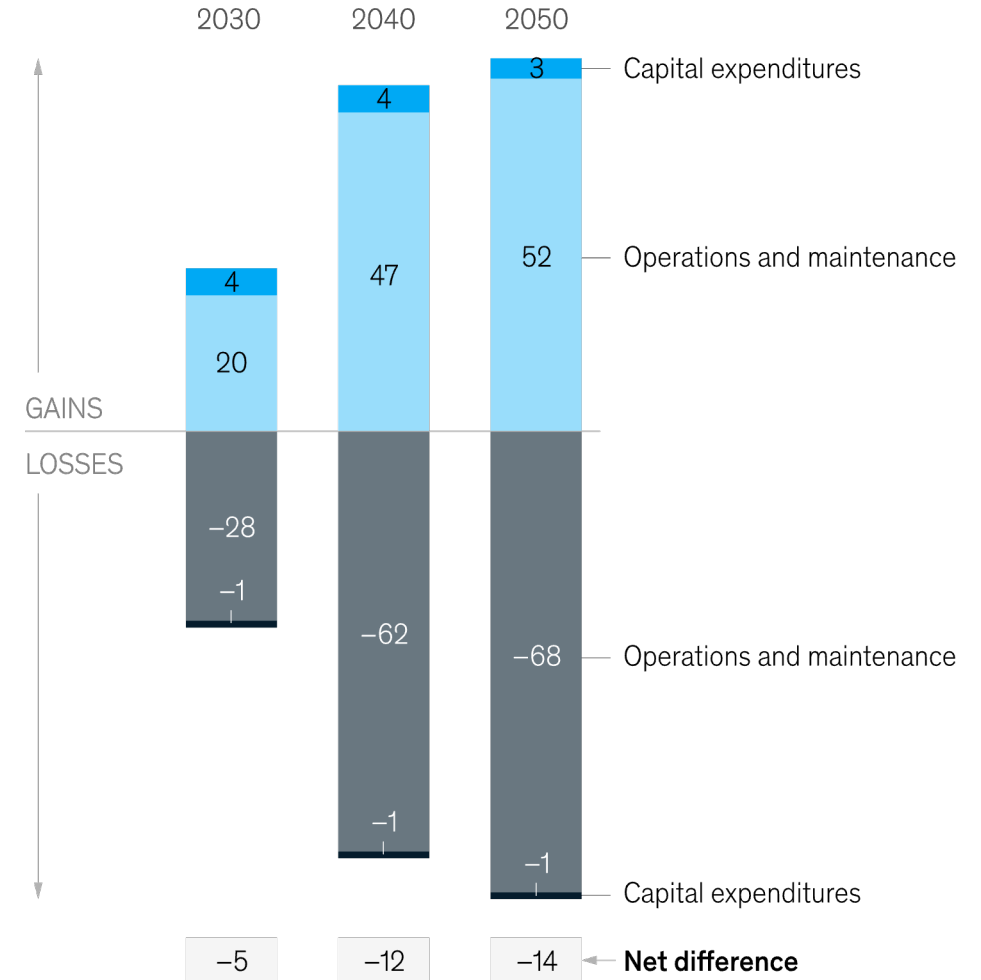
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BMW pledges not to cut jobs in transition to electric vehicles

Some industry bodies say plans to ban new combustion-engine cars will cause large-scale unemployment

Employment shifts, gross changes associated with a net-zero transition,¹ million jobs

The automotive industry would undergo a significant reallocation of jobs in the NGFS Net Zero 2050 scenario.



¹Includes direct and indirect jobs.

Source: NGFS Net Zero 2050 scenario using REMIND-MAGPIE (phase 2); Vivid Economics; McKinsey Sustainability Insights; McKinsey Global Institute analysis

