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# Considerations for Storage as a Transmission Asset

PJM PC Special Session

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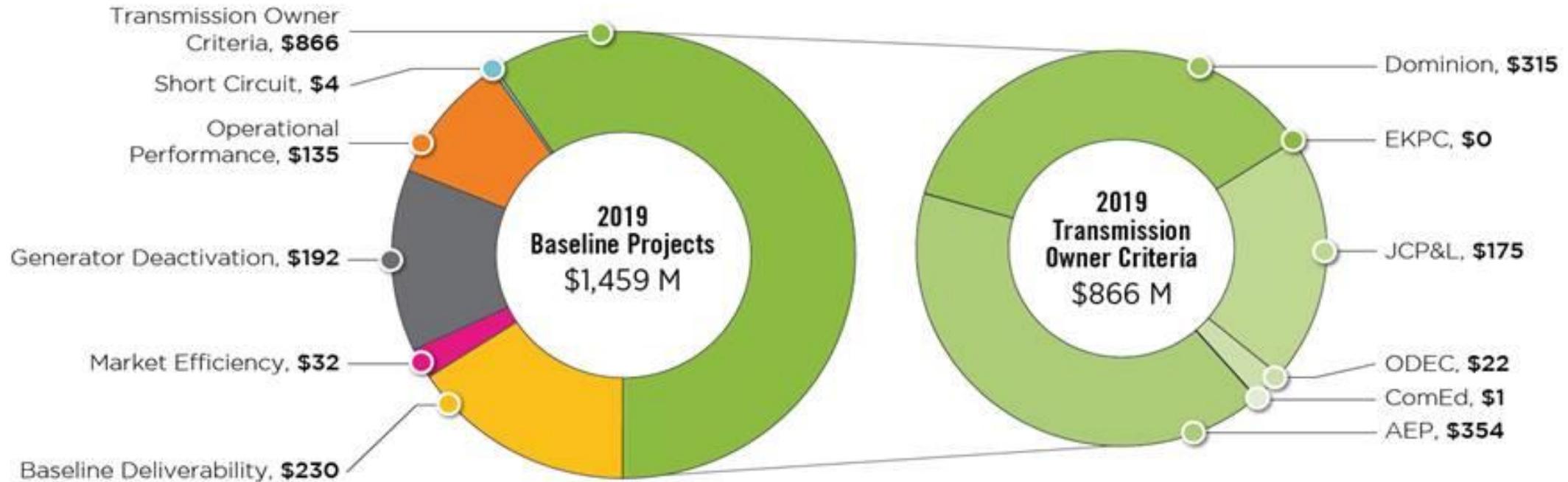
**Sep 25, 2020**

[www.energystorage.org](http://www.energystorage.org)

