MPP Trucking Transition Strategy FAQ

What is MPP?

The Mission Possible Partnership (MPP) is an alliance of climate leaders focused on supercharging the decarbonisation of seven global industries representing 30% of emissions: aviation, shipping, trucking, steel, aluminium, cement/concrete, and chemicals. Without immediate action, these sectors alone are projected to exceed the world's remaining 1.5°C carbon budget by 2030 in a Business-As-Usual scenario.

MPP comprises four core partners: the Energy Transitions Commission, RMI, We Mean Business Coalition and the World Economic Forum.

MPP brings together the world's most influential leaders across finance, policy, industry and business. MPP is focused on activating the entire ecosystem of stakeholders across the entire value chain required to move global industries to net-zero.

MPP is funded by the Bezos Earth Fund, Bloomberg Philantropies, Breakthrough Energy, the Climateworks Foundation, the European Climate Foundation, and the Joseph and Marie Field Family Environmental Foundation.

What does MPP try to achieve with its Sector Transition Strategies?

The objectives of the MPP Sector Transition Strategies are:

1. **To demonstrate industry-backed, 1.5°C-compliant pathways to net zero**, focusing on in-sector decarbonisation and galvanising industry buy-in across the value chain.
2. **To be action-oriented with clear 2030 milestones**: By quantifying critical milestones for each sector in terms of its required final energy demand, upstream feedstock resources, and capital investments, MPP wants to lay the foundation for tangible, quantitative recommendations of ways to reach these milestones through collaboration among industry, policymakers, investors, and customers.
3. **To be transparent and open**: MPP's long-term goal is to fully lay open the internal machinery of the Sector Transition Strategies, that is, to make its Python models open source and all data inputs open access. In addition, MPP is developing online web interfaces that bring the Sector Transition Strategy reports to life: individual users will be able to explore the results of the reports and to customize model input assumptions, study the impact of individual levers, and dive deeper into regional insights.
4. **To break free from siloed thinking:** The transition of a sector to net zero cannot be planned in isolation since it involves interactions with the broader energy system, for instance, via competing demands for resources from multiple sectors. All MPP Sector Transition Strategies are based on similar assumptions about the availability and

costs of technologies and resources like electricity, hydrogen, or sustainable biomass. By providing a harmonized, cross-sectoral perspective, we intend to inform decision makers with a fair, comparable assessment of transition strategies for all seven sectors.

How is Zero-Emissions defined?

Battery-electric trucks (BETs) and Hydrogen fuel-cell electric trucks (HETs) do not emit any CO2. The term net-zero applies to processes or combustion that emit CO2 that has been either captured upstream using industrial processes or recently grown in a plant. That does not apply to hydrogen fuel cell or battery electric trucks that have no tailpipe emissions (a hydrogen fuel cell does create water vapours). For clarity and to distinguish from sustainable renewable or synthetic fuels, this MPP section uses the term zero emissions.

What drives Zero-emissions truck (ZET) adoption?

ZET adoption is driven mostly by vehicle economics, but some fleets will buy ZETs before total cost of ownership superiority while others will refrain, keeping more costly diesel vehicles. The former is often driven by environmental commitments, while the latter could be because of operational or grid constraints. Much of the market will make decisions based on financials and their own formal or informal discount rate for future operating expense savings.

Can the grid handle these electric trucks?

A ZET is not viable if it lacks charging, both at the depot and often on route. A proxy for electricity constraints [is] modelled in the MPP analysis, and in the real world many actions must be taken to ensure the grid does not become a major barrier. That includes having the electrical infrastructure to provide service for depots, which have loads that can range from the equivalent of a skyscraper to a business district. For on route charging, higher speeds (>1 MW) create greater grid demands but can also improve vehicle efficiency and charger station utilization rates. Abundant high power will eliminate a adoption barrier and facilitate the ZET transition.

The amount of power a depot requires is large, but ZETs will only need 3% of the four modelled regions overall electric supply. Utility grid upgrades and investments in renewable generation need urgent attention but are achievable.

How green can the grid really be?

In the MPP model, supplies of green H_2 are not constrained and are assumed to stand for 100% of the H2 supply. Electricity for BET is expected to be sourced from the grid and a projection has been made to assume future grid compositions that are 90% renewable by 2050, with the remaining electricity provided by some form of net-zero baseload generation. These grid projections are in line with analysis by the International Energy Agency and stated policy goals from [xx].

How does the MPP trucking model work?

The model calculates the total cost of ownership for trucks of different powertrains over their lifetimes, using regionally and duty cycle specific assumptions. At each new truck purchasing point the model selects the lowest cost powertrain and uses a logistic function to assign the probability of purchase, creating an s-curve for ZET deployment.

What about vehicle residual value? What about battery residual value?

Second life markets are not included in the model. Instead, vehicles are assumed to have a reasonable useful life of 15 years for urban and regional duty cycles and 9 years for long haul. That is how long diesel vehicles last, but electric vehicles may last longer, albeit with degraded battery capacity. Even after a battery no longer has peak performance, it may still retain considerable energy capacity, enough to function in a lower range truck, or to be resold for stationary storage. Finally, a truly worn-out battery may be able to be recycled. These markets or second lives are not mature enough to be included in the model, but the report does encourage the development of those markets.

How did you pick the values in your model?

Some economy-wide values, like how much power is renewable, or the costs of hydrogen, were modelled by a central MPP team that looked at these values broadly to align across all MPP sector transition strategies. Others, like the cost of batteries, or new diesel vehicles were based on expert opinion and published reports and validated with industry experts.

Any forward-looking projection is contestable. The model projects modest annual reductions in battery costs, less than historic improvements. On the other hand, in 2021 battery prices rose and batteries' primary ingredient, lithium, will be in great demand for both grid and vehicle use.

Producing hydrogen from renewably powered electrolysis is a newly commercialized technology. It is not a technical breakthrough but will require unprecedented scale. Cost reductions to make it competitive depend on industrial improvements and the use of cheap, likely off-peak, renewable power. The model estimates hydrogen cost declines that align with many industry reports, but may also be considered too optimistic by some stakeholders and too pessimistic by others.

Who did you talk to?

We engaged with the Road Freight Zero community, which comprises over 50 companies and 20 organizations. Independently we met and had our work outputs reviewed by OEMs, Transporters, financers, utilities, energy suppliers, and other stakeholders. We have done this in several regions.

We want to use the model and test its assumptions, when will it be available?
The MPP team will make the model available online before the United Nations Climate Change Conference in November 2022.

What is the right mix of policy to achieve the 2050 ZET transition?

This report identifies many policies that can help create the transition but does not necessarily identify what mix is optimal. The trucking industry is very regional in nature, so what will work well in one region will perhaps not work that well in a different region. So, local policies designed to promote ZETs can help secure and accelerate the transition, especially in the early stages.

What about bio-fuels, what role will they play?

Bio fuels (e.g., biodiesel) are more or less chemically identical to diesel and offer very similar performance. This would seem to make them an ideal fuel for trucks. However, those fuels are made by converting bio feedstocks into fuels via industrial processes. Those feedstocks are limited, and those processes can be expensive. For biodiesel, the highest-value use cases for the biomass feedstocks is in other industries, especially aviation and petrochemicals. For this reason i.e. feedstock availability, biofuels are expected to play a very limited role in truck decarbonisation.