

Developing a Sustainable Electric Vehicle (EV) Business Model for Emerging Markets

Why Electric Vehicles now

- ❖ **Reduced fossil fuel use and emissions.** As globalisation increases in momentum, so does the call for lower automotive fuel emissions.
- ❖ **Emerging markets governments** are getting elected on promises to reduce transport pollution and need to adopt and implement policies that previously were just “talk”.
- ❖ **Key technology maturation** – EV technology, Hybrid applications, Battery Management Systems efficiency – BMS, and Charging Infrastructure, are being developed and implemented at much lower market costs than 2-3 years ago.
- ❖ **International EV industry regulation** and standards are being implemented at national, regional and local levels.
- ❖ **Developing model variety** and appropriate application types Consumers have increasing new model choices, including commercial vehicles, trucks and buses, that compete in performance with internal combustion engines (ICE).

Business entrants require all of the above to justify their financial investment, time, and human endeavour to justify a sustainable presence in the Electric Vehicle Industry

Manila 2016



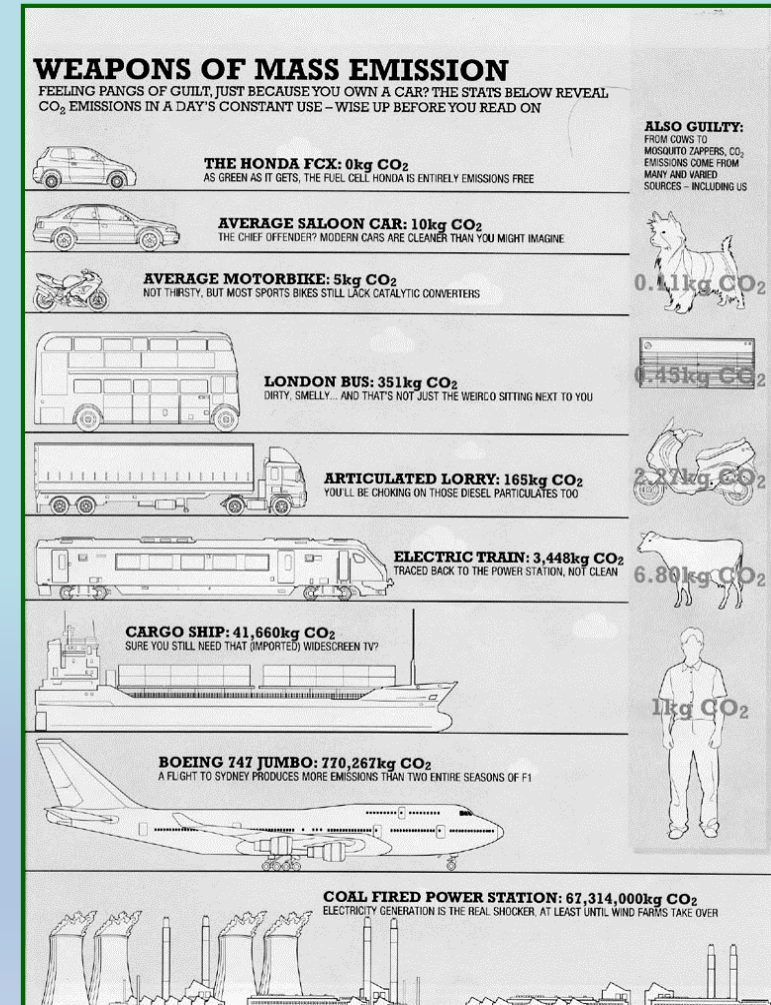
Shanghai 2018



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Necessity and Opportunity – do we need Electric Vehicles?

- ❖ For the future of the planet (even if it is where you live), we need clean air.
- ❖ Can EV can provide sufficient vehicle diversity to meet all transport needs
- ❖ Existing unsafe, unhealthy, polluting, not fit for purpose vehicles need replacing
- ❖ The creation of new, clean EV vehicle markets requires prudence, diligence, endeavour, innovation, imagination and dogmatism.
- ❖ Are you too late to enter the EV market
 - China dominates the Public transport EV sector. There more than 70 EV models in China to suit all private and commercial needs
 - ❑ Buses, Trucks, Taxis (270,000 in 2016), E-Trikes (6,000,000 in 2015)
 - The ROW has focused on private EV ownership, with Norway leading the way in % of all vehicles, incentives and The global growth of the EV market since 2014 has been concentrated on the private personal ownership sector – with one major exception, China. Buses, taxis, motorcycles, and urban trucks are all available as a viable option in EV delivery.



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- ❖ Public Transportation is the major cause of pollution (48%) and the reason for runaway health issues in urban populations.
- ❖ Some ADB and ASEAN members have seriously developed their transport infrastructure.
 - Others are well behind the norm, in some cases lacking the commitment to improve air quality, traffic flows and vehicle expansion management. The need for new clean transport is well documented; the volume of old, unsafe, polluting, expensive to run, vehicles to be replaced is compelling.
- ❖ With global opinion planning to eradicate the use of fossil fuels by 2040, and banning from city centres by the mid-20's, electricity is an obvious fuel to consider.
 - Using renewables must be the long-term choice for electricity production, and where the grid capacity by coal fired power stations, off grid generation by solar, wind, LPG generators will improve the real EV emissions footprint

Why Electric Vehicles Beat Gasoline Vehicles

This chart compares the financial and environmental costs of gasoline vehicles to all-electric and partially electric vehicles

	Gas cost @	kWh @	Annual cost @	gallons/year	Tons of	Total CO2/year
Vehicle type	50 miles/day	50 miles/day	50 miles/day	of gas @ 50 miles/day	tailpipe CO2/year	including upstream *
10 MPG gas	\$12.50	200	\$4,600	1,829	21.0	27.3
20 MPG gas	\$6.25	100	\$2,300	915	10.5	13.6
30 MPG gas	\$4.17	67	\$1,500	609	7.0	9.1
40 MPG Hybrid	\$3.13	50	\$1,100	457	5.2	6.8
50 MPG Hybrid	\$2.50	40	\$900	365	4.2	5.5
Plug-in hybrid A	\$1.25	10	\$640	182	2.5	3.0
Plug-in hybrid B	\$0	22	\$396	0	0	0.4 or 0.0
All-electric car	\$0	12	\$216	0	0	0.2 or 0.0

Plug-in hybrid A = 25 mile all-electric range

Plug-in hybrid B = 50 mile all-electric range

Main assumptions used to produce the values are:

1. The average cost of gasoline is \$2.50/gallon
2. Time of Use (TOU) for nighttime charging is approx. \$0.05/kWh
3. There are about 40 kWh of energy in a gallon of gasoline
4. Burning 1 gallon of gasoline produces approx. 23 pounds of CO2

* This column includes "upstream" CO2 emissions for the process involving locating, extracting, refining, and transporting gasoline, as well as CO2 emissions from the California mix of power plants that produce electricity to charge EVs. If the electricity used to charge an EV comes from solar, hydroelectric, or nuclear, the last two entries are 0.

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Business Objectives — there must be a compelling set of criteria to consider entering the EV industry

- ❖ There are numerous ways to be an active participant in the EV Industry
 - As a designer, manufacturer, and supplier of new vehicles
 - As a social entrepreneur – operating EV fleets for the Health, Education Departments and Private Tourism needs
 - As a vehicle owner by becoming a manager of a consolidated groups of vehicle operators.
 - Finance the EV industry through imaginative, innovative, affordable and secure repayment schemes
 - Be the marriage maker between demand for a cleaner transport system) and the supply of the proven EV needed
 - To achieve sufficient profitability that enables a % of income to go towards community needs

Business Achievements — participation must be long-term, strategic, profitable and open-minded, achieving:

- ❖ Participation in the creation of new business owners, many of whom are marginalised borrowers
- ❖ Meeting a social need. Small EV's cover the gap between private car and limited Public Services –
 - School buses, Ambulances, Home care health
- ❖ Expanding the attraction of tourism with cleaner visitor mobility
- ❖ Adapting to new technologies

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Government Responsibility, Policies, Regulations and Incentives

- ❖ All interested and potential industry participants must be assured that Government will support the EV industry through public policy, fiscal measures and supporting private investment
- ❖ Policy makers in emerging markets must learn from the successes and failures of those countries with a dynamic & maturing EV market.
- ❖ Government –must address the damage caused by the Internal Combustion Engine (ICE)
- ❖ Subsidies must be monitored and controlled without fear or favour.
- ❖ Apply policies to those public transport sectors where EV industry scale is achieved by replacing existing old, polluting vehicles – “Jeepney” Modernisation Programme – Philippines
- ❖ Create a legal framework where import and excise duties on all EV industry parts – vehicles, components, batteries, chargers, are zero rated and are regionally consistent (ASEAN)
- ❖ Use existing Investment promotion schemes to include all aspects of the EV industry.
- ❖ Encourage Universities to adopt technical courses involving the latest EV technology.
- ❖ The private sector should get involved financially supporting postgraduate education for the general good of domestic and international market development



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- ❖ Commercial participants must work with their governments at all levels
- ❖ Private companies do not have to be involved in all EV parts.
 - Work with government to enable it to participate and benefit from the EV industry
 - Select your involvement in what suits your experience, appetite, and return to shareholders
 - Develop relationships with domestic and overseas agencies and participants
- ❖ Financial incentives must go to those whose EV make environmental quality improvement a reality;
 - ❖ Offer vehicle purchase cost subsidies – China 23%, Europe >45%,
 - ❖ Reduced/No EV registration fee – UK, Norway,
 - ❖ Manufacturing and assembly investment incentives – China, Thailand, Philippines, India,
 - ❖ Encourage the domestic producers to export as well

Incentives for EV buyers

- ❖ The most progressive country in the EV world is Norway. 37% of new car purchases in March 2018, were EV, - 14,400 new vehicles, all EV.
- ❖ Progressively since 1990 every EV buyer in Norway has enjoyed the following:
 - ❖ No purchase/import taxes
 - ❖ Exemption from 25% VAT on purchase
 - ❖ Low annual road tax
 - ❖ No charges on toll roads or ferries
 - ❖ Free municipal parking
 - ❖ Access to bus lanes
 - ❖ 50 % reduced company car tax
 - ❖ Exemption from 25% VAT on leasing
 - ❖ No congestion or CBD access charge

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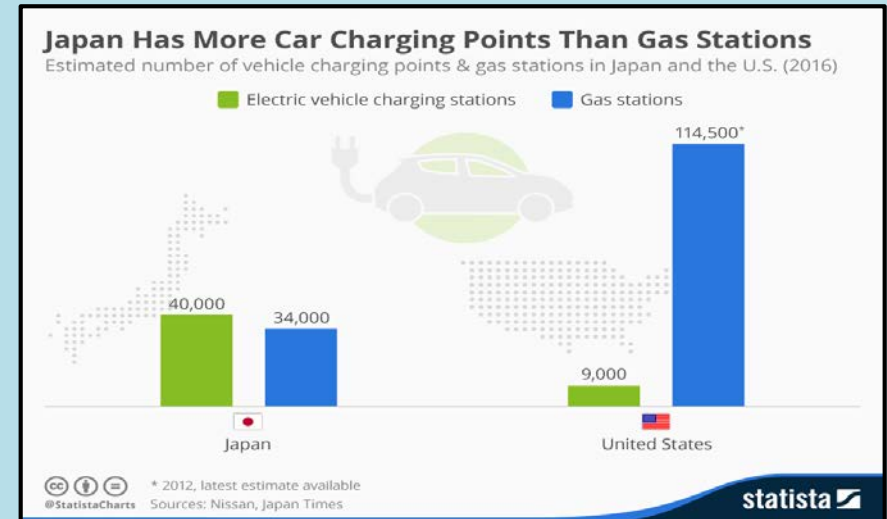
Fiscal Opportunities– ensure that all fiscal benefits continue beyond changes of government. Where subsidies are offered there must be a clear policy of when such fiscal stimulus can be eliminated.