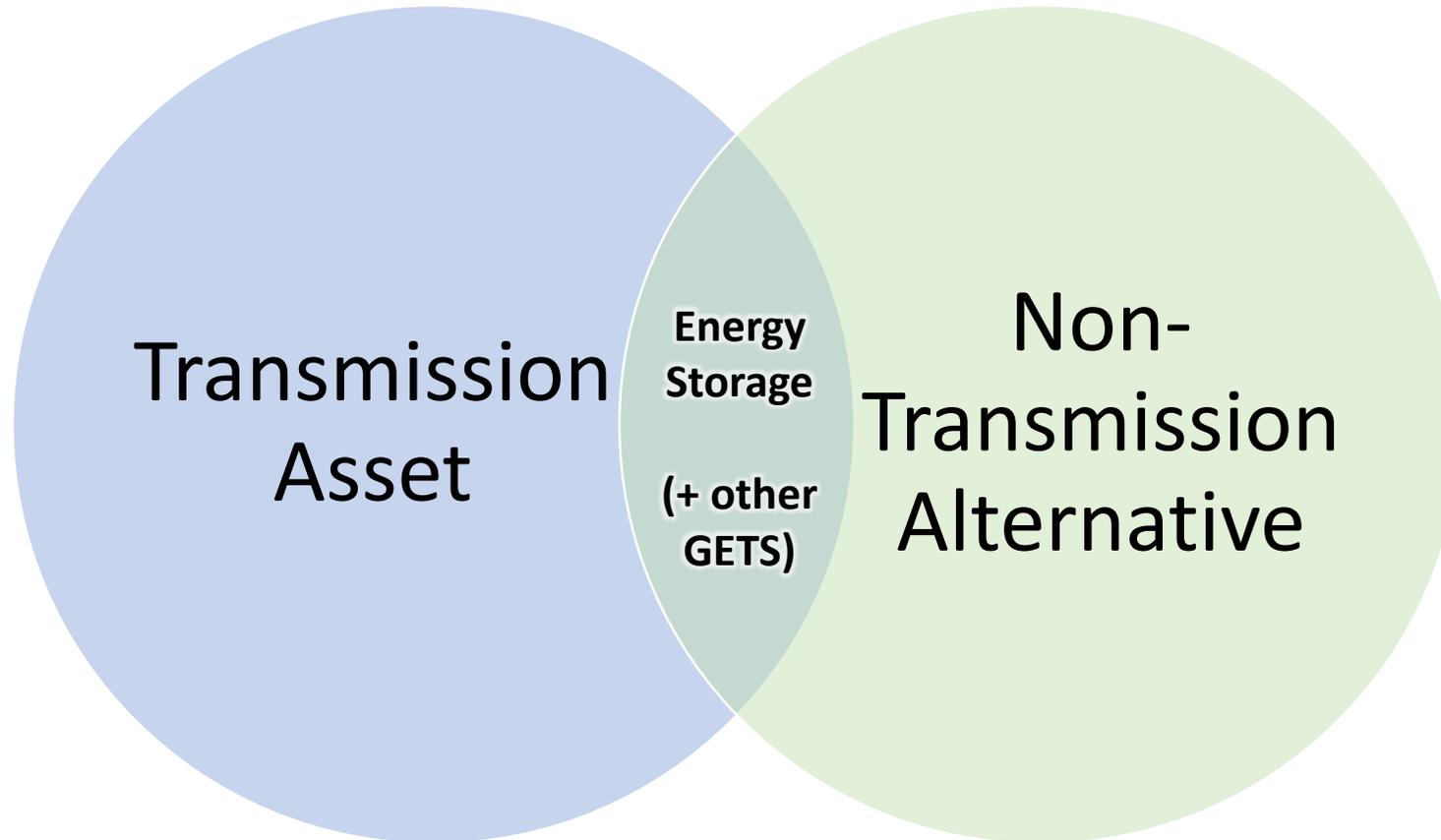


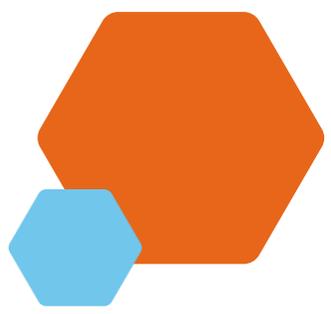
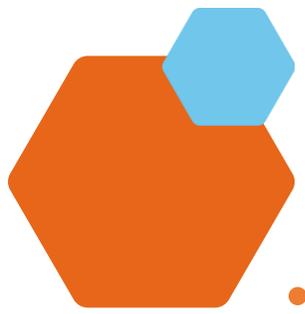
# An opportunity for efficiency

- **PJM 2019 RTEP spending was over \$2B**
- Some categories may be amenable for a storage-as-transmission solution



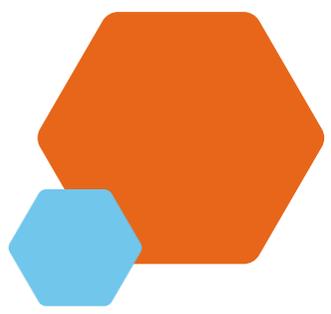
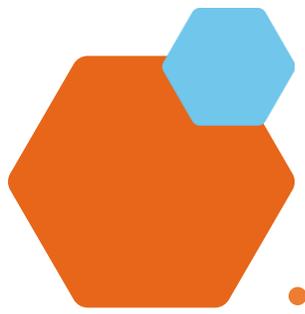
# Storage-as-Transmission: Where it Fits





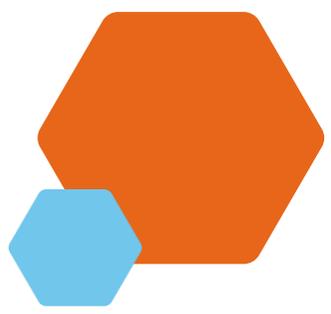
# SATA as an Ancillary Service?

- **Merits consideration because any entity that has the requisite technical and financial capabilities should be able to propose, own, and operate storage-as-transmission**
  - Would also enable generator storage to become dual-use
- **Questions that would need to be answered for ancillary service**
  - Is a discrete reliability service identifiable? What is it?
  - What do you do with being on “standby” for reliability service?
  - How do you determine the economics/cost basis?



# A Straw Proposal

- **New section of tariff or storage transmission service**
  - Not transmission, not ancillary service
  - Not specific to any discrete transmission function—catch-all for transmission service
- **Key components**
  - Open to any entity that has the requisite technical and financial capabilities
  - Specific study process (if Tx-only, not require generator interconnection)
  - Cost-based recovery for components required to meet transmission need
  - RTO via transmission planning process designates when tariff applies to a storage facility



# Storage in Transmission Planning

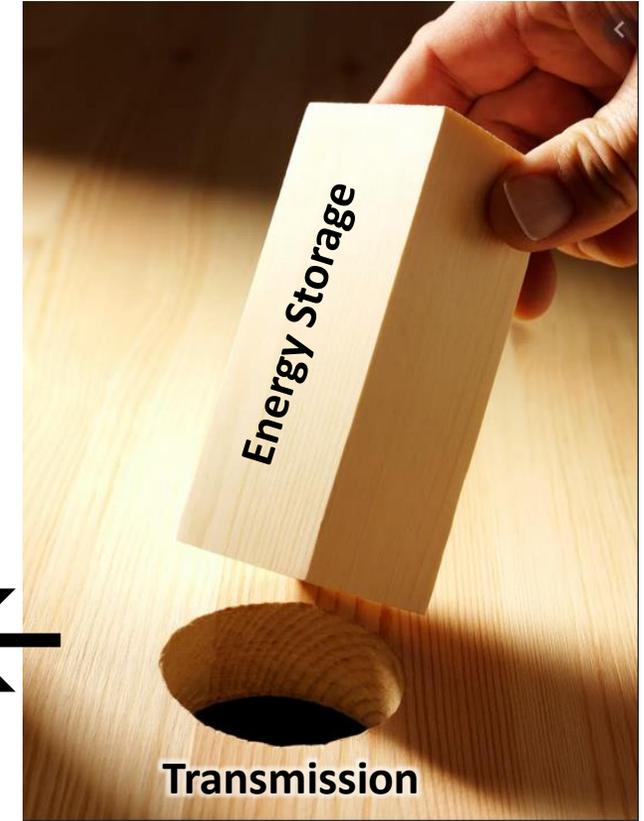
- **Regardless of approach, still needs to be brought into transmission planning**
  - Evaluation
  - Timeline/process
- **Evaluation criteria**
  - Ability to meet need
  - Cost
  - Time to deployment
  - Project risk
  - Option value
  - Risk management value
- **Planning process**
  - Shorter timeline possible for SATA, which is fast to build
  - Data availability for assessing SATA fit for transmission system reliability needs
  - Appropriate modeling of SATA, especially for market efficiency needs
- **Storage-as-transmission is a long-term solution**
  - Short-run SATA (i.e., while Tx upgrade occurs) potentially better remunerated in an “RMR” manner

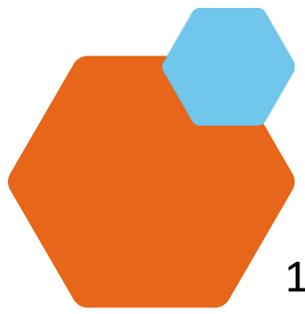
We've figured this out before



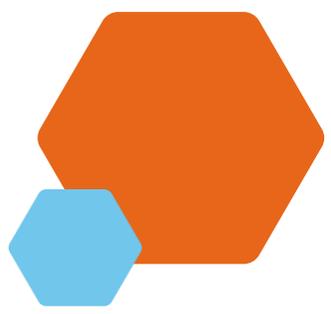
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# ESA Principles on Storage as Transmission Only



1. Energy storage should be considered as a transmission solution in the normal course of transmission planning processes.
2. Storage-as-transmission possesses different qualities than conventional transmission solutions and merits treatment that does not unduly penalize those differences.
3. SAT solutions should be studied using a process and timeline where approval, development, and deployment meet the objectives and/or the needs of the transmission system planner.
4. The ability to propose, develop, own, operate, and receive fixed cost recovery for any SAT solution should be open to any capable and, where appropriate, qualified industry participant.
5. Transmission system operators should make decisions about dispatch of storage for providing transmission service.
6. Cost-recovery through transmission rates should be available for all providers of SAT.
7. Transmission incentives should be available for technologies, including SAT, that maximize value or deliver cost-savings by augmenting existing transmission infrastructure.
8. Round-trip losses from SAT should be treated consistent with conventional transmission line losses.

For ESA's full policy statement on storage-as-transmission only, see slides appendix or online at <https://energystorage.org/policy-statement/policy-statement-storage-as-transmission/>

# ESA Principles on *Dual-Use* Storage as Transmission

1. ISO/RTO tariffs must allow energy storage resources to participate in transmission services and market services. Accordingly, the ISO/RTO transmission planning process must allow energy storage resources to offer to meet the needs of, and requirements for, upgrades for which they are technically feasible of providing. Tariff and market rules should allow a single energy storage resource to receive compensation for the provision of both transmission and market services as long as those services are technically feasible and as long as those services are operationally and financially distinct.
2. Storage as transmission projects seeking to offer services in organized markets should not be competitively advantaged as a result of timing differences in the transmission planning process. Any storage project that has been submitted for approval or has been approved in a regional transmission planning process that seeks to also offer services to an organized market shall be subjected to the existing generator interconnection study process.
3. There are multiple combinations of full vs. partial cost-recovery and market revenue crediting that can be contemplated for dual-use storage. Regional processes should allow for all such mechanisms to be developed and filed for approval.
4. ISOs/RTOs should put in place measures to mitigate potential market distortions from dual-use storage. As an example, if a storage resource serves a transmission function and also participates in wholesale markets, the storage asset may be required to adopt an established or agreed upon way of accounting for transmission revenues in the calculation of its bid or offer price in the market.
5. ISO/RTO Staff will have the option to maintain control of the dispatch of a dual-use storage asset for transmission operations, as it is the ISO/RTO that holds the burden of reliability. As captured in ESA's storage as transmission policy position from 2019, ISO/RTO control of any storage resource will be subject to the restrictions agreed upon in an operating agreement specific for the individual resource. The dual-use storage asset owner/operator will be responsible for offering market services to the organized market, as an ISO/RTO cannot participate in its own market. Opportunities for market participation will be based upon studies and will also be reflected in the resource operating agreement. The parameters to define state-of-charge (SOC) management for transmission operations purposes shall also be formalized in the operating agreement, and ISO/RTO Staff shall again have the option to exercise control. SOC management for market participation purposes will be left to the asset owner/operator. The criteria for when ISO/RTO Staff may take control of a dual-use storage resource for SOC management purposes will be based on specific operating conditions or periods of time derived from studies and forecasts. Such criteria will be specified in the resource operating agreement.



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# Questions? Feedback?

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# APPENDIX: ESA Storage-as-Transmission Recommendation (2019)

**The document refers to storage-as-transmission only.** Storage that wishes to participate in the generator services markets, in addition to acting as transmission, will necessarily be subject to different rules.

**Additionally, the focus of this document is on regional transmission planning.**

Finally, as this policy statement is designed to provide ESA's official policy position on storage-as-transmission, it does not address other ownership or operational structures that may provide efficient and effective solutions to certain transmission or reliability needs. For instance, storage should be considered as a non-transmission alternative (NTA) where competitive market-based resources may address underlying transmission needs in a cost-effective manner.



## **PRINCIPLE 1: Energy storage should be considered as a transmission solution in the normal course of transmission planning processes.**

To that end, ESA holds the following policy positions:

1. RTOs/ISOs and utilities should consider and model energy storage as an appropriate solution for transmission needs or, where appropriate, invite proposals of energy storage as an appropriate solution for transmission needs. RTOs/ISOs and utilities should adopt methods and software that enable appropriate modeling, design, and optimization of storage-as-transmission (“SAT”) solutions.
  - a. Energy storage should be considered and treated as transmission assets and not limited only to proposal as a “non-transmission alternative” or similar construct. SAT are capital projects that are transmission, providing transmission functions.
2. RTOs/ISOs and utilities should consider assistance from third parties to model and review SAT solutions until planning staff have had sufficient experience with SAT.
3. RTOs/ISOs and utilities should allow SAT as an alternative to transmission system upgrades that result from the interconnection of generator resources.
4. RTOs/ISOs and utilities should consult storage industry participants, storage manufacturers, EPC firms, storage solution providers, and/or relevant research entities to establish cost estimates and operational criteria—such as round-trip efficiency, optimal min/max charge, and so on—for the study of SAT solutions in forward-looking planning processes. Modeling of SAT solutions should closely match the projected operating pattern of the SAT asset.

**PRINCIPLE 2: Storage-as-transmission possesses different qualities than conventional transmission solutions and merits treatment that does not unduly penalize those differences.**

To that end, ESA recommends the following policies:

1. In addition to cost, RTOs/ISOs and utilities should evaluate salient quantifiable criteria, particularly those that relate to risk management and option value, for all solutions, both SAT and traditional transmission solutions. Such criteria can include:
  - a. Time to deployment. Storage can often be built and brought on-line far faster than traditional wires solutions. Minimization of project delays leads to more cost-effective transmission solutions and certainty in planning.
  - b. Project risk. The likelihood of storage project completion may also be higher than traditional wires solutions, owing to fewer permitting and other challenges, which can support greater certainty in planning. Environmental impact, physical footprint and environmental justice concerns are considerably smaller for SAT compared to a traditional wires solution.
  - c. Option value. Storage projects can be deployed in increments to meet reliability needs as they occur and change over time, presenting transmission planners with option value and increased flexibility.
  - d. Risk management value. Traditional transmission solutions are usually physically permanent. If system dynamics change and operational challenges move or become naturally alleviated, there are limited opportunities to repurpose traditional transmission solutions. Storage projects can help manage investment risk since they can be repurposed for other uses, and even potentially relocated, if they are no longer needed for their original purpose.
  
2. The SAT solution should provide comparable performance to the traditional wires solution.

**PRINCIPLE 3: SAT solutions should be studied using a process and timeline where approval, development, and deployment meet the objectives and/or the needs of the transmission system planner.**

To that end, ESA recommends the following policies:

1. Storage serving only a transmission function should not be subject to a standard generator interconnection process and study.
2. Study of SAT should be more detailed than studies of conventional transmission solutions in transmission planning processes. To avoid negative grid impacts, transmission planners should study the injection and withdrawal of SAT under its planned operation as a transmission-only asset, subject to an operating agreement.
3. Transmission planners should implement specific criteria/thresholds for the acceptable impact of a proposed SAT on generators in the queue (i.e., restudies).

**PRINCIPLE 4: The ability to propose, develop, own, operate, and receive fixed cost recovery for any SAT solution should be open to any capable and, where appropriate, qualified industry participant.**

To that end, ESA recommends the following policies:

1. Any entity that has the requisite technical and financial capabilities can propose, own, and operate a SAT project.
  - a. Where parties are required to have certain technical capabilities (e.g., engineering, site development, and so forth), such qualifications should be appropriate and applicable for providers of SAT.
2. Relevant data required to optimize and propose a SAT solution (e.g., frequency and duration of reliability violations, corresponding load levels, etc.) should be publicly available, subject to necessary FERC Critical Energy Infrastructure Information (CEII) data security safeguards.
3. Market participants should be able to provide SAT as a contracted service to transmission owners for any portion of the storage device's capability, provided that such a contractual arrangement meets technical, financial, and legal obligations.
  - a. A transmission owner's contract for SAT, which need not be for the full capacity of the storage device, should be eligible for cost-recovery under FERC transmission rates.

## **PRINCIPLE 5: Transmission system operators should make decisions about dispatch of storage for providing transmission service.**

To that end, ESA recommends the following policies:

1. In organized markets, the relevant RTO/ISO should control scheduling and dispatch of SAT, per normal RTO/ISO operating criteria. Outside of organized markets, these responsibilities should fall to the applicable utility.
  - a. For an asset owner receiving full cost recovery through rates for SAT, managing state-of-charge outside of RTO/ISO or utility control should be prohibited except in exceptional circumstances to maintain transmission system reliability.
    - i. As part of regular, periodic operations planning efforts, the RTOs/ISOs and utilities should review the expected operation of SAT-only facilities and determine if there will be any need for exceptional operation outside of established limits. Asset owners should be consulted to determine if unique steps should be taken.
  - b. RTO/ISO or utility control of SAT includes decisions of when to charge/discharge for providing transmission service and when to charge/discharge to manage SAT state-of-charge in preparation for the next expected period of service need.
2. To ensure appropriate forecasts of SAT utilization (e.g., cycles and throughput) to meet predicted life, RTOs'/ISOs' and utilities' control must respect SAT parameters, with exceptions only in exceptional circumstances to maintain system reliability. Those parameters should be defined in an asset-specific operating agreement with the RTO/ISO or utility when a SAT project is proposed as a solution in transmission planning.
  - a. Operating agreements should include features such as limits on state of charge, net daily throughput, maximum number of cycles per day, and other salient parameters that affect SAT performance. Operating agreements should also include arrangements to adapt to changes in SAT operations beyond the original agreement.
  - b. If actual transmission system needs do not match forecasts and RTO/ISO or utility instruction leads to SAT operations resulting in shortened asset life, it should not be considered a lack of prudence or failure in system development and configuration. SAT asset owners should have the opportunity to petition the relevant regulatory body for an appropriate course of action.
3. SAT facilities should be automated to provide the required transmission services if preferred or required for reasonable system reliability.
  - a. For automated processes, protective thresholds will be included to preserve asset life.
4. Clear criteria should be established for the responsibility of the SAT asset owner for maintenance, repair, and troubleshooting an SAT facility. Wherever possible, such criteria should follow appropriate, existing requirements.

**PRINCIPLE 6: Cost-recovery through transmission rates should be available for all providers of SAT.**

To that end, ESA recommends the following policies:

1. Transmission planning regions should have mechanisms and/or tariffs in place that provide a pathway to SAT cost recovery for entities that do not currently receive conventional transmission cost-recovery under FERC-jurisdictional transmission rates.
2. The ability for a SAT solution to be repurposed at a future date should not preclude the project from receiving cost recovery for reliability services. Should the operation or utilization of an SAT asset change, then the approved cost recovery mechanism, amount, and timeline should be subject to review and modification.
3. Cost allocation for SAT solutions should be generally consistent with existing processes utilized for other transmission solutions.

**PRINCIPLE 7: Transmission incentives should be available for technologies, including SAT, that maximize value or deliver cost-savings by augmenting existing transmission infrastructure.**

**PRINCIPLE 8: Round-trip losses from SAT should be treated consistent with conventional transmission line losses.**