



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

NARUC Partnership Program
Public Utilities Commission of Ohio
Ministry of Energy of Ghana
Energy Commission of Ghana
and
Public Utilities Regulatory Commission of Ghana
sponsored by

United States Agency for International Development

Review of
The Ohio Power Siting Board Process

Kim Wissman
Executive Director
Ohio Power Siting Board
On behalf of NARUC



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

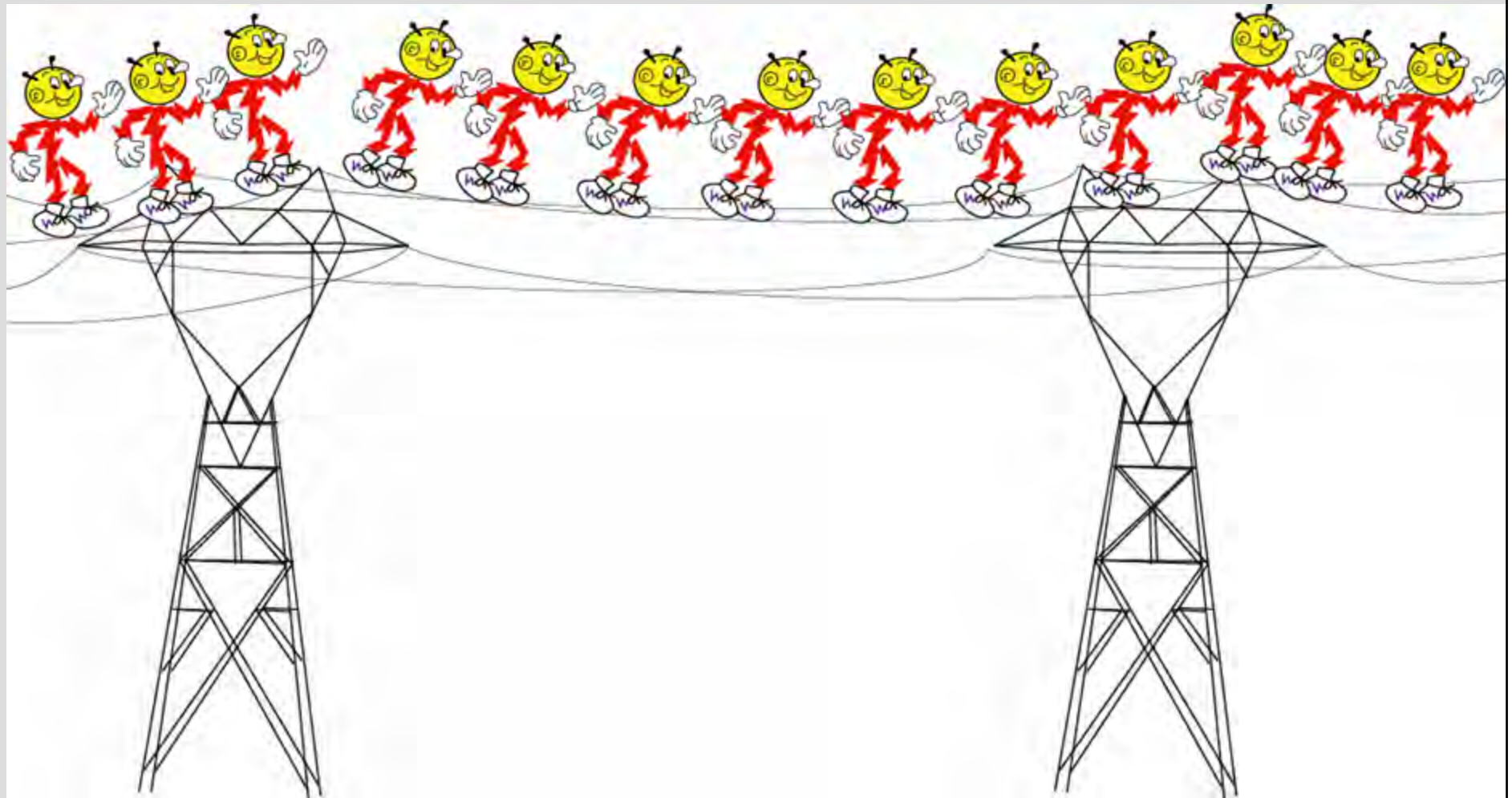
PLANNING AND TRANSMISSION EXPANSION



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners





USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Reliability

- **Adequacy**

The ability of an electric system to supply the aggregate electrical demand and energy requirements of the customers at all times.

