



**ARE YOU READY FOR YOUR  
ALTERNATIVE FUEL FUTURE?**

## INTRODUCTION

We don't want to alarm you. But the changes that are coming to logistics are imminent and all-encompassing.

Vehicle manufacturers are already moving production away from diesel to alternative fuels. This process will accelerate until 2040 when (with very few exceptions, mining being one) you'll only be able to buy alternative fuel Heavy Goods Vehicles (HGV). In two to five years - when the Total Cost of Ownership (TCO) of Alternative Fuel Vehicles (AFV) becomes cheaper than diesel - you'll be actively buying them, ready or not. The resulting fleets, with a blend of diesel and AFV, will undoubtedly impact the planning and execution of your logistics operations. And leaving it until the last minute to switch will add both cost and complexity to your operation.

But what does all this mean for you? Diesel vehicles have quick refueling and turnaround times. Battery vehicles need to be charged more often and take far longer to recharge. Batteries also degrade over time, causing capacity loss (ever wondered why people talk about "charging to 80%? That's because, beyond that, the charging rate reduces).



## CHANGE IS COMING TO LOGISTICS

By 2035, all new vehicles (of 26 tons and below) will need to be AFV. By 2040, all new HGVs will need to be AFV. Over this period, manufacturers will be moving production away from diesel engines. As governments struggle to meet their commitments, we can also expect increased legislation and even penalties. The increase in Ultra Low Emission Zones (ULEZ) and low-traffic neighborhoods - in addition to Euro7 emission regulations - will increase planning complexity and, in many cases, reduce logistics efficiency and increase costs.

Companies like Amazon are already several steps ahead of the curve. At the close of 2022, the e-commerce giant had just five 37-ton electric lorries in the UK. In the next three years, more than 700 eHGVs are set to join the company's UK fleet, with a further 1,500 in Europe. Moves like these, from an organization of Amazon's size, will undoubtedly help scale the production of eHGV and stimulate a speedier shift away from diesel<sup>1</sup>.

***“Deploying thousands of electric vans, long-haul trucks, and bikes will help us shift further away from traditional fossil fuels—and hopefully, further encourage transportation and automotive industries in Europe and around the world to continue scaling and innovating, as we will have to work together to reach our climate goals,”***