- ❖ EV sales result in considerable savings on the national import cost of gasoline and diesel. For a vehicle travelling 25,000 kms per annum, an approximate saving of 2,400 litres of gasoline or 2,000 litres of diesel can be expected. The loss of excise revenues can be offset by:
 - EV usage results in an 80% reduction in Carbon Dioxide - CO₂ emissions
 - ❑ Using the economic revenues from monetizing reduced Carbon Dioxide emissions
 - Increased employment (income tax) through increased employment in the manufacturing, sales, servicing sectors and resultant increased consumer spending
 - Increased indirect tax revenues through:
 - ❑ Increased consumer spending results in increased sales tax revenues – GST and VAT
 - ❑ Tourism is a major reason for enhancing economic growth. A reputation for pollution, terrible traffic congestion, and dirty transportation is alleviated by promoting clean air improvements. Increases in tourist numbers are enhanced by advertising the countries EV policy. Thailand, Malaysia, Philippines, Indonesia
- ❖ Increased entrepreneurship, through new EV industry entrants
- ❖ Private industry will be catalysed into enhancing education, research programmes, bursaries and scholarships

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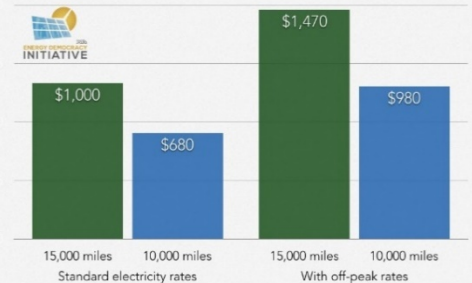
Infrastructure – must be commissioned in direct relation to the demand for EV. Be it home charging, fleet depot, or roadside facilities, battery charging must be available on demand, in convenient locations and at an affordable cost. This is not as daunting as you think. Japan has more charging stations than gas stations.

- ❖ Electricity as the powertrain fuel is the natural choice, but a lack of grid capacity can thwart industry enthusiasm for the adoption of EVs. This is remedied by the use of “off-grid electricity production, using solar energy, and LPG/CNG/LNG generators for battery charging.
- ❖ Electricity suppliers must offer charging plans that include discounts for off-peak and peak-shaving returns (using electricity outside of peak demand).
- ❖ To alleviate stress on the grid, battery exchange provides longer operating hours, more range, and higher returns for the EV user.



