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TOYOTA AT A CROSSROADS:

Evaluating the World's Largest Automaker's BEV Strategy Against the 1.5°C Pathway

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EXECUTIVE SUMMARY

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The global transport sector is responsible for 15% of global greenhouse gas (GHG) emissions, with road vehicles accounting for roughly 70% of that total, making it one of the world's largest sources of greenhouse gases[1]. To align with the Paris Agreement's goal of limiting global warming to 1.5°C, governments and industries worldwide have committed to phasing out internal combustion engine (ICE) vehicles in favor of zero-emission transport.

Toyota, the world's largest automaker, sells around 10 million vehicles annually, the vast majority of which are ICE-powered. The auto giant has pledged to achieve carbon neutrality by 2050 and has announced plans to produce 1.5 million battery electric vehicles (BEVs) by 2026 and 3.5 million by 2030. As 2025 marks the tenth anniversary of the Paris Agreement, this is a critical moment to assess whether Toyota's climate commitments are consistent with a 1.5°C pathway.

This report analyses Toyota's emissions by market and by powertrain to evaluate its progress toward near-term emission reductions for 2026 and 2030. Building on the findings of Greenpeace's 2022 report, *The Internal Combustion Engine (ICE) Bubble*[2], which identifies a 1.5°C-aligned trajectory as requiring 100% battery electric vehicle (BEV) production by 2030, this report assesses Toyota's performance against both that benchmark and the less stringent Science Based Targets initiative (SBTi) framework. Based on these two benchmarks, the findings indicate a large gap between Toyota's planned BEV production and the emission reductions required under a 1.5°C pathway. Even if Toyota achieves its 2030 BEV production target, it will still fall short of the necessary reductions unless total sales volumes decline and ICE production is phased out more rapidly.

At a time when climate impacts and extreme weather events are intensifying globally, Greenpeace calls on Toyota to set absolute emissions reduction targets across its full value chain and to accelerate its transition to 100% BEV sales by 2030.

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KEY FINDINGS

1 Toyota's use-phase emissions remain overwhelmingly based on fossil fuel combustion

In 2023, 98.9% of Toyota's use-phase (Scope 3 Category 11) emissions came from internal combustion engine and hybrid vehicles, showing that the company's sales — and resulting emissions — are almost entirely tied to fossil fuel powertrains.

2 Per-vehicle use-phase emissions highlight the vast gap between combustion and zero-emission vehicles

In 2023, Toyota's internal combustion engine vehicles (ICEVs) emitted an average of 45.99 tCO_2e per vehicle, compared to just 13.06 tCO_2e for battery electric vehicles (BEVs) — a difference of more than threefold. Hybrid vehicles (HVs) and plug-in hybrid electric vehicles (PHEVs) fall between the extremes, at 30.79 tCO_2e and 23.66 tCO_2e, respectively, offering only partial reductions because both still use fuel combustion as an energy source. These figures underscore that only a full transition to zero-emission vehicles — BEVs and, where renewable hydrogen is available, fuel cell electric vehicles (FCEVs) — can deliver the deep decarbonization required to meet 1.5°C-aligned targets.

3 Toyota's regional emissions are driven by sales of internal combustion engine vehicles

Markets with a high proportion of ICEV sales have a correspondingly high proportion of per-vehicle emissions. For example, Toyota vehicles in Thailand emit more than four times CO_2 per vehicle than those in Norway, where the BEV sales ratio is high. The United States leads in total emissions, driven by high sales volumes and a dominant lineup of large ICEVs such as sports utility vehicles (SUVs) and pick-up trucks. These patterns show how Toyota's sales strategy directly shapes its global climate impact — and highlight the urgent need to accelerate a full shift to zero-emission vehicles.

4 Toyota's decision to reduce the number of BEVs will mean it does not reduce greenhouse gas emissions as rapidly as it could do

Although Toyota initially announced in 2023 a goal of producing 1.5 million BEVs by 2026, the company subsequently reduced the figure to 800,000 units — a 50% cut from its original target. The revision means fewer reductions in greenhouse gas emissions (because the vehicles it will produce generate more emissions than BEVs). The difference in emissions between 1.5 million BEVs and 800,000 BEVs amounts to a projected 11.7-22.6 $MtCO_2e$ — roughly equivalent to the annual emissions of 4.5 - 8.7 million households in Japan[3,i].

5 Toyota's 2030 decarbonization plan lacks ambition, as it's projected to emit up to twice the greenhouse gases allowed under a 1.5°C pathway

Even under its current target — producing 3.5 million BEVs by 2030 — Toyota's projected use-phase emissions reach 273.7 $MtCO_2e$, exceeding the SBTi 1.5°C benchmark (253.0 $MtCO_2e$) by 8.2% and reaching approximately double the Carbon-Budget Consistent (CBC) benchmark (140.4 $MtCO_2e$). Even Toyota's most progressive plan is incompatible with the pace of decarbonization required under the Paris Agreement.

6 Toyota must accelerate its BEV transition and phase out ICEV sales to align with 1.5°C

To close the emissions gap while maintaining current sales volumes, Toyota would need to achieve 100% BEV sales by 2030 and completely phase out of ICEV sales by that date. Achieving 100% BEVs will require a clear, region-specific phaseout timeline and a rapid scale-up of BEV production across all major markets, with the view to transition to a company offering mobility services including shared vehicles. Without such measures, Toyota will remain off track from the 1.5°C pathway.

i According to the Japanese Ministry of the Environment, Japan's average household emitted 2.59 t-CO_2 in 2022.

1 CLIMATE CHANGE AND THE AUTOMOTIVE INDUSTRY

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1.1 Background

Global greenhouse gas (GHG) emissions reached 53.2 GtCO_2e in 2024, up 1.3% from the previous year, with no sign of a peak in fossil fuel consumption[4]. China, the United States, and India were the largest emitters, while Japan emitted 1,063.3 MtCO_2e, accounting for 2% of global emissions and ranking eighth worldwide[5].

The global transport sector is a major contributor, emitting 8.4 GtCO_2e in 2023 (15% of global GHG emissions), of which ~70% comes from road vehicles[1]. Battery electric vehicles (BEVs) are the most effective alternative to internal combustion engine vehicles (ICEVs), with lifecycle emissions currently 38 - 53% lower depending on the electricity mix[6]. As renewable energy becomes more readily available, and the installation and use costs decrease, the advantages of BEVs over ICEVs will increase. Governments worldwide have introduced policies to accelerate the transition from ICEVs to BEVs to align with the Paris Agreement's 1.5ºC goal.

Commitments to the BEV shift from automakers vary. Legacy companies like Toyota remain heavily reliant on ICEVs and hybrid vehicles (HVs), while newer entrants like Tesla and Rivian sell BEVs exclusively. General Motors and Ford aim for 100% BEV sales by 2035 and 2040, respectively.

In 2023, Toyota sold 10.3 million vehicles, but only 1% were BEVs[7]. That year, the company emitted a total of 592.9 MtCO_2e[ii], which is equivalent to more than half of Japan's national emissions. Use-phase emissions (Scope 3 Category 11) from ICEVs and HVs accounted for 74% of Toyota's total emissions (436.28 MtCO_2e)[8].

Tailpipe emissions from Toyota's millions of vehicles drive the company's climate impact. Improving manufacturing processes and adopting low-carbon materials such as steel, aluminum, and batteries are important steps, but they are not enough to achieve net zero — a full transition away from ICEVs to BEVs is essential for Toyota to meet net zero emissions by 2050. Toyota has not yet announced plans to phase out ICEVs, despite being the world's top-selling automaker.

ii All emission figures hereafter are obtained from Toyota's Sustainability Data Book unless otherwise noted.

Toyota's self-reported Scope 3 Category 11 emissions have not decreased over the past five years, rising from 234 $MtCO_2e$ in 2020 to 439 $MtCO_2e$ in 2022, partly due to methodological changes under the Science Based Targets initiative (SBTi). As the New Climate Institute identifies, independent evaluation is limited because Toyota does not publicly disclose key inputs, such as annual driving distances or well-to-wheel (WTW) emission factors[9].

