Net Metering:

The Range of Cost-Benefit Factors

Prepared for Utah PSC Docket 14-035-114

Net Metering Workgroup Session II

… May 12, 2015

Utah Citizens Advocating Renewable Energy (UCARE) is a grassroots organization formed in February 2014 to promote the growth of clean renewable energy and to challenge attempts to constrain clean energy growth.

UCARE has intervened in two Public Service Commission (PSC) dockets in support of net metering customers whose clean energy benefits all Utahns.

http://ucare.us.org/ info@ucare.us.org

Context of the Public Service Commission's net metering cost-benefit analysis:

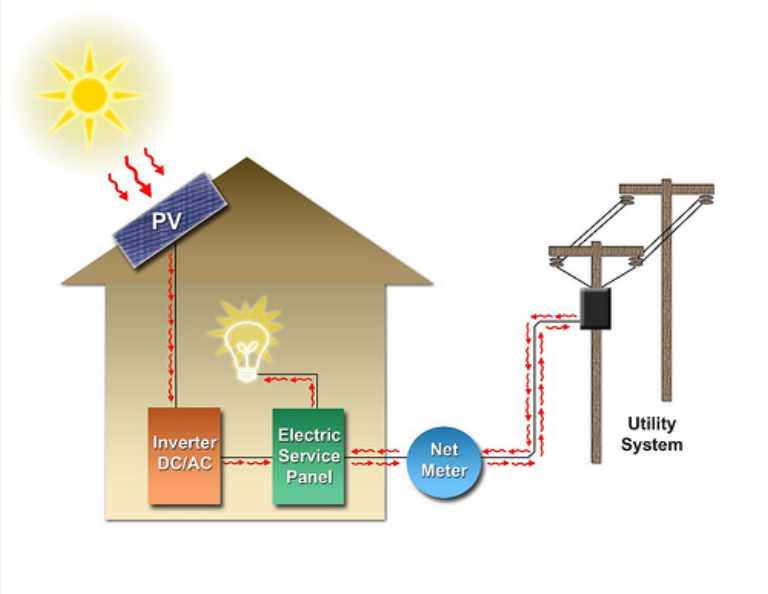
The 2014 Utah State Legislature, in adopting Senate Bill 208 that amended Utah Code Ann. 54-15-105.1, called on the PSC to determine:

"whether the costs that the electrical corporation or other customers will incur from a net metering program will exceed the benefits of the net metering program, or whether the benefits of the net metering program will exceed the costs"; and to determine

"a just and reasonable charge, credit, or ratemaking structure, including new or existing tariffs, in light of the costs and benefits."

Net Metering

Net metering allows residential and commercial customers who generate their own electricity from solar power to feed electricity they do not use back into the grid.



Net metering is a billing mechanism that credits solar energy system owners for the electricity they add to the grid.

In this presentation, UCARE will identify cost-benefit factors that we believe affect the value of RMP/PacifiCorp's net metering program to the electrical corporation, its rate payers, and the general public.

Since the relevant Utah statute, Utah Code Ann. 54-15-105.1, calls for the compensation of net meter customers "at a value that is at least avoided cost, or as determined by the governing authority," the benefits of solar net metering may be expressed as "avoided costs."

UCARE chooses to focus on two sets of cost-benefit factors: Grid System and Societal

Grid System factors impact the generation, transmission, and distribution of energy from point of production to point of consumption along with associated operations and maintenance. These factors are directly experienced by all parties to the electrical grid.

Societal factors impact the environment, public health, and the economy. These factors are linked to electrical grid operations and are experienced by rate payers as part of the general public.

Each cost-benefit factor will be introduced with an "avoided cost" question looking at the impact of solar net metering (NEM), since solar is the leading NEM energy resource in Utah.

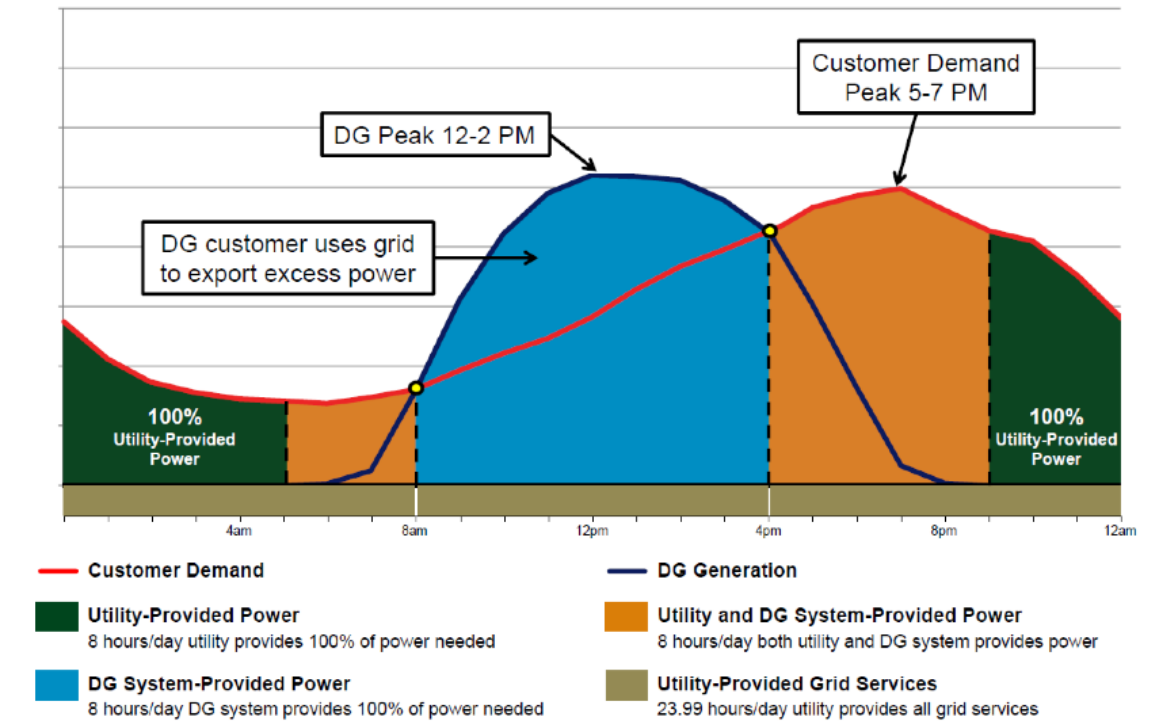
Grid System Factor:

Energy Generation

? - To what extent do NEM grid system inputs reduce costs associated with marginal fuel consumption, operations and maintenance, and wheeling charges?

