

THE FUTURE OF ELECTRIFIED VEHICLES IN SOUTHEAST ASIA

POSITION PAPER
FEBRUARY 2021



Nissan
FUTURES
Electrification & Beyond

FROST & SULLIVAN

CONTENTS

Definition of Electrified Vehicle	03
About the Study & Research Methodology	03
Executive Summary: Key Outcomes	04
Awareness of Electrified Mobility Powertrain Technologies	05
Intention to Purchase Electrified Vehicle	07
Key Factors Driving Adoption of Electrified Mobility	08
Profile of EV Intenders	10
Incentives to Adopt Electrified Vehicles & Perceptions of Maintenance Costs	11
Barriers to Adoption of Electrified Mobility	12
Nissan e-POWER Features	13
Attractiveness of Nissan e-POWER Technology	14
Final Word	15
Lists of Charts	15

DEFINITION OF ELECTRIFIED VEHICLE

In this study, electrified vehicle includes:



Battery Electric Vehicle (BEV)
Depends entirely on a battery that is charged by plugging into the electricity supply. The battery powers the motor through an inverter



Plug-in Hybrid Electric Vehicle (PHEV)
Has a conventional gasoline or diesel, as well as an electric motor powered by a large battery that is charged by plugging into the electricity supply



e-POWER
Has a small petrol engine to charge high-output battery when necessary, eliminating the need for an external charger

Electrified vehicle excludes:



Full Hybrid
Has an electric motor powered by a battery, but does not source its electricity from being plugged in

About the Study

Frost & Sullivan, the Growth Pipeline™ company, conducted a research for a study titled “The Future of Electrified Vehicles in Southeast Asia” in August - September 2020. Commissioned by the Japanese automotive maker Nissan, the survey conducted online interviews with 3,000 car owners, equally distributed across six countries in Southeast Asia (ASEAN): Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.

As a follow-up to the January 2018 study, the research uncovered key trends and developments in the consumer appetite for electrified mobility across ASEAN.

Research Methodology

Markets	Indonesia, Malaysia, the Philippines, Singapore, Thailand, Vietnam	
Methodology	Online survey interview via online panel	
Survey interview length	30 minutes	
Sample achieved	N = 3,000 (N = 500 per market, 6 markets)	
Fieldwork timing	August 2020 - September 2020	
Respondent criteria	Minimum monthly household income <ul style="list-style-type: none"> Indonesia (min. IDR 5,000,000) Malaysia (min. MYR 6,000) The Philippines (min. PHP 30,000) Singapore (min. SGD 6,000) Thailand (min. THB 30,000) Vietnam (min. VND 8,500,000) 	Must have a driver's license Have heard of electrified vehicle Must currently own or lease a passenger car

EXECUTIVE SUMMARY

Key Outcomes

This study shows that respondents have remained highly enthusiastic in their consideration of purchasing an electrified vehicle despite the uncertainties surrounding COVID-19.

Overall, 37% of the study respondents revealed that they would certainly consider electrified vehicles as their next car purchase within the next three years. While this percentage is lower compared to 51% in 2018, almost 55% of the respondents in 2020 indicated that they would probably consider purchasing an electrified vehicle in the next three years. This is significantly higher than 46% in 2018. Respondents from Indonesia, the Philippines, and Thailand show the most eager purchase consideration for an electrified vehicle in the latest study.

Range anxiety continues to be the most significant barrier in the adoption of an electrified vehicle. However, the study shows that customer perception towards purchase barriers has significantly improved from 2018, demonstrating an increased understanding and acceptance of electrified mobility across Southeast Asia.

Key motivators for consumers to possibly switch to an electrified

vehicle and purchase one in the near future is strongly rooted in the perception of better safety standards. Aside from that, the increasing environmental awareness among consumers and the lower running costs associated with an electrified vehicle over the long-term was also seen as pivotal factors to adopt electrified mobility.

Over three-quarters of the study respondents indicate that tax benefits and installation of charging stations at apartment buildings are the top-2 incentives for them to switch to an electrified vehicle. This demonstrates the ongoing need for car manufacturers, policy makers and private parties to collaborate to spur the adoption of electrified mobility.

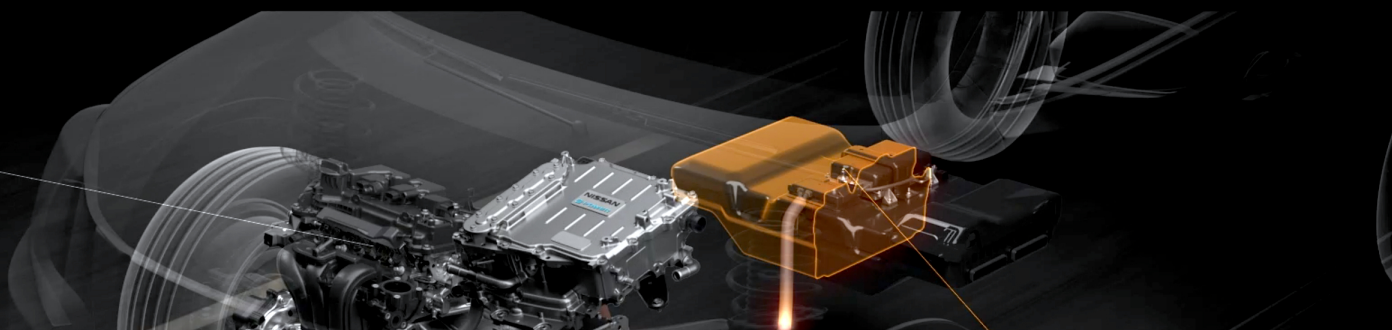
Moreover, the study also unveils that 67% of the consumers across Southeast Asia have environmental awareness as their top-of-mind emotional need when considering an electrified vehicle, and they believe that their adoption of an electrified vehicle would undoubtedly contribute to environmental protection. While 67% of the consumers perceive electrified vehicles to be cool and trendy, further findings from the study revealed that 66% of the

consumers believe electrified vehicle adoption is a near-term inevitability.