Toyota's climate measures, are analyzed in this report and focus on the compatibility between its BEV production plans and expected near-term emissions reductions through to 2030. Despite concerns over the impact of tariffs imposed by the United States (US), Toyota aims to sell about 10 million vehicles in 2025[10] — a dominance driven by strong ICEV and HV sales in several markets, including the US and Japan.

This report evaluates whether Toyota is making sufficient progress toward emissions reductions aligned with the Paris Agreement. The COP30, which will be held in Brazil in November 2025, will mark the ten-year anniversary of the Paris Agreement and is an appropriate time for Toyota to renew its commitment to the compliance with the Paris Agreement and strengthen its accountability in its endeavor to net zero. Toyota stands at the crossroads to set 1.5°C-compliant emission reduction targets and devise solid strategies for realistic energy transitions as one of the world's largest and leading automakers.

1.2 Toyota's Climate Strategy

Toyota pursues a multi-technology approach to net zero, offering HVs, plug-in hybrid electric vehicles (PHEVs), fuel cell electric vehicles (FCEVs), and hydrogen combustion engines in addition to the most common vehicle technology solution — BEVs. The company argues that its strategy addresses global market diversity, customer needs, and technological maturity. However, unlike competitors such as Nissan and Volvo, Toyota continues to invest in ICE technology.

Operationally, Toyota established its BEV Factory in 2023 as a dedicated unit to accelerate BEV development. By 2025, BEV development was fully integrated into Toyota's main operations, streamlining processes and improving responsiveness to the evolving BEV market[11]. Financially, the company announced its plan to invest approximately 5 trillion yen (USD 34 billion) in BEVs by 2030[12].

Despite these advances, Toyota's production targets may reflect a more accurate picture of progress. In 2021, Toyota announced a 3.5 million annual BEV target for 2030. In 2023, it set a 2026 target of 1.5 million BEVs, which was later revised in 2025 to 800,000 units, reflecting a notable pullback in near-term commitments[13].

In 2024, Toyota sold 10,159,336 vehicles worldwide, of which only 139,892 (1.38%) were BEVs[7]. If total sales remain constant through 2030, producing 1.5 million BEVs by 2026 and 3.5 million BEVs by 2030 would correspond to roughly 15% and 35% of total sales, respectively.

In contrast, other automakers have set BEV targets as percentages of total sales that vary by time frame (2030, 2035, 2040), geographical coverage (global or regional), and segments covered (passenger cars, commercial vehicles). Volkswagen aims for 80% BEV sales in Europe, 55% in the US, and 50% in China by 2030, whereas BMW targets 50% global BEV sales by 2030[14]. Percentage-based sales targets such as those at Volkswagen and BMW are generally more ambitious and adaptable than Toyota's fixed-volume targets.

Even though Toyota's near-term climate targets were validated by the Science Based Targets initiative (SBTi) in 2022, the company has no long-term target certified[15]. The SBTi serves as a leading emissions reduction standard-setter, guiding corporate climate strategies and target setting. Toyota's 2030 targets were approved under SBTi's 2018 methodology, which was later paused due to the absence of a 1.5°C-aligned pathway for Scope 3 Category 11 (use-phase) emissions[16]. A new automotive sector standard, expected to strengthen alignment with 1.5°C pathways, was under review at the time of writing (September 2025).

In this report, Toyota's progress is assessed against two benchmarks: the Science Based Targets initiative (SBTi) 1.5°C pathway and Greenpeace's 2022 report, *The Internal Combustion Engine (ICE) Bubble*. The SBTi framework guides corporate climate targets based on sector-specific emissions intensity trajectories. The SBTi's current near-term target-setting for automakers allows companies to align with 1.5°C pathways by reducing average vehicle emissions per kilometer, without requiring a full transition to zero-emissions vehicles.

By contrast, *The Internal Combustion Engine Bubble* report by Greenpeace takes a carbon budget–based approach. It translates a 1.5°C carbon budget in the transport sector to the maximum number of ICEVs that can still be added to the global fleet, comparing manufacturer production plans against the number of this limit. The 2022 Greenpeace report says that full alignment with the 1.5°C goal requires automakers to reach 100%

BEV production by 2030, representing a more stringent and comprehensive standard for decarbonization[iii].

Toyota's climate-related strategies and targets are shown in Box 1, below.

Box 1 Toyota's climate pledges
(Source : Toyota Sustainability Data Book)

Short-term	Mid-term	Long-term
Reduce Scope 3 vehicle use-phase emissions intensity by 33.3% for light-duty vehicles (LDVs) and 11.6% for medium / heavy-duty vehicles (HDVs)	Reduce Scope 1 & 2 emissions by 68% compared to 2019 levels. For Scope 1, reduce emissions to carbon neutrality, with offsets included. For Scope 3, reduce vehicle use-phase emissions intensity by 50% compared to 2019 levels.	Group-wide carbon neutrality, zero emissions from corporate activities and production plants.
By 2030 (compared to 2019)	**By 2035**	**By 2050**

1.3 Data and Methodology

This report examines Toyota's BEV production plans and evaluates the resulting use-phase emissions against the Intergovernmental Panel on Climate Change (IPCC) 1.5°C pathways. Expected reductions are calculated using emissions data disclosed by Toyota. The analysis is organized into four key components:

1. Toyota's 2023 vehicle sales and use-phase CO_2 emissions by market (Section 2.1);
2. Breakdown of 2023 use-phase emissions by powertrain (Section 2.2);
3. Toyota's 2026 BEV production plan and associated emissions estimate (Section 3.1);
4. Projected 2030 emissions under alternative BEV adoption scenarios, including target-based, industry-outlook, and below industry-outlook pathways, with comparison to 1.5°C benchmarks (Section 3.2).

A comprehensive description of the methodology is provided in Appendix A.

iii We also report SBTi as a reference benchmark; however, many SBTi-underpinning scenarios (e.g. The International Energy Agency (IEA)'s Net Zero Emissions by 2050 Scenario) tend to assume substantial biofuel expansion, whereas Greenpeace's 2022 *The Internal Combustion Engine Bubble* framework explicitly excludes biofuel or synthetic fuel contributions.

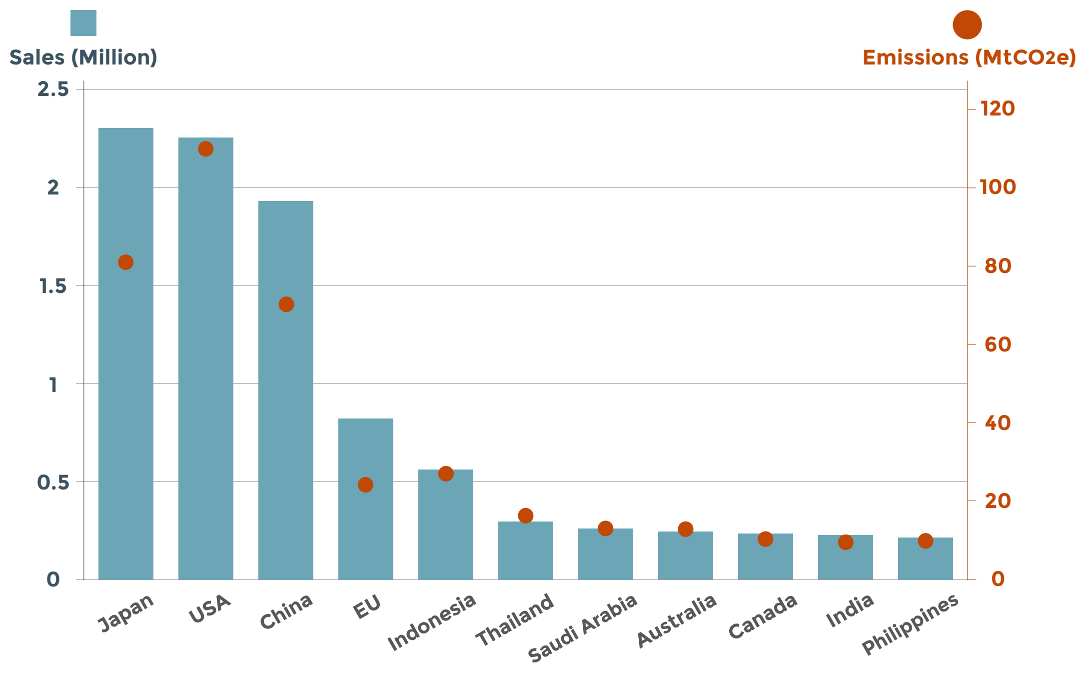
2 TOYOTA'S 2023 EMISSIONS PROFILE

2.1 Sales and Use-Phase CO_2 Emissions by Market

This section presents Toyota's 2023 vehicle sales and use-phase emissions across its key markets. Sales are concentrated: the top three markets — Japan, the US, and China — account for over 60% of total sales, rising to approximately 73% when including the EU and Indonesia.

