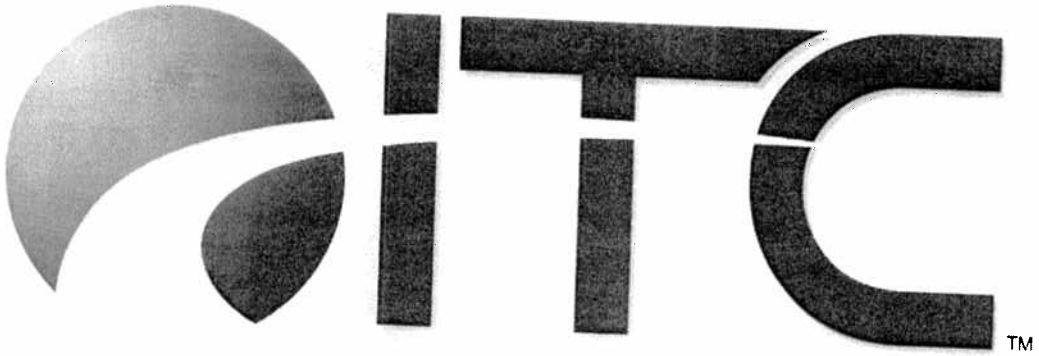


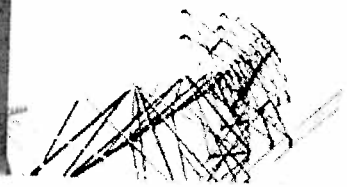

# An Introduction to Transmission
# House Energy and Technology Committee

Linda Blair
Executive Vice President & Chief Business Officer

April 21, 2009

ITC

# Public Act 141 of 2000

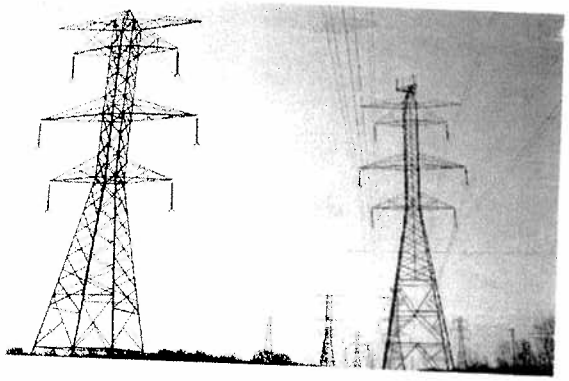


- **Michigan PA 141 of 2000 provided the opportunity for the state's utilities to sell their transmission assets**

  *Sec. 10w (1) Each investor-owned electric utility in this state shall, at the utility's option, either join a FERC approved multistate regional transmission system organization or other FERC approved multistate independent transmission organization or divest its interest in its transmission facilities to an independent transmission owner.*

- **CE divested its transmission assets in 2002**
- **DTE divested its transmission assets in 2003**
- **In addition, both utilities joined the MISO Regional Transmission Organization so that the scheduling of the transmission system is no longer performed by market participants.**

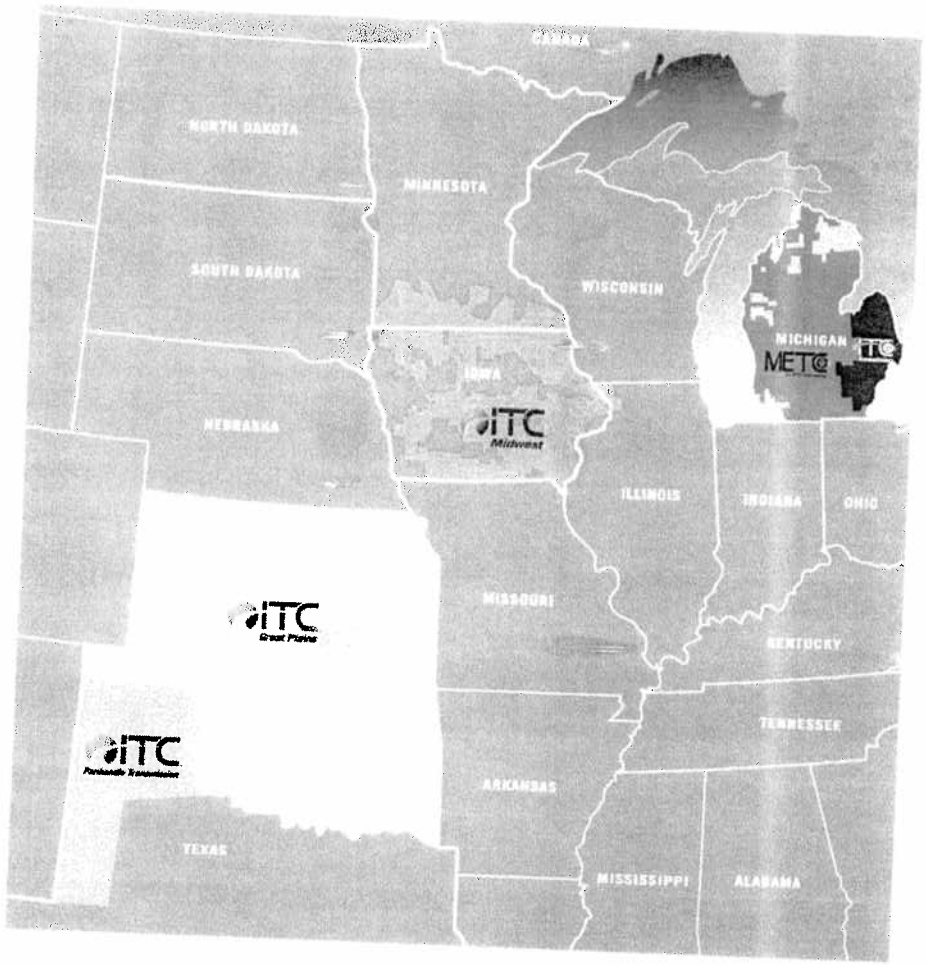
# Outline



- Who is ITC Holdings Corp.
- Improvements in the Transmission System
- Industry Overview
- Regional Transmission and Renewable Energy
- Conclusions

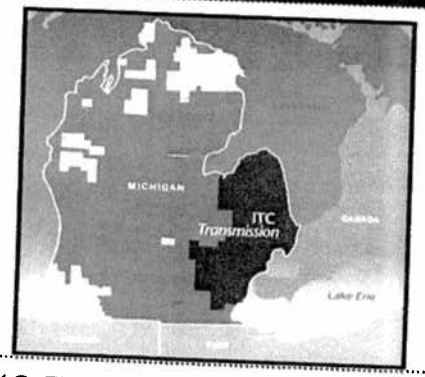
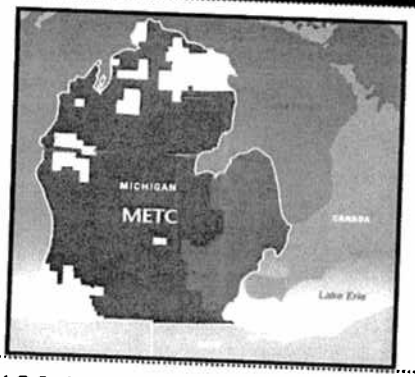
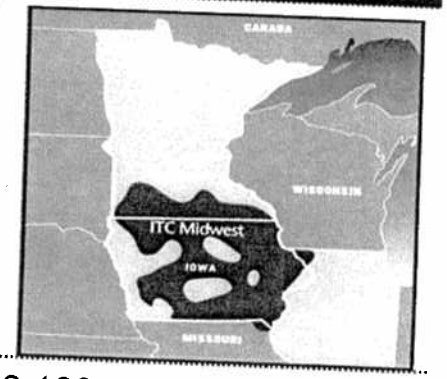
# Who Is ITC Holdings Corp.?

# Who Is ITC?

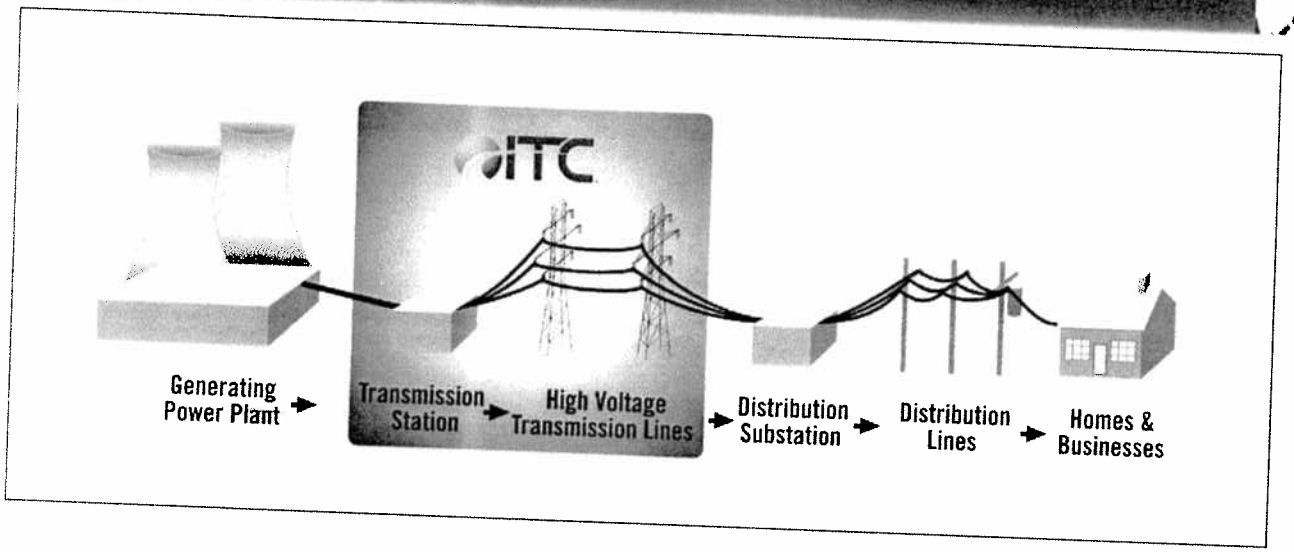



- ITC was first established in March 2003 when DTE Energy sold transmission subsidiary ITC*Transmission*.
- In July 2005 ITC became a publicly traded company on the NYSE.
- In October 2006 ITC purchase the Michigan Electric Transmission Company, LLC ("METC"), the former assets of Consumers Energy.
- In December 2007 acquired all of the transmission assets of Interstate Power and Light Company (IP&L), a subsidiary of Alliant Energy.
- Operate 15,000 miles of transmission, serving over 25,000 MW of load.
- 8th largest transmission load serving entity in the country.
- Pursuing opportunities to build, own, and operate transmission in the Upper Midwest, Kansas, Oklahoma and Texas.

