New England East-West Solution (NEEWS) Interstate Reliability Project *Updated Needs Assessment*

Connecticut Energy Advisory Board
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ISO new england

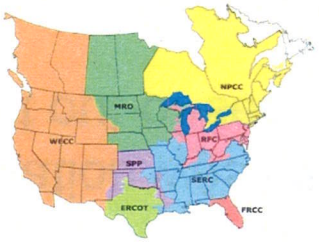
About ISO New England

- **Not-for-profit corporation created in 1997 to oversee New England's restructured electric power system**
- **Independent System Operator**
  - Independent of companies doing business in the market
  - No financial interest in companies participating in the market
- **Regulated by the Federal Energy Regulatory Commission**
- **Major responsibilities:**
  - Reliable power system operations
  - Efficient and competitive wholesale electricity markets
  - Long-term regional system planning

Reliability Standards Guide Regional Transmission Planning

- North American Electric Reliability Corporation
  - Reliability Standards for the Bulk Power System in North America
- Northeast Power Coordinating Council
  - Basic Criteria for the Design and Operation of Interconnected Power Systems
- ISO New England
  - Reliability Standards for the New England Area Bulk Power Supply System

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION



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Standards are used to ensure that the regional transmission system can reliably deliver power to consumers under a wide range of future system conditions.

Preface

- This presentation is a high-level overview of the Aug. 12 presentation to the Planning Advisory Committee, which contains all of the details of the issues represented here.*
- It is important to note that to meet Rhode Island's continuing load-serving requirements, a portion of the Interstate project must be built regardless of system changes that have occurred since original NEEWS needs assessment.
- The analysis that the Aug.12 presentation was based on did not include the entire Salem Harbor plant out-of-service as a base-line assumption.

* http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/ceii/mtrls/2010/aug122010/neews_interstate.pdf

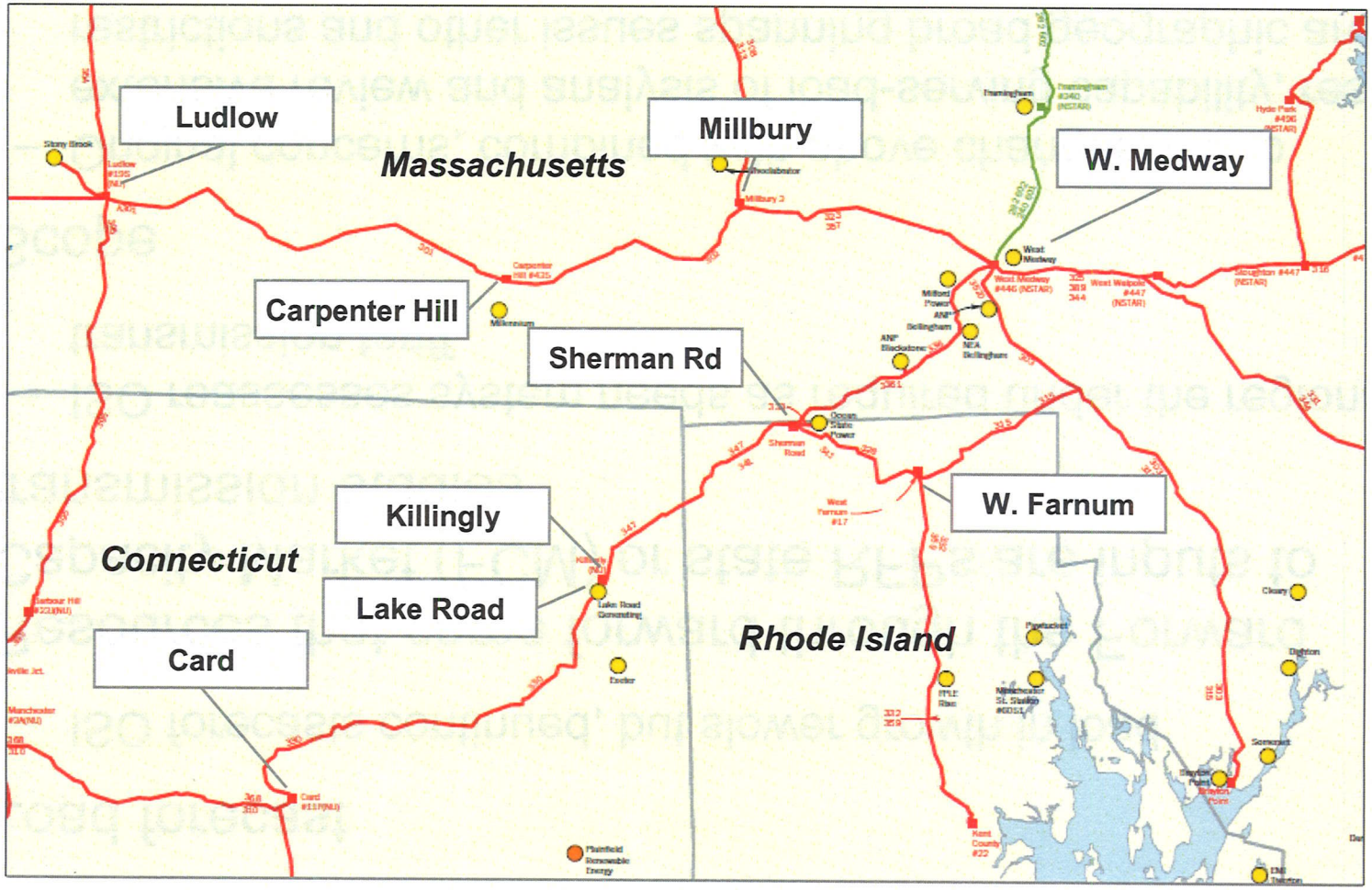
Presentation Objective

- To review ISO New England's determination of the need for the New England East–West Solution (NEEWS) Interstate Reliability Project
  - Status of four NEEWS projects
  - Geographic overview
  - Updated needs assessment
  - Modified Interstate Reliability Project