McKinsey
& Company

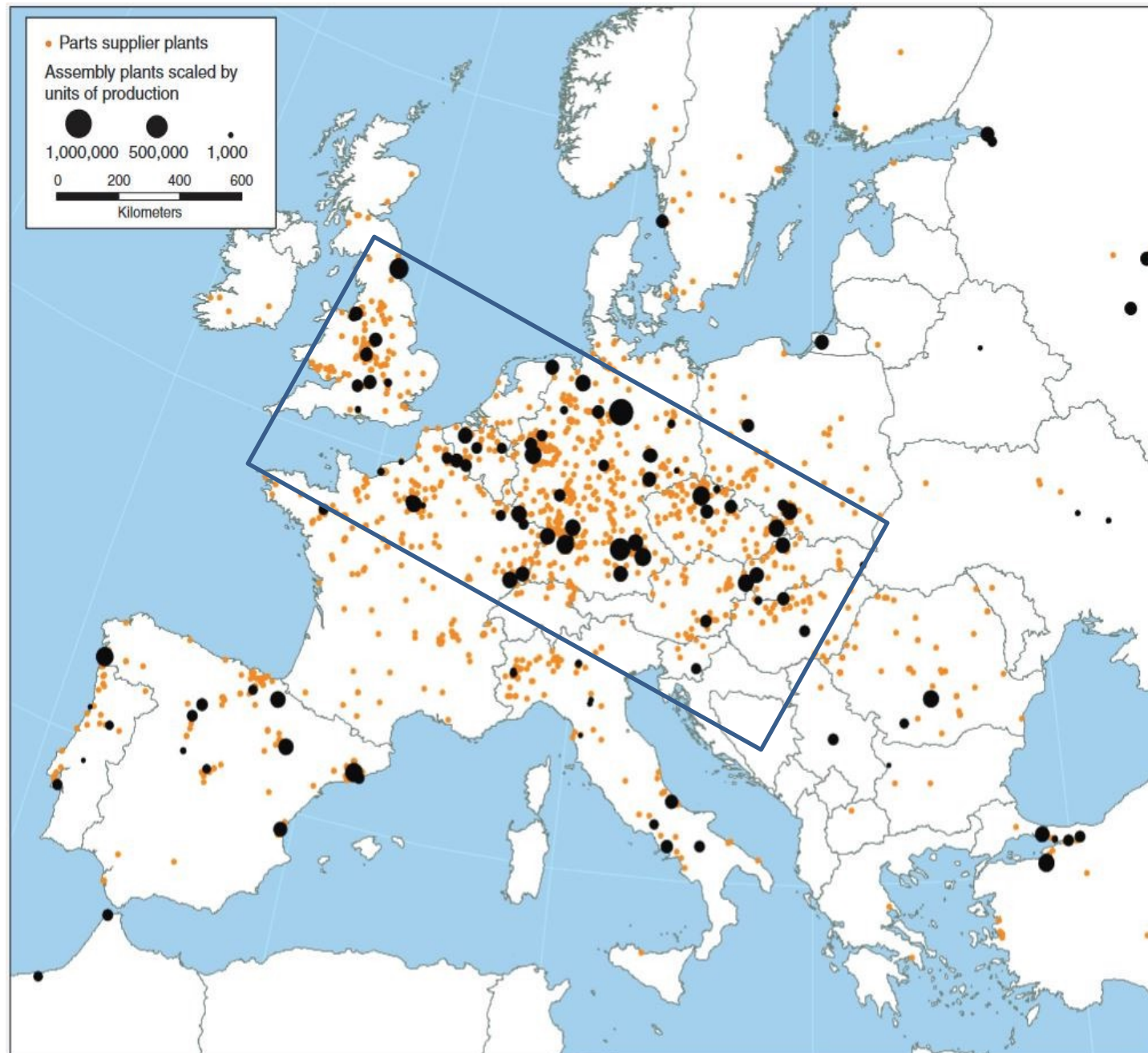
Some quick reflections

- Size of the impact?
- Models of Capitalism – co-determination?
- Make or Buy?
- Whole Value Chain?
- Policy implications

