

MOBILITY

INDUSTRY

INSIDER

Q4 2019 | Pulse

Quick & Wireless Charging

Succinct **PERIODIC SUMMARY OF DEVELOPMENTS** across trends, players activities, FutureBridge viewpoint, and what it means for industry participants



FutureBridge

WHAT'S INSIDE!

In our Q4 2019 Pulse we have examined how OEMs are trying to mitigate range anxiety and also trying to expand their market share for their EVs by offering free charging business models. Another emerging trend we have identified is related to Charging Network players looking for expansion by raising funds.

What's more, our quarterly review of academic research highlights how players could optimize and plan charging for free-floating shared electric vehicle fleets.

Finally, this document includes detailed analysis of the Startup Activity related to Quick and Wireless Charging in Q4'19 and the profile of NEXVIA, a complete supplier of EV charging solutions.

01

Pulse themes

- More carmakers explore free charging business models to promote their EVs
- EV infrastructure players are raising funds to fuel expansion

02

Quarterly review of early-stage research

[Optimal charging management and infrastructure planning for free-floating shared electric vehicles](#)

03

Startup Tracker highlights

- A snapshot of our Startup Tracker in Q4'19 with segmentation by technology, region & commercialization
- Regional hubs of innovation for the 5 new startups we have added to our Startup Tracker in Q4'19
- Startup highlight – [NEXVIA](#), a complete supplier of EV charging solutions

01

Pulse Themes

More carmakers explore free charging business models to promote their electric vehicle offerings

CONTEXT



OEMs are trying to expand access to charging network for their EV owners using various strategies. Some of these strategies involve collaborations with charging network providers or roaming agreements where the vehicles can be charged at various outlets. Free charging is another policy that OEMs are taking to promote their product offering in different geographies, especially Australia, USA and UK.

“In talking with our future customers, it’s clear that easy access to public charging infrastructure paves the way for a seamless EV ownership experience,” **says** Managing Director, BYTON Americas, Jose Guerrero.



Recent Developments

- Nissan teams up with CSIRO for [free solar-powered](#) EV charging trial in Australia. The 200-day trial involves three EV stations at Nissan’s Melbourne head office powered by roof-mounted solar panels that power a built-in 6kWh battery pack or can send energy directly to an electric vehicle. The solar-powered recharging station is intended to cover shorter trips.
- BYTON partnered with Electrify America [for Free Charging](#) in the U.S. Byton customers in the US will get complimentary unlimited 30-minute DC Fast charge charging sessions, as well as unlimited 60-minute Level 2 charging sessions on the company’s nationwide network.
- Mercedes EV owners get 5 years [free ultra-fast charging](#) on Chargefox network in Australia. The Chargefox public network includes standard DC (22kW), fast (50kW) and ultra-rapid chargers (350kW).
- Volvo UK offers charging [bonus to buyers](#) of new PHEVs via the Volvo On Call app. Free electricity initiative is just one part of a larger plan by Volvo to achieve a substantial reduction in the lifecycle carbon footprint of all its new cars.



DEVELOPMENTS
Emerging trend



Roaming agreement which helps in the Interoperability of Charging Network –

- EV Charging Firms Create [Roaming Network in UK](#)
- Vattenfall and NewMotion Sign E-Mobility [Roaming Agreement](#) in UK
- Ford’s EVs to Come With Access to [Multiple Charging Networks](#)


FutureBridge Insight & What should you investigate? →

➔ FutureBridge on Free charging offers by OEM

- The dynamics of the auto industry are changing and all players are trying their best to hold a position for them in future electrified mobility. Charging is still one of the main concerns that customers are having so OEMs are making more and more collaborations to make it more user-friendly and accelerate the rate of EV adoption by offering a seamless owner experience.
- Easy access to the public charging infrastructure will help in paving the way for seamless EV ownership, thus helping in the growth of sales in EV. Unlimited charging also exemplifies the commitment of the company towards its customer centricity. The collaboration and the offers could help OEMs to enter the new geography and diversify their business