# ITC System Statistics

| Subsidiary | ITC*Transmission* | METC | ITC Midwest |
|---|---|---|---|
| Service Area |  |  |  |
| System Peak Load | 12,745 MW | 9,469 MW | 3,100+ MW |
| Total Transmission Miles | More than 2,700 | Approximately 5,400 | Approximately 6,800 |
| Membership | Midwest ISO | Midwest ISO | Midwest ISO |
| ITC Acquired Transmission Assets | March 1, 2003 | October 10, 2006 | December 20, 2007 |

# Power Flow




- Transmission is the delivery system for high voltage electricity from the generation source (fossil, nuclear, wind, solar, etc.) to the local distribution system.
- In Michigan, ITC owns and operates transmission facilities at voltages of 120 kV (120,000 volts), 138 kV (138,000 volts), 230 kV (230,000 volts), and 345 kV (345,000 volts).
- In Michigan, ITC's customers are Detroit Edison, Consumers Energy, municipal utilities, cooperatives and retail marketers.

# Transmission is Our Only Business

## ITC is an independent transmission company

- Independence means no affiliation with a market participant (generator, retailer, marketer, etc)
- Operate in an open, non-discriminatory manner
- Only independent transmission company in the country

## ITC is singularly focused on transmission - we own, operate, maintain, and construct transmission facilities.

- There is no internal competition for capital – it is dedicated for prudent transmission investment.

## Customers benefit from transmission investment

- Improved reliability
- Reduced congestion
- Increased access to generation resources



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# Regulation

- **ITC operating subsidiaries are regulated by the Federal Energy Regulatory Commission (FERC) for purposes of establishing rates, terms and conditions of service.**
  - Regulated by FERC because transmission is considered interstate commerce.
- **Michigan Public Service Commission maintains jurisdiction over siting of transmission projects**
  - MPSC approval required for siting of transmission projects that are 345kV and above, and over 5 miles in length.
- **ITC operating subsidiaries belong to the Midwest Independent System Operator (MISO), which is a regional transmission organization (RTO).**

# Improvements in the Transmission System

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# Improving the Transmission Infrastructure

**Focused on needed investment and maintenance to improve system performance, enhance reliability, and reduce congestion.**

- Focus on preventative maintenance

- Focus on needed investment to
  - Replace aging infrastructure
  - Upgrade existing facilities
  - New infrastructure to improve reliability, reduce congestion, or interconnect generation.



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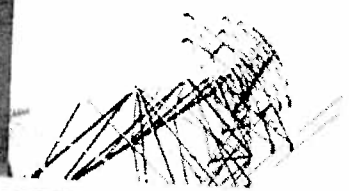
# Improved Maintenance, Efficiency



- Our maintenance methodology is simple: invest in prevention.
- When we assumed responsibility for the some parts of the system, there was in some areas a 4-15 year backlog in maintenance.
- Now, the backlog in the ITC*Transmission* footprint is minimal and we are focusing on preventative maintenance.

| Activity | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Breaker Inspections | 28 | 82 | 96 | 58 | 72 |
| Bus Inspections | 6 | 51 | 81 | 60 | 60 |
| Relay Complete Periodic Maintenance | 10 | 176 | 354 | 526 | 416 |
| Tower Inspections | 857 | 1,441 | 1,442 | 2,212 | 1,173 |
| Tower Painting | 147 | 1,095 | 3,500 | 0 | 1,048 |
| Infrared Inspections | 153 | 155 | 154 | 157 | 159 |
| Transformer DGA | 43 | 91 | 62 | 95 | 116 |
| Line Clearance / Corridor Mowing | 95% | 100% | 100% | 100% | 100% |



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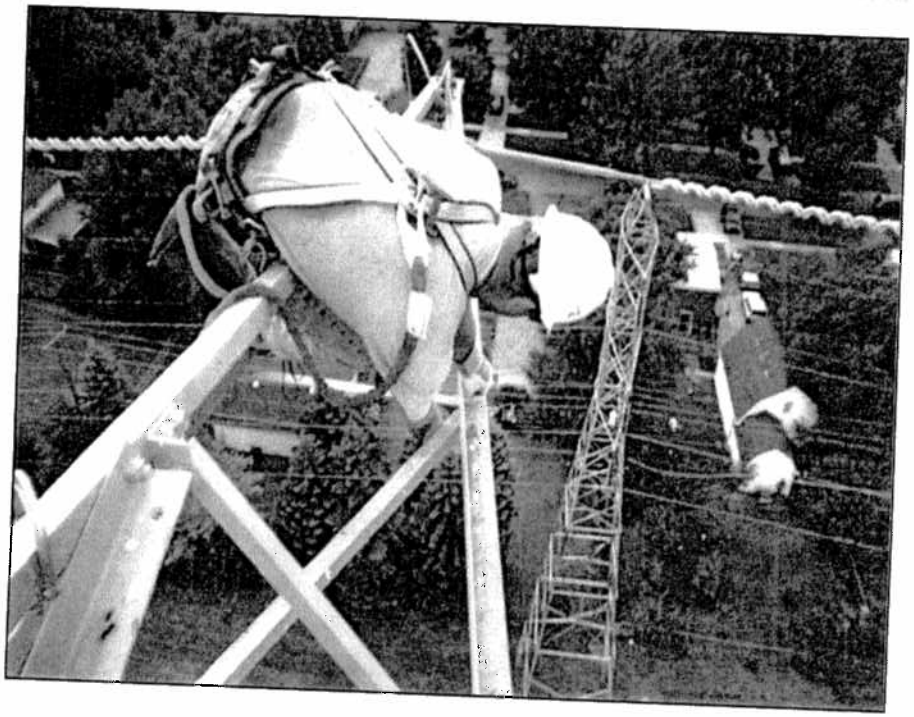
# Maintenance Activities



**Physical Inspections of transmission towers**

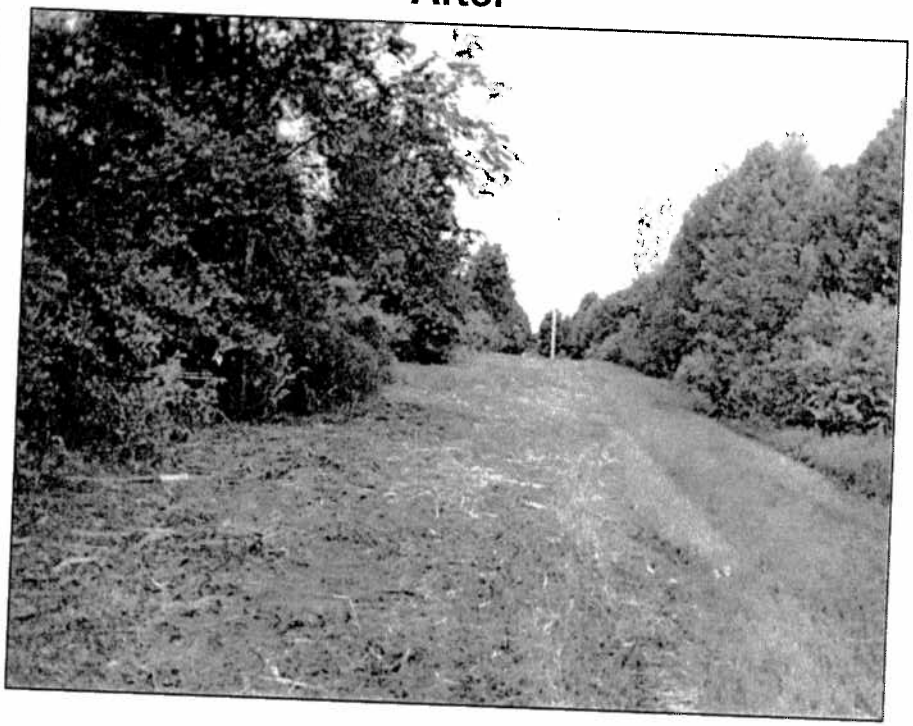
# Maintenance Activities

## Vegetation Management

-Tree trimming and removals are an essential component to ensuring reliability
-Mandatory NERC reliability standards include vegetation management

**Before**

**After**





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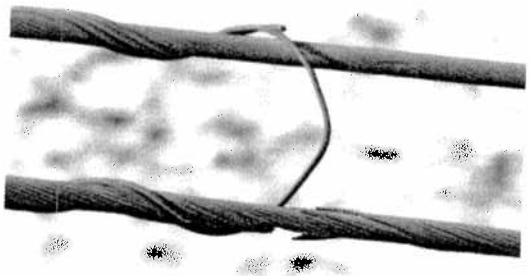
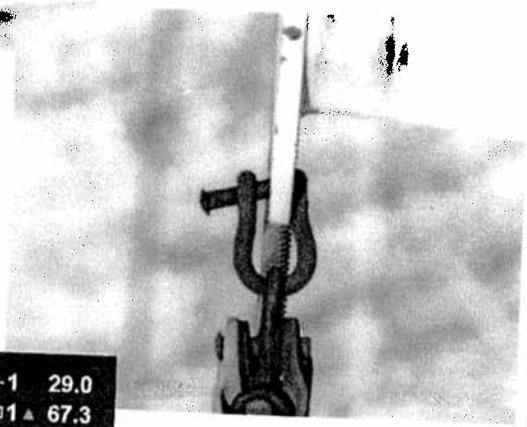
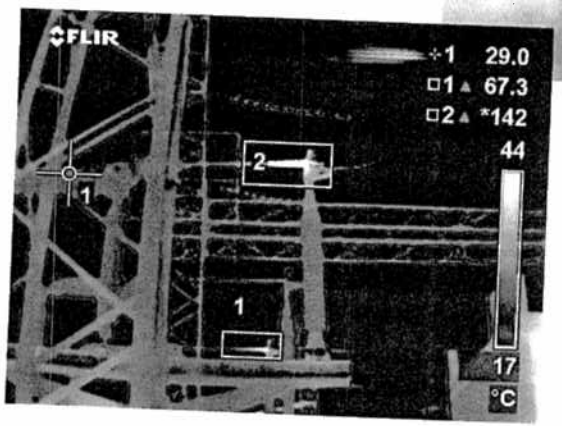
# Maintenance Activities








