



NMPP Energy Is a Non-Profit, Member-Owned Organization Providing Electricity, Natural Gas and Utility-related Services to Nearly 200 Member Communities Across Seven Midwestern and Mountain States.

NMPP Energy Promotes the Benefits of Joint Action and Local Utility Control Among Its Member Communities.

- ❖ **Nebraska Municipal Power Pool**
- ❖ **Municipal Energy Agency of Nebraska**
- ❖ **National Public Gas Agency**
- ❖ **Public Alliance for Community Energy**



NEBRASKA POWER ASSOCIATION



The Nebraska Power Association is a voluntary organization formed in 1980 to address common interests and concerns of Nebraska's publicly-owned electric utility industry. The NPA's members represent municipalities, public power districts, public power and irrigation districts and electric cooperatives engaged in the generation, transmission and distribution of electric energy in Nebraska.

Nebraska Power Association's



Renewable Energy Background and Outlook for Nebraska Electricity Consumers Report

A Reference Document on Renewable Energy
Resources in Nebraska

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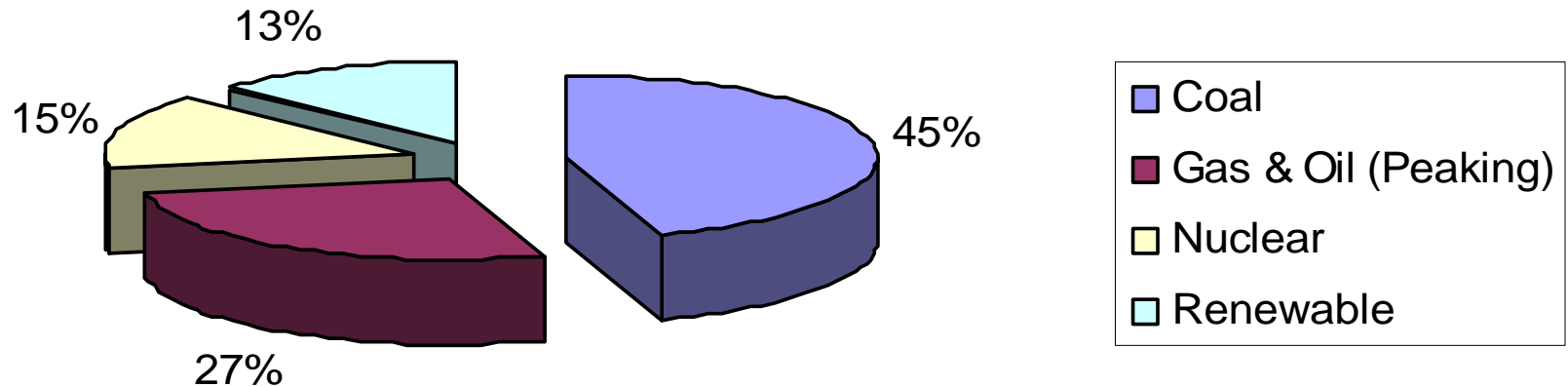
Purpose of Report

- **To help inform NPA member utilities, policymakers and Nebraska electric consumers on:**
 - Existing renewable energy resources in the state
 - Factors that influence development of new generation, including regulatory uncertainties
 - Drivers and challenges of wind-powered generation development in Nebraska
 - The impact of meeting a Renewable Portfolio Standard of 15% by 2020