SPOTLIGHT


“Collaboration/ Partnership”



Electric Vehicles industry has well understood that availability of charging stations for EV is the new thrust for customer to go buy an EV or subscribe to a particular charging network. Therefore, from automotive manufacturers to network providers, all are betting on new partnerships to provide maximum number of charging points

5 | Industry Bulletin | Dec 2019

Quick and Wireless Charging
OEMs are looking for expansion of charging infrastructure for promoting electrification



The number of EVs on the road is anticipated to increase rapidly in coming decades. EV market growth and mandates of zero emission vehicles by various states along with the shift towards cleaner and lower carbon fuels are making the OEMs to shift to electrification. One of the major OEMs faced in this is that of the charging infrastructure. So, OEMs are very focused to invest in infrastructure development to make their shift to electrification smooth. In order to do most of them are collaborating with the charging infrastructure provider.

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What should you investigate?

- What are the other entry strategies OEMs are following to enter a new Geography?
- Is free charging really a helpful strategy for market entry?

Source : Circuit Digest

EV infrastructure players are raising funds to fuel their network expansion

CONTEXT



Sales of battery power passenger cars on the road which include plug in hybrid have suppressed 5 million in the previous years.

But investment to the charging companies have-not followed a trajectory according to the survey by [WoodMac](#). The sum of venture investments in EV infrastructure companies totaled \$1.7 billion from 2010 through the first half of 2019, accounting for just 14% of all disclosed grid edge investments. In H2 2019 also we found a lot of funding activity happening. Entrepreneurs in this space are quietly hopeful that an increasing market value for grid flexibility will provide renewed interest in smart charging technologies



DEVELOPMENTS

Recent Developments

- EV Connect raised a [\\$12 million Series B](#) round led by Mitsui & Co. Ltd. and San Francisco-based investors Ecosystem Integrity Fund., the fund will be used as an expansion of the network of EV connect
- Volta Charging Raises [\\$64 Million in Series C](#) bringing the total Series C capital raise to \$100 million. The capital will be used to expand the company's network in established metropolitan area as well as for new markets
- Fastned raises [€12M by selling bonds](#), these bonds pay 6% interest per annum during a term of 5 years. It is going to use a major portion of the finance it received for the expansion of its fast charging networks



DEVELOPMENTS Emerging trend

M&A is another strategy followed by the players in this ecosystem—

- LS Power [Acquires](#) Electric Vehicle Fast-Charging Specialist Evgo
- EDF in talks to [buy](#) electric vehicle charging start-up Pod Point
- ABB's [Acquisition](#) of Chinese EV Charging Provider Chargedot to Strengthen E-Mobility Portfolio

FutureBridge Insight & What should you investigate? →

→ FutureBridge Insight on Expansion for EV Charging Network

- Quick growth in the rate of EV adoption is emphasizing –the need for faster infrastructure build-out.
- Since 2010, EV charger manufacturers, network operators and vertically integrated vendors have accounted for half of EV infrastructure venture capital investment activity
- EV infrastructure M&A activity has been dominated by strategic vendors and utilities that want to strengthen their EV infrastructure offerings.
- According to our Industry Development tracker, we found Non-strategic" investors, like venture capital firms and private equity, are more interested in charging infrastructure investment rounds than others. That category is followed by "undisclosed investor," followed by strategic vendors, namely car companies. Strategic utilities and strategic oil and gas investors comes the next

What should you investigate?




Who are the strategic investor investing in this sector?




What the are of focus for the investor in these sector?

