Pathways to decarbonization:

The European passenger car market, 2021–2035

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Webinar

May 21, 2021

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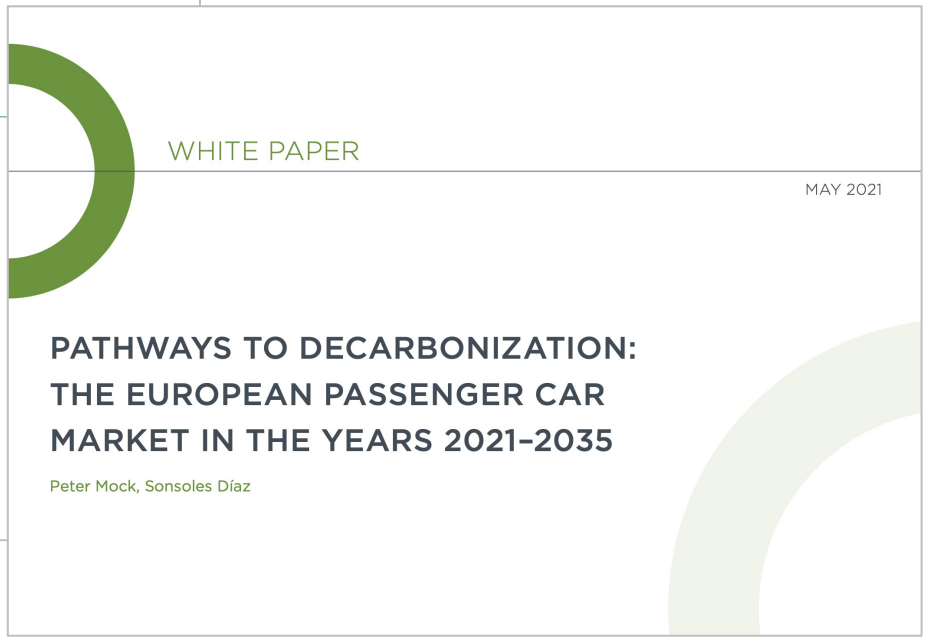
Two recent ICCT papers analyze pathways for reducing vehicle CO_2 emissions in Europe



