Maine Power Reliability Program

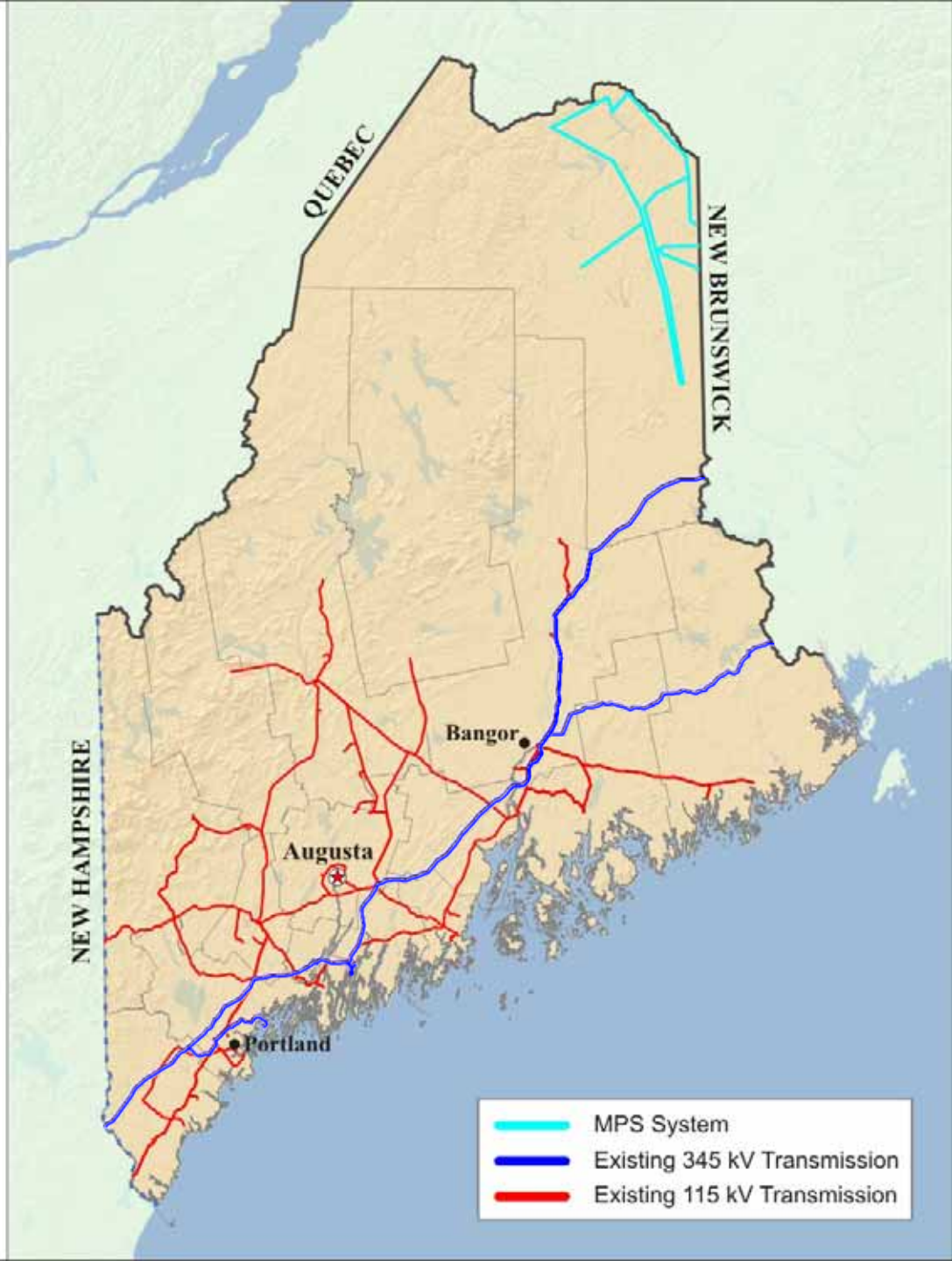
A Central Maine Power Company Program

Lewiston City Council Workshop

January 13, 2009

Maine Bulk Power Transmission System

- Carries bulk electricity from generating plants to areas where electricity is needed
- 345kV backbone was placed in service in 1971 – state of the art and built to last
- NRI, 2nd interconnect to Eastern Canada, the latest improvement (2007)



