SPACE•TIME•INSIGHT
"Situational Intelligence for the Smarter Enterprise"

Space-Time Renewables Integration Composite

Space-Time Awareness Suite:
Industry's leading suite of geospatial analytics composite applications.

Space-Time Renewables Integration Composite:

Features:

- Situational awareness for better production forecasts
- Geospatial visualization of forecast confidence
- Alerts to generation ramp events in real-time
- Generation portfolio dashboards & preventive & remedial action scripts
- Views of generation capacity, in the context of existing supply
- Inventory view of the complete generation stack
- Drill to wind turbine or solar panel-level detail

Benefits:

- Increased ability to manage renewables integration
- Higher predictability of grid integration and production
- More optimal utilization of transmission assets
- Greater capability to ensure stable and predictable grid operation
- Improved reliability and capacity of renewable generation resources
- More ability to manage market uncertainty and regulatory oversight
- Improved economics through predictable generation forecasts

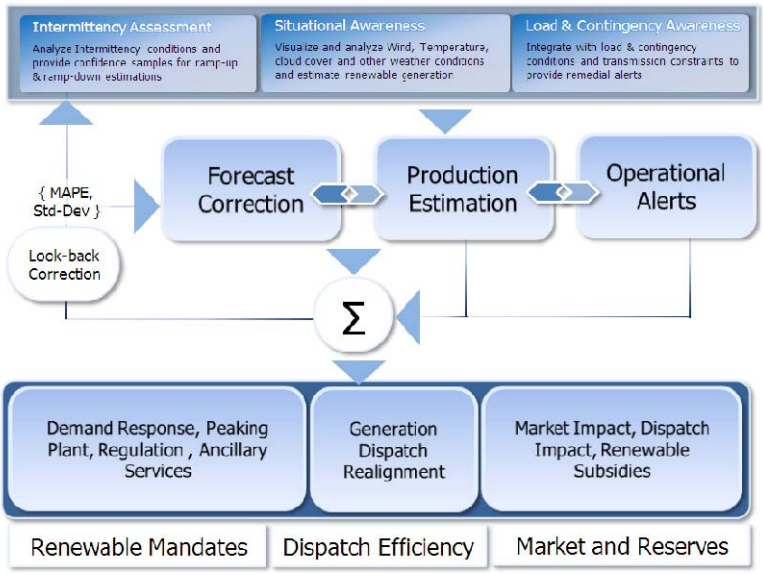
Customers Say:

- *"Space-Time Insight improves our overall ability to respond to, and even avert, potential system emergencies."*

As fossil fuels increase in price and as the consequences of greenhouse gas emissions worsen, State and Federal governments are creating new mandates to dramatically increase renewable energy sources on uncomfortably short timelines. Complex and costly regulations, shorter deadlines, and higher penalties for non-compliance add urgency. The evolving state of current technologies, the lack of uniform standards, the unpredictable intermittency of renewable power, the complications of balancing conventional and renewable energy sources and the cost of upgrading seriously data infrastructure further complicate electric utility operations.

The ability to view and act on the portfolio of generation resources, both virtual and real, in the context of demand, is essential for stable and predictable operation of the electric grid.

This screenshot of Space-Time Renewables Integration Composite shows renewable energy generation in the context of grid congestion alerts, enabling improved renewables integration and grid balancing decision making.



The diagram shows the wind and solar energy intermittency management decision flow supported by Space-Time Insight.

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Screenshot of Space-Time Renewables Composite shows power flow and intermittency estimations to visualize potential grid congestion issues.

This screenshot shows renewable energy supply and demand alignment in the context of load, pricing, weather, & potential demand response.

Space-Time Renewables Integration Composite – Key Features

- Situational awareness for better wind & energy production forecasts
- Geospatial visualization of confidence levels for production forecasts
- Alerts that direct the operator to generation ramp events in real-time
- Generation portfolio dashboards and remedial action scripts that guide alignment of renewable generation capacity with forecasted demand
- Situational views of virtual and physical generation capacity, in the context of existing fuel supply
- An inventory view of the complete generation stack to enable integration of demand response, DERs and storage options
- Wind turbine or solar panel detail to support capacity improvement options at unit commitment level

Space-Time Renewables Integration Composite – Customer Benefits

- Increased ability to manage integration of intermittent renewable energy
- Improved predictability of wind and solar energy production and integration into the grid
- More optimal utilization of transmission assets under current infrastructure conditions through reduced congestion and improved dynamic rating.
- Greater capability to ensure stable and predictable operation of the grid in the context of increased renewable energy integration
- Improved reliability, stability and capacity of renewable generation resources
- Increased ability to manage market uncertainty and regulatory oversight of intermittent renewable production
- Improved economics through predictable generation forecasts