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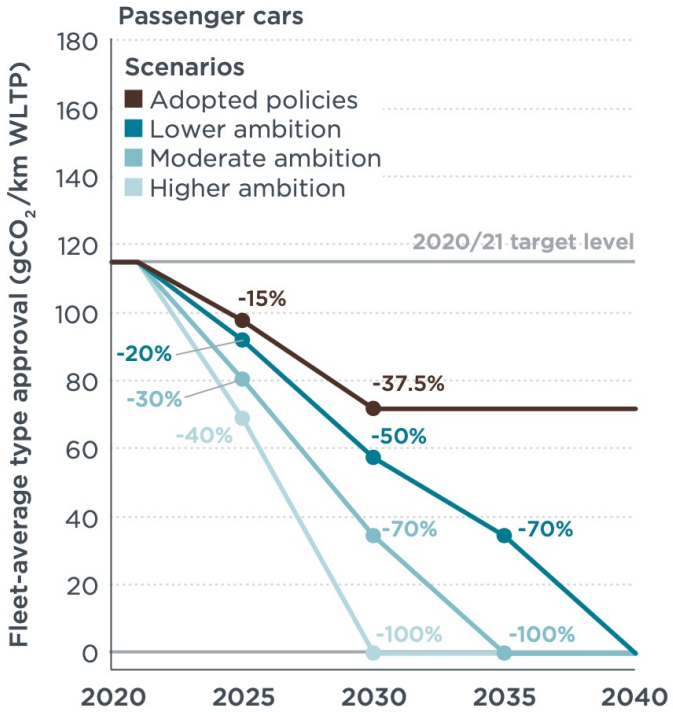
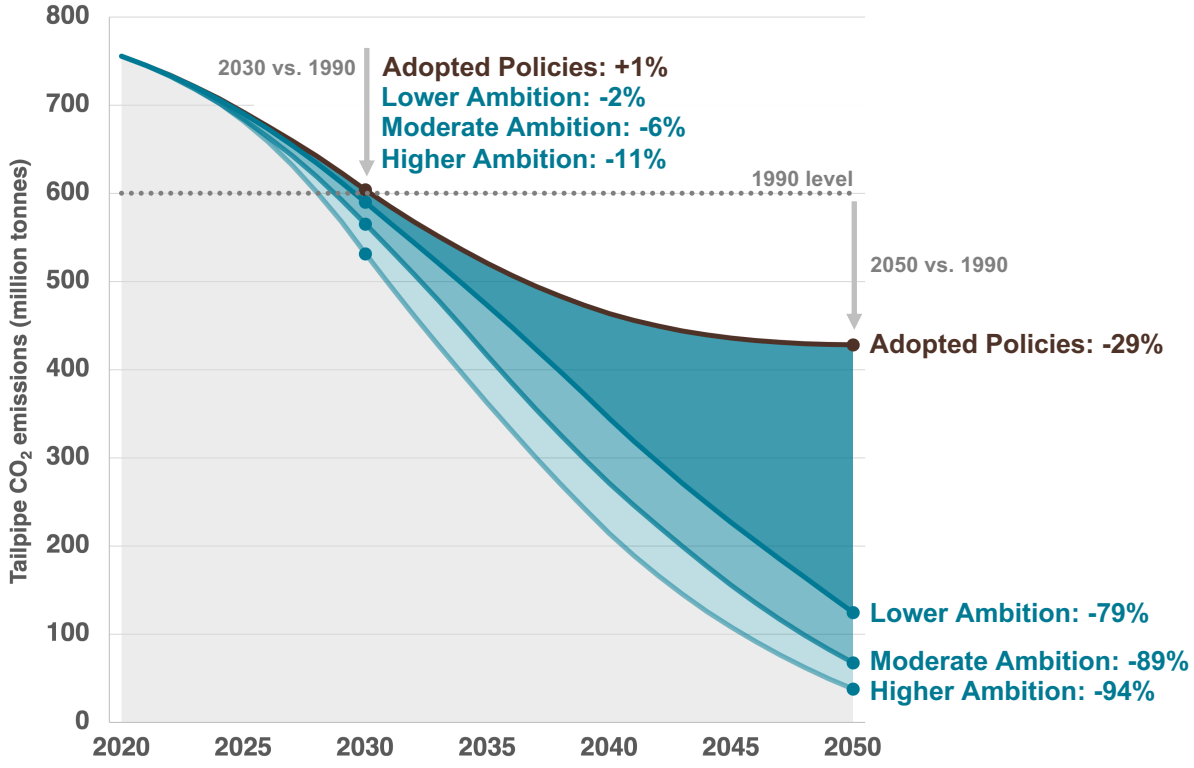
https://theicct.org/publications/decarbonize-EU-PVs-may2021
https://theicct.org/publications/eu-vehicle-standards-green-deal-mar21

For both analyses, we define the same set of four scenarios ranging between -37.5% to -100% for new cars by 2030



Source: https://theicct.org/publications/eu-vehicle-standards-green-deal-mar21

Only the Moderate and Higher Ambition scenarios comply with Green Deal targets for 2050, i.e., min. -70% by 2030



Source: https://theicct.org/publications/eu-vehicle-standards-green-deal-mar21

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Using literature data, we define a set of vehicle technology combinations to be available in the upcoming years

Table 3. WLTP CO_2 emission levels, by vehicle type, for the years 2021–2035, plus average annual improvements

		CO_2 (WLTP, in g/km)				CO_2 (WLTP, per year)		
		2021	2025	2030	2035	2021-25	2025-30	2030-35
ICE	Powertrain improvements only	143	135	134	134	-1.6%	-0.1%	0.0%
	+ road load improvements	141	127	120	118	-2.7%	-1.0%	-0.4%
ICE_MHEV	P0 mild hybrid	128	115	109	107	-2.7%	-1.0%	-0.4%
ICE_HEV	P2 full hybrid	114	102	97	95	-2.6%	-1.1%	-0.4%
PHEV	Plug-in hybrid (50 km electric range)	35	31	30	29	-3.0%	-0.7%	-0.7%
	" (75 km)	21	19	18	17	-2.7%	-1.0%	-0.4%
	" (100 km)	14	12	12	12	-2.8%	-0.9%	-0.4%
BEV	Battery Electric Vehicle (350 km electric range)	0				n/a		
	" (450 km)							
	" (550 km)							
FCV	Fuel Cell Vehicle (450 km electric range)			0		n/a		

