

Infrastructure Challenges to Mass Adoption of Electric Vehicles



Introduction

While the number of electric vehicles is sure to increase exponentially in the coming years, charging these vehicles is going to prove a challenge. Consumers who purchase electric vehicles still struggle with factors like high battery prices and the low availability of working chargers. Owners of E-bus fleets and E-truck manufacturers are in need of rapid charging solutions in order to make these electric alternatives to traditional buses and trucks feasible. And the current energy grid as it stands will not be able to keep up with future demand, so we must employ new ways to ensure the grid doesn't become overloaded.

In this whitepaper, we'll go over the biggest infrastructure challenges to the mass adoption of electric vehicles and explore the solutions that Heliox offers to help ease the transition.



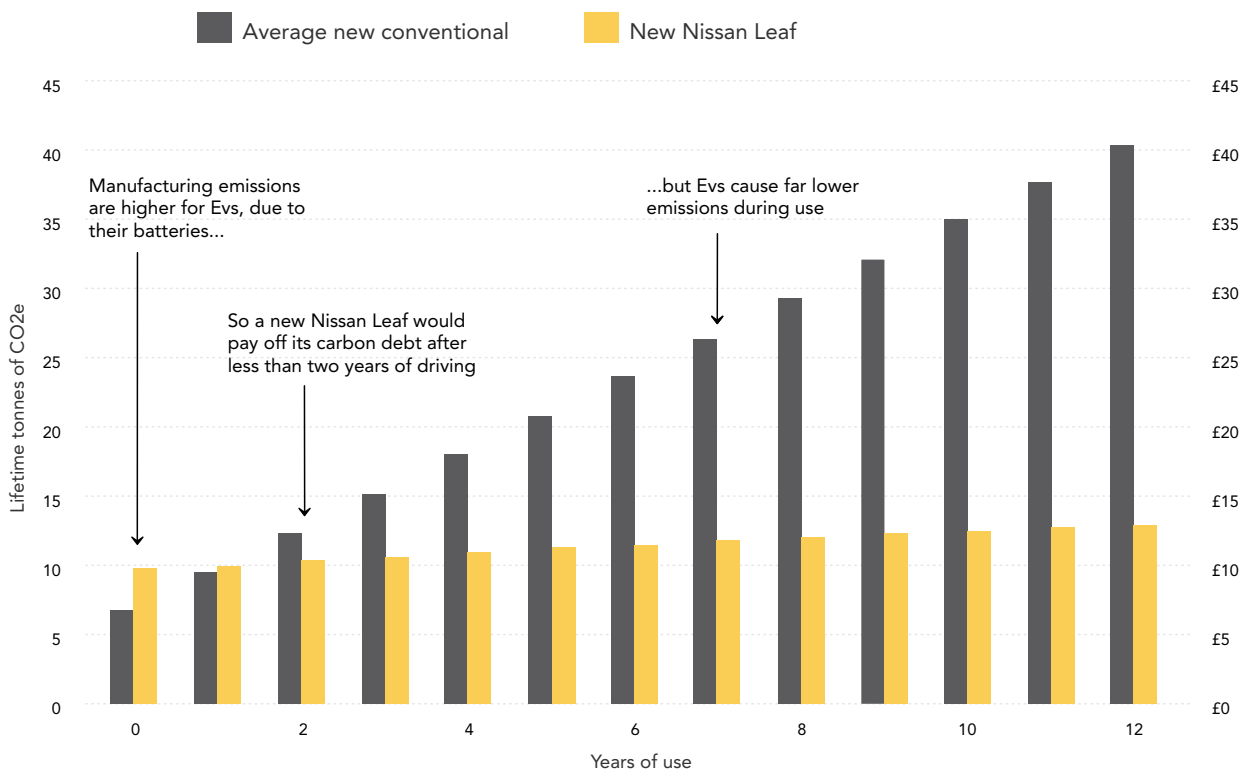
SECTION 1

Mass Adoption of Electric Vehicles: The need of the Hour

COP 26 in Glasgow has come and gone. It’s success or failure to collectively tackle the scourge of climate change for future generations will be determined by those generations yet to come. It is too early to weigh up the summit's impact. What we do know, however, is that the transportation industry in its current state is having an adverse effect on the world's climate, through the emission of greenhouse gases. The time has come for cars to busses, from trucks to ferries to transition to clean e-mobility.