The awareness of 'the EV driving experience' (fast acceleration, near-noiseless driving, one-pedal driving) leaves room for improvement. However, educated consumers value and show interest in the overall driving experience that they can get from driving an electrified vehicle.

Overall, the top perceptions that respondents have towards an electrified vehicle and its driving experience are predominantly positive. The only concern of some consumers is the perceived limited driving range and maximum speed.

As a relatively new technology in Southeast Asia, the public awareness of Nissan e-POWER technology is low compared to other powertrains. However, after education about the various powertrains, 73% of purchase intenders for electrified vehicle find the Nissan e-POWER technology to be somewhat or very attractive, and over two-third of them indicate likelihood to purchase a Nissan e-POWER vehicle.



AWARENESS OF ELECTRIFIED MOBILITY POWERTRAIN TECHNOLOGIES

Awareness levels of different vehicle powertrains

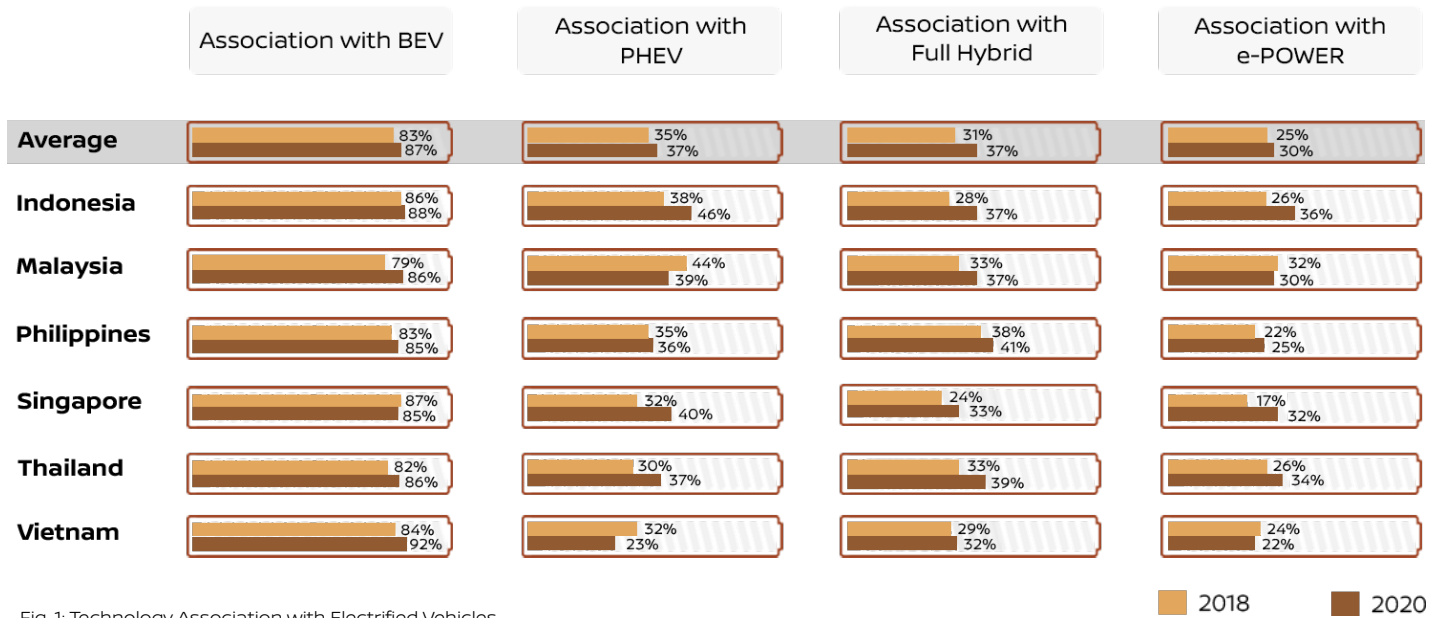


Fig. 1: Technology Association with Electrified Vehicles

Compared to 2018, significantly more consumers associate electrified mobility with BEVs. There are also significant increases in association of electrified mobility with full hybrid and e-POWER as compared to other electrified mobility powertrains. This is possible due to the increasing presence of these vehicle engine types in Southeast Asia. Of the surveyed markets, Nissan has already introduced e-POWER technology to

Thailand, Singapore, and Indonesia. As such, the study shows that the association of electrified vehicles with e-POWER has significantly increased in these three markets.

Consumers in Indonesia show the strongest association of electrified mobility with e-POWER, while consumers in Vietnam show the lowest association of electrified mobility with e-POWER.

Attractiveness of different vehicle powertrains (Southeast Asia average)