Automotive sector:
direct and indirect employment in the EU

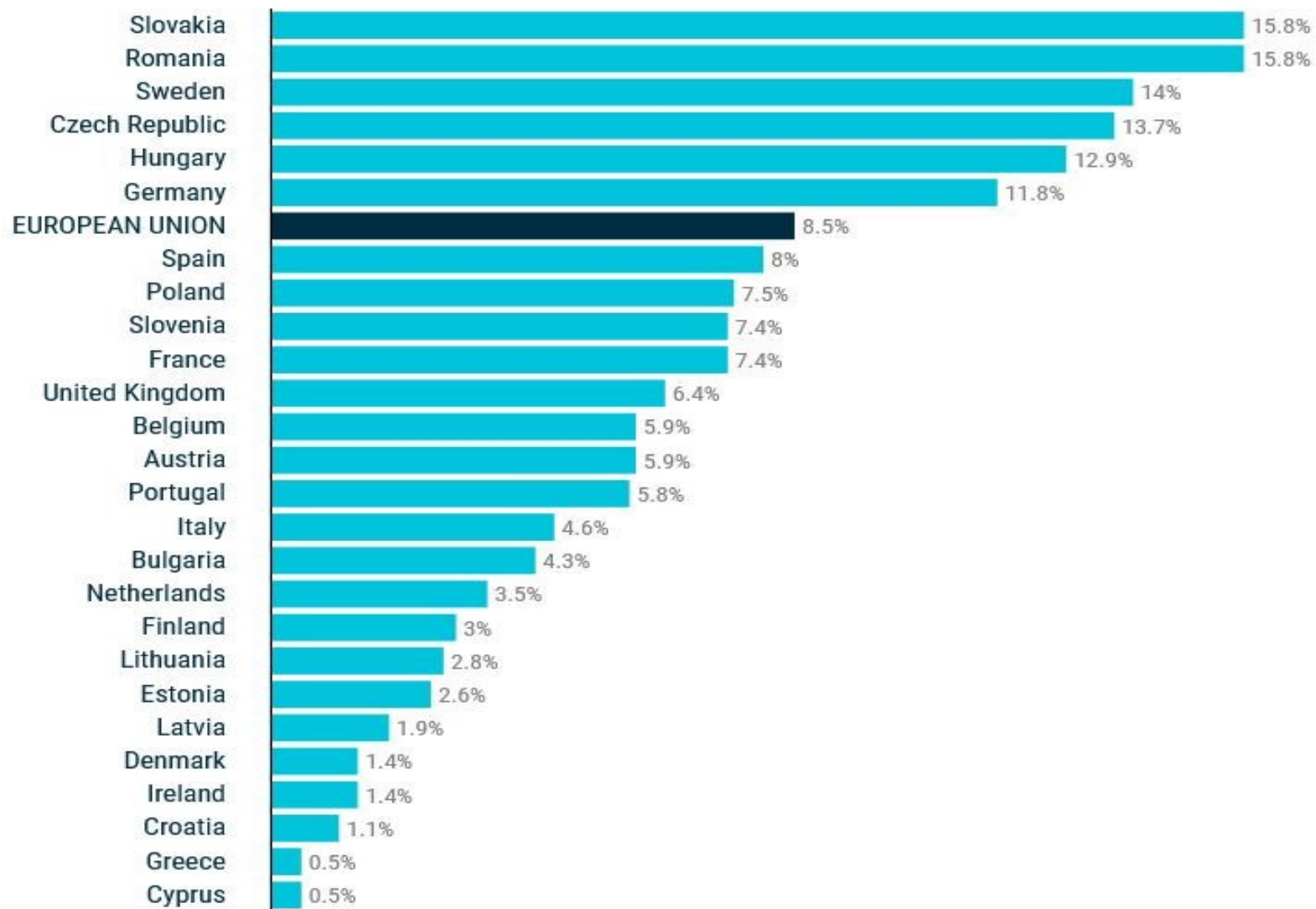
IN THOUSANDS / 2018¹

14.6m jobs	2.7m direct jobs	3.7m manufacturing jobs	2.7m jobs	DIRECT MANUFACTURING	2,685
				Motor vehicles	1,174
				Bodies (coachwork), trailers and semi-trailers	173
				Parts and accessories	1,339
	11.9m indirect jobs	1.0m jobs	1.0m jobs	INDIRECT MANUFACTURING	968
				Rubber tyres and tubes, retreading and rebuilding of rubber tyres	140
				Computers and peripheral equipment	77
				Electric motors, generators and transformers	247
				Bearings, gears, gearing and driving elements	224
				Cooling and ventilation equipment	279
	11.0m non-manufacturing jobs	4.7m jobs	4.7m jobs	AUTOMOBILE USE	4,657
				Sale of motor vehicles	1,652
				Maintenance and repair of motor vehicles	1,631
				Sale of motor vehicle parts and accessories	704
				Retail sale of automotive fuel in specialised stores	445
				Renting and leasing of motor vehicles	226
		5.6m jobs	5.6m jobs	TRANSPORT	5,592
				Other passenger land transport	2,177
				Freight transport by road	3,415
		0.7m jobs	0.7m jobs	CONSTRUCTION	727
				Roads and motorways	686
				Bridges and tunnels	41



Share of direct automotive employment in total manufacturing

BY COUNTRY / 2018



Scale of impact? German estimates...

National Platform Future of Mobility (NPM) (2020): more than **400,000 jobs** in the country's car industry could be gone by 2030 in a worst-case scenario involving a rapid switch to electric vehicles.

Boston Consulting Group (BCG) (2020): little difference in the number of personnel and amount of work involved in building an electric car and a vehicle with a combustion engine.

Fewer workers are required to build engines, but not the whole car, as e-mobility requires new production stages, such as battery cell and module production and packaging, as well as power electronics and thermal management of the battery.

Vehicle assembly or laying the wires also more labour-intensive for electric cars than for vehicles with combustion engines, according to the study. But... battery cell production an issue?

Fraunhofer Institute for Organization and Industrial Engineering: "job losses from the introduction of electric mobility are likely to be substantially lower in the area of vehicle manufacturing than global studies have predicted."

Expect employment in this area to fall by 12% this decade, due to output volumes and higher productivity. But supplier industry could face significant job losses.

"With respect to component manufacture, however, labour requirements are 70% higher for the production of a conventional powertrain than for the production of a powertrain for an electric vehicle," the study says.

"there is no uniform employment trend in the 'transformation corridor' over the coming decade. Instead, there will be a complex, interconnected mixture of job creation, job upgrading and job cuts." Vital to ensure that SMEs do not fall victim.