Some argue that the raw materials needed to create fully electric vehicles and the electricity needed to power them illustrate that EVs aren’t the solution. But this ‘carbon debt’ is paid back by the vehicle over a period of time compared to gas powered vehicles. According to Carbon Brief, the manufacturing emissions are indeed higher for a typical EV, a Nissan Leaf, but this EV would pay off its debt after less than 2 years of driving. See below for more data:

A new Nissan Leaf EV pays back emissions from battery production after less than two years - and emits three times less Co2 in its lifetime than the average new conventional car in the UK.



Let's also take into consideration 'Net-Zero' goals of countries around the world by the year 2050. Net zero means not adding to the amount of greenhouse gases in the atmosphere. Achieving it means reducing emissions as much as possible, as well as balancing out any that remain by removing an equivalent amount. This will put pressure on companies and Fleet Owners within organisations to look at all areas of their businesses to ensure they are hitting ever tougher targets.

Reducing greenhouse gases by transitioning to EV's and working towards a global goal of Net Zero by 2050 makes good business sense for companies with a long-term outlook.

The hour has come for companies looking to make the transition over to e-mobility, education, understanding, regulation and key infrastructure challenges lay ahead, which we'll cover in the next sections:

“The total cost of ownership (TCO) combines both the purchase price and operating expense. Electricity costs less than petrol and diesel, there's less tax to pay, and EV service and maintenance cost about a third less than an ICE car.”



SECTION 2

Four Key Infrastructure Challenges

1. Price

One of the biggest challenges towards wider adoption of electric vehicles is their high price tag. Consumers see the higher prices of electric vehicles and often opt for cheaper gasoline-powered vehicles. The heft of the price of an electric vehicle comes from the expensive materials and processes used to make EV batteries. This puts a passenger EV at around \$30-40,000, which may turn off potential consumers.

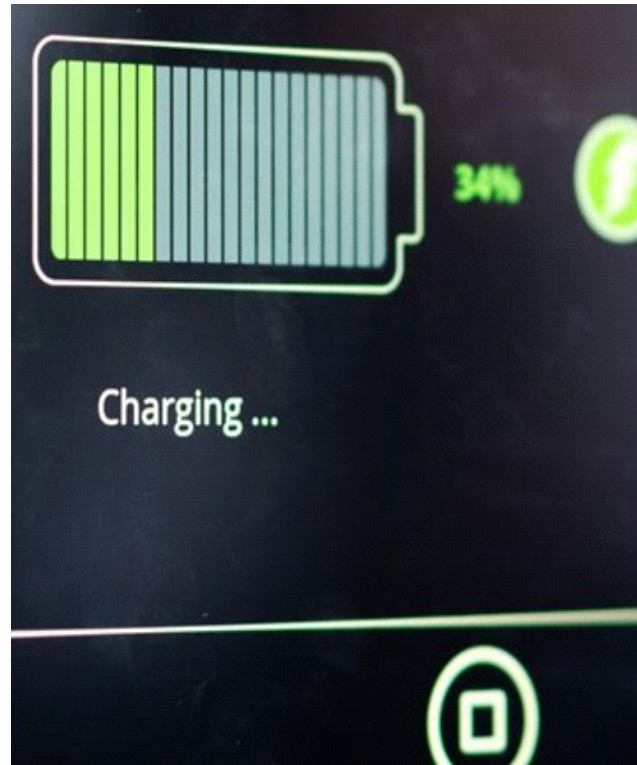
However, the higher initial price of an EV is deceptive. Electric vehicles save massive amounts of money on fuel over the 15-year lifespan of the car. Studies have shown that EVs can save consumers in the United States anywhere from between \$4,500-\$12,000 depending on the state you live in. Consumer education on the cost-benefit of EVs paired with cheaper means of battery production are both key to accelerating the adoption of EVs.