Electric vehicle charging Infrastructure Investment


Investments/Funding




PLN invest around Rp 6 billion in EV charging stations >>




Kia motor invests in charging infrastructure >>




EV Connect Raises \$12 Million Series B >>



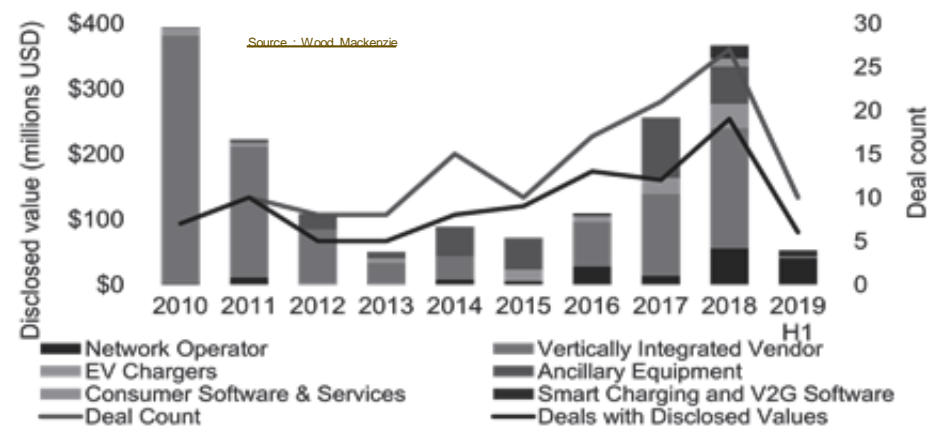
Fastned Raises fund of 12 million Euros >>



EVI Technologies Raises Funding From Napino >>



London to invest £4 million in EV infrastructure >>



Major Developments Summary Q4 2019- Quick & Wireless Charging

Technology advancements

- GILBARCO VEEDER-ROOT** - Payment Option for EV charging >>>
- GBatteries** - micro-pulse technology to reduce EV charging time >>>
- BRIDGESTONE** - Power generating Tyref or EVs >>>
- CONNECTED KERB ENSO** Tyres recycled to turn into EV chargers >>>
- Google** - EV charger plug types nearby >>>

Launches

- electrify america** - Level 2 charger for the home >>>
- FLUKE** - Testing Electric Vehicle Charging Stations >>>
- CSIRO** - Solar EV charging module >>>
- AFC Energy** - Hydrogen fuelled EV charger >>>
- PROTERRA** - Multi-Dispenser Charging Solution >>>
- Argonne NATIONAL LABORATORY** - Light to Recharge Lithium-Ion Batteries >>>
- NEXVIA** - Integral Solutions for EV Charging >>>
- CLIPPERCREEK** - Dual EV Charging Station >>>

Collaborations/Partnership

- chargepoint+** Inf rastructure Agreement >>> **SFMTA** **DOVER FUELING SOLUTIONS** EV chargers for retail and commercial locations >>> **-chargepoint+**
- bp** For Charging networks >>> **Reliance Industries Limited** **NISSAN** solar-powered EV charging >>> **CSIRO**
- MG** Inf rastructure for EV Charging >>> **eChargeBays** **GREEN power** Wireless chargers >>> **WiTricity**
- BYD** EV charging inf rastructure >>> **AMPLIFY FLEET CHARGING SIMPLIFIED** **VIA VAN** EV charging inf rastructure >>> **SHELL**
- NISSAN** EV charging Networks >>> **EVgo** **BYTON** Free Charging In U.S. >>> **electrify america**
- e-on** EV charging points >>> **BMW** **podPOINT** Charge point >>> **PSA GROUPE**

02

Quarterly academic review

Optimal charging management and infrastructure planning for free-floating shared electric vehicles

Science direct, Nov 2019, (Mohammad S. Roni, Zonggen Yi, John G. Smart)

Methodology

This paper proposes an intuitive solution to overcome this barrier is to increase the number of fast-charging stations in the fleet service area.

This paper studies the relationship between fleet vehicle downtime and the number of charging stations by modeling the fleet operations of a major car-sharing service provider.

An integer programming model is developed that jointly optimizes charging station allocation, in terms of the number and location of charging stations, and the assignment of EVs to charging stations.