Battery production plans in Europe: 22 gigafactories planned

Up to 460 GWh in 2025



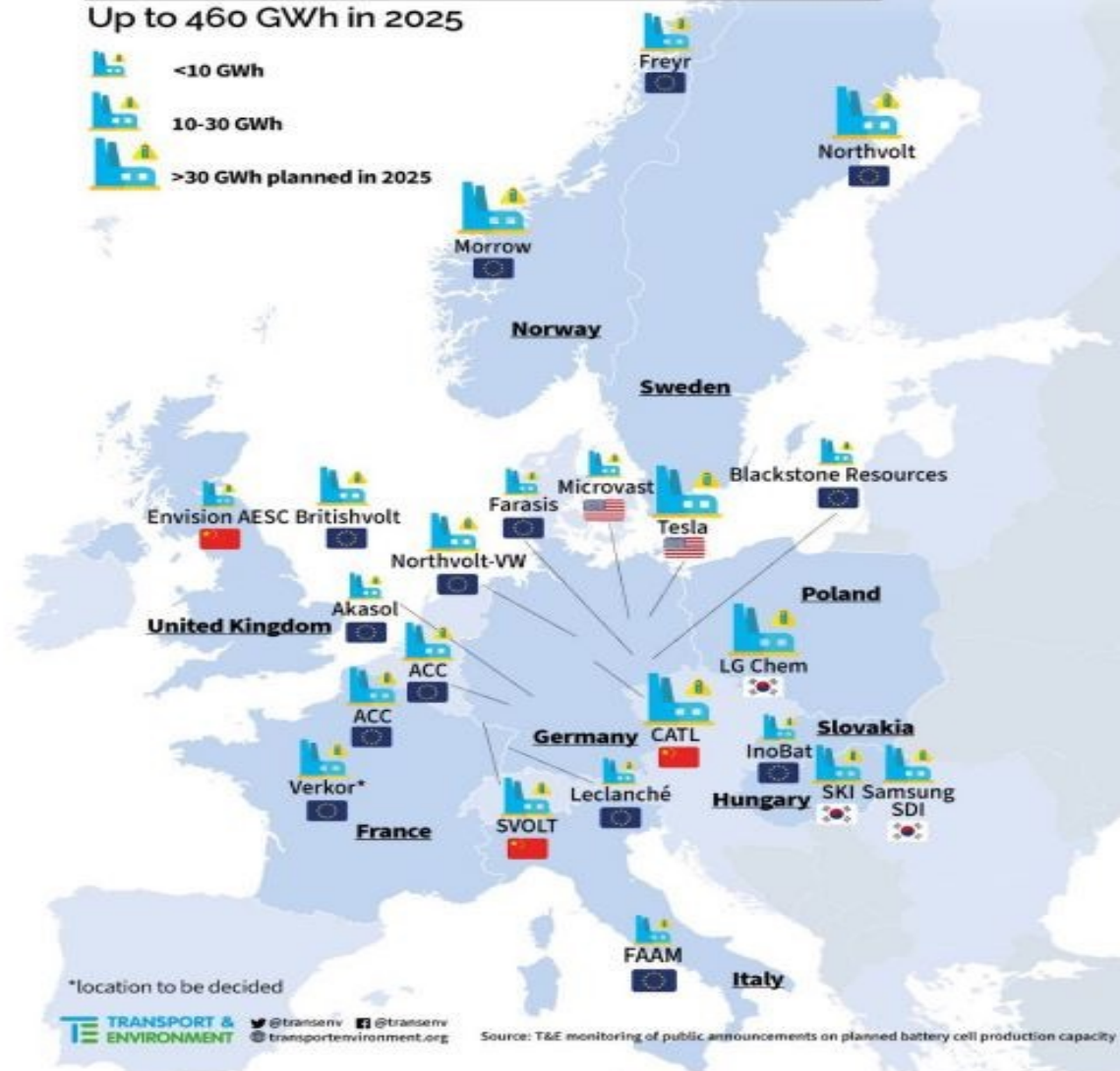
<10 GWh

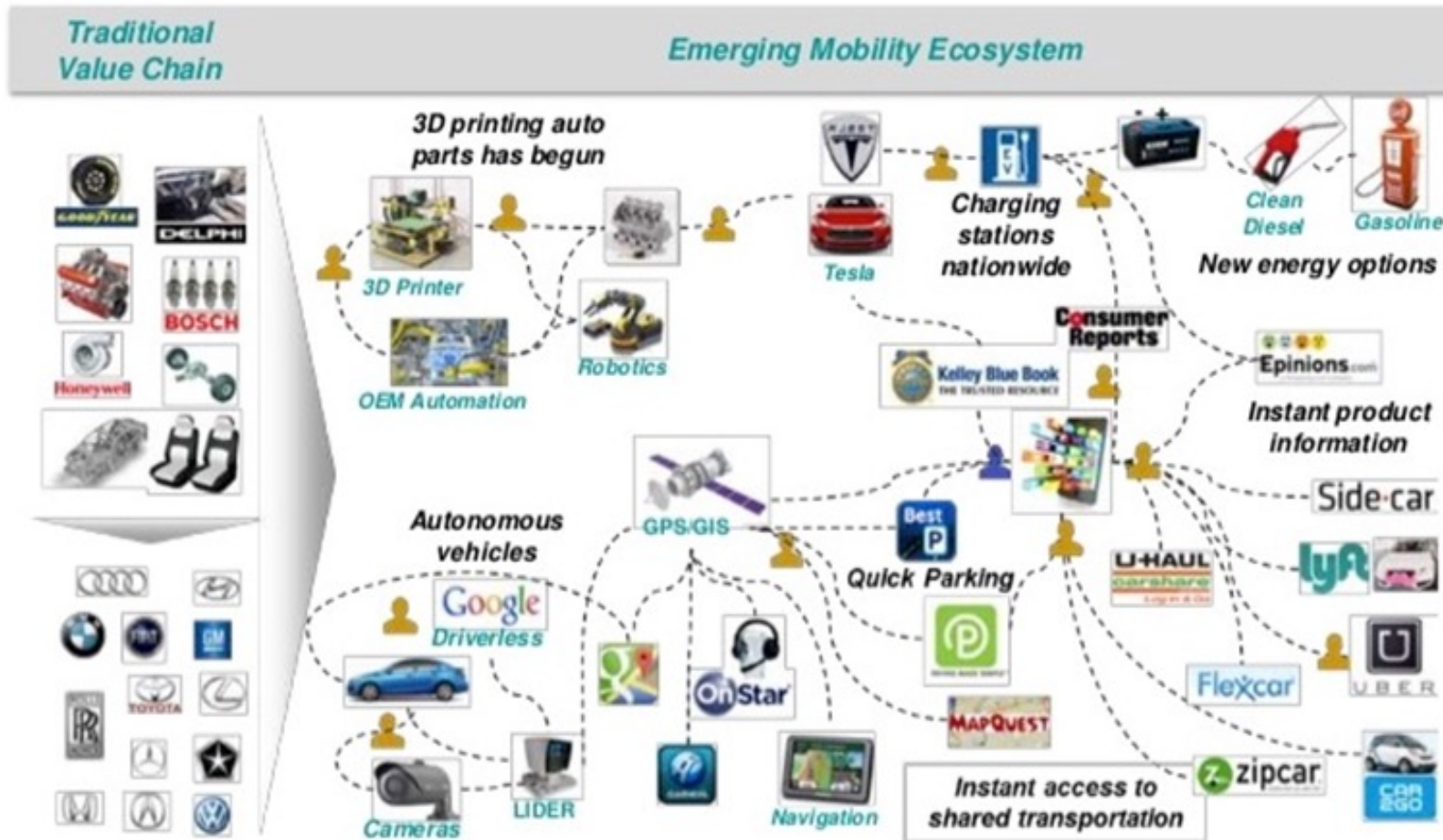


10-30 GWh



>30 GWh planned in 2025





‘ICE to ACE’