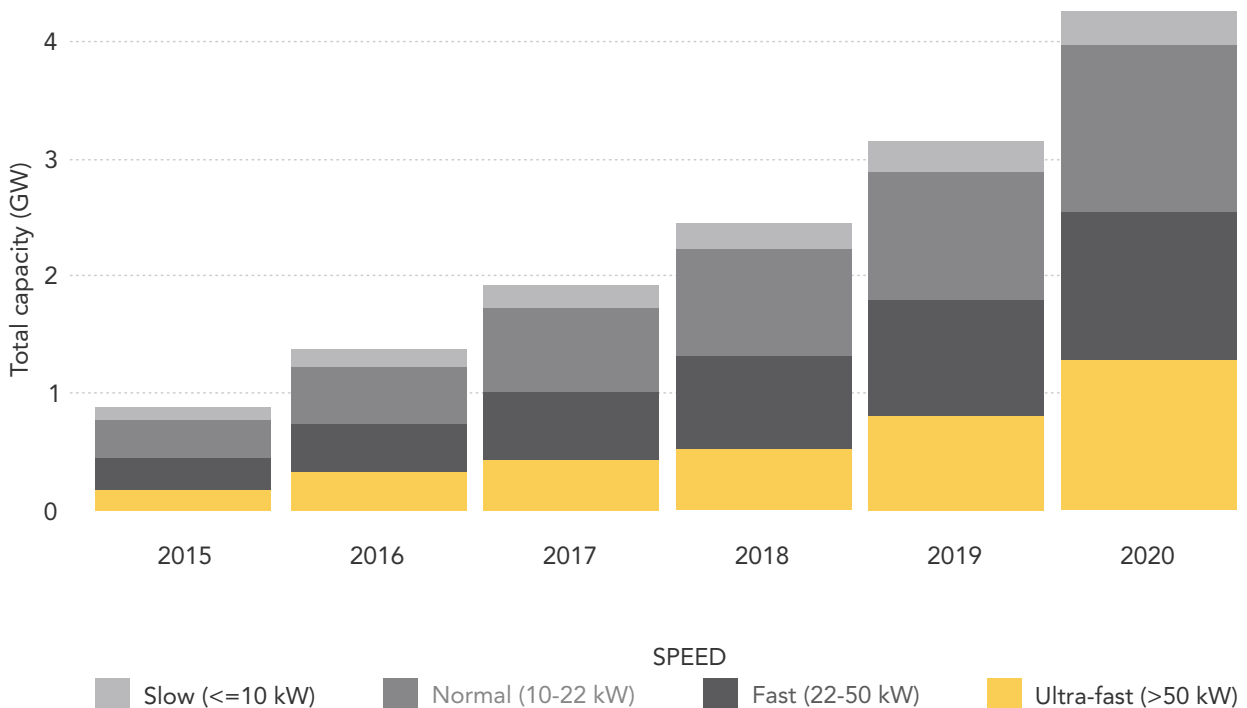
2. Charging Speeds

Slow charging speeds are another potential hurdle. Current estimates for the charging time of the average electric car put it at almost eight hours to fully charge when using a 7kW charging point. When compared to the mere minute or two it takes to fill a tank of gas, slow charging speeds are enough to deter truck- and bus-owners who don't have the luxury of waiting on a charge.

However, the development of rapid charging solutions decreases this wait time exponentially. Heliox supplies E-bus and E-truck owners with rapid chargers capable of providing up to 67% faster charging speeds than any other provider. They also have 97% charge efficiency, which is the highest in the industry. As time goes on, rapid chargers are only going to become even faster, easing the transition towards wider adoption of E-buses and E-trucks.



EV charging points capacity
Cumulative installed capacity in Europe by year and charging speed