- Investigated infrastructure planning of free-floating electric vehicle (EV) car-sharing system.
- Studied the tradeoffs between downtime of EVs and the number of charging stations.
- Charging time for the electric vehicle is the dominant factor in total downtime.
- Adequate infrastructure planning is needed to manage the EV's driving range of charging trips.

FutureBridge Analysis

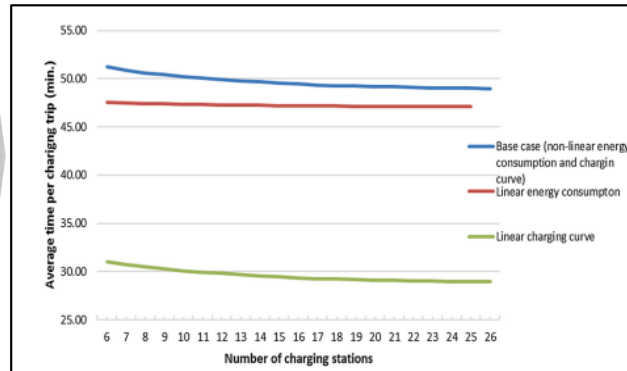
Disruptiveness	High
Feasibility	High
Timeframe / Maturity	Near Future
Areas Covered	EV Infrastructure Model, Charging Time

Conclusion

Developed an optimization model to understand the infrastructure barrier if a free-floating car share-service provider is willing to include EV to the vehicle fleet.

- The study showed that charging time is the dominant factor in the total downtime of a charging trip in car-sharing EV fleets
- The case study results indicate that charging times for EVs in a car-sharing fleet varies from 71.82% to 74.56% of the total downtime of a charging trip
- The study also indicated that by adding 5–20 new charging stations could reduce total downtime and travel time for car-sharing EV fleets by 2.34–4.45% and 25.62–49.17%, respectively
- Results also show that if the SOC threshold is below 18%, all EV vehicles in a car-sharing fleet cannot be charged using the existing six DCFCs in the Seattle area, implying that adequate infrastructure planning is needed in order to manage the driving range for EV trips in a car sharing fleet.

Assignment EVs to charging stations in a time-space network



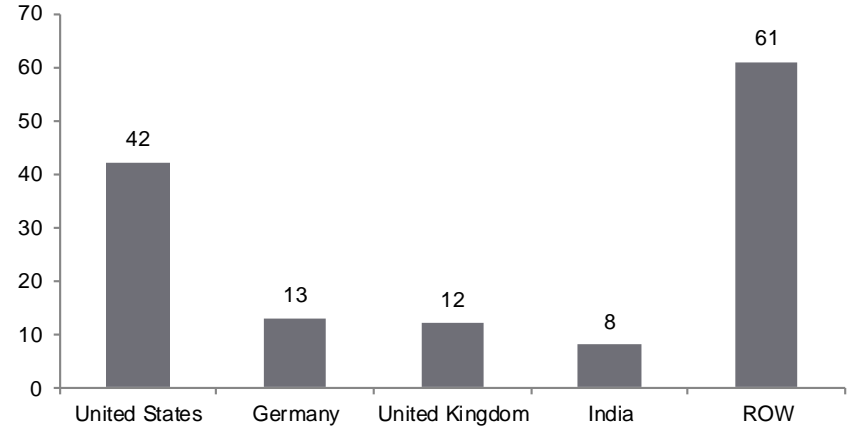
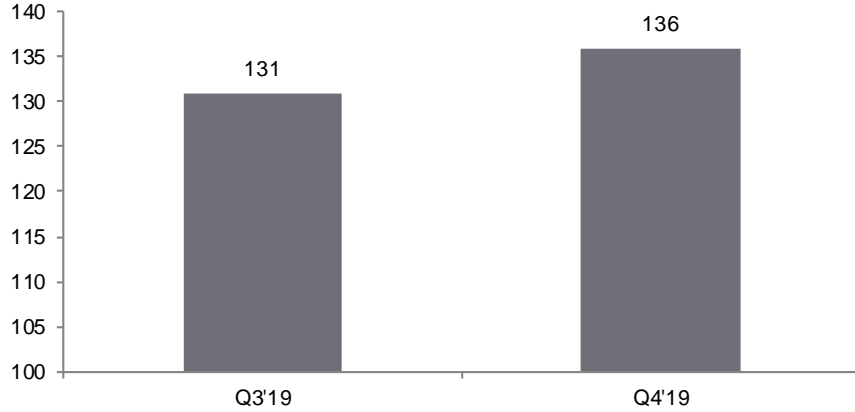
Comparison of non-linear energy consumption per mile vs linear energy consumption