Implications for the Value Chain 1

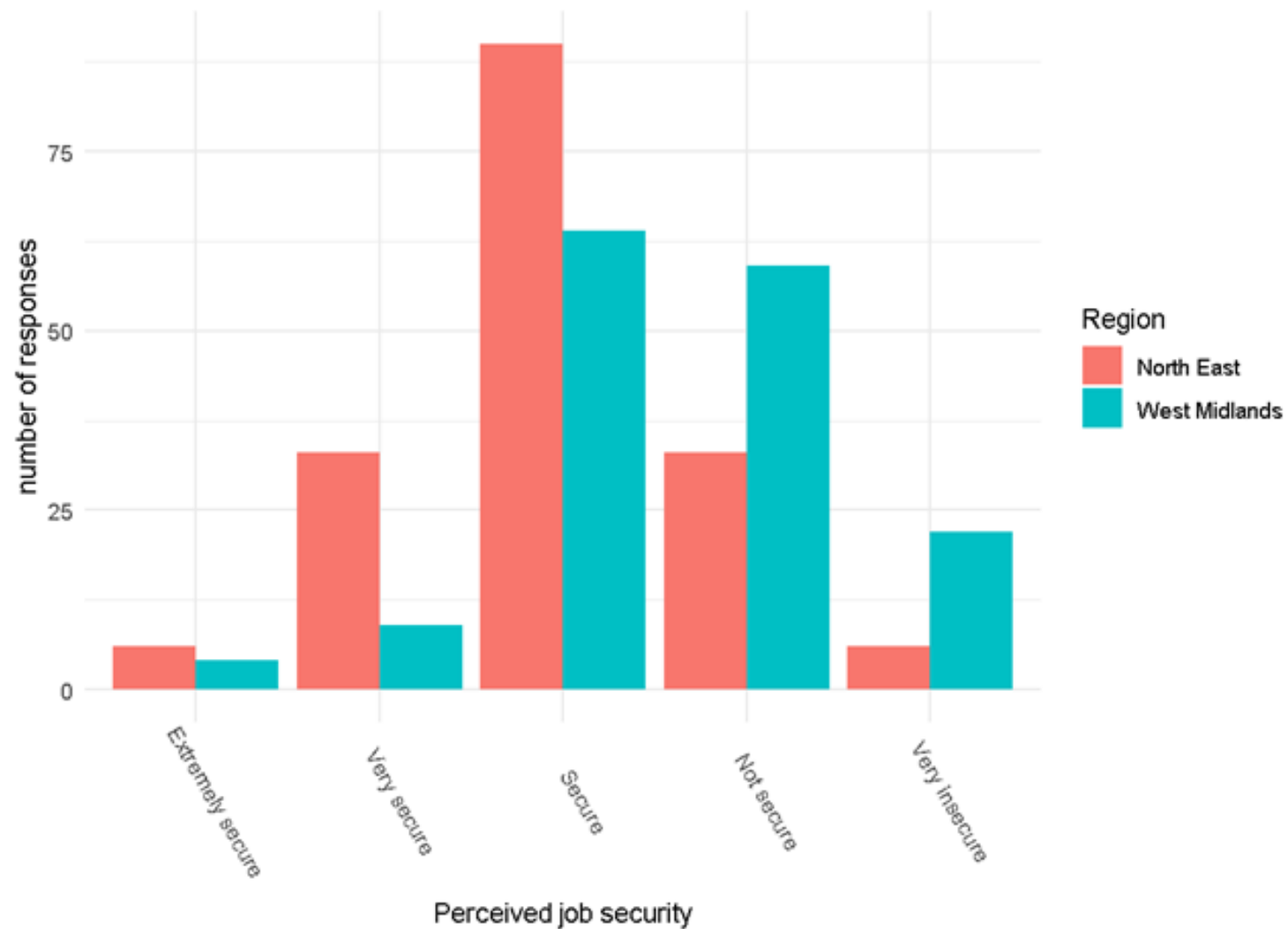
→ **‘fleet-based on-demand personal mobility’ value chain**, comprising components which will share data across the value chain, such as:

- ***Vehicle design and manufacturing*** (existing automaker, outsourced automotive manufacturer, supplier or fleet operator, operating more on an open innovation model).
- ***Operating Platform*** (existing automaker, tier 1 supplier or new entrant like Waymo, Renovo or Drive.ai)
- ***User Experience Platform provider*** (controlling the passenger’s mobility experience, including in-cabin experience, including hardware, software and data.

