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Chief Clerk’s Office  
Illinois Commerce Commission Office  
527 E. Capitol Avenue  
Springfield, IL 62701  
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Reference: Illinois Commerce Commission EV Notice of Inquiry

ABB is pleased to submit our response to Illinois Commerce Commission EV NOI. ABB strongly believes that EV charging infrastructure is a key enabling technology for clean air and efficient sustainable transportation, but can only be accomplished through comprehensive stakeholder collaboration to ensure planning and execution is sound, reliable, which will serve communities and EV drivers within them today and in the future.

ABB is a global electrification and automation leader and has been developing and deploying electric vehicle charging technology for nearly a decade. With 8,000 DC fast-chargers (DCFC) deployed worldwide, ABB has the largest installed base of high power EV chargers. ABB is also the leading provider of power grid technology and equipment worldwide. Combined, our power grid and EV industry experience that has brought us an understanding of the complexities of infrastructure deployment as well as the long-term commitment needed to operate a highly reliable ecosystem of right-sized power delivery. ABB is a uniquely qualified electrification technology company because:

• ABB has led the global development of DC charging technology, from 50kW to 600kW, for more than eight years, with many large scale projects deployed, including extensive learnings in operational execution;
• As a power electronics pioneer and innovator, we offer the most reliable and redundant DC fast charging power conversion technology and topology;
• ABB DC fast charging equipment is certified to all relevant safety standards and ADA requirements; and is third-party tested and regularly updated for full vehicle interoperability;
• ABB has a 24/7/365 Network Operations Center for monitoring, remote diagnostics and software upgrades;
• ABB and has a well-integrated support model for managing lifecycle services, parts availability and warranty execution.

Sincerely,

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ABB Response to Illinois Commerce Commission EV NOI

Questions and Issues

Energy Efficiency:

A. Do EVs contribute to energy efficiency in Illinois by relying on electricity instead of fossil fuels? If so, how?

The rise of EV’s offers multiple areas of energy efficiency, directly within the technology as well as via intelligent charging planning and infrastructure for grid asset management.

Firstly, electric vehicles are inherently energy efficient by virtue of their electric drivetrain. Electric motors offer efficiency above 90% whereas most combustion engines operate around the 20% efficiency mark. Additional EV energy savings come from the regenerative braking systems in all EVs.

Secondly, when charging infrastructure is intelligently used, grid asset efficiency can benefit. For example, with special EV charging rates, intelligent chargers can shift EV charging loads to times of lower demand. Overnight loads allow power generators to operate more consistently, and not suffer as much lost energy efficiency from ramping down assets overnight.
B. Describe whether and how EV charging stations will affect overall energy efficiency in Illinois.

a. Describe whether and how development of additional charging infrastructure will affect overall energy efficiency in Illinois.

As discussed in answer A, allowing utilities to implement smart charging programs that incentivize off-peak charging behavior as well as smarter home and office charging equipment and software will go a long way to promote more efficiency use of energy by users as well as by power utilities and power generators.

Grid Reliability and Resilience:

A. Describe whether and how EVs will improve grid reliability and resilience.

Electric vehicles hold significant potential for grid reliability and resilience, particularly when paired with smart planning, thoughtfully developed rate structures, and intelligent charging features like demand response and delayed or intermittent charging that flattens the overall load throughout the day and/or overnight.

Around a half century ago, home air conditioning demand increased dramatically in American homes. At the time, A/C loads were not intelligently manageable, but rather were cooling was needed on demand, in real time, could not be actively deferred, and large capital investments in generation capacity were driven by peak loads. This led to the inefficient use of grid and generation assets.

EV's of today, however, follow a fairly predictable usage patterns and have the ability to intelligently manage when they charge. For example, the ability to shift EV loads to the evening leads to a more efficient use of generation assets and an increased ability to harness night-time wind generation. Utilities can capitalize on intelligent charging to provide a host of grid services and benefits, many of which are addressed in the following sections.

B. Identify best charging practices and whether and how they can relieve pressure on the grid during peak-demand times, as well as relieve pressure on individual circuits.