03

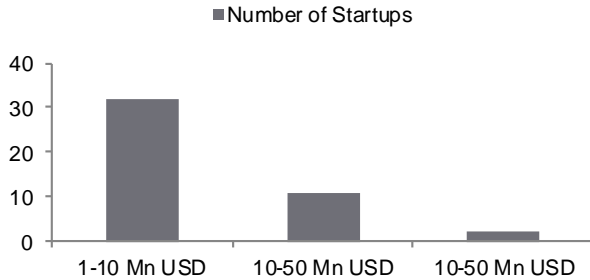
Startup Tracker highlights

Startup Tracker summary Q4 2019

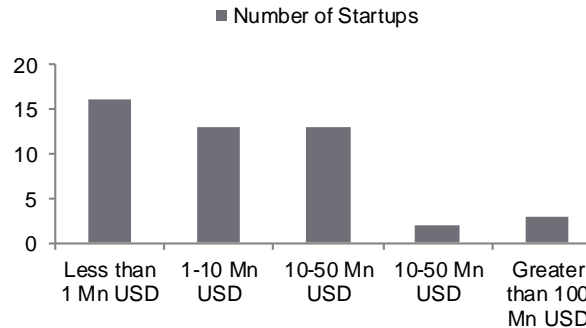
Analysis of the 136 entities we are monitoring. Analysis shows that US & Germany lead the race in number of startups



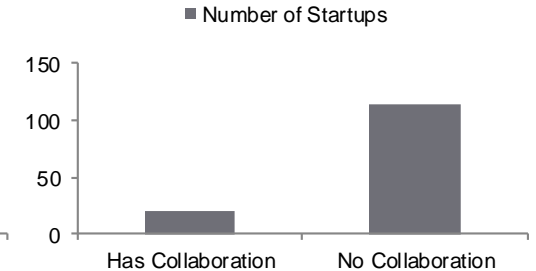
Most Recent Revenues



Total Funding Raised



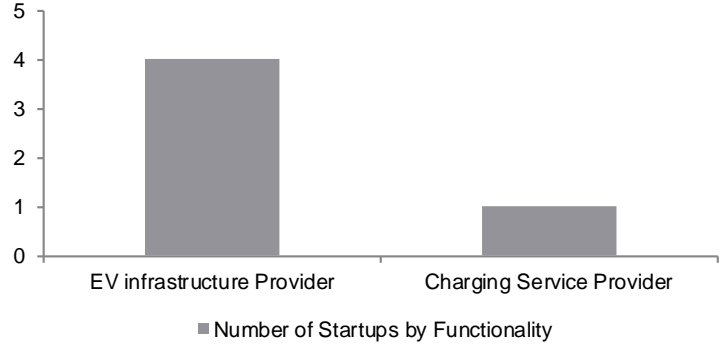
Techno Commercial Collaboration



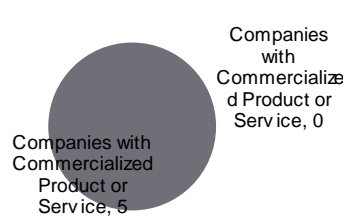
What are the hubs of startup innovation for Automotive Quick and wireless charging

We have added 5 new startups in Q4'19 to bring our coverage to 136 entities. The analysis below refers to the 5 new startups