While total use-phase emissions generally scale with sales volume, regional differences in vehicle portfolios lead to notable variations (Figure 1). For example, Toyota vehicles sold in the US generate the highest total emissions, surpassing Japan despite slightly lower sales. This reflects higher per-vehicle emissions in the US, driven by the dominance of ICEVs and the popularity of larger models such as sports utility vehicles (SUVs) and pickup trucks. A similar contrast is observed between the EU and Indonesia: although Toyota sells about 1.5 times more vehicles in the EU than in Indonesia, emissions from vehicles sold in Indonesia are higher due to the ICEV-heavy sales mix.

Fig. 1 Toyota's vehicle sales and use-phase CO_2 emissions by market (2023)



Per-vehicle emissions, calculated from use-phase emissions divided by sales, further illustrate these differences (Figure 2). Emissions are highest in Thailand (54 t/vehicle) and lowest in Norway (13 t/vehicle), highlighting that regional emissions are shaped not only by the number of vehicles sold but also by the powertrain composition.

Fig. 2 Toyota's per-vehicle use-phase CO_2 emissions by market (2023)

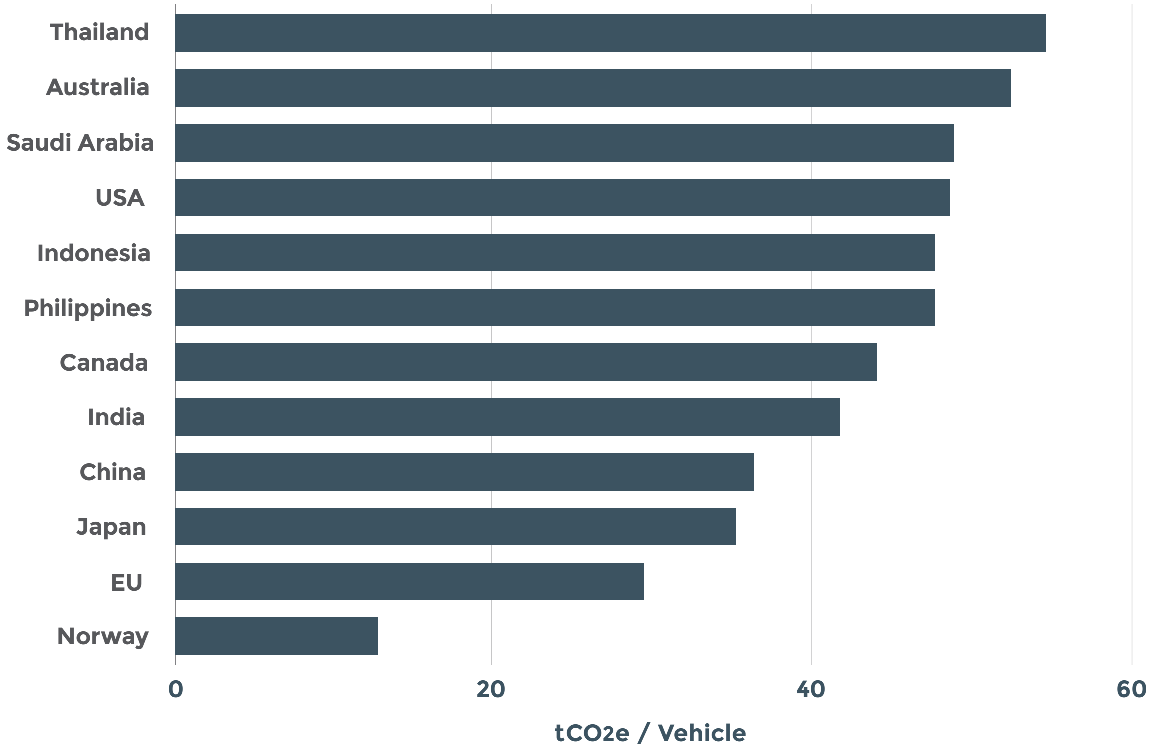
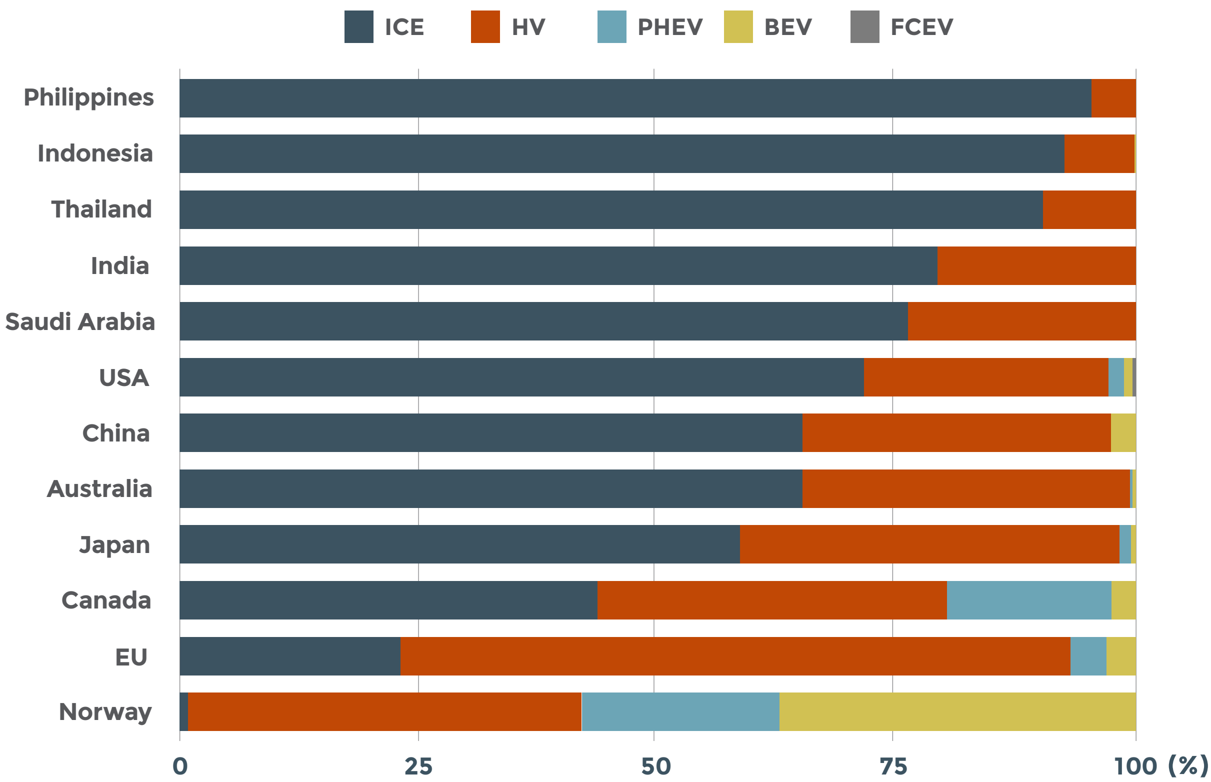


Figure 3 shows the share of each powertrain by market. Markets with a higher proportion of ICEVs tend to have higher per-vehicle emissions, reflecting the dominant role of ICEV sales in driving overall use-phase CO_2 output[iv]. Markets such as Norway, where a combination of government policies including BEV tax exemptions were introduced earlier than other countries, illustrate how high BEV uptake can dramatically reduce use-phase emissions[v].