- **Security**

The ability of the electric system to withstand sudden disturbances such as electric disruptions or unanticipated loss of system elements



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Generation Adequacy

- Sufficiency of generation supply to meet expected demand

Sufficient megawatt generating capacity shall be installed to ensure that the probability of occurrence of load exceeding the available generating capacity shall not be greater, on the average, than one day in ten years. Factors to be considered in the calculation are the characteristics of the loads, the probability of error in load forecast, the scheduled maintenance requirements for generating units, the forced outage rates of generating units, limited energy capacity, the effects of connections to other pools, and network transfer capabilities within the systems.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Transmission Planning

- In the integrating utility compact, transmission serves as the integrating medium for the utility generating resources to serve its load centers.
- In the de-regulated environment, transmission serves as a transportation system to facilitate wholesale market competition.



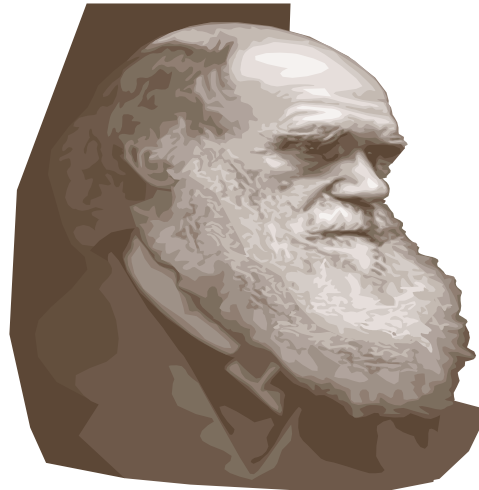
USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

EVOLUTION OF PLANNING

- Traditional
- Integrated Resource Planning
- Least Cost Planning
- Integrated Value Based Planning under a Competitive Environment





USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Electric and gas utilities were operated as vertically integrated monopolies under strict regulatory control

- Required to file demand forecasts since the early 1970s
- Initially, filed with the Ohio Power Siting Commission to justify the need for the construction of major new facilities
- Not “approved” by the Commission
- During this time the demand for electricity and natural gas, had been increasing at a relatively constant rate of 6% to 8% per year, and the expectation was that it would continue to do so into the future
- For electric utilities, these optimistic projections caused them to begin construction of several large central-station generating facilities
- Little need for smaller “peaking” generation plants because the rapidly increasing demand meant that we would quickly “grow into” baseload plants



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Events during the early to mid 1970s (e.g., oil embargo)

Energy prices rose rapidly having a chilling effect on demand

- Some of the facilities under construction would not be needed, large amount of excess capacity would result
- In 1982, the Ohio Legislature passed a law requiring electric and gas utilities to file long-term peak demand and energy forecasts with the Ohio Department of Energy (ODOE)
- Primary goal was to utility forecasting procedures to avoid over-building in the future
- The reports also included a supply plan
- ODOE evaluated the forecast reports and reported its findings to the PUCO and the Ohio Power Siting Commission.
- The law also required the ODOE to produce an independent forecast of statewide energy needs.
- The PUCO regularly issued a number of reports documenting these activities
- The PUCO's independent forecast was used as an informal check on the validity of the forecasts filed by the utilities.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Traditional Planning

- **Evaluate**
Annual Load Shape/Plant Performance
- **Analyze Supply Options**
Generation Resources
Coal, Nuclear, Hydro, Other Renewables, etc.
- **Minimize Revenue Requirements**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