Status of NEEWS Projects

1. Rhode Island Reliability Project (RIRP)
   - ☑ RI Energy Facility Siting Board approved Aug. 12, 2010
   - ☑ ISO testified that a portion of Interstate was needed to complete plan
2. Greater Springfield Reliability Project (GSRP)
   - ☑ CT Siting Council approved with modifications March 16, 2010
   - ☑ MA Energy Facilities Siting Board approved Sept. 28, 2010
3. Interstate Reliability Project (Interstate)
   - ☑ ISO presented updated needs assessment to stakeholders at the Planning Advisory Committee in August and November
4. Central Connecticut Reliability Project (CCRP)
   - ☐ Under study by ISO

NEEWS Interstate: Geographic Overview



Substation

Existing 345 kV line (post GSRP and RIRP)

What's Changed Since the Original Study?

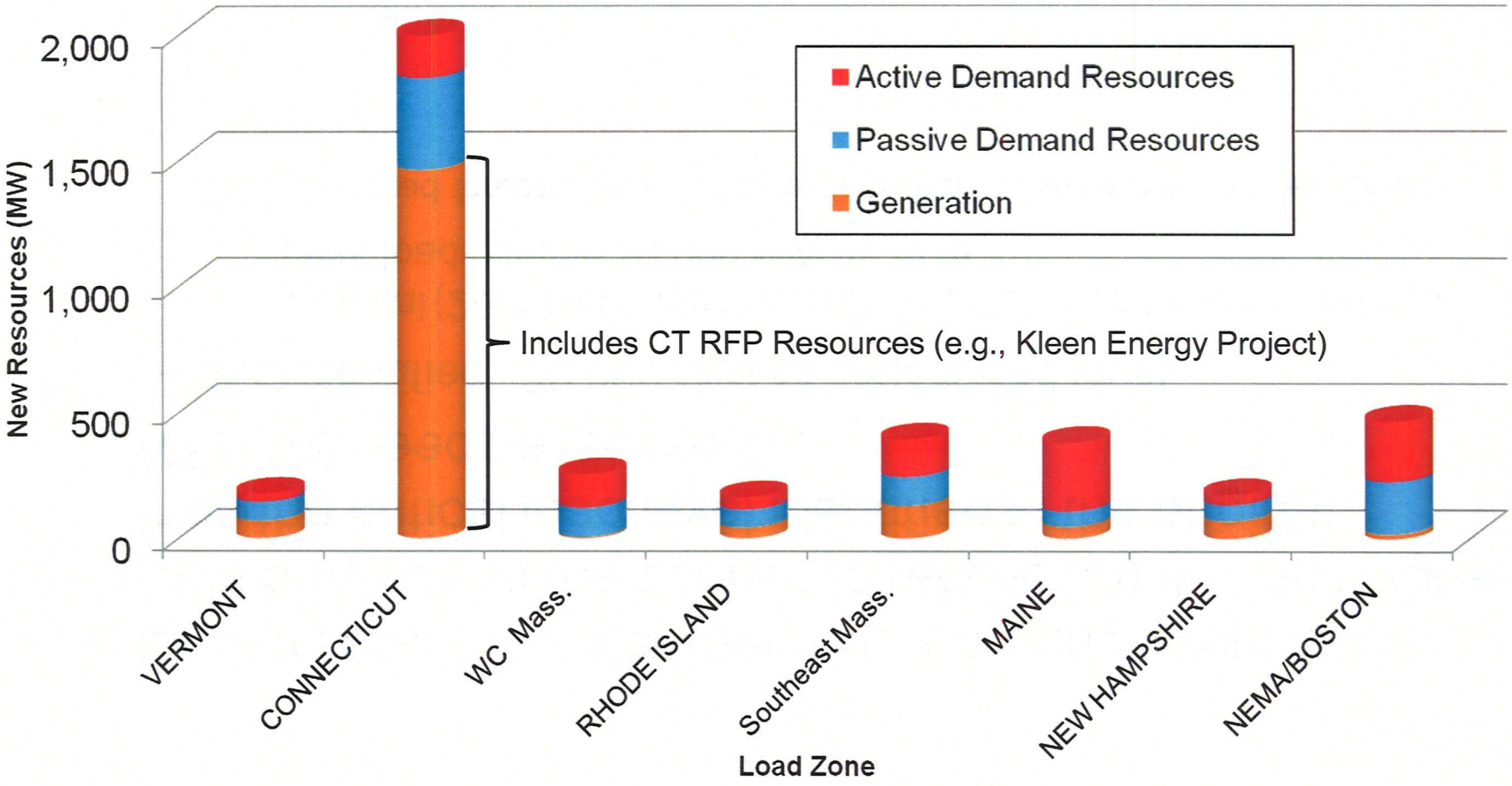
- Load forecast
  - ISO forecasts continued, but slower growth in load
- Resources that come forward through the Forward Capacity Market (FCM) or state RFPs are inputs to transmission studies
  - ISO reassesses system needs as required under the regional transmission tariff
- Scope
  - Original concerns, combined with above changes, led to extensive review and analysis of load-serving capability, resource restrictions and other issues spanning broad geographic areas