Grid System Factor:

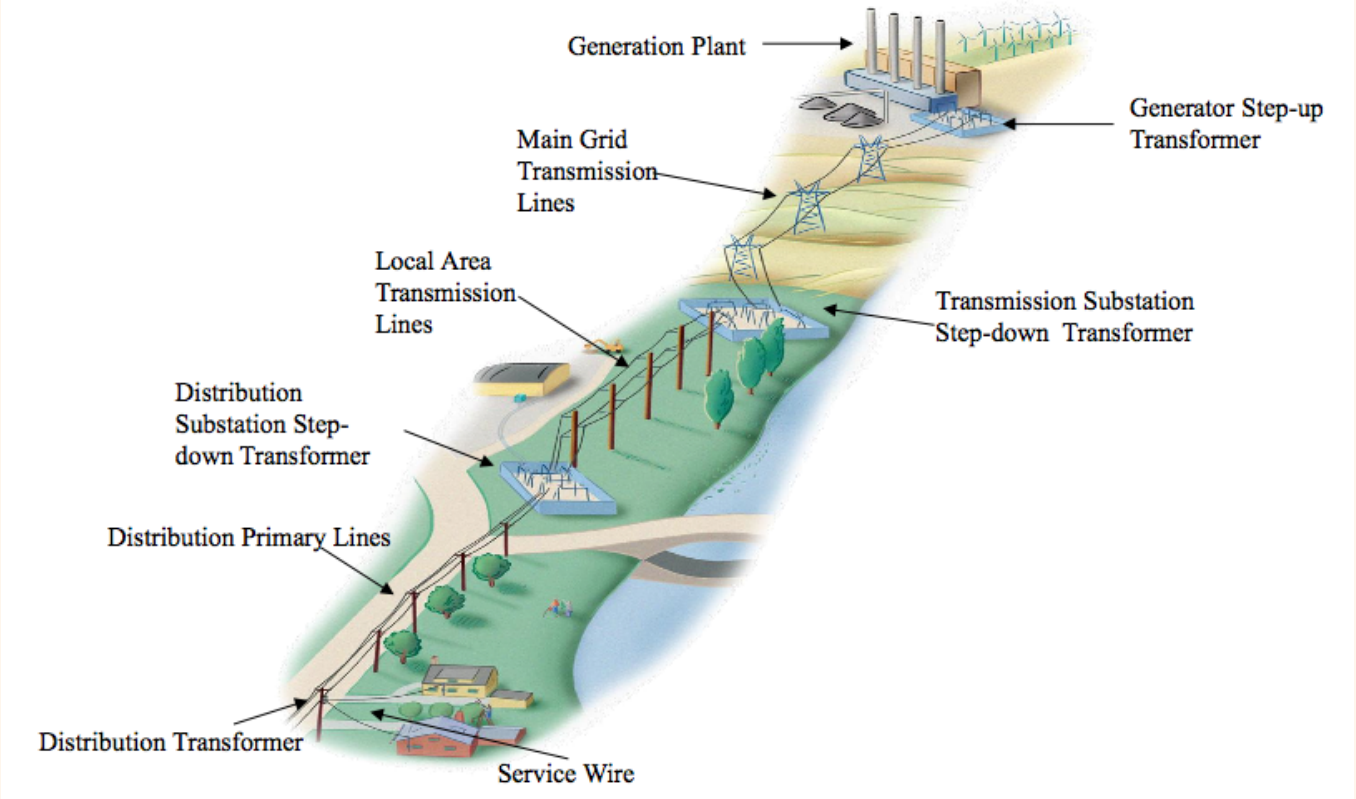
Capacity Resources



? - To what extent do NEM grid system inputs reduce costs associated with additional equipment, fuel, maintenance, and administration of peak-demand supply resources?

Grid System Factor:

Transmission & Distribution Resources



? - To what extent do NEM grid system inputs reduce costs associated with delivery of energy from points of generation to points of load?

Grid System Factor:

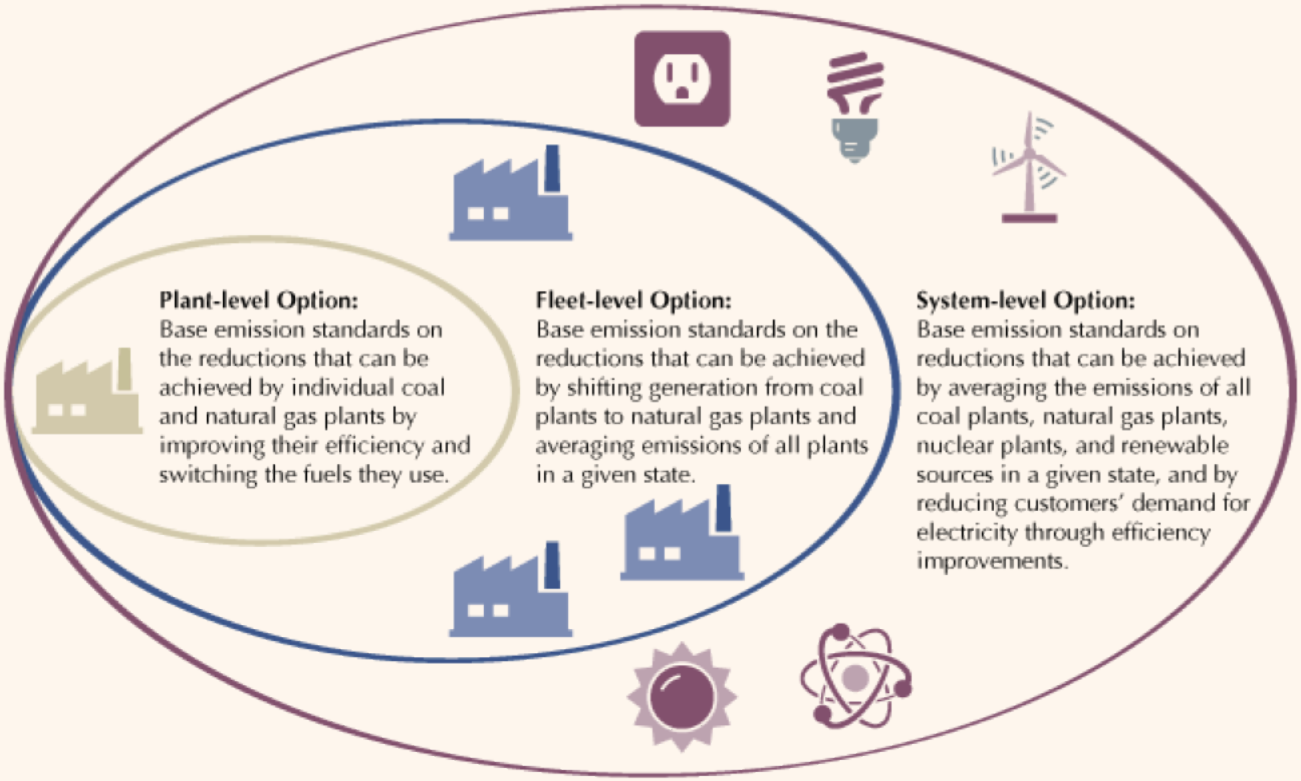
Line Losses …

Transmission & Distribution

? - To what extent do NEM grid system inputs reduce costs associated with the energy lost between points of central generation and points of load?

Grid System Factor:

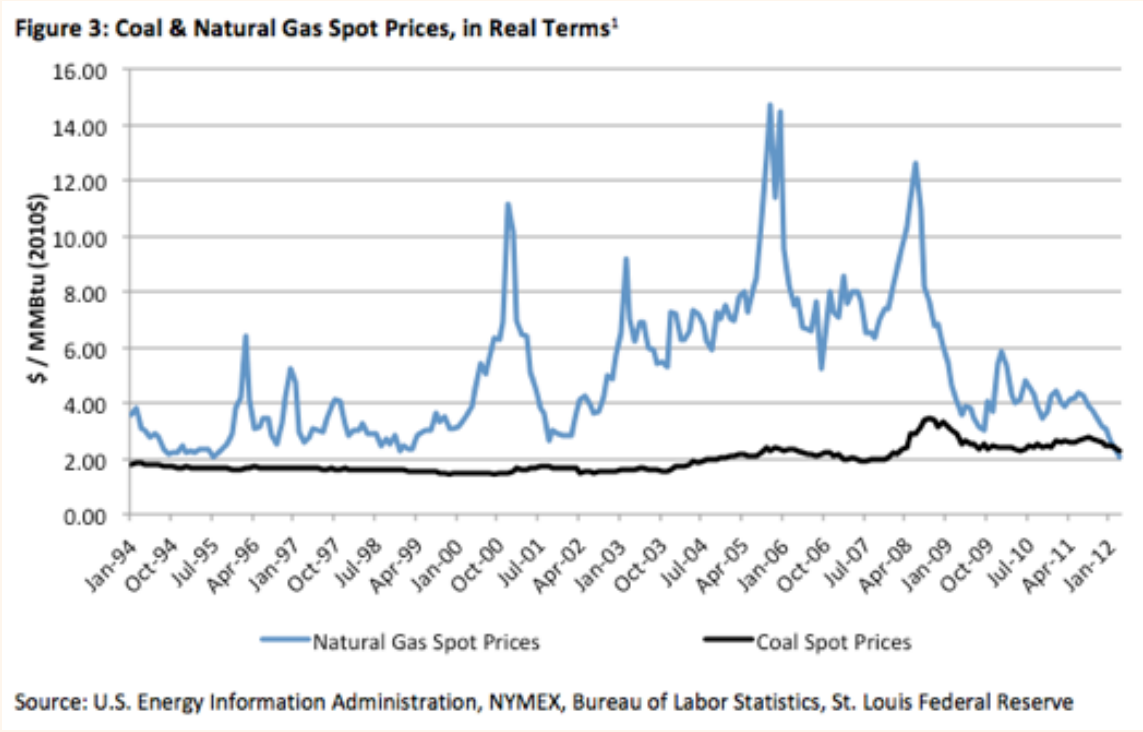
Environmental Compliance



? - To what extent do NEM grid system inputs reduce costs associated with state and federal environmental regulations?

Grid System Factor:

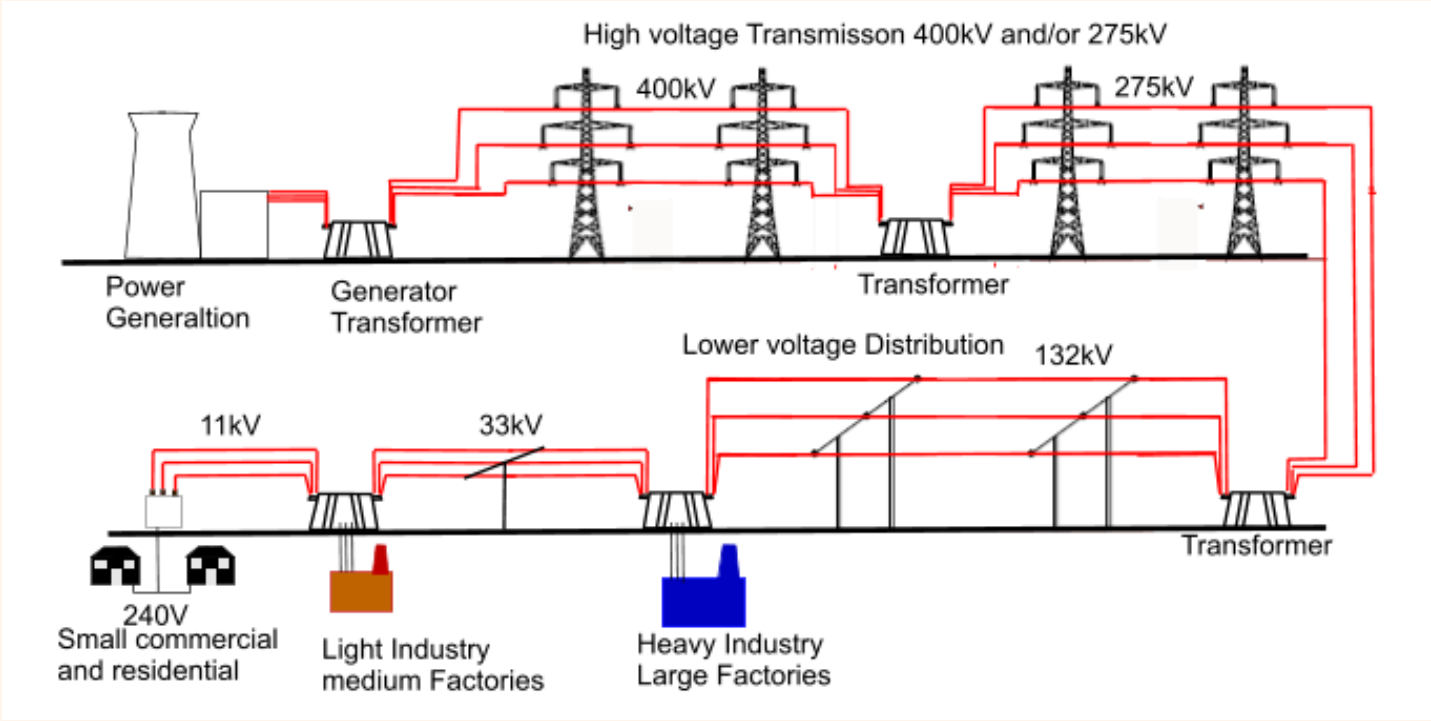
Market Price Effects



? - To what extent do NEM grid system inputs reduce costs associated with the introduction of new energy resources on market forces and price volatility?

Grid System Factor:

Grid Support Services



? - To what extent do NEM grid system inputs reduce costs associated with management of power generation and delivery, including voltage control?

Grid System Factor:

Outage Control

? - To what extent do NEM grid system inputs reduce costs associated with the ability to isolate and minimize power interruptions?

Grid System Factor:

Operation & Management of a Net Meter Program

Account # 821-64-0810-3

PSEGLI- Rate 180 - Residential, General Use

ELECTRIC USAGE	Meter # 96944749
03/31/2014 ACTUAL reading	06141
02/28/2014 ACTUAL reading	-06005
KWH Used in 31 day(s)	136
Applied to Energy Credit Bank	0
Billed KWH	136

ENERGY CREDIT BANK	
Opening Balance	0
Applied from Current Bill	0
Energy Credit Balance	0

DELIVERY & SYSTEM CHARGES	
Basic Service : 31 day(s) @ $ .3600	$ 11.16
136 KWH @ $ .0857	11.66
Subtotal	**22.82**
POWER SUPPLY CHARGES	
136 KWH @ $ .123067	16.74
Efficiency & Renewables Charge	
136 KWH @ $ .006246	0.85
OTHER CHARGES	
NY State Assessment	0.49
Revenue-Based PILOTS	0.62
Suffolk Property Tax Adjustment	0.83
Sales Tax @ 2.5 %	1.06
Subtotal	**3.00**
Total Charges	**$ 43.41**

ELECTRIC USAGE HISTORY *(kWh)*

■ *Actual Reading* □ *Estimated Reading*

	Days	Average Daily kWh	Cost	Temp.
Current Month	31	4	$ 1.40	37
Last Year	27	7	$ 1.93	40

Missing bar(s): usage included in next bar

? - To what extent do NEM grid system inputs reduce costs associated with NEM credit accounting, interconnection, and program administration?

Grid System Factor:

Net Meter Customer Costs

… Solar PV Purchase and Installation

… Solar PV Annual Excess Loss

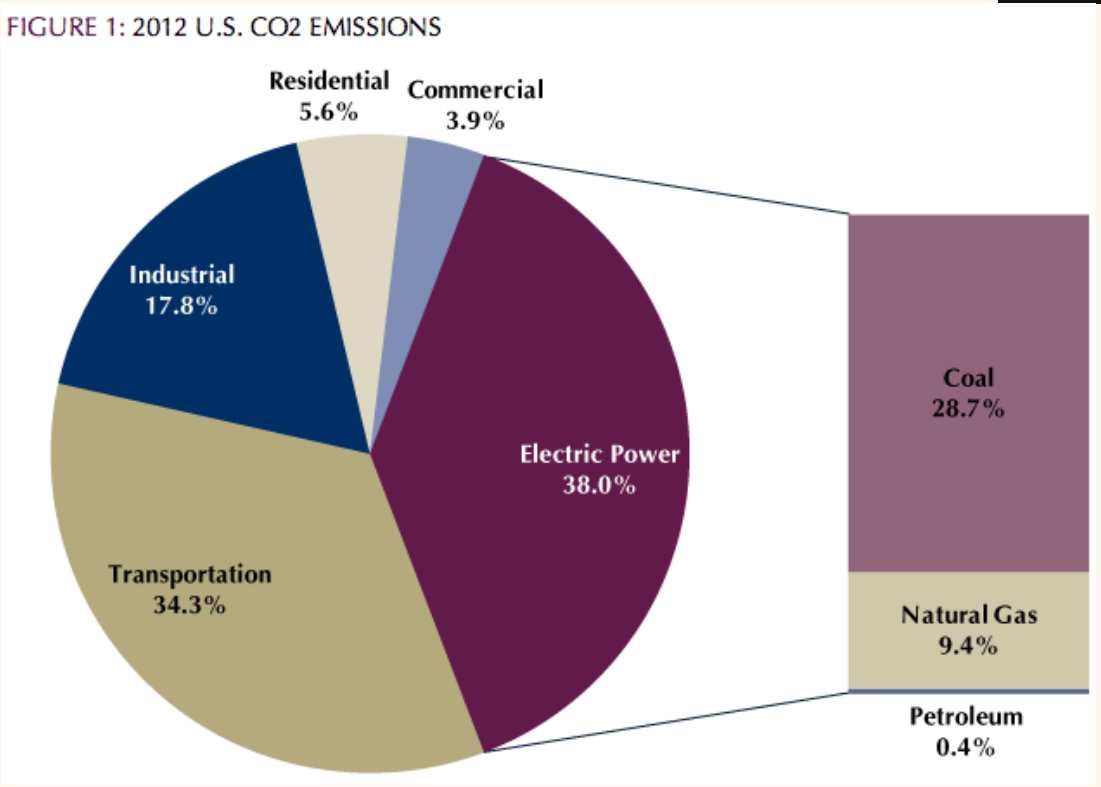
? - To what extent do NEM grid system inputs reduce costs associated with customer purchase, installation, operation and maintenance within system size and benefit caps?