OFF-PEAK CHARGING INCREASES SAVINGS OF DRIVING ELECTRIC

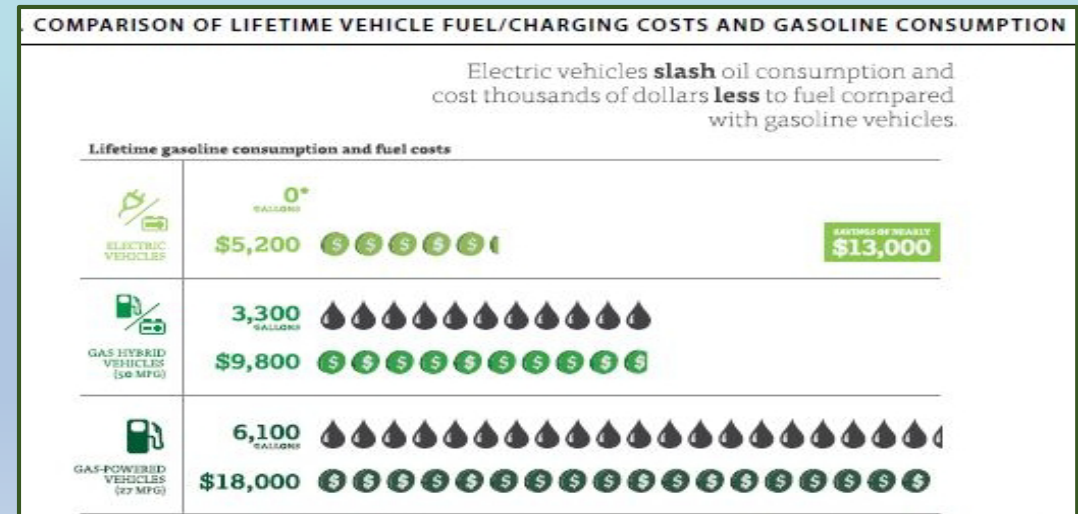
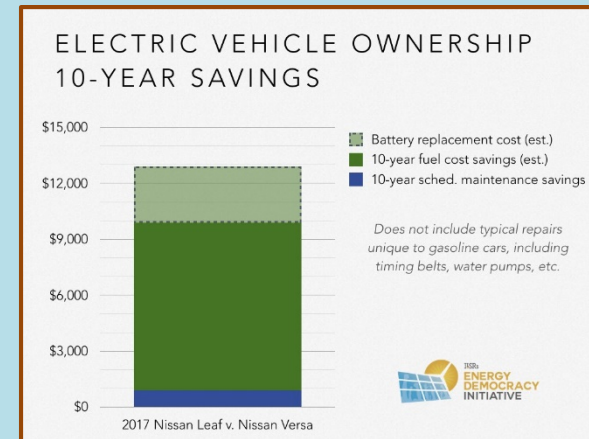
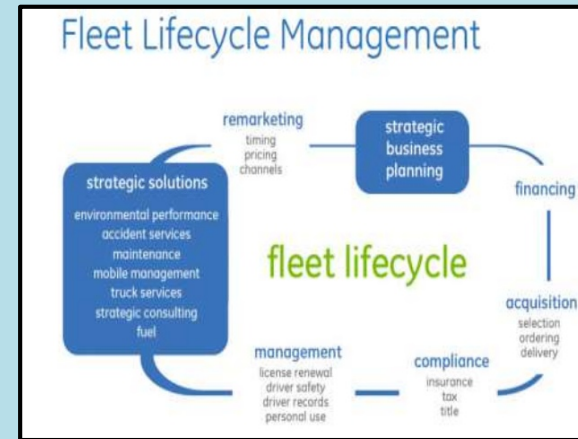
Annual average savings compared to driving on gasoline, U.S. states



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Identify and Promote – Demonstrate the lifetime cost savings that can be realised by operating EV fleets.

- ❖ Encourage the creation of EV transport fleet management as a key opportunity to EV entry.
- ❖ EV fleet operations will provide economies of scale that will provide higher returns to all industry participants
- ❖ Insist that ride-hailing companies operate “Alternative Fuel” vehicle and provide EV incentives to those that adopt such schemes – Ola India, Didi China – 260,000 EV taxis introduced in 2018
- ❖ Domestic and foreign investors must be offered competitive incentives to establish all EV activities in the country
 - ❖ To be competitive, apply consistent economic community policies – reference, ADB, ASEAN, APEC, TPP, EEC



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Adaptability, Affordability – engage in those parts of the industry that suit your best interests

- ❖ The long-term viability of the EV industry will be secured by prudent, consistent, innovative and sustainable financially affordable solutions. The industry cannot afford individual or corporate financial failures.
- ❖ Investment choices
 - Vehicle design, Manufacture, Assembly, partnering with overseas EV companies
 - Importing – complete vehicles – CBU, or CKD/SKD to create a domestic EV assembly industry
- ❖ Technical choices
 - Batteries, Lithium-Ion,
 - Charging infrastructure
 - On-board regeneration
- ❖ Renewable energy for base electricity supply
 - Solar energy
 - Wind

Sustainable Incentives for EV buyers

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Augmentation – there is no limit to the application of EV to meet all vehicle uses.