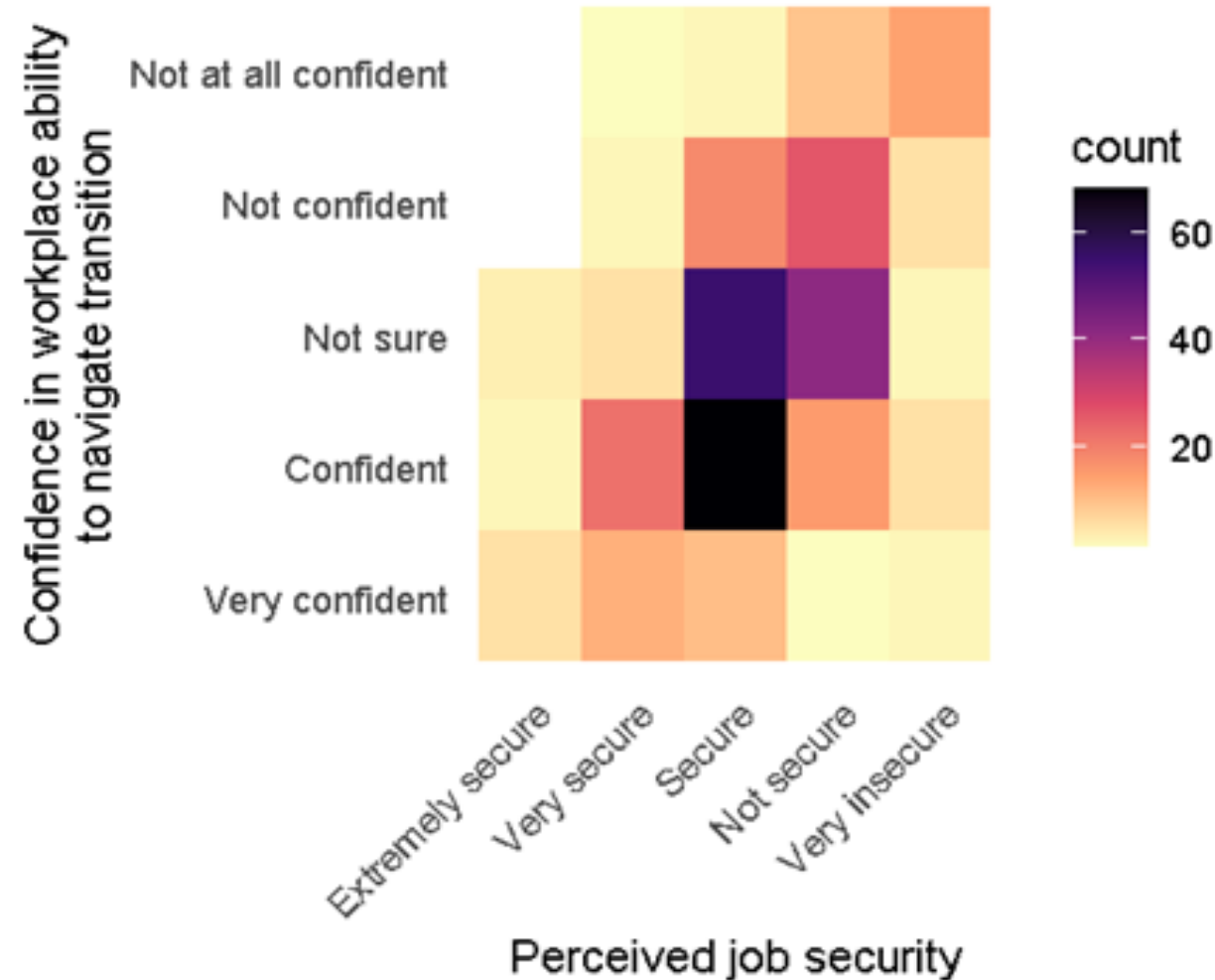
Implications for the Value Chain 2

- ***Data services provider***: content - entertainment, traffic, mapping or weather, consumed by ACE platforms or passengers in ACE vehicles.
- ***Fleet creation***: fleet operators could specify, design and buy/lease from a specific vehicle manufacturer or lease vehicles from a 'fleet creation company', as in the airline industry. Fleet creation involves financing and insurance.
- ***Fleet operator***: firms operating and managing the fleet of ACE vehicles offering on-demand mobility services - extend to integrating on-demand with public transport and to '*Global Distribution System*' firms (as in the airline industry) offering reservations to on-demand mobility services?
- ***Fleet service and maintenance provider***: servicing, maintaining and supporting fleets – specialists may provide this service.