2007 Generation Resource Mix

(in Nebraska) - CAPACITY

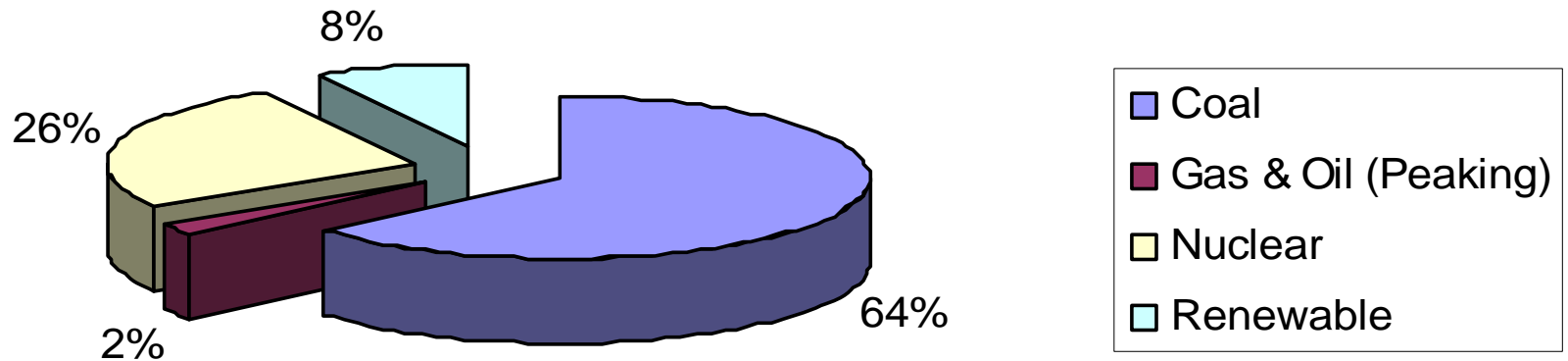
Nebraska Electric Utility Generation Resources 2007 Capacity - 8,259 MW



2006 Generation Resource Mix

(in Nebraska) - ENERGY

Nebraska Electric Utility Generation Resources 2006 Energy - 34,994 GWh



Nebraska Electric Utility Generation Resources (capacity and energy)

Resource Type	2007 Capacity 8,259 MW		2006 Energy 34,994 GWh	
	%	MW	%	GWh
Coal	45%	3,699	64%	22,699
Gas & Oil	27%	2,262	2%	778
Nuclear	15%	1,240	26%	9,003
Renewable	13%	1,058	8%	2,514

□ Renewable w/o hydro – 1% (for both capacity and energy)

Nebraska's existing hydro and other renewable generation capacity (in kW)

Type	Capacity (kW)
WAPA Hydro	837,659
Neb. Utility Hydro	160,620
Wind	51,780
Methane	7,380
Photovoltaic	6.2

Electricity Price Comparisons

- From the Oct 2007 LB 901 “Conditions Certain” Report, and referenced in this report:
 - Nebraska wholesale electricity prices for the 2004-2007 study period are 41.2% below the regional market
- From the DOE-EIA retail sales data for 2006, referenced in this report, Nebraska’s retail electricity rates are:
 - 8.5% below the average of the surrounding states of Iowa, South Dakota, Wyoming, Colorado, Kansas, and Missouri
 - 31.8% below the national average

Key factors influencing development of future generation in Nebraska

- Increasing electricity usage by consumers
- Desire to lessen dependence on non-renewable fuels (i.e. coal, oil and natural gas)
 - Energy security/independence concerns
- Regulatory uncertainties
 - **Renewable portfolio standard** (National & State)
 - Potential limitation or tax on **carbon dioxide** emissions due to Climate Change legislation

Regulatory Uncertainty: Renewable Portfolio Standard - RPS

- Renewable Portfolio Standard - defined
 - Regulatory requirements that designate the amount of renewable energy needed at a given point in time. Sometimes direct mandates of the amount and type of renewable installations are issued by regulators. Other times utilities voluntarily set their own standards.
- RPS currently adopted in 25 states and the District of Columbia (no national RPS at this time)
 - 14 states have an RPS level growing to 20% or greater
- RPS bills have been introduced in the Nebraska Unicameral and at the federal level
 - None enacted into law at this time

Nebraska has significant potential for wind-powered generation

- Nebraska's wind-powered generation potential ranks 6th highest in nation
- Wind is the most feasible resource to meet a new renewable generation requirement in Nebraska
- Nebraska is well positioned to meet a potential RPS requirement because of its substantial wind resource and largely agricultural makeup with relatively small population

Possibilities/challenges of large amounts of wind generation (National RPS)

- Nebraska's potential for wind-powered generation could make it an ideal “exporter of wind energy”
- Some existing Nebraska statutes may be a barrier to the development of wind resources
 - The Nebraska Power Review Board requirements are seen as a barrier to renewable energy projects
 - Least-cost alternative
 - Determining need (i.e. capacity of wind)

Possibilities and challenges of large amounts of wind generation (National RPS)