- ❖ ***As a private vehicle*** using recognised branded EVs, consumers are demanding vehicles that provide cleaner emissions, lower fuel costs, convenient charging, and a quiet, better driving experience.
 - ❖ However government must create the mechanisms necessary for EV to be imported,
- ❖ ***As a Public Transport option,***
 - ❖ EV owners and operators enjoy improved driver security, higher returns, lower maintenance costs
 - ❖ Passengers enjoy improved safety, (seat belts, on-board cameras), cleanliness, comfort – air-conditioning, a range of on-board enhancements (Wi-Fi, TV, GPS), and convenience (tap & pay fare structure),
- ❖ **Non-fare-paying passenger EV transport applications**
 - ❖ Logistics, post & parcel delivery operations enjoy a cleaner urban impact with smaller EV with improved access to narrow and poorer quality roads so prevalent in emerging market cities
 - ❖ Commercial/Private shuttle services
 - ❖ Education: School shuttle services for children in inaccessible areas where school transport is unavailable
 - ❖ Health and Welfare: Collection and returning of out-patients, where an ambulance is not required
 - ❖ Retailing: shoppers to and from the main shopping malls especially in rural areas
 - ❖ Manufacturing: Industrial Estates operate '000s buses taking workers to and from work
 - ❖ Tourism: “Taxi” operations at airports, city tours, hotels, courtesy vehicles

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Sustainability is achieved by

- ❖ Market scale – in the Philippines alone there are
 - ❖ 3,000,000 2 & 4 –stroke motor cycle sidecars
 - ❖ 240,000 “Jeepney” with no certified Euro emissions
 - ❖ 150,000 “Multicabs”, with no certified emissions
- ❖ Accessibility – Government & the private sector must work in all areas of regulatory, technical commercial cooperation
- ❖ Applications – of new technology
- ❖ Adoption – of all commercial avenues to market
- ❖ Adaptation – to change as it is needed and available
- ❖ Affordability – the constant watchword for the EV industry
- ❖ Augment – become a pioneer of the EV industry
- ❖ Achievement – be proud of your involvement and results
- ❖ Adventure – not many of us are present at the beginning of an industrial revolutions. The EV industry is just such an opportunity

Inclusiveness – is achieved by

- ❖ Investment – financial and human
- ❖ Inform – make yourself available
- ❖ Innovate – do not assume all is perfect
- ❖ Impact – maintain your integrity
- ❖ Infrastructure – become involved
- ❖ Implementation – follow through all actions
- ❖ Inertia – maintain focus
- ❖ Involvement – include all in your vision
- ❖ Improve – all
- ❖ Incentivise – develop your own incentive schemes
- ❖ Identify – and analyse your role in the EV industry
- ❖ Identify the realisation of
“Cleaner for a Healthier Future”

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Thank You



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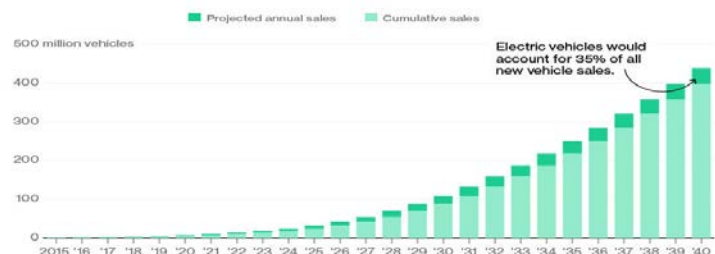
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Where is the market going? – Emerging markets must be aware that delaying market entry will negatively impact on domestic growth, delay social and environmental development.

The Rise of Electric Cars

By 2022 electric vehicles will cost the same as their internal-combustion counterparts. That's the point of liftoff for sales.