Additional questions relevant to identifying, quantifying, monetizing, and integrating grid system avoided cost factors into the PSC's analytical framework for studying the net metering program.

Next: Societal Factors … a.k.a. Externalities

Societal Factor - **Environment:**

Carbon Dioxide



? - To what extent do NEM grid system inputs reduce costs associated with current and future carbon emissions regulation and mitigation of health and ecosystem damages potentially caused by climate change?

Societal Factor - **Environment:**

Criteria Air Pollutants

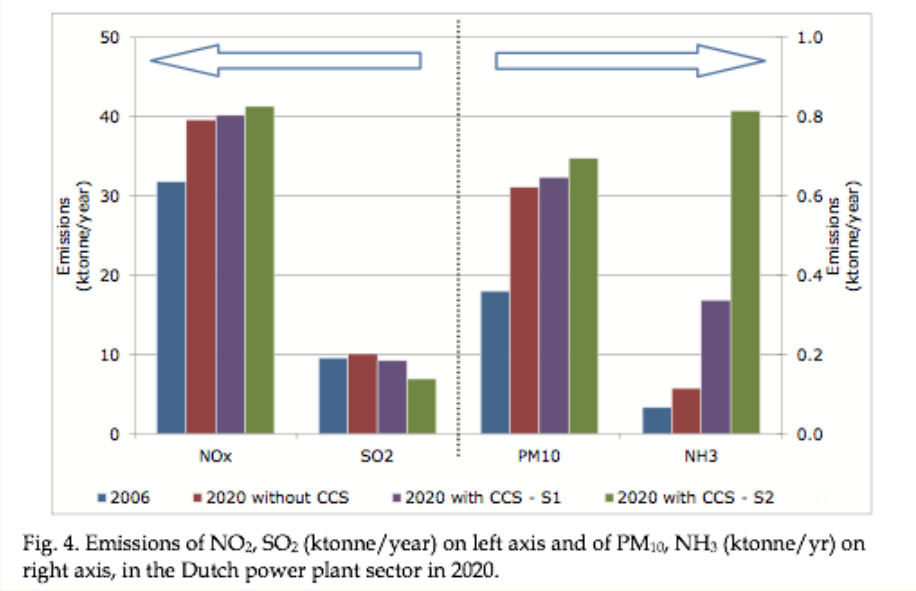
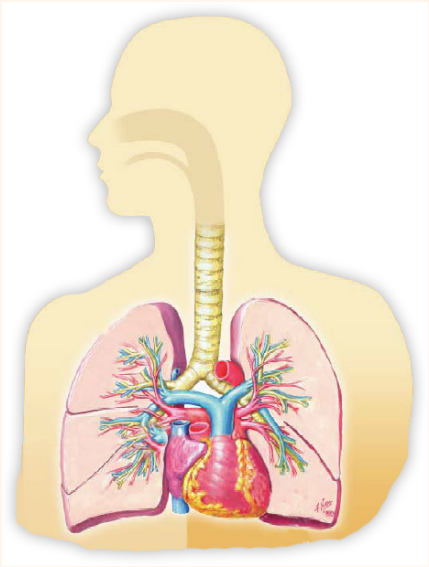


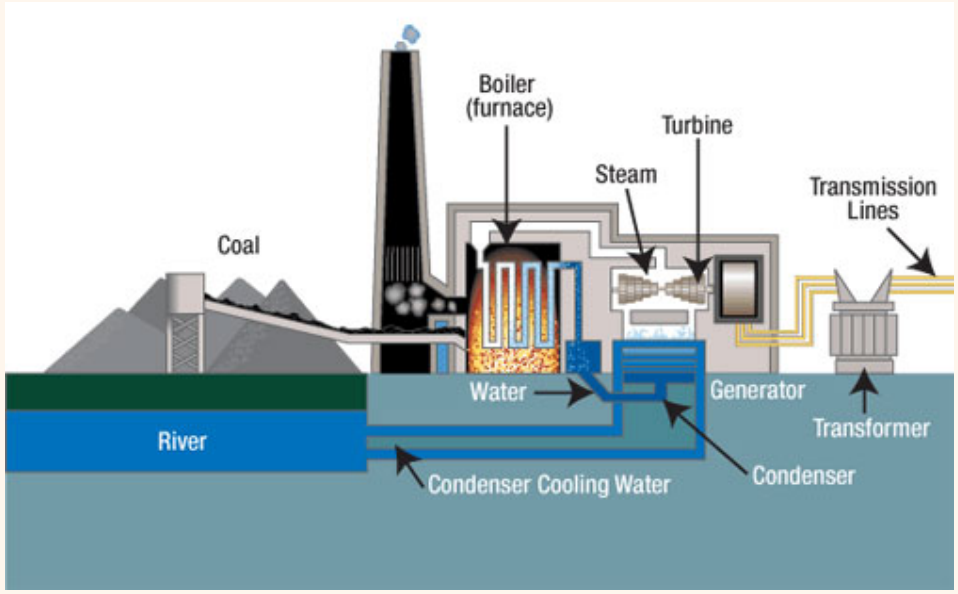
Fig. 4. Emissions of NO_2, SO_2 (ktonne/year) on left axis and of PM_{10}, NH_3 (ktonne/yr) on right axis, in the Dutch power plant sector in 2020.



? - To what extent do NEM grid system inputs reduce costs associated with NOx, SO2, and particulate matter emissions regulation compliance, medical expenses, and value of mortality risk?