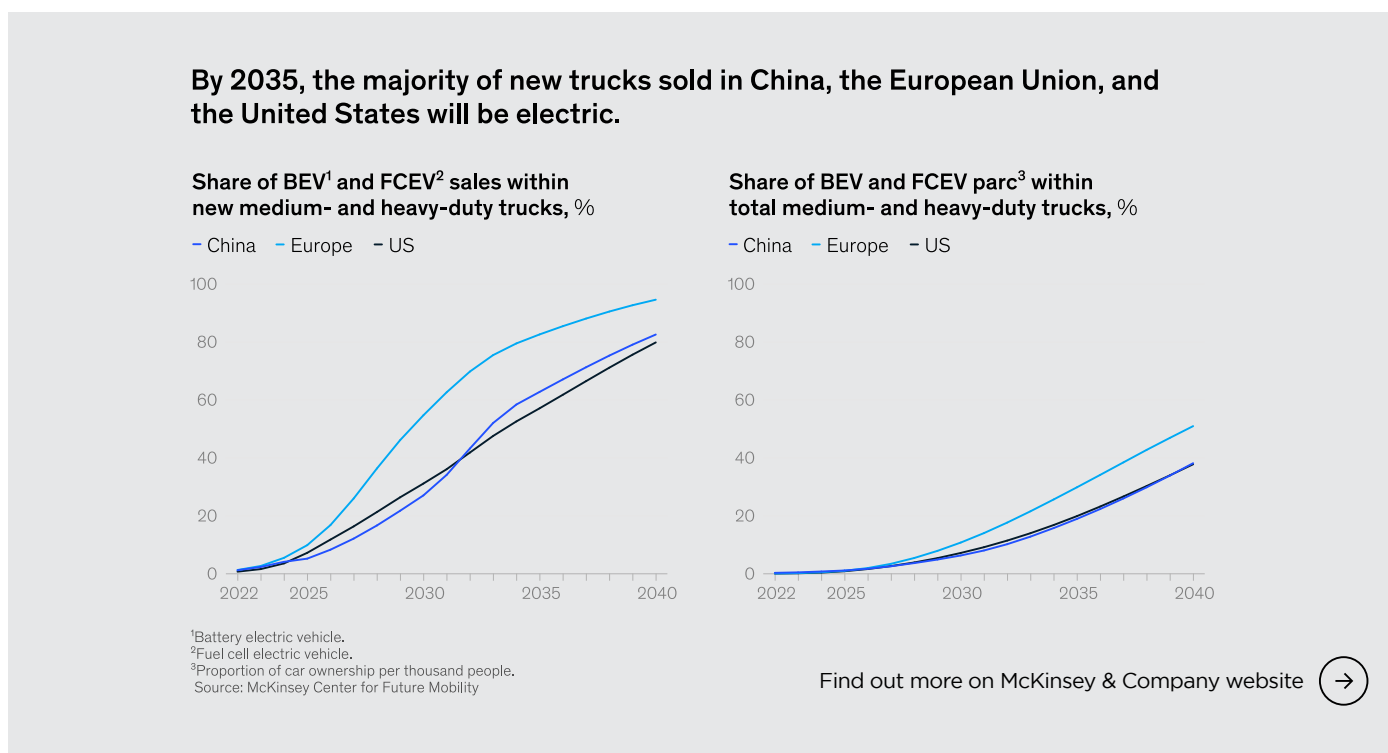
**- Andy Jassy, CEO of Amazon**

<sup>1</sup> <https://trans.info/700-electric-lorries-in-amazon-uks-fleet-in-3-years-308404>

## BUT 2035 IS AGES AWAY, AND 2040 IS EVEN FURTHER?

Well, yes and no. According to the [McKinsey report, 'Preparing the world for zero-emission trucks'](#)<sup>2</sup>, many fleet operators have already announced decarbonization targets which will influence the types of vehicles produced in the future.

**“Demand for ZE (zero-emission) trucks is expected to increase substantially, partly because the Total Cost of Ownership is expected to fall by about 10 percent over the next five to ten years. By 2035, the majority of new trucks sold in China, the European Union, and the United States will be electric.”**



Logistics has been slower in transitioning to renewable energy and will start to feel the pressure to reduce emissions.

From 2025, the transport and construction sectors will be included in the Emission Trading System (ETS 2).

This mechanism will gradually reduce the number of carbon emission credits available, effectively adding an extra cost to the price of fossil fuels agile companies, like Amazon, are acting early to avoid these penalties.

For example, the European Commission’s “Fit for 55” legislative package is a bundle of proposals to reduce emissions by at least 55% by 2030 compared to 1990 levels.

<sup>2</sup> <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/preparing-the-world-for-zero-emission-trucks>



## CHALLENGE YOUR THINKING ON TRUCK TCO

It's widely accepted that the Total Cost of Ownership (TCO) of an AFV truck is higher than its diesel equivalent, but that will change. Some reports calculate that this will shift as early as 2024. Other reports state that in Germany, France, and the Netherlands, TCO parity with diesel tractor-trailers is already possible. Of course, this will vary according to your exact business case and fuel costs.



A study by the International Council on Clean Transportation (ICCT) analyzed the TCO of Battery Electric Trucks (BET) from the viewpoint of a first user over five years, factoring vehicle retail price and residual value, electricity and diesel costs, maintenance and battery replacement costs, and charging infrastructure costs.

ICCT concluded that before 2030, without policy support in all countries evaluated (France, Germany, Italy, the Netherlands, Poland, Spain, and the UK), and BET can achieve TCO parity with diesel tractor-trailers<sup>3</sup>.