- Under an export scenario, much of Nebraska's wind energy could be sold along with Renewable Energy Credits
- RECs are the property rights to the environmental benefits from generating electricity from renewable resources. These certificates can be sold and traded and the owner of the REC can legally claim to have purchased renewable energy attributes
- A large export of wind energy would require extensive expansion of the transmission grid beyond the expansion needed to serve Nebraska under an RPS
- As additional wind capacity is added to the electrical grid, operational impacts and wind integration costs increase

Possibilities and challenges of large amounts of wind generation (State RPS)

- Wind-powered generation has no fuel costs or emissions which makes it a good resource to partially meet requirements to reduce carbon dioxide emissions from fossil-fuel plants
- Wind generation is variable and cannot be dispatched.
- Large amounts of wind generation would require:
 - Back-up generation (most likely natural gas)
 - Significant investment in transmission facilities
 - Significant wind integration costs

A case study on cost impact of RPS

- Standard of 15% by 2020
 - 1520 MW of new wind generation
- Two scenarios:
 - 1) Capital cost for 15% RPS from wind generation with combustion turbine backup (\$4.9 billion)
 - 2) Equivalent conventional coal and other capacity, if no RPS (\$4.0 billion)
 - State-wide retail rate impact estimated to be 8% in 2020
- Study to better determine impacts
 - Amount of transmission needed
 - Effects on other generation cost increases
 - Land use and right-of-way

Incentives for renewable generation development limited for public power

- Incentives for wind development are greater in states other than Nebraska—an all public power state
 - Federal Production Tax Credits (PTC)
 - Income tax credits, sales tax exemptions, property tax abatement
- To meet a potential RPS in Nebraska, public power/private partnerships may be the lowest cost option for public power customers, due to lack of Production Tax Credits for public power ownership

Projected (first-year) costs for new generation

(at various capacity factors, excluding transmission cost)

Renewable Alternatives

In ¢/kWh

Solar (Photovoltaic): 24.5

Solar (Thermal): 14.8

Methane w/ Digester: 9.8

Biomass (stoker or CFB): 9.6

*Wind: 7.58 – 8.54

**Wind: 6.2

Landfill Methane - 4.7

Conventional Alternatives

In ¢/kWh

Combustion Turbine - 14.3

Combined Cycle - 8.3

Nuclear - 5.7

Coal - 4.5

* *Reduced capacity value - cost including turbine plant (80%); transmission (9%); and wind integration (11%)*

** *Reduced capacity value; turbine cost only*

Regulatory uncertainty: Climate Change Policy Influences

- Global Warming
- Climate Change policy proposed in Congress
 - Requirement to reduce greenhouse gases
 - Carbon dioxide emissions (most common greenhouse gas)
 - Most electricity in Nebraska generated by coal (64.9%, as of 2006)
 - Coal contains 50% carbon
 - Combustion of coal to produce electricity creates carbon dioxide emissions

Proposed requirements:

Carbon Tax versus Cap-and-Trade

- Cap-and-trade program
 - An emissions allowance that caps the amount of CO₂ emissions from a utility's fossil fuel-fired generating fleet. Utilities that produce less CO₂ than the allowable emissions cap would be eligible to trade or sell their excess allowances to a utility exceeding the limitations.
- Carbon Tax
 - A tax assessed at a level high enough to influence voluntary reductions in emissions. For each ton of carbon emitted, utilities would have to pay a “tax”—the idea being that this “financial penalty” would force utilities to upgrade equipment or build non-to-low CO₂ emitting power plants.