Future Loads Still Exceed Critical Level

- Load forecast is lower than ISO's original projection (primarily due to the economic recession), but still higher than the critical load level identified in the original NEEWS needs assessment
  - ISO identified ~30,000 MW as critical load level
    - Original (2005) and updated (2010) CELT load forecasts project peak loads above 30,000 MW in 2015
      - Load forecast is net of reductions from passive demand resources

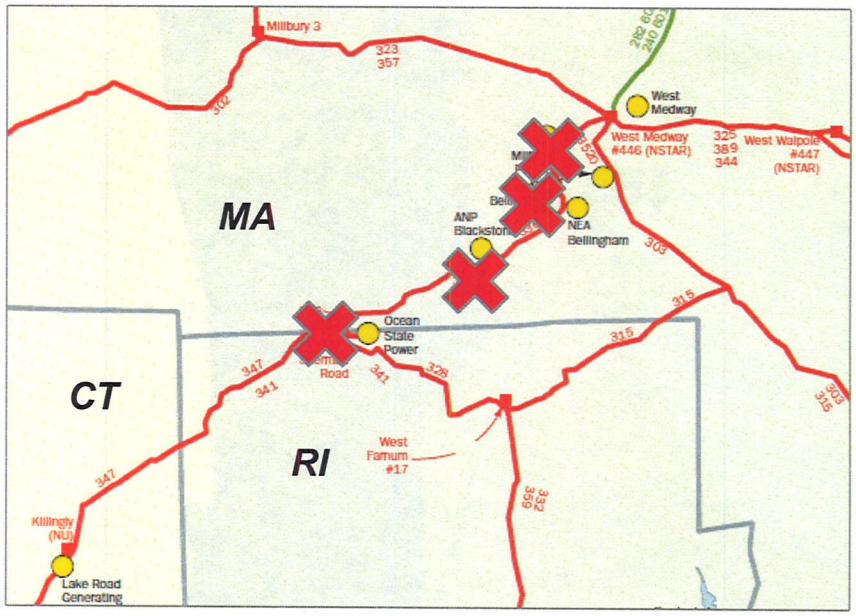
New Resources Triggered Updated Needs Assessment

Results of Forward Capacity Auctions 1, 2 and 3



Current Transmission System Limits Ability to Add New Resources

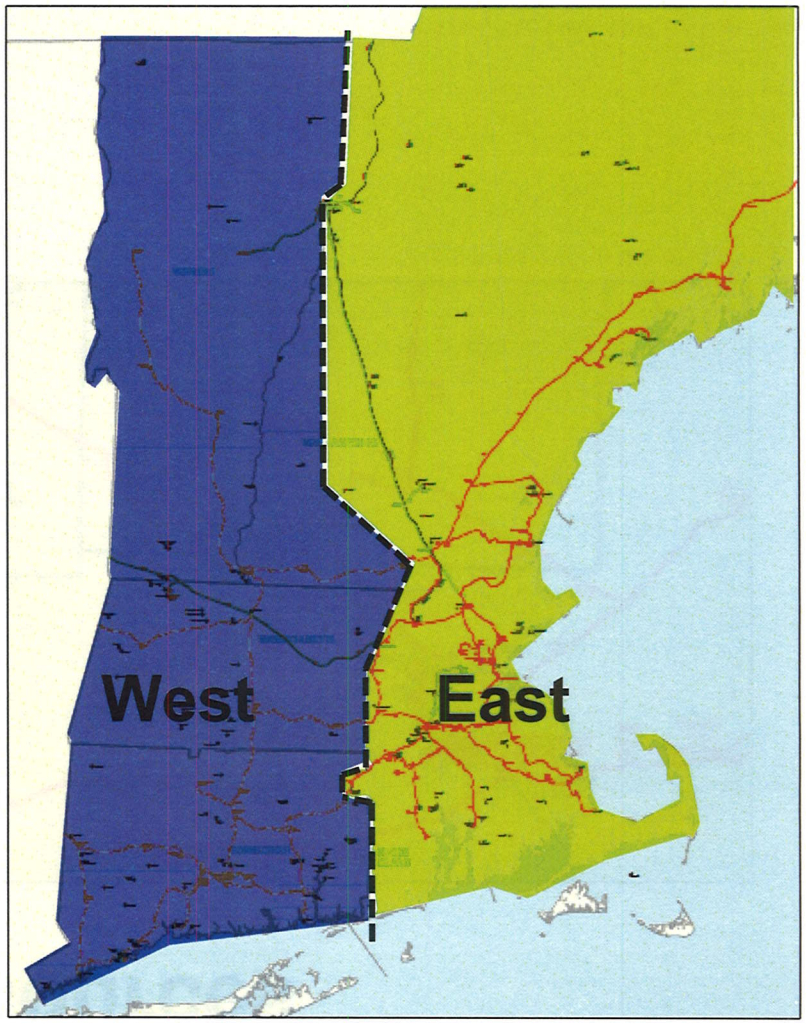
- New generating facilities proposed in MA and RI failed to qualify in FCM due to transmission system limits
  - Four power plants totaling more than 430 MW
  - Similar issues identified in original Lake Road studies



Electrically, New England is Two Regions

*Power flows are limited East to West (and West to East)**

- East-West Interface bisects New England
  - Along CT-RI border
    - Except for jog around Lake Road/ Killingly facilities in northeast CT
  - Just west of Millbury, MA
    - Northeast into NH
  - West of generating facilities in southern NH
    - North through NH and VT
  - West of HVDC line from Québec
- Transmission limits between these areas pre-date markets
  - Long-standing limits observed earlier by NEPOOL operators