“Extending the European Emissions Trading Systems to include transport and instituting tax discounts for renewable electricity would accelerate the cost of ownership parity,” ICCT added.

Of course, this does not include the impact of transport policies or intangible factors such as producers and consumers looking for end-to-end supply chain sustainability improvements. Getting your planning in place now means you'll be able to take advantage of any incentives and avoid being hit by penalties – the perfect win-win.

<sup>3</sup> <https://theicct.org/publication/total-cost-of-ownership-for-tractor-trailers-in-europe-battery-electric-versus-diesel/>

## NOT ALL AFVS ARE CREATED EQUAL

So why are we talking about AFV and not EV? It's beyond the scope of this paper to compare the alternatives in detail. But it's worthwhile making a note of the four main types of AFV.

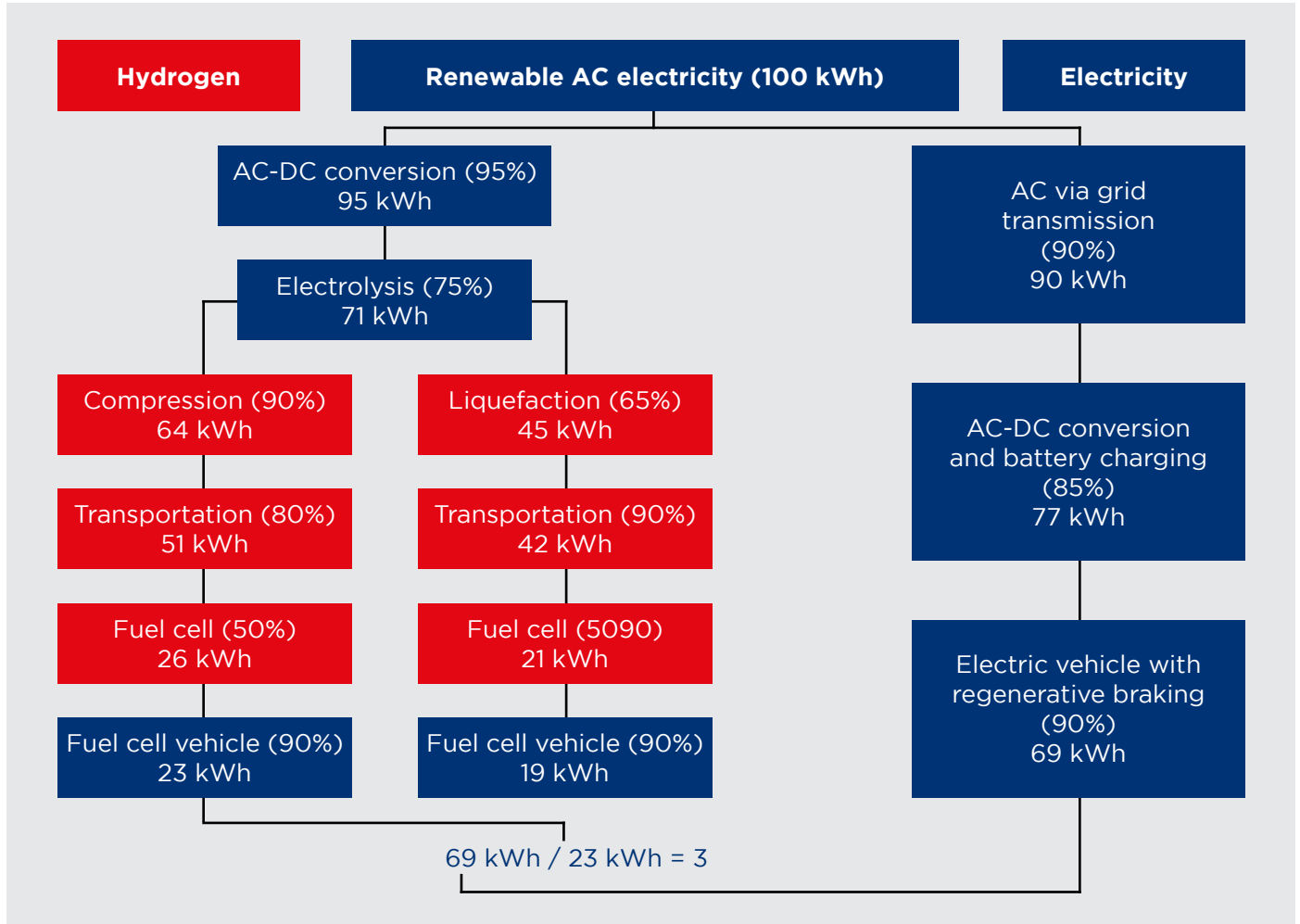
<b>BEV</b>	<b>Battery Electric Vehicles</b>	Zero emission as the electricity is stored in a battery pack.
<b>FCEV</b>	<b>Fuel Cell Electric Vehicles</b>	Zero emission as electricity is generated by combining hydrogen with oxygen from the air to produce water.
<b>HICEV/ H2-ICE</b>	<b>Hydrogen Internal Combustion Engines</b>	Hydrogen is burnt in a modified combustion engine. Because of its byproducts, this is not zero emission.
<b>HVO</b>	<b>Hydrotreated Vegetable Oil</b>	Although CO2 and particulates are still emitted (impacting clean city initiatives), the carbon content comes from renewable sources.