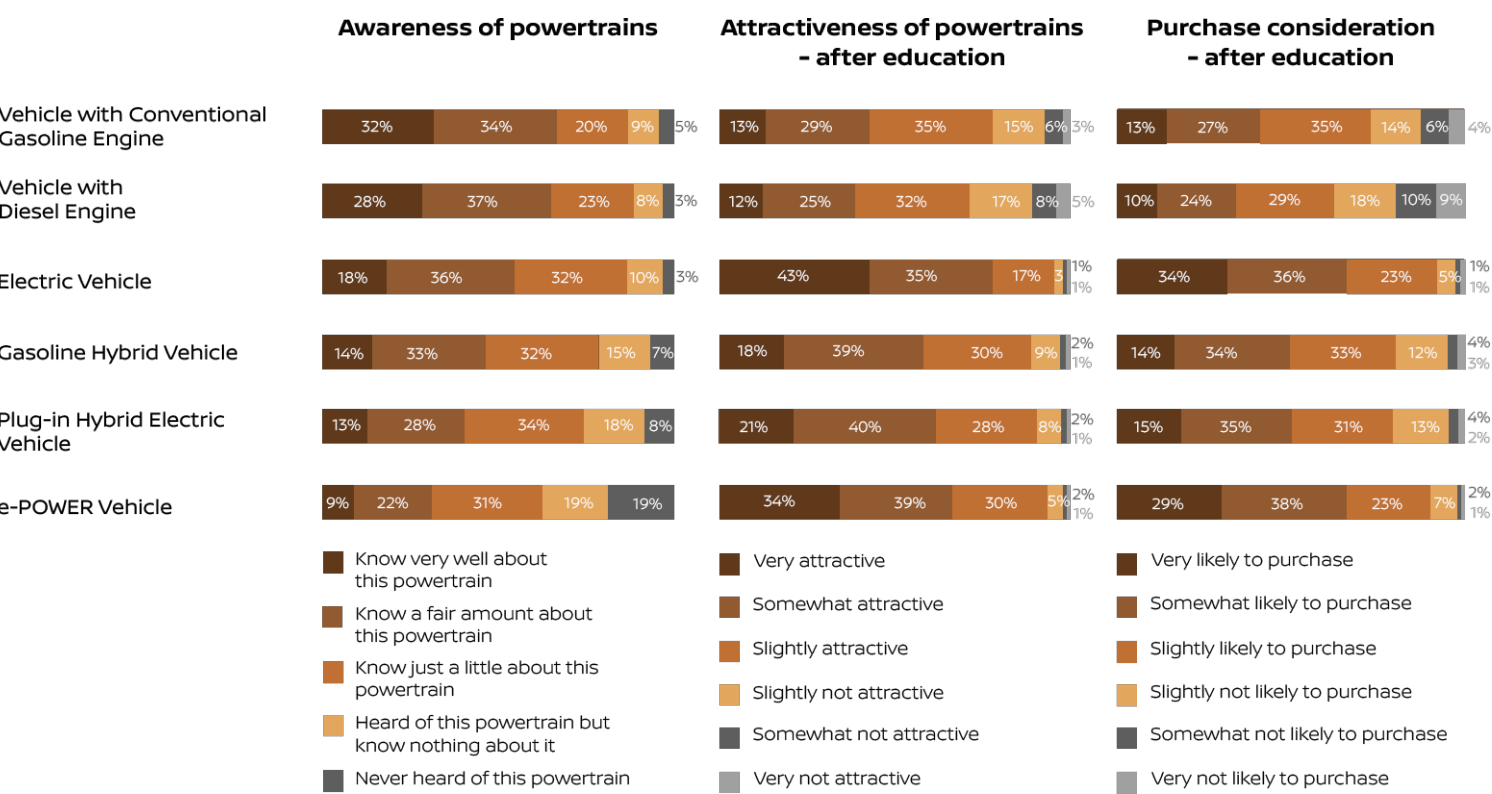


Fig. 2: Attractiveness of Different Vehicle Powertrains

A comparison of the different vehicle powertrains shows that most consumers have the highest awareness of conventional vehicles with gasoline or diesel engines. This is not surprising as these vehicle powertrains still capture the biggest market share in Southeast Asia today.

e-POWER vehicle powertrain is ranked the lowest in awareness among vehicle powertrains. However, after education about the various powertrains, e-POWER

is rated as a very attractive powertrain (34%), ranking only behind BEVs (43%).

Consumers are mainly attracted to several e-POWER features, such as the fast and smooth acceleration, near-noiseless driving experience, and the ability of the e-POWER system to eliminate the need for an external charger while receiving the 'EV driving experience'.

INTENTION TO PURCHASE ELECTRIFIED VEHICLE

Consideration to purchase an electrified vehicle as next car purchase in the next 3 years

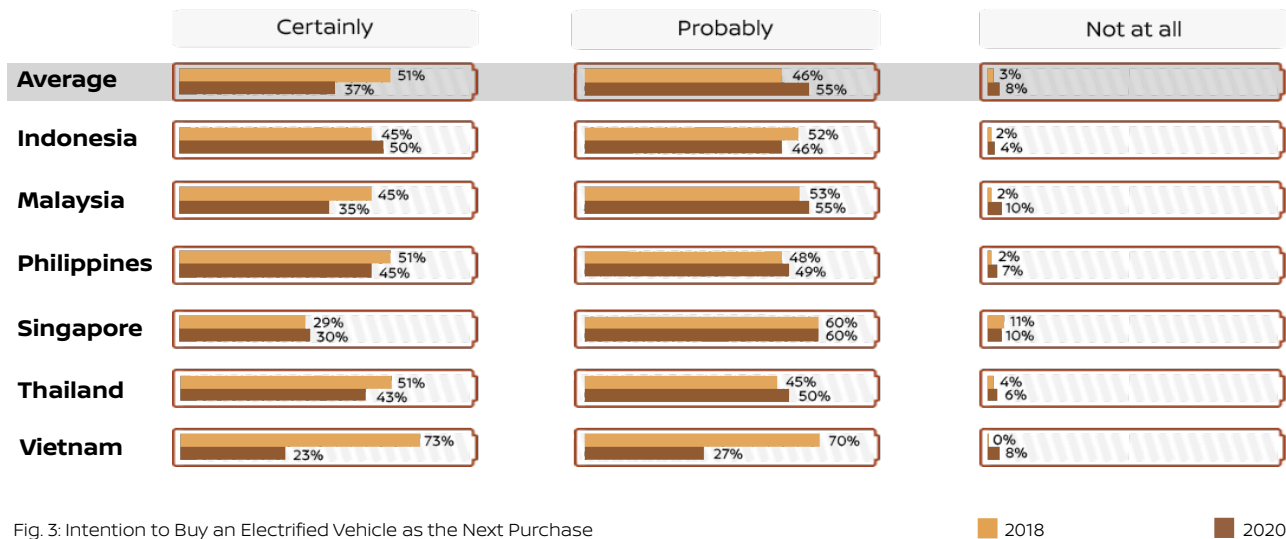


Fig. 3: Intention to Buy an Electrified Vehicle as the Next Purchase

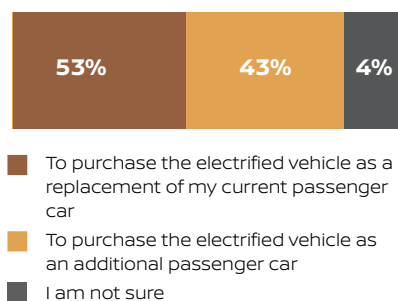
There is significant latent demand for electrified vehicles across all six markets in Southeast Asia. However, current adoption rates are not a true reflection of this underlying demand.