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Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

Retail prices for battery-electric vehicles are expected to strongly decrease; high uncertainty for fuel-cell vehicles

Table 4. Direct manufacturing cost increase, by vehicle type, for the years 2021–2035 relative to a 2018 baseline vehicle.

		per year
ICE	Powertrain impro	
	+ road load impr	
ICE_MHEV	P0 mild hybrid	
ICE_HEV	P2 full hybrid	
PHEV	Plug-in hybrid (5	
	" (75 km)	
	" (100 km)	
BEV	Battery Electric V	
	" (450 km)	
	" (550 km)	
FCV	Fuel Cell Vehicle	

Note. Costs include the average an
excluding any profits and taxes.

Table 5. Retail price increase, by vehicle type, for the years 2021–2035. relative to a 2018 baseline vehicle.

		2021	2025	2030	2035	per year 2021-25	per year 2025-30	per year 2030-35
ICE	Powertrain improvements only	150 €	350 €	360 €	340 €	0.2%	0.0%	0.0%
	+ road load improvements	200 €	530 €	710 €	790 €	0.3%	0.1%	0.1%
ICE_MHEV	P0 mild hybrid	1,090 €	1,320 €	1,460 €	1,510 €	0.2%	0.1%	0.0%
ICE_HEV	P2 full hybrid	2,300 €	2,390 €	2,470 €	2,490 €	0.1%	0.1%	0.0%
PHEV	Plug-in hybrid (50 km electric range)	6,790 €	6,210 €	5,490 €	5,060 €	-0.6%	-0.6%	-0.3%
	" (75 km)	8,050 €	7,000 €	6,040 €	5,630 €	-1.1%	-0.8%	-0.3%
	" (100 km)	9,240 €	7,900 €	6,570 €	6,070 €	-1.4%	-1.1%	-0.4%
BEV	Battery Electric Vehicle (350 km electric range)	10,260 €	4,590 €	1,180 €	480 €	-6.2%	-2.9%	-0.6%
	" (450 km)	13,000 €	6,510 €	2,510 €	1,610 €	-7.2%	-3.4%	-0.7%
	" (550 km)	15,790 €	8,620 €	3,920 €	2,740 €	-8.0%	-4.0%	-1.0%
FCV	Fuel Cell Vehicle (450 km electric range)			3,920 €	2,690 €			-1.0%

Note. Costs include the average annual cost increase or reduction relative to the estimated retail price for the 2018 baseline vehicle.

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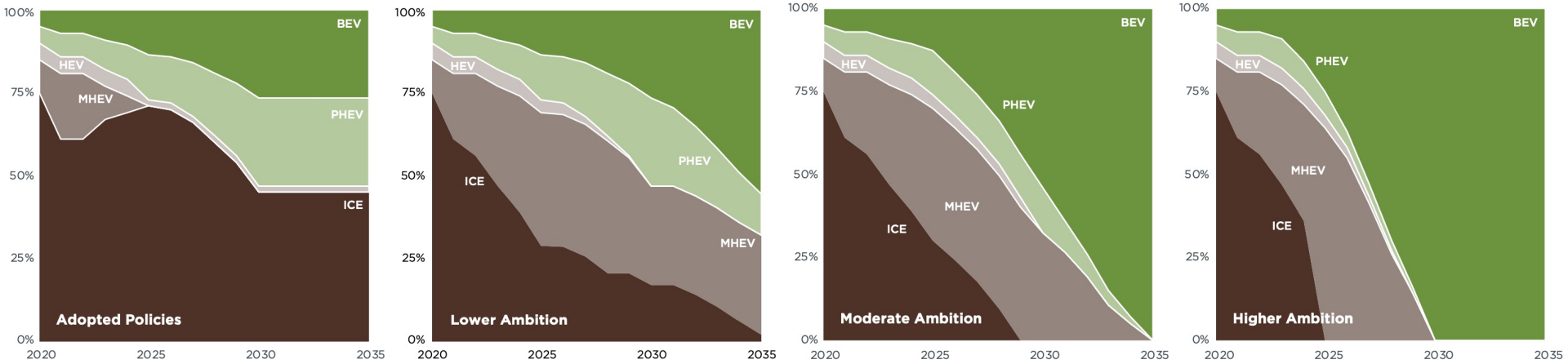
Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