- ***High resolution fly-over photography identifies minute details:***
  - Worn conductor material;
  - Loose, missing bolts or pins; and
  - Cracked insulators.
- ***Using thermography, ITC can identify "hot spots" on our system that may cause potential problems or failures.***



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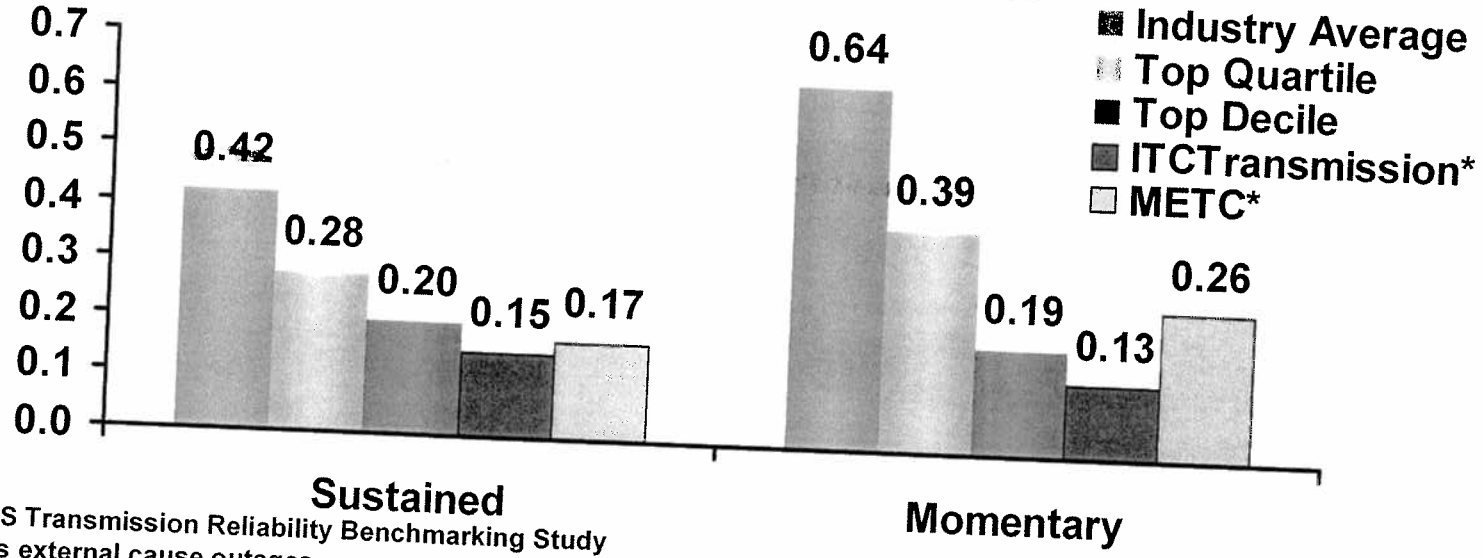
# Operational Excellence

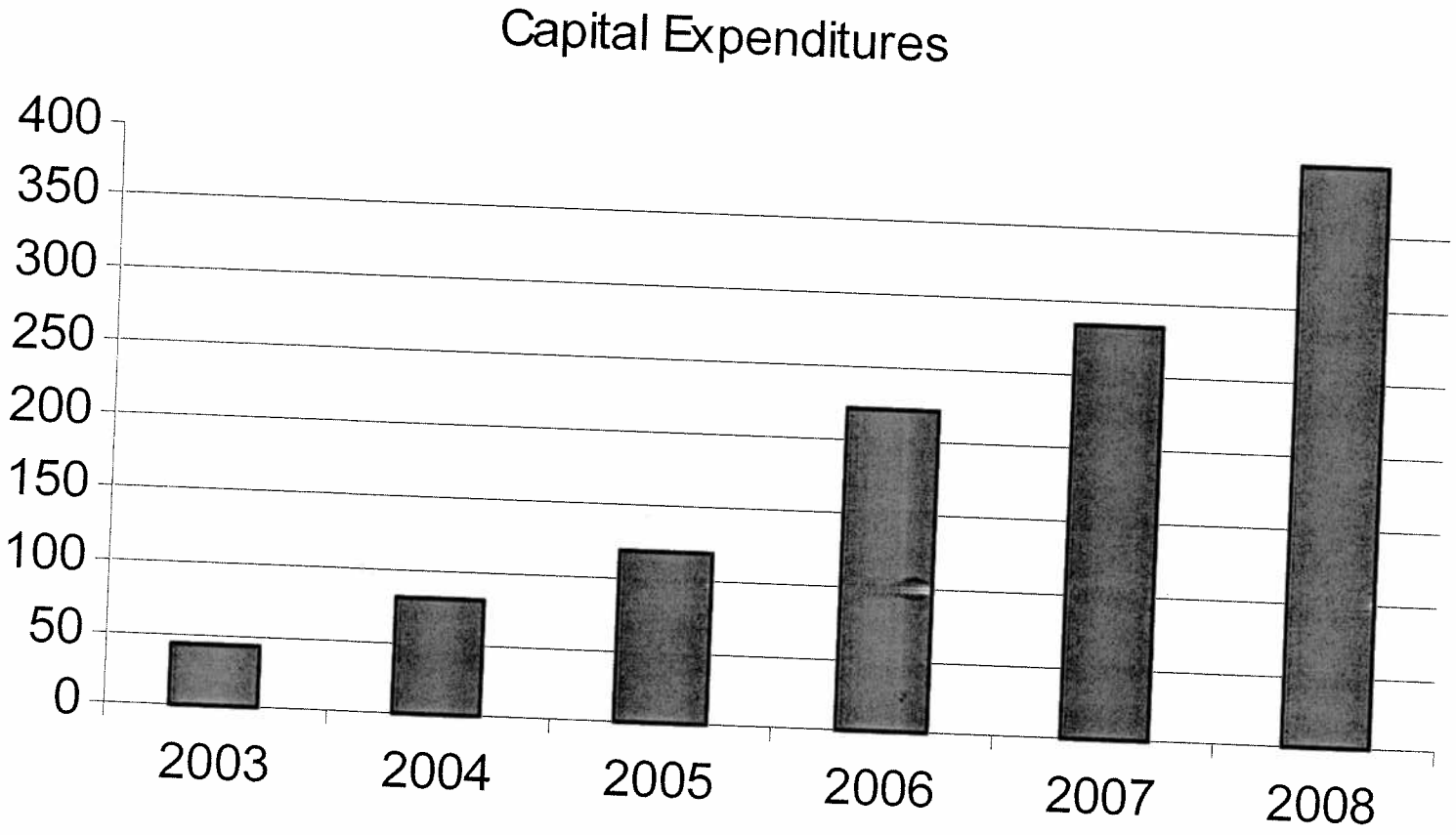
- ITC's goal is best-in-class system performance for all operating subsidiaries
  - — Michigan systems achieved top decile performance for sustained outages
  - — ITC*Transmission* is top decile in momentary outages while METC is top quartile

## 2007 Average Circuit Outages: Sustained and Momentary (1)




(1) 2008 SGS Transmission Reliability Benchmarking Study
* Excludes external cause outages

# Significant Investment in the Grid



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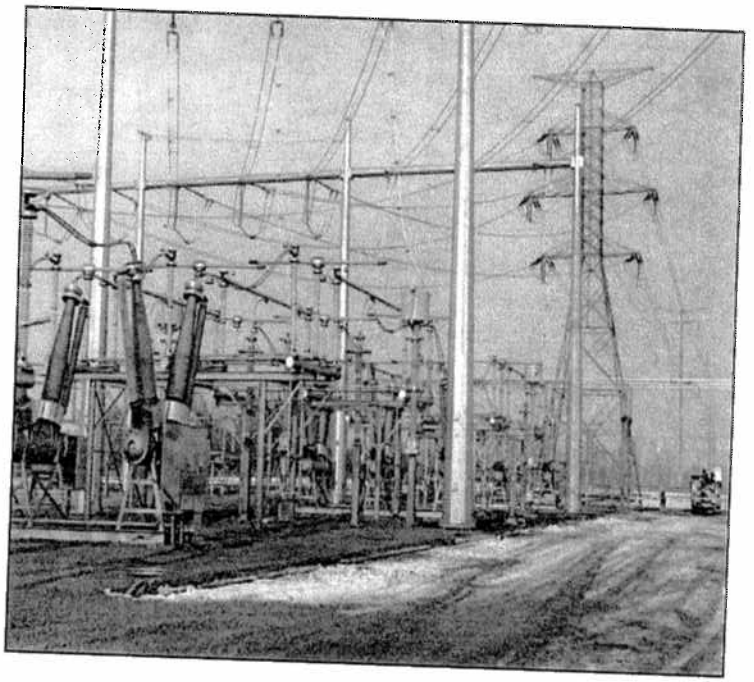
# Capital Projects

Milan 345-120 kV Project- Before (August)



Milan 345-120 kV Project – After (December)