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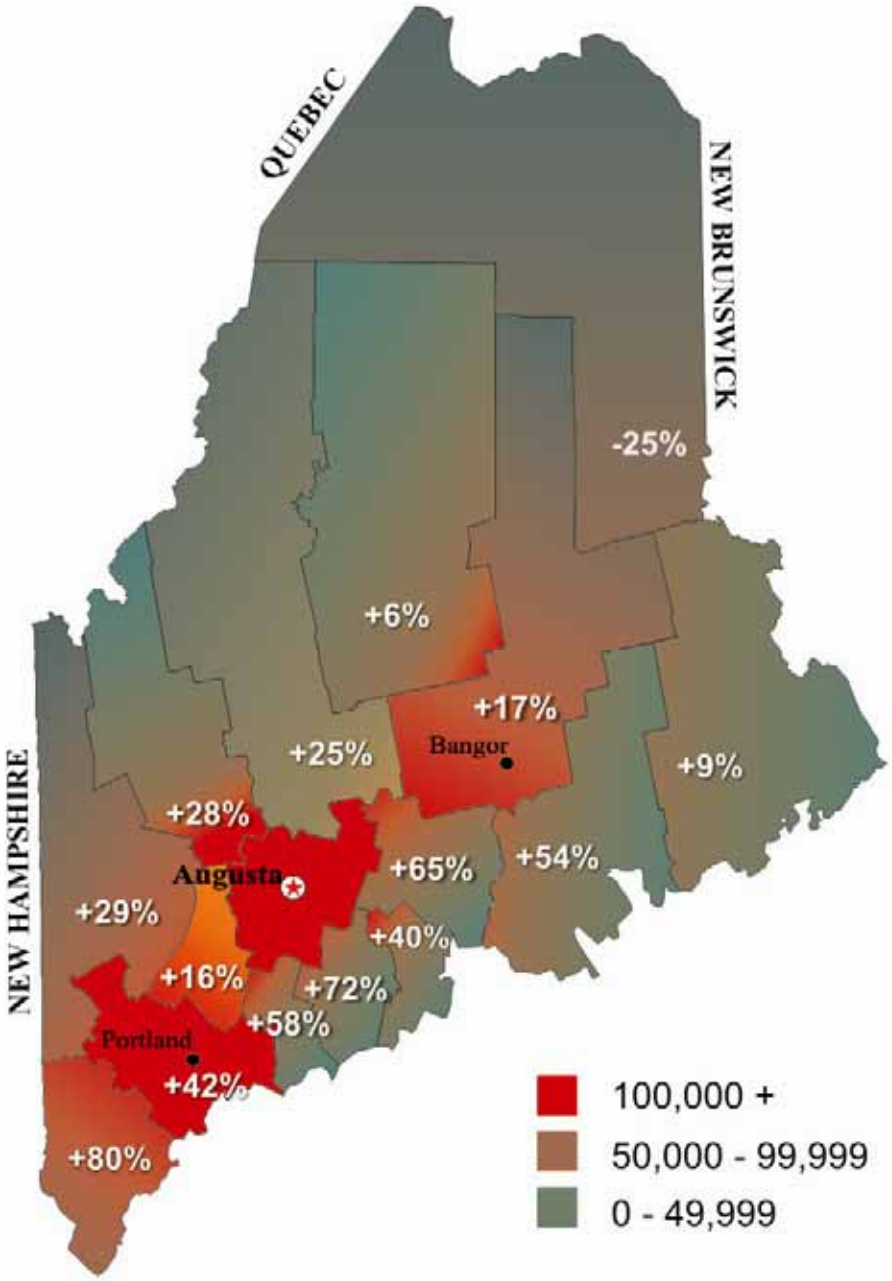
Demographics 2007

- Increased 32 % since 1971
- Population shifted south and coastal