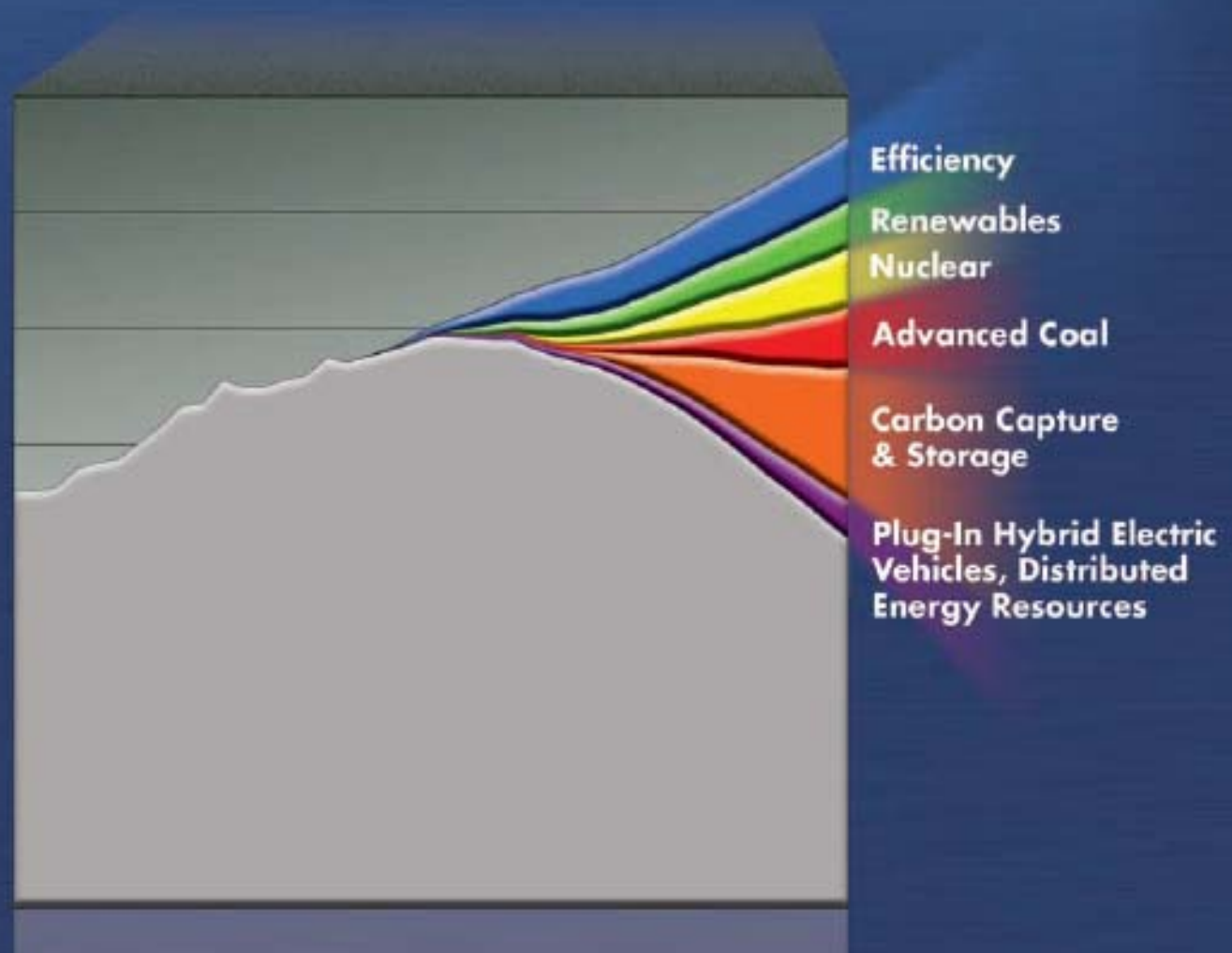
Response to Climate Change

- New generation resource decisions based on consideration of Climate Change
- Carbon emission reduction requirements
 - Carbon tax or cap-and-trade
- Financial impact on electricity costs
 - Compliance with Climate Change requirements will be more costly than compliance with renewable generation requirements (RPS)

The Power to Reduce CO₂ Emissions

The Full Portfolio

Source: EPRI Energy Technology Assessment Center



Customer-owned renewable resources

- Utility-owned resources lower cost than customer-owned
 - Wind – 3 to 10 times higher cost
- Solar – higher cost than wind
 - Nebraska potential – 9th highest in U.S.
- Methane – good potential in Nebraska
 - Livestock
 - Landfills

Summary



- Potential for Climate Change legislation and state or federal Renewable Portfolio Standards to impact future resource decisions in Nebraska.
- Renewable generation - opportunity to utilize Nebraska's large wind potential
- Increase in electric costs likely (most options related to RPS and Climate Change not least cost alternative)
- Further studies need to be completed
- The complete report can be viewed on the NPA website at <http://www.nepower.org/>