Fig. 3 Powertrain breakdown by market (2023)



2.2 Emissions Breakdown by Powertrain

This section details how each powertrain contributed to Toyota's total use-phase emissions in 2023, both in absolute terms and as a share of the total. Toyota's reported Scope 3 Category 11 emissions (436.28 $MtCO_2e$) are allocated across five powertrains (ICE, HV, PHEV, BEV, FCEV) using a sales-weighted well-to-wheel (WTW) methodology.

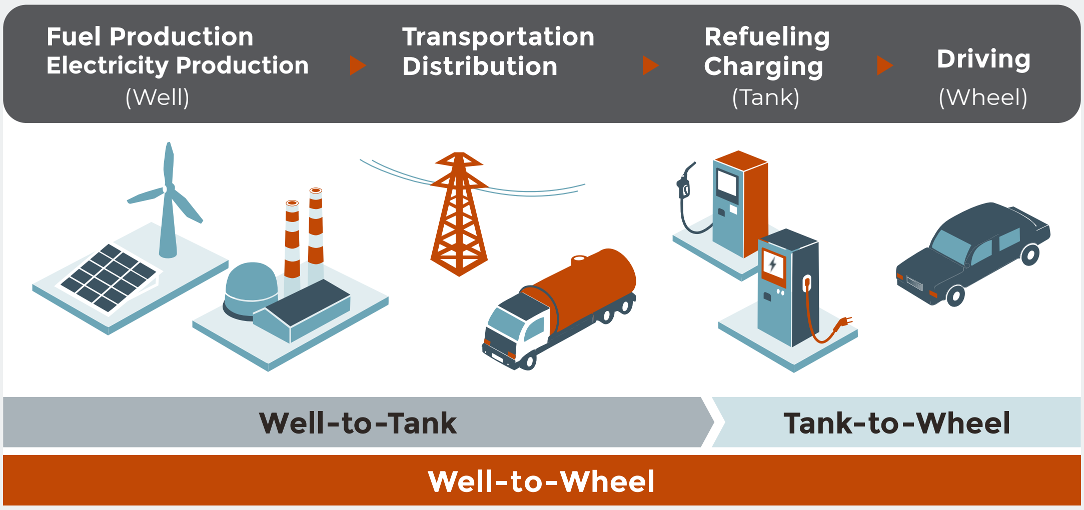
iv This relationship is supported by a positive Pearson correlation coefficient ($r \approx 0.73$) between ICEV sales share and per-vehicle carbon intensity across the top ten sales markets. Markets with high ICEV dominance (e.g. Indonesia, Thailand, Saudi Arabia, India) exhibit the highest per-vehicle emissions, whereas markets with lower ICEV shares (e.g. the EU, Japan) record lower intensities.

v In Toyota's 2023 top-market set, BEV shares are generally low, so the BEV effect cannot be isolated within those markets alone. Norway is shown as an illustrative outlier: its markedly lower per-vehicle use-phase WTW (lifetime) emissions reflect both a much higher BEV share and a low electricity emission factor than the other markets analysed.

Per-vehicle emissions by powertrain are also analysed to complement the aggregate figures.

Box 2 Well-to-wheel emissions schematic

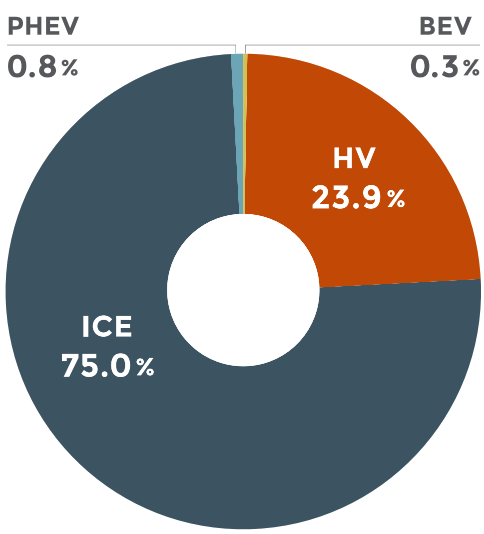
Well-to-wheel (WTW) divides use-phase emissions into tank-to-wheel (TTW) and well-to-tank (WTT). TTW covers direct tailpipe emissions at the point of use, and WTT captures upstream emissions from producing and delivering fuel or electricity; WTW is the sum of the two. For zero-emission vehicles such as BEVs and FCEVs, TTW is zero and all WTW emissions come from WTT, which depends on the grid mix (BEV) or the hydrogen production pathway (FCEV).



Use-phase emissions by powertrain

Toyota's 2023 use-phase emissions are overwhelmingly dominated by combustion powertrains (Figure 4). ICEVs account for more than two-thirds of total emissions (~332 $MtCO_2e$), while HVs contribute ~100 $MtCO_2e$. Together, these two powertrains represent 98.9% of Toyota's total use-phase emissions. PHEVs, BEVs, and FCEVs collectively comprise only a marginal share, reflecting their limited market penetration. Further details on use-phase emissions by markets can be found in Appendix B.

Fig. 4 Toyota's global use-phase emissions (Scope 3 Category 11) by powertrain (2023)

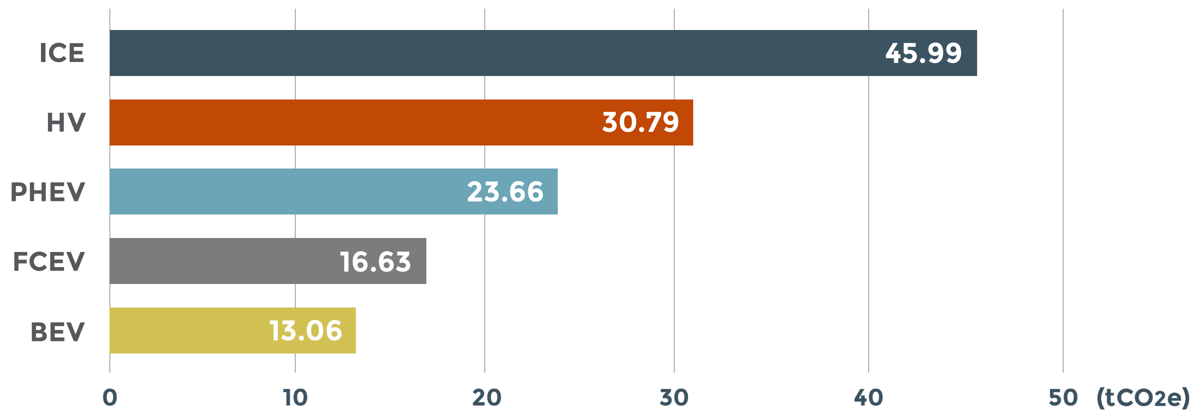


Per-vehicle emissions by powertrain

Per-vehicle emissions are calculated by dividing the allocated Category 11 total for each powertrain by its 2023 sales volume. While this is not a full life-cycle assessment (LCA), the resulting hierarchy is consistent with independent LCA studies (e.g., ICCT 2021 global comparison)[17].

- ICEVs have the highest per-vehicle emissions, averaging 45.99 tCO_2e, reflecting their combustion-based operation and large contribution to total emissions.
- HVs emit 30.79 tCO_2e per vehicle, or roughly 33% lower than ICEVs, yet their overall impact remains substantial given their high market share.
- PHEVs emit 23.66 tCO_2e per vehicle — around 48% lower than ICEVs but still nearly 1.8 times higher than BEVs. PHEV real-world emissions depend heavily on the utility factor (UF), a term that refers to the frequency in which cars are charged: low-UF operation (infrequent charging) approaches HV-level emissions, while high-UF operation resembles BEV performance. Real-world studies indicate PHEV emissions often exceed their official laboratory test values; for instance, a 2024 European Commission study found average real-world CO_2 emissions 3.5 times higher than official laboratory ratings[18].
- BEVs record the lowest lifetime use-phase emissions at 13.06 tCO_2e, benefiting from zero tailpipe emissions and higher drivetrain efficiency.
- FCEVs follow closely at 16.63 tCO_2e, though their true climate benefit depends on the hydrogen production pathway — renewable hydrogen yields substantially lower WTW emissions than fossil-based hydrogen.