- Electric power consumption doubled since 1971



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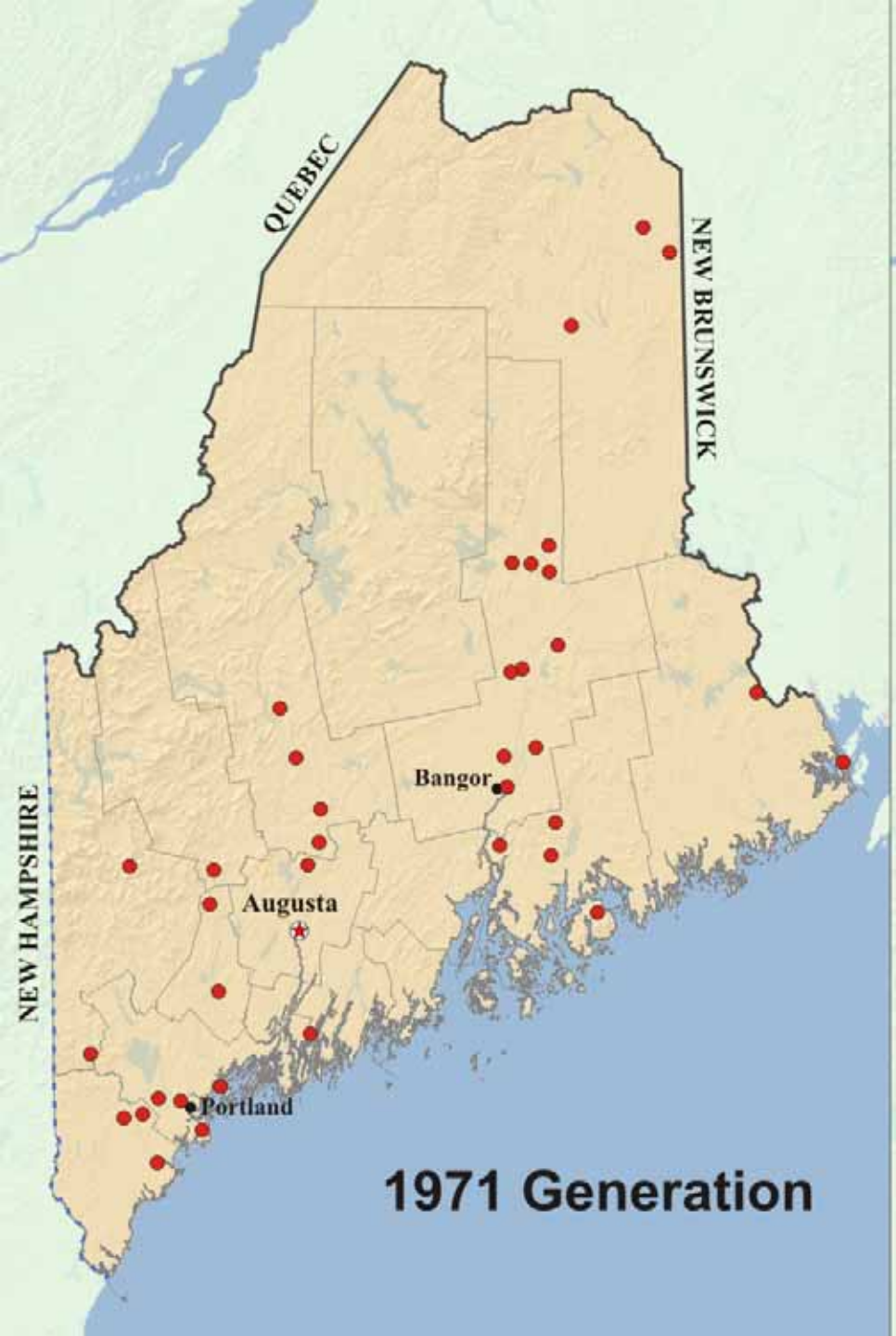
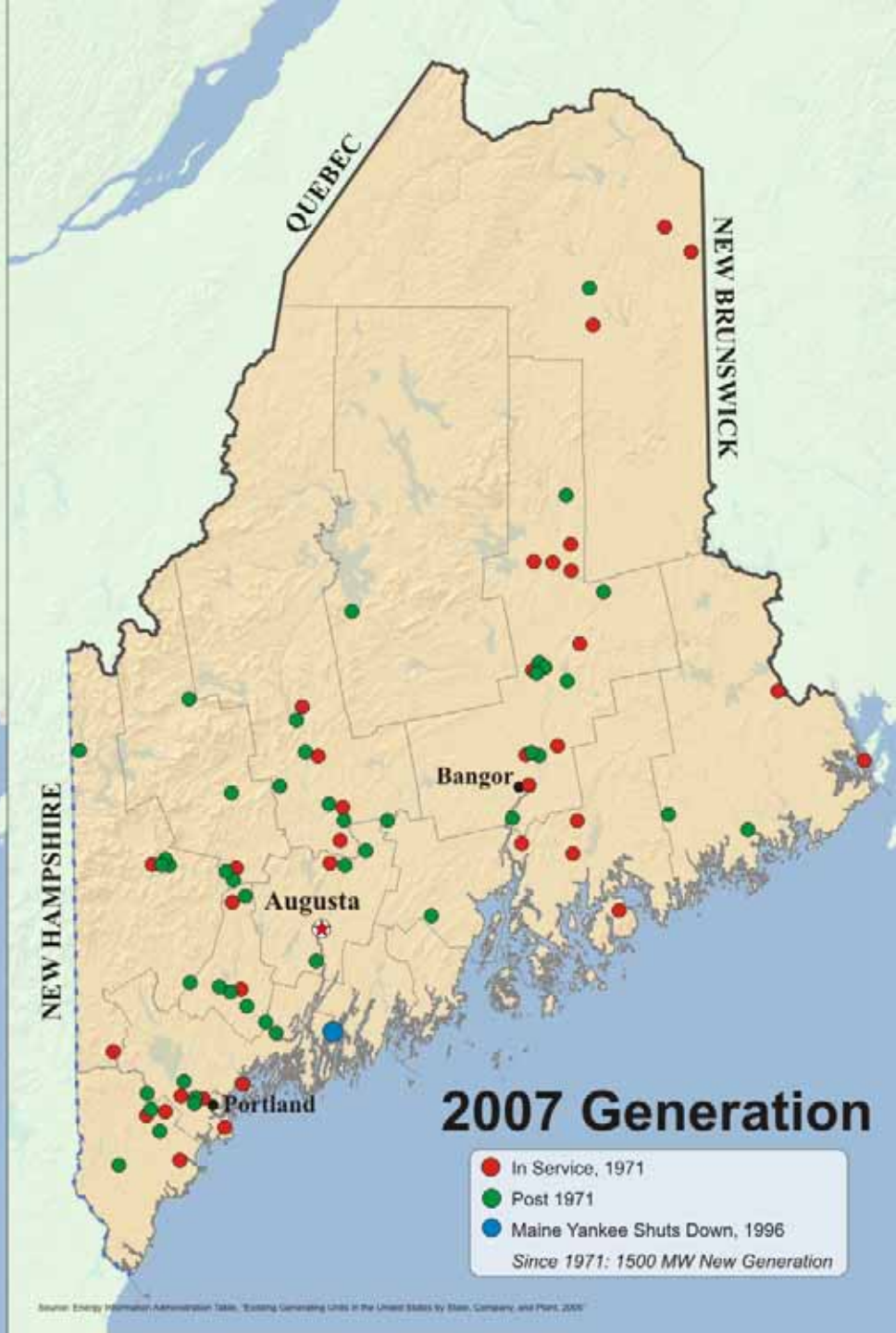

QUEBEC
NEW BRUNSWICK
NEW HAMPSHIRE
Bangor
Augusta
Portland
1971 Generation


QUEBEC
NEW BRUNSWICK
NEW HAMPSHIRE
Bangor
Augusta
Portland
2007 Generation
In Service, 1971
Post 1971
Maine Yankee Shuts Down, 1996
Since 1971: 1500 MW New Generation

Needs Assessment Study

- Began January 2007 by CMP under the direction of ISO New England
- 2017 Peak Load Forecast
- Hundreds of Outage Events
- Nearly 5000 Cases Simulated
  - Generators off & online
  - Energy in & out of Maine
- Finalized June 19, 2007

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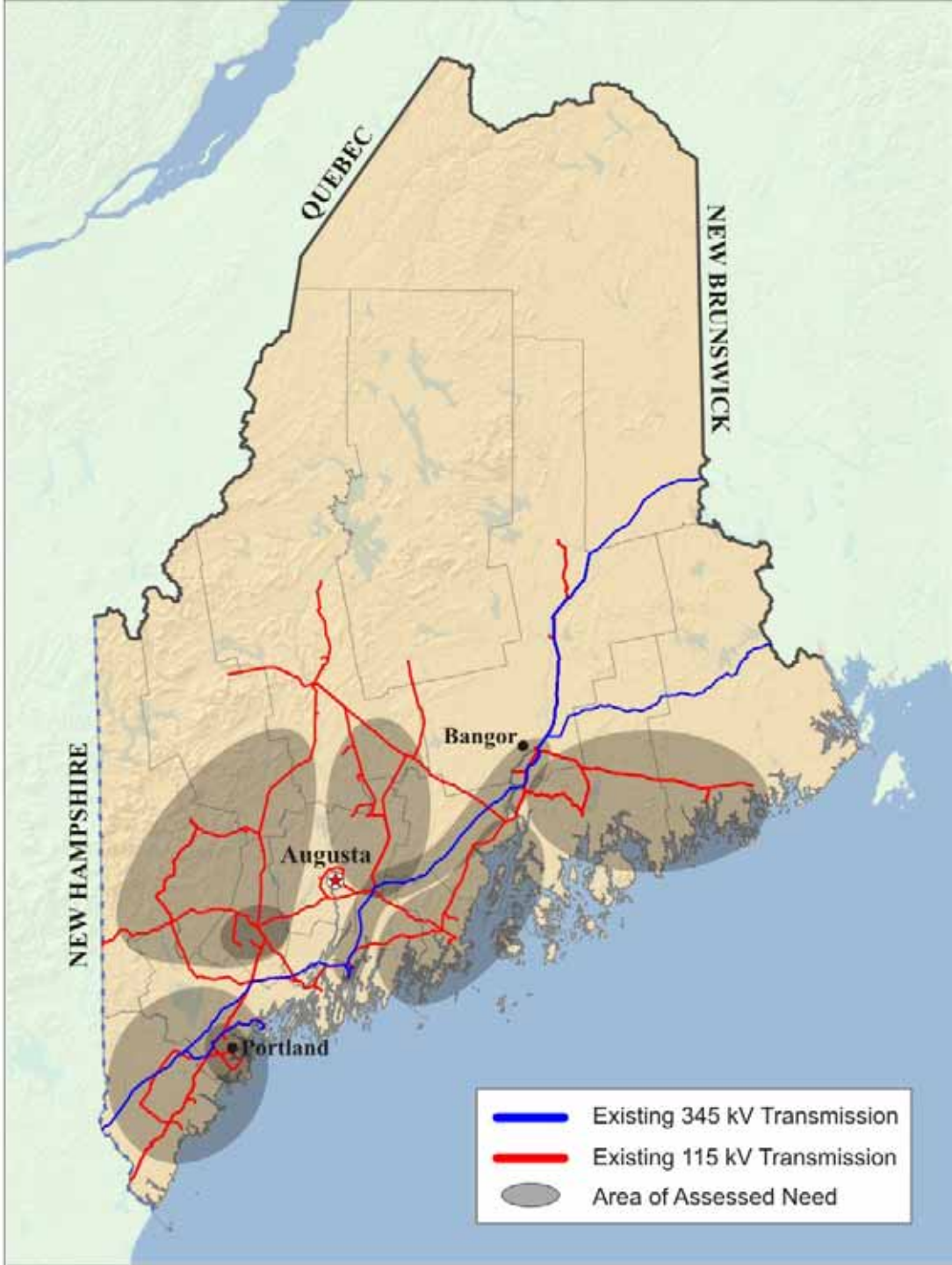
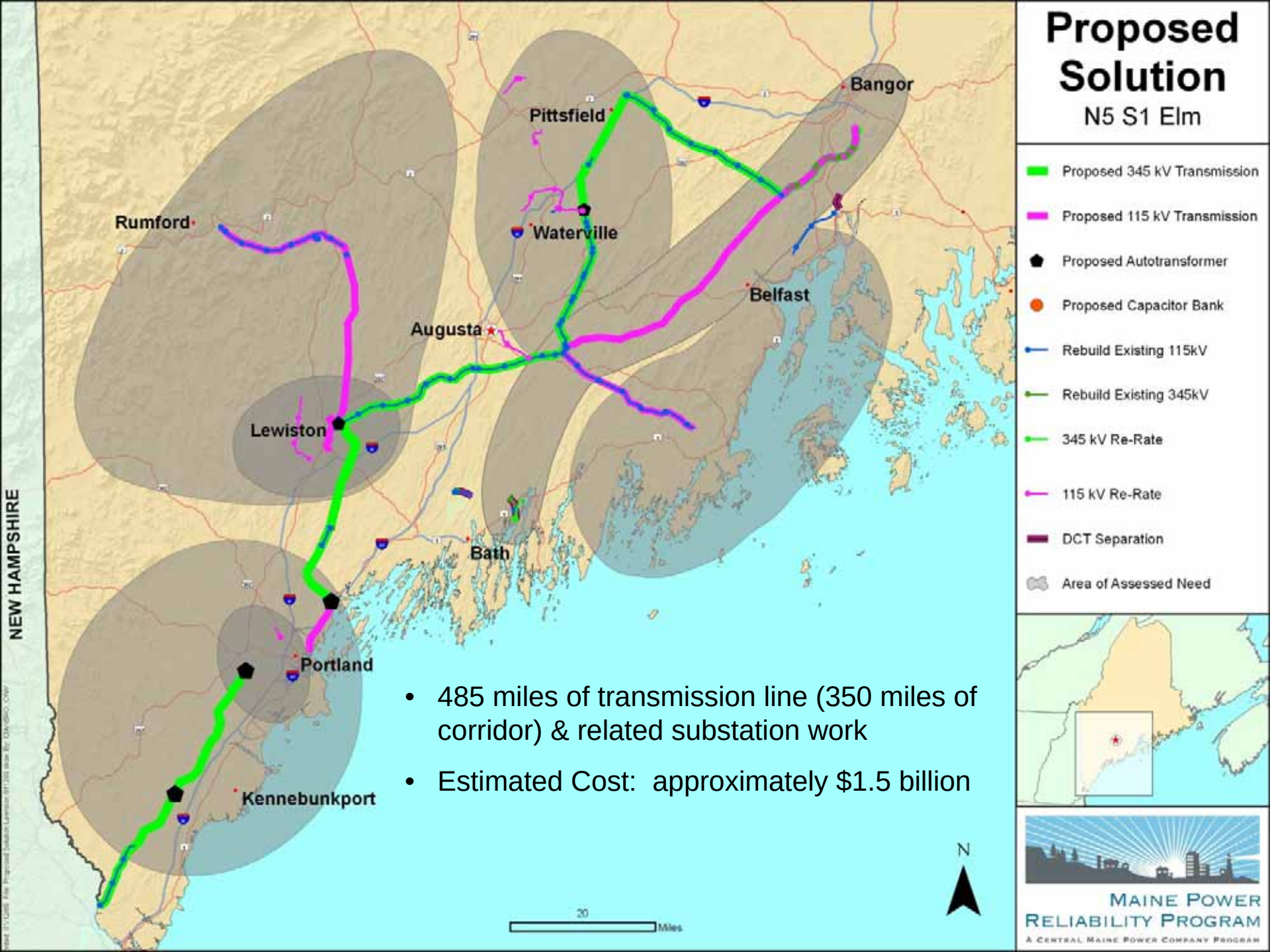


Summary of Key Findings

- Insufficient 345kV transmission
- Insufficient 345/115kV transformation capacity
- Insufficient 345kV transmission support for Portland and Southern Region
- Insufficient infrastructure in Western, Central, Midcoast, Downeast and Southern Maine Regions
- Insufficient thermal capacity ratings of transmission lines

