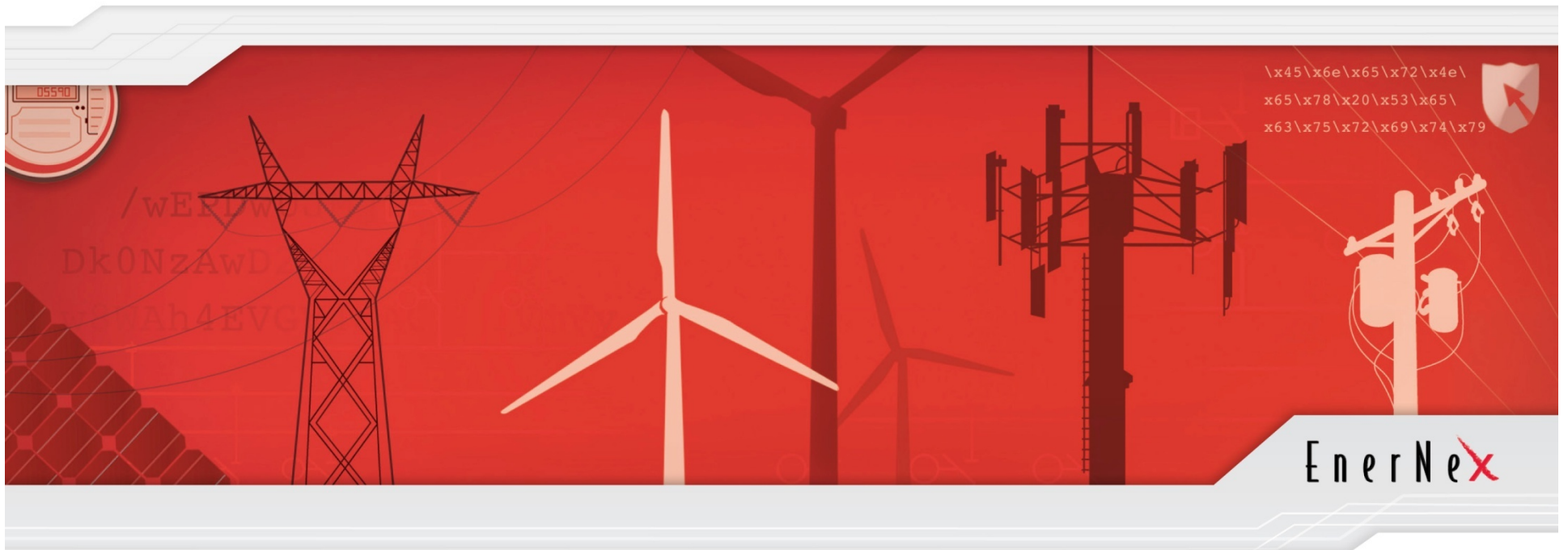


NYESERDA MDMS – Kick-off

February 18, 2013





Agenda

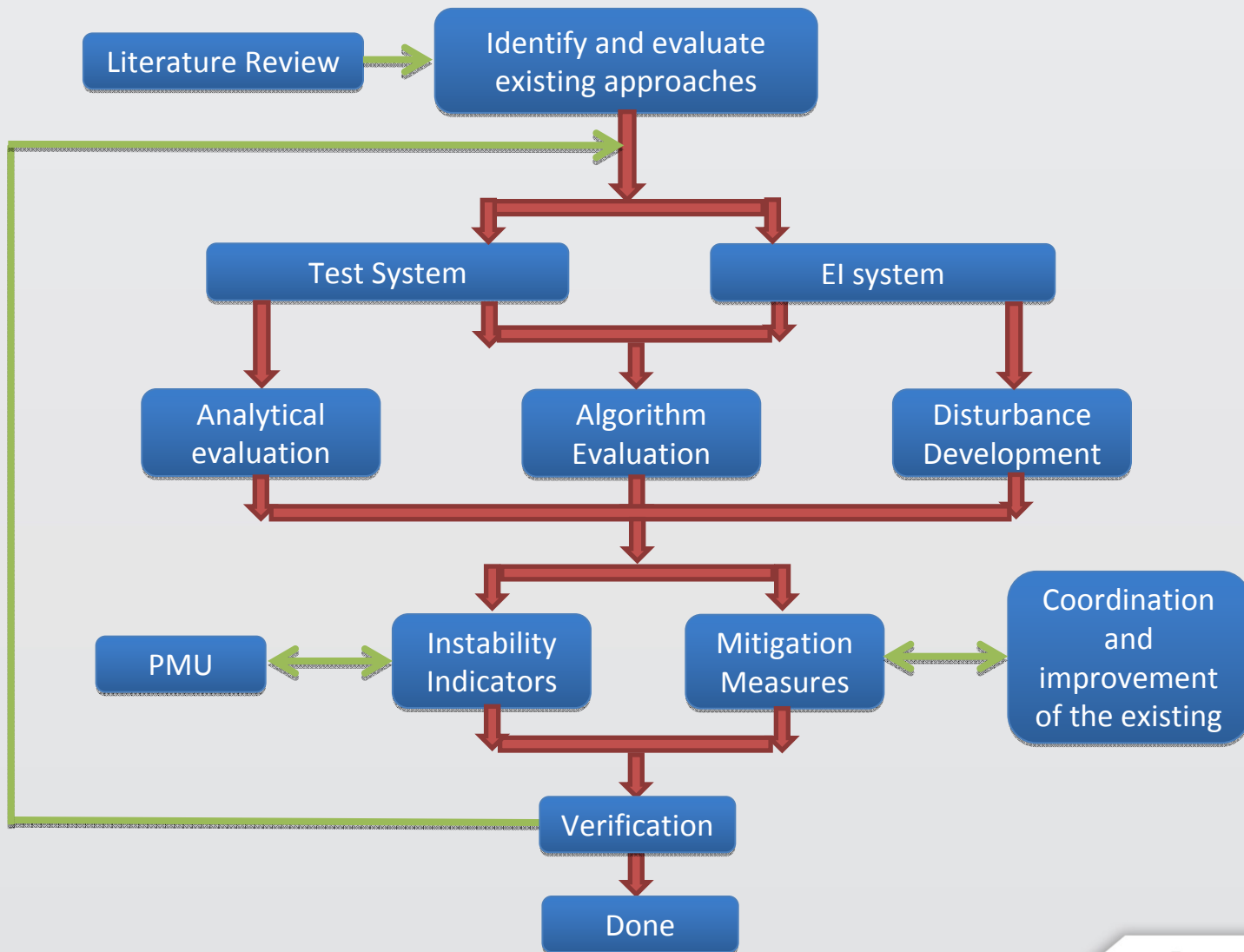
1. Project Objectives
2. High-level Methodology
3. Scope of Work
4. Milestones
5. Discussion



Project Objectives

- ▶ The objective of this research study is to study the online and real-time instability detection and mitigation measures for enhancing the reliability and stability of the New York bulk electric power system when subject to major disturbances.
- ▶ This work will include, but not be limited to,
 - developing dynamic simulation cases with a wide range of disturbance scenarios,
 - developing algorithms for instability detection based on PMUs and/or other new measurement devices,
 - developing mitigation measures for major disturbances, and,
 - verifying the effectiveness of candidate detection algorithms and mitigation measures in dynamic simulations

High-level Methodology



Scope of Work – Task 1

- ▶ Develop Technology Plan
- ▶ EnerNex will develop a technology transfer plan that is designed to communicate project results to interested parties in New York and throughout the United States.
- ▶ Deliverables: Detailed technology transfer plan
 - Publications
 - Workshops

Scope of Work – Task 2.1

- ▶ Literature Review
- ▶ EnerNex will summarize the state-of-the-art analytical approaches on BPS angle stability and mitigation schemes. EnerNex will identify the pros and cons of the existing methodologies for proposing improved and/or new methodologies.
- ▶ Deliverables: Report detailing the findings and conclusions of the literature review

