Review of EU Road Transport Policies to support Industrial Strategy for Lower Carbon Fuels & Products

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Current EU Road CO_2 Policy & Industrial Impact

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- **Current Policy Limitations:** The EU's CO_2 emission performance standards for cars and heavy-duty vehicles, while presented as technology-neutral, effectively prioritize battery electric vehicles. Sustainable fuels used in internal combustion engines are treated as having the same CO_2 impact as fossil fuels under this regulation. All other impacts of the car manufacture or use are out of scope.

- **Potential Industrial Impact:** This policy approach is linked to signs of de-industrialization in strategic EU sectors, including automotive manufacturing and suppliers, fuels/refining, steel, and metals.

- **Competitiveness & Economic Concerns:** European manufacturers face significant compliance costs, potentially paying billions for credits to competitors (e.g., from the US and China) due to stringent targets and an effective carbon penalty far exceeding ETS prices (€500/tonne vs. ~€90/tonne).

CO_2 in Vehicles: Narrow Compliance Routes for 2035

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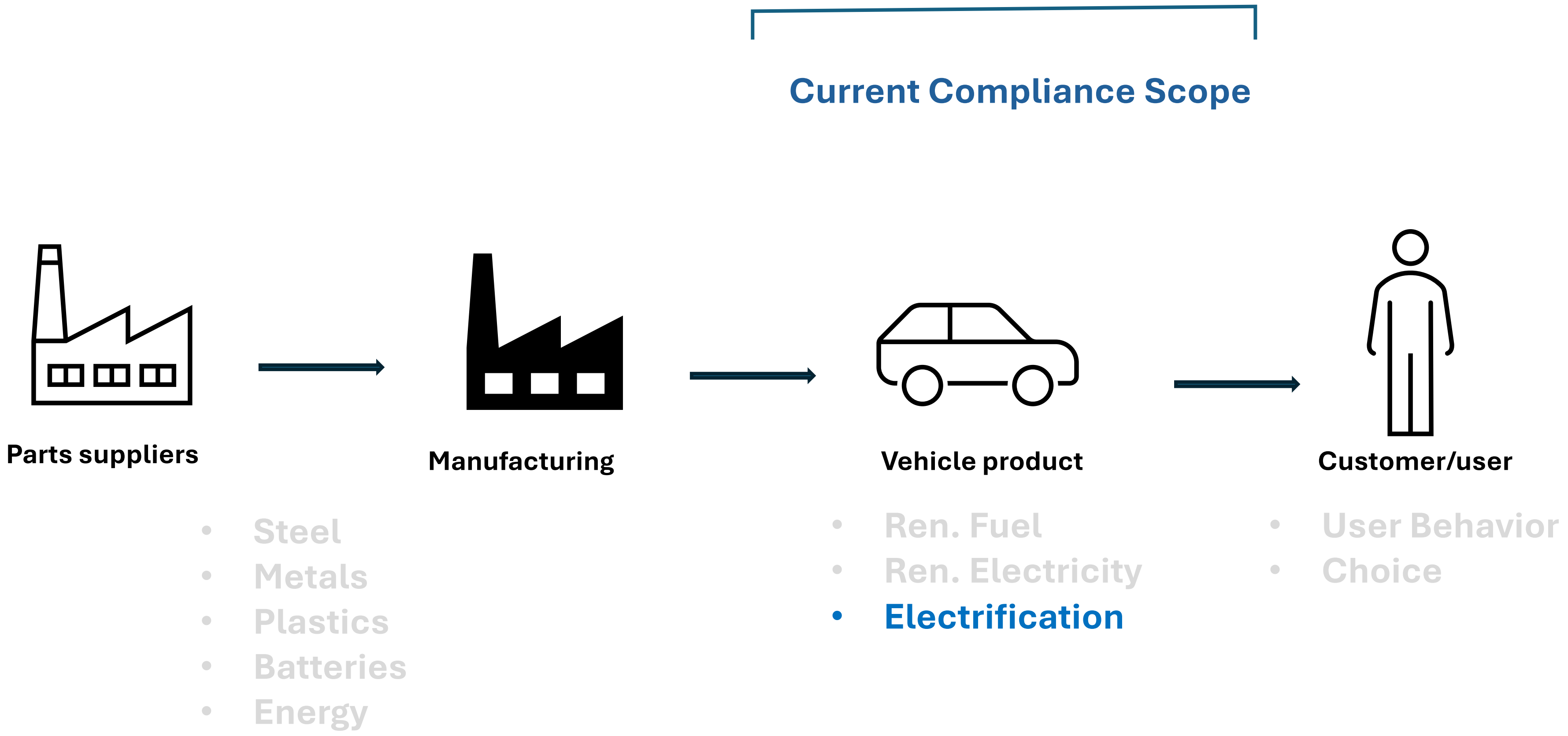
Investments focussed into one key technology, but where EU may not be competitive



Which EU policies recognise Renewable Fuels?

Emissions Trading Scheme ETS (Industrial)	**YES** (as zero CO2)
Emissions Trading Scheme (Road & Buildings)	**YES** (as zero CO2)
Renewable Energy Directive	**YES** (LCA basis)
CO2 in Cars/ & HDVs	**NO** (treated as Fossil)
FuelEU Maritime	**YES** (LCA basis)
RefuelEU Aviation	**YES** (LCA basis)

Sustainable Fuels Potential: Complementing Electrification

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- **Strategic Need:** Sustainable fuels offer a valuable pathway to decarbonize road transport alongside electrification.

- **Optimized Application:** Utilizing sustainable fuels, especially in Plug-in Hybrid Electric Vehicles (PHEVs), can significantly enhance fleet-wide CO2.

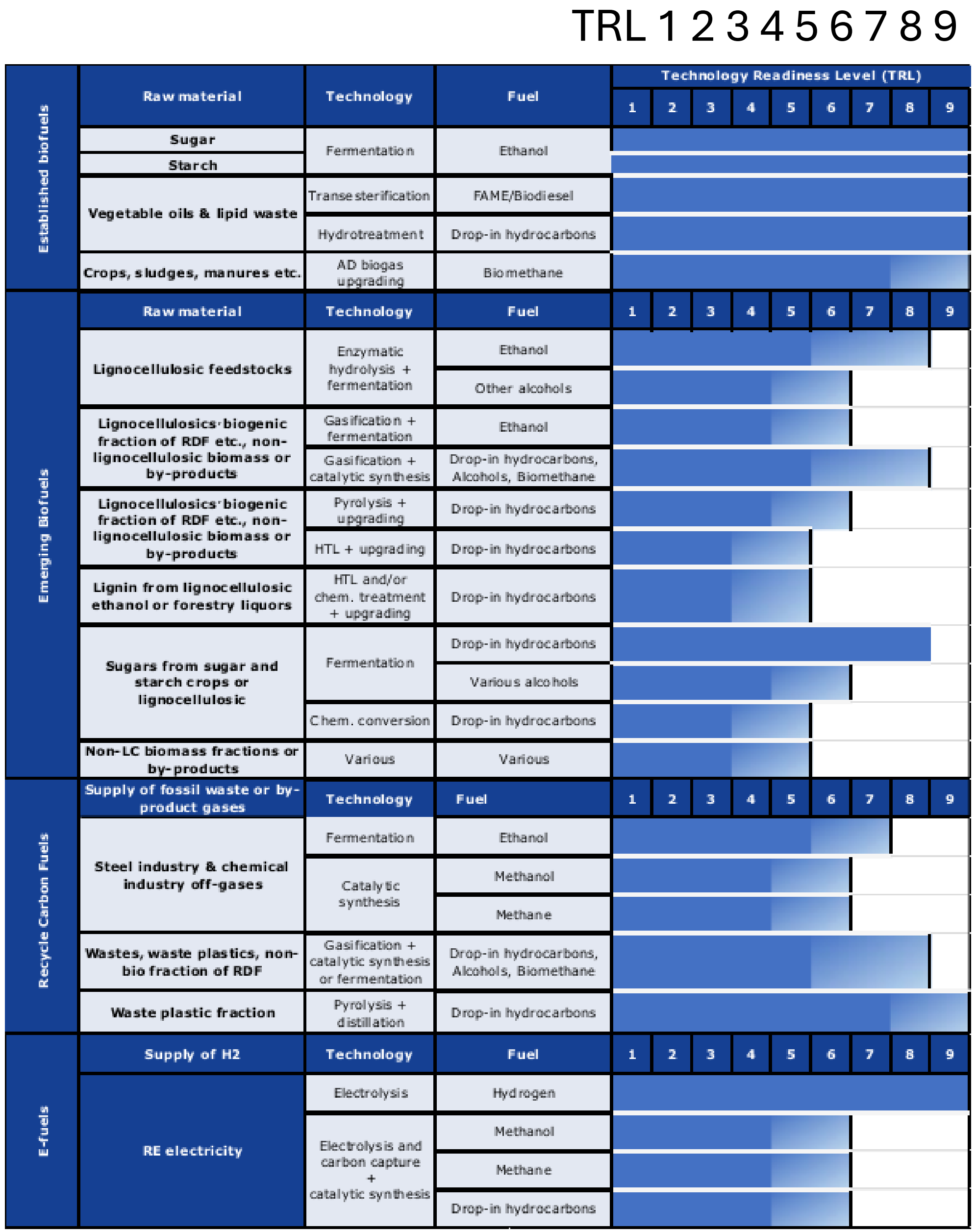
- **Resource Availability:** Advanced conversion technologies (e.g., gasification, Fischer-Tropsch) can unlock vast, currently underutilized EU and global biomass resources. Realizing this potential requires technology maturation and scale-up.

Sustainable Fuels Potential & TRL

Accessing potential requires increasing TRL

Advancing TRL will require long term commitments and technology investment

Source: IEA Bioenergy



Overview of technology pathways and their technology readiness level (TRL)

First-gen biofuels
Limited Supply
Feedstock constrained

Advanced Biofuels
Logistics & Process
Technology cost constrained

Recycled Carbon Fuels
H2 Cost and C source uncertainty constrained

E-Fuels
Electricity Cost
Constrained

Supply & Investment Barriers: Technology & Policy

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- **Feedstock Logistics & Technology Readiness:** Utilizing lower-quality, more abundant biomass for advanced biofuels necessitates significant progress in aggregation logistics and conversion process technologies, moving them from pilot/demonstration (TRL 6-7) to commercial scale (TRL 8-9). Current supply limitations are exacerbated by policy uncertainty, creating a "self-fulfilling prophecy" where lack of recognition hinders development.
- **Investment Climate & Policy Certainty:** The fuels industry requires clear, long-term policy signals and reliable demand to justify the substantial, multi-decade investments needed for advanced biofuel or e-fuel production facilities. The current trajectory towards phasing out internal combustion engines in cars under CO2 standards removes a major potential market, deterring investment.
- **Market Risk & Sector Interdependence:** Relying solely on mandates in aviation (SAF) and potentially maritime carries significant market and volume risk for investors. Historically, road, aviation, and maritime fuels (plus chemical feedstocks) are co-produced; removing the large road fuel market makes standalone SAF or marine fuel production less economically viable and efficient, jeopardizing refinery site transitions. A stable role in road transport (e.g., for PHEVs/HDVs) would significantly de-risk investments benefiting all sectors.

CO_2 in Vehicles: Additional Compliance Routes for 2035

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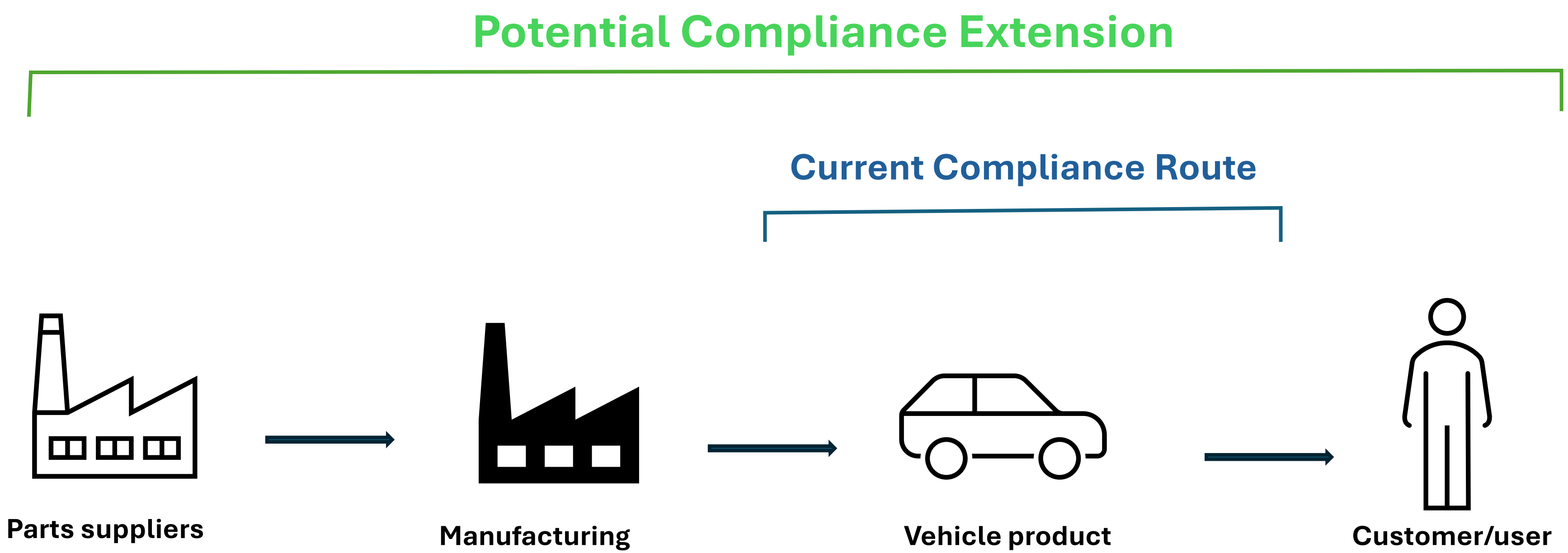
Multiple Industries can benefit from investment support from high implied CO2 price



- Steel
- Metals
- Plastics
- Batteries
- Energy

- Ren. Fuel
- Ren. Electricity
- Electrification

- User Behavior
- Choice

Beyond Tailpipe Emissions

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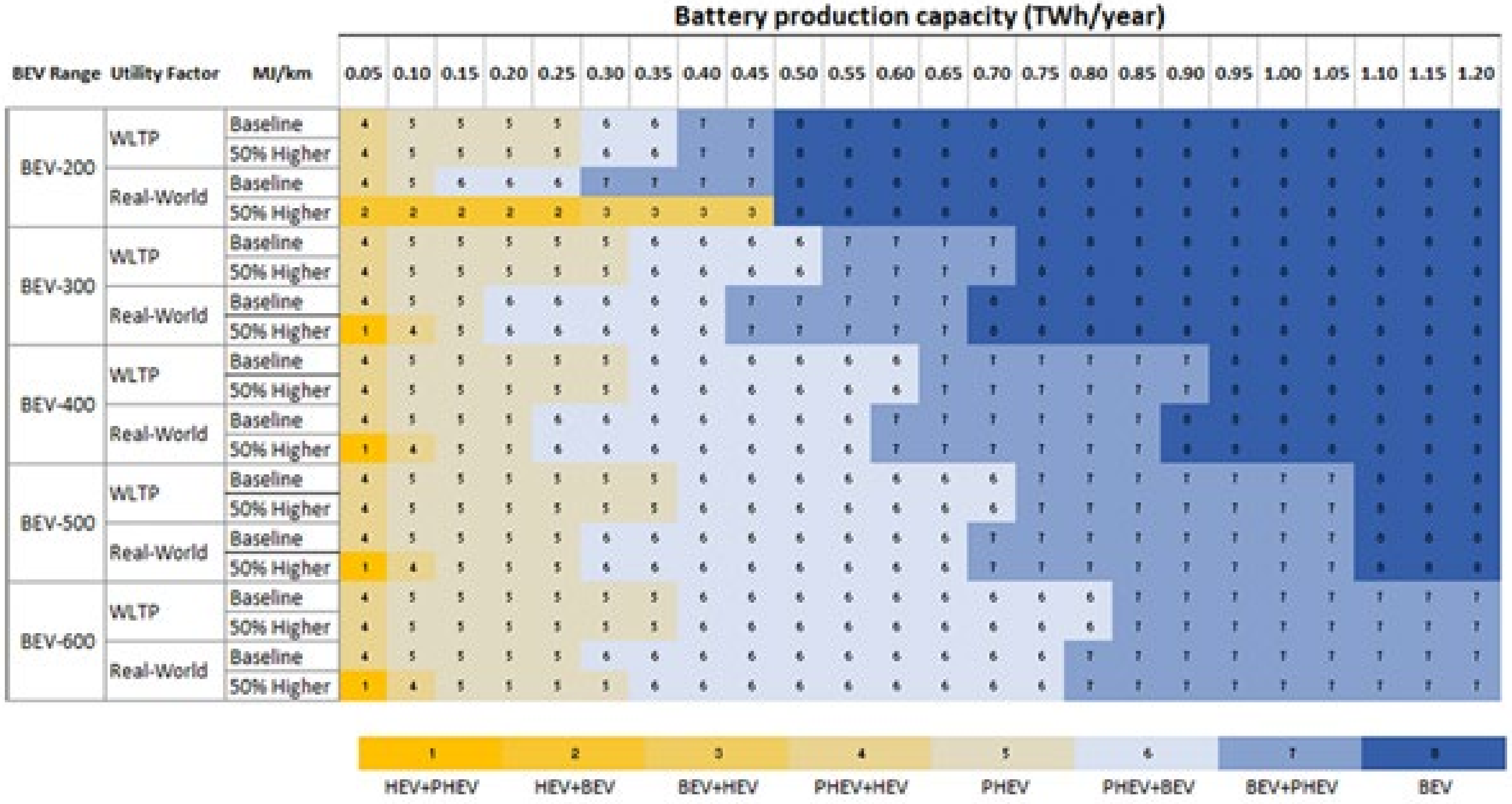
- **Broaden Compliance Scope:** Shift the regulatory focus beyond solely tailpipe emissions to encompass a wider range of decarbonization actions relevant to the vehicle lifecycle, providing flexibility.
- **Crediting Low-Carbon Materials:** Introduce mechanisms allowing vehicle manufacturers to gain compliance credits for using materials with a lower embedded carbon footprint, such as green steel (saving ~1.4 tonnes CO_2 per typical car) or low-carbon aluminum, plastics, and battery components. Given established supply chains, robust verification of carbon intensity is feasible. This would create much-needed demand pull for these green materials.
- **Recognizing Low-Carbon Fuels:** Implement a system to credit the use of certified renewable and low-carbon fuels (biofuels, RFNBOs/e-fuels) towards vehicle CO_2 targets, similar to how their benefits are recognized under the RED, ETS, and maritime/aviation regulations. This could involve obligating fuel suppliers or enabling vehicle manufacturers to claim credits for fuels used in their vehicles (e.g., PHEVs, HDVs).

Do we need any sustainable fuels for road sector? Consider this:

Optimisation of use of batteries where supply is limited



BEV Range	Utility Factor	MJ/km	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
BEV-200	WLTP	Baseline	4	5	5	5	5	6	6	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		50% Higher	4	5	5	5	5	6	6	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	Real-World	Baseline	4	5	6	6	6	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		50% Higher	2	2	2	2	2	3	3	3	3	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
BEV-300	WLTP	Baseline	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	8	8	8	8	8	8
		50% Higher	4	5	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	8	8	8	8	8	8
	Real-World	Baseline	4	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8
		50% Higher	1	4	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8
BEV-400	WLTP	Baseline	4	5	5	5	5	5	6	6	6	6	6	6	7	7	7	7	7	7	8	8	8	8	8	8
		50% Higher	4	5	5	5	5	5	6	6	6	6	6	6	7	7	7	7	7	7	8	8	8	8	8	8
	Real-World	Baseline	4	5	5	5	6	6	6	6	6	6	6	7	7	7	7	7	7	8	8	8	8	8	8	8
		50% Higher	1	4	5	5	6	6	6	6	6	6	6	7	7	7	7	7	7	8	8	8	8	8	8	8
BEV-500	WLTP	Baseline	4	5	5	5	5	5	5	6	6	6	6	6	6	6	7	7	7	7	7	7	7	8	8	8
		50% Higher	4	5	5	5	5	5	5	6	6	6	6	6	6	6	7	7	7	7	7	7	7	8	8	8
	Real-World	Baseline	4	5	5	5	5	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8
		50% Higher	1	4	5	5	5	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8
BEV-600	WLTP	Baseline	4	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7
		50% Higher	4	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7
	Real-World	Baseline	4	5	5	5	5	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7
		50% Higher	1	4	5	5	5	5	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7

Fig. 14. The outline of the optimal level of vehicle electrification based on the vehicle sales mix, ignoring the market shares less than 5% (legend note: the first term in each combination, e.g. HEV in HEV+PHEV, represents the dominant option within each combination).

What do we do if we don't have enough batteries available?

Source: Concawe

- Making more of the fleet PHEVs is more effective than limited production of full BEVs
- Nudging plugging-in behaviour to achieve higher <u>Utility Factor</u> is key.
- Providing PHEVs exclusively with sustainable fuels would significantly improve fleet CO2

Conclusion & Path Forward

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- **Core Issue Diagnosis:** The current EU CO2 regulation for road vehicles, by focusing narrowly on tailpipe emissions and effectively excluding sustainable fuels, is creating significant industrial competitiveness challenges, hindering investment in key decarbonization pathways, and stands inconsistent with broader EU climate policy frameworks.
- **Proposed Solution Framework:** Sustainable fuels represent a necessary complement to electrification for achieving deep decarbonization in transport, especially considering resource constraints and hard-to-abate segments. Europe requires a coherent, strategic approach for the transition of liquid fuels across all sectors, including road.
- **Policy Recommendation:** Evolve the road vehicle CO2 standards towards genuine technology neutrality before the planned phase-out targets take full effect. This involves incorporating well-developed options like crediting the verifiable use of low-carbon materials and sustainable fuels. Such reforms can better support holistic decarbonization, stimulate investment across critical value chains (vehicles, fuels, materials), enhance EU industrial resilience, and strengthen the credibility of the EU's climate leadership model.

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ERCST Reflection Note

Road transport decarbonization: innovative policy approaches for competitiveness and investment

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