From an environmental viewpoint, it's widely accepted that we need to move away from fossil fuels and toward renewable energy. There's little point in using gas to generate electricity when a modified internal combustion engine can run on gas. Fuel options are not all as green as we might expect either. Hydrogen can be extracted from water using electricity. But what's known as blue hydrogen is extracted from gas, a fossil fuel. Renewable energy is not yet a cheap or unlimited resource, so we need to use it as efficiently as possible.

The TCO of a vehicle is impacted by the upstream costs, for example, carbon capture or delivery of hydrogen or electricity.

We can see from the diagram below that for every 100kWh of electricity we put in, there are drastically different amounts of energy available for the driver. Taking energy costs into account, a BEV can be 3.5 times more efficient than a hydrogen AFV. Choosing the correct vehicle for a particular route will significantly impact profitability.



## LOGISTICS: NEW CHALLENGES

Understanding the challenges and planning ahead will be key to a smooth and efficient change to AFV. Because those organizations that embrace the changes early will have a clear benefit compared to the late adopters.





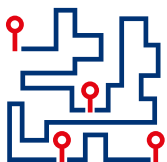


### Blended fleet

You don't need us to tell you that having a blended fleet of diesel, battery, and fuel cell vehicles will affect your planning, network, and route structures. The new puzzles will add complexity that your existing ways of working simply cannot handle. Different vehicles with different characteristics will suit different use cases, the challenge being to get the benefits from using your AFV and diesel vehicles to their best potential.

### More complex routing

Achieving the potential from a blended fleet will challenge your route planning. Even calculating the range of a fully-charged AFV will be complex for a planner without the correct tools. That's because its range will be variable based on the weather, load carried, and road conditions (e.g. gradients).



You may have to consider shorter routes or even swapping vehicles. Breaking down your routes into multiple trips means the level of vehicle charge at the start of a trip will determine the trip's viability. The availability of recharging stations will change over time. As en-route recharging becomes an option, you'll need to be able to adjust your planning, even factoring in the possibility of recharging while unloading to extend range.

### The need to plan vehicle downtime (charging)

Many companies plan to use vehicles on multiple routes per day. They have to plan departure times to balance the usage of depot capacity (e.g. warehouse pick rates). Planners will now also have to consider the vehicle recharging plan. Hydrogen-powered vehicles can be recharged quickly. But the use of recharging stations will become an additional planning puzzle for battery-powered vehicles.



To make matters more complex, the rate of charge for a battery-powered vehicle not only varies according to the charging station but also slows above 80% charge. If you have a limited number of charging stations, planners will need to decide on the amount of time each vehicle spends on a charging station and thus the charge level when that vehicle departs.