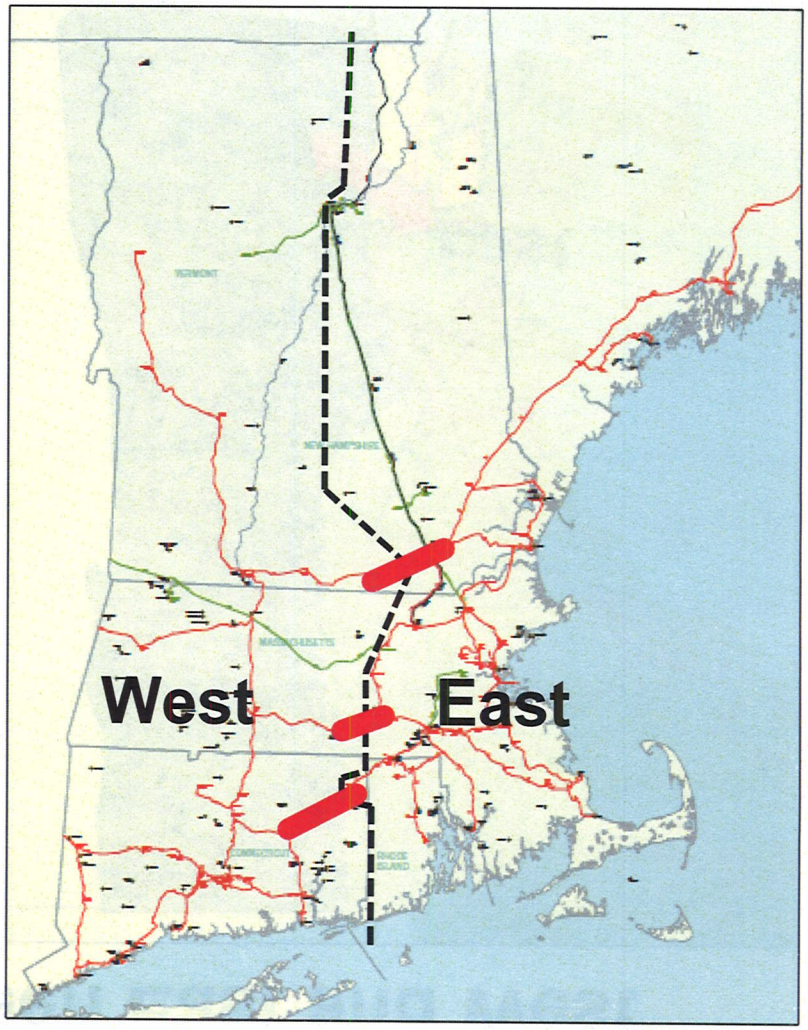


* There are other limiting interfaces in New England, which are not included in the scope of this study.

Only Three 345 kV Lines Connect East and West

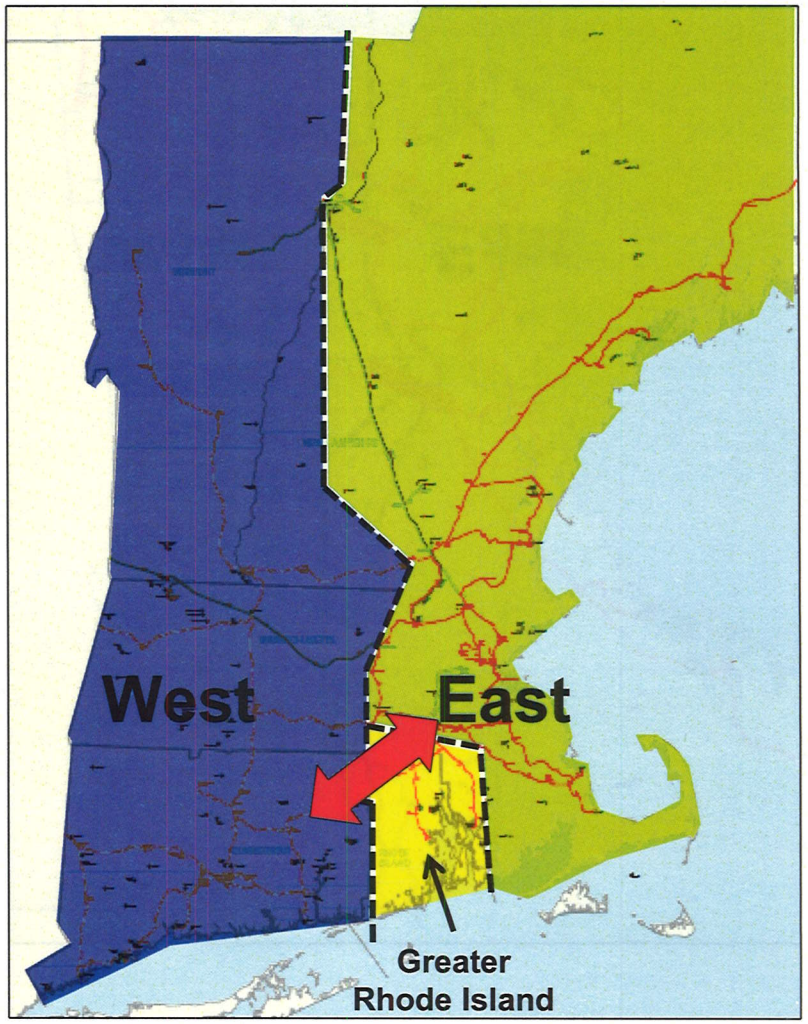
- With only three 345 kV transmission lines connecting the two regions, the system has limited capability to move power across the interface
  - Power flows are limited moving East-to-West and West-to-East

State	*From*	*To*
NH	Amherst	Scobie
MA	Carpenter Hill	Millbury
CT	Card Street	Lake Road