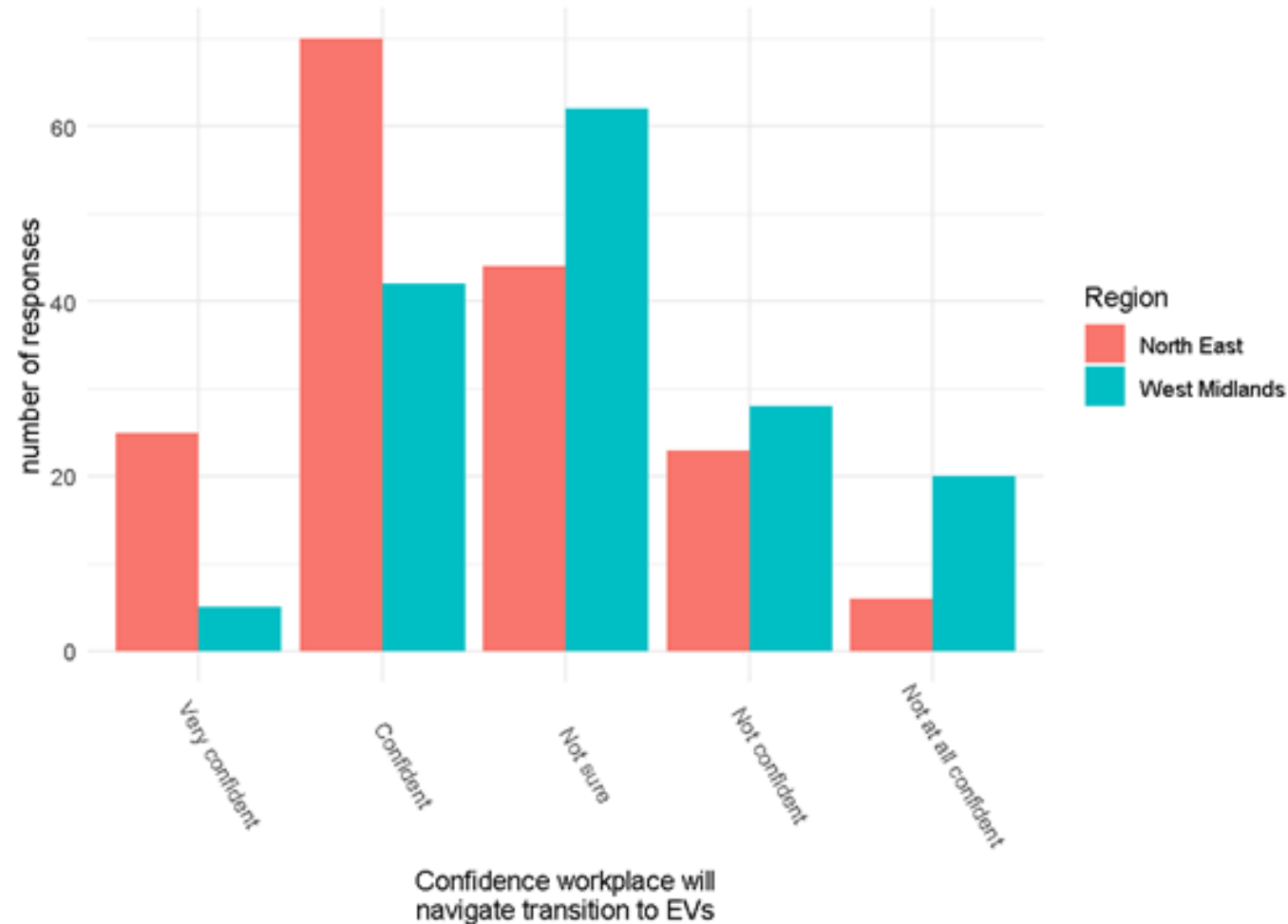
Perceived job security



Job security and the zero-carbon transition



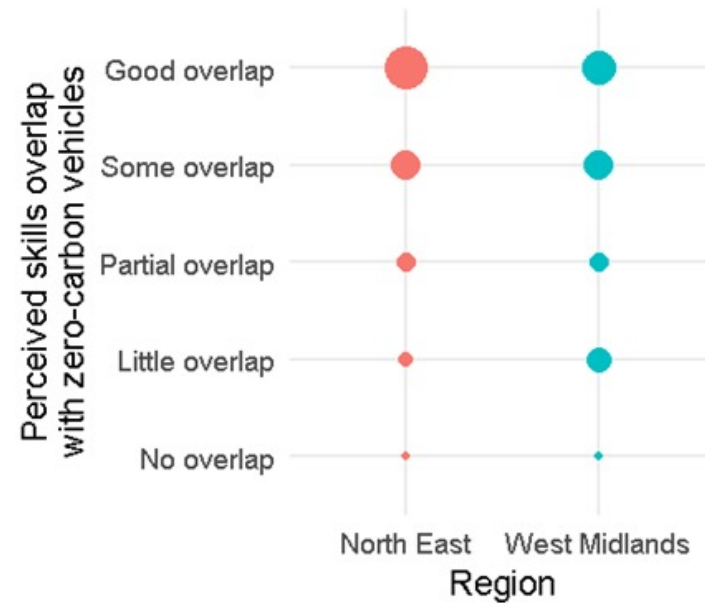
Confidence in ability of workplace to navigate the transition to net zero



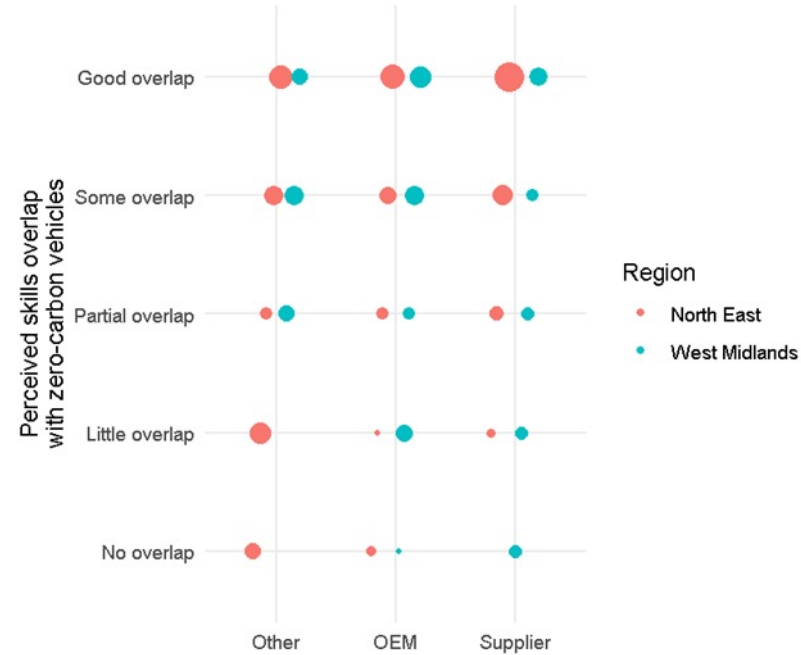
Workforce training from the employer

Region	Proportion offered training	
	No	Yes
North East	81%	19%
West Midlands	86%	14%

Perceived skills overlap with zero-carbon vehicles



Perceived skills overlap with zero-carbon vehicles by company-type



JOBS, SKILLS AND TRAINING

M/M to E/E

Automation & digitisation

Job loss in ICE/Job growth in EV

Estimated impact of electrification and digitisation on occupations/job types

Job impact in production and technical development departments	Pessimistic Assumption	Optimistic Assumption
Production Operatives	-30%	-10%
Supply chain coordinator	-10%	0%
Production coordinator	-10%	0%
Machinery supervisor	-5%	0%
Project Managers	-4%	0%
Production Planner	-3%	0%
Developer	0%	5%
Electrotechnical worker	0%	10%
Software developer	5%	30%
Data Analyst	250%	350%

Herrman et al. (2020, p. 93ff.)

Skills Requirements

The production of electric vehicles requires:

- Knowledge of electrics, electronics, and IT; skills in the handling of high voltage systems... for the installation of interior components and the laying of cable harnesses.
- High voltage awareness, ability to work with high-voltage components; handling chemicals & hazardous materials.
- Skills in the operation and servicing of machines for the production of electrodes.
- Quality management of electrochemical energy storage.
- knowledge of networking, data management, and process planning....

Skills Requirements and Qualifications

Development of a Digital Production Platform requires:

- Skills in data analysis and development of software
- Engineers with software and digital skills
- Ability to think and act in an interdisciplinary manner
- First degree and higher level of education
- Degree in Advanced Manufacturing Engineering

NB Also impacts 'back office' functions

There are 'unknown' skills

Activities, level of qualification by job type, in a typical gigafactory

Job Type & %	Employment Activity Profile	Level of Qualification
Production Operators 60%	Material handling, machine loading, machine unloading, pack assembly, logistics, module/pack assembly, inspection	Level 1-3
Equipment Technicians 15%	Machine Service & maintenance, optimising machine performance, quality control, reviewing cost & delivery	Level 3-5
Engineers & Senior Staff 10%	Facility Engineers, process/production engineers, IT and data management, achievement of KPIs, legislation checks	Level 6 & up
Quality Technicians 5%	In-process controls, confirmation of specifications (parts and supply), performance evaluation, assessment of defects	Level 4
Quality Engineers 5%	In process controls, confirmation of part/supply specification, performance evaluation, defect analysis	Level 6
Management & HQ functions 5%	HR, Finance, purchasing, IT and data management	Level 6 & up

Faraday Institution (2020)

WHAT ABOUT WORKERS MADE REDUNDANT?