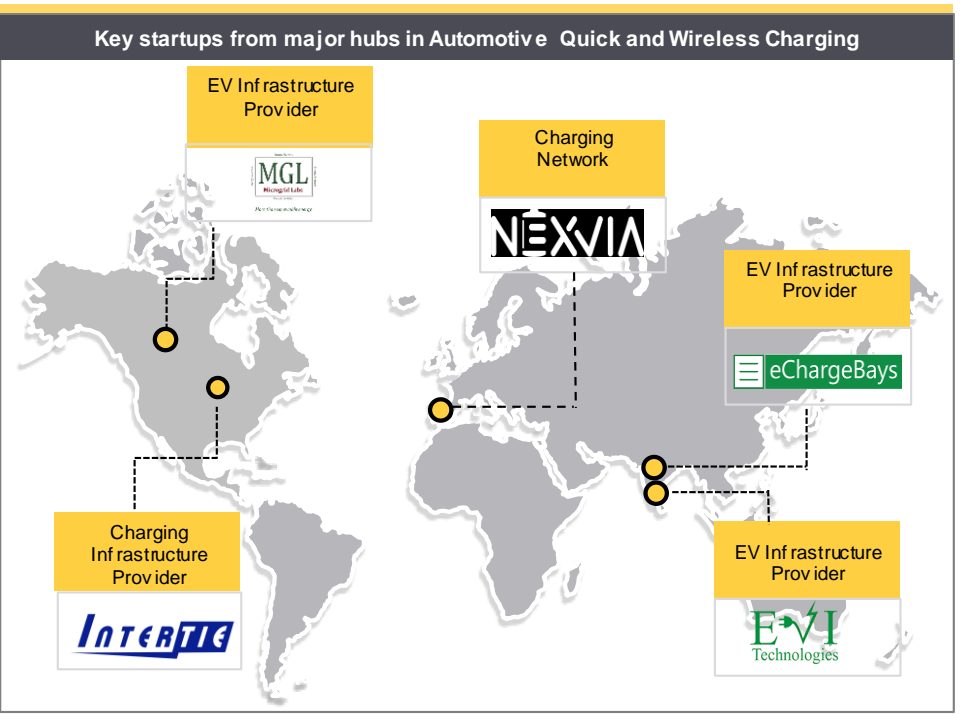
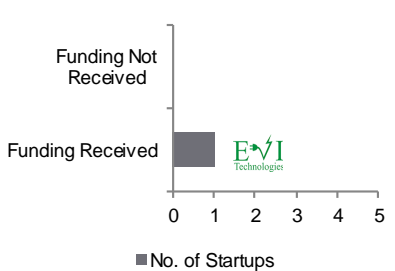
Number of Startups by Functionality



Companies with Commercialized Product or Service



Startup funding Status



Startup highlight – NEXVIA complete supplier of EV charging solutions

Company About

Supplier of integrated, scalable, flexible, fast and ultrafast charging stations, which can charge any EV, regardless of the distribution grid used.

Solution consists of -

- Optimized design to ensure future charging capacity.
- Medium-voltage system with power electronics in a prefabricated enclosure.
- Extreme weather conditions (low temperature kit).
- Small footprint.
- Factory assembly and testing.
- Straightforward installation.

EVSE project scope

1. Grid connection medium voltage switchgear (up to 40.5 kV)
 2. Charging post

- Grid step-down transformer
- Low voltage board
- Protection, control and comms devices
- Power converter

SERVICES

- Consultancy**
- Building work & Equipment Installation –**
 - Medium-voltage transformer substation
 - Power electronics
 - Charging dispenser
 - Charging point painting and signage
- Projects –**
 - According to local Regulation
 - Liaison with utility company
 - Liaison with local Council
- Commissioning –**
 - Relays
 - Software Management
 - Tests
- After-sales service / maintenance**

ACTIVITIES

Partners, associates and founder members

News

- NEXVIA to Be Supplier of Integral Solutions for EV Charging and Will Install over 200 EV Charging Points During Its First Year of Activity >>>

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