Corridor Through Greater Rhode Island Further Limits Power Flows Between East and West

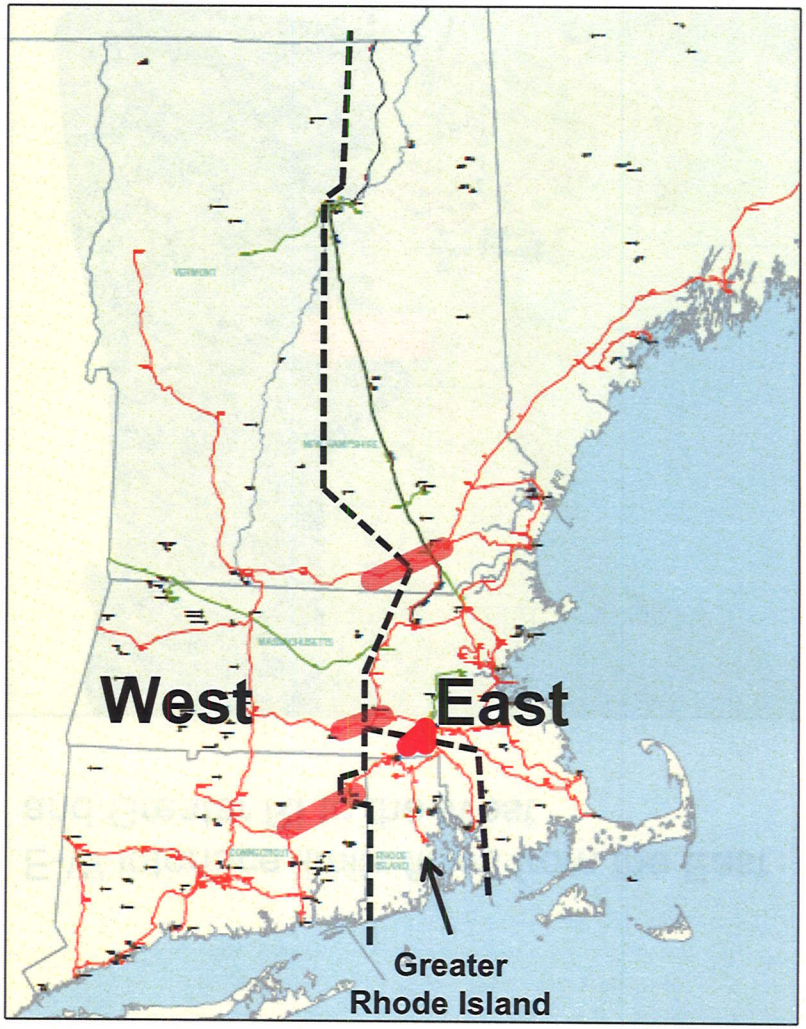
- Transmission constraints in a corridor of the Greater Rhode Island subarea further restrict flows between East and West
  - Corridor connects from West Medway in Massachusetts through Rhode Island to Lake Road and the Card substation in Connecticut
  - Limits flows in two directions
    - From the West and Greater RI to the East
    - From the East and Greater RI to the West
  - Corridor also has limited ability to add qualified capacity



Other Lines Affect Flows Between East and West

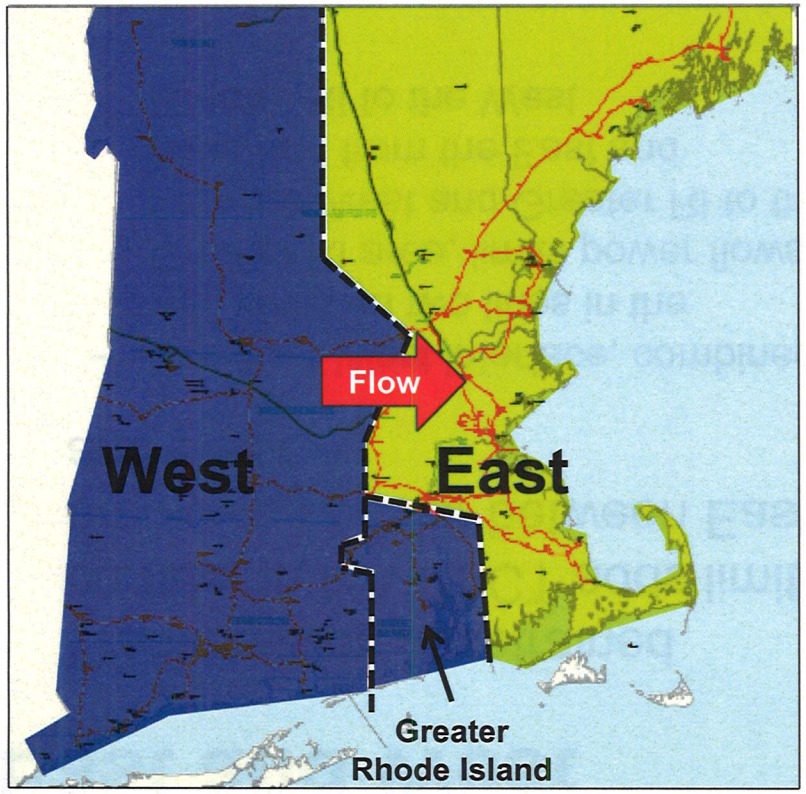
- Transmission constrained corridor in MA-RI-CT adds limits on moving power between East and West
  - The East-West interface, combined with limits on two lines in the Greater RI area, limits power flows from the West and Greater RI to the East, and from the East and Greater RI to the West