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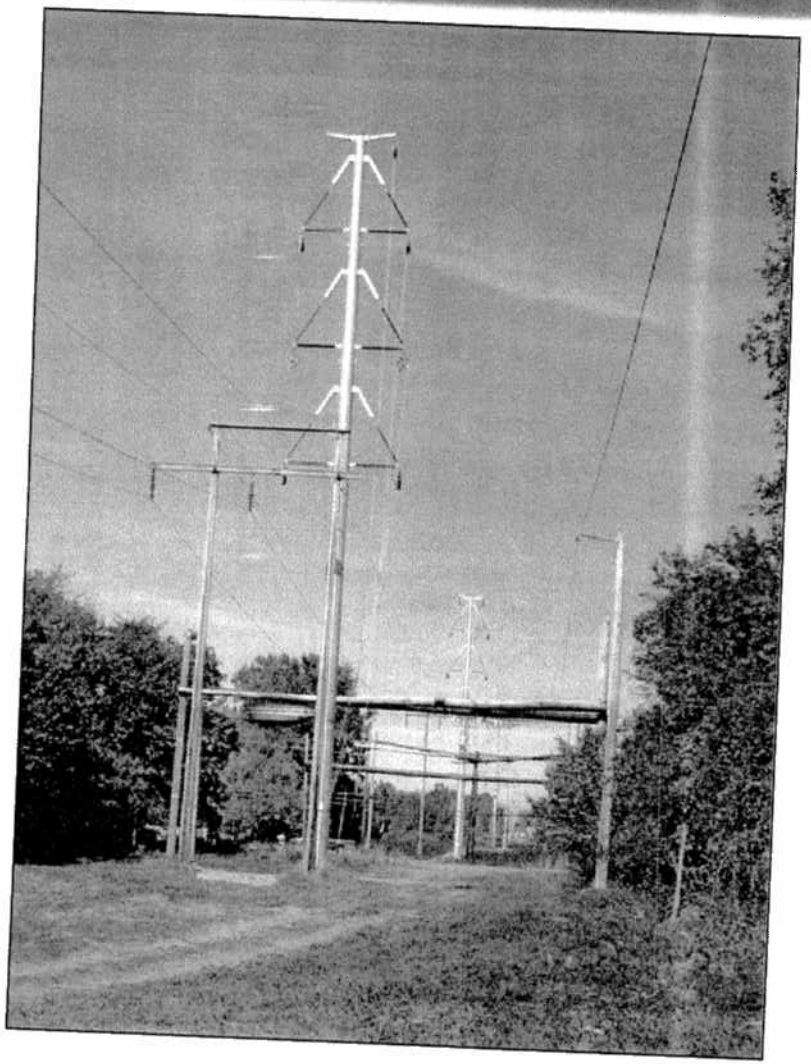
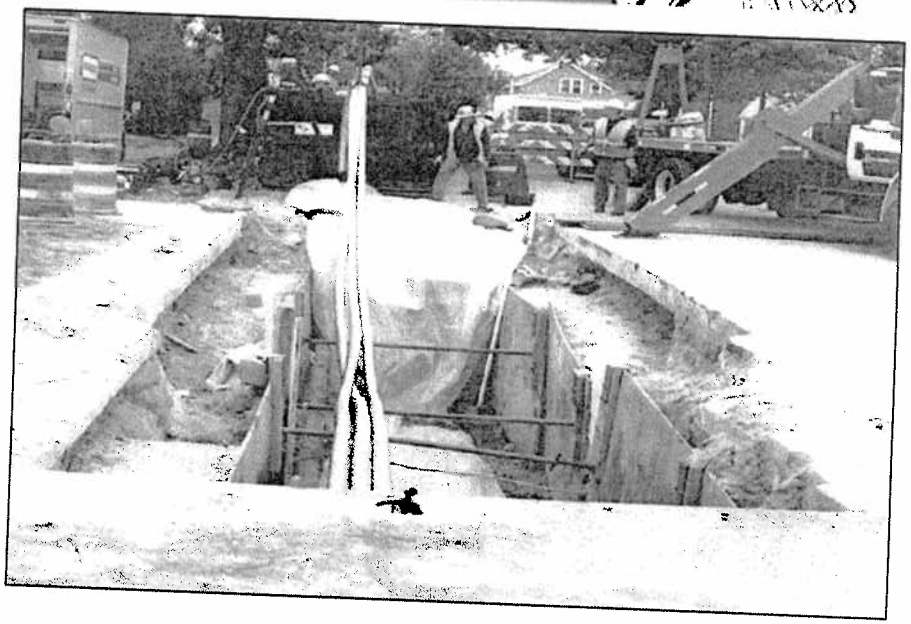
# Capital Projects



Thumb Rebuild Project



Caniff- Stephens 345kV Underground Cable Replacement Project



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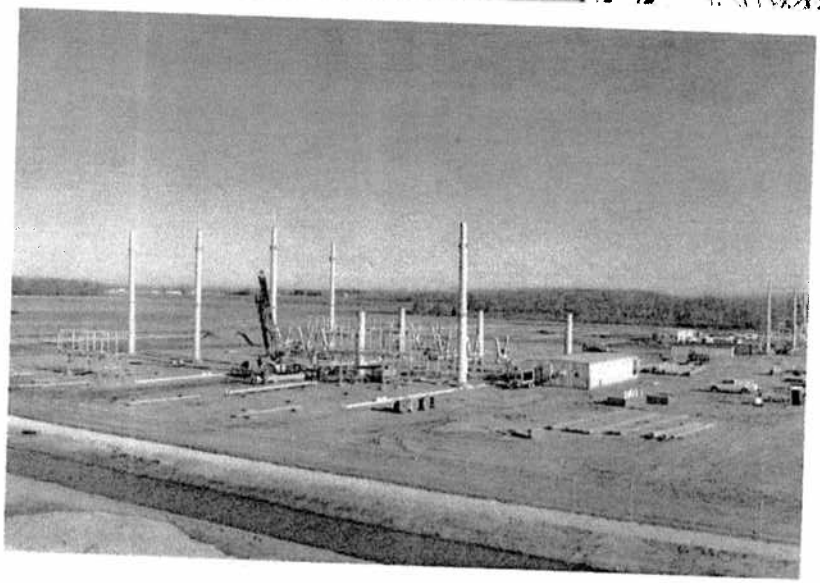
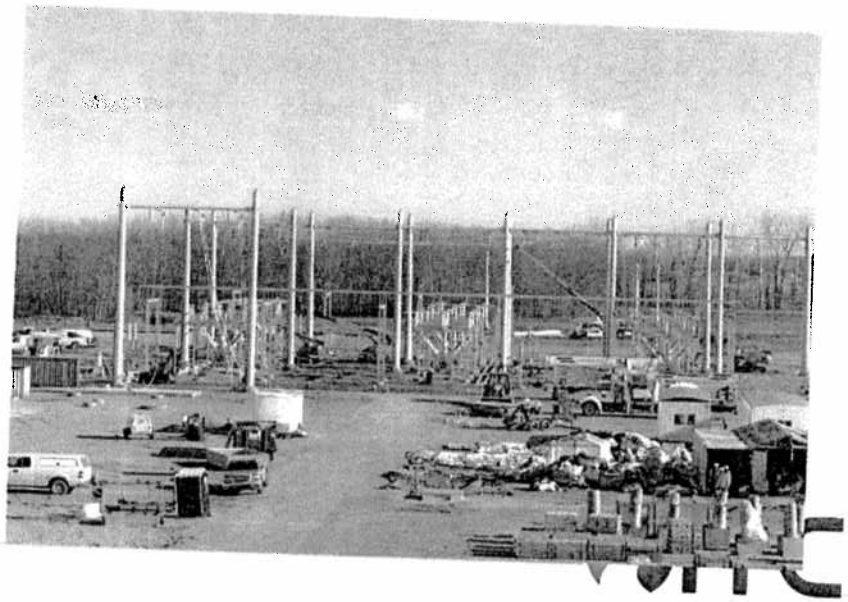
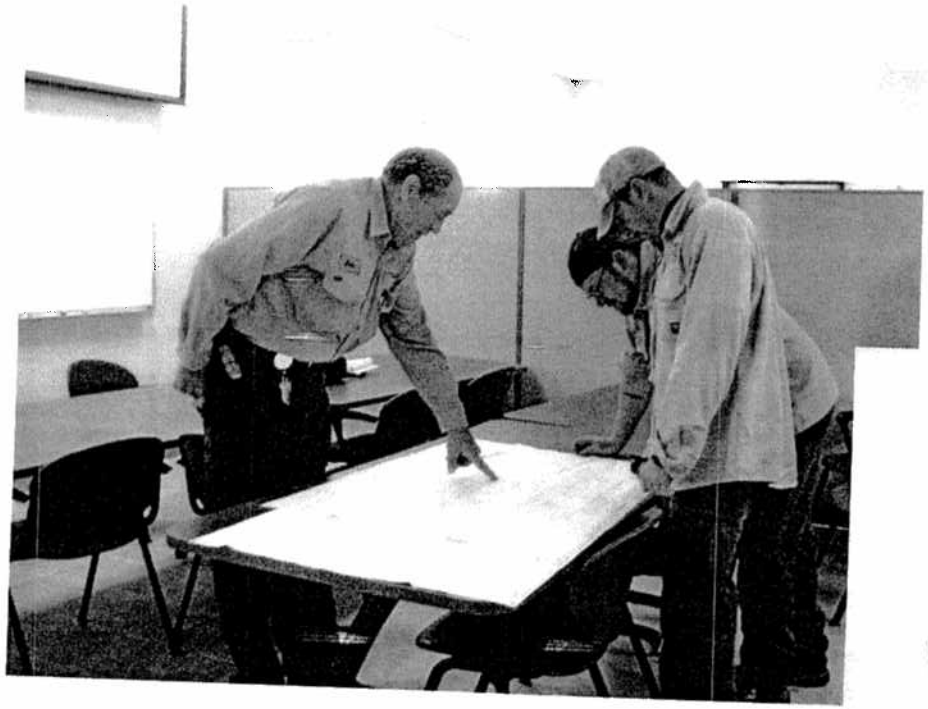
# Capital Projects – Murphy Substation 2009



