



Charging Networks: Opportunities in the push for future vehicles



Highlight

- Charging networks connect electric vehicle (EV) charging stations across different areas by sharing locations, available charger types, and the online status of each station. Network operators are responsible for the construction, operation and maintenance of charging stations, as well as the expansion of charging networks in response to the varying demands of EV drivers.
- In EIC's view, charging networks are extremely important for the growing demand by EV users. The operation and construction of EV charging networks therefore presents an interesting business opportunity. The increasing availability of charging stations will reduce a major concern among EV drivers during long-distance travel, a concern known as range anxiety. However, investments in charging stations and charging networks are risky and may produce uncertain returns due to the emerging nature of the industry. Before investing, businesses should pay close attention to positive industry signs, such as electricity rates for charging stations, charging station electrical system integration standards, and EV market conditions.

Despite the excitement surrounding the global EV market, the actual number of EVs on the road remains low due to driver concerns about EV battery range and a lack of charging stations. Currently, the distance that an EV can travel on a fully-charged battery is still much shorter than that of an internal-combustion car with a full tank of gas. Finding a charging station remains a challenge given the currently limited coverage area. On top of this, existing stations are isolated, making them difficult to locate. These factors present key obstacles for potential EV adopters. Range anxiety concerns remain, especially during long-distance trips, although an MIT study finds that worries about long distance travel in EV cars are overblown because a typical EV model such as the Nissan Leaf can travel up to 135 km on a full charge, which is longer than the 72.5 km distance that most Americans travel on an average day.

Building confidence and providing information for consumers therefore present business opportunities for charging network operators. International experience suggests that a fast expansion of charging networks requires network operators who are capable of station-installation service and data collection from their own stations as well as others. Collected data should be shared via internet platforms such as mobile-phone

applications and websites. To reduce range anxiety, France has set a goal of building one charging station for every 40 kilometers. Super highways in Europe that connect Denmark, Germany, the Netherlands, and Sweden are also well covered with charging stations and network. Using the information gathered from existing stations, network operator can plan for efficient network expansion. Collaboration with the government will help reduce concerns for future EV owners. As a result of these expansion efforts, research house Bloomberg New Energy Finance (BNEF) estimates that the share of EVs in Europe will expand from 1-2% of total car sales in 2015 to 38% by 2040.

Network operators often possess extensive electrical engineering and IT capabilities in order to build a successful business ecosystem. Tesla Motors' Supercharger Network is set up to provide services for Tesla owners. Power company NRG has also established a charging network called "EVgo" to leverage the company's power industry expertise to develop their own charging equipment and network technology to expand its customer base. Additionally, some software developers such as Greenlots focus on building network management platforms. The platform is designed to complement other equipment producers such as charging station owners as well as other network operators by allowing them to communicate through a common platform. Furthermore, network operators need a payment system to collect service charges from users at charging stations.

Network operators need to plan for high capital investments and long payback. The current number of EV users is still low and this could hinder charging network expansion. ChargePoint presents a successful business model for network operation that lets a third party own a charging station and connect to its network. This allows for flexible network expansion that answers directly to various consumer demands, such as shopping mall trips or intercity travel. The company also partners with car makers such as BMW, Nissan, Chevrolet, and Volkswagen. Besides getting a subscription fee for using its network, in return, car makers can offer the privilege to their customers. Despite rapid network expansion, the main revenue source for ChargePoint still comes from equipment and software sales to business partners and charging-station owners, rather than from selling electricity to EV users.

For Thailand, investment in charging networks will be necessary to support growing demand. The Thai government plans to reach 1.2 million EV vehicles and 690 charging stations by 2036. Accordingly, the government has set up a budget of 76 million baht to help build charging stations. In additions, effects are underway to establish related rules and regulations. EIC expects that in the initial phase new charging stations will be concentrated in Bangkok and metropolitan areas. Then coverage will expand to large cities with high purchasing power and to primary travel routes used for long distance travel. In the future EIC sees two possible paths for charging network expansion in Thailand: 1) the spread of single stations or small charging networks in different areas that will later be combined by a network operator with the best expansion strategy, and 2) large investment by businesses with nationwide store coverage that expands into the EV charging business by leveraging their existing branches to support their established business and brand image. In either scenario, Thai EV users will likely benefit from enhanced convenience and reduced range anxiety.

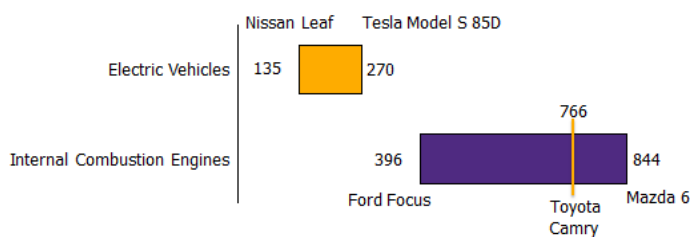
Implication ■ **EIC views that investing in EV charging networks is necessary despite the uncertainty of investment returns.** Businesses that want to enjoy first-mover advantage should take up government support measure to learn about Thai EV consumer

behavior and charging station management. A delay in investment could mean forgoing opportunities. Moreover, being the first in the market could yield indirect benefits, such as establishing a brand, attracting EV drivers before other entrants, and creating an environmentally friendly image. However, this comes at the cost of higher risk.