- Metal working activities, especially stamping and cutting (turning, milling, drilling, grinding) declining
- Firms closing already (eg GKN Driveline)

VW plan for a 'just transition'

- Create jobs in other business activities and re-train workers to do the jobs in new business areas
- Guide employees through the transition & give help to gain qualifications to enhance employability
- Generous redundancy package

A plan for a 'just transition'?

- Top-ranked policy options preferred by workers = access to training provided by gov't (22%), direct support for existing workers (19%) and phasing the end of petrol/Diesel to give time to adjust (16%). Note that access to training & direct support were also ranked #2 by many workers.

Policy?

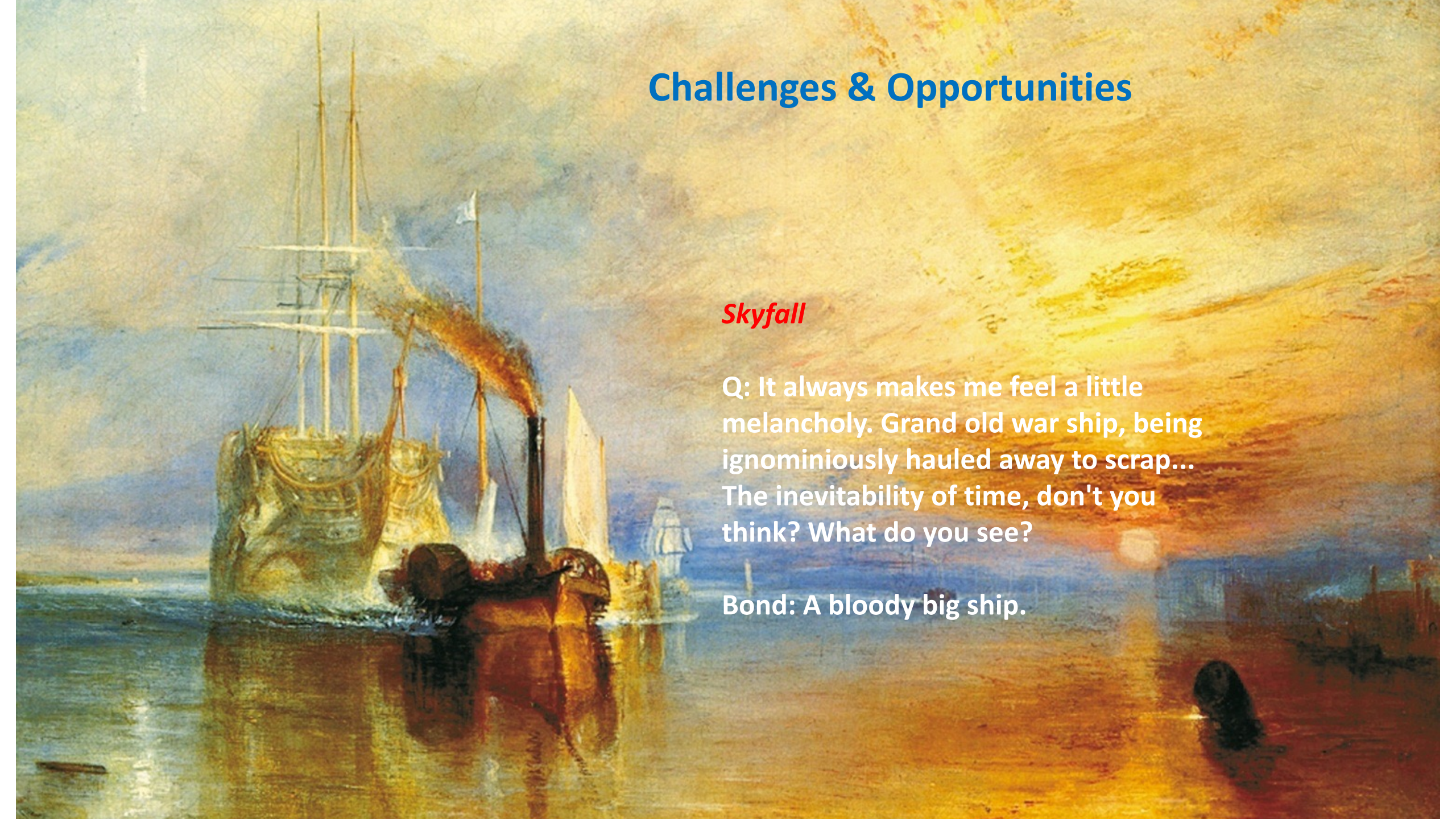
- ‘Coordination failure’ – role for industrial policy
- Collaborative approach / participation / knowledge discovery – modern industrial policy
- Training/retraining/skills throughout life (Singapore, Scandinavia, Germany)
- Worker participation
- Diversification / reorientation (supported by who?) MG Rover experience
- Reshoring (supported by who?) MAS / AMSCI experience
- Financing investment – eg battery gigafactories
- Building a **new** value chain (supply chain is vulnerable given shift to in-house): raises an issue for **Smart Specialisation**
- Multiple transitions
- Welfare systems?
- Value capture as well as creation
- UK: Brexit?

Challenges & Opportunities

Skyfall

Q: It always makes me feel a little melancholy. Grand old war ship, being ignominiously hauled away to scrap... The inevitability of time, don't you think? What do you see?

Bond: A bloody big ship.



Thanks for listening.

Comments, Questions welcome.

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