Fig. 5 Toyota's lifetime use-phase emissions per vehicle by powertrain (2023)[vi]



vi Lifetime emissions refers to use-phase WTW over the assumed lifetime of vehicles sold in 2023; manufacturing and end-of-life are excluded.

3 TOYOTA'S FUTURE PATHWAY

This section evaluates whether Toyota's BEV sales plans align with the 1.5°C pathway of the Paris Agreement for 2026 and 2030. For 2030 analysis, pathways outlined by both the Science Based Targets initiative (SBTi) and Greenpeace's 2022 *The Internal Combustion Engine Bubble* report are used as scenarios. Whereas SBTi provides a widely recognized benchmark for corporate target validation, Greenpeace offers a more stringent carbon-budget consistent (CBC) interpretation — concluding that automakers must reach 100% BEV production by 2030 to remain consistent with a 1.5°C trajectory.

3.1 2026 Target Scenario Analysis

In 2023, Toyota announced to produce and sell 1.5 million BEVs annually by 2026 — out of roughly 10 million vehicles expected that year — but later revised this target down to 800,000 BEVs[19]. The 700,000-unit shortfall is assumed to be filled by other powertrains, primarily ICEVs and HVs. The resulting additional emissions depend on the mix of powertrains, with three illustrative scenarios:

(i) **BEV 1.5 million plan:**
1.5 BEV units are manufactured annually by 2026;

(ii) **Minimum emissions-increase scenario:**
700,000 units are replaced by HVs, with 800,000 BEVs in 2026;

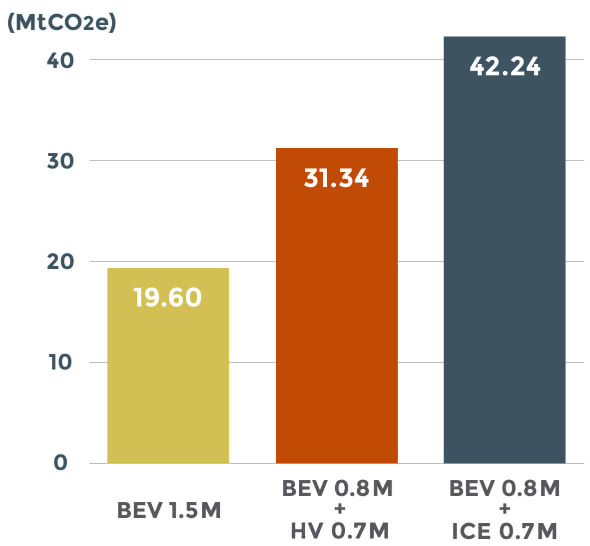
(iii) **Maximum emissions-increase scenario:**
700,000 units are replaced by ICEVs, with 800,000 BEVs in 2026.

The projections calculated for this report suggest that maintaining the original 1.5 million BEV target would result in roughly 20 $MtCO_2e$ of use-phase emissions in 2026 (Figure 6). By reducing the BEV target to 800,000 BEVs, Toyota is projected to miss out on saving 11.7–22.6 $MtCO_2e$ compared with its initial 1.5 million BEV plan. The difference in emissions is because ICEVs and HVs emit far more CO_2 over their lifetimes than BEVs.

Our analysis suggests that Toyota's 2026 BEV target revision is not merely a numerical adjustment but a decision with immediate and significant climate consequences. Even in the minimum-increase scenario, in which 700,000 HVs and 800,000 BEVs are manufactured, the reduction in BEV production means a lost opportunity to save 11.7 $MtCO_2e$ in 2026 in emissions because HVs emit more CO_2e than do BEVs.

Reaching the revised 2026 target of 800,000 BEVs will require a steep acceleration in sales: from roughly 140,000 BEVs produced in 2024, Toyota must grow sales around 140% per year. If the company falls short of this revised target, emissions will be higher, widening the gap to meet a 1.5°C-compliant pathway. The pace and scale of BEV adoption will therefore be critical to meeting Toyota's climate commitments.

Fig. 6 Emissions impact of the 2026 BEV target revision with additional scenarios



3.2 2030 Target Scenario Analysis

This section evaluates potential pathways for Toyota's global vehicle sales mix and associated use-phase emissions in 2030, focusing on the implications of the company's BEV adoption targets for meeting 1.5°C-aligned targets. Scenarios are constructed to illustrate how varying levels of BEV uptake affect total emissions.

The scenarios assume that increases in BEV adoption primarily replace conventional ICE vehicles. HVs are fixed at 45% of sales, PHEVs at 6.4%, and FCEVs at a 1.0% floor across all scenarios. BEV shares then vary, with ICEVs absorbing the residual to ensure total sales sum to 100%. The scenarios are as follows:

(i) **Target-based :**
Aligns with Toyota's stated 2030 BEV target of 3.5 million units (~32.6% of total sales at baseline)

(ii) **Industry-outlook :**
Reflects third-party market benchmarks (InfluenceMap/S&P Global Mobility)[20], with BEV sales at roughly half of Toyota's stated target (~1.75 million units, 16.3% at baseline)

(iii) **Below industry-outlook :**
Assumes BEV sales reach only half of the industry-outlook benchmark (~0.875 million units, 8.1% at baseline), representing a lagging adoption pathway

Projected emissions under these scenarios are calculated on a per-vehicle basis and are aggregated across Toyota's sales volume. In addition, sensitivity analyses were completed to test the impact of ±5% variations in total vehicle sales, which are presented in Appendix C.

The scenarios illustrate the trade-off between BEV scale-up and ICEV reduction and provide a clear basis for comparing projected emissions against 1.5°C-compliant targets.

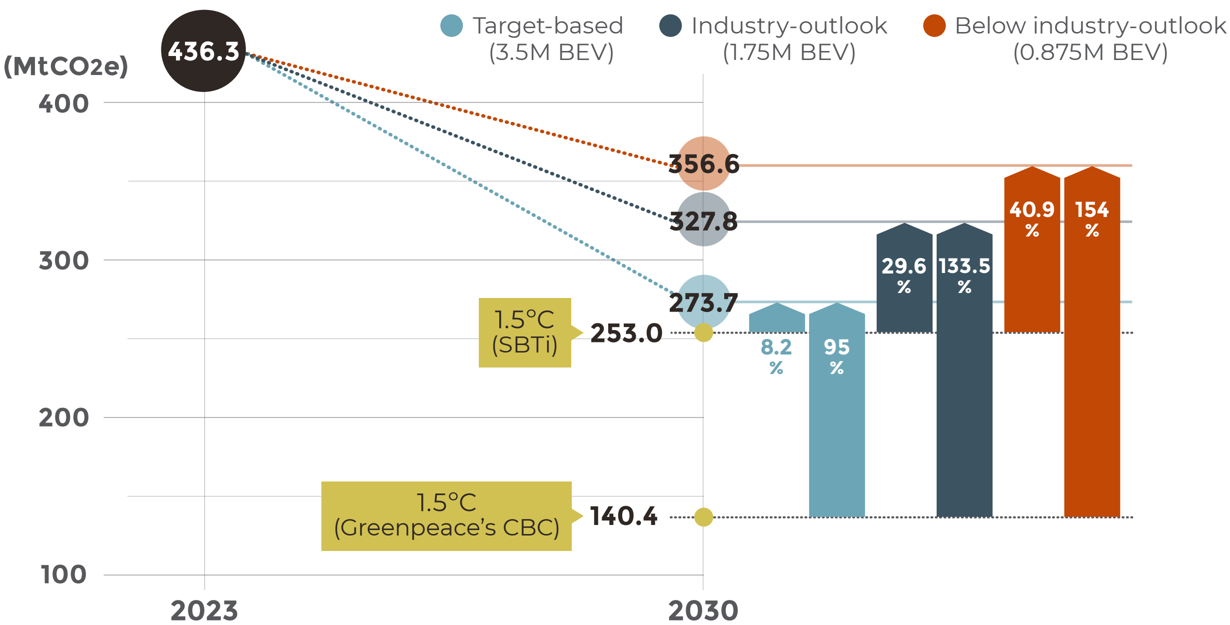
Projected 2030 use-phase emissions under each scenario, alongside excesses relative to SBTi (253.0 $MtCO_2e$) and Greenpeace's carbon-budget consistent (CBC, 140.4 $MtCO_2e$) benchmarks, are shown in Figure 7.