- Over time, the forecasting procedures used by the utilities improved, primarily using econometric models to produce their long term forecasts
- High capital costs and long construction schedules associated with large generating plants, combined with increased emphasis on conservation and energy efficiency helped shift the focus of the forecast process toward a search for the “optimal mix” of resources to meet energy demands.
- The optimal mix included various forms of demand side management activities as well as new generating capacity.
- The forecast reports filed by the utilities evolved into integrated resource plans and they were reviewed and evaluated by the Commission on that basis.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

- Similar, though perhaps less dramatic, changes also took place in the natural gas industry, where increased reliance on competitive market forces has largely replaced the need for government review of forecasts and supply plans for local distribution companies.
- At the present time, we continue to collect energy data and produce the independent long term forecast.
- The gas and electric distribution utilities continue file their long term forecast reports with the Commission, but review of those report is much less rigorous than in the past.
- During the transition to competition, the Commission's primary focus has been on short term deliverability.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Integrated Resource Planning

- **Evaluate**
 - Annual load shape
 - Cost Effectiveness
 - Program Performance
 - Plant Performance
 - Financial Performance
- **Analyze Options**
 - Supply-Side Generation Resources
 - Transmission Requirements
 - Demand Side Management
- **Minimize Revenue Requirements**



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Least Cost Planning

These resulted in least cost planning for the vertically integrated utility system.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Passage of new legislation in 1999 (SB 3) split the electric industry into three distinct segments—generation, transmission and distribution.

- Generation was largely deregulated in the hopes that competition would ultimately provide electricity most efficiently
- Prices established in competitive markets would send appropriate signals to consumers and they would adjust their consumption accordingly.
- In this new environment, where we are depending upon market forces to provide the right amount of electricity at the right price, there was much less need for the forecasting process in place at the time.
- Early versions of SB 3 had eliminated the forecasting requirements, but the final version retained the requirement that utilities file long term forecast reports, but without the supply plan portion.
- There was some concern that a demand forecast was still needed to ensure that transmission and distribution systems were adequate.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Planning in a Deregulated Environment

- **Evaluate**
 - Value/Cost
 - Profit Potential
 - Competitive Threats
- **Analyze Options and Service**
 - Product Attributes
 - Profitability niches
 - Delivery Preference
 - Investment/Risk
- **Objectives**
 - Minimize Revenue Requirements
 - Meet Customer Needs
 - Maximize Net Value



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Transmission Planning In the Unregulated Environment

- Bulk Transmission planning is driven by market needs to meet transmission service requirements
- Available transmission capacity is a fundamental component for resource adequacy
- Coordination between market needs and local area transmission requirements is key



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Concepts and Methods

- Public Policy
- Non-Utility Generation
- Assessing Investment Options
- Competitive Organization
- Reducing Uncertainty
- Understanding Customer Value
- Product Differentiation
- Rates and Prices



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

ROLES TO PLAY

- **Load Serving Utility Planner**
Balancing utility and customer values
- **Transmission Provider**
Provide non-discriminatory access to qualified users
- **Marketing Representative**
Customer concerns and opportunities
- **Rate Analyst**
Using Rates to achieve goals
- **Consumer Advocate**
Indicate desirable products and services
- **Regulator**
Objective and potential responses



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

REGULATORY AUTHORITY

- Federal Energy Regulatory Commission
- State Regulatory Commissions
- Regional Oversight and Activity



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Resource Adequacy Requirement

- Forward-looking requirement development
- Regional basis to encourage long-term contracts for supply and reflect markets
- Preserve strong state role in determining planning horizon, supply and demand options and siting requirements, as well as cost recovery where appropriate.





USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Components of Resource Adequacy Requirement

- Annual regional demand forecast by RTO
- Regional flexibility
- Load Serving Entities must satisfy its resource requirements by:
 - a) Securing adequate generation resources (by owning and operating generating units; holding bi-lateral long term contracts with power marketers; or buying power on the spot market); and
 - b) Securing adequate transmission capacity to access generating resources to serve its load requirements.
- Stakeholders need to determine Provider of Last Resort/Default Service Provider
 - Fair terms and conditions
 - Reasonable compensation for risk



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Regional Planning Process

- Start process within reasonable timeframe to facilitate development of infrastructure
- “Ground-up” process with regional coordination to address loop flow
- Stakeholder input/State review and approval for planning in regulated and siting in deregulated states