Of the 3,000 respondents surveyed in 2020, 37% revealed that they would certainly consider an electrified vehicles as their next car purchase within the next three years, a percentage that was lower compared to 51% in 2018. However, almost 55% respondents in 2020 indicated that they would probably consider

purchasing an electrified vehicle in the next three years, significantly higher than the 46% in 2018. Only 8% says they will not consider an electrified vehicle at this point.

Despite the economic uncertainties due to COVID-19, respondents are still highly enthusiastic when considering an electrified vehicle purchase in the near future. Respondents in Indonesia, Philippines, and Thailand are the most eager to make the switch.

Reasons to purchase electrified vehicle in the near future



Of the respondents that intend to purchase an electrified vehicle, 53% plan to purchase it as a replacement for their current passenger car, while 43% plan to purchase it as an additional passenger car for their household.

Fig. 4: Reason to Purchase Electrified Vehicle in the Near Future

KEY FACTORS DRIVING ADOPTION OF ELECTRIFIED MOBILITY

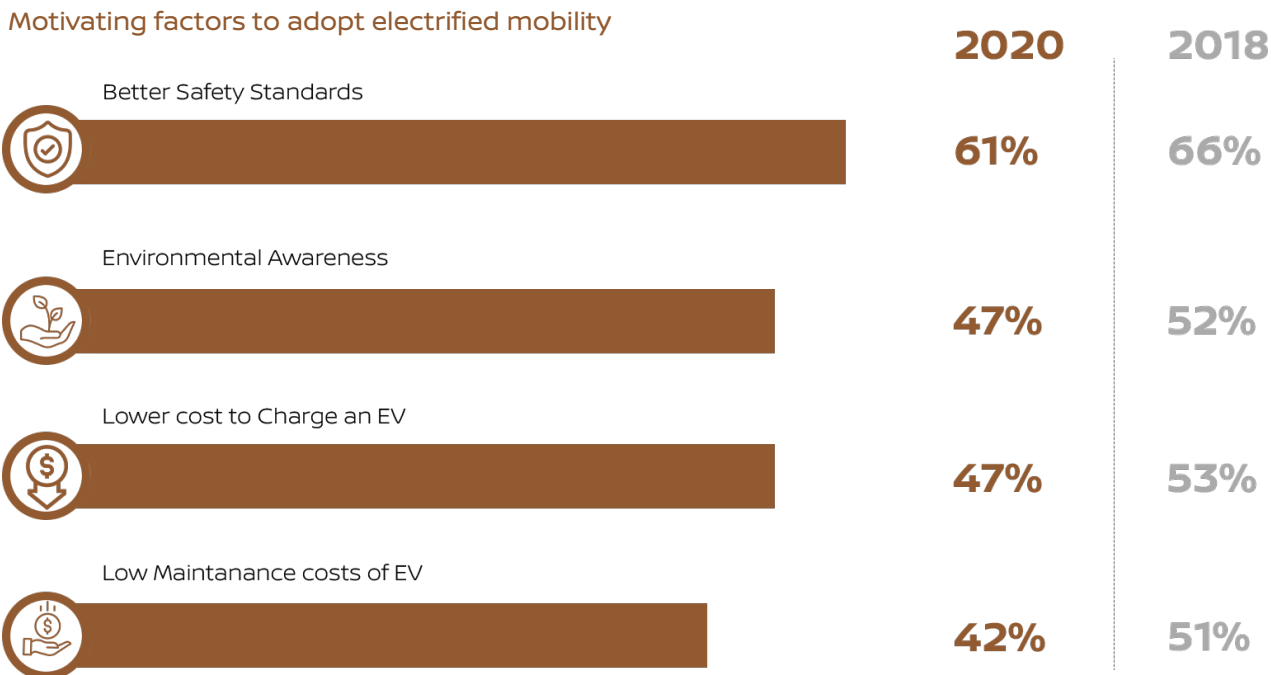


Fig. 5: Motivating Factors for Electrified Vehicle Purchase

There is an increasing awareness of reduced environmental impact for driving an electrified vehicle in the long run in this region, as compared to driving other conventional gasoline or diesel cars. Consumers across all countries in Southeast Asia identify better safety standards (61%) and improved environmental awareness (47%) as key motivators in purchasing an electrified vehicle. An estimated 42% cite the lower long-term costs associated with electrified vehicles in terms of maintenance and charging compared to conventional gasoline or diesel vehicles as another major factor that will influence their decision to buy an electrified vehicle.

INDONESIA	MALAYSIA	PHILIPPINES
Environmental Awareness	Lower Maintenance costs of EV	Better Safety Standards
Better Safety Standards	Better Safety Standards	Environmental Awareness
Lower Maintenance costs of EV	Environmental Awareness	Lower cost to Charge an EV
Ability to Fast Charge	Lower cost to Charge an EV	Lower Maintenance costs of EV
SINGAPORE	THAILAND	VIETNAM
Lower Maintenance costs of EV	Better Safety Standards	Environmental Awareness
Better Safety Standards	Lower cost to Charge an EV	Better Safety Standards
Lower cost to Charge an EV	Environmental Awareness	Lower cost to Charge an EV
Ability to Fast Charge	Lower Maintenance costs of EV	Lower Maintenance costs of EV

Fig. 6: Motivating Factors for Electrified Vehicle Purchase, by Country

Emotional need for electrified vehicles

I consider myself environmentally friendly and climate change is something I worry about



I think electric vehicles are cool and trendy and I may consider one in future



The move to electric vehicle is inevitable. We will all be driving electric vehicles one day



I am more willing to consider an electrified vehicle than I was five years ago



I would be willing to pay more for a vehicle that helps the environment



Similar to the 2018 study, environmental consciousness and climate change remained as top-of-mind emotive issues for 67% of the consumers in considering an electrified vehicle purchase in 2020. The idea of an inevitable move towards electrified vehicles in the near future and the perception of electrified vehicles being cool and trendy also continue to resonate with consumers.

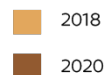
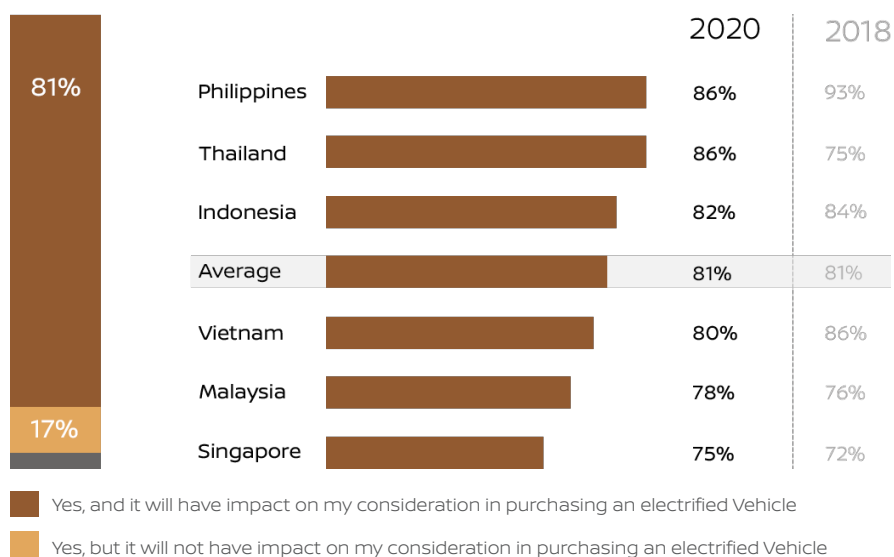


Fig. 7: Emotional Need for Electrified Vehicle

Perceptions of environmental impact on purchase decision

81% of study respondents mentioned that their choice would be significantly influenced by different power sources. This care for the environment was found to be more important to consumers in Philippines and Thailand.

While seen as essential, the adoption of alternate fuels or electrified vehicles still requires a shift in mindset at all levels accompanied by a clear, practicable roadmap to push the adoption of cleaner, greener vehicles



Fossil Fuels



Nuclear Power



Renewable Energies

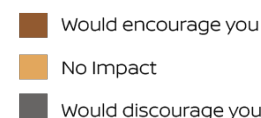


Fig. 8: Impact of Fuel Source on Electrified Vehicle Purchase Decision

PROFILE OF EV INTENDERS

While consumer attitudes behind driving habits and emotional needs differ, they correlate with three major profile groups comprising those who intend to buy electrified vehicles, namely:

- Environmentalists
- Basic Utility Drivers
- Trendy Enthusiasts

The features of electrified vehicles, the value that potential buyers expect, and the prices they are willing to pay depend on their attitude towards an electrified vehicle.

ENVIRONMENTALISTS

Climate change is something that worries them

They are willing to pay more for a car to help environment

They accept that the move to EV is inevitable and willing to pay little more for charging equipment

They believe that EV can reduce environment impact



The environmentalists profile group has expanded to 38% in 2020 from 34% in 2018. This group of consumers is driven by strong environmental awareness and climate change concerns. They view electrified vehicle use as a way to do their bit for the environment.

BASIC UTILITY DRIVERS

Basic utility drivers, looking for inexpensive means of transport with lowest running cost

They believe that a vehicle is simply a means of transport rather than a source of pleasure

They mind less about the appearance of the car as long as it serves the functional purpose



Approximately 23% of the intender customer base comes from the basic utility drivers profile group. This profile group has shrunk from 27% in 2018. It comprises consumers who are looking for an inexpensive means of transport with the lowest running costs. For them, a vehicle is simply a means of transportation rather than a source of pleasure, with the focus more on the functional purpose of the car rather than its appearance.

TRENDY ENTHUSIASTS

Interested in high performance vehicle, a car represent a sense of luxury and premium

They dislike old fashioned car, always looking for an innovative model

They believe that EV has seen many technological breakthrough and ready to use

They think that EV is cool & trendy



The third and largest group consists of the trendy enthusiasts. They are interested in high-performance, premium vehicles with advanced features that represent a sense of luxury and exclusivity. This group of consumers is trendy, dislikes "old-fashioned" cars, and looks for innovative models.

INCENTIVES TO ADOPT ELECTRIFIED VEHICLES AND PERCEPTIONS OF MAINTENANCE COSTS

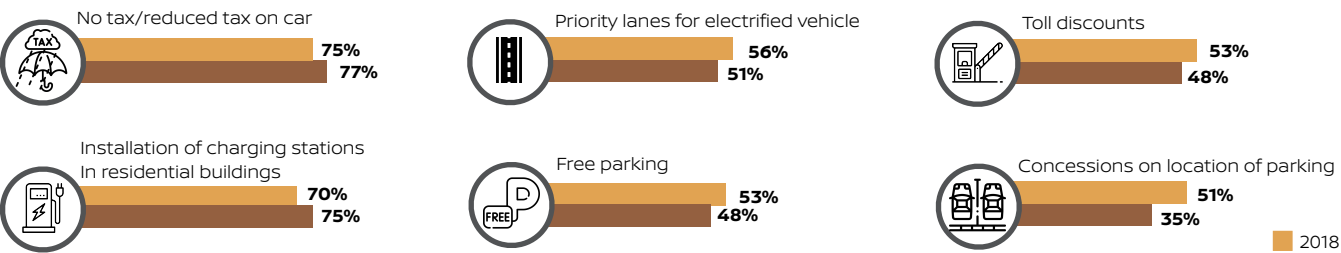
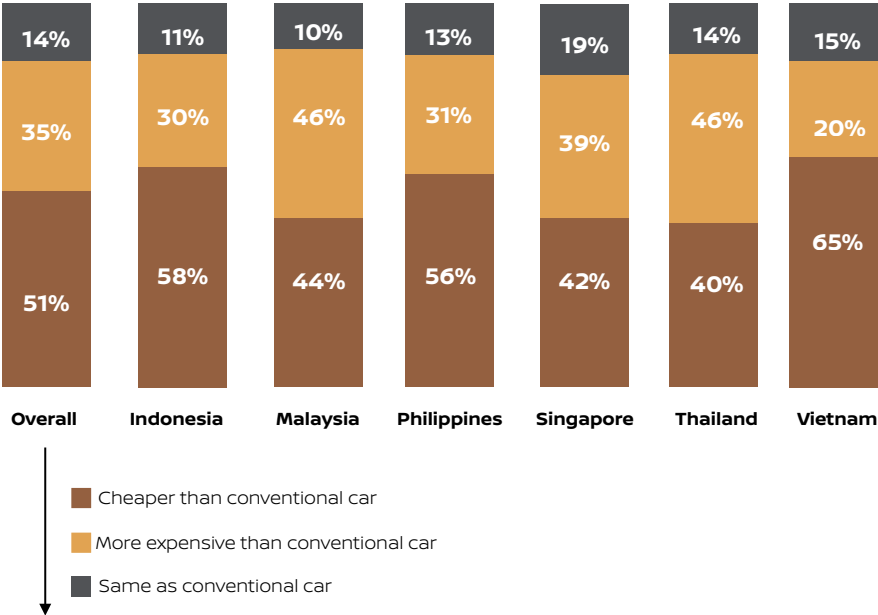