The results highlight the critical role of BEV adoption in reducing Toyota's use-phase emissions. Even under the target-based scenario, projected 2030 emissions reach 273.7 $MtCO_2e$, exceeding the SBTi 1.5°C benchmark by 8.2% and the CBC 1.5°C benchmark by 95%. Achieving alignment with the CBC pathway would require a complete phase-out of ICE vehicles and a full transition to 100% BEV production by 2030. Toyota's current target, while a step forward, therefore remains far from sufficient to meet the Paris Agreement–aligned decarbonization trajectories.

The industry-outlook scenario, reflecting more conservative BEV adoption aligned with broader market trends, results in 327.85 $MtCO_2e$, and an even greater gap with both the SBTi and CBC benchmarks, 29.6% and 133.5% above, respectively. Even with ±5% variations in total sales, emissions remain substantially above the benchmark. The below industry-outlook scenario, representing lagging BEV adoption (~0.875 million BEVs; 8–9% share), projects emissions of 356.63 $MtCO_2e$ (+40.9% above SBTi and +154.0% above CBC). These scenarios illustrate the scale of the gap Toyota faces if it fails to achieve its stated BEV targets, underscoring that slower adoption would result in emissions far exceeding both the SBTi and CBC benchmarks.

Overall, the scenarios project that the pace and scale of Toyota's BEV transition, combined with a more aggressive ICE phase-down, will be decisive factors that determine alignment with 1.5°C-compliant climate targets by 2030.

Fig. 7 Toyota's projected 2030 use-phase emissions compared with SBTi and Greenpeace CBC benchmarks



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4 DISCUSSION AND CONCLUSION

Our analysis suggests that Toyota's BEV production plans fall far short of the ambition required to align with the 1.5°C pathways defined by both the Science Based Targets initiative (SBTi) and Greenpeace's 2022 *Internal Combustion Engine Bubble* framework.

Although Toyota initially announced in 2023 a goal of producing 1.5 million BEVs by 2026, the company subsequently reduced the figure to 800,000 units — a 50% cut from its original target. Our calculations indicate that this revision would result in 11.7 $MtCO_2e$ in excess emissions if the shortfall is filled by HVs, and 22.6 $MtCO_2e$ if replaced with ICEVs — more than double the emissions under the original BEV plan.

Looking ahead to 2030, even if Toyota achieves its stated goal of selling 3.5 million BEVs annually, projected use-phase emissions would still exceed the SBTi-aligned 1.5°C benchmark by 8.2% and remain roughly 95% higher than the Greenpeace CBC benchmark, which calls for a complete phase-out of internal combustion vehicles by the end of the decade. These results are based on constant electricity emission factors. However, as the acceleration of grid decarbonization is expected and already happening, the standard for what is required to align with a 1.5°C-compatible pathway will be raised.

While BEV expansion will reduce Toyota's fleet emissions, its current production trajectory does not constitute credible alignment with any 1.5°C-compatible pathway. The persistent gap between Toyota's BEV sales plans and the required emissions reductions undermines the credibility of its carbon-neutrality pledges.

Toyota also remains an outlier among global automakers by declining to commit to a full ICEV phase-out for passenger or heavy-duty vehicles in major markets. Its regional goals — such as 50% BEV sales by 2030 and 100% by 2035 in the EU and UK — merely comply with existing regulations rather than demonstrate proactive climate leadership. Meanwhile, Toyota continues to invest in alternative technologies with uncertain climate benefits, including biofuels and hydrogen.

In 2023, BEVs accounted for less than 1% of Toyota's global sales, rising only slightly to 1.4% in 2024 — far below the 18% global average sales of BEVs across all manufacturers as reported by the International Energy Agency[21]. Although Toyota has shown early signs of acceleration in 2025 (e.g., a 36% year-on-year BEV sales increase in Europe[22] and an 84% jump in China in early 2025[23]), it remains uncertain whether this growth can be sustained or scaled to meet its 2026 target, especially amid new US import tariffs.

Greenpeace recommendations for Toyota

1. **Commit to ICE phase-out:**
   To meaningfully reduce emissions and uphold accountability to its carbon-neutrality goals, Toyota must commit to an accelerated phase-out of ICEVs and a clear pathway to 100% BEV production by 2030.
2. **Commit to absolute emissions reductions:**
   Align emissions reduction targets with a minimum 43% absolute reduction by 2030 (from 2019 levels) across the value chain, consistent with Intergovernmental Panel on Climate Change (IPCC) 1.5°C pathways. Several peer automakers such as Stellantis and BMW already have absolute targets.
3. **Set transparent, time-bound battery electric vehicle (BEV) adoption targets:**
   Define the amounts of emissions reduction the company aims to achieve through 2030, 2035 and 2040, and establish corresponding annual BEV sales share. Develop regional internal combustion engine vehicle (ICEV) phase-out timelines with interim benchmarks.
4. **Improve transparency in Scope 3 emissions accounting:**
   Disclose methodologies and assumptions for Category 11 (use-phase) emissions to enable comparability and reduce underreporting risks that could erode credibility.
5. **Transition to a company offering mobility services from a vehicle manufacturer:**
   Demonstrate the business model of net zero mobility services, rather than pursuing the expansion of ICEV and hybrid vehicle (HV) sales.

GLOSSARY

1.5°C	A climate pathway aiming to limit global temperature rise to 1.5°C above pre-industrial levels, as referenced in the Paris Agreement.
BEV	Battery electric vehicle. A vehicle without a fuel tank or exhaust pipe that is powered by electricity.
CO_2e	Carbon dioxide (CO_2) equivalent. A standard unit that expresses the impact of different greenhouse gases in terms of the amount of CO_2 that would create the same warming effect.
EEA	European Environment Agency
EF	Emission factor
EPA	Environmental Protection Agency (United States)
EV	Electric vehicle. A vehicle fully or partially powered by electricity.
FCEV	Fuel cell electric vehicle. A vehicle using a fuel-cell and powered by compressed hydrogen.
HV	Hybrid electric vehicle. A vehicle with a small battery assisting the engine, a form of internal combustion engine vehicle.
GHG	Greenhouse gas
GVG	Green Vehicle Guide (Australia)
ICCT	International Council on Clean Transportation
ICE	Internal combustion engine. A vehicle powered by burning fuel such as gasoline or diesel.
LCA	Life Cycle Assessment
MIIT	Ministry of Industry and Information Technology (China)
MLIT	Ministry of Land, Infrastructure, Transport and Tourism (Japan)
NRCan	Natural Resources Canada
IPCC	Intergovernmental Panel on Climate Change
PHEV	Plug-in hybrid vehicle. A vehicle powered by both gasoline and electricity, a form of internal combustion engine vehicle.
SBTi	Science Based Targets Initiative.
TTW	Tank-to-wheel. Direct emissions at the point of use (tailpipe only).
VCA	Vehicle Certification Agency (United Kingdom)
WLTC	Worldwide Harmonized Light Vehicles Test Cycle (Japan version of WLTP)
WLTP	Worldwide Harmonised Light Vehicle Test Procedure
WTT	Well-to-tank. Upstream emissions from the production of fuel or electricity.
WTW	Well-to-wheel (= well-to-tank + tank-to-wheel)

APPENDIX A: METHODOLOGY

Appendix A explains the data source and methodological framework applied to estimate Toyota's 2030 use-phase emissions, providing the basis for the scenario analysis in Section 2 and 3.