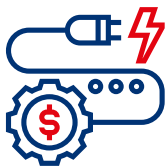
### Access

Less tangible challenges include the ability to flex collection/delivery times based on the relative quietness of AFV in operation and the types of vehicles that can access Ultra Low Emission Zones (ULEZ) or noise-restricted areas at particular times of the day or week.



### Variations in charging costs

As outlined above, the cost of the energy available will depend on the vehicle type. But even with BEV, when you charge your vehicle will dramatically affect the cost. During peak load times, in industries that use large amounts of electricity, the electricity distribution networks are already calling for demand reduction. The cost of electricity varies throughout the day, too. The difference in cost could be as much as 600%.



But will you be able to charge all your vehicles simultaneously using the cheapest electricity? That's unlikely based on the cost of charging stations and installing additional multi-megawatt electricity supplies. So, planning just got even more complex.

## HOW WILL THE CHANGES IMPACT YOUR ORGANIZATION?

Keep having faith, because these challenges can become opportunities. At The Logic Factory, we can help you get all the pieces of your particular puzzle in place. With the correct tools, your planners can produce more efficient plans and take advantage of the opportunities AFV presents:



- 1 Efficiently plan a blended fleet
- 2 **Maximize the profitability of your vehicles without detrimental effects on your service-level agreements (SLAs)**
- 3 Adjust to an ever-improving infrastructure
- 4 Opportunities to extend collection/delivery time windows by using quieter AFV for overnight, early, and late deliveries (where noise prohibition rules apply)
- 5 **Centralized knowledge empowers your planners**
- 6 Ensuring that vehicles have sufficient charge to fulfil the allocated trips
- 7 **Seamlessly integrate route planning, pick planning, and recharge planning**
- 8 **Save costs by maximizing the use of lowcost energy supplies (using offpeak electricity to charge or hydrogen vehicles for longer routes)**
- 9 Planning more efficient vehicle swaps and unloading/reloading
- 10 **Planning achievable routes for your fleet, agency drivers, and 3rd parties to ensure SLAs are met**
- 11 Improve customer perception by using greener resources
- 12 Efficiently plan for Euro7 restrictions, ULEZ, and low-traffic neighbourhoods
- 13 **Improve corporate responsibility by ensuring you reduce your emissions and total energy consumption**

From the efficient use of charging points as a new aspect of yard management, to factoring in recharge detours, extending delivery options with AFV and trailers and everything in between, The Logic Factory can help you maximize your planning potential.



## PREPARATION IS THE KEY TO SUCCESS

Your infrastructure, fleet, and planning must be fit for purpose to solve these new challenges. “A to B” planning and siloed routing tools won’t create the integrated plans that you need. In the past, spreadsheets could be used to fill any gaps in your planning solutions. But now they’ll start to have a major impact on your operational costs.

You might be tempted to bury your head in the sand. Or grab an off-the-shelf software package that promises to fix things for you. But please don’t. Because with timely preparation and an integrated supply chain solution, none of these complex challenges are insurmountable.



**TALK TO TLF**

We hope we’ve balanced highlighting the challenges and providing you with enough information to start formulating a plan.

Executing your plan using our professional systems makes solid commercial sense, so talk to us today!

[Talk To Us](#)

## ABOUT THE LOGIC FACTORY

The Logic Factory (TLF) is a global Supply Chain Planning and Optimization consultancy whose mission is to help customers make lasting performance improvements through optimized planning in the domains of manufacturing & supply chain, logistics, and workforce.

TLF offers high-quality planning, scheduling, and optimization solutions as well as hosting, maintenance, and support services. We believe in building long-term relationships based on mutual trust – as a valuable partner that supports your business growth.

TLF’s headquarters is in Den Bosch, The Netherlands. We have offices in Ahmedabad, India; Ardmore PA, United States and Liverpool, United Kingdom, enabling us to offer customers global coverage.



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