State	From	To
MA	West Medway	ANP Blackstone
MA	West Medway	ANP Bellingham

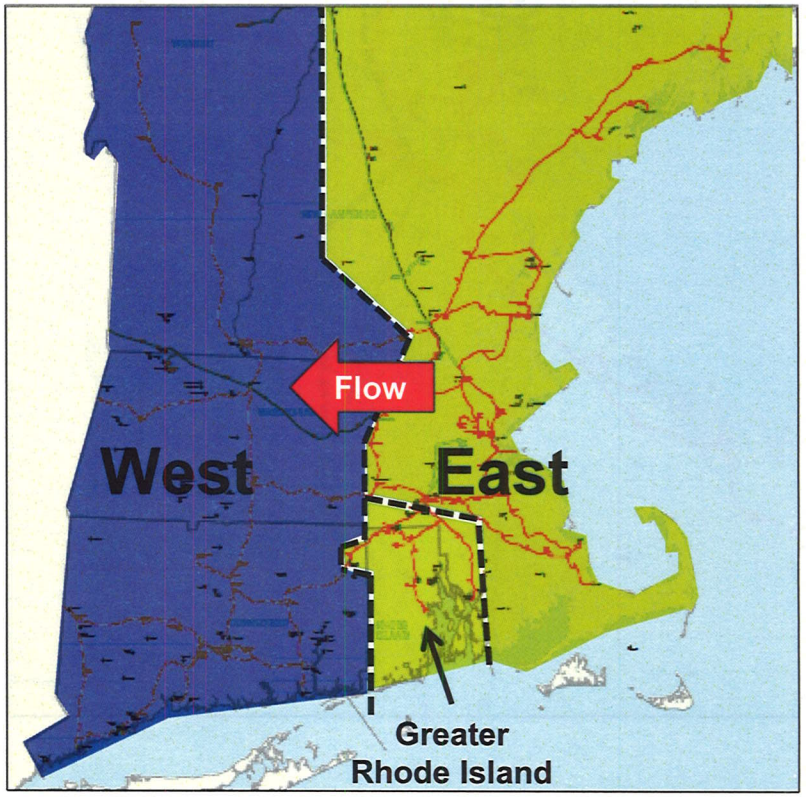


Limiting Interface Shifts with System Conditions

E-W interface and Greater RI corridor limit flows from the West and Greater RI to the East