In all three alternative scenarios, battery-electric vehicles ultimately penetrate the fleet by 2030–2040



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Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

Additional manufacturing costs increase up to 2030 but then reduce again due to expected EV cost reductions

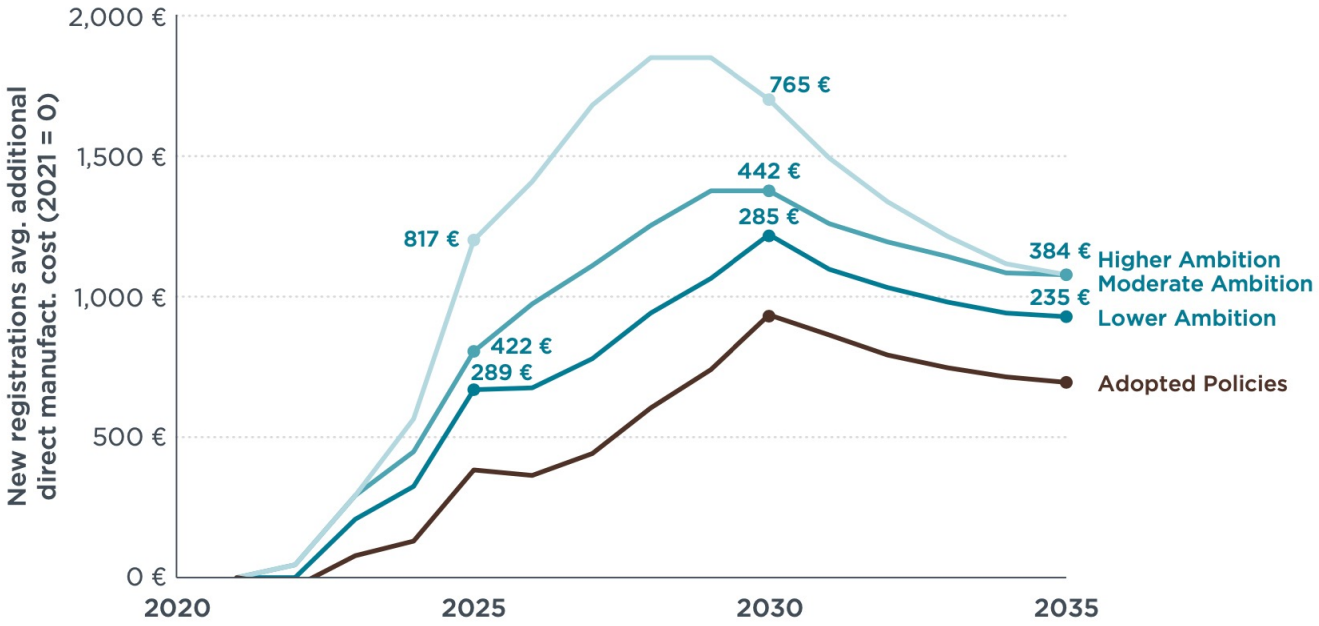

Figure 5. Additional direct manufacturing cost with a 2021 baseline. Label values refer to the cost difference vs. the Adopted Policies scenario.

Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

Consumer payback and societal savings are highest for those scenarios with the highest CO_2 reductions

Table 12. Summary of cost-benefit calculations for all main scenarios from a manufacturer, consumer, and societal perspective, compared to a 2021 baseline.

