IRP Stakeholder Workshop #2: Stakeholder Comment Form - Additional Material With Uplight's Question Responses

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Introductory Comments to Uplight's IRP Question Responses

Illinois's proposed IRP framework appropriately recognizes the growing importance of demand-side resources, including energy efficiency (EE), demand response (DR), distributed energy resources (DERs), and virtual power plants (VPPs), and takes a meaningful step by incorporating these into baseline assumptions and higher-flexibility scenarios. The framework proposes to model existing DR, embed EE within load forecasts, assume continued distributed solar growth, and introduce a new, single "representative VPP" resource whose reliability contribution will be estimated and used to offset supply-side investments. It also identifies key parameters, such as composition, available capacity, duration/frequency, and cost, that will inform how this VPP is constructed and evaluated. In addition, the IRP contemplates "High Flexible" scenarios where incremental EE, DR, and VPP potential are layered onto the system to assess their impact on resource needs.

However, while directionally appropriate, this approach falls short in several important ways that risk materially undervaluing the demand side. Most notably, the reliance on a single representative VPP, combined with treating demand-side resources largely as exogenous assumptions rather than selectable resources, limits the model's ability to capture the diversity, scalability, and system-responsive nature of aggregated DERs. By collapsing a wide range of technologies (e.g., EV charging, smart thermostats, water heating, customer batteries, commercial controls) into one fixed profile, the IRP risks "hard-coding" inflexible assumptions around duration, frequency, and availability that do not reflect how VPPs are actually deployed and optimized in practice. Similarly, embedding EE and rates primarily as annual load modifiers rather than fully capturing their 8,760 impacts, and not clearly separating existing versus incremental flexibility, further obscures the true operational value of the demand side. Together, these limitations create a structural bias toward supply-side solutions by preventing VPPs and flexible load from competing on equal footing in the capacity expansion model.

To address these gaps, Illinois should evolve the IRP toward a more robust and comparable treatment of demand-side resources. First, VPPs should be modeled as selectable, dispatchable resources within PLEXOS, capable of being built, dispatched, and optimized alongside gas, storage, solar, and other supply-side options. Second, rather than relying on a single representative VPP, the IRP should either model multiple VPP archetypes or, preferably, adopt a hybrid modeling approach in which bottom-up DER data defines realistic operating constraints (e.g., duration limits, cycling frequency, seasonal availability), while the model is allowed to dispatch VPPs flexibly within those bounds based on system needs. Third, VPP ELCC should be derived from the underlying resources and applied on an hourly or time-sliced basis, not just as an annual average, to better reflect evolving reliability conditions. Fourth, the framework should explicitly separate existing and new load flexibility, recognizing that emerging electrified loads (e.g., EVs, smart appliances) can provide materially different and often greater flexibility than legacy DR programs. Fifth, EE, rates, and load-modifying resources should be applied on a full 8,760 basis, while existing DR and new VPP resources should be modeled on the supply side to enable direct comparison with traditional generation. Finally, the IRP should incorporate the net system impact of VPPs, including avoided transmission and distribution costs from targeted deployment, so that VPPs are evaluated on a more complete and comparable cost basis. Collectively, these refinements would allow the IRP to more accurately reflect the role of the demand side and unlock its ability to serve as a core, scalable resource in Illinois's future system.

Question Responses (Responses also submitted via the Google Form)

Are there specific resource types that are not adequately captured by the proposed categories and should be reflected in the IRP framework?

The current framework appropriately proposes a single representative VPP that aggregates multiple DER technologies, and we support maintaining that construct to reflect the portfolio-level effects of aggregation. However, to ensure that this VPP is accurately characterized—and to avoid masking important differences in performance—the IRP should more explicitly recognize the underlying resource types that drive VPP capability.

Specifically, while the VPP should remain an aggregated resource, the model inputs and assumptions should distinguish key building blocks such as:

- Managed EV charging
- Residential smart thermostats
- Commercial building controls
- Flexible water heating / thermal storage
- Customer-sited batteries and BTM solar+storage
- Flexible large loads

This distinction is important because these technologies have different duration, frequency, availability, and seasonal performance characteristics, which directly determine the aggregate VPP's ELCC and dispatch capability. In addition, where feasible, the modeling framework should allow these underlying technologies to be recognized separately or parameterized explicitly, even if they ultimately roll up into a single VPP resource for capacity expansion purposes. This ensures the VPP reflects true aggregated capability rather than a simplified or static proxy.

Are there any resource categories that should be added, removed, or redefined to better reflect meaningful differences in cost, performance, or system value?

Yes. While we support maintaining a single aggregated VPP resource to reflect the portfolio-level benefits of DER aggregation, the current framework would benefit from refining how resource categories are defined and parameterized so that this VPP more accurately reflects underlying capabilities and can compete directly with supply-side options. Specifically, the IRP should ensure that the VPP is treated as a selectable, dispatchable supply-side resource in PLEXOS, rather than solely as a scenario input. In doing so, the model should explicitly parameterize the underlying DER building blocks—such as managed EV charging, smart thermostats, customer-sited batteries, commercial controls, and flexible water heating—so that their differing duration, availability, and performance characteristics are reflected in the aggregate VPP without requiring each to be modeled as a standalone resource.

In addition, several supporting category refinements are needed to improve consistency and avoid double counting or undercounting. The IRP should clearly separate existing demand response (modeled on the supply side) from new VPP resources (modeled as expandable/selectable capacity), and distinguish flexible electrified load from legacy DR programs to reflect the enhanced capabilities of newer technologies. Energy efficiency and rate impacts should also be separated into existing and incremental components and applied on an 8,760 basis to the load forecast, rather than only as peak adjustments. These refinements preserve the simplicity of a single VPP construct while ensuring it is grounded in realistic inputs and evaluated on a comparable basis with traditional generation, ultimately improving the model's ability to identify least-cost, system-responsive resource portfolios.

What feedback do you have on the proposed base case cost assumptions for mature technologies (including solar, wind, lithium-ion storage, and gas)?
Please indicate which specific assumption you are commenting on, describe the reason for your feedback, and provide any alternative data source or supporting materials that you would like us to consider to support your recommendation. Please provide a link or share via email.
No response.

What feedback do you have on the proposed base case cost assumptions for emerging technologies (including nuclear and long duration storage)?

Please indicate which specific assumption you are commenting on, describe the reason for your feedback, and provide any alternative data source or supporting materials that you would like us to consider to support your recommendation. Please provide a link or share via email.

No response.

What feedback do you have on the proposed commercial availability timelines shown on Slide 18? Please identify any technology timelines you believe should be revised, why you think it should be revised, and any supporting data or materials you have to support your recommendation.

No response.

Please refer to the approach to modeling VPPs in this IRP on slide 29. Are there any targeted refinements you would recommend to improve the robustness of this approach and the results?

Yes. We support the proposed approach of modeling a single representative VPP to capture the aggregate effects of DERs, but recommend several targeted refinements to ensure that this construct more accurately reflects real-world performance and can be robustly evaluated within the planning framework. First, the VPP should be modeled as a selectable, dispatchable resource within PLEXOS, rather than solely as an exogenous assumption used to offset supply-side investments. This would allow the model to determine the optimal level of VPP deployment and dispatch alongside other resources, ensuring a consistent least-cost comparison.

Second, while maintaining a single VPP construct, the model should adopt a hybrid approach in which the VPP is grounded in bottom-up assumptions from its underlying technologies (e.g., EV charging, thermostats, batteries, and controls), but is allowed to dispatch flexibly within those constraints based on system needs. This avoids overly rigid assumptions around duration and frequency while still ensuring that performance remains realistic. In support of this, VPP reliability contributions should be based on the time-varying characteristics of the underlying resources, with ELCC applied on an hourly or seasonal basis rather than as an annual average.

Finally, the framework should explicitly separate existing and incremental VPP capability, reflect the net impact at the customer meter and portfolio level, and incorporate locational and avoided transmission and distribution value where feasible. Together, these refinements preserve the simplicity of a single aggregated VPP while materially improving its representation, enabling it to better capture the diversity, scalability, and system-responsive nature of demand-side resources in the IRP modeling process.

As shown on Slide 29, this IRP will model one representative VPP made up of multiple DER building blocks. Please rank which VPP building blocks you believe are most important to include in a representative VPP.

- BTM solar
- BTM storage
- Managed EV charging
- Residential smart thermostats
- Water heater controls
- Commercial building controls
- Others

At a foundational level, a representative VPP should not be constructed based on a fixed preference for specific technologies, but rather should be designed to reflect the optimal mix of resources based on system need, cost inputs, and operational characteristics. In practice, this means the IRP should allow the composition of the VPP to be informed by the relative economics, availability, duration, and performance of each DER type, rather than prescribing a static mix. This is consistent with the broader recommendation to treat the VPP as a flexible, system-responsive resource, where the underlying technologies collectively deliver the most cost-effective combination of capacity, energy shifting, and reliability services.

That said, based on current market maturity, scalability, and demonstrated performance—and reflecting Uplight's experience in deploying and operating these resources—the following ranking represents the most impactful building blocks for inclusion in a representative VPP:

1. Residential Thermostats – Proven, scalable resource with reliable peak demand reduction and broad customer adoption
2. BTM Storage – Highly dispatchable and valuable for capacity, though dependent on ownership models and dispatch rights
3. Managed EV Charging – High growth potential and significant flexible load capability, particularly for load shifting and off-peak optimization
4. Commercial Building Controls – High-value, dispatchable load with longer duration and strong performance in peak events
5. Water Heater Controls – Underutilized but increasingly important flexible load with multi-hour shifting capability
6. BTM Solar – Valuable when paired with storage, but limited standalone dispatchability for reliability
7. Others – Should include:
    - Flexible large loads (e.g., data centers, industrial DR)

- Smart appliances and electrified end uses (e.g., heat pumps)
- Grid-interactive efficient buildings

Importantly, even with this ranking, the IRP should ensure that all of these technologies are parameterized and available within the VPP construct, allowing the model to determine the most effective composition over time rather than relying on a fixed allocation.

Slide 30 identifies key VPP parameters that will inform the representative VPP to be modeled in the IRP. Please use the parameter categories shown when responding to the following questions. Please provide specific assumptions where possible with supporting data sources and/or program examples, where available.

- **Based on the building block rankings you provided in your response to the previous question, please specify the percentage of total VPP nameplate capacity you recommend assigning to each building block.**
- **Of those building blocks, how would you distinguish between existing and new resources in your proposal?**
- **What available capacity should be assumed for this VPP? How should it be assumed to vary over the year?**
- **How long may this VPP sustain the response? How frequently?**
- **What may this VPP cost?**

For the representative VPP, the IRP should preserve the concept of one aggregated VPP resource, but the resource should be built from explicit assumptions about the underlying DER building blocks. This is consistent with Uplight's view of a VPP as a portfolio of multiple energy asset types and customer segments that is managed as an integrated resource and operated like a conventional power plant. The goal should not be to lock in a rigid technology mix forever, but to create a representative portfolio that reflects near-term market maturity, customer adoption, operating capability, and cost, while still allowing future optimization across technologies.

Recommended VPP composition by nameplate capacity:

For this IRP cycle, we recommend assigning the representative VPP approximately as follows:

- Residential Thermostats: 30%
- BTM Storage: 20%
- Managed EV Charging: 20%
- Commercial Building Controls: 15%
- Water Heater Controls: 7.5%
- BTM Solar: 2.5%
- Others: 5%

This weighting reflects Uplight's experience: the strongest near-term VPP opportunities are flexible load resources that can be aggregated, forecasted, and dispatched across residential and commercial customer segments. Uplight's demand management and VPP offerings emphasize unifying demand-side resources across asset classes and customer segments into firm, dispatchable portfolios, including DR, DERMS, VPPs, and EV charging. BTM solar should receive limited standalone weight because it is not dispatchable absent storage or controllable export behavior; its value is better captured when paired with BTM storage.

Existing versus new resources:
The IRP should distinguish between existing enrolled or enrollable flexibility and new incremental VPP capability. Existing resources should include legacy DR, installed smart thermostats, existing commercial controls,

installed batteries, and current customer programs that can be brought under dispatch or performance measurement. New resources should include incremental devices and customer participation enabled by CRGA tariffs, electrification, managed charging, new smart thermostats, heat pump water heaters, BTM storage adoption, and grid-interactive buildings. This distinction matters because newer devices generally provide more granular telemetry, better control, more reliable performance, and greater dispatch flexibility than legacy programs such as traditional AC cycling.

Available capacity and seasonal variation:
Available VPP capacity should not be modeled as a flat annual MW value. It should vary by hour, season, resource type, and system condition. The VPP should have the greatest dependable capacity during summer afternoon/evening peaks and winter morning/evening peaks, with additional flexibility during high-renewable or high-net-load periods. Thermostats and commercial controls will tend to contribute most during weather-driven peaks; managed EV charging and water heating can provide more frequent load shifting; BTM storage can provide higher-confidence dispatch when charged and under aggregator control. The IRP should therefore model the representative VPP on an 8,760 basis, with an aggregate availability profile derived from the underlying technologies.

Duration and frequency:
The representative VPP should be modeled with multiple dispatch capabilities rather than a single fixed event shape. A reasonable starting assumption is:

- **Residential thermostats:** 2–4 hours per event
- **Commercial building controls:** 2–6 hours per event
- **Managed EV charging:** 3–8 hours of shift capability
- **Water heater controls:** 3–8 hours of shift capability

- **BTM storage:** 2–4 hours of firm dispatch, depending on battery size and state of charge

For frequency, the IRP should distinguish between reliability events and economic dispatch. A reasonable reliability planning assumption would be 20–40 critical events per year, while EV charging, water heating, batteries, and some commercial loads could support more frequent economic dispatch or load shaping if customer constraints are respected.

Cost:
The modeled VPP cost should be built up from the components required to deliver dependable, measurable capacity:

- Customer acquisition and enrollment
- Customer incentives
- Device enablement and integrations
- Platform / DERMS / VPP operations
- Forecasting, telemetry, measurement, and verification
- Dispatch operations and performance settlement

For planning purposes, the IRP should express these costs as an annualized $/kW-year or $/MW-day value so the representative VPP can compete directly with gas, storage, and other supply-side resources. However, the model should also recognize that targeted VPP deployment can avoid or defer distribution and transmission investments. Therefore, the VPP should be evaluated on a net cost basis, where avoided T&D value reduces the effective cost of VPP MWs when the resource is deployed in constrained locations or dispatched during local peaks. This is critical to ensure the model reflects the full system value of VPPs rather than only their bulk capacity value.

Do you have any feedback to provide on the Assumptions workbook separately posted? Please note the specific assumption, your recommendation, and any data or supporting materials to support your recommendation.

No response.

If CCS is considered as an added, co-paired technology with natural gas resources in a scenario:

No response.