EV charging infrastructure can provide the tools, connectivity, and intelligence needed to manage loads and reduce pressure on the grid. Importantly, these attributes are already available on the market. With the proper rate structures and incentives, these tools allow EVs to relieve pressure on the grid.

EV owners have a choice of when to charge their vehicles. For the most part, owners charge their vehicles overnight at their homes. As a general matter, this is beneficial to the grid, because that is when demand is lowest. Well-thought out EV charging rates can nudge owners to begin charging after the evening peak, when overall demand lessens. Drivers can easily shift their charging times via smart chargers tied to smart apps, or they can very easily program charging times directly in their vehicle.
Managed charging, or what’s often called “V1G” is a tool that can be implemented with existing intelligent software tied to charging infrastructure. Managed charging allows the utility to optimize the rate of charging by intermittently slowing down or briefly stopping charging across vehicles, based on load conditions and driver preferences. Similarly, well-tailored rate structures can incentivize EV owners to use their cars for grid services like voltage and frequency regulation which can help maintain power quality on the distribution system (V2G). With EV owner opt-in, utilities could use intelligent charging infrastructure to implement these.

**a. Describe whether and how transportation electrification in the public and non-residential sectors will affect the load on the electric grid.**

Unlike residential charging which may be lower and more distributed, fleet charging will create larger loads in specific locations. Addressing new significant loads is something utilities and technology providers have a lot of experience with. It is important to study the projected load on the grid and design well-thought out plans for accommodating the new loads. Fortunately, new loads, even large ones, can be integrated on to the grid. In some cases, grid upgrades may be required, in other cases, on-site battery storage may be an attractive way to manage demand. On-site storage is a well-established tool for reducing demand and ABB is engaged in some pilots that pair on site storage with EV charging. Similarly, many fleet operators are evaluating onsite solar generation to reduce their demand.

**C. Describe whether and how development of additional charging infrastructure will affect grid reliability and resilience.**

While EVs bring new loads to the grid, intelligent charging infrastructure, paired with well-thought out rate structures, can turn those loads into grid assets that can improve grid reliability and resilience.

**E. Do vehicle-to-grid capabilities need to be enabled in order for EVs to provide grid support?**

Vehicle to grid capabilities are easily implemented today as V1G, or non-bi-directional managed charging, where intelligent chargers can structure charging. No major changes need to be made to vehicles, chargers or facilities in order to enable managed charging.

Vehicle to grid capabilities that employ V2G concepts use vehicle batteries as storage assets or to provide grid services. This utilizes bi-directional charging and is still in the early stages of development and piloting.

**G. Identify cybersecurity implications, if any, of widespread EV adoption.**

As with the digitalization of any industry, cybersecurity is an important focus for all layers of the industry to incorporate into products and software. As many aspects of the electric grid already have migrated to leverage the benefits of digitalization, EV infrastructure should be viewed through a similar lens: EVs offer an incredible opportunity to improve quality of life along reducing the many costs associated with an antiquated transportation system, but must be deployed in intelligent, secure ways with the strongest cybersecurity controls inherent in all planning and deployment.
Deployment of EV charging devices required widespread infrastructure to meet market demand at the different places where cars travel such as home, public/private establishments, or near the highway. The impact of individual chargers on the distribution system can be neglected for small charging stations with a few chargers, unless a large number of EVs are charging simultaneously. However, the synchronous charging of EVs at a large charging hub with high power charging infrastructure may cause potential adverse impacts to the distribution system, such as a distribution transformer, distribution line/cable, circuit breaker and fuse. These impacts may lead to voltage instability, phase unbalance, and heating problems.

a. Discuss the potential for EVs to be a vector for smart grid control network penetration.

ABB urges that charging infrastructure procurement include vendor evaluations for comprehensive software security controls both at the data transmission and data storage levels. ABB defers to vehicle makers and utilities on their domain expertise with related vehicle and grid security respectively.

b. Discuss the potential for EVs to be vector for causing physical disruptions if charging and discharging is coordinated in a malicious manner as part of a botnet under the control of malicious actors.

Due to the increased numbers of EVs and increased demand for DCFC infrastructure, the penetration of charging infrastructure for electric grids will increase. It is well known that transmission of large amounts of energy within short time windows can potentially cause electric network voltage stability problems. An attack to take control of charging infrastructure at the same time could compromise the operational security and voltage stability of the electric distribution power grid, pushing the whole grid toward instability.

Barriers:

A. Describe regulatory barriers to increased electrification of the transportation sector.

The most omnipresent regulatory barriers include, rate-design, “make-ready” infrastructure, and siting.

a. Identify possible solutions to overcome regulatory barriers.

Firstly, utilities should be allowed some flexibility in supporting make ready plans that aid safer and more reliable grid connections and should be allowed to recoup the costs of those through careful and well-designed rate based plans. These costs should not necessarily impact customer rates, as the utilities will have new revenue from connected EVs.

Secondly, ABB urges cities and communities to streamline the permitting process to help infrastructure deployments move more efficiently.

B. Describe economic barriers to increased electrification of the transportation sector.
While lithium ion batteries continue to come down in cost, increase in power density, and reduce the cobalt in their chemistry, the R&D timeline that converts development into commercialization means that vehicle rebates and incentives still very much support the transition to EVs.

Demand charges or tariffs are also a significant barrier to increased electrification as they make the business model for charging very difficult. This is especially true to DCFC, fleets, and medium and heavy duty vehicle deployments.

a. **Identify possible solutions to overcome economic barriers.**

Enhanced vehicle rebates at state and regional levels will push the desirable adoption curve faster. ABB is supportive of charging infrastructure rebates where deployments are well planned with an operational model. Charging deployment programs that do not include uptime and performance metrics and similar accountability measures create higher risk for stranded charging assets and lost confidence in public charging infrastructure.

Well-thought out rate structures that adequately compensate utilities incentivize EV owners to charge at times of lower demand, and do not penalize charging loads will increase EV deployment.

C. **Describe any other barriers to increased electrification of the transportation sector.**

Standardization and interoperability are still major concerns for the EV charging landscape, especially for the diverse needs of medium and heavy duty electric vehicles. Interoperability standards increase consumer choice and reduce the risk of stranded assets. One of the most significant ways in which infrastructure can develop faster in the most efficient and cost-effective way is to encourage and support standards and related interoperability. Technology innovation is the driver of economic growth in any new market, but innovation also creates risk. This risk is manageable through the proving out of safety, reliability and usability standards.

a. **Identify possible solutions to overcome those barriers.**

While the EV industry has and will largely work from within to collaborate on open and interoperable solutions, it is incumbent upon policy makers, stakeholder agencies, utilities and other industry stakeholders to mandate that any infrastructure funding opportunities require and/or specify open, interoperable standards for deployment investments.

**Benefits:**

A. **Describe the cost benefits associated with increased EV deployment in Illinois.**

a. **What is the effect on the State?**

Vehicles with high-utilization rates, like fleets, medium, and heavy duty vehicles have lower total-cost of ownership than conventional vehicles. The reduced maintenance and fuel costs of Government-owned vehicle fleets will save the tax-payer money.
B. Describe the environmental benefits associated with increased EV deployment in Illinois.

Transportation electrification reduces air and noise pollution, particularly in high population density areas and disadvantaged communities that tend to be in heavier transportation corridors.

**EV Charging Infrastructure:**

**A. Describe whether more charging stations should be developed in Illinois.**

More charging systems will need to be deployed to not only serve the EVs of today, but those of the future, from individually owned passenger vehicles to public transportation, shared mobility fleets, and the larger vehicles that move goods across highways and do last mile delivery in cities and communities.

**b. Describe the rate at which additional public charging infrastructure needs to be developed to meet the demand of increasing numbers of EVs in Illinois.**

Availability of public charging infrastructure is widely known to be among the top considerations for consumers and fleets to move to EV adoption. Fast deployment of public charging is needed to meet the growing demand of EVs in Illinois.

**B. Identify the costs associated with installing additional charging infrastructure throughout the state. Assume that installation includes distribution build out, customer make-ready work, ad charging equipment.**

Public charging infrastructure can vary widely in cost and depends on a variety of factors including: number of chargers, capacity of the chargers, siting, usage patterns and needs of customer, charging technology, etc.