Fig. 10: Incentives Influencing Switch from Conventional Cars to Electrified Vehicles
Perception on maintenance cost

Findings indicate that governments have a critical role to play in promoting and encouraging the adoption and use of electrified vehicles. 77% of the respondents are ready to switch from conventional gasoline or diesel cars to electrified vehicles if tax benefits are given.

Tax benefits (77%) and charging infrastructure in residential buildings (75%) are the top-2 most attractive incentives for consumers to switch to electrified vehicles; both have increased from 2018.

Other incentives that would encourage consumers to use electrified vehicles include priority lanes for electrified vehicles (51%), and free parking (48%).



Average perceived range of maintenance cost variance of an electrified vehicle over a conventional car

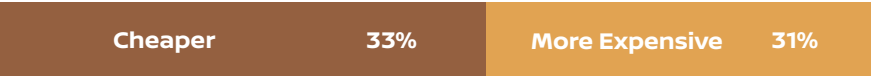


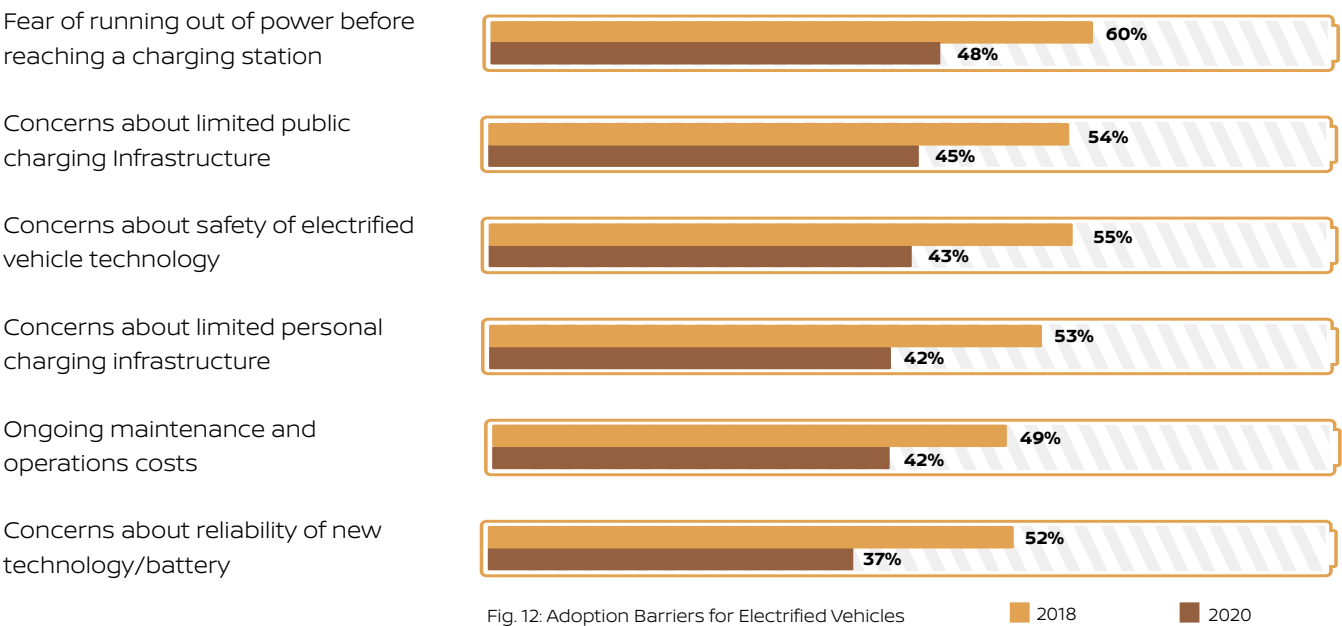
Fig. 11: Perceptions of Maintenance Costs for an Electrified Vehicle

Almost 65% of respondents perceive the maintenance costs of electrified vehicles to be either cheaper than or the same as that of conventional gasoline or diesel cars. However, some respondents (particularly those in Thailand,

Malaysia, and Singapore) have the misconception that electrified vehicle maintenance costs are more expensive than for conventional gasoline or diesel cars.

On average, the perceived maintenance costs of an electrified vehicle as compared to an equivalent conventional gasoline or diesel car to be 33% cheaper to 31% more expensive.

BARRIERS TO ADOPTION OF ELECTRIFIED MOBILITY



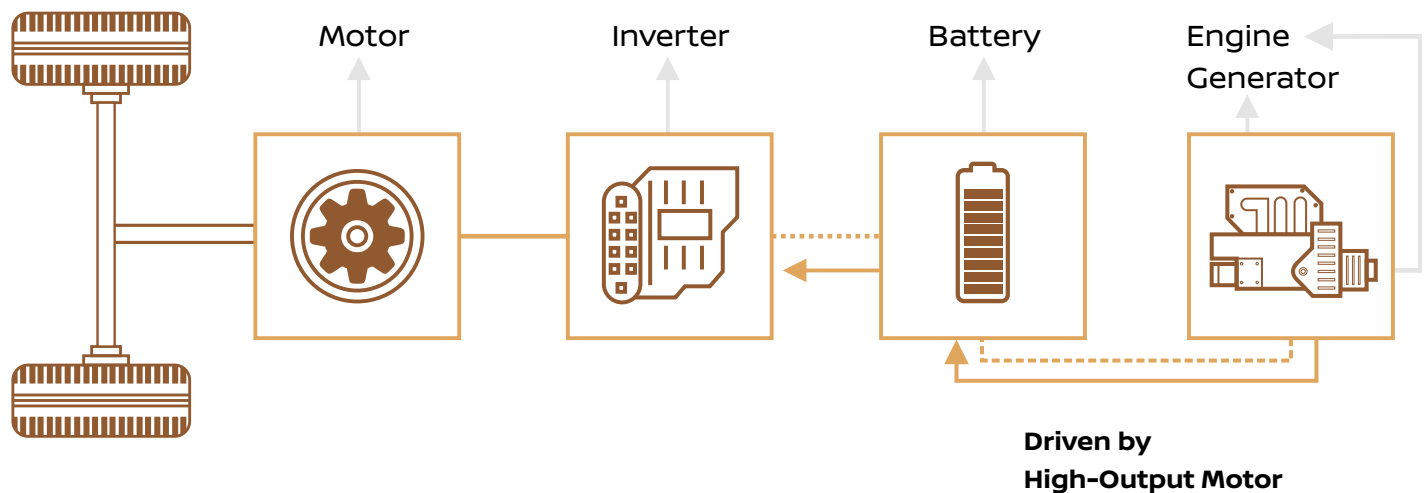
Consumer perception towards the barriers to adopt electrified mobility has seen significant improvement since 2018. This demonstrated that consumers are more optimistic and more willing to accept electrified vehicles today than ever before, with a significant demand potential for electrified vehicles in Southeast Asia.

Range anxiety is still the main hindrance to electrified vehicle uptake because consumers are apprehensive of power running out before they can reach a charging station. This is compounded by consumer concerns about the limited public and private charging infrastructure and the safety standards of electrified vehicle technology.

It is therefore imperative, for manufacturers to demonstrate and convince consumers about the safety of their electrified vehicles in varying weather and usage conditions. For example, since 2010, Nissan has sold more than 500,000 units of the Nissan LEAF, without critical incidents related to either the vehicle technology or the batteries.

Other adoption barriers for electrified vehicles include perceptions of higher maintenance and operation costs and higher purchase price compared to conventional gasoline/ diesel cars.

NISSAN e-POWER FEATURES



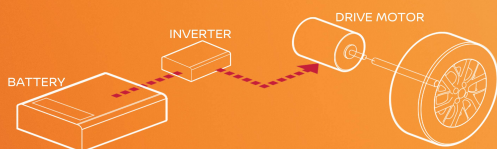
Nissan's e-POWER technology is a 100% electric motor-driven system that offers outstanding features that provide a full complement benefits and the same high-performance driving experience as an all-electric car. It uses the EV technology perfected in the Nissan

LEAF and adds an efficient petrol engine to charge the lightweight, lithium-ion battery pack when necessary.

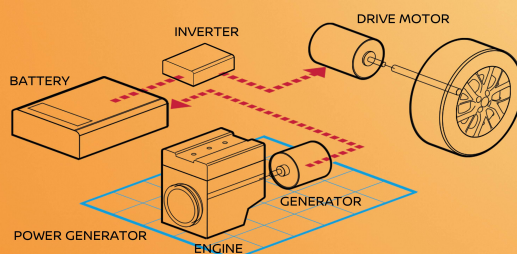
Nissan's e-POWER system includes a petrol engine with a power generator inverter, battery, and an electric

motor. The electric motor delivers power directly to the wheels using energy stored in the battery pack. Used for charging the battery pack or powering the electric motor, the petrol engine eliminates the need for an EV charger.