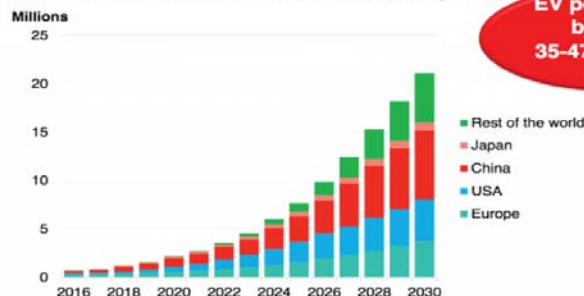


Sources: Data compiled by Bloomberg New Energy Finance, Marklines

Bloomberg

The Rise of Electric Cars

BNEF sees more than 20 million sales by 2030



Electric Bus – China



Electric Shuttle Bus (inner city)



All-Electric Sedans – Global



Nissan Leaf



Renault Zoe

Electric Tricycles – Asia



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Availability & Functionality – choice

Adopt these new 100% Electric Vehicles

20-seat Inner City bus –
Plug & Play, Battery Exchange



EV Public bus

China, Thailand

20-seat Inner City bus –
Solar Roof Charging



All Asian markets

14-seat Shuttle bus –
Plug & Play, Battery Exchange



All Asian Markets

4-6 seat E-Trikes –
Plug & Play, Battery Exchange



Philippines, China, Thailand

To replace these old, dirty, dangerous, unsustainable ICE vehicles

Philippines – “Jeepney”
> 200,000 must be replaced



Philippines – “Multicabs”
> 100,000 must be replaced



Philippines – Motorcycle Taxis
> 2,000,000 need to be replaced






Economics

❖ Fiscal benefits to Government

- Carbon Credits
 - ❑ An EV industry enable will reduce CO^e levels by 80% (100% if batteries are charged using renewables)
- Improved employment, higher personal incomes, increased tax revenues
- Transfer of Technology
- Improved health increases GDP by up to 2.00%

❖ Private sector

- Operational cost savings
- Lower inventory costs
- Diversity of business opportunity
- Social entrepreneurship

Philippines - 5-year programme	"Trike/Tuk-Tuk"	"Multicab"	"Jeepney"
Vehicle Type (original fuel - gasoline or diesel)			
Number of ICE units to be replaced	3,500,000	150,000	240,000
Vehicle Weight	<500kgs	>1800kgs	>3000kgs
Fuel savings (p.a.)	\$1,750	\$4,900	\$12,500
No more oil Changes (Savings p.a.)	\$100	\$500	\$1,000
Electricity Cost p.a. (\$0.50 per kWh)	\$500	\$1,125	\$1,800
Total Savings	\$1,150	\$4,275	\$11,700
Number of new EV units per annum	700,000	30,000	48,000
Co ₂ e saved per annum (in tonnes)	0.24	1.20	3.15
Co ₂ e saved per annum (in tonnes)	168,000	36,000	151,200
Co ₂ e credits earned per vehicle p.a. (May 2018)	\$19	\$154	\$50

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Finance Options – affordability is key to sustaining purchasing power

Philippines – 5, 6, 7 scheme Electric “Jeepney” (20 seats)



- ❖ Cost of EV – US\$ 30,000
- ❖ **5.00%** Government paid deposit
- ❖ **6.00%** Interest, **7** years to pay
- ❖ Daily cost (US\$ 17.60)
- ❖ Total cost – (US\$ 34,450)

ASEAN – “E-Trike” leasing scheme (4-6 seats)



- ❖ Cost of EV – US\$ 7,300
- ❖ **15.00%** deposit paid by buyer
- ❖ **10.00%** interest, **5** years to pay
- ❖ Daily loan cost (US\$ 8.00)
- ❖ Total cost – 3 years (US\$ 8,220)

ASEAN – “E-Trike” leasing scheme (4-6 seats) EV Battery Leasing & exchange scheme



- ❖ Cost of EV US\$ 4,900
- ❖ **20.00%** deposit paid by buyer
- ❖ Daily loan cost – (US\$5.00)
- ❖ Charging cost – US\$ 8.00 per day