Societal Factor - **Environment:**

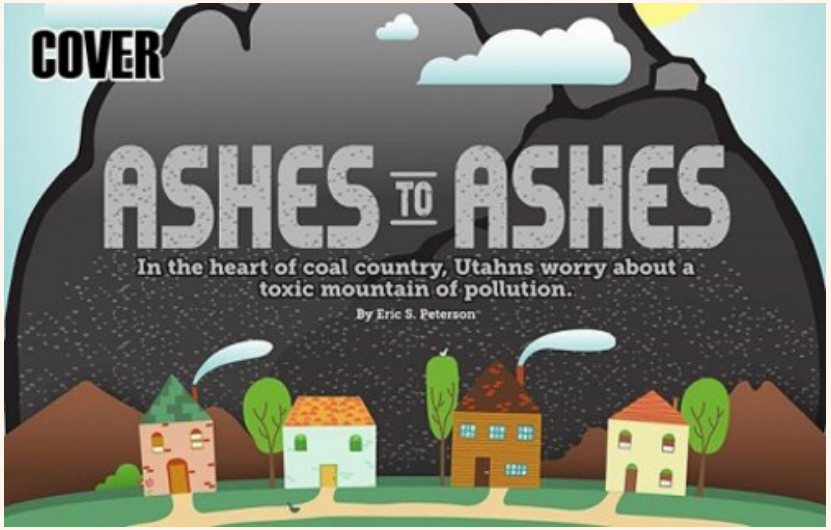
Water Consumption & Pollution



? - To what extent do NEM grid system inputs reduce costs associated with withdrawal and consumption of water for extracting and processing fossil fuels, and for cooling coal and natural gas power plants?

Societal Factor - **Environment:**

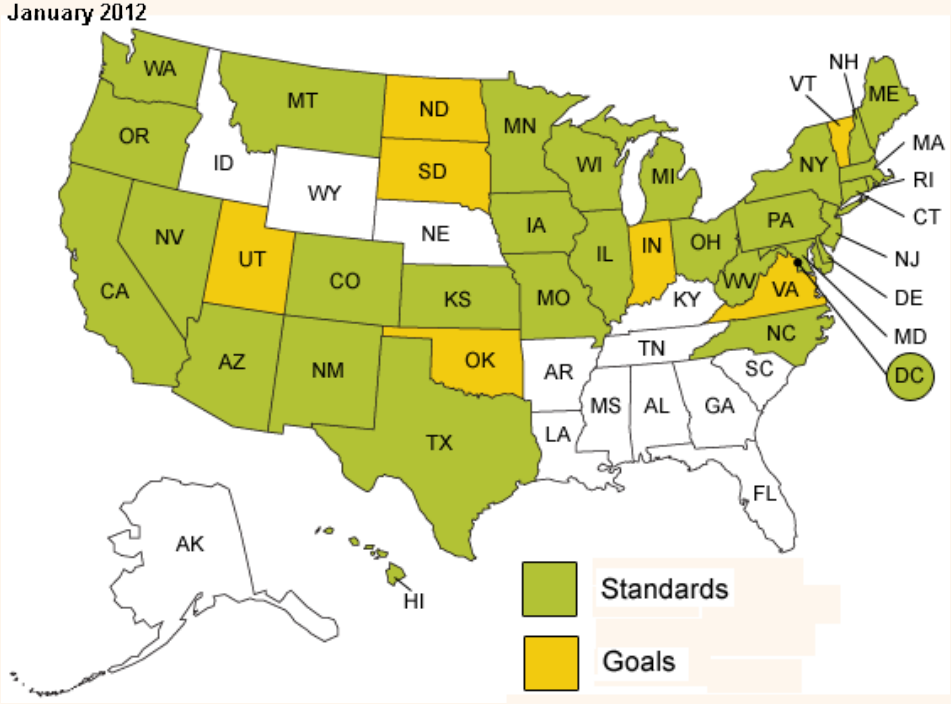
Land Degradation



? - To what extent do NEM grid system inputs reduce costs associated with extraction of fossil fuels and disposal of combustion byproducts?

Societal Factor - **Economic:**
Renewable Portfolio Standard Costs

States with Renewable Portfolio Standards (mandatory) or Goals (voluntary), January 2012



? – To what extent do NEM grid system inputs reduce costs associated with additional required clean energy investments and premature retirement of non-compliant grid system assets?

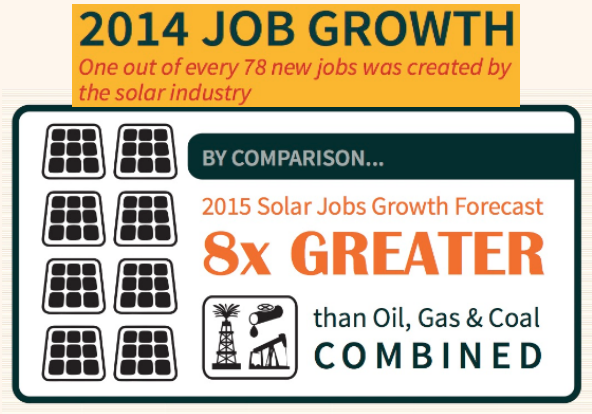
Societal Factor - **Economic:**

Economic Development

Potential Job Losses Due to Closure of Coal "Units at Risk"

25-400 MW, > 40 years old w/o existing or planned scrubbers

	No. of units	Direct jobs	Total jobs
New England	11	1,975	6,552
Middle Atlantic	34	2,564	13,101
E. No. Central	146	17,605	82,873
W. No. Central	74	6,868	29,880
So. Atlantic	98	14,324	63,304
E So. Atlantic	55	9,141	46,570
Mountain	15	1,675	9,010
Total U.S.	**433**	**54,151**	**251,291**



? - To what extent do NEM grid system inputs reduce costs associated with rates of economic growth, jobs creation and displacement, and tax revenue bases?

Societal Factor - **Health Costs:**

Medical Expenses

? - To what extent do NEM grid system inputs reduce costs associated with physical and emotional health damages related to environmental impacts of energy production?