Author's elaboration on data from openchargemap.io

3. Charger Infrastructure

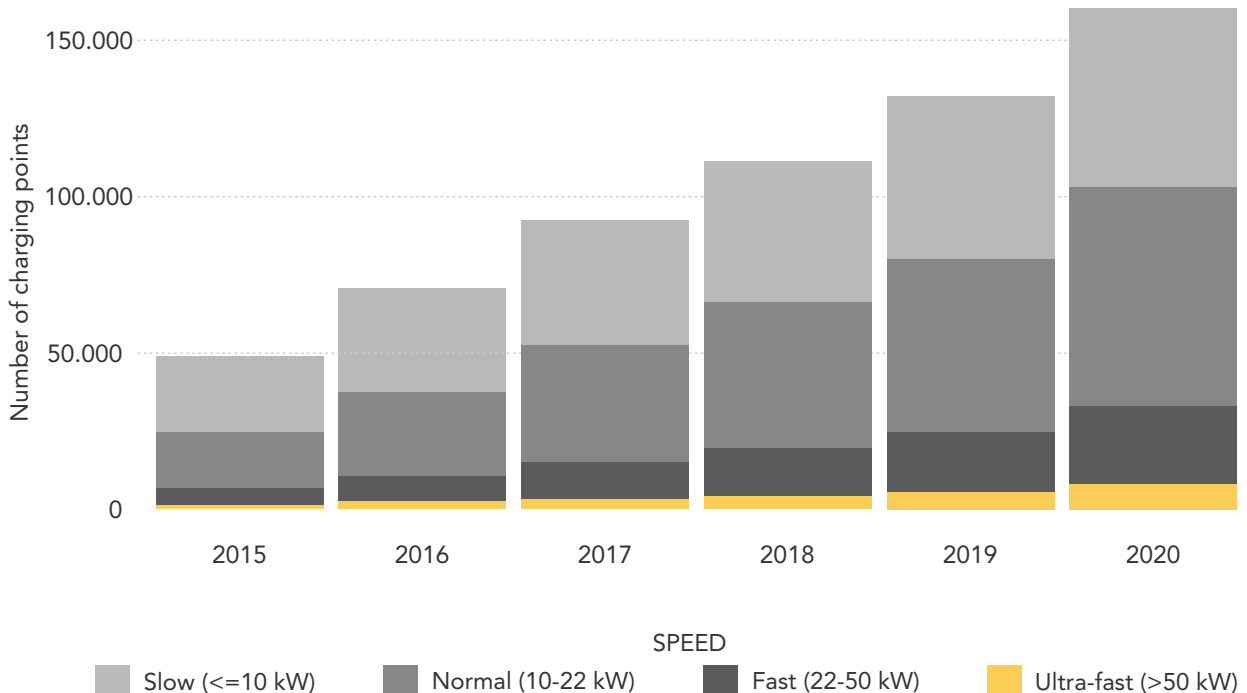
The worst nightmare for any road trip is for your EV to break down in the middle of the road with no electric charging station within sight. The International Council on Clean Transportation has reported that 88 out of 100 US locations with a charging infrastructure had less than half of the total needed in place. Expanding this charging infrastructure and ensuring the availability of EV chargers is vital if EVs are going to become fully mainstream.

Charging stations are expensive to install, which can have a potential chilling effect on their widespread adoption. But Heliox offers rapid chargers that are affordable and supported by 24-hour service and maintenance. These chargers can be used for fleets, public charging, commercial buildings, and shopping centers. As more and more EV owners require a charging solution for their vehicles, Heliox will step up to provide governments and businesses with an affordable way of expanding their infrastructure.



EV charging points

Cumulative charging points in Europe by year and charging speed



Author's elaboration on data from openchargemap.io

3. Grid Capacity

In addition to the need for more EV charging stations, the grid capacity presents another obstacle towards EV expansion. By increasing our reliance on electricity and decreasing our reliance on gasoline, the pressure put on the electric grid is going to skyrocket. The power generation capacity as it stands now is simply unequipped to power these vehicles without straining the grid. The Department of Energy has released an estimate of a 38% increase in electricity consumption by 2050, due in large part to the increase in adopting EVs. As an increasing number of people charge their EVs, we may run into overloaded grids especially during peak hours during the day.

Luckily, Vehicle-to-Grid (V2G) presents the key to the future of smart energy management. V2G allows EVs to green the grid by leveraging their inactivity to allow a two-way energy exchange between vehicle and grid. This means that the energy from the EV batteries can be used by the electric grid during peak hours, then recharging the vehicle during non-peak hours. ABI Research estimates that V2G could save global energy suppliers \$2 billion and save consumers 15% on their household energy bill by 2025.

Another more recent aspect of balancing the grid comes in the form of BESS, or Battery Energy Storage Systems. BESS is a technology developed for storing electric charge by using specially developed batteries. It has advantages over other storage systems as it has a small footprint and no restrictions on geographical locations that it could be located in.

Take, for example, the case in South Australia of the Hornsdale Power Reserve build. Due to a blackout event in 2016 leaving millions of residents in Queensland without power. Tesla and Neoen constructed (at the time) the world's largest lithium battery system in less than 100 days. It went into service at 100MW and was upgraded in 2020 to 150MW.

It was found that Hornsdale Power Reserve garnered numerous benefits to the grid system over the years, including removing the need for network upgrades and additional capacity. It also responded effectively to stress events on the local network. With more research and development taking place, it is believed right now that BESS technology may offer the best potential as a smart grid enabler and balancer.



V2G allows EVs to green the grid by leveraging their inactivity to allow a two-way energy exchange between vehicle and grid.

SECTION 3

Towards an e-transition

Consumer And Business Education

Because electric vehicles are still a relatively new form of technology, a lot of mainstream consumers aren't aware of their advantages. This lack of information may keep many consumers from adopting an EV when they otherwise would. Studies such as Deloitte's 2021 Global Automotive Consumer Study show that almost 75% of consumers in the US are looking to get an internal combustion engine (ICE) as their next vehicle. Continued education is necessary to keep this trend on an upward trajectory.

Regulations

Navigating the permit process, regulations, and interconnection with utilities is a struggle for many business owners looking to install EV chargers. Confusion over installation is a hurdle that Heliox is helping business owners overcome thanks to the knowledge of our Sales, Operations, and Installation teams. Our ability to navigate European regulations and standards can help clear the path towards more rapid adoption of EV charging stations.

Another key aspect is for energy management or e-mobility companies need to step in with a 360-degree view - enabling a transition by leading with design, installations and monitoring to derive long-term benefits from data analysis, interoperability between companies and the assurance of being future-proof.

The mass adoption of electric vehicles is a foregone conclusion at this point. The trend towards EVs, E-buses, and E-trucks has been a long time in the making and is only accelerating as EV technology continues to develop. According to research by McKinsey & Company, the automotive industry is set to introduce roughly 600 new electric vehicles by 2025. Electric vehicles are quickly becoming mainstream, but we must still overcome these challenges before mass adoption of them will become a reality.



SECTION 4

The Decade Ahead

Fatih Birol, the IEA’s executive director, goes on to say: “While they can’t do the job alone, electric vehicles have an indispensable role to play in reaching net-zero emissions worldwide. Current sales trends are very encouraging, but our shared climate and energy goals call for even faster market uptake,”

It’s worth noting that the transition of electric vehicles will also have a profound knock-on effect on many other areas of our lives. Take, for example, the news from the UK where the government announced that all new homes in England must have electric vehicle charging points. This equates to 145,000 new charge points installed per year thanks to new regulations, ensuring infrastructure keeps pace with a market that needs to grow exponentially to hit net zero targets.

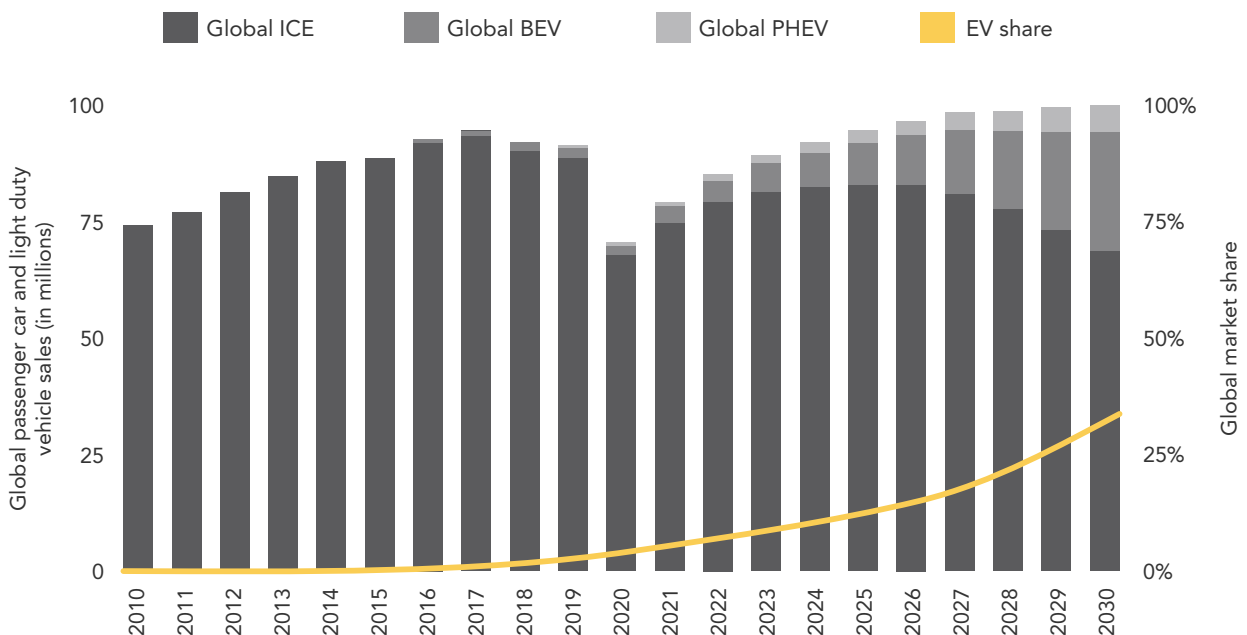
As you can see from the Deloitte Insights EVs will secure around 32% of the total market share for new car sales by 2030.

But what about regional sales? Deloitte expects that by 2030 China will hold 49 per cent of the global EV market, Europe will account for 27 per cent, and the United States will hold 14 per cent.

“The number of electric cars, buses, vans and heavy trucks on roads is expected to hit 145 million by 2030, the International Energy Agency said on Thursday.”

- CNBC

Outlook for annual global passenger-car and light-duty vehicle sales, to 2030



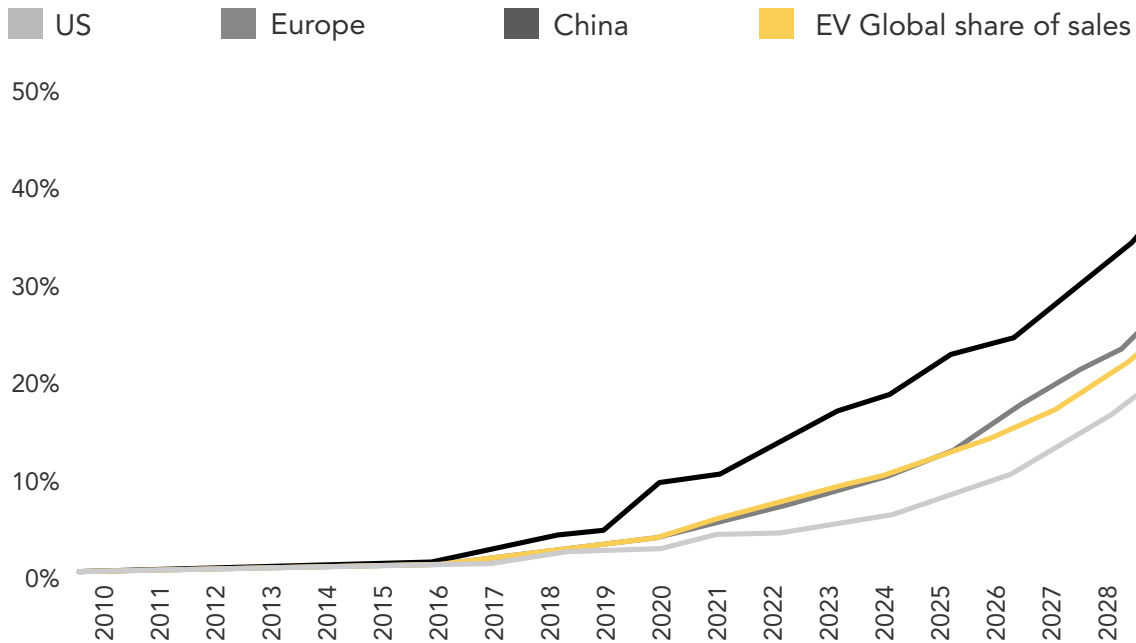
Source: Deloitte analysis, IHS Markit, EV-Volumes.com

For the decade ahead, factors like charging infrastructure, regulations, tax incentives, charging speeds, energy management, consumer sentiment and legally enforceable carbon targets will all play their part in the speed at which the e-mobility transition happens.

It is for companies like Heliox to continue to educate and break down barriers for businesses and consumers alike on the numerous benefits of moving to clean transportation right now, for the health and well-being of the world and future generations.



Outlook for EV market share by major region



Source: Deloitte analysis, IHS Markit, EV-Volumes.com

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