1. Scope and assumption

Data coverage

The analytical boundary encompasses all vehicles sold by Toyota and its consolidated brands — Toyota, Lexus, Daihatsu and Hino — in line with the company's reported emissions boundary. In scope are on-road products, namely passenger cars, light commercial vehicles, and trucks/buses, which are also followed by emissions boundaries used in the report.

Temporal scope

Toyota's Fiscal Year 2023 Scope 3 Category 11 disclosure (1 April 2023 – 31 March 2024) is used as the emissions baseline. Powertrain shares are derived from MarkLines sales data for the calendar year 2023 (1 January – 31 December 2023). Because of the different reference periods for the baseline (FY) and the weights (CY), a minor mix bias may persist but no major discrepancy was found[vii]. Model-level tailpipe CO_2 (g/km, combined) prioritises 2023 sales-year values; where unavailable, model-year values are employed as proxies.

Geographical scope

This study covers vehicles sold globally by Toyota. For each market, official type-approval tank-to-wheel (TTW) CO_2 (combined, g/km) at the model/powertrain level is used as reported in established regulatory cycles (e.g., WLTP, WLTC, EPA). Rules for cross-cycle calibration (e.g., US, Canada, China), data precedence, and the re-allocation workflow are detailed in Appendix A: 2 and 3.

Powertrain definitions

Vehicles are grouped into five powertrains: internal combustion engine vehicles (ICEVs), hybrid vehicles (HVs), plug-in vehicles (PHEVs), battery electric vehicles (BEVs), and fuel-cell electric vehicles (FCEVs). Multi-variant or ambiguous models are mapped using manufacturer specifications and observed sales splits in official regulatory datasets.

vii Based on a comparison of MarkLines data for Q1 2023 and Q1 2024 — the only non-overlapping quarters between FY2023 and CY2023 — we estimate that substituting Q1 2024 for Q1 2023 would shift the annual powertrain shares by approximately –2.5 percentage points for ICEV and +2.0 percentage points for HV. This effect is modest and does not materially affect the overall assessment of Toyota's powertrain mix.

Allocation approach and assumptions

This study does not re-estimate Toyota's total Scope 3 Category 11 emissions. Instead, it reallocates the company's reported 2023 emissions across powertrains to obtain shares and absolute values of individual powertrains. Vehicle lifetime and annual mileage are treated as common constants across powertrains and are therefore excluded; these factors cancel out in share-based calculations.

Efficiency and emission-factor assumptions

Fuel-efficiency improvement is applied at recent observed rates from Toyota (HV: 1.04%/year, ICEV: 0.42%/year, PHEV: 1.04%/year with UF[viii] = 0.5)[ix, 24, 25]. Emission factors for fuel and electricity are held constant at 2023 market-specific levels. This conservative setup excludes prospective decarbonization of energy supply and shows that scaling up BEVs still delivers substantial reductions relative to an HV-centred strategy.

2. Data sources and harmonisation

Corporate disclosures

Toyota's reported FY2023 Scope 3 Category 11 emissions, 436.28 $MtCO_2e$, is taken from the company's Sustainability Data Book.

Sales and powertrain mix

MarkLines is an online automotive industry portal that provides global automotive sales and production data[26]. MarkLines is used as the base dataset and it is cross-checked with following official government/agency datasets.

- European Environment Agency (EEA, European Union)[27]
- U.S. Environmental Protection Agency (EPA, United States)[28]
- Green Vehicle Guide (GVG, Australia)[29]
- Natural Resources Canada (NRCan, Canada)[30]
- Ministry of Industry and Information Technology (MIIT, China)[31]
- Ministry of Land, Infrastructure, Transport and Tourism (MLIT, Japan)[32]
- Vehicle Certification Agency (VCA, United Kingdom)[33]

viii For the upstream allocation framework, a constant utility factor (UF) of 0.5 is applied for simplicity. In scenario calculations, however, market-specific UFs based on real-world data were used.

ix Derived from EEA (2022-2023) for Toyota vehicles; weight-normalised to neutralise model-mix shifts. A one-year rate is used as efficiency gains are levelling off, making recent data better for near-term projections. These are broadly consistent with literature: OECD estimates the improvement of conventional vehicles at about 0.45%/year on average over 1984–2020; ICCT shows ~10–15% per generation efficiency gains for hybrids. Considering that a vehicle model's generation cycle is typically 5-7 years, 1.04%/year is a conservative and reasonable estimate.

Tailpipe CO_2 factors

Model/powertrain tank-to-wheel (TTW) tailpipe CO_2 intensities are organized in the following order:

Step 1 Relevant-market official government/agency datasets

Use the official tailpipe CO_2 certification values (g/km, combined) for the same model–powertrain published by the government or public certification agency of the market (i.e., EEA/EU; EPA/US; GVG/Australia; NRCan/Canada; MIIT/China; MLIT/Japan; VCA/UK) where the vehicle was sold.

Step 2 EEA WLTP model average (all-trim coverage for sold vehicles)

When a relevant-market government/agency dataset was unavailable, the model-level value from the EEA/EU dataset under the Worldwide Harmonised Light Vehicles Test Procedure (WLTP) was used. The EEA dataset is suitable for cross-market representation because it provides all-trim coverage. Therefore the EEA dataset supports a sales-weighted average across trims to obtain a single model–powertrain tailpipe CO_2 emission factor (g/km)[x].

Step 3 Closest-market official government/agency dataset

If neither of the above is available, a model-level value from another market's official government/agency dataset was used. Where multiple candidates exist, the markets geographically closest to the country of sale were used.

Step 4 Derived from fuel-efficiency data

If none of the above were available in the above steps, emissions from Toyota-reported fuel efficiency using fuel-efficiency-to-CO_2 conversion factors were employed[xi]. Where Toyota documentation was unavailable, we used reputable region-specific secondary media that reproduce Toyota's figures from government/agency or manufacturer sources (e.g., CarGuide/Philippines[34], CarDekho/India[35]).

x This step is prioritised because the EU/EEA WLTP dataset provides comprehensive model records across trims, providing average of emissions by model and powertrain, accounting for cases where higher- or lower-emitting trims of the same model are sold disproportionately.

xi ICE (gasoline) TTW conversion factor: 2.322 kg CO_2/L.

Cross-cycle calibration

As this study reallocates a fixed global total across powertrains, minor cross-cycle differences have limited impact on final proportions. Accordingly, calibration is restricted to markets (e.g. US, Canada, China) where systematic, significant deviations are observed[xii]. Additionally, as Toyota applies a real-world adjustment of around 10%, in line with SBTi practice, we mirror this by applying a uniform uplift of 10% to WLTP-based CO_2 values to conservatively bridge the gap between approval and real-world figures.

Derivation of benchmarks

To evaluate alignment with 1.5°C climate goals, we used two benchmark emissions:

(i) SBTi-aligned benchmark
We applied the SBTi Corporate near-Term Tool (Scope 3, "Use of sold products")[36]. The tool computes company-level absolute/unit intensity targets consistent with the IPCC-aligned 1.5°C pathway. Toyota's FY2023 Scope 3 Category 11 total (436.28 $MtCO_2e$) was entered as the base year and 2030 as the target year.

(ii) Greenpeace's carbon-budget consistent benchmark
Following Greenpeace's *The Internal Combustion Engine Bubble* (2022), this benchmark operationalises a 1.5°C-compliant trajectory by requiring 100% BEV production by 2030 and a rapid ICEV phase-out. We apply this production requirement to Toyota's portfolio to derive the corresponding 2030 use-phase emissions. This represents a high-ambition, carbon-budget-consistent benchmark.

The resulting 2030 benchmarks are used as comparison points for scenario results throughout this report.