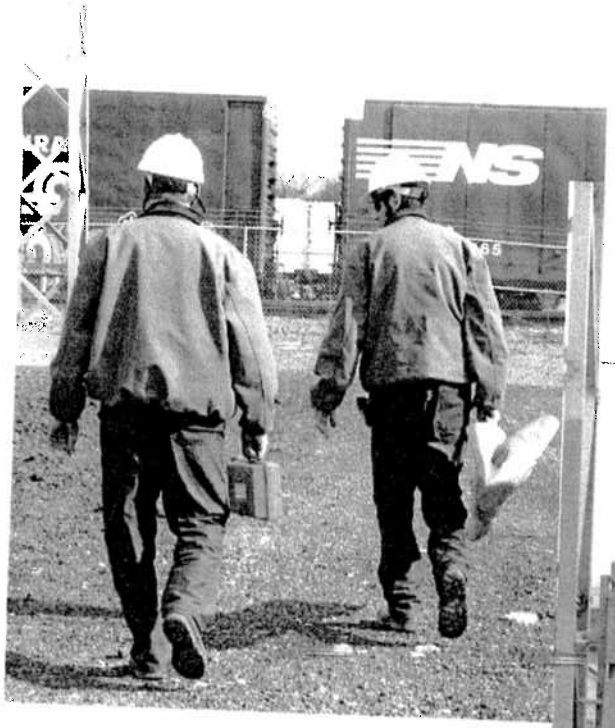


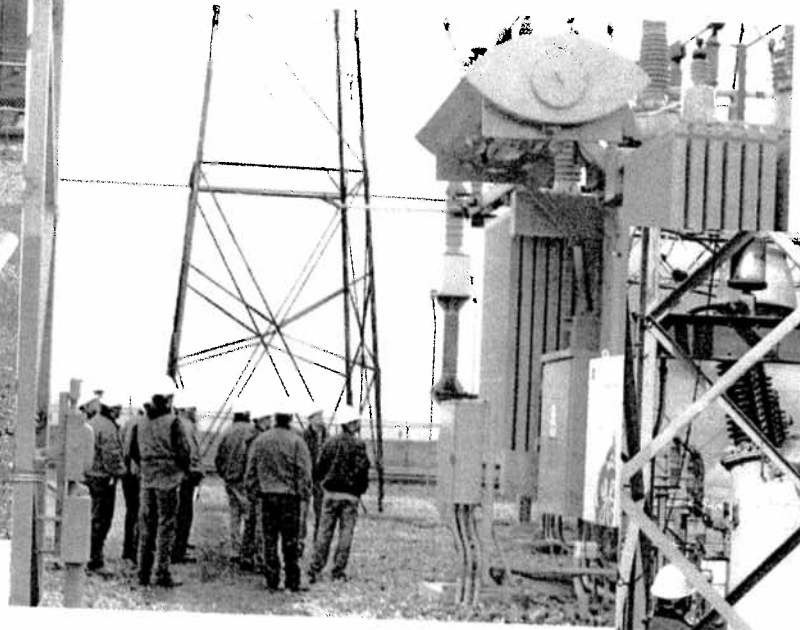
# Field Training

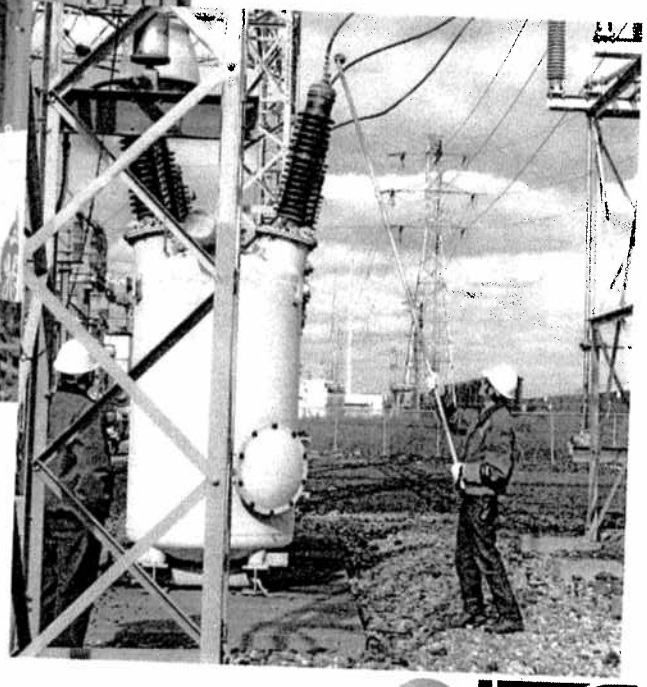


- Academics
  - Apprentices obtain an Associates Degree from an approved institution
  - 100% reimbursed for a "C" average or better

# Field Training







- ULC Employee Training
  - Academics
  - OTJ – On The Job
  - Academic Field Training
  - Continuing Education Training

# Industry Overview

# Lack of Industry Investment

***Transmission investment in the last 30 years has lagged while the transmission system continues to be put under increasing stress***

## Underinvestment

**Decline in transmission investment**

$12.8 Bn decline from the 10-year period 1975-1984 to the 10-year period 1992-2001 (1)

## Demand Growth

**Growth in electricity consumption**

Annual demand has doubled From 1975 to 2001(2)

## Outage Costs

- Costs from August 2003 blackout:

  *$4 - $10Bn*

- Annual lost production costs to U.S. businesses:

  *$46Bn in power outages*
  *$6.7Bn in power quality issues* (3)

***Estimated investment required to modernize the grid:***
***$50 - $100Bn*** (4)

(1) According to the Edison Electric Institute ("EEI"). Figures are quoted in 2003 dollars.
(2) According to Department of Energy ("DOE"), annual electricity consumption more than doubled from 1975 to 2001.
(3) According to Electric Power Research Institute ("EPRI").
(4) According to a September 2004 DOE study regarding cost of power interruptions to U.S. electricity customers.



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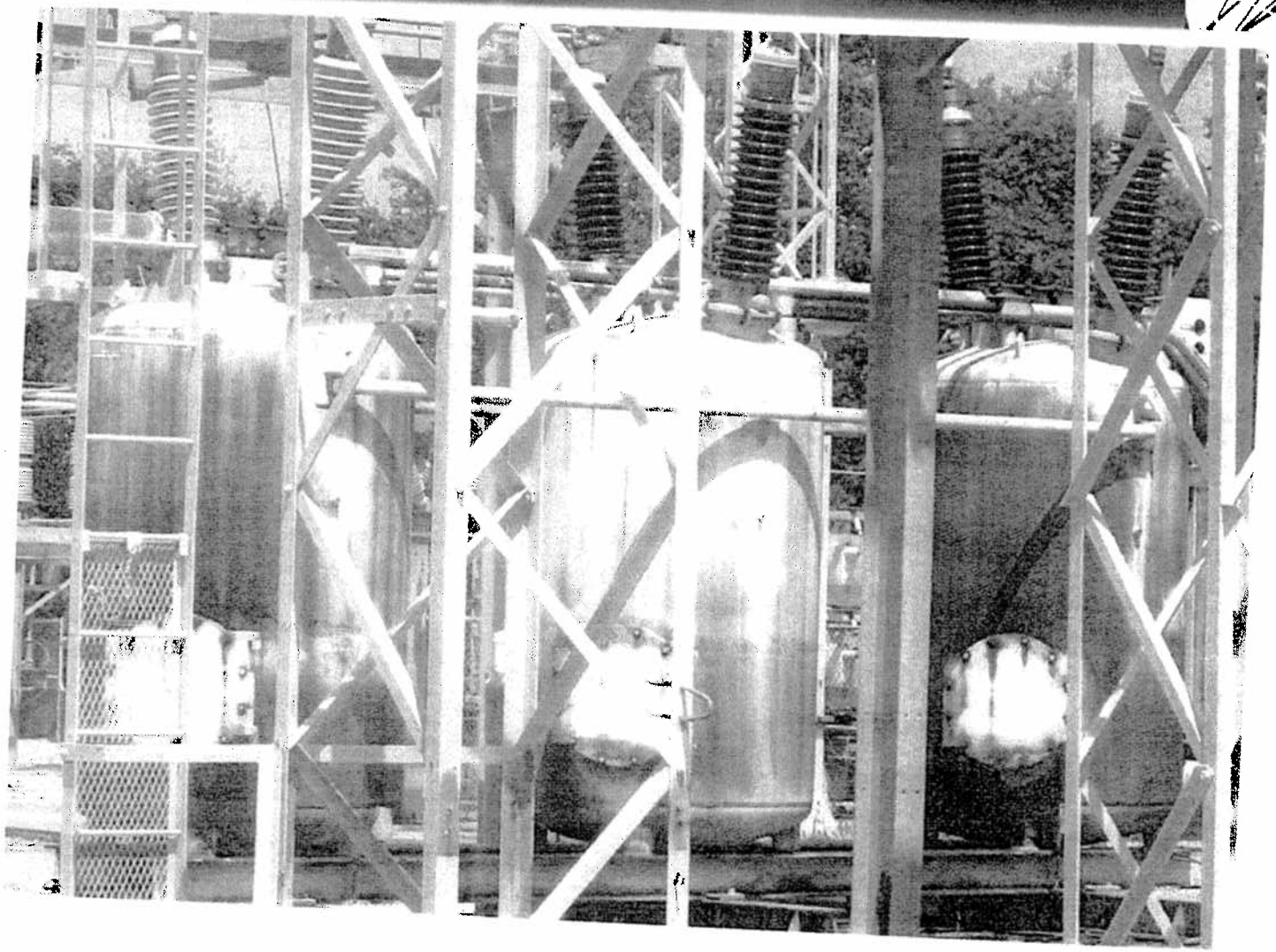
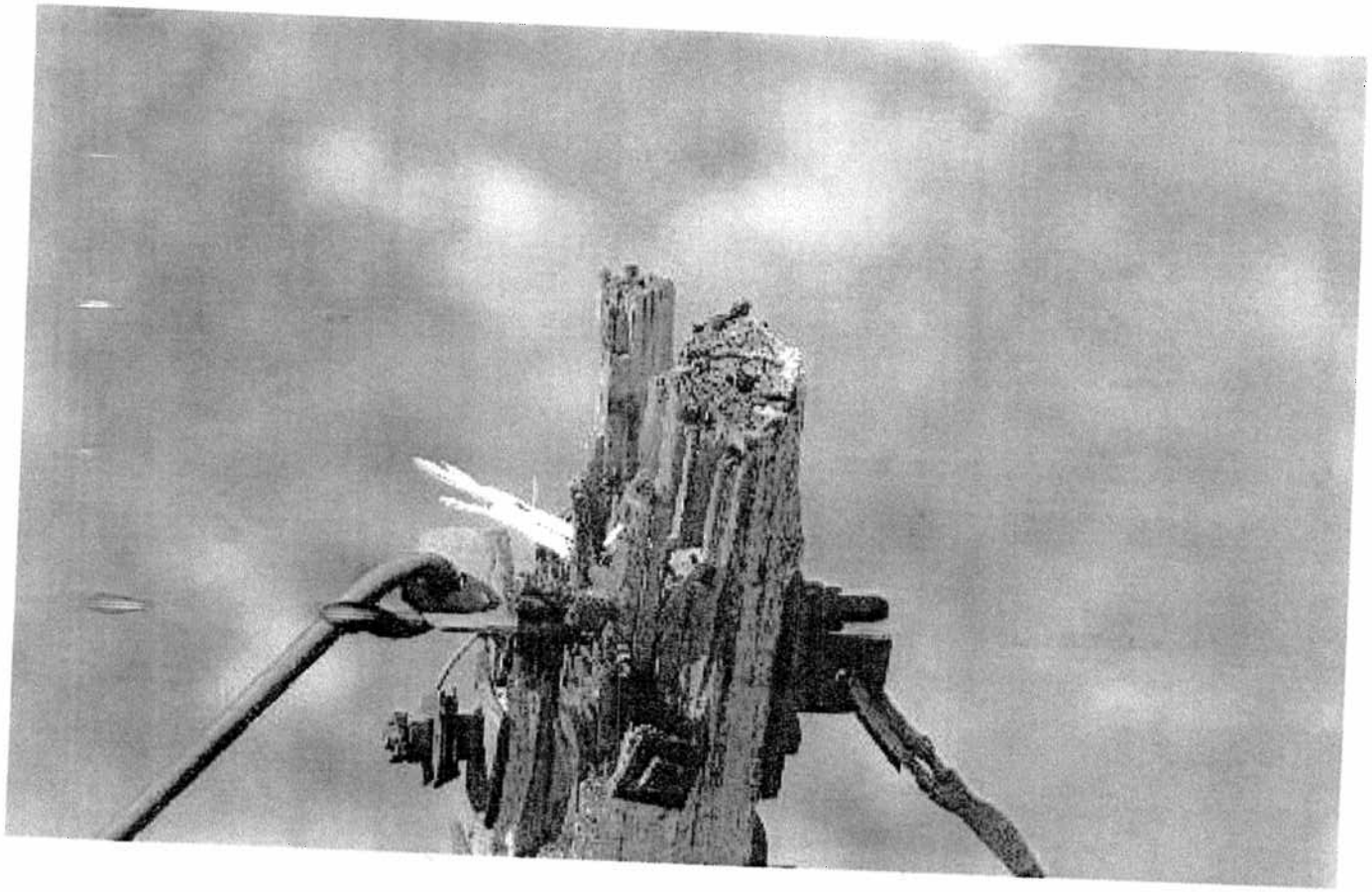
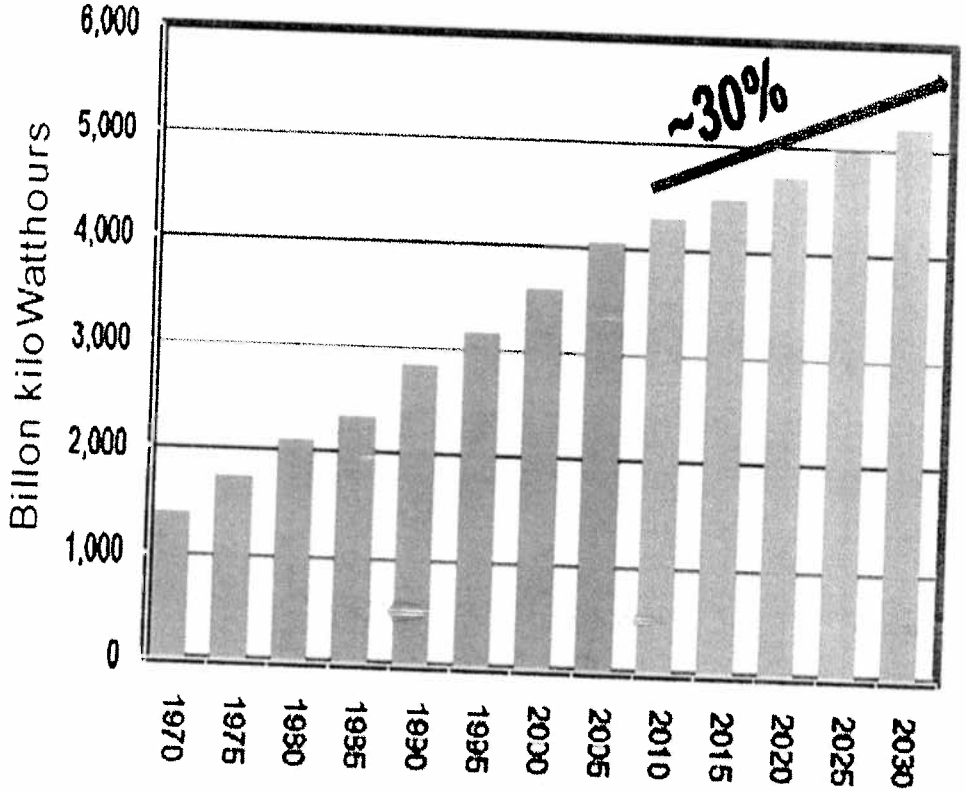
# Lack of Investment and Maintenance