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Transmission Expansion

- provide for ongoing load growth,
- interconnecting new generation and transmission,
and
- providing for transmission service requests.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Planning Activities

Collaborative

Transmission Owner planning staffs

ISO/RTO planning staff

Stakeholder Groups





USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Planning Steps

- Continued local planning responsibilities of the Transmission Owners to ensure reliability of their systems.
-
- The plans of the Transmission Owners for both load growth and RTO requests for transmission service and interconnections, are reported to the ISO/RTO and integrated.
- The RTO then evaluates these integrated plans for ability to meet their obligations to ensure reliability in an efficient manner, and to identify the ability of these plans to meet the projected demands of the energy market in the region.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

CONSTRAINTS ON TRANSMISSION SYSTEM

- **Thermal limits**
- **Voltage stability**
- **Dynamic Stability**
- **Other system operating constraints**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

What Happens

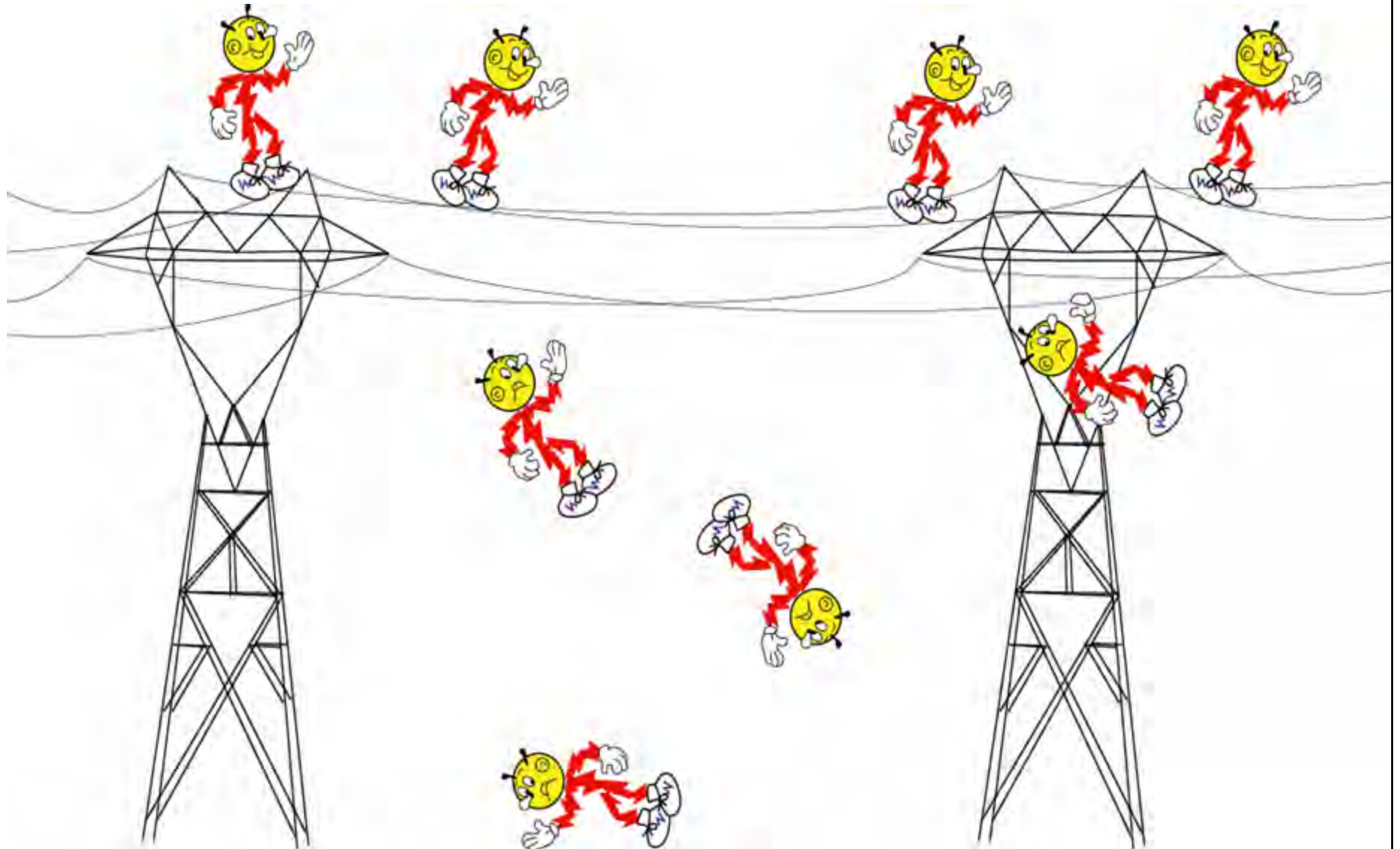
- **Reliability consequences**
- **Interruption to service**
- **Financial impacts to utility and customer**
- **Customer/User satisfaction**
- **Regulatory implications**
- **Unstable Prices**
- **Hampered economic growth or economic loss of existing business**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners





USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

METHODS

- **Reduce the Load**
- **Redispatch the Generation**
- **Change the Characteristics of the Transmission System**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Remember...Transmission

- In the integrated utility compact, transmission serves as the integrating medium for the utility generating resources to serve its load centers.
- In the de-regulated environment, transmission serves as a transportation system to facilitate wholesale market competition.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Wholesale Markets

- **Recent increase in wholesale energy transactions across the transmission system has created new and different loading on the transmission system.**
- **Generators offer their generation on the wholesale market**
- **Power Flows have changed from the “vertically integrated” days of operation.**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Transmission Planning In the Competitive Environment

- **Bulk transmission planning is driven by market needs to meet transmission service requirements.**
- **Available transmission capacity is a fundamental component for resource adequacy.**
- **Coordination between regional market needs and local area transmission requirements is key.**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Transmission Expansion

- provides for load growth and economic development,
- interconnecting new generation and load, and
- provides for transmission service requests.



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

RELIABLE OPERATION

For the Bulk Power System to operate reliably:

- **Total generation at any moment must equal total load plus losses**
- **Electricity is allowed to flow through the transmission system in accordance with physical laws**
- **System must be designed with reserve capacity in generation and transmission to allow for uninterrupted service when contingencies occur**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Benefits of Adequate Regional Transmission Planning

- **Access to generation resources**
- **Enhanced reliability**
- **Efficient utilization of resources**
- **Ability to dispatch intermittent generation**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Consequences of Inadequate Regional Transmission Planning

- **Increased reliance on local power sources**
- **Potential inefficient use of available generation resources**
- **More installed plant required to meet given load demand**
- **Higher energy costs**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Signs of Inadequate Regional Transmission Planning

- **Uneconomic dispatch**
- **High levels of congestion**
- **Transmission maintenance scheduling difficulty**
- **Generation/Load interconnection delays and difficulty**
- **Reliability/system problem incidents**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Regional Transmission Entities

- **Must assure reliability**
- **Administer wholesale power sales**
- **Relieve congestion**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

Congestion Management

SHOULD BE MULTI-FACETED!!!!

There is NO easy, single answer for all congestion problems

Need to exercise the following:

- **Identification of congestion**
- **Evaluation of solutions**
- **Implementation**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

FIRSTLY,

Utilization of Existing Assets

- **Make sure existing transmission is used effectively and efficiently**
- **Generation dispatch**
- **Real-time pricing**
- **Locational pricing**
- **TLRs**
- **VAR Control**
- **Demand-side management options**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

SECONDLY,

UPGRADE Existing Infrastructure

- **Reconductoring**
- **Improved communications**
- **Use of other technologies, for example**
 - **Phase Angle Regulators**
 - **Flexible AC Transmission Systems**
 - **Storage Technologies**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

LASTLY,

Infrastructure Expansion

- **Investment in additional transmission lines**
- **Investment in new technologies, such as superconductivity**
- **Investment in new generation**



USAID
FROM THE AMERICAN PEOPLE



N A R U C
National Association of Regulatory Utility Commissioners

ITS ALL ABOUT MONEY

- Who Pays
- How Much
- When

A serious national debate