Scenario	Average new car CO_2 level	Additional manufacturing costs	Consumer payback period	Net consumer savings years 0-8	Societal savings vehicle lifetime
2025					
Adopted Policies	-15%	382 €	>8	-83 €	-995 €
Lower Ambition	-20%	671 €	>8	-229 €	-17 €
Moderate Ambition	-30%	804 €	4	600 €	580 €
Higher Ambition	-40%	1,199 €	6	420 €	987 €
2030					
Adopted Policies	-37.5%	938 €	6	331 €	139 €
Lower Ambition	-50%	1,223 €	4	913 €	1,752 €
Moderate Ambition	-70%	1,380 €	3	1,889 €	3,422 €
Higher Ambition	-100%	1,703 €	2	3,107 €	5,660 €
2035					
Adopted Policies	-37.5%	695 €	3	778 €	416 €
Lower Ambition	-70%	930 €	1	2,457 €	3,977 €
Moderate Ambition	-100%	1,079 €	1	4,250 €	6,856 €
Higher Ambition	-100%	1,079 €	1	4,250 €	6,856 €

Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

Two sensitivity scenarios analyze an increased penetration of plug-in hybrid vehicles, e-fuels, and fuel cells

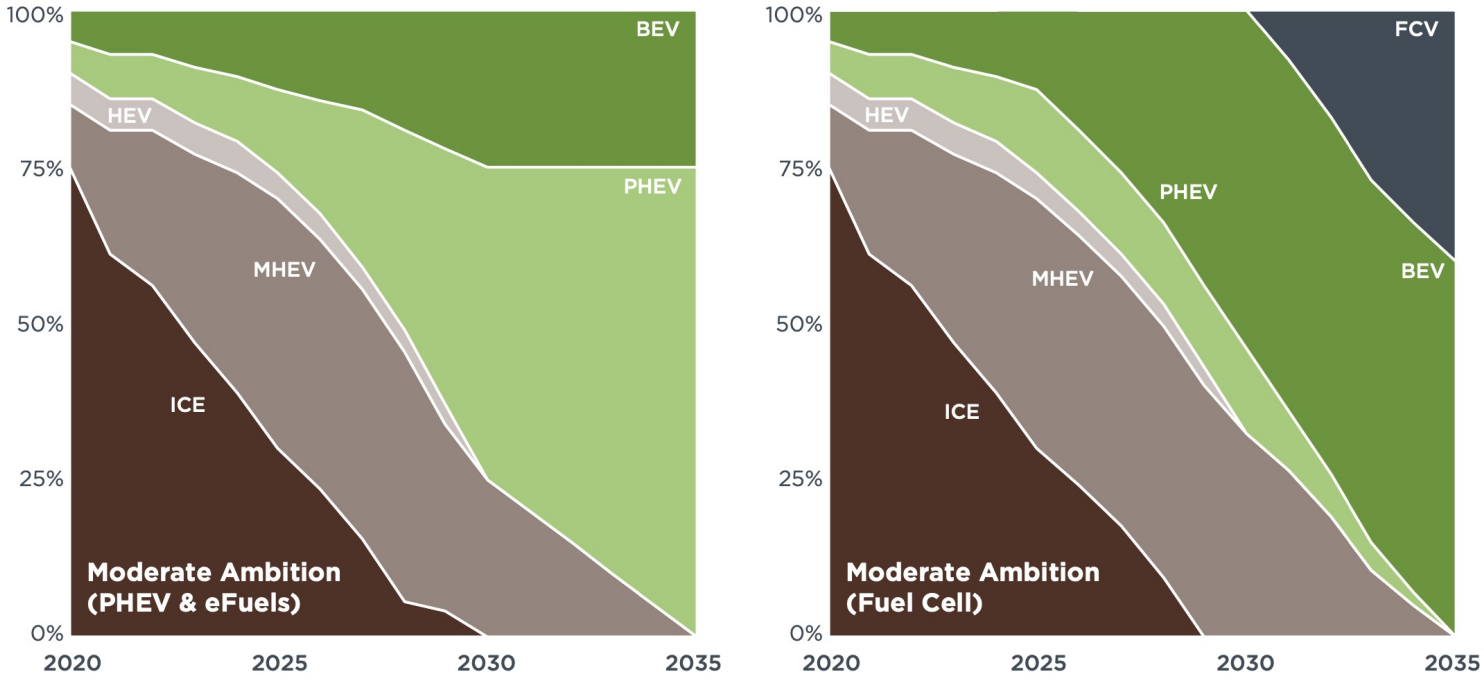

Figure 7. Technology market share evolution for the two sensitivity scenarios.

Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

Relying on plug-in hybrids and e-fuels will be more than twice as expensive and still misses climate targets

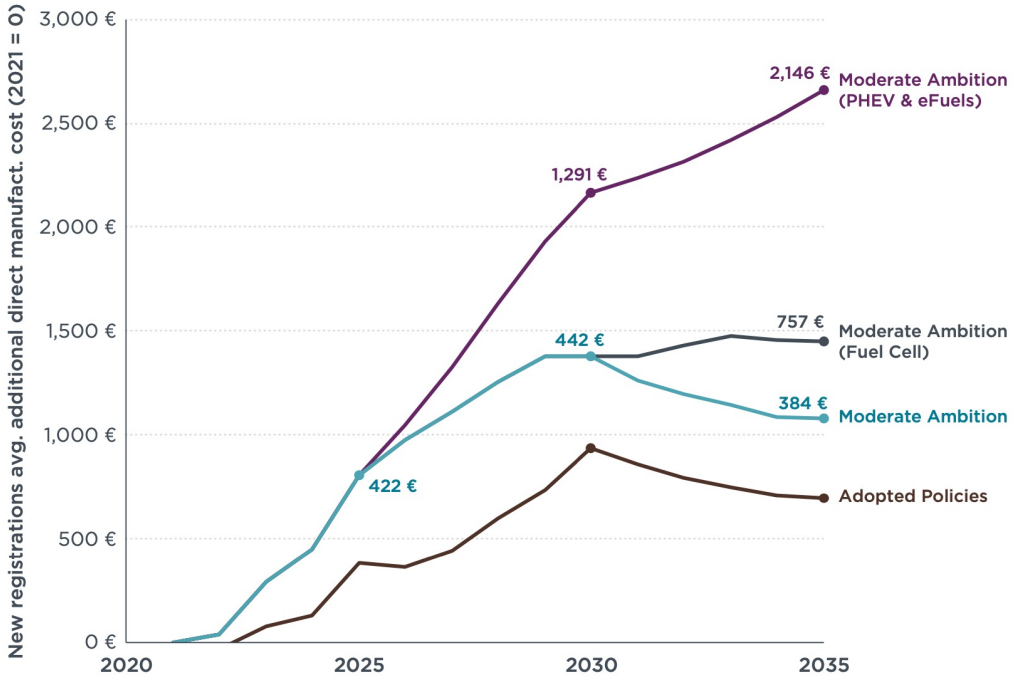

Figure 9. Additional direct manufacturing cost with a 2021 baseline. Label values refer to the cost difference compared to the Adopted Policies scenario.

Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

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Retail price parity for a 350 km battery-electric vehicle, excluding any subsidies, is estimated for ~2028–2029

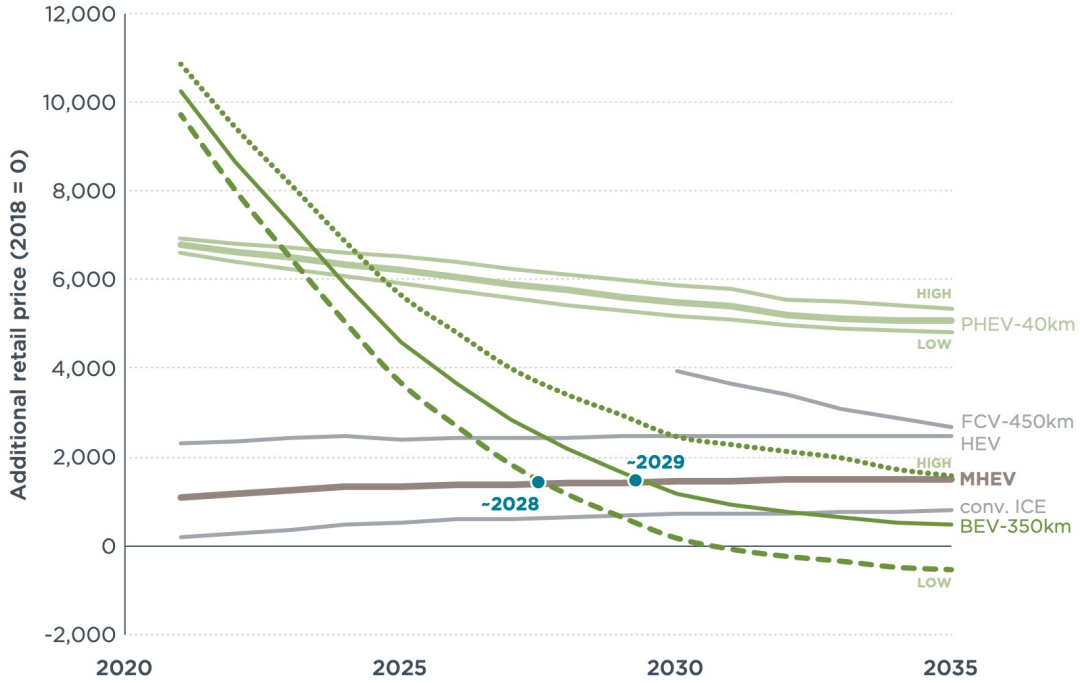

Figure 11. Assumed retail price developments for various vehicle types, relative to a 2018 baseline vehicle.

Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

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Parity for total cost of ownership for consumers, excluding subsidies, is reached by 2025

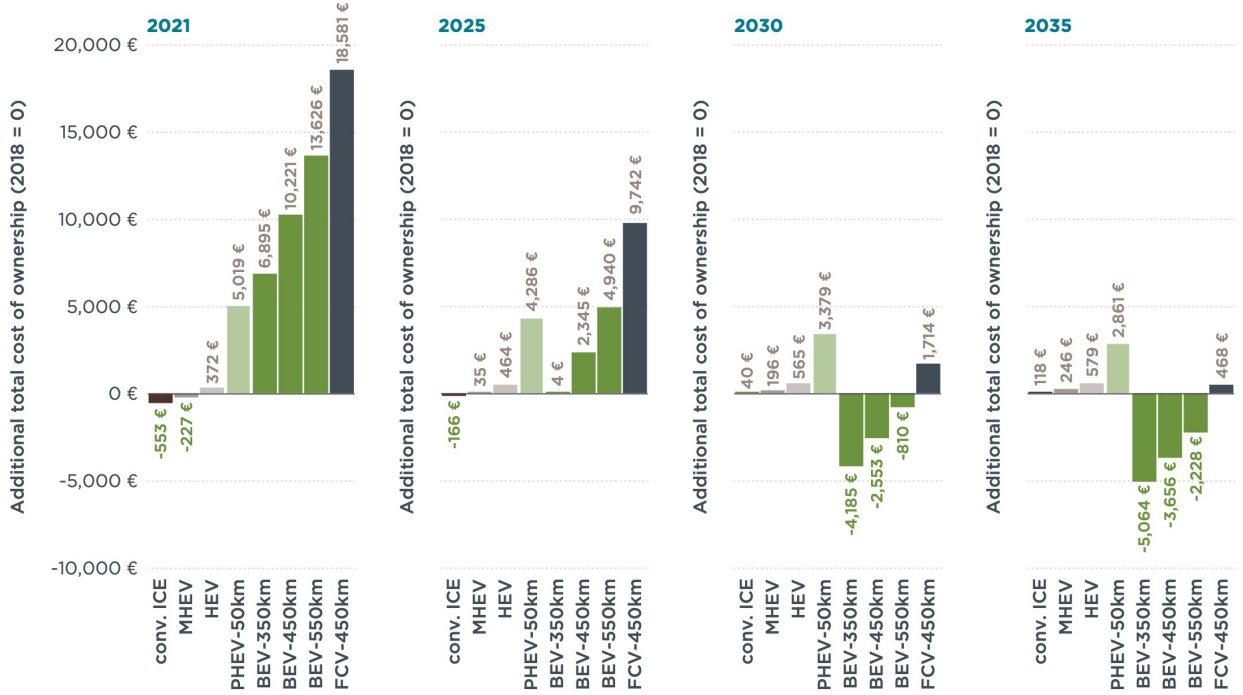

Figure 12. Additional total cost of ownership (vehicle purchase price and fuel cost savings) for the consumer, relative to a 2018 baseline vehicle.

Source: https://theicct.org/publications/decarbonize-EU-PVs-may2021

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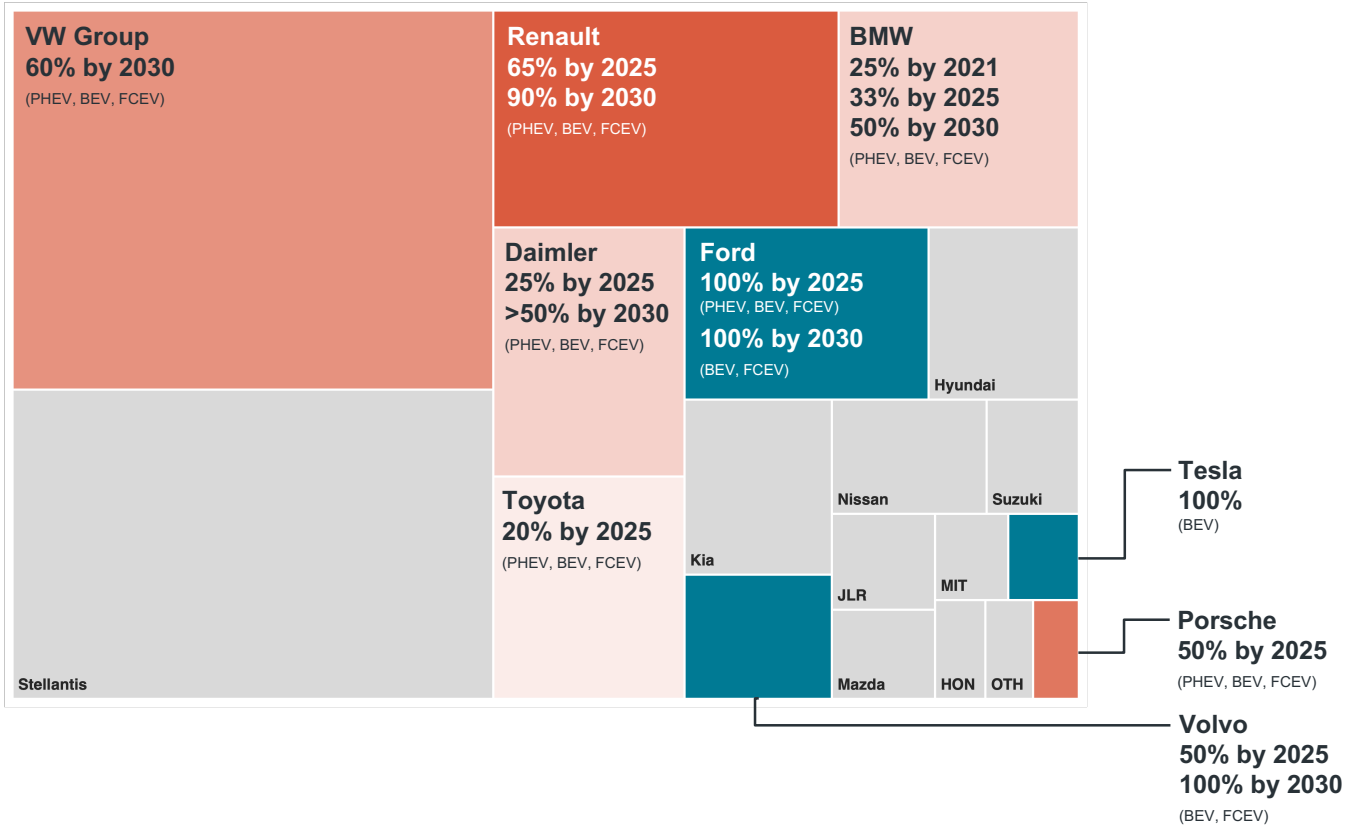
Vehicle manufacturers are prepared for a strong uptake of electric vehicles by 2030, as public announcements show



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More information:

Paper on pathways for reducing vehicle CO_2 – **emissions perspective**
https://theicct.org/publications/eu-vehicle-standards-green-deal-mar21

Paper on pathways for reducing vehicle CO_2 – **technology and cost perspective**
https://theicct.org/publications/decarbonize-EU-PVs-may2021

Blog post on interim CO_2 targets for new vehicles
https://theicct.org/blog/staff/interim-targets-europe-may2021

Blog post on alternative fuels crediting
https://theicct.org/blog/staff/alt-fuels-crediting-eu-standards-may2021

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