E-W interface limits flows from the East and Greater RI to the West



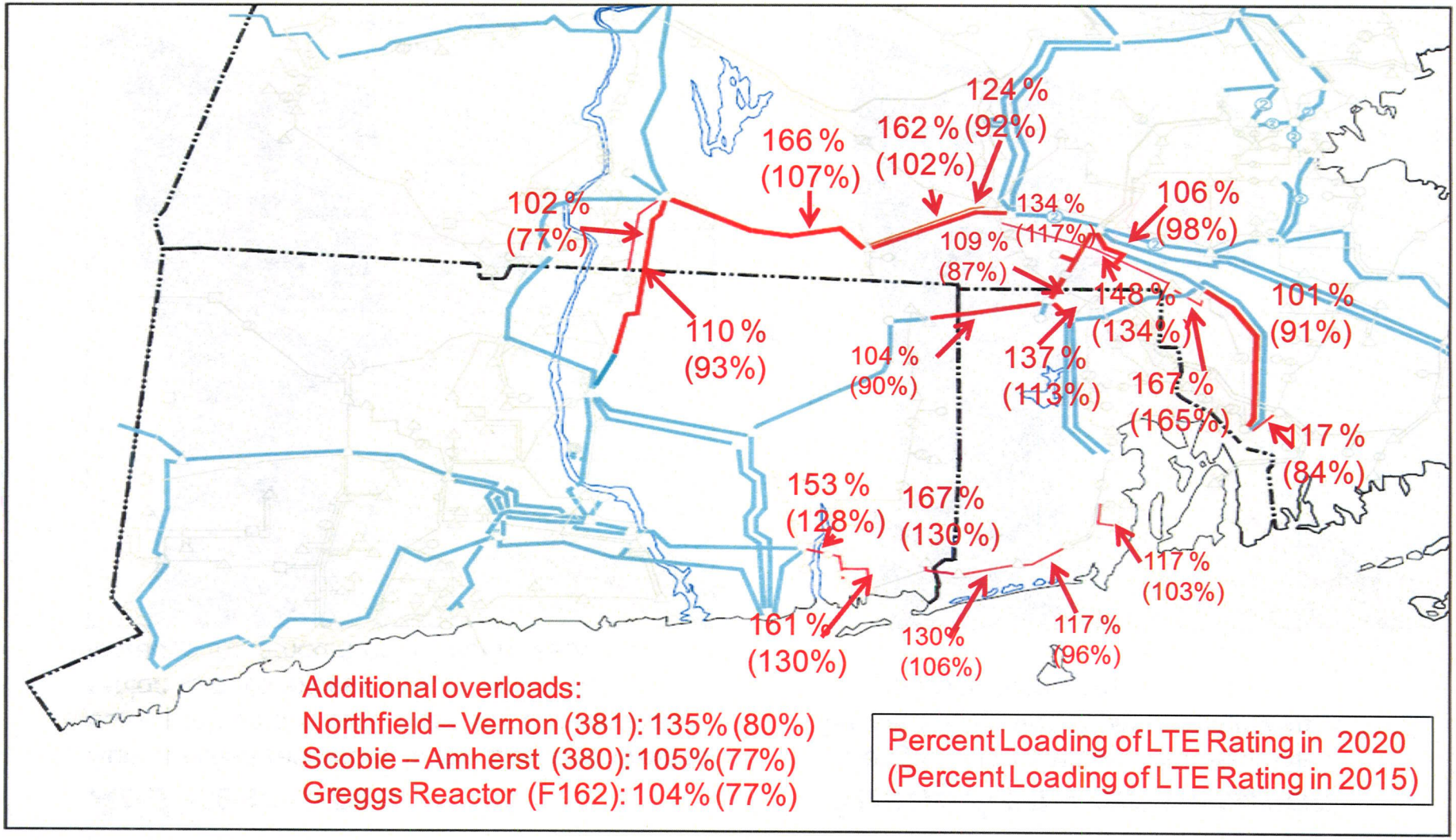
Interstate: Updated Needs

Scope of Needs Assessment	Finding
Eastern New England Load-serving requirements	Interstate project is needed
Rhode Island Load-serving requirements	Interstate project is needed
Western New England Load-serving requirements	Interstate project is needed
Connecticut Load-serving requirements	Interstate project is needed
Some resources that are required to serve load can be unacceptably restricted	Interstate project is needed
Resolve equipment protection concerns • Transmission switching causes mechanical stress on Lake Road generation	Mitigation of issue is a benefit of Interstate project

Region Has Simultaneous Load-serving and Resource Restriction Issues

- Challenges
  - Eastern New England and Western New England are projected to have *inadequate* resources and transmission to reliably serve load in the 2010-2012 and 2015-2019 timeframes, respectively
  - Current transmission system restricts existing resources and limits ability to add new resources to serve load
- Potential solutions
  - Adding qualified resources in both Eastern and Western New England to resolve load-serving requirements
  - A transmission solution that allows for transfer of power across Eastern and Western New England to reliably serve load

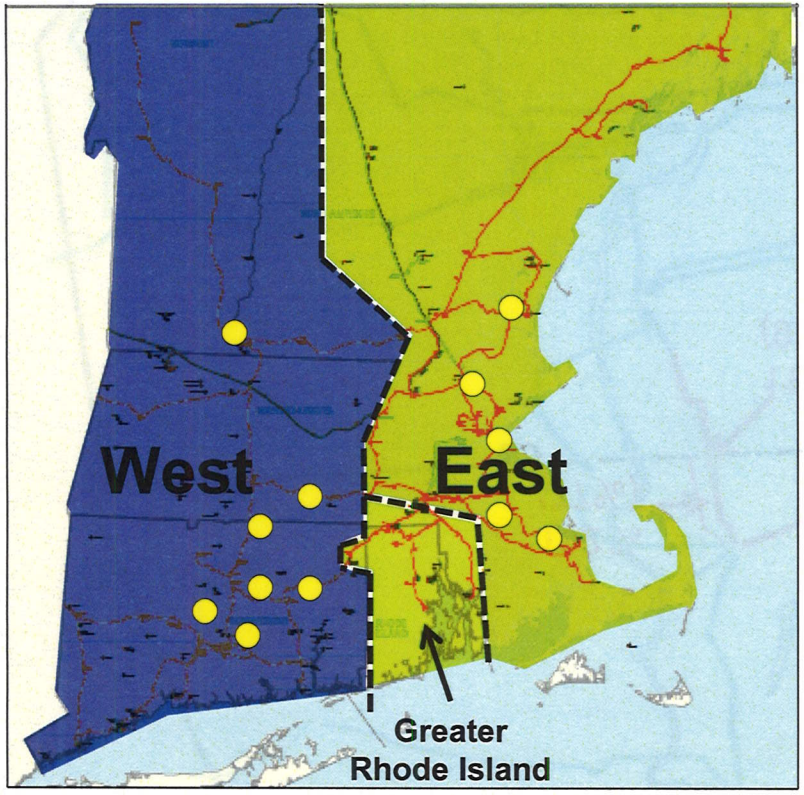
Line Overloads Widespread in 2015, 2020



What are the Options?

Add Resources

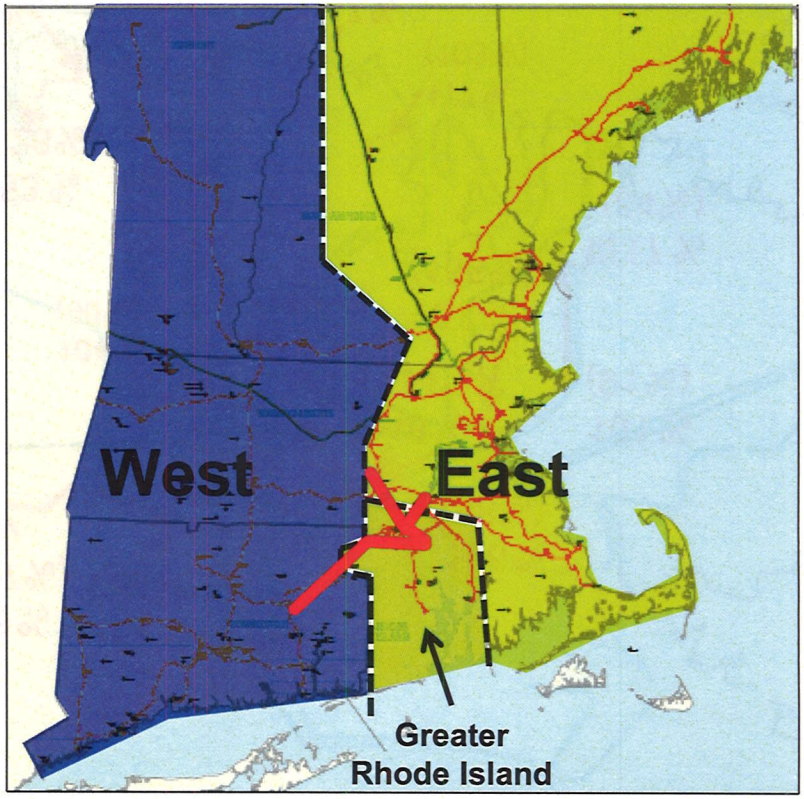
Add qualified resources in the East and West to solve problems in each area, but this requires region to build excess supply, which will increase the amount of locked-in resources



or

Strengthen Transmission

Strengthen transmission connections between East and West to reliably serve load with existing resources

