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| PGRR Number | [120](https://www.ercot.com/mktrules/issues/PGRR120) | PGRR Title | SSO Prevention for Generator Interconnection |

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| Date | March 25, 2025 |

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| Submitter’s Information | |
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| Market Segment | Not applicable |

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| Comments |

Smart Wires appreciates the opportunity to submit comments on Planning Guide Revision Request (PGRR) 120. Smart Wires is a United States-based company founded in 2010 and headquartered in Durham, North Carolina. Smart Wires manufactures the SmartValve, a modular Static Synchronous Series Compensator (M-SSSC) that injects a controllable voltage in quadrature with the line current to synthesize a capacitive or inductive reactance. This technology can resultantly increase or decrease power flows on a circuit. The SmartValve leverages Voltage-Sourced Converter (VSC) technology and power electronics. The power electronics components use Insulated-Gate Bipolar Transistors (IGBTs) that have been widely used for utility-scale VSCs, including STATCOMs and HVDC systems.[[1]](#footnote-1)

Smart Wires supports the Lone Star and Splight comments detailing that certain grid enhancing technologies, including M-SSSC like SmartValve, can provide series compensation while mitigating risk of Subsynchronous Oscillation (SSO) and Subsynchronous Resonance (SSR), and that a blanket ban by ERCOT on interconnection of series-compensated lines is not a prudent solution. In a similar application, Central Hudson Gas & Electric deployed SmartValve devices explicitly to avoid SSR concerns.[[2]](#footnote-2) An EnerNex study of SmartValve impact on SSR conducted for this project found that active voltage injection from the SmartValve provides reactive compensation at line frequency like conventional series capacitors, but its actions do not extend to other frequencies.[[3]](#footnote-3) Since the power transfer on a single line or through a network is determined by transient stability limits, deploying SmartValves thus improves system capability and flexibility, resulting in increased stability of the power system. Therefore, SmartValve can be a compelling solution to provide series compensation to transmission circuits while avoiding SSR concerns.

Smart Wires proposes the following modifications to PGRR120:

1. Modify the proposed PGRR120 language to include valid exceptions for generators and allow Transmission Service Providers (TSPs) to propose M-SSSC as an option for SSO mitigation

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| Revised Cover Page Language |

None

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| Revised Proposed Guide Language |

***5.2.10 Subsynchronous Oscillation (SSO) Prevention***

(1) A proposal to interconnect a generator, as described in paragraph (1)(a) or (1)(b) of Section 5.2.1, Applicability, will be subject to cancellation as described in Section 5.2.6, Project Cancellation Due to Failure to Comply with Requirements, if the number of Credible Single Contingencies causing the generator to become radial to a series capacitor(s) post contingency is not greater than one and proposed generators study indicates an unmitigable risk of Subsynchronous Oscillation (SSO) through studies. Credible Single Contingencies will be determined as follows:

(a) Large generators shall have the number of Credible Single Contingencies that cause a generator to become radial to a series capacitor(s) determined during the topology-check in the Security Screening Study, as described in Section 5.3.1, Security Screening Study.

(b) Small generators shall have the number of Credible Single Contingencies that cause a generator to become radial to a series capacitor(s) determined by the TDSP.

(2) A proposal to modify a generator, as described in paragraph (1)(c) of Section 5.2.1, that is interconnected such that a Credible Single Contingency causes the generator to become radial to a series capacitor(s) shall be allowed only if simulations demonstrate that SSO is not observed.

(3) If any SSO is observed during operations, ERCOT may prohibit the generator from operating until it is demonstrated to ERCOT’s reasonable satisfaction that SSO has been fully mitigated.

(4) A Transmission Service Provider (TSP) shall be allowed to provide mitigation to prevent the risk of SSO under the listed configuration in paragraph (1) above. Such mitigations will include, but are not limited to, operational schemes such as breaker configuration, switching mechanisms like the cross-tripping of series capacitors for the credible N-1 condition, the replacement of series capacitors with grid-enhancing technologies such as M-SSSC, TCSC, UPFC, STATCOMs, etc., or eliminating the need for series capacitors via networking with new or existing lines.

1. [https://publicdownload.epri.com/PublicAttachmentDownload.svc/AttachmentId=89050](https://url.avanan.click/v2/___https://publicdownload.epri.com/PublicAttachmentDownload.svc/AttachmentId=89050___.YXAzOnNtYXJ0d2lyZXM6YTpvOjVlZjJjNzNiYjYwNTBlNmNhNmYzYWU5NjY3YjMxNzNhOjY6NmQ4ODo2MGE0NzUzMjA3NjljNTA5MTAzYzU1YmZjYmZkOTlmYzk1NTA2NTYxYmJlYmQ5NGU4MDBlNTY2NGEyZmZhNDllOnA6VDpO) [↑](#footnote-ref-1)
2. [https://www.smartwires.com/2024/09/18/smart-wires-collaborates-with-central-hudson-gas-amp-electric-to-provide-185-mw-extra-capacity-for-renewable-energy-in-new-york/](https://url.avanan.click/v2/___https://www.smartwires.com/2024/09/18/smart-wires-collaborates-with-central-hudson-gas-amp-electric-to-provide-185-mw-extra-capacity-for-renewable-energy-in-new-york/___.YXAzOnNtYXJ0d2lyZXM6YTpvOjVlZjJjNzNiYjYwNTBlNmNhNmYzYWU5NjY3YjMxNzNhOjY6Y2UxNDphZGQyZTMwNjU4NjNjZTI5MTYyMWVhMzIwZWUxZGRlZTdmZmUyZDMzODU5M2RlMzUwY2IwOWYwN2U5MjRjNzdhOnA6VDpO) [↑](#footnote-ref-2)
3. “Comparative Performance of SmartValves with EHV Series Capacitor: Implications for Sub- Synchronous Resonance,” is available on www.smartwires.com [↑](#footnote-ref-3)