Scope of Work – Task 2.2

- ▶ Simulation Case Development
- ▶ EnerNex will develop dynamic simulation cases for a wide range of disturbance scenarios for algorithm and methodology verification.
 - Major External Disturbances – (1) extreme power flows through the NY system that result from cascading external transmission outages; (2) voltage collapse external to the NY system; and (3) “beyond criteria” losses of generation external to the NY system.
 - Major Internal Disturbances – (1) extreme contingencies within the NY system, including the simultaneous loss of multiple transmission lines, multiple sequential loss of multiple transmission lines, multiple generation unit losses, (2) voltage collapse within the NY system, and (3) “beyond criteria” losses of generation within the NY system.
 - Normal Disturbances – the single contingency events that the NY system is designed and operated to withstand and are included to test any control schemes that are developed in this study to insure that they operate properly.
- ▶ Deliverables: Dynamic disturbance scenarios

Scope of Work – Task 3

- ▶ Instability Detection and Mitigation Measures Development
- ▶ EnerNex will develop algorithms for real-time and online detection of system angle instability. EnerNex utilize the capabilities of new measurement devices for the development.
- ▶ EnerNex will develop mitigation measures to avoid adverse or even catastrophic impacts of large disturbances to the NY bulk electric power system. **EnerNex will identify whether the system could suffer from reactive power issues following any mitigation scheme and develop corresponding reactive power compensation schemes.**
- ▶ Deliverables: Report describing the developed detection algorithms, mitigation measures, and compensation schemes.

Scope of Work – Task 4

- ▶ Testing of Algorithms and Mitigation Measures
- ▶ EnerNex will test its proposed algorithm operations and mitigation measures against the disturbance scenarios developed in Task 2.
- ▶ Deliverables: Report describing the major disturbance mitigation study test results and the analysis of these results along with findings, and conclusions.

Scope of Work – Task 5

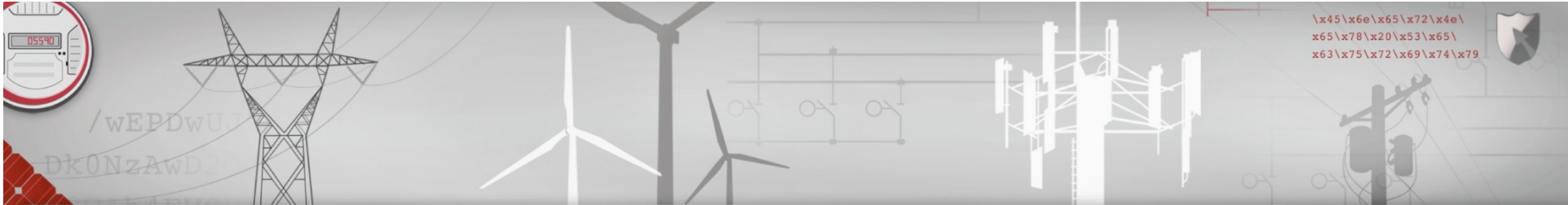
- ▶ Technology Transfer
- ▶ EnerNex will conduct all technology transfer tasks to the Project Manager's satisfaction. Should the project's results differ from the expected outcome, EnerNex will modify the ^{Deliverables:} technology transfer plan, with the Project Manager's approval, to facilitate appropriate technology transfer activities.
- ▶ Deliverables: Completion of all technology transfer activities approved by NYSERDA's Project Manager.

Scope of Work – 6

- ▶ Final Written Documentation
- ▶ Deliverables:
 - A draft version of the Final Written Document.
 - A final version of the Final Written Document

Milestones

Milestone Number	Project # 36651 EnerNex Milestone Description	Month Completion	NYSERDA Milestone Payment	External Cost Share	
0	Project Management and Reporting	On-going			% total
1	Develop Technology Transfer Plan	2	\$ 4,200	\$ 2,000	2%
2	Review and Simulation Case Development	6	\$ 52,500	\$ 25,000	25%
3	Phase Angle Instability Detection and Mitigation Measures Development	12	\$ 52,500	\$ 25,000	25%
4	Testing of Algorithms and Mitigation Measures	15	\$ 42,000	\$ 10,000	20%
5	Technology Transfer	16	\$ 4,200	\$ 3,000	2%
6	Final Written Document	18	\$ 54,600	\$ 10,000	26%
	Total		\$ 210,000	\$ 75,000	100%
		Total Cost	\$ 285,000.00		



Discussion