Transmission Alternatives Assessment

- **10 Alternative Routes Studied & Evaluated by:**
  - Reliability & Electrical Performance
  - Costs
  - Environmental Impacts
  - Real Estate
- **250,000 Cases Simulated**



- 485 miles of transmission line (350 miles of corridor) & related substation work
- Estimated Cost: approximately $1.5 billion

Non-Transmission Alternatives

- **New Generation**
- **Conservation**
  - Energy Efficiency
  - Demand Response

- **Energy Efficiency Improves Economics Of All Solutions**
- **Portland Loop NTA Options Are Most Promising**

Environmental Assessment

- Vernal Pools
- Wetlands
- Threatened and endangered species
- Wildlife habitat
- Historic and cultural surveys
- Scenic character
- Noise

Regulatory Schedule

- **MPUC Petition filed July 1, 2008**
  - Transmission & Non-Transmission Alternatives
- **DEP and other Environmental Permit Applications – Early 2009**
- **Local Permitting in 80 Municipalities**
  – Beginning Early 2009

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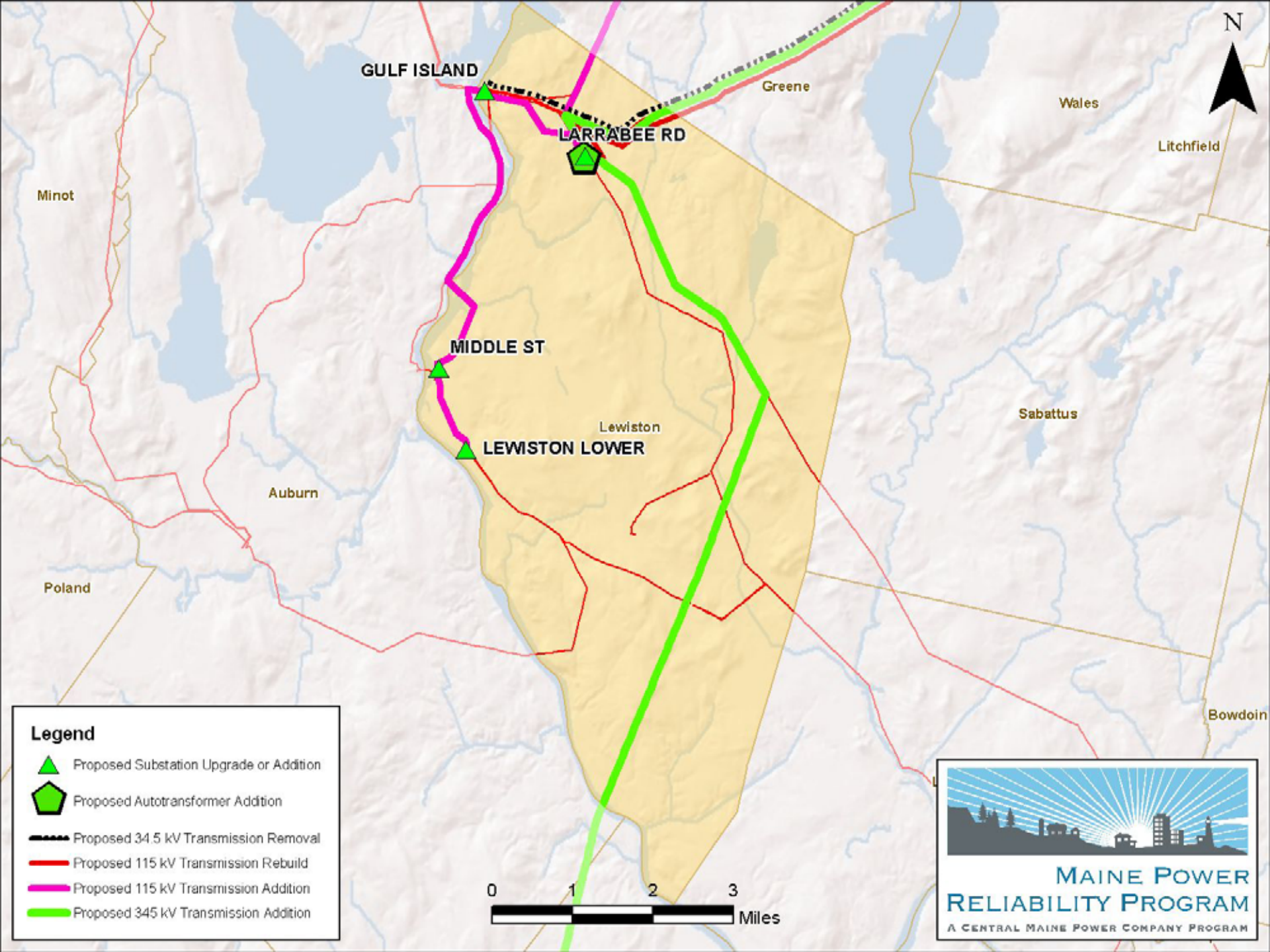
Reliable Service

That is what the Maine Power Reliability Program is all about!


GULF ISLAND
LARRABEE RD
MIDDLE ST
LEWISTON LOWER
Lewiston
Auburn
Minot
Poland
Greene
Wales
Litchfield
Sabattus
Bowdoin
N
Legend
Proposed Substation Upgrade or Addition
Proposed Autotransformer Addition
Proposed 34.5 kV Transmission Removal
Proposed 115 kV Transmission Rebuild
Proposed 115 kV Transmission Addition
Proposed 345 kV Transmission Addition
0
1
2
3
Miles
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Segment 17 (Proposed 345 kV Corridor) Corridor in Lewiston

- CMP has owned this corridor since 1930
- A recently completed survey of the ROW discovered several instances of unauthorized encroachment
- 9 site visits have been conducted with Lewiston residents who neighbor Segment 17

Segment 17 (Proposed 345 kV Corridor) Corridor in Lewiston cont.

- CMP has shared this message with those landowners:
  - Where feasible, CMP will not be clearing to the edge of the ROW for this project, applicable cross sections have been updated to reflect this change.
  - Where feasible, CMP will consider reasonable minor pole relocation along the proposed centerline.
  - Permission will be granted, after the fact, to existing encroachments in the ROW when consistent with existing CMP policy over compatible ROW uses.

Effect of Transmission Corridors on Property Values

- **MPRP uses existing CMP corridor where possible**
  - Efficient use of existing corridor is the most cost-effective solution for CMP rate-payers
  - In Lewiston, to the south of Gulf Island, MPRP will be located entirely within existing corridor

Effect of Transmission Corridors on Property Values

- **Studies around the U.S. and Canada show transmission projects may have a modest impact on property values**
  - Some studies show a small short-term property value impact, usually estimated at 3% - 10%
  - Generally, studies show that impacts diminish – and disappear – over time

CMP's Integrated Vegetation Management Program

- Variety of tools used to hold ROW in an early successional stage
- Only the minimum amount of herbicide necessary to meet the reliability objectives

CMP's Integrated Vegetation Management Program

- Each ROW is treated every four years
  - After snow melt, taller hardwood trees and softwood species are removed using chain saws, brush saws and brush hooks
  - Stumps of trees capable of resprouting are treated with herbicide
  - No herbicides are applied within the 25 foot buffer along water
  - 100 foot buffer is maintained for known wells and other drinking water supplies
  - When leaves are full, crews selectively apply herbicides with hand pressurized back pack tanks
  - All crews are supervised by a licensed Maine pesticide applicator

Exponent®

Understanding EMF and Health Issues

William H. Bailey, Ph.D.

Today's Topics

- What is EMF? What is audible noise?
- What is the status of research on EMF and health?
- What regulations may apply?
- EMF and audible noise modeling results for proposed line section near Lewiston
- Q & A

Exponent

Electric and Magnetic Fields (EMF)

- Electric and magnetic fields are areas of energy that surround anything that
  - generates
  - transmits, or
  - uses electricity

Electric Fields

- Electric fields result from voltages
- Typically measured in units of kilovolts per meter (kV/m)
- Shielded from objects such as trees, shrubs, walls
- Strength diminishes as you move away from the source

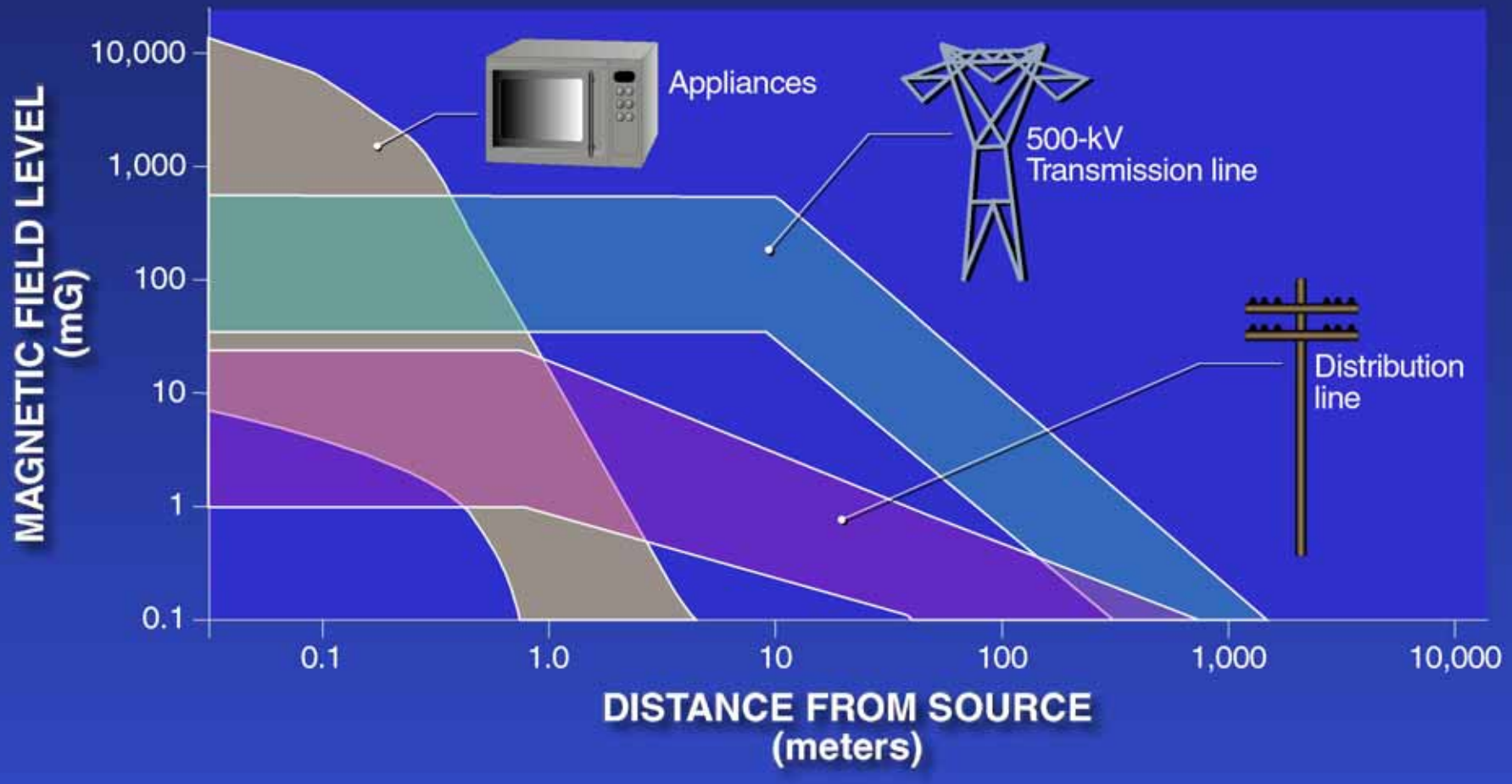
Exponent

Magnetic Fields

- Magnetic fields result from current flow
- Typically measured in milligauss (mG)
- Not shielded from objects such as trees, shrubs, walls
- Strength diminishes as you move away from the source

Exponent

The Highest Magnetic Field Levels are Measured Close to Appliances



Source: Modified from Morgan, MG. Electric and Magnetic Fields From 60 Hertz Electrical Power: What Do We Know About Possible Health Risks? (1989). Carnegie Mellon University.

Research Summary

- No conclusion that EMF causes disease
- No consistent statistical association between magnetic fields and any disease
  - Except for observation of higher average magnetic fields (>3–4 mG) among children with leukemia in some studies
- Short and long-term animal studies as a whole do not show adverse effects
- Laboratory studies of cells and tissues have not confirmed any mechanism for harm

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Research Summary—Childhood Leukemia

- An association has been observed between rare exposures to high levels of magnetic fields and childhood leukemia
- Researchers do not believe it is causal for three reasons –
  - The studies are prone to error
  - No harm observed in animal studies
  - No explanation for adverse effects in studies of cells and tissues
- Childhood leukemia is a rare disease and little is known about its causes

Exponent

Exponent's EMF Report to MPUC

In summary, there is no scientific basis to project any adverse health effects as a result of the electric and magnetic fields from typical sources of these fields in our environment including power distribution lines, transmission lines, electrical appliances, and electrically-powered transportation.

Exponent

Comparison of EMF Guidelines

	ICNIRP (1998)	ICES (2002)
Controlled		
Magnetic field	4,200 mG	27,100 mG
Electric field	8.30 kV/m	20.00 kV/m+
General Public		
Magnetic field	833 mG	9,040 mT
Electric field	4.2 kV/m	5.00 kV/m[1]

[1]Within power line rights-of-way, the MPE for the general public is 10 kV/m under normal load conditions.

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EMF and AN Levels Associated with Maine Power Reliability Program (MPRP)

Exponent

EMF and AN Calculations

- At a cross-section representative of the proposed line near Lewiston,
  - electric and magnetic field levels were calculated at average and peak loading for existing and proposed conditions
  - AN was calculated for existing and proposed conditions under fair and foul weather conditions
- Levels were compared to existing standards and guidelines to determine impacts

Exponent

EMF Calculations—Results

- MPRP generally would produce modest increases in the levels of EMF at ROW edge closest to the 345-kV line
  - Calculated EMF levels are well below exposure limits
  - Exponent is conducting additional research to determine what changes in the phasing of existing and proposed lines could result in magnetic field reductions

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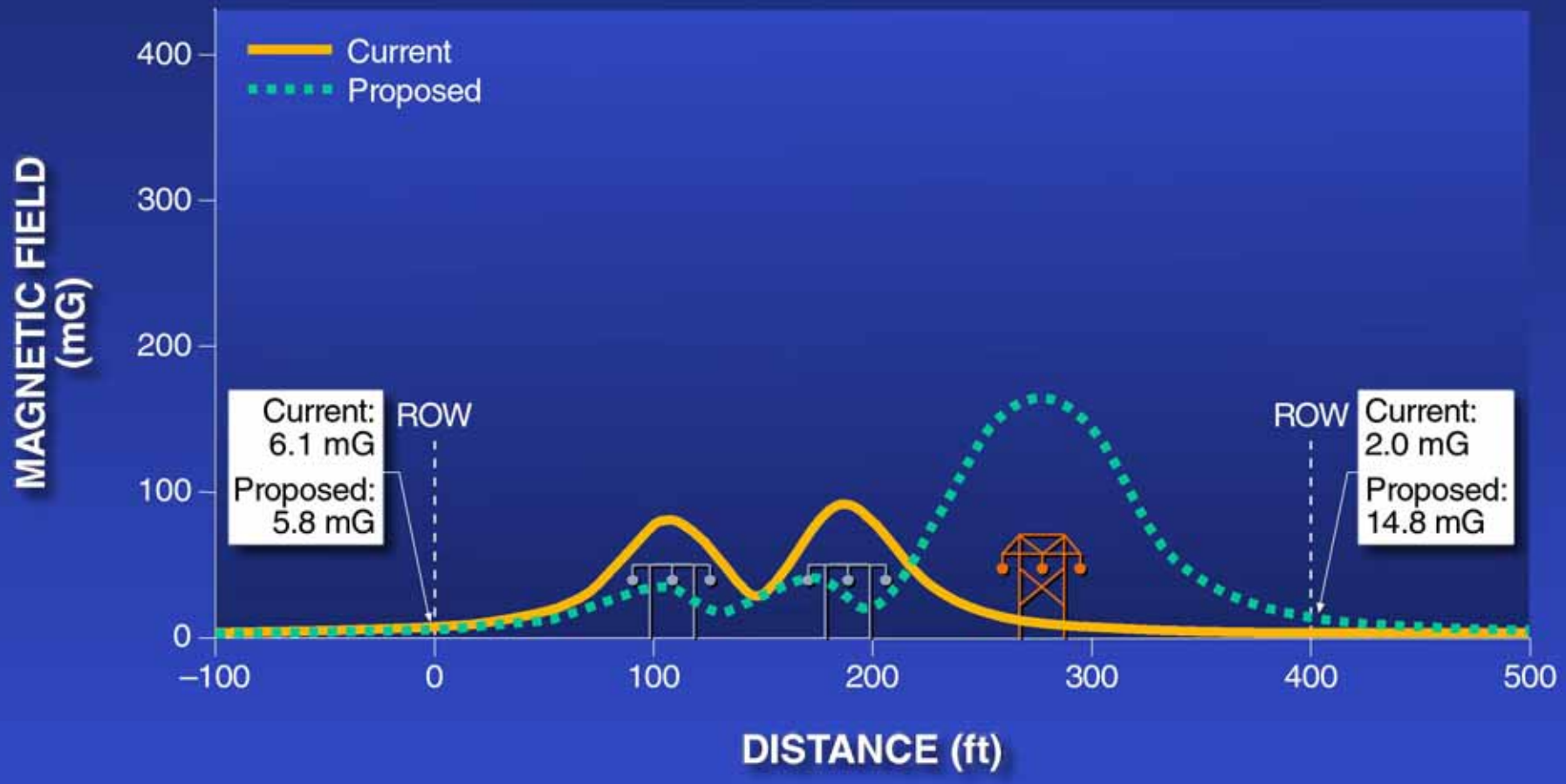
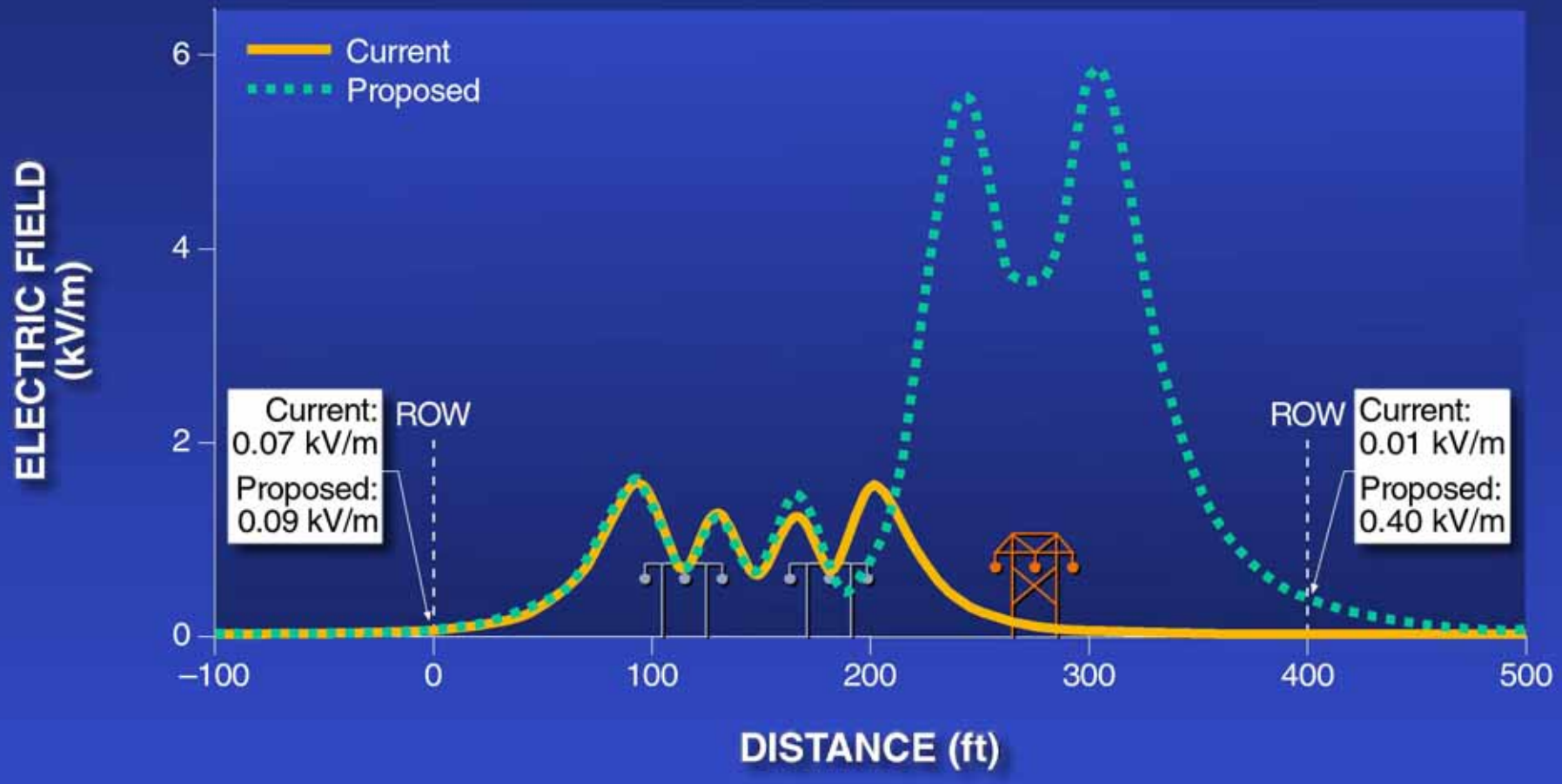
Magnetic Field Levels Will Increase Modestly at ROW Near 345-kV Line



Electric Field Levels Will Increase Modestly at ROW Near 345-kV Line



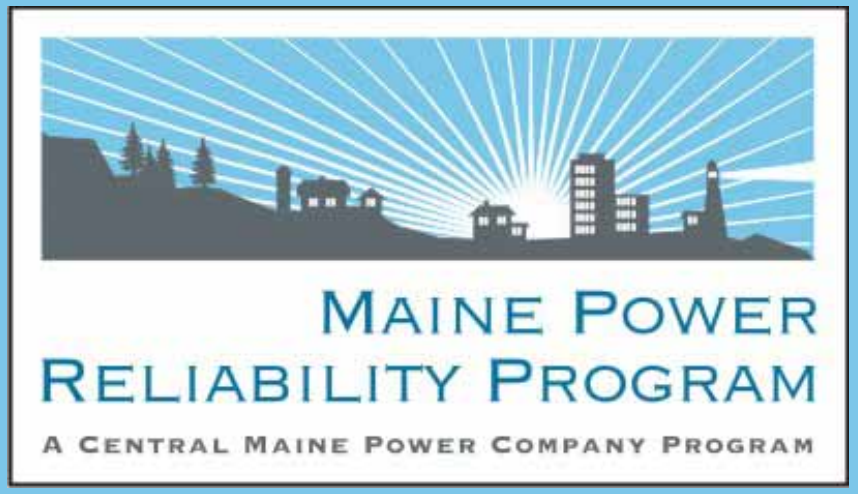
Audible Noise (AN)

- Hissing, crackling sound that results from the partial electrical breakdown of the air around the conductors of a transmission line
- High-voltage lines are designed to be free of AN under ideal conditions
- However, protrusions on the conductor surface—particularly water droplets on or dripping off the conductors—cause AN
- AN is generally a foul-weather condition

Exponent

AN Calculations—Results

- AN levels at the edges of ROWs in fair weather were calculated to be below the noise standard of the Maine DEP
  - Higher levels of AN would occur during foul weather, but would be masked by the background noise of rain and wind
  - Comparable to the AN levels that might be found in a living room or a business office



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