Table 2030 benchmarks for Scope 3 Category 11

	2023 Emission	2030 Benchmark
Absolute emissions 1.5°C/SBTi	436,280,000 tCO_2e	253,042,400 tCO_2e
Absolute emissions 1.5°C/Greenpeace's CBC		140,395,393 tCO_2e

Note: *Values are absolute Scope 3 Category 11 use-phase, well-to-wheel lifetime emissions. The 1.5°C/SBTi value is calculated using the SBTi Corporate Near-Term Tool (Scope 3 tab); the Greenpeace value follows The Internal Combustion Engine Bubble report's carbon-budget-consistent requirement.*

xii The corrections are only applied to US, Canada, and China, where consistent deviations from EU values were observed due to test-cycle difference. For other countries such as Japan, the UK, and Australia, values are already WLTP-aligned (e.g., Japan's WLTC) or deviations are minor, so no further adjustment was applied.

3. Analytical framework

The analytical framework reallocates Toyota's Scope 3 Category 11 emissions across five powertrains to obtain: (i) per-powertrain shares; and (ii) absolute use-phase emissions by powertrain. The framework proceeds in the following steps:

1. **Sales mix**
   Construct the 2023 sales mix by powertrain and market.

2. **Resolve tank-to-wheel (TTW) intensities**
   Map model/powertrain TTW tailpipe CO_2 (g/km, combined) by market, applying the precedence outlined in Section 2.3.

3. **Assign upstream components**

   ICE/HV (and PHEV Charging-Sustaining mode): calculate regional uplift factors[17].

   Uplift factor[xiii] = 1 + (WTT GHG / TTW GHG)

   BEV (and PHEV charging-depleting mode): multiply model/powertrain electric energy consumption by the 2023 country-specific electricity emission factor (EF) to derive upstream g/km[37].

   CO_2/km = Electricity consumption (Wh/km) × Grid emission factor (gCO_2/kWh)

   FCEV: multiply hydrogen consumption (kg/100 km) by the relevant market H_2 EF (where applicable)[38].

4. **Construct well-to-wheel (WTW) intensities**
   For each powertrain–market combination, add the upstream component to the tailpipe component to derive per-kilometre WTW intensities. For PHEVs, apply the utility factor (UF) to the EV component and (1-UF) to the fuel component, and sum the two to obtain composite WTW intensities.

   ICE/HV: WTW GHG = TTW GHG × Uplift factor
   PHEV: UF × WTW GHG (CD mode) + (1-UF) × WTW GHG (CS mode)

5. **Allocate totals**
   Using the sales mix as weights, aggregate WTW across markets to obtain each powertrain's global share, then multiply these shares by Toyota's reported FY2023 Scope 3 Category 11 total (436.28 MtCO_2e) to yield absolute use-phase emissions by powertrain.

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xiii The uplift factor is derived from ICCT's regional gasoline data, using the ratio of fuel production (WTT) to combustion (TTW). It is calculated as Uplift = 1 + (WTT/TTW), and applied as WTW = TTW × Uplift.
For the regions - EU, US, China, and India, the specific uplift factors are used; for all other regions, the simple average of the factors are used.

APPENDIX B: COMPREHENSIVE SECTION 2.2. DATA

Use-phase emissions by powertrain in major markets

		BEV (%)	HV (%)	ICE (%)	PHEV (%)	FCEV (%)
Japan	Sales	0.13	39.54	59.26	1.05	0.02
	Emissions	0.07	28.58	70.60	0.74	0.01
US	Sales	0.65	25.65	71.83	1.75	0.12
	Emissions	0.19	21.06	77.72	0.99	0.04
China	Sales	2.20	32.18	65.58	0.04	0
	Emissions	1.01	29.10	69.86	0.03	0
EU	Sales	2.95	69.74	23.71	3.52	0.08
	Emissions	0.56	67.11	29.82	2.46	0.04
Indonesia	Sales	0.13	6.94	92.90	0.03	0
	Emissions	0.07	4.40	95.51	0.02	0
Thailand	Sales	0.04	9.27	90.64	0.06	0
	Emissions	0.01	5.63	94.32	0.04	0
Saudi Arabia	Sales	0	23.27	76.73	0	0
	Emissions	0	16.69	83.31	0	0
Australia	Sales	0.37	33.98	65.47	0.17	0
	Emissions	0.15	18.66	81.06	0.12	0
Canada	Sales	2.16	36.20	44.37	17.26	0.01
	Emissions	0.29	31.60	59.00	9.10	0
India	Sales	0	20.37	79.63	0	0
	Emissions	0	12.91	87.09	0	0
Philippines	Sales	0	4.23	95.77	0	0
	Emissions	0	2.91	97.09	0	0
Norway	Sales	36.96	41.08	1.16	20.79	0.01
	Emissions	2.27	71.98	3.10	22.64	0.01

APPENDIX C: COMPREHENSIVE SECTION 3.2. DATA

2030 Toyota sales scenarios by powertrain (with different sales variation)

Sales	Scenarios	BEV adoption	BEV (%)	HV (%)	ICE (%)	PHEV (%)	FCEV (%)
Constant	Target-based	Target-Aligned BEV	32.6	45.0	15.0	6.4	1.0
	Industry-outlook	Target-Shortfall BEV	16.3	45.0	31.3	6.4	1.0
	Below Industry-outlook	Lagging BEV	8.1	45.0	39.5	6.4	1.0
5% Increase	Target-based	Target-Aligned BEV	31.0	45.0	16.6	6.4	1.0
	Industry-outlook	Target-Shortfall BEV	15.5	45.0	32.1	6.4	1.0
	Below Industry-outlook	Lagging BEV	7.8	45.0	39.8	6.4	1.0
5% Decrease	Target-based	Target-Aligned BEV	34.3	45.0	13.3	6.4	1.0
	Industry-outlook	Target-Shortfall BEV	17.1	45.0	30.5	6.4	1.0
	Below Industry-outlook	Lagging BEV	8.6	45.0	39.0	6.4	1.0

Note: *With HV (45.0%), PHEV (6.4%), and FCEV (1.0%) fixed across all scenarios, higher BEV shares reduce ICEV shares one-for-one. In the Target-based cases, BEV shares are 32.6% (3.5 million BEVs at constant sales), 31.0% with +5% sales, and 34.3% with –5%, yielding ICEV shares of 15.0%, 16.6%, and 13.3%, respectively. Under the Industry-outlook cases, BEV shares are 16.3%, 15.5%, and 17.1%, with corresponding ICEV shares of 31.3%, 32.1%, and 30.5%. In the Below industry-outlook (Lagging BEV) cases, BEV shares fall to 8.1%, 7.8%, and 8.6%, while ICEV shares rise to 39.5%, 39.8%, and 39.0%. These mixes form the basis for comparisons with the 1.5°C-consistent and 100% BEV pathways in Section 3.2.*

Projected 2030 emissions by powertrain compared with SBTi and Greenpeace CBC

Sales	Scenarios	BEV	HV	ICE	PHEV	FCEV	Emis-sions	Excess vs SBTi	Excess vs GP's CBC
		($MtCO_2e$)						(%)	
Constant	Target-based	45.73	138.37	72.12	15.70	1.79	273.71	8.2	95.0
	Industry-outlook	21.72	138.37	150.27	15.70	1.79	327.85	29.6	133.5
	Below Industry-outlook	11.43	138.37	189.34	15.70	1.79	356.63	40.9	154.0
5% Increase	Target-based	45.73	145.29	83.54	16.48	1.88	292.92	15.8	108.6
	Industry-outlook	22.86	145.29	161.69	16.48	1.88	348.20	37.6	148.0
	Below Industry-outlook	11.43	145.29	200.76	16.48	1.88	375.84	48.5	167.7
5% Decrease	Target-based	45.73	131.45	60.70	14.91	1.70	254.49	0.6	81.3
	Industry-outlook	22.86	131.45	138.85	14.91	1.70	309.78	22.4	120.6
	Below Industry-outlook	11.43	131.45	177.92	14.91	1.70	337.42	33.3	140.3

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