- Even though investment returns from charging station alone may be uncertain, utilizing the areas surrounding stations could generate additional revenues. Particularly, station areas can be rented out to coffee shops and restaurants. Other types of businesses such as hotels and real estate developers can also invest in charging stations to show environmental commitment as an organization and prepare for demand from future EV users. Those who own suitable locations but unready to take risks can wait for further expansion of charging networks and stable network operators. This will open up more investment options.
- Private companies seeking to invest in charging networks should watch for positive signs of changes in relevant regulations and market conditions. In terms of regulations, things to watch are electricity rates for charging station and electrical system integration standards. Additionally, market condition indicators may include total cost of ownership per 1 km of each EV model. Currently the total cost of ownership of a Nissan Leaf is 26% higher than that of a Toyota Corolla, an internal combustion engine automobile. A significantly smaller gap between the two types of cars will signal a good time to enter the charging network business.

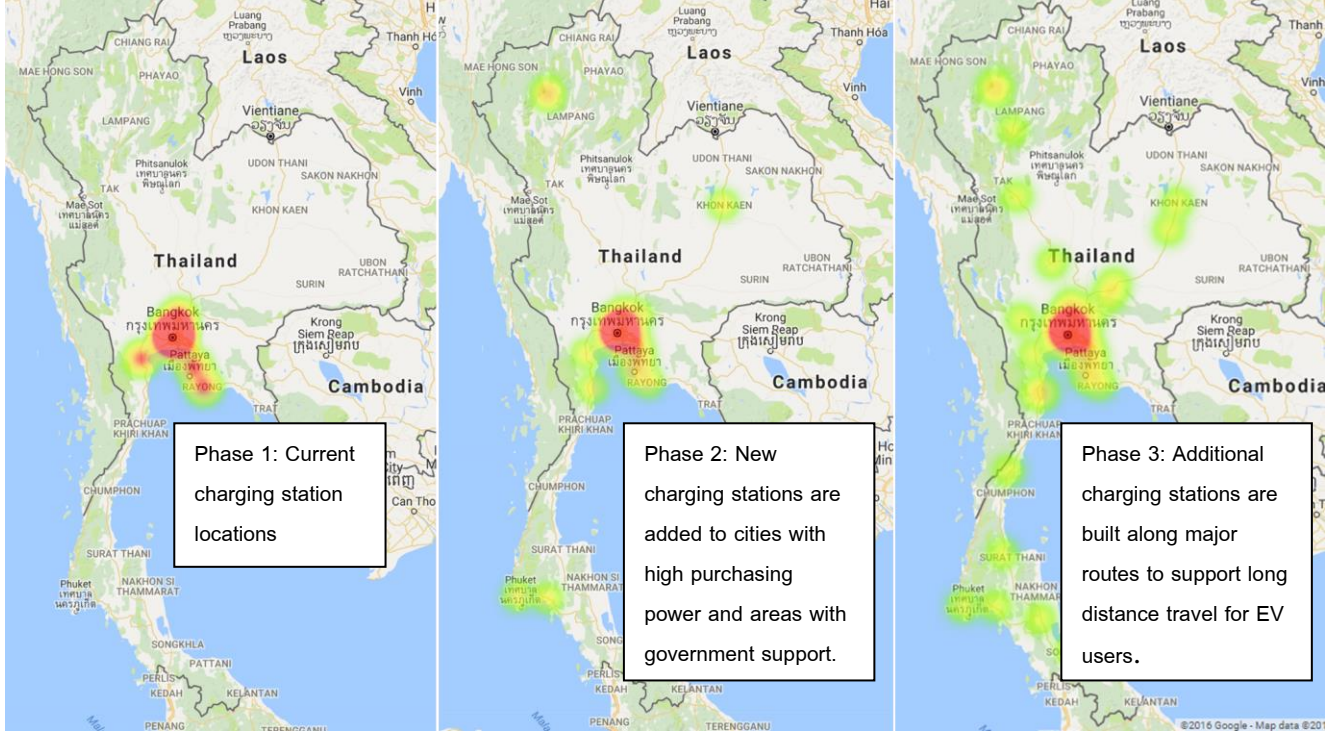
Figure 1: Among sample car models, the distance that a fully-charged EV can travel is shorter than that of an internal combustion car with a full tank of gas.

Unit: Km



Source: EIC analysis based on data from various car makers and fueleconomy.gov

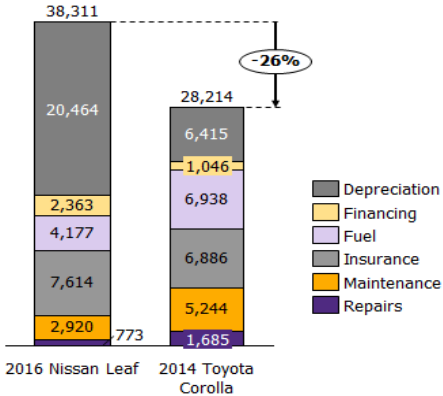
Figure 2: EV charging stations in Thailand are initially concentrated in Bangkok and metropolitan areas and slowly expanding to major cities and routes.



Source: EIC analysis

Figure 3: Total cost of ownership for EVs is 26% higher than that of cars with an internal combustion engine, excluding tax

Unit: USD per 1 km



Source: EIC analysis based on data from edmunds.com

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