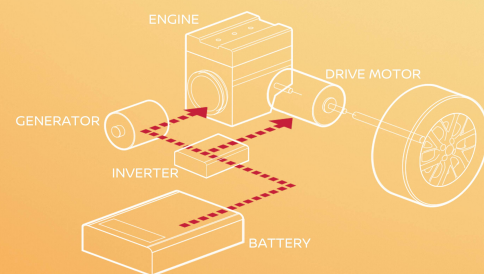
ELECTRIC VEHICLE



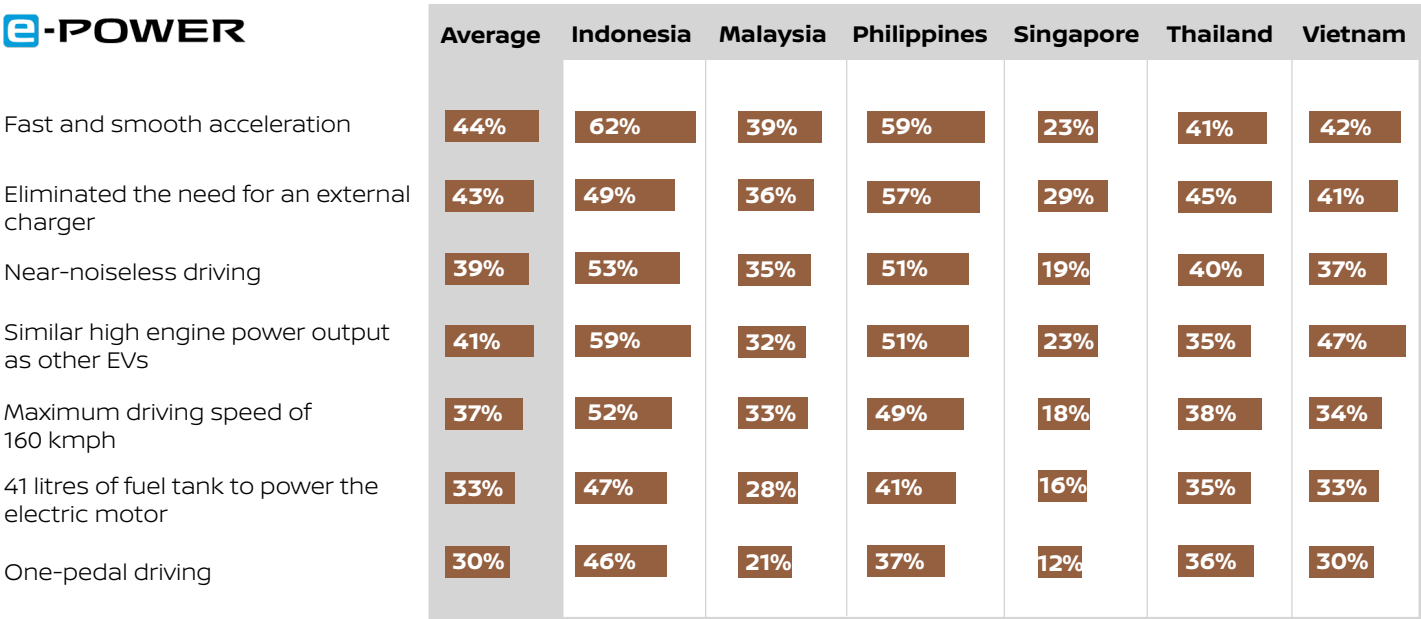
e-POWER



CONVENTIONAL HYBRID



ATTRACTIVENESS OF NISSAN e-POWER TECHNOLOGY



Among the e-POWER system’s features, consumers are mainly attracted to its fast and smooth acceleration, the eliminated need for an external charger, and the near-noiseless driving experience. Meanwhile, other features of interest to current owners of electrified vehicles are the maximum driving speed and the one-pedal driving feature.

Consumers in Southeast Asia are relatively evolved with different e-POWER features having different attractiveness levels in different markets.

FINAL WORD

Southeast Asia is in the midst of transformation where electrification and greener technologies are redefining the future of mobility. However, adopting an electrified mobility ecosystem requires strong and sustained collaboration between public and private stakeholders and the creation of a long-term roadmap

tailored to address the unique needs of every market.

The electrified vehicle evolution is compelling the automotive industry to reinvent itself. Nissan is at the forefront of this change through the Nissan Intelligent Mobility portfolio that focuses on growth and

innovation in core products, core technology, and core markets.

With its clear vision for Nissan FUTURES, Nissan Next is set to deliver a future defined by enhanced vehicle electrification, connectivity and autonomy.

LIST OF CHARTS

Fig.1	Technology Association with Electrified Vehicles
Fig.2	Attractiveness of Different Vehicle Powertrains
Fig.3	Intention to Buy an Electrified Vehicle as the Next Purchase
Fig.4	Reason to Purchase Electrified Vehicle in the Near Future
Fig.5	Motivating factors for Electrified Vehicle Purchase
Fig.6	Motivating factors for Electrified Vehicle Purchase, by Country
Fig.7	Emotional Need for Electrified Vehicle
Fig.8	Impact of Fuel Source on Electrified Vehicle Purchase Decision
Fig.9	Profiling of Electrified Vehicle Purchase intenders
Fig.10	Incentives influencing Switch from Conventional Cars for Electrified Vehicles
Fig.11	Perceptions of Maintenance Costs for an Electrified Vehicle
Fig.12	Adoption Barriers for Electrified Vehicles
Fig.13	Attractiveness of Nissan e-POWER Technology, by Country



FROST & SULLIVAN

The Growth Pipeline™ Company

Powering clients to a future shaped by the growth



GLOBAL FOOTPRINTS



NORTH AMERICA

San Antonio, TX
Houston, TX
Santa Clara, CA
Irvine, CA
New York, NY
Rockville Centre, NY
Miami, FL
Detroit, MI
Toronto, Canada



LATIN AMERICA

Mexico City, Mexico
Buenos Aires, Argentina
Sao Paulo, Brazil
Bogota, Colombia



EUROPE

London, UK
Oxford, UK
Frankfurt, Germany
Milan, Italy
Paris, France
Valbonne, France
Warsaw, Poland
Moscow, Russia



MIDDLE EAST

Dubai, UAE
Dammam, Saudi Arabia
Herzliya, Israel
Istanbul, Turkey
Sanabis, Bahrain



ASIA PACIFIC

Sydney, Australia
Auckland, New Zealand
Bangkok, Thailand
Beijing, China
Shanghai, China
Jakarta, Indonesia
Iskandar, Malaysia
Kuala Lumpur, Malaysia
Seoul, South Korea
Singapore
Taipei, Taiwan
Tokyo, Japan



SOUTH ASIA

Bengaluru, India
Chennai, India
Gurgaon, India
Pune, India
Kolkata, India
New Delhi, India
Mumbai, India
Colombo, Sri Lanka



AFRICA

Johannesburg, South Africa
Cape Town, South Africa

40+

Offices

2000+

Consultants

250,000+

Client serviced worldwide

Fortune 1000

Clients & SMEs

ABOUT FROST & SULLIVAN

Frost & Sullivan, the Growth Pipeline™ company, works in collaboration with clients to leverage visionary innovation that addresses the global challenges and related growth opportunities that will make or break today's market participants.

For more than 60 years, we have been developing growth strategies for the Global 1000, emerging businesses, the

public sector and the investment community.

Is your organization prepared for the next profound wave of industry convergence, disruptive technologies, increasing competitive intensity, Mega Trends, breakthrough best practices, changing customer dynamics and emerging economies?

Copyright Notice

The contents of these pages are copyright © Frost & Sullivan. All rights reserved. Except with the prior written permission of Frost & Sullivan, you may not (whether directly or indirectly) create a database in an electronic or other form by downloading and storing all or any part of the content of this document. No part of this document may be copied or otherwise incorporated into, transmitted to, or stored in any other website, electronic retrieval system, publication or other work in any form (whether hard copy, electronic or otherwise) without the prior written permission of Frost & Sullivan.

To join our Growth Partnership, please visit www.frost.com