**C. Describe whether additional charging stations should be installed in densely populated areas, in areas outside densely populated cities, or both.**

Charging stations are needed in both scenarios, and less populated areas should not be disadvantaged over populated regions. The rule of thumb to follow is right sized and right numbered. Where cities may require more lower power charging for high density parking applications, office buildings, multi-unit dwellings and overnight flights, they will also require a fair number of “metro” DC fast charging stations for parking use cases where drivers stop for an hour or two. The highest power charging stations will be needed along highway corridors, and to support fleets wherever they are.

**a. Describe how EV charging infrastructures could penetrate low income communities that generally do not have high EV adoption.**
Lower income residents generally have less access to individual charging stations for overnight charging where a dedicated garage and installation is required. In these cases, multi-family housing charging spots become more necessary, along with community DC fast charging stations where the charging asset can be shared by many and charging can take-place throughout the day by more people. Charging programs with public or utility funding should be encouraged to serve these needs.

D. Discuss ownership of charging stations.

ABB is supportive of all ownership models so long as they include proper operational planning and customer-focused implementation. ABB welcomes utility investment in charging infrastructure in a way that makes sense for supporting community goals for cleaner air while balancing the needs of consumers and the private market.

E. Describe whether charging stations should consist of DC Fast Chargers, slow chargers, or a mixture of both. Explain why.

Unequivocally a mixture of all levels of charging speed and power, basis application, is required. Charging infrastructure is never a one-size fits all approach due to the highly diverse nature of vehicle use and type.

Charging technology choices have expanded greatly in recent years in power range and capability, but they also need to fit driver needs in order to be commercially successful. Next generation EVs will be able to charge at significantly higher powers than today, but they won’t always need the same rates of charge. Right-sizing for sites to find the best technology for the use case is key. For example, drivers of long-range EVs will appreciate a quick ten minute charge while stopped for a quick break along an interstate highway, or while on route to the next city. But they will also be satisfied by a one hour charge at a restaurant or shopping mall that they frequent in their community, or an eight hour charge while they are at work. The charging technology to meet each of those use cases exist today and all are relevant to growing EV adoption.

F. What other utility service options, especially those currently offered in other jurisdictions, could promote EV adoption?

Education, rate design and smart charging incentives are effective ways utilities can promote EV adoption.

G. What kinds of building code considerations should be kept in mind?

Planning ahead with new buildings eliminates the need for costly retrofitting later. To make it easier for charging infrastructure integration at buildings and facilities, building codes should take into account electrical service such as dedicated circuits, sufficient capacity, conduit and electrical panels. In addition, buildings should consider sufficient dedicated parking accommodations.

H. What kinds of ordinance changes can help encourage EV adoption?
Ordinances that support EV ready building codes and parking accommodations that make EV infrastructure inclusion easier for building and facilities managers are beneficial. Additionally, streamlining permitting and related civil works processes for EV infrastructure installations will alleviate project interruptions for all investing in EV infrastructure deployments.

I. What other municipal codes can encourage EV adoption?


J. Describe technical standards, guidelines, and best practices to manage EV charging standards.

Major technical standards groups that influence EV charging infrastructure safety, interoperability and best practices include National Electrical Manufacturers Association (NEMA), National Fire Protection Association (NFPA)/National Electric Code (NEC), International Electrotechnical Commission (IEC), International Organization for Standardization (ISO), Open Charge Alliance (OCA), Society of Automotive Engineers (SAE), Charging Interface Initiative e.V. (CharIN) and CHAdeMO Association.

Ratemaking:

A. Describe whether utilities should charge time-varying rates, such as time-of-use rates, to incentivize EV penetration in the state. Explain why or why not.

a. How would EV drivers benefit from these rates?

Time varying or EV charging rates, are critical to EV deployment and would benefit EV drivers by allowing them to take advantage of lower rates to charge their vehicles. It would also enable better grid management and boost grid reliability and resilience.

B. Discuss whether charging infrastructures should be included in the rate base if the charging infrastructure is owned by public utilities. Explain why or why not.

ABB supports rate-basing strategies where smart implementation of rate design, managed charging, and charging maintenance can create longer term savings for both the utilities and consumers alike. Private companies and parties, should not, however, be competitively disadvantaged.

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