# Lack of Investment and Maintenance



# Growing Demand




- Demand for electricity continues to grow; expected to increase 30% by 2030
  - Increasing population
  - Shifting population centers / urban sprawl
  - Increased dependence on electricity for every-day lives

*Sources: U.S. Department of Energy, Energy Information Administration, Annual Energy Review 2006 and Annual Energy Outlook 2008 Early Release*

** Electricity demand projections based on expected growth between 2006-2030*



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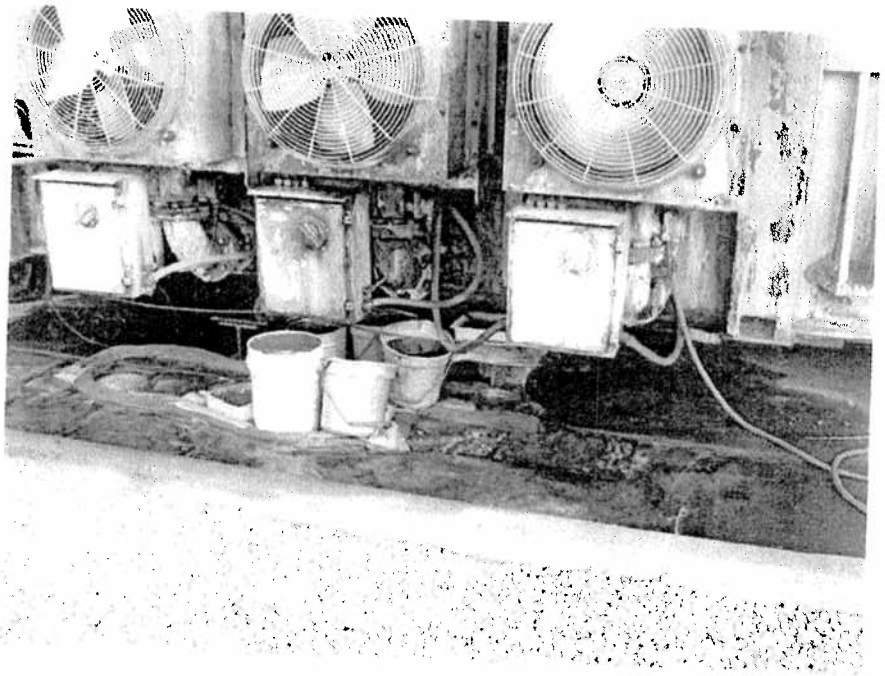
# Aging Infrastructure



- Yet, as shown earlier, there has been a 30-year trend of underinvestment
  - 70% of transmission lines are 25 years or older
  - 70% of power transformers are 25 years or older
  - 60% of circuit breakers are more than 30 years

*Source: http://www.globalenvironmentfund.com/GEF%20white%20paper_Electric%20Power%20Grid.pdf*



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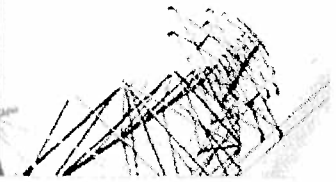
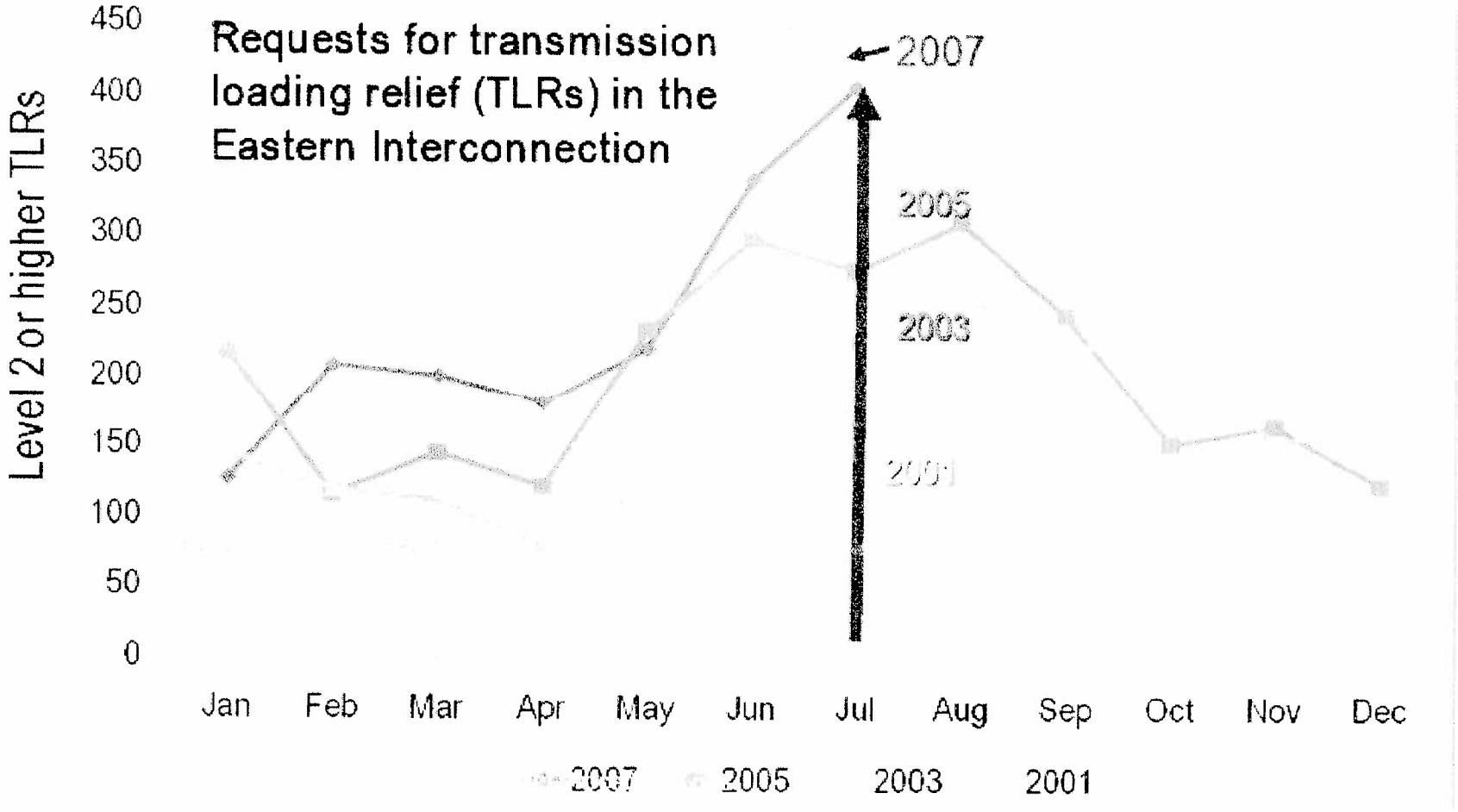
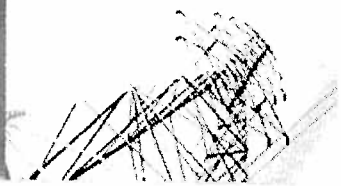
# Mounting Reliability Issues






*Source: http://www.eia.doe.gov/conf_pdfs/Monday/owens.pdf*

# Inefficiencies Increase Costs



- Lack of system investment has led to increased congestion.
- With increased congestion comes inefficiency
  - — In 1970 transmission and distribution losses were about 5%
  - — In 2001 losses grew to 9.5%, due to heavier utilization and congestion
- Increased congestion and inefficiency have led to increased prices in the price of delivered energy.

*Source: http://www.energetics.com/gridworks/grid.html (A DOE website)*



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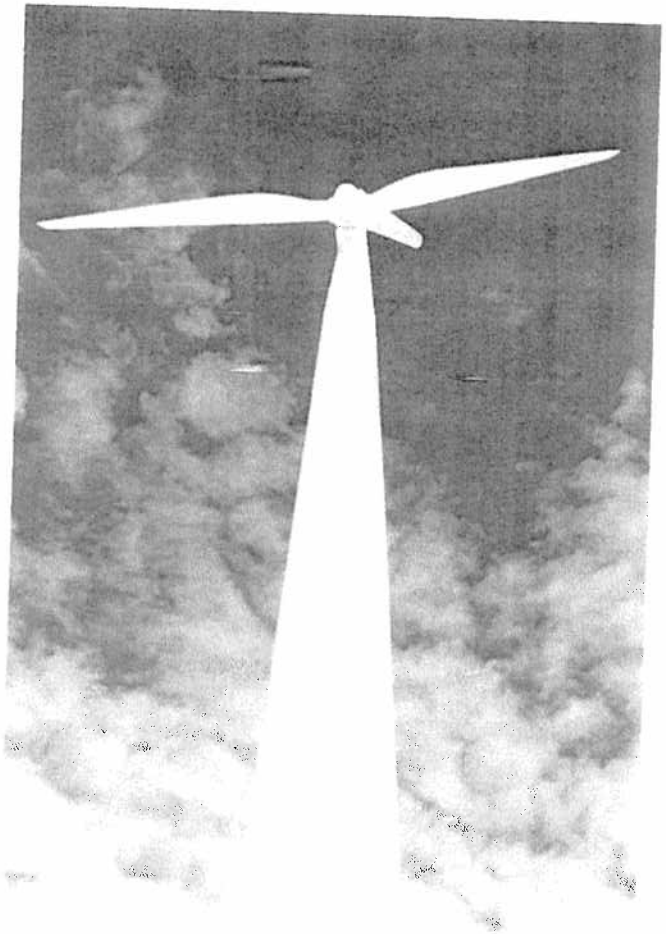
# Changing Landscape



- Blackout of 2003
  - — Reliability issue
- Changing Use of the Grid
  - — Long haul transactions
- Increased attention to global warming and energy policy
- Changes in energy resources
  - — Less coal
  - — More renewables
- Greater focus on efficiency
- Reduced dependency on foreign oil



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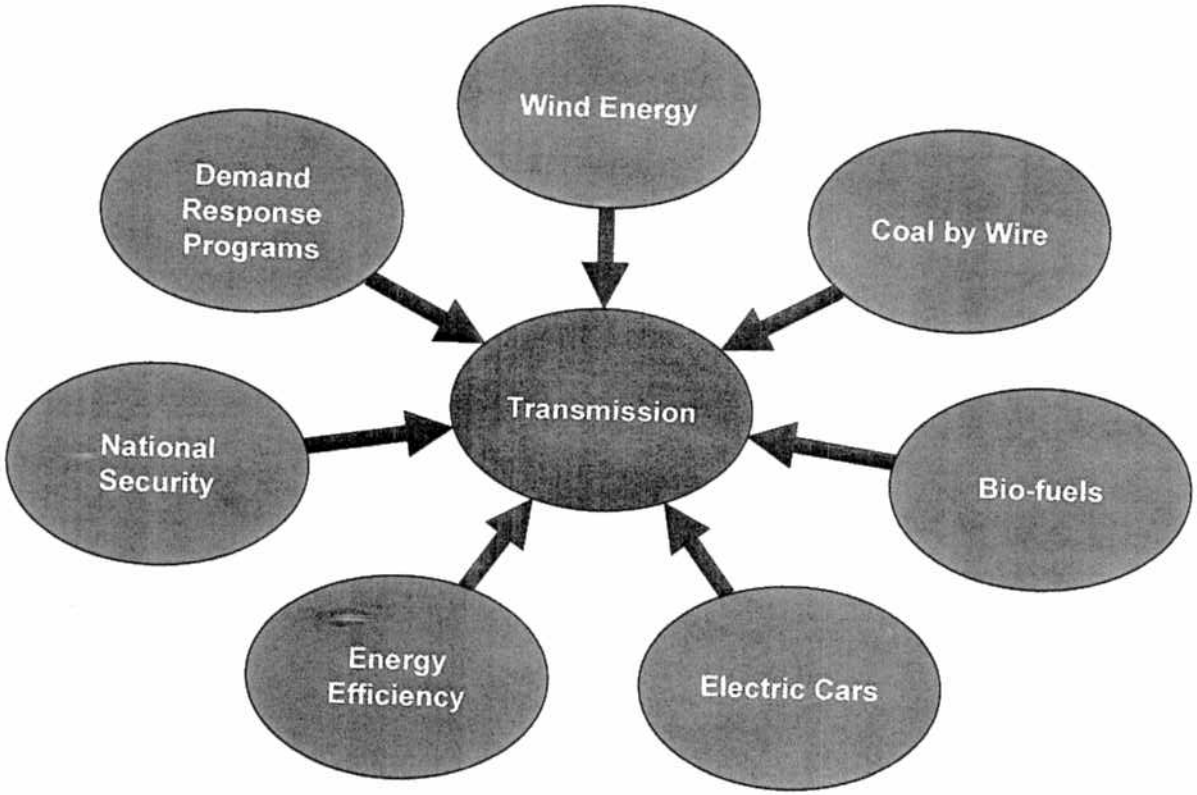
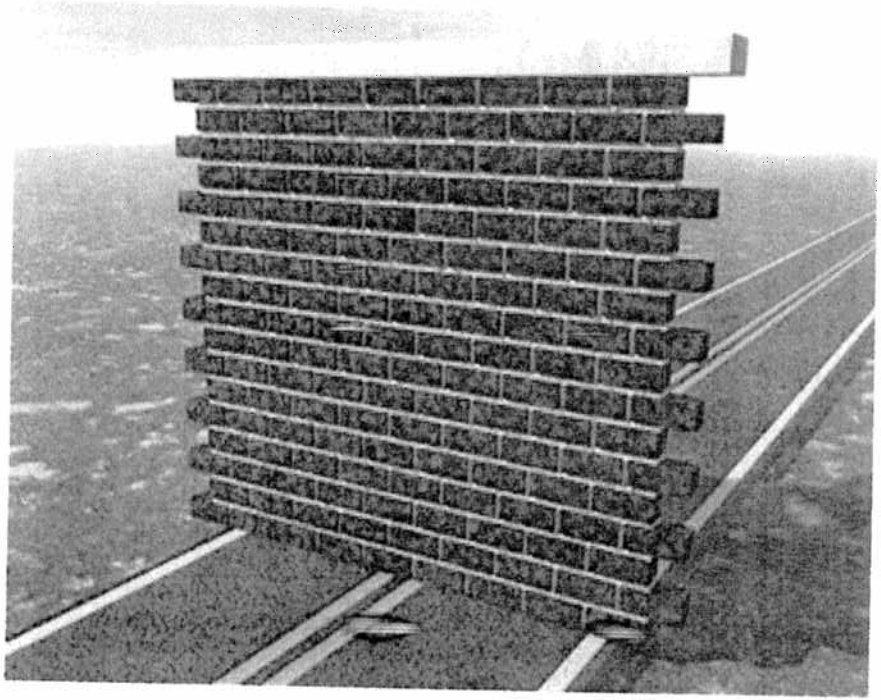
# Transmission is Critical Link




***Transmission is at the center of the energy debate; it is the critical link to many of the energy policy visions. Yet, many barriers remain.***

# Impediments to Transmission



- Influence of market participants
- Fallacy of generation vs. transmission debate
- Sandbox mentality
- Siting challenges
- Lack of regional cost recovery mechanism for regional projects
- Voluntary nature of RTO membership
- Lack of collective industry vision / stated energy policy

# Regional Transmission and Renewable Energy

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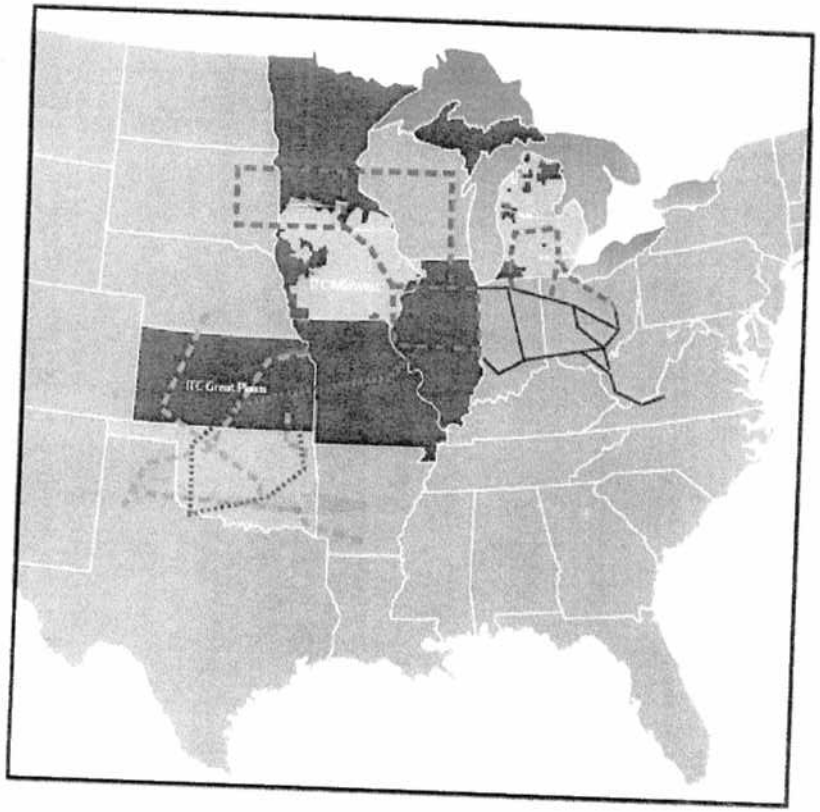
# Regional Transmission Vision

## *765 kV transmission infrastructure is part of a larger vision plan.*



- Regional transmission is being considered in MISO and SPP.
- There is a growing national interest in reducing our carbon footprint and developing renewable energy in remote areas for delivery to load centers.



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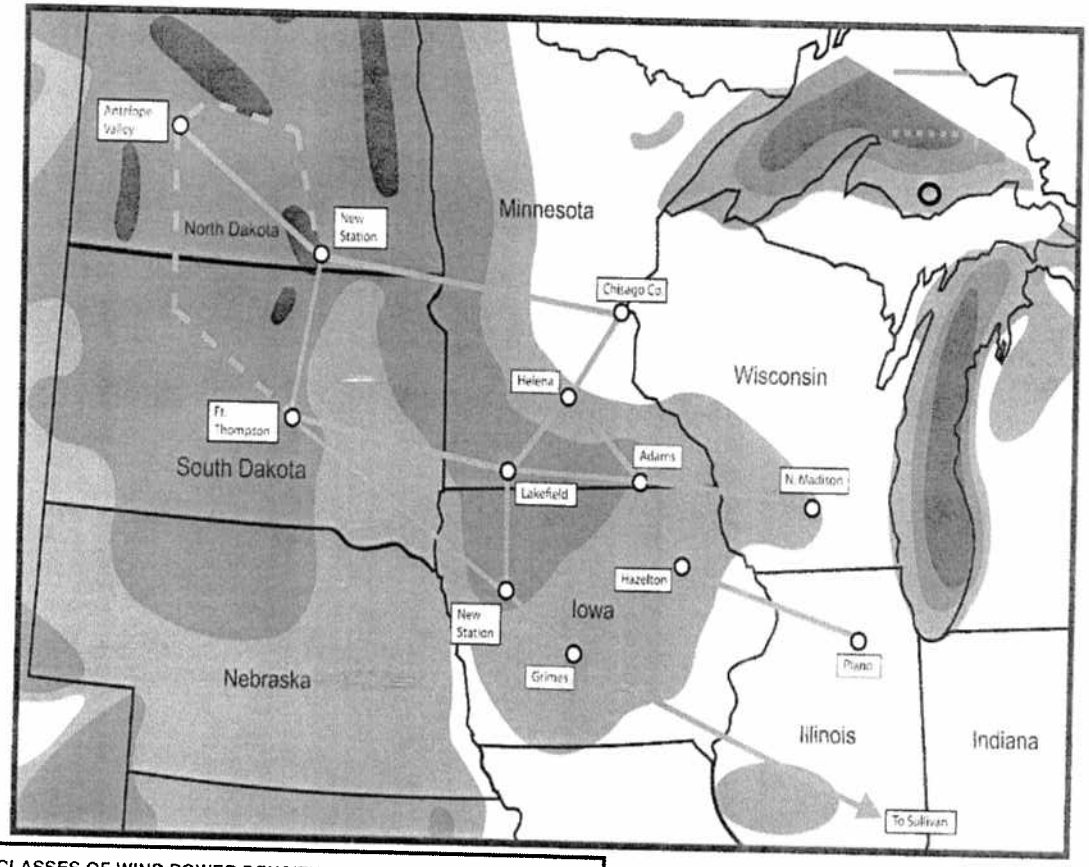
# Green Power Express Benefits

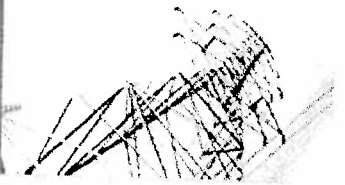



**CLASSES OF WIND POWER DENSITY**

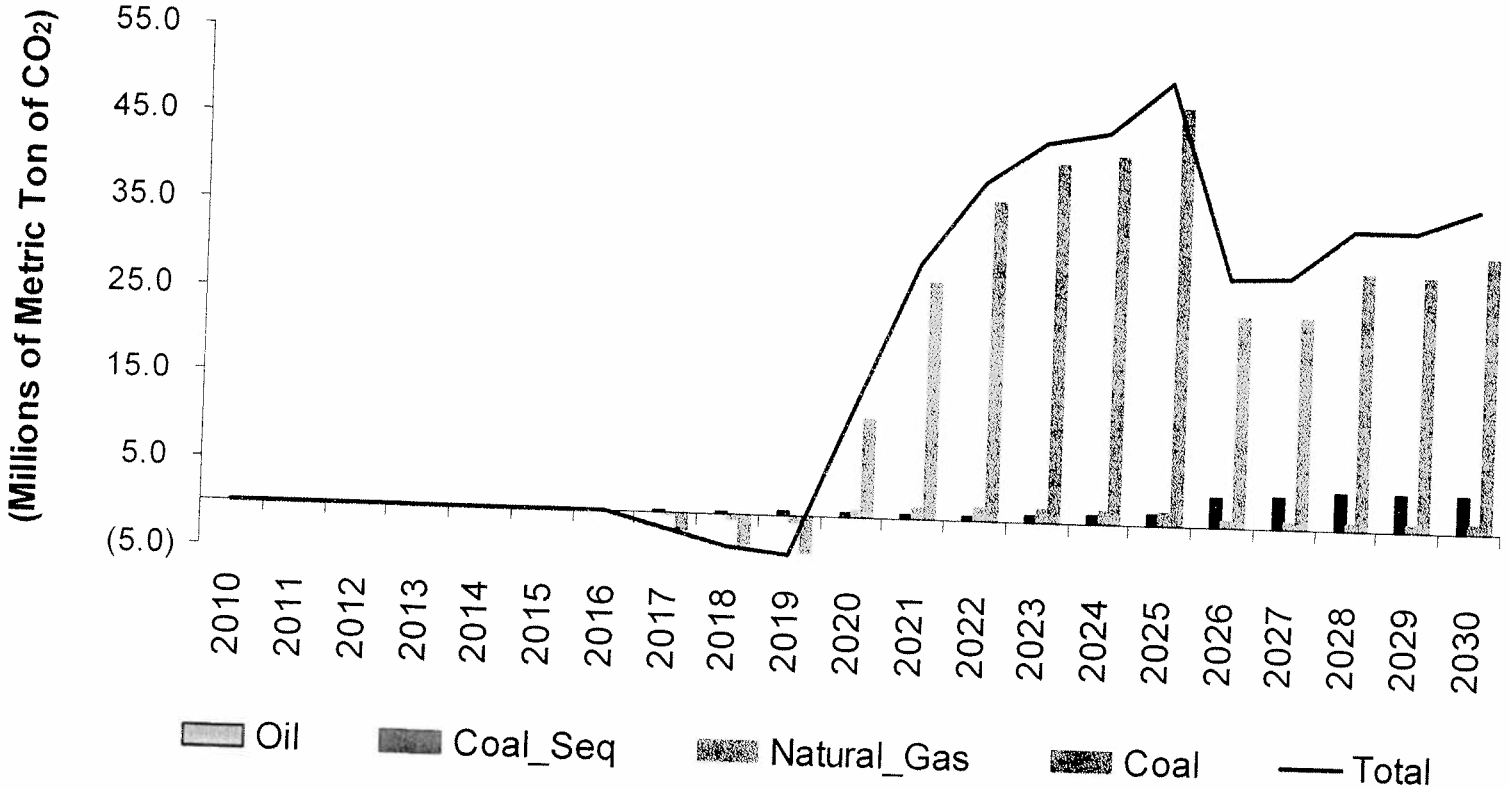
| Wind Power Class | 10 m (33 ft) Wind Power (W/m²) | 10 m (33 ft) Speed m/s (mph) | 50 m (164 ft) Wind Power (W/m²) | 50 m (164 ft) Speed m/s (mph) |
|---|---|---|---|---|
| 1 | 0 | 0 (0) | 0 | 0 (0) |
| 2 | 100 | 4.4 (9.8) | 200 | 5.6 (12.5) |
| 3 | 150 | 5.1 (11.5) | 300 | 6.4 (14.3) |
| 4 | 200 | 5.6 (12.5) | 400 | 7.0 (15.7) |
| 5 | 250 | 6.0 (13.4) | 500 | 7.5 (16.8) |
| 6 | 350 | 6.4 (14.3) | 600 | 8.0 (17.9) |
| 7 | 400 | 7.0 (15.7) | 800 | 8.8 (19.7) |
| | 1000 | 9.4 (21.1) | 2000 | 11.5 (24.4) |

- Increases electric reliability
- Facilitates the movement of approx. 12,000 MW of power from high efficiency, wind abundant areas.
- Reduces line losses
- More efficient use of land.
- Reduces carbon emissions by approx. 37 million metric tons.
  - *Equals annual emissions of 7-10 600 MW coal plants or 9-12 million automobiles*
- Avoids system congestion.
- Largely resolves MISO generation interconnection queue issues for the region.

# Significant Reduction in Carbon



**Annual $CO_2$ Savings (Emissions) by Fuel, 2010-2030**
**(High Transmission Scenario Over Low Transmission Scenario)**




Source: The Brattle Group

# Conclusions

- Transmission is the energy delivery system that provides reliability, access, reduces congestion, and lowers the cost of delivered energy.
- A robust transmission system is critical to bringing the benefits of all generation sources including wind, solar, and other renewables to Michigan customers.
- Transmission can reliably and efficiently integrate vast amounts of wind energy and deliver the energy to load centers and customers located in Michigan and further east.
- ITC has made significant improvements to Michigan's transmission system through planned capital investments and improved maintenance activities.
- Transmission is an integral part of the national energy vision when looking to diversify our energy portfolio, reduce carbon emissions, and reduce our reliance on foreign oil..