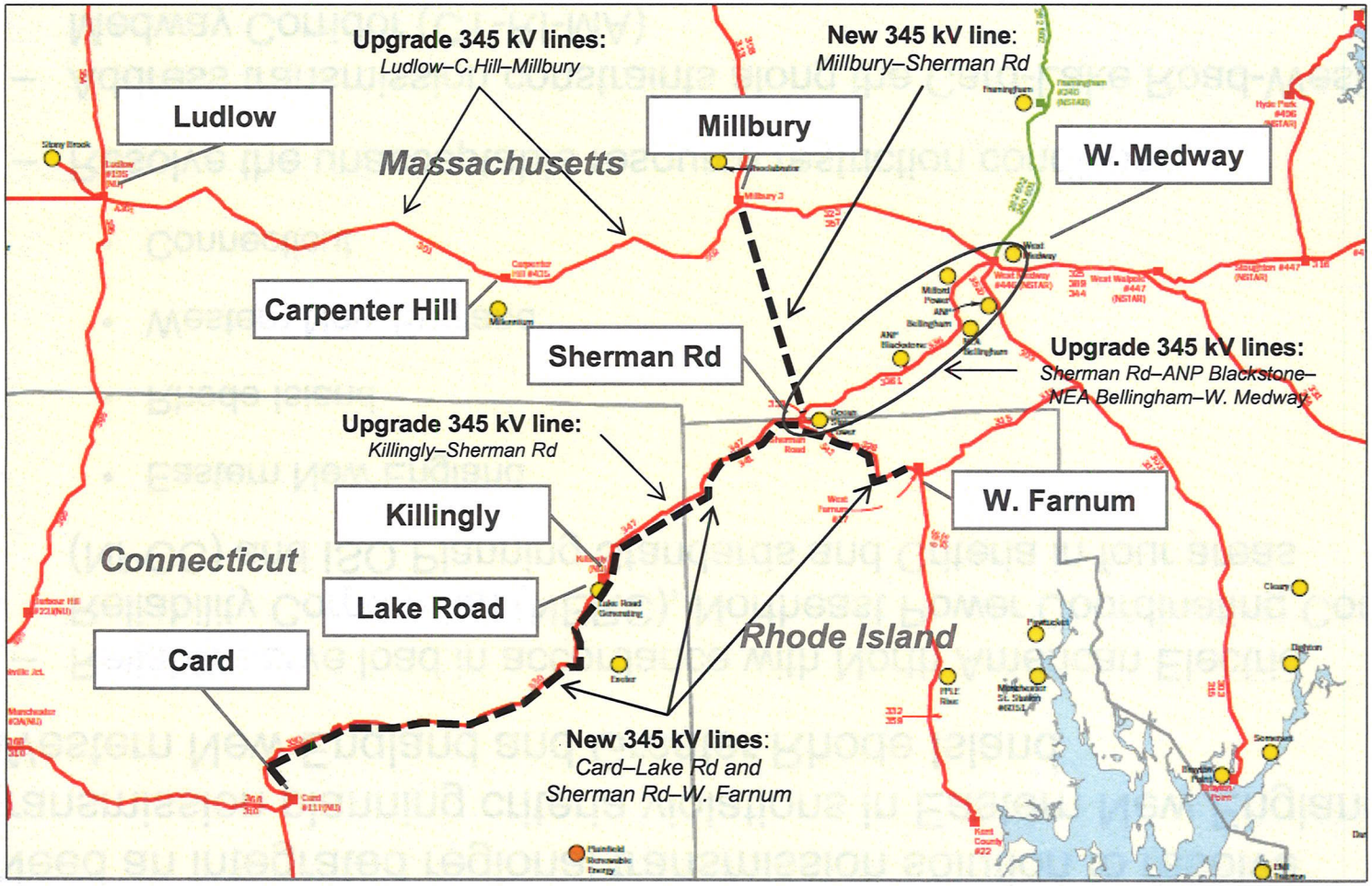


Generation ○ and Transmission ▬ are conceptual and are shown for illustration purposes only.

Summary of Needs

- Need an integrated regional transmission solution to resolve transmission planning criteria violations in Eastern New England, Western New England and Greater Rhode Island
  - Reliably serve load in accordance with North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Council (NPCC) and ISO Planning Standards and Criteria in four areas
    - Eastern New England
    - Rhode Island
    - Western New England
    - Connecticut
  - Resolve the unacceptable resource restriction conditions
  - Address transmission constraints along the Card-Lake Road-West Medway Corridor (CT-RI-MA)

Modified Interstate Reliability Project*



Substation | Existing 345 kV line (post GSRP and RIRP) | New 345 kV line

* This configuration is one of five transmission alternatives being evaluated by the study group.

Conclusions

- The need for an Interstate project is confirmed
- Additional reliability needs identified
  - Western New England resources are unable to adequately serve load in the East due to West-East transmission limitations
- The original Interstate project goes a long way in resolving a majority of the issues
  - Does not resolve all criteria violations in serving Eastern New England load
- Studies to date demonstrate that the Interstate plan with modifications addresses the East-West and West-East constraints
  - Modified plan is one of five transmission alternatives under study