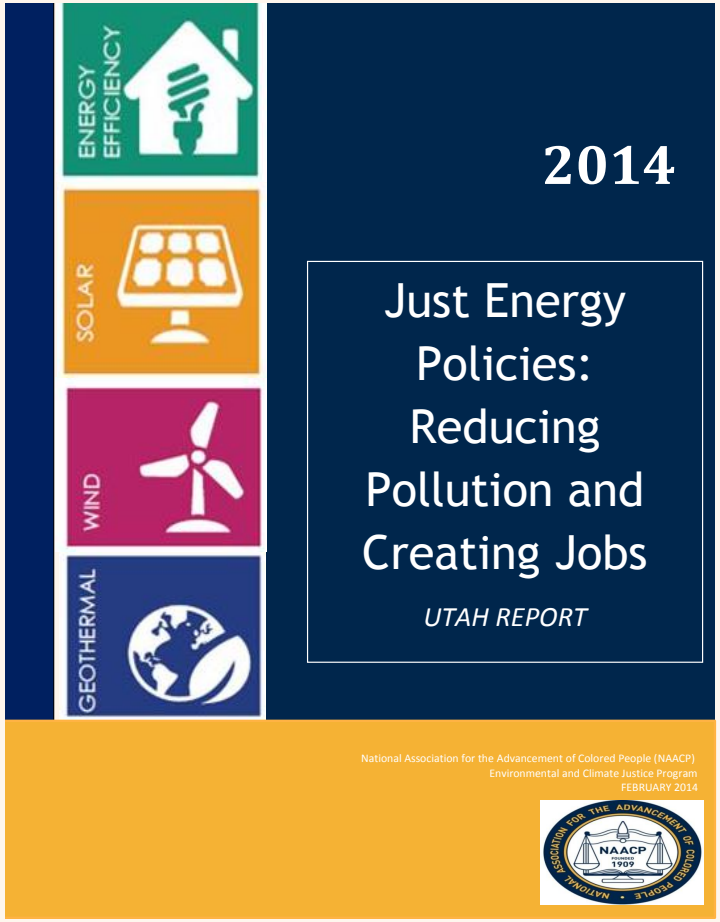
Societal Factor - **Health Costs:**

Secondary Health Costs

? - To what extent do NEM grid system inputs reduce costs associated with demographically specific economic and educational losses related to environmental impacts of energy production?

CONSIDERING COSTS EXTERNALIZED FROM THE GRID

Why the NAACP is Standing Up for Just Energy Policies



"Prolonged exposure to toxins from…energy production facilities is tied to birth defects, heart disease, asthma attacks, lung disease, learning difficulties, and even lower property values.

Many of the same polluting facilities…are major contributors to the greenhouse gases that are driving climate change.

Low-income neighborhoods and communities of color suffer more of the direct health, educational, and economic consequences of these facilities…"

Additional questions relevant to identifying, quantifying, monetizing, and integrating societal avoided cost factors into the PSC's analytical framework for studying the net metering program.

PacifiCorp's 2015 IRP and the Valuation of Net Metering in Utah

Prepared for Utah PSC Docket 14-035-114
Net Metering Workgroup Session II
… May 12, 2015

PacifiCorp's 2015 Integrated Resource Plan (IRP)

Categories of IRP items that may affect the valuation of Net Metering in Utah:

- ~ Renewables portion of energy mix
- ~ Renewable Portfolio Standards (RPS)
- ~ Other state, regional, federal rules
- ~ Other IRP items

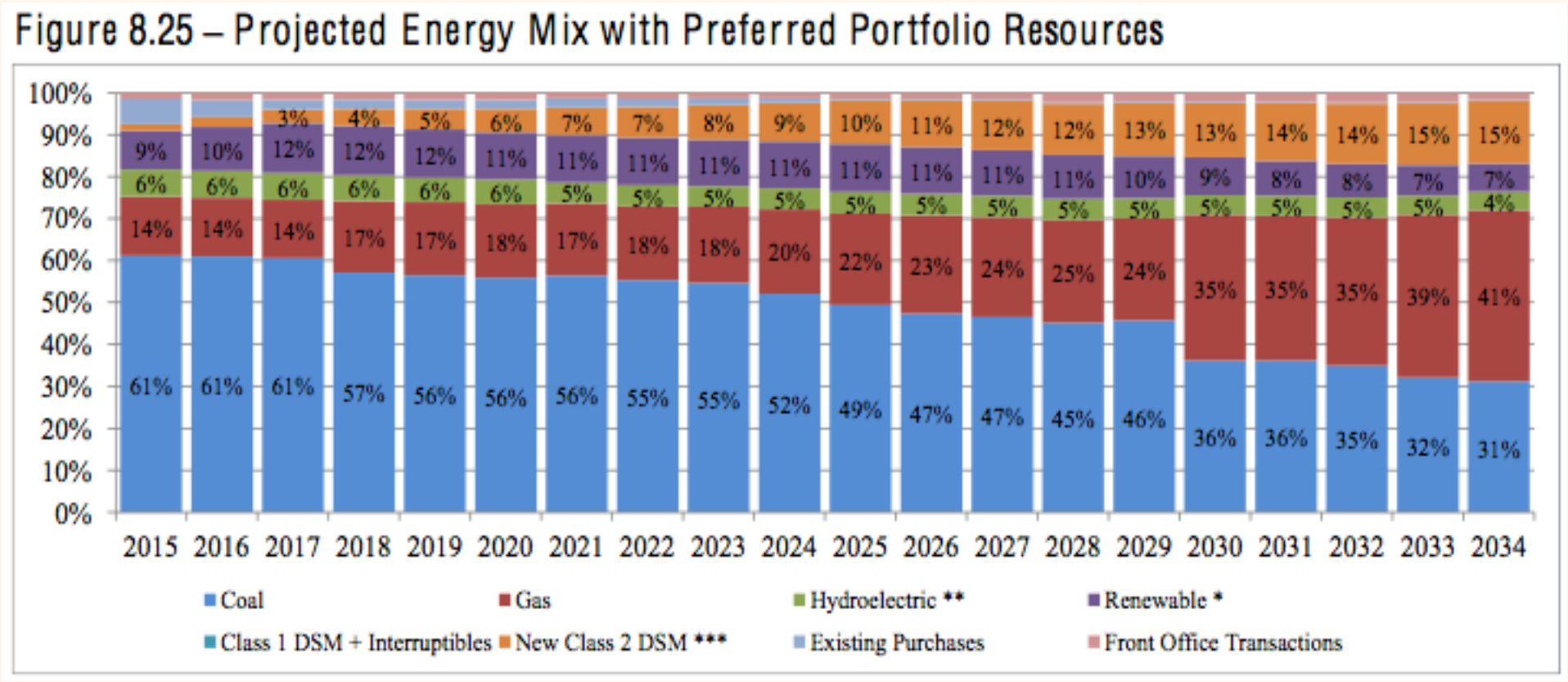
Reduced Renewables Mix to 2034

What may be the NEM valuation impacts of:

~ a 2 % reduction of renewables as part of the PacifiCorp energy mix by 2034

~ Demand Side Management (DSM) and Energy Efficiency (EE) as “renewables”?

Reduced Renewables Mix to 2034



Renewables: 2015 … 9 % 2034 … 7 %

Renewable Portfolio Standards (RPS)

Supply and Location of Renewable Resources

"It should be noted that the primary drivers of renewable resource selection are the requirements of renewable portfolio standards, compliance with draft EPA rules under 111(d) of the Clean Air Act, and availability of tax credits."

2015 IRP, page 114

Federal RPS, Clean Air Act Assumptions

What may be the NEM valuation impacts of:

~ IRP assumption there will be no federal RPS

~ future Clean Power Plan revisions?

PacifiCorp States' RPS Requirements

What may be the NEM valuation impacts of:

~ relative value of solar in OR, WA, CA

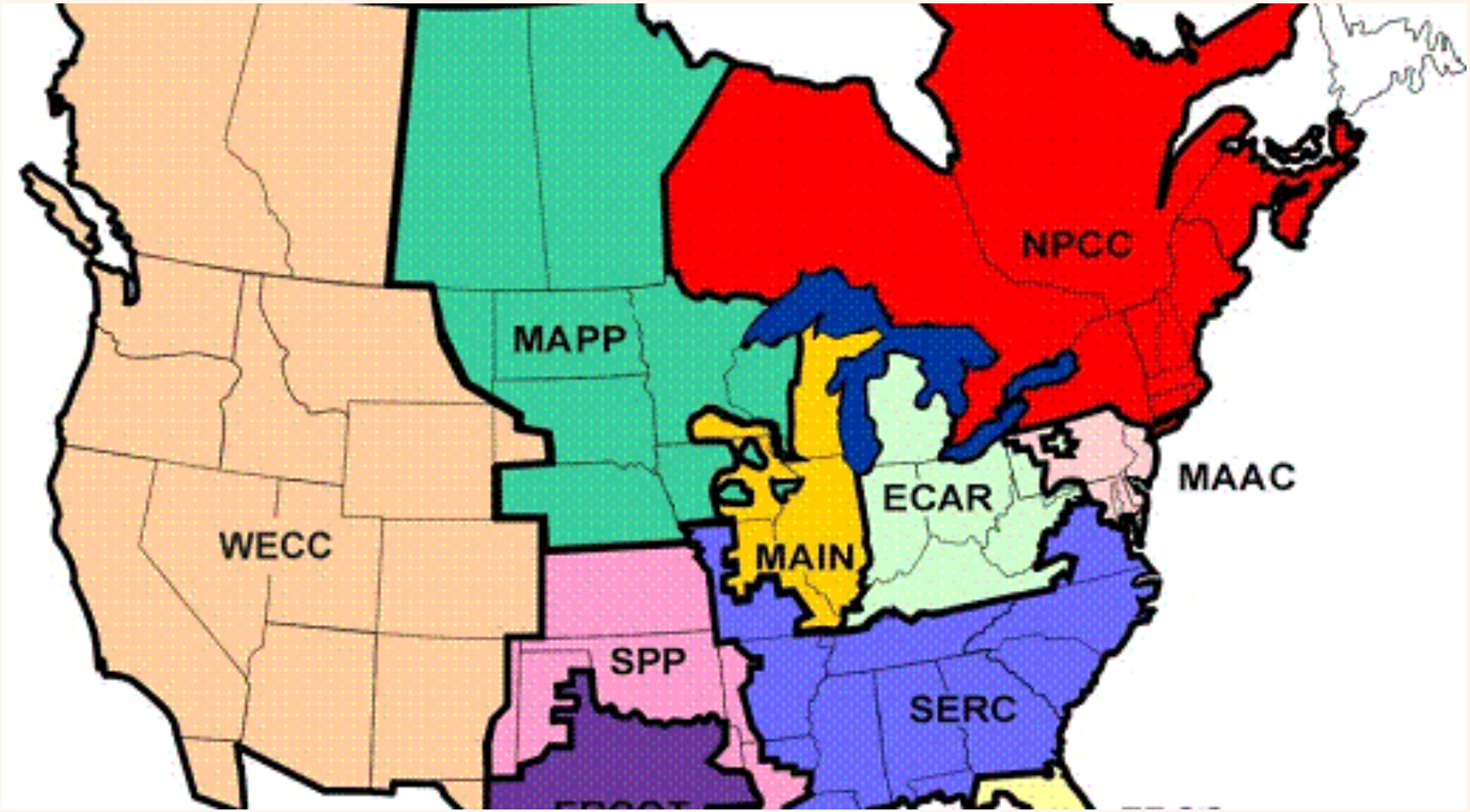
~ interstate exchanges of renewable energy

~ interstate exchanges of RECs

~ DSM/EE portion of adjusted retail sales

~ changes in state RPS goals (e.g. CA)?

Other state, regional, federal rules



State Climate Change Regulations

What may be the NEM valuation impacts of:

~ Greenhouse Gas (GHG) laws passed in Washington, Oregon, and California?

Cross-State Air Pollution

What may be the NEM valuation impacts of:

~ potential litigation from downwinder states?

WECC Regional Environmental Regulations

What may be the NEM valuation impacts of:

~ RPS requirements of non-PacifiCorp WECC states

~ Canadian national and WECC state rules?

Regional Haze Rule Requirements

What may be the NEM valuation impacts of:

~ EPA decision on Utah state implementation plan (SIP)

~ future best available retrofit technology (BART) costs?

Water Quality Standards and Costs

What may be the NEM valuation impacts of:

~ Clean Water Act requirements

~ state cooling and effluent charges?

Coal Combustion Residuals and Costs

What may be the NEM valuation impacts of:

~ the Resource Conservation and Recovery Act

~ disposal and storage costs?

EIM Agreement with CAISO

What may be the NEM valuation impacts of:

