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TRANSACTIONS

2023 Q4

Developing On Call Energy & Capacity Security

PART 03

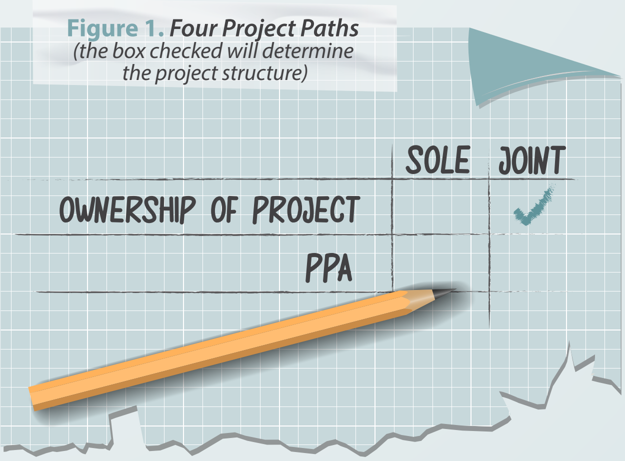
JOINT PROJECT OWNERSHIP

As provided in Part 1 and 2 of this *three-part series*, **there are industry proven power project development and asset management processes which can be utilized to effectively develop, own, and manage a natural gas fired generation resource.** The last of a series of three articles, ***this article outlines the process and provides a framework that can be followed when a joint development and joint ownership structure is put in place to develop, build, and operate the project.***

JOINT PROJECT OWNERSHIP STRUCTURE

Depending on the power project's ownership structure, ***a joint ownership and development strategy can require a level of talent resource engagement that is the same as or similar to that of a sole ownership strategy.*** That is, the lead owner would likely provide the required talent resources, either internally and or externally. However, this level can be impacted by the terms of the joint development, ownership, and operating

Figure 1. *Four Project Paths*
(the box checked will determine the project structure)



	SOLE	JOINT
OWNERSHIP OF PROJECT		✓
PPA		

LOOK FOR US

Upcoming Conferences

DECEMBER 5-7
Great Lakes Expo
Grand Rapids, MI

JANUARY 29-30, 2024
NAEMA East Meets West
Vail, CO

MARCH 3-6, 2024
NRECA TechAdvantage
San Antonio, TX

UPCOMING WEBINARS

Hi-Line Engineering is excited to once again offer 12 webinars throughout 2024 all geared toward keeping you up-to-date on industry issues and standards!

DECEMBER 12
Interconnection of Distributed Generation

JANUARY 9, 2024
Impacts of Electric Vehicles

FEBRUARY 13, 2024
Basics of Distribution System Planning

Note All webinars are recorded & available for viewing post-presentation agreements agreed to by the owners. Further, the need for joint ownership agreements creates additional complications and considerations relative to those issues for sole ownership.

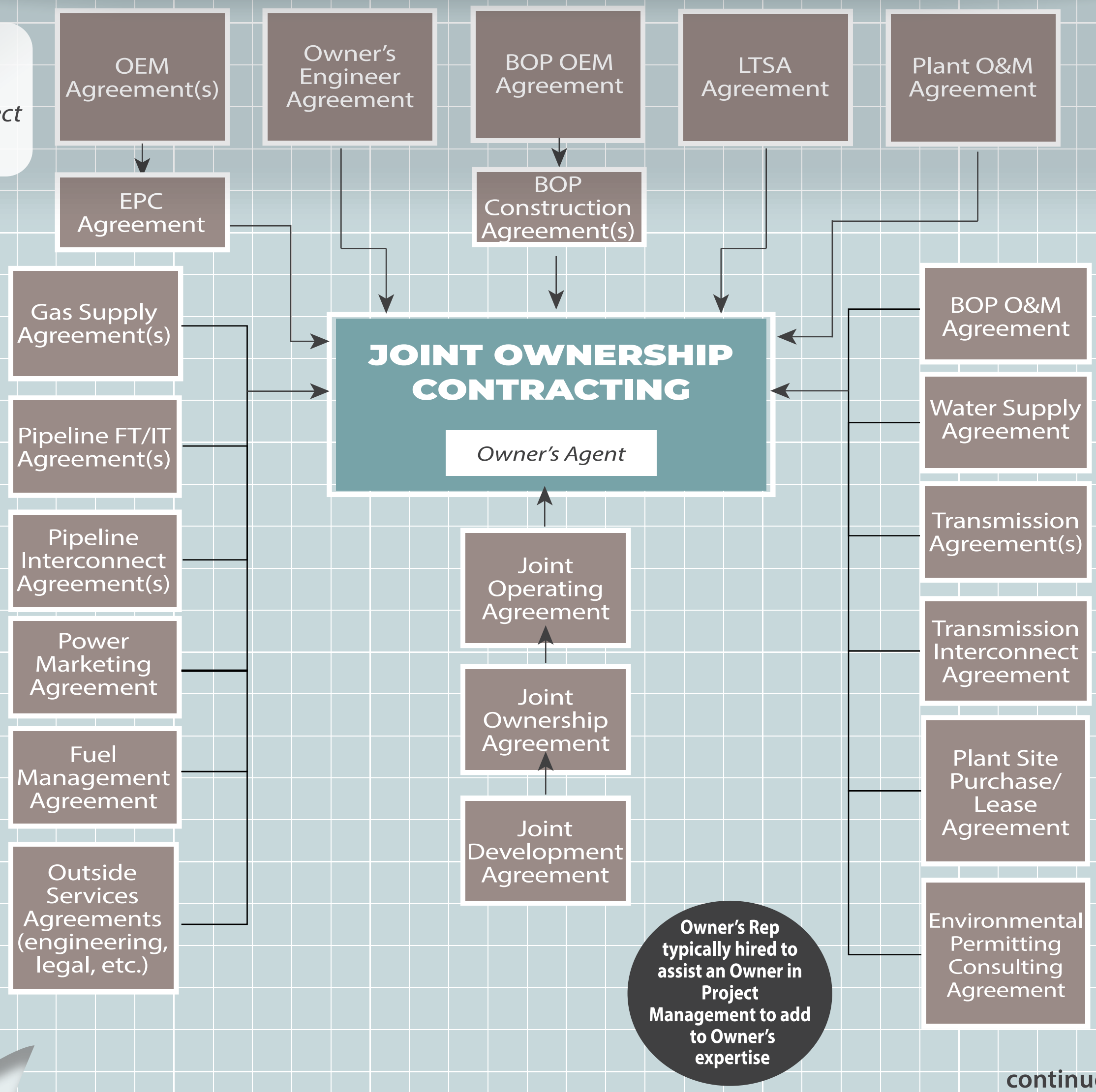
Figure 2 represents the implementation functions and the required talent resources needed for power project development under a joint project ownership structure. In cases where all the owners lack the experience and/or resources, or for reasons such as conflict of interest, the owners can agree to outsource these activities and define the roles and responsibilities within the joint project agreements. Under a joint project strategy, owners' legal and owners' representative support will need to be well versed in joint project agreements that will be required.

Owners who are not leading the development efforts will require their own support services to help protect their interests during the project development process and after commercial operation. These services can be sourced in-house or contracted separately by the non-lead owner. Such owner representative services would not be part of the project nor be a joint project expense. The ability of any owner to monitor and challenge, if necessary, project management directions and decisions based on experts' reviews would need to be outlined in the joint project agreements.

JOINT PROJECT INTERNAL STAFFING

Joint ownership will require internal talent resources during both project development and commercial operation. The breadth and depth of the internal talent resources will depend on the terms of the joint project agreements in place to manage the project development and operations. The project development and operations resources are generally housed within the project's lead functional organization. Existing internal resources are often relied on by the lead owner to drive functional activities that can be viewed as outside the plant fence such as power transmission and fuel procurement, but it is not uncommon for such expertise to be outsourced. The degree of engagement will depend on the joint agreements in place to manage the project.

Figure 2. *Joint Project Ownership Required Agreements:* *Joint Project Ownership Structure*



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The project-lead organization will design the outsourced talent resources' reporting relationships that best fits their managerial situation. A development lead or project manager will be required to coordinate and oversee their team of engaged internal and outsourced resources. In addition, the project lead will be the organization's project "go to" person. Although this individual would report to the lead owner's senior management, they would be accountable to other owners as well.

ADDITIONAL DEVELOPMENT & OPERATIONS RESOURCE CONSIDERATIONS

1

INTENTIONAL INTERNAL LEAN PROJECT ORGANIZATIONAL STRUCTURE

Functions are executed by external resources where possible for a variety of reasons, including existing staff's experience and the ongoing lack of need for in-house resources post development.

2

INTERNAL DEVELOPMENT SUPPORT STRUCTURE

All co-owners should appoint their own project lead that will require direct authority from senior management and support on an as-needed basis from the various internal support functions of the co-owner.

3

OPERATIONS SUPPORT

The degree of effort required by a co-owner during operations will depend upon the amount of expected contribution from the co-owner and will depend largely on the terms of the joint operations agreement.

SUMMARIZING THE EFFORT

Natural gas fired power project development includes a range of implementation functions. These functions require both technical and commercial skillsets. The development and implementation resources must be qualified to support the execution of each function. It will be critical for these internal and acquired resources to meld the development activities so that the project can be commercialized to meet its goals.

Regardless of the chosen development strategy, the resulting structures will generally include the same types of technical and commercial talent, but the level of engagement of these resources will differ.

Best practices require the formal engagement of an owner's engineer when an EPC contract or developer arrangement is the determined approach. This is an expected requirement for funding approval. It is best practice for a co-owner not experienced in power project development and operations and with limited internal project development talent, to engage an owner's representative to act as an extension of the co-owner's development and operations staff.

Organizations without the power project development, ownership, and operations internal resources and experience have successfully evolved while also maintaining a lean approach to fulltime internal staffing. The required high level of project development and operations proficiency can be successfully acquired through outsourcing. Organizations will acquire power project internal talent and outsourced talent resources and design reporting relationships that best fit their organization's managerial situation. During the development phase, the reporting relationships will need to operate much like a matrix organization with dual reporting to both the organization's internal leads and the project's development lead to be successful. ■

KEY TAKEAWAYS

BREADTH OF EXTERNAL RESOURCES

A breadth of external resources is required during the development and operational phases for ownership development strategies for organizations not housing those resources internally.

DEPTH OF EXTERNAL RESOURCES

The depth of engagement for external resources depends on the development strategy, project structure, and the organization's internal talent.

INTERNAL RESOURCE NEED

No matter the development strategy, the required level of incremental internal staffing can be best fit to meet the co-owner's needs.

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ELECTRIC VEHICLES

Forecasting, Grid Impacts & Proactive Planning

Electric vehicles (EVs) are rapidly gaining momentum globally, with many countries and automakers setting aggressive EV adoption targets. Rapid EV adoption represents both an opportunity (energy sales growth) and a challenge (infrastructure and demand costs) for electric utilities. Thoughtful forecasting, grid impact analysis, and proactive planning will allow utilities to cost-effectively integrate new EV loads while maintaining high reliability standards. ***This article provides an overview of key capabilities utilities should develop to properly prepare for wide-scale EV adoption in their service territory.***

01 EV Adoption Forecasting.

The first critical capability is developing robust forecasts for EV growth within your service territories. ***EV adoption is driven by several key factors:***

Cost Parity. As battery costs decrease, EVs will reach sticker price parity with internal combustion engine vehicles Most analysts estimate this will occur between 2025 and 2030.

Vehicle Variety and Availability. As automakers continue to expand the EV models offered, consumers will have more options to consider.

Consumer Preferences. Younger and more affluent consumers often have strong environmental preferences favoring EVs. Regional consumer surveys and publicly available U.S. Census data can provide insights on key population metrics to consider.

Government Policy. Stricter emissions regulations, carbon pricing programs, and purchase incentives boost EV popularity. Monitoring related national, state, and local policies can provide insight to future growth potential.

Charging Infrastructure. Increased public charging station availability alleviates consumer range anxiety, encouraging adoption. Tracking charging infrastructure development provides useful signals on a region's preparedness for widespread EV adoption.

To develop sound EV forecasts, utilities should analyze historical regional growth trends combined with a holistic analysis of the key points discussed above. Automaker production targets also give visibility into projected EV sales penetration and supply dynamics.

Forecasts should consider multiple scenarios ranging from conservative to aggressive adoption levels. EV sales can be projected as a percentage of total new vehicle sales, with the percentage growing exponentially over time. To translate sales into utility EVs, vehicle lifespan assumptions are needed to calculate retirements. Vehicle registration data can provide a good estimate for the current number of EVs in a given zip code, city, county, or region.

Ultimately, a robust forecast provides visibility into the total number of EVs by year as well as their general locations within the service territory. This fundamental projection serves as the foundation for all subsequent grid impact analysis.

02 Load Profile Analysis.

Once EV adoption is forecasted, utilities need to analyze the grid load impacts. This begins by developing load profiles, which estimate the diversified demand from a community of EVs over time. ***Load profiles are created by simulating driving and charging behaviors using several key variables:***

Battery Size. Maximum storage capacity affects required charge times. Larger batteries take longer to recharge.

State of Charge. A fully depleted battery will draw maximum charging current whereas a battery at a higher state of charge typically will draw less current as it reaches 100% charge.

Charger Type. Level 1, 2, and DC fast charging have very

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different load impacts based on the charger power rating.

Ambient Temperature. Cabin heating and battery conditioning needs increase at extreme temperatures, raising charging loads.

Charging Strategies. Immediate charging upon arriving home creates increased grid demand during peak hours versus delayed charging. Utilities can influence charging behavior with incentives and consumer education.

Charger Availability. The amount of public charging infrastructure is considered when developing and analyzing load shapes.

The assumptions made regarding consumer charging behavior significantly impact the load profiles. Uncontrolled immediate charging after customers return home from work generally creates the highest peak demand. However, utilities have options to mitigate these impacts. Price signals through time-of-use (TOU) rates can incentivize delayed charging, and direct load control allows shifting charging to overnight periods when grid utilization is lower. Additionally, simple consumer education on when to charge your EV has proven effective at influencing consumer charging behavior.

By developing load profiles under various charging behavior scenarios, utilities can quantify the benefits of mitigation strategies and properly prepare for increased EV load.

03 Managing On-Peak EV Load.

There are a few key tools that utilities can use to provide incentives to consumers to delay EV charging or shift charging to overnight periods:

Time-of-Use Rates. Utilities can implement time-of-use (TOU) rate plans that charge lower rates overnight and higher rates during peak periods. The price signals incentivize consumers to delay charging to the lower cost overnight hours, while still giving the customer the option to charge their vehicle as needed. TOU rates are enabled by smart meters and often require educating consumers on how their bill is calculated and impacted by different behaviors.

Below are some effective ways that utilities can ensure consumers are aware of TOU rates and impacts:

Clear communication when enrolling in TOU rates. Provide information packets that explain the rate periods, prices, and bill impact in simple terms. Have customers affirmatively opt-in to demonstrate understanding.

TOU rate comparisons on bills. Show TOU rate prices versus the standard rate on each bill to illustrate savings. Provide regular bill forecasts if possible.

TOU usage data on bills. Include charts showing the customer's hourly/daily usage compared to TOU periods to reinforce peak/off-peak behavior.

TOU period indicators on smart devices. Leverage smart home devices and apps to provide alerts and notifications when entering peak rate periods.

Targeted customer education. Focus educational campaigns on customers with bill variability and low satisfaction to improve TOU understanding.

Customer service training. Ensure customer service teams can explain TOU concepts and bill impacts clearly to customers that call with questions.

Resources for analyzing bills. Provide bill analyzers, videos, and other self-service resources to help customers understand TOU impacts.

The key is layered, multi-channel communication tailored to different consumer segments. By improving TOU rate awareness, utilities can drive engagement and properly influence charging behavior.

Managed Charging Programs. Utilities can offer rebates or bill credits for allowing direct utility control of EV chargers through a one-way communication link. With direct control of the device, the utility can shift charging to off-peak hours. There is typically a limit to the number of hours or instances in which a utility can directly control or interrupt a charging device, ensuring that consumers are not fatigued by the program. Consumers opt-in to the program and provide control to the utility in exchange for charger rebates or monthly bill credits.

Demand Response Integration. EV chargers can be integrated into demand response programs that utilities use to shave peak loads. During peak events, a signal is sent to enrolled chargers to temporarily reduce charging load, similar to the managed charging programs discussed above. The difference is that demand response events are typically less common and only occur during very specific windows. Consumers receive enrollment incentives and occasional event payments or bill credits.

Public Education. Utilities can educate consumers on the benefits of off-peak charging through websites, social media, and advertising of "Beat the Peak" programs or other similar consumer behavior programs. The idea is to appeal to environmental benefits, doing good for the community, and avoiding grid congestion to help influence behavior.

Workplace Charging Incentives. Another strategy is to provide rebates for employee workplace chargers that have delayed start and/or TOU capabilities, where workplace charging is shifted to the lowest peak hours during the day.

Overall, the combination of financial incentives, technology integration, and public education provides multiple avenues for utilities to encourage off-peak and delayed EV charging.

04 Distribution Grid Impact Analysis.

The next consideration involves integrating EV load profiles into distribution grid models to analyze system impacts. Many utilities have extensive modeling capabilities for the substations, feeders, and transformers that deliver power to customers. The forecasted EV loads can be overlaid onto these existing models.

The geographic allocation of forecasted EVs provides the basis for assigning them to specific feeders and distribution assets. The load profiles are used to grow feeder loads to match each year in the forecast period. EVs can be modeled as clusters of spot loads placed randomly on feeders, or as more uniformly distributed loads along entire feeder segments.

Power flow analysis is then used to simulate load flows with the additional EV loads. This identifies capacity constraints resulting from increased demand. Upgrades may be triggered on substation transformers, feeder conductors, or local distribution transformers in high adoption areas. Low voltages caused by increased peak demand and excessive voltage drops are also identified.

Utilities can augment this standard analysis by developing heat maps that identify areas of the distribution grid that may be more at risk for exceeding capacity. Risk factors like higher home values, multi-family housing, and proximity to public charging stations indicate locations likely to experience high adoption levels. Heat maps enable targeted planning and prioritization of distribution grid upgrades.

By integrating EV load profiles with detailed grid models, utilities gain critical insights into infrastructure risk areas and required system upgrades to maintain reliability.

05 Proactive Distribution Grid Planning.

The forecasting, load impact analysis, and grid modeling capabilities described enable proactive distribution grid planning to cost-effectively manage increased EV adoption.

Utilities have several options to mitigate impacts:

Detailed load flow studies allow identifying capacity upgrades to substations, feeders, and transformers needed to accommodate EV loads in a timely manner.

New transformer sizing guidelines for new residential and commercial construction prepare for increased EV density and reduce the need for premature replacements.

AMI systems with transformer-level loading data offer excellent visibility into developing hot spots and indicators of pending overloads.

Coordination with local permitting offices helps track new residential charger installations to stay ahead of evolving loads.

Consumer education campaigns can encourage safe and code-compliant charger installation along with off-peak charging to manage loads.

Exploring EV time-of-use rate designs creates fair cost recovery and incentives for smart charging behavior.

06 Final Thoughts.

The mass adoption of EVs presents challenges but also opportunities for utilities focused on grid modernization and clean energy initiatives. Investing in robust forecasts, detailed impact analysis, and proactive distribution grid planning enables utilities to integrate EV loads in a cost-effective manner while delivering value to customers. With careful preparation, utilities can maintain reliable electric service as EVs scale rapidly in coming years. ■

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