



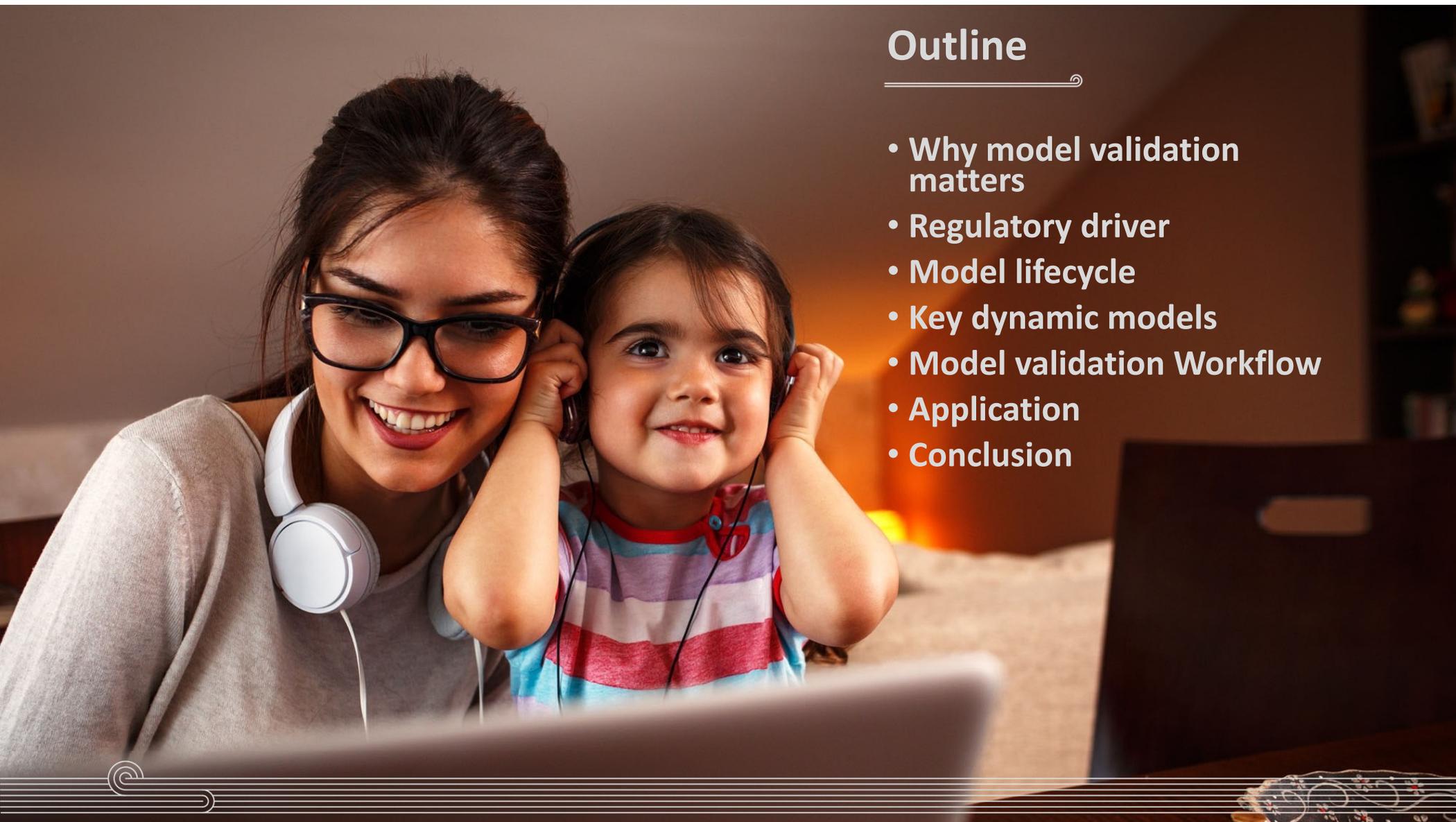
TRANSPower

Current Practices in Power System Model Validation Process

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11/11/25





Outline

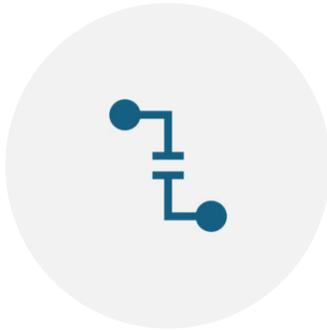
- Why model validation matters
- Regulatory driver
- Model lifecycle
- Key dynamic models
- Model validation Workflow
- Application
- Conclusion



What happens if the
HVDC trips?



HVDC Trip: A shock to system stability



**LOSS OF POWER
TRANSFER CAPABILITY**



**FREQUENCY
DISTURBANCE**



**VOLTAGE
DISTURBANCE**



How do we confirm the
grid is still secure?



System Operator (SO) relies on combination of real-time data, operational tools, and predefined criteria.

Real-time monitoring
and SCADA data

Contingency analysis
and stability
assessments

Decision support
tools

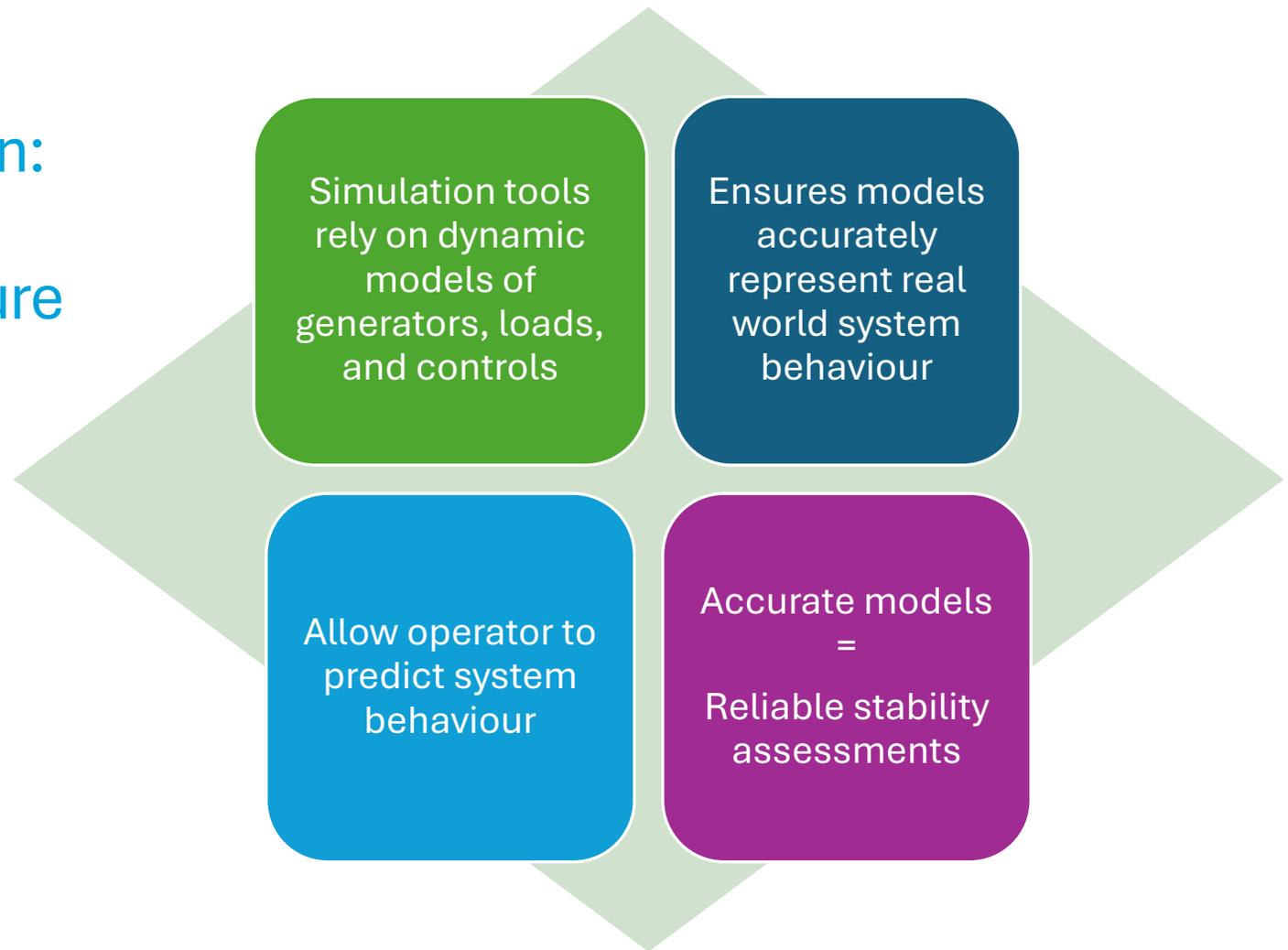
Operating standards
and security criteria



These decisions rely heavily on the accuracy of the dynamic models used in simulations.



Model validation: The key to a stable and secure power system



Regulatory drivers: ensuring secure and reliable operation

Electricity Industry Participation Code (EIPC)

- Foundational regulatory document
- Administered by the Electricity Authority

GL-EA-716: Power Plant Dynamic Model Validation and Submission Prerequisites
GL-EA-953: Connection study requirements



System Operator (SO)

- Assess new generation connections
- Use validated models in operational tools



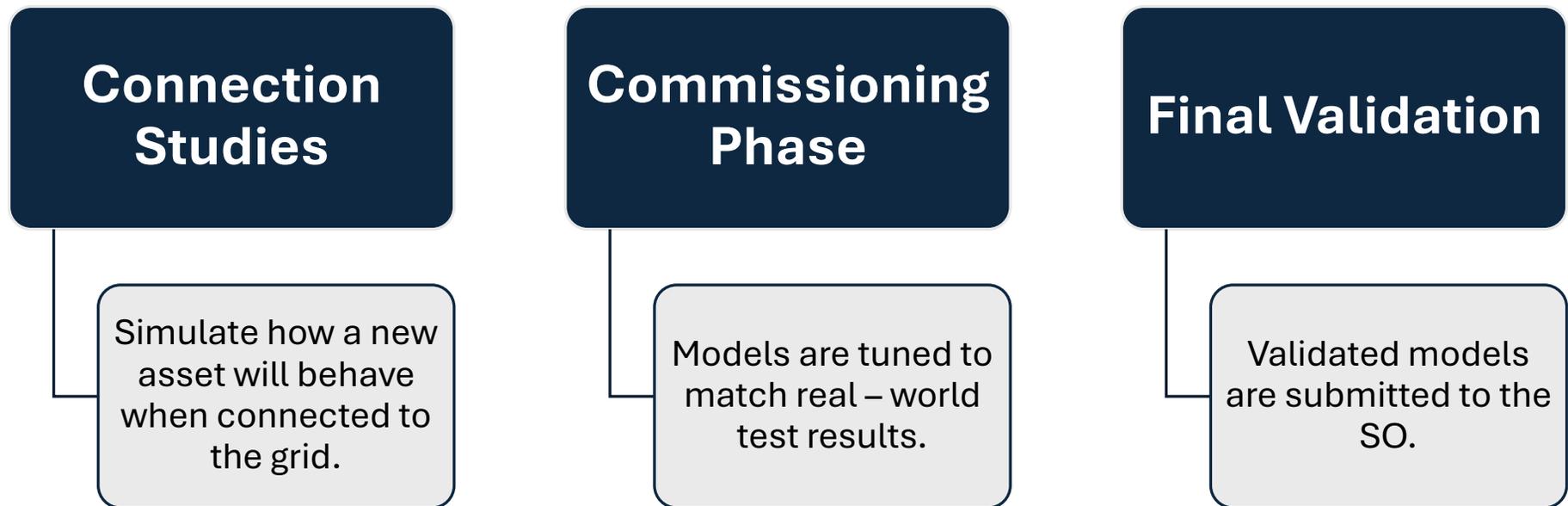
Asset Owner (AO)

- Submit **site-specific, detailed, and final dynamic models.**

From Question to Practice: How Models are Validated



Model lifecycle



Key dynamic models

Synchronous Generator Models

- Exciters
- Governors
- Power System Stabilizers (PSS)

Inverter-Based Resource (IBR) Models

- Power/Frequency Controllers
- Voltage Controllers

Static Var Systems

- SVCs (Static VAR Compensators)
- STATCOMs

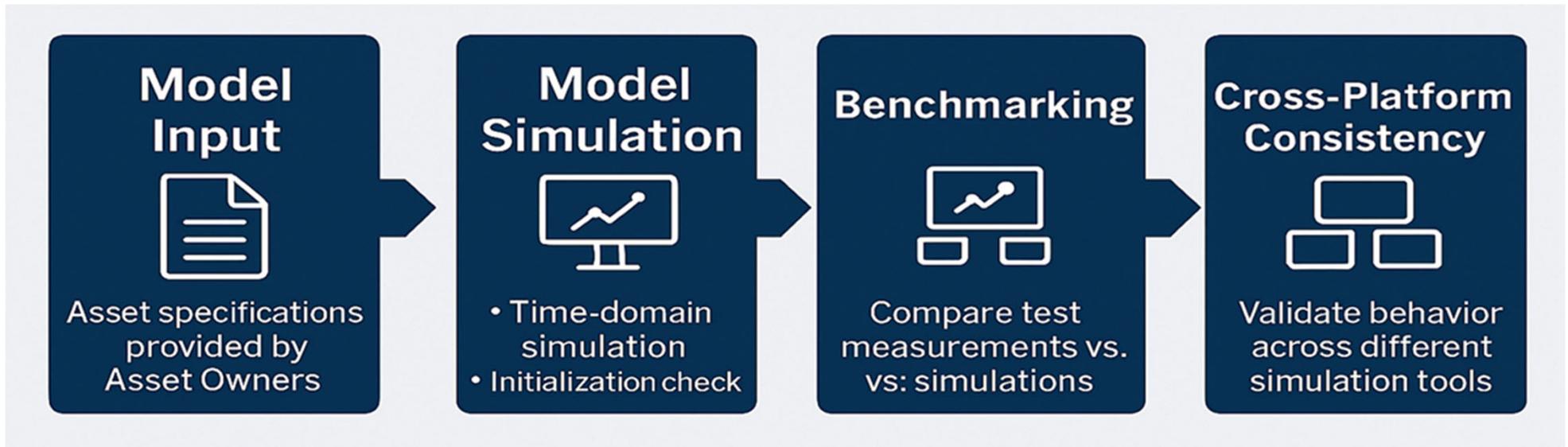
Battery Energy Storage Systems (BESS)

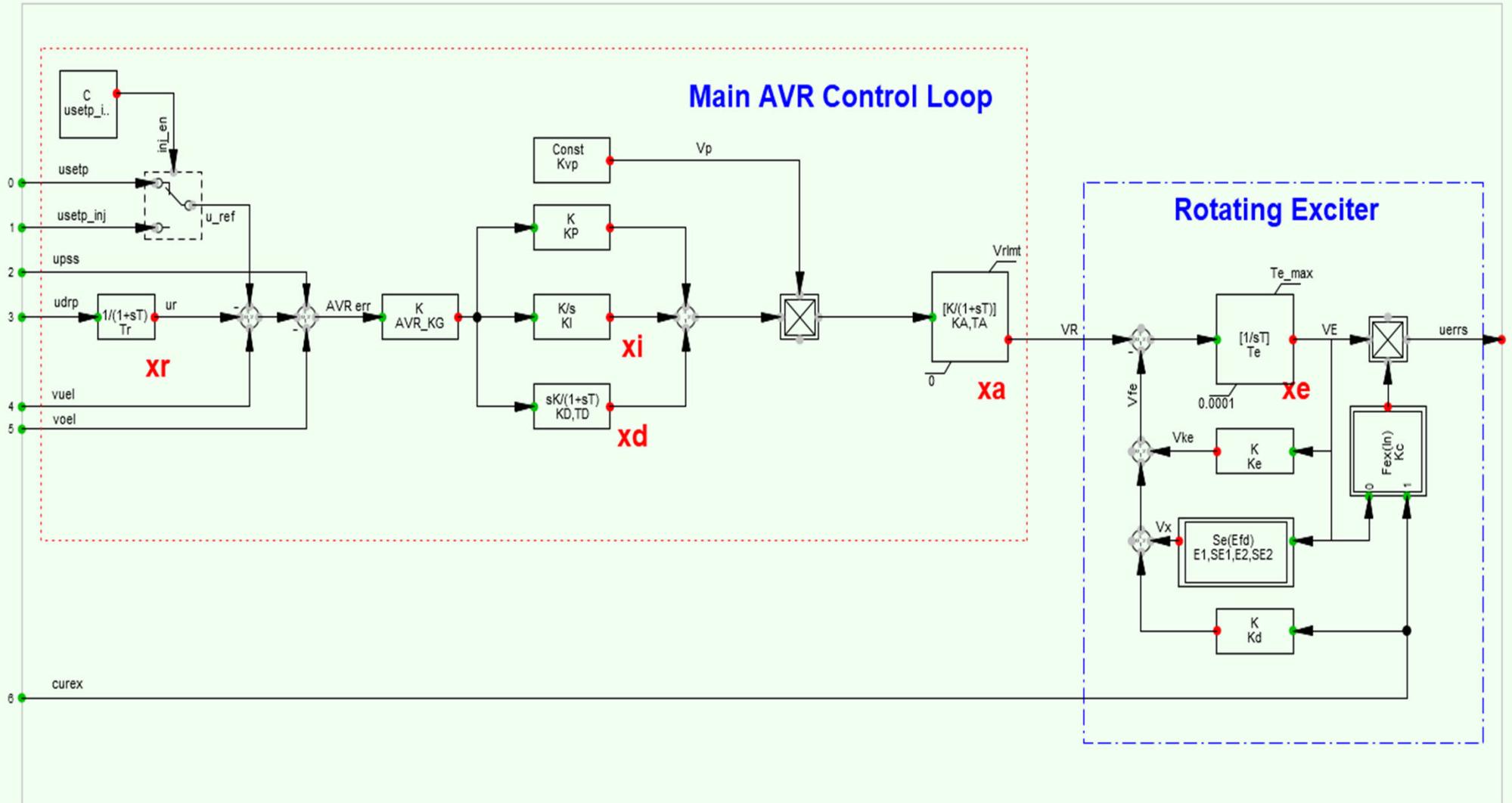
- Include inverter control, state-of-charge dynamics, and grid support functions.

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Model validation work flow





Validated models power these tools



PowerFactory

Purpose: Offline studies



PSCAD

Purpose: Offline studies



DSA Tools

Purpose: Offline &
real-time studies



Verifying the ideal model

Adequacy

Accuracy

Stability

No Initialisation Anomalies

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Use of validated models



Load-flow analysis, dynamic stability assessments and other system studies as required



Calculation of power system steady state and stability limits



Efficient dispatch of offered generation and optimal setting of voltage support devices in real-time.



Studies of equipment frequency capabilities including the assessment of reserves and incident investigations



Studies of system frequency response and voltage stability when subjected to contingent and extended contingent events



Inform Asset Owners via published models on the Authority's Electricity Market Information (EMI) website.



Validated Models = Reliable System Operation

Predicting System Behavior

Validated models help predict power system responses under stress conditions accurately.

Foundation of Grid Security

Model validation always ensures secure and reliable power system operation.

Integrating Renewable Energy

Precise models enable safe integration of renewable and inverter-based energy resources.





Thank you

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