Digital ERS Forum 4

2025-02-17

Fraunhofer ISI

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Intro

- The **purpose of these digital seminars** is to fill the void between the larger conferences. An unpretentious but (hopefully) fruitful way to share knowledge and drive development forward.
- **All seminars have a specific theme**. The theme for the first seminar was progresses in ERS tests, the theme for the second seminar was decision-making situation concerning ERS, the third theme was Socio-economic costs & benefits and demand forecasts for ERS.
- The theme for **today's seminar is** "**The OEMs' view on ERS.**" OEM's are often interviewed, but seldom participates at seminars – now we will hear from them directly. Talks focusing on economic assessment, business strategies etc for ERS (compared to other drivetrains).

Agenda

1. Welcome and Motivation (Matts Andersson & Patrick Plötz)
2. Technology acceptance & the role of OEMs (Patrick Plötz, Fraunhofer ISI)
3. Scania's View on ERS (Christer Thorén, Scania)
4. MAN's View on ERS (Julius Engasser, MAN)
5. Evolving OEM strategies for low carbon trucks (Aline Scherrer, Fraunhofer ISI)
6. Summary and Conclusion (Matts Andersson & Patrick Plötz)

Practicalities

- We will send out all presentations afterwards.
- Mute your mike and turn of your camera when you are not presenting/commenting.
- Raise your digital hand if you want to ask a question after a presentation.
- Hard on the issue, soft on the person.

Outro

- The focus for the next seminar is New studies and recent developments.
- We appreciate suggestions for presentations.
- Feel free to forward the invitation.

Thanks!

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Technology Acceptance & The Role of Truck OEMs in Electric Road Systems

Patrick Plötz
Fraunhofer ISI, Germany

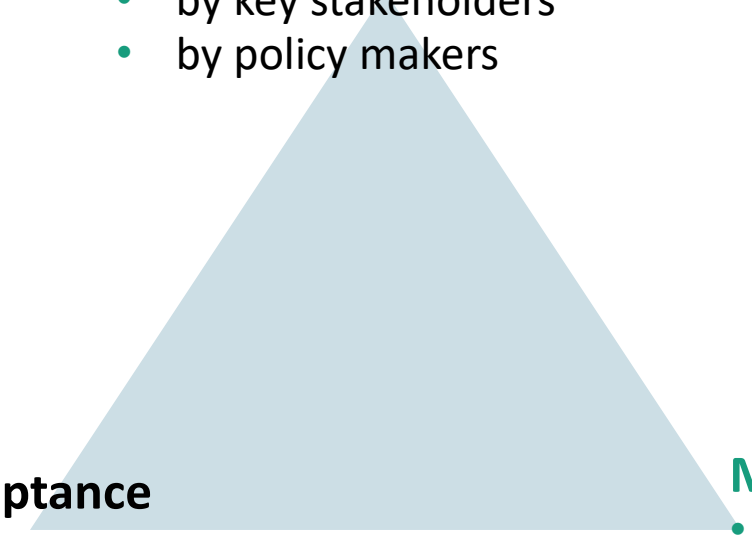
Social acceptance of new energy technologies is the willingness and readiness of different stakeholders to support, adopt, and integrate a new technology or system.

Wüstenhagen et al. (2007). "Social acceptance of renewable energy innovation: An introduction to the concept." Energy Policy, 35(5), 2683. https://doi.org/10.1016/j.enpol.2006.12.001

Three dimensions of social acceptance of renewable energy innovation

Society & policy, local communities, and the market

Socio-political acceptance
- of technologies and policies
- by the public
- by key stakeholders
- by policy makers



Community acceptance
- Procedural justice
- distributional justice
- trust

Market acceptance
- Consumers
- Investors
- Techn. & **Vehicle suppliers**
- Users

Wüstenhagen et al. (2007). "Social acceptance of renewable energy innovation: An introduction to the concept." Energy Policy, 35(5), 2683. https://doi.org/10.1016/j.enpol.2006.12.001

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Social Acceptance: Implications for Electric Road Systems (ERS)

Acceptance is not just passive approval but active participation & investment in making ERS mainstream

What ideal social acceptance for ERS would look like:

- Socio-political Acceptance:
  Governments and regulators endorse ERS through policies, subsidies, and infrastructure investments.

- Market Acceptance:
  Businesses, especially truck OEMs, logistics companies, infrastructure manufacturers and operators, as well as investors, see ERS as economically viable and incorporate it into their strategies.

- Community Acceptance:
  Local populations and truck drivers perceive ERS as beneficial, fair, and practical for real-world use.

Acceptance is/would be not just passive approval but active participation and investment in making ERS a mainstream solution.

Role of Truck OEMs in Market Acceptance of Electric Road Systems

Truck offer, viability, standardization, Supply Chain coordination & potential Commitment

Tech. Development & Products

- OEMs must integrate ERS-compatible trucks into their product portfolios.
- Development of hybrid or fully ERS-dependent drivetrains.

Econ. Viability & Business Models

- OEMs influence the cost-effectiveness of ERS trucks through pricing, leasing models, and TCO considerations.
- Collaborations with infrastructure providers to ensure a viable charging and payment system.

Standardization & Interoperability

- OEMs play a key role in defining common ERS standards to avoid technological fragmentation.
- Ensuring compatibility across different ERS technologies (e.g., catenary, inductive, conductive).

Partnerships & Supply Chain Coordination

- Collaborations with governments, energy providers, and logistics companies to build confidence in ERS.
- Ensuring a reliable supply chain for critical components such as batteries and pantographs.

Industry Signaling & Commitment

- OEMs' strategic decisions impact investor & fleet operator confidence.
- Public commitments, pilot projects, and early adoption can create a positive feedback loop for broader market acceptance.

Summary

- Technology success does not only depend on feasibility and costs but also social acceptance
- Social acceptance is the willingness & readiness of stakeholders to support, adopt, and integrate a new technology or system.
- Truck OEMs play in key role as they offer the products, collaborate with infrastructure providers, define standards, cooperate with governments and influence the supply chain.
- A fast transition towards ERS is difficult without truck OEM support.

Bildquelle: shutterstock/twenty1studio

Thank you for your attention!

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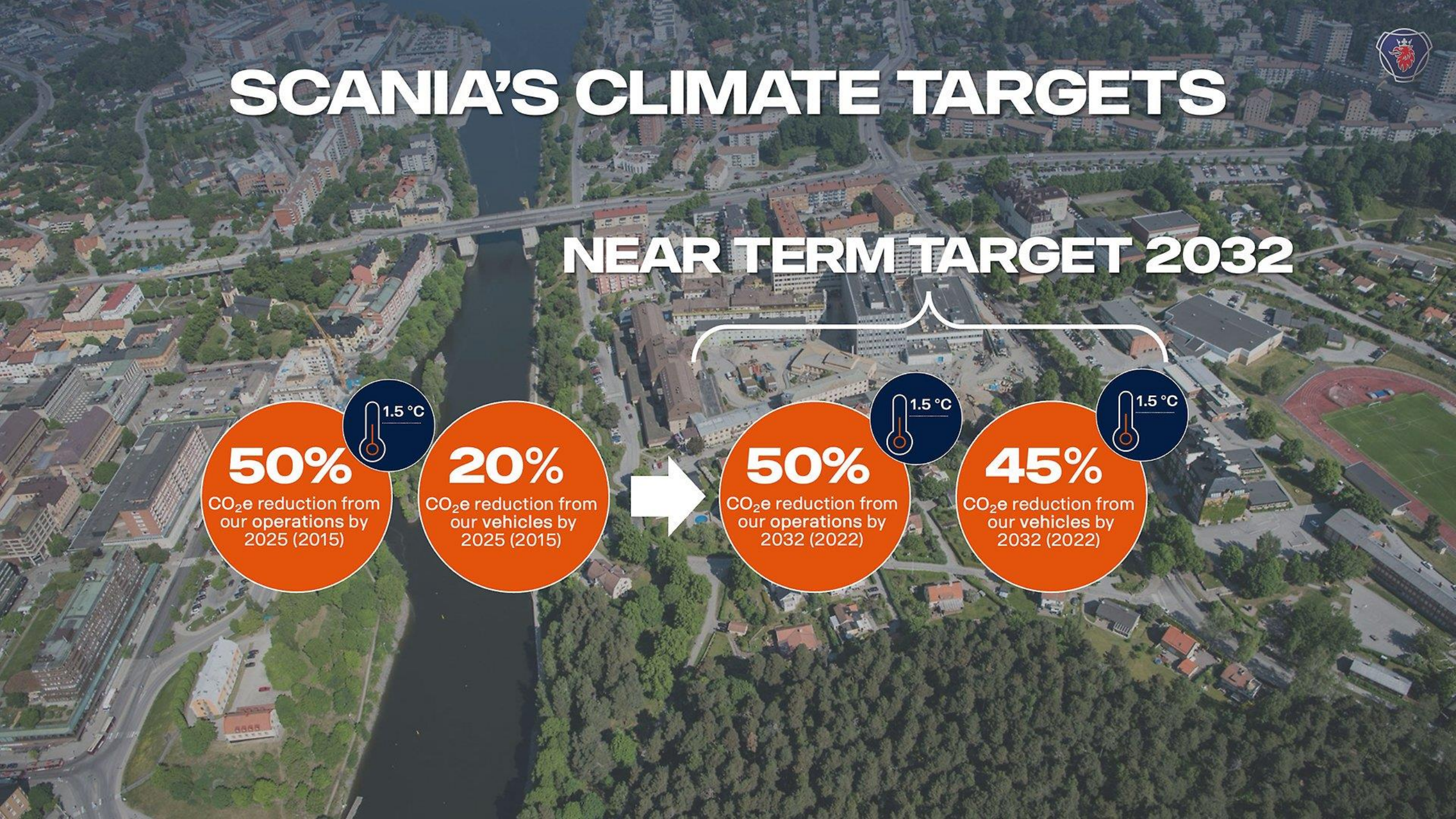
PILOT PARTNER CHRISTER THORÉN

ERS FROM A SCANIA PERSPECTIVE

2025-02-17

SCANIA


SCANIA'S CLIMATE TARGETS
NEAR TERM TARGET 2032
1.5 °C
50%
CO2e reduction from our operations by 2025 (2015)
20%
CO2e reduction from our vehicles by 2025 (2015)
1.5 °C
50%
CO2e reduction from our operations by 2032 (2022)
1.5 °C
45%
CO2e reduction from our vehicles by 2032 (2022)

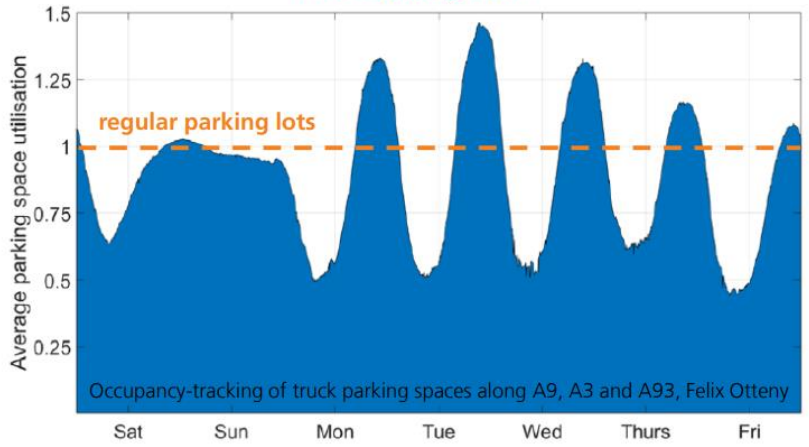
BEV is the solution

Hola project shows challenges with charging

BEV volume at rest areas

How many parking lots should be equipped with charging infrastructure?

live-tracking data



what it looks like in practice

- Live tracking of utilization, modeling of arrival and departure times
- Transfer to any highway service area
- Traffic simulation for one year in minute resolution

- **Demand of charging infrastructure is higher than the BEV share**
  - Overparking combined with random accumulation of BEV
  - BEV share on site can be higher than BEV stock (e. g if not all locations are equipped with charging stations)

* www.vwl.de/downloads/205532/parkplatzmangel_ entlang_der_nrw-autobahnen_-_halterner_zeitung.pdf

Problem with grid availability

Results – Charging Sites

588 sites

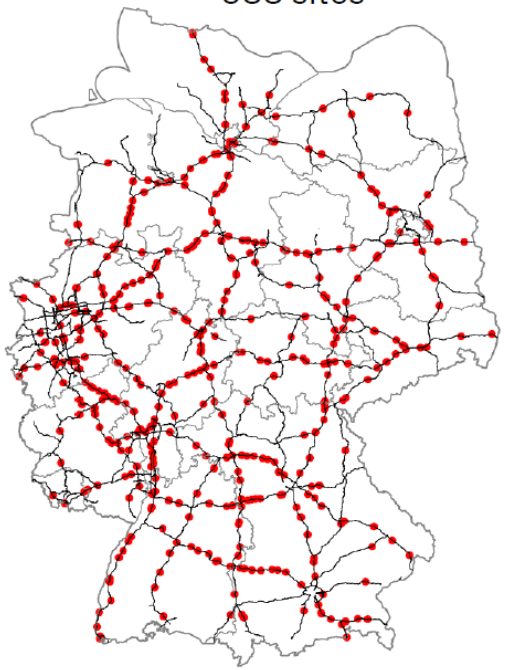


Figure 12: Potential Charging Hub Locations and Distribution within Germany

457 sites

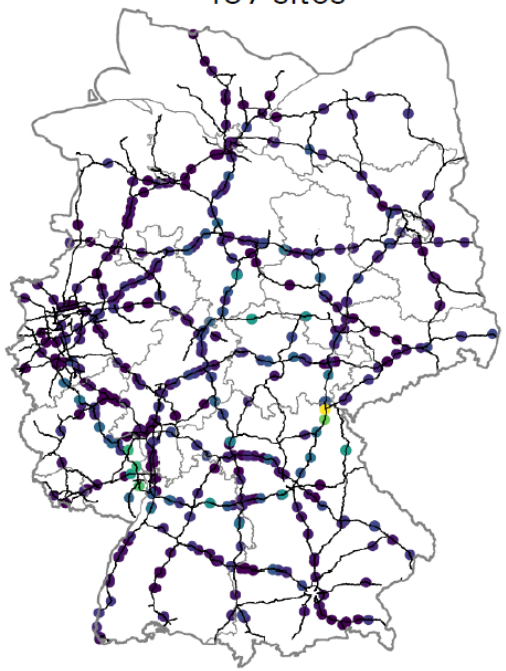


Figure 13: Charger Distribution at 20 % Electrification

202 sites

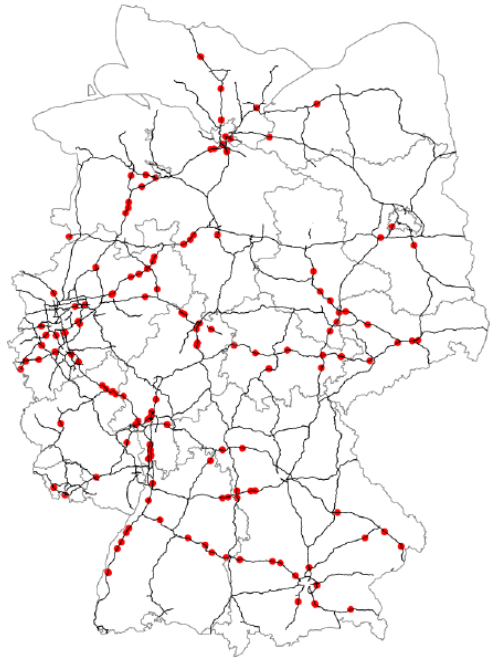


Figure 14: Charging sites with proximity of less than 1.5km to next electrical substation

Menter 2023

Alternative solutions needed

- ERS
  - Limited need for charging on highway
  - Grid connection distributed
  - Less batteries needed
  - The economy is good

ERS at Scania

- Operated in Sweden and Germany from 2016 to 2024
- 3.5 million km driven
- It works
- There is an approved EU standard, TS50712
- If there is a market, Scania will have trucks

SCANIA

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Digital ERS seminar – Aline Scherrer – Fraunhofer ISI
17.02.25

The path towards net-zero: European truck manufacturers' heavy-duty AFV innovation strategies 2018 - 2021

Scherrer, A., & Rogge, K. S. (2025). When do incumbents adopt radical net-zero technologies? Analysing differences in strategy trajectories of European truck manufacturers towards alternative vehicle technologies. Technological Forecasting and Social Change, 211, 123872. https://doi.org/10.1016/j.techfore.2024.123872

Strategizing under uncertainty and net-zero targets

The key role of manufacturers and their different policy reactions

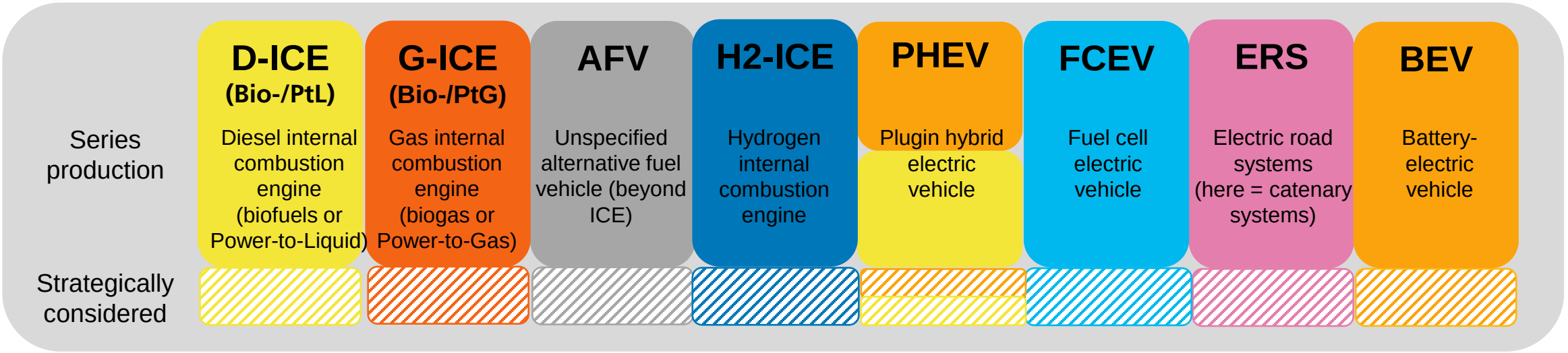
- **Vehicle manufacturers: key actors in the transport transition**
- Develop and diffuse new products
- Are asked for guidance by policymakers about what is technologically and economically feasible (e.g. German Cleanroom conversations 2022 and 2024)
- **Their choices for or against certain technologies influence the speed and success of the transition**
- Incremental vs. radical technology alternatives
- One central influence: phase-out policies like the EU CO_2 emission performance standards for new heavy-duty vehicles (2024/1610 amending 2019/1242)
- **We find four types of trajectories in the manufacturers' technology innovation strategies**
- **Firm-level factors contribute to explaining the commonalities and differences**

Methods

- **Qualitative study based on**
- **interviews** (2021-2022; focus Germany, EU) and
- **five types of documents** (annual reports, press releases, firm tweets, CEO statements in newspapers, LinkedIn posts by key managers)

Firm / Brand	Interviewee position	Date
DAF	Manager AFVs	10-2022
Daimler	Manager CO_2 strategy	07-2021
	Manager electric mobility	01-2022
IVECO	Manager AFVs	04-2022
MAN	Engineer electric mobility	01-2022
Renault	Manager electric mobility	01-2022
Scania	Manager AFVs	07-2021
Traton*	Manager electric mobility strategy	07-2021
Volvo	Manager AFVs	07-2021
	Manager electric mobility	01-2022

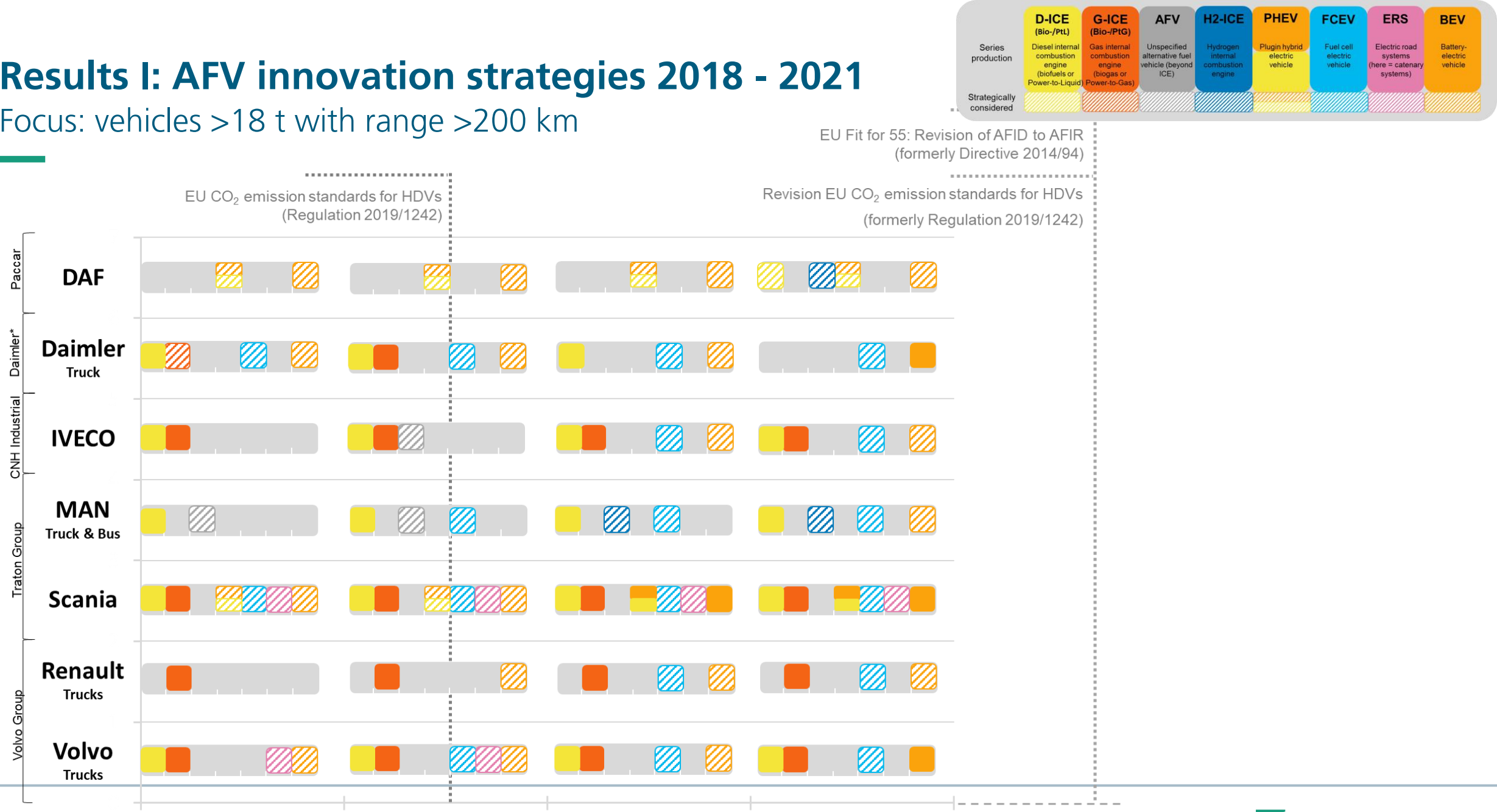
Case: zero-emission truck technologies



reinforcing/incremental → challenging/radical

Results I: AFV innovation strategies 2018 - 2021

Focus: vehicles >18 t with range >200 km



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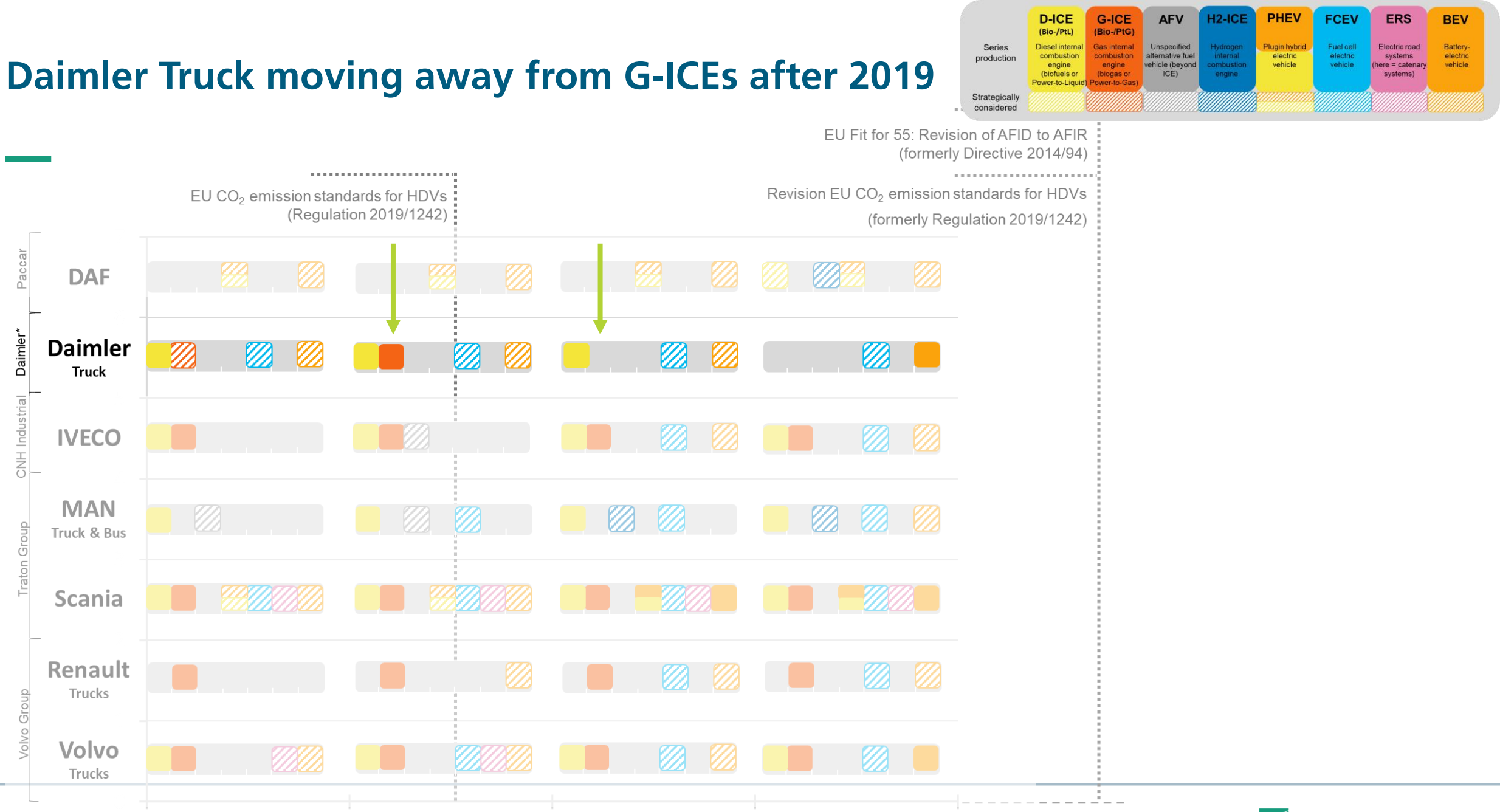
Daimler Truck moving away from G-ICEs after 2019



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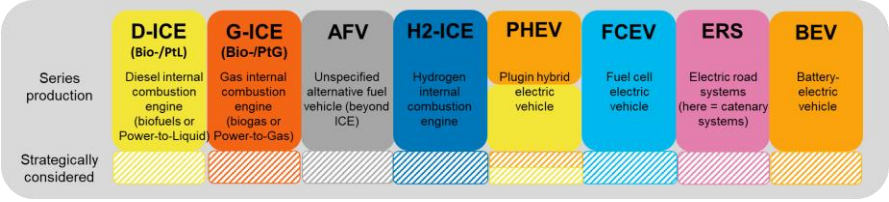
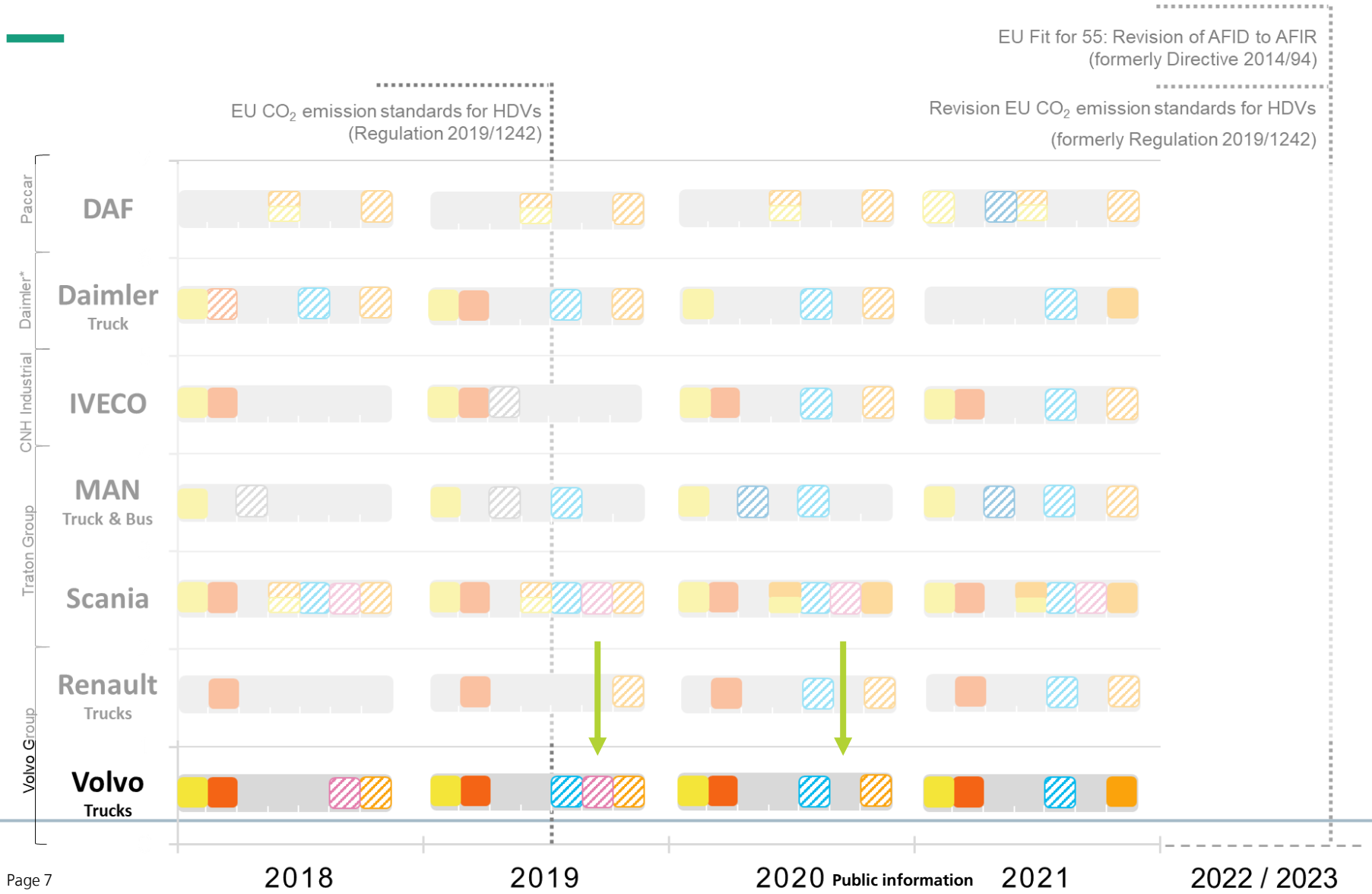
Volvo with short interest in ERS





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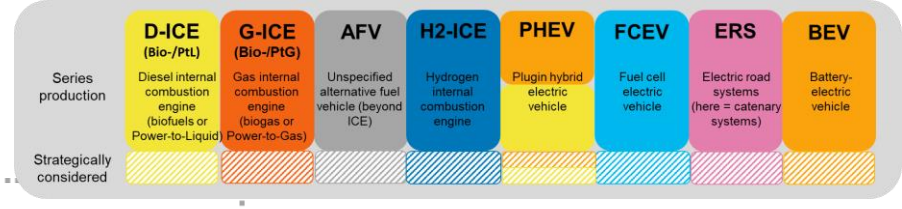
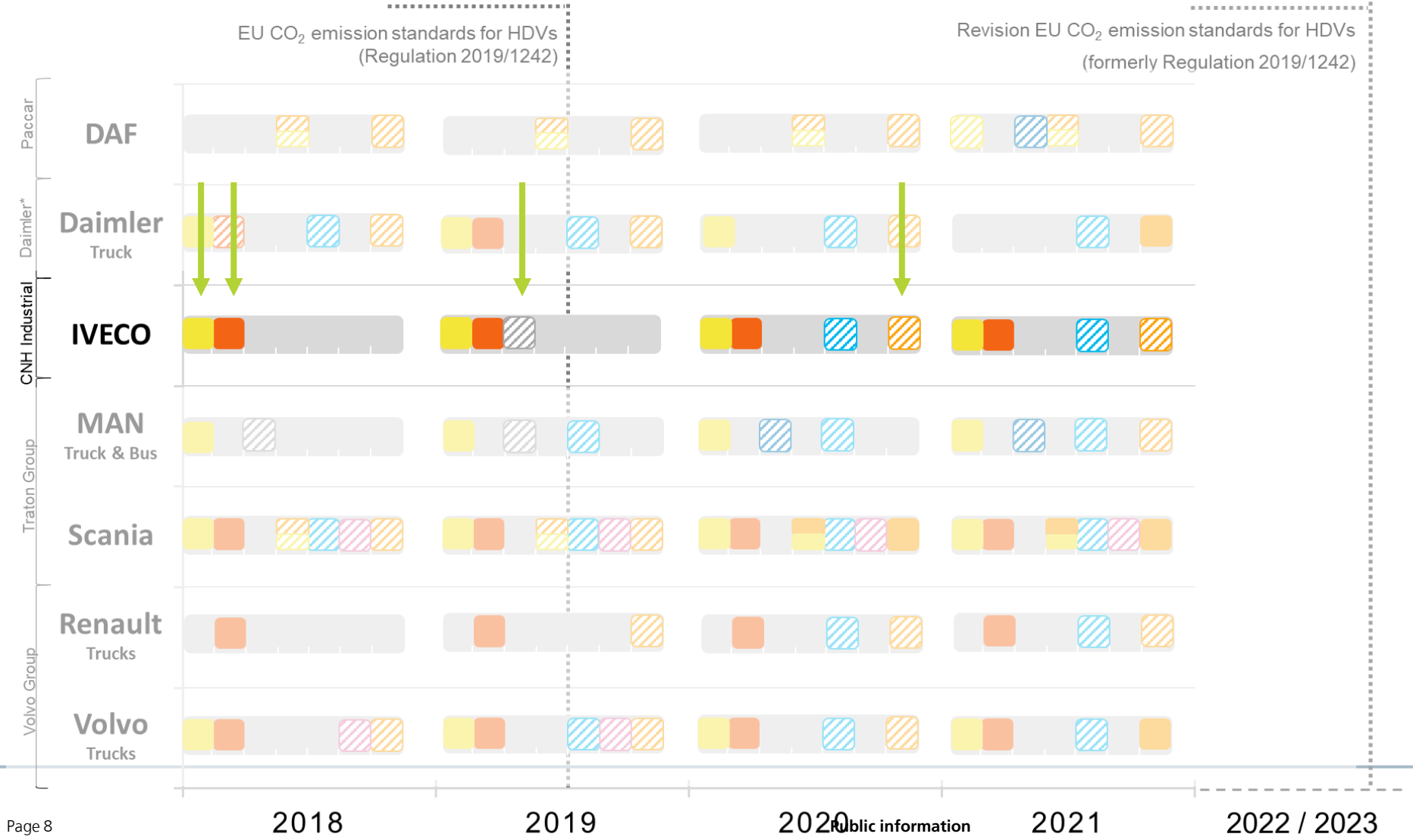
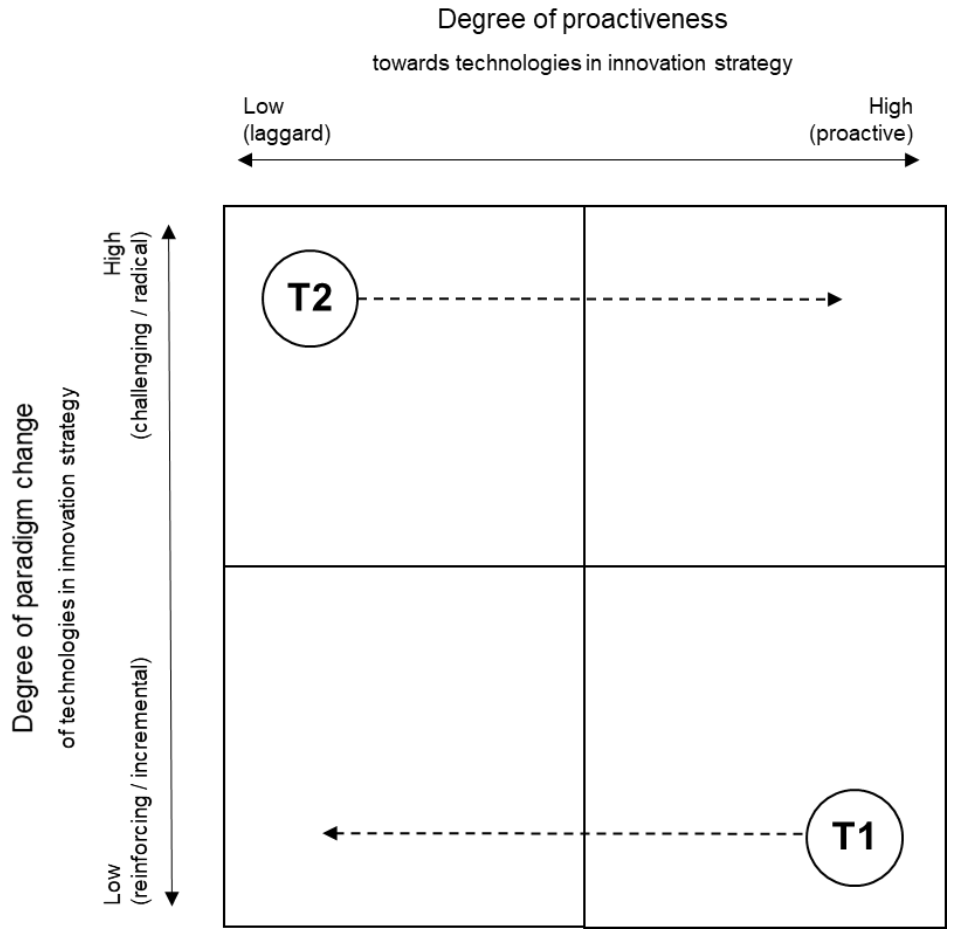
IVECO as first mover in D-/G-ICEs for alt. fuels and late accouncement of BEVs





Results II: Systematically capturing the strategy differences over time

A new typology for innovation strategy trajectories



Two example positions in the typology

T1

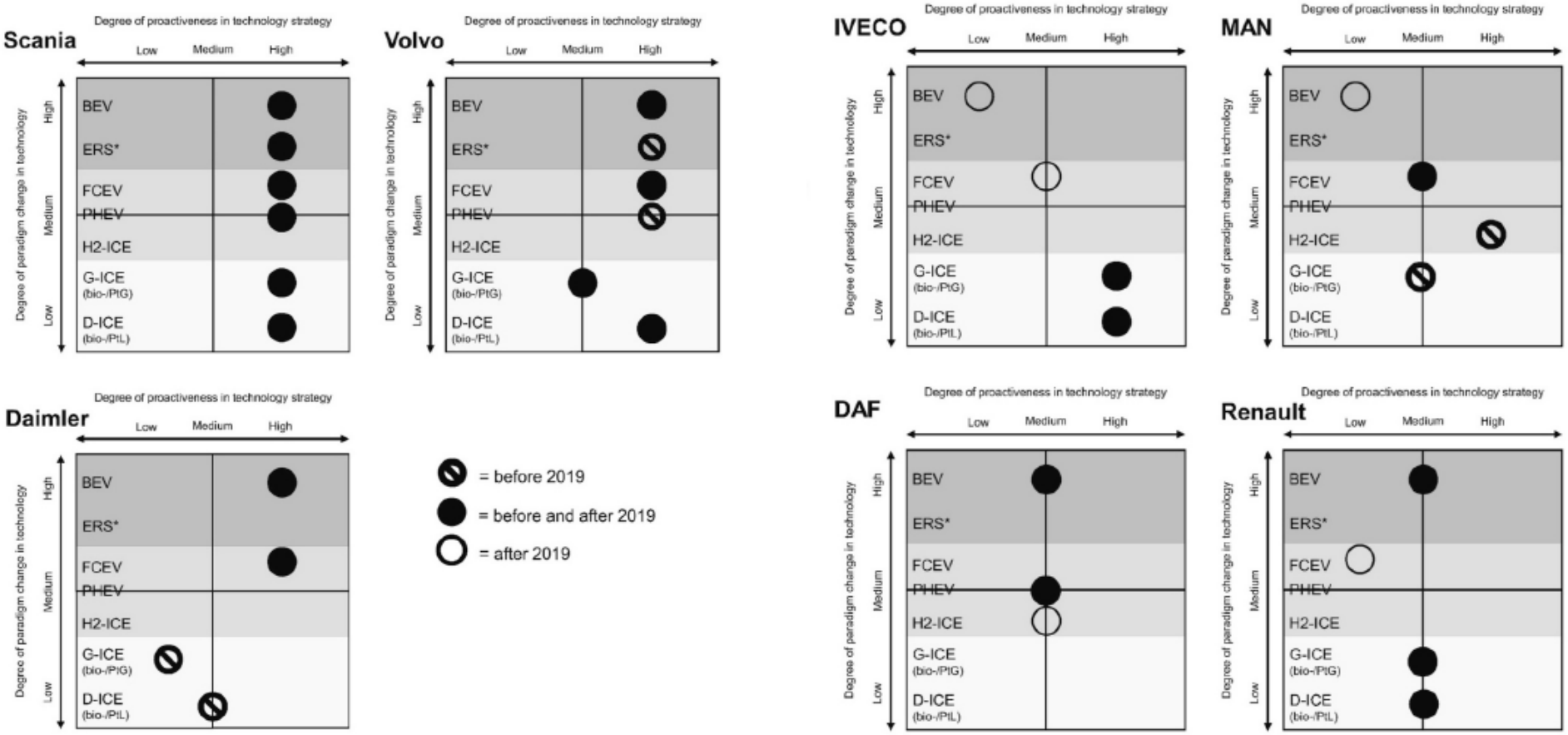
- Incremental, system-reinforcing
- e.g. *D-ICE using biofuels of e-fuels*
- Far right = the manufacturer is the first to develop this option

T2

- Radical, system-challenging
- e.g. *BEV*
- Far left = the manufacturer is the last to develop this option

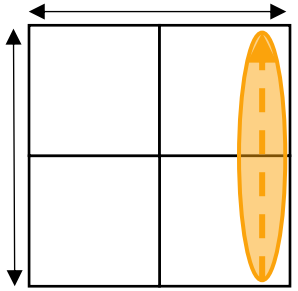
Differentiating between technologies (*"when it comes to D-ICE, the firm is a laggard"*) rather than general firm innovation strategies ("*the firm is a laggard*") allows us to capture firm behaviour in the transition in more detail

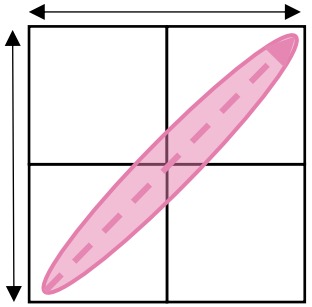
Assessing each manufacturer's strategy trajectory across all technologies

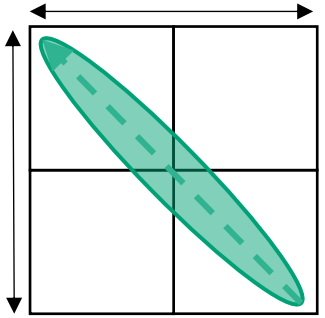


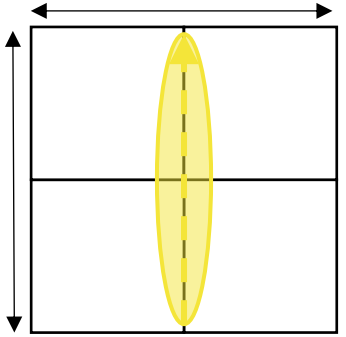
Four types are identified:

(1) Proactive diversifier, (2) focused leapfrogger, (3) initial incrementalist, (4) diverse follower





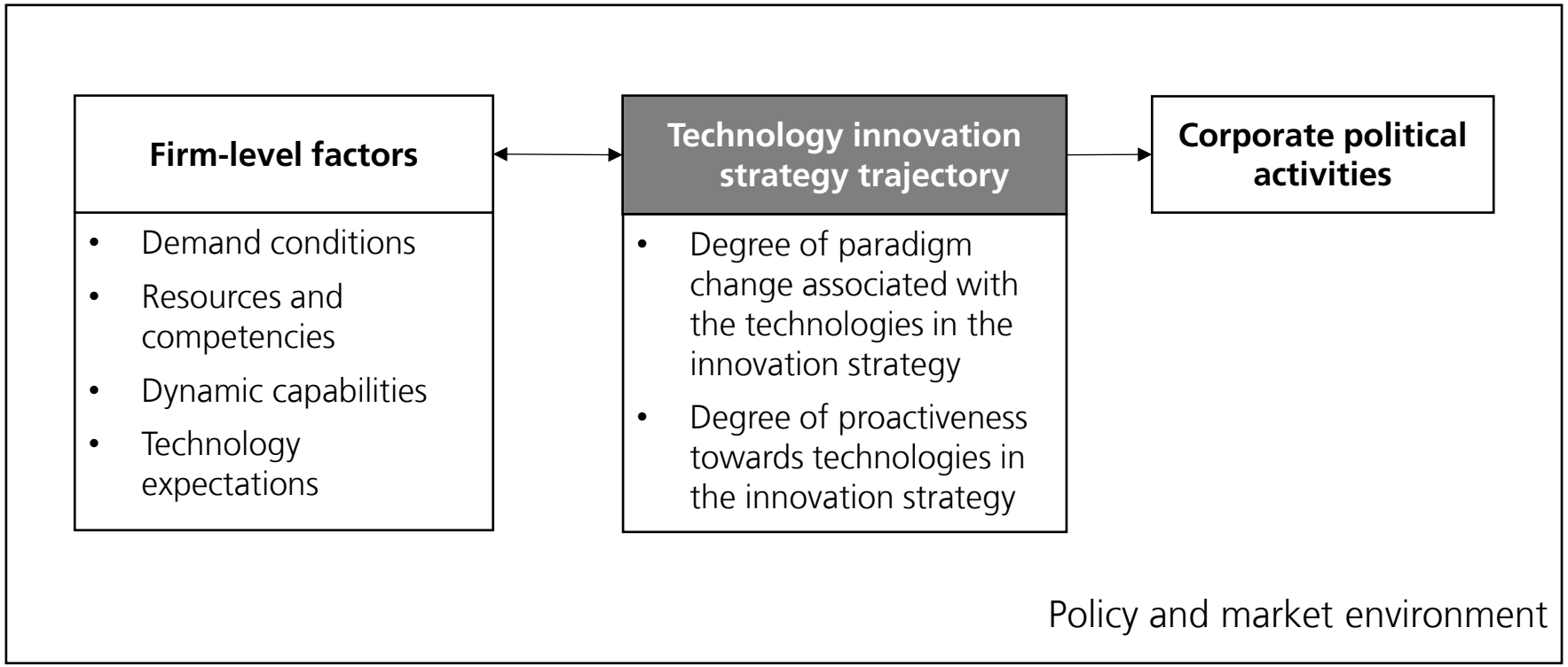




Proactive diversifier	Focused leapfrogger	Initial incrementalist	Diverse follower
Scania	Daimler	MAN	DAF
Volvo		IVECO	Renault
• First innovators in vehicle technologies at every level (both incremental and radical technologies) • Retain technologies of all levels	• Initially slow progress towards incremental alternatives and later omission of these technologies • Later proactiveness in radical alternatives	• Initial proactive progress towards incremental alternatives • Followed by comparatively late movement towards more radical technologies	• Diverse and consistent approach to alternatives at all levels; not most proactive for any technology

Results III: Explaining the commonalities and differences between the types

Firm-level factors from the strategic management literature



Match between the types and firm-level factors

- **a large number of firm-level determinants differed between firms in consonance with the identified trajectory types; however**
- **key markets:** e.g. share of manufacturers' sales in Europe vs. other world regions as a key difference between types, from almost entire sales (*followers*) to around 1/6 (*leapfrogger*)
- **resources and competencies**: e.g. greater focus in existing competencies of *diversifiers* and *leapfroggers* on radical alternatives; collaboration focus on components and infrastructure (*incrementalists* and *followers* more on vehicle technologies)
- **research investments**: match with timing and communication of R&D investments
- **knowledge acquisitions**: initial incrementalist with external CEO change; internal appointments at other firms
- **expectations towards AFV technologies and infrastructure:** e.g. strong and communicated expectations towards BEV and batteries for long-haul of *diversifiers* and *leapfrogger*
- **we also found some inconsistencies where factors were found to be similar for manufacturers across types**
- *diversifiers, leapfrogger* and *incrementalists* with select commonalities in single factors

Take-aways and connection to ERS

- **Changes in technology innovation strategies for all manufacturers around 2019**

- Manufacturers themselves frequently mention Paris Agreement (2015) but changes in the sector only started around 2018; stricter EU emissions standards as a trigger for more paradigm-challenging technological innovations

- **Firm-level factors contribute to explaining the differences:**

- presence on different markets, existing competencies (e.g. from the passenger and bus sector), potential for own R&D and collaboration on components/infrastructure vs. collaboration for whole vehicles design

- **Manufacturer perspective vs. system perspective**

- Shift of manufacturers towards infrastructure: ensuring achievement of AFV sales for fleet emission targets

- Stationary infrastructure more conducive for own efforts than ERS and no particular ERS competencies pre-existing
  → necessity for government securities and intervention (esp. for smaller OEMs with *incrementalist* and *follower* trajectories)

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References

Presented results:

Scherrer, A., & Rogge, K. S. (2025). When do incumbents adopt radical net-zero technologies? Analysing differences in strategy trajectories of European truck manufacturers towards alternative vehicle technologies. Technological Forecasting and Social Change, 211, 123872. https://doi.org/10.1016/j.techfore.2024.123872

Appendix

Analysed documents per manufacturer

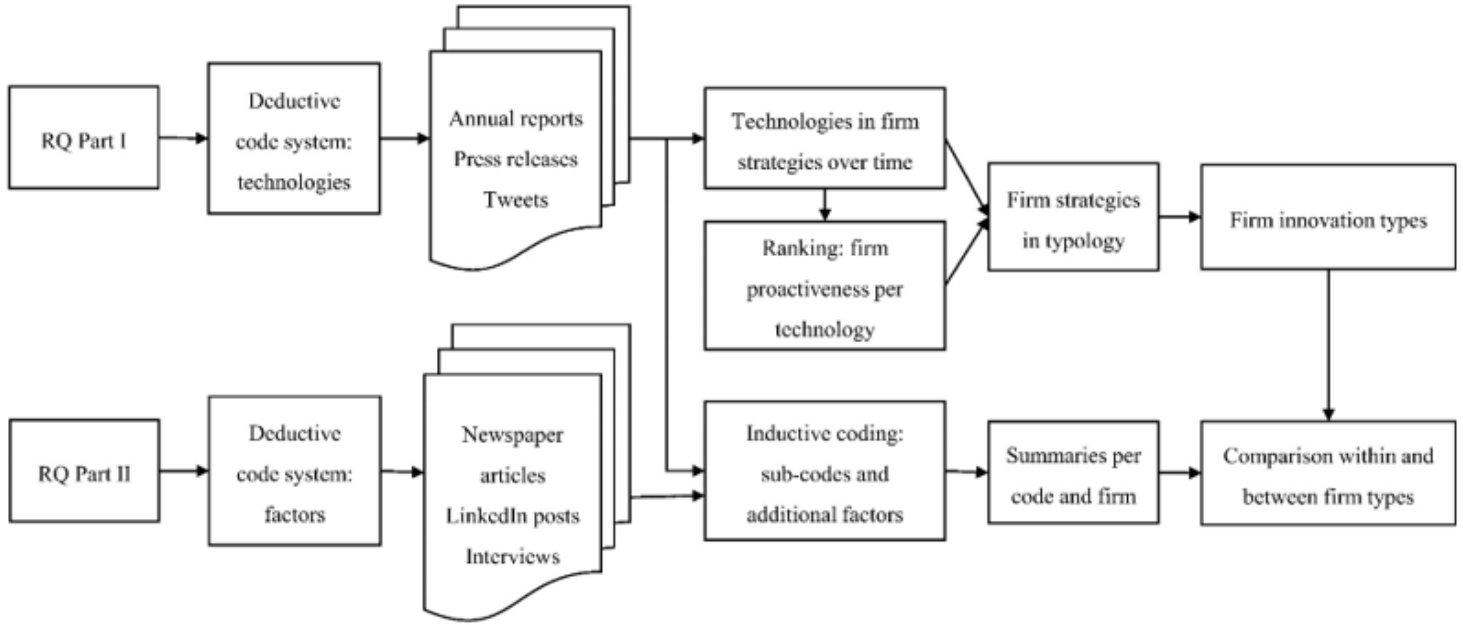
Table 1. Number of documents and interviews per manufacturer

	No. of analysed documents					No. of analysed transcripts
Manufacturer[3]	Annual reports	Press releases	Tweets	Newspaper articles*	LinkedIn posts	Interviews
DAF	4	14	54	1	1	1
Daimler Truck	4	39	152	91	17	2
IVECO	4	24	3	26	4	1
MAN Truck & Bus	3**	10	31	11	17	1
Scania	4	9	104	7	19	1
Traton Group	3***	12	52	22	-	1
Renault Trucks	4	11	72	2	2	1
Volvo Trucks	4	23	167	10	3	2
Sum (total n)	30	142	635	170	63	10

Note: *Only counted towards manufacturer if a direct quote is included. **Not available for 2021 at time of publication. ***Not available for 2018.

Steps of the data analysis

Figure 3. Steps of the data analysis



Note: RQ Part I refers to the "how" and RQ Part II refers to the "why" of the research question.

Timeline of citizens acceptance

- Citizens are typically less organized than industry but have significant political power since they vote.
- Some interesting conclusions from the literature are:
  - Often a contradiction between popularity and efficiency.
  - People tend to like users pay.
  - For people to like environmental policy measures they should see the problem as significant and the solution as adequate.
- The literature shows that citizens acceptance typically follows this timeline

1. Not interested – only discussed among experts.
2. The closer to introduction, the more skeptical – political discussing characterized by ”battle of framing”.
3. Acceptance (if introduced)

- Germany is probably ahead of Sweden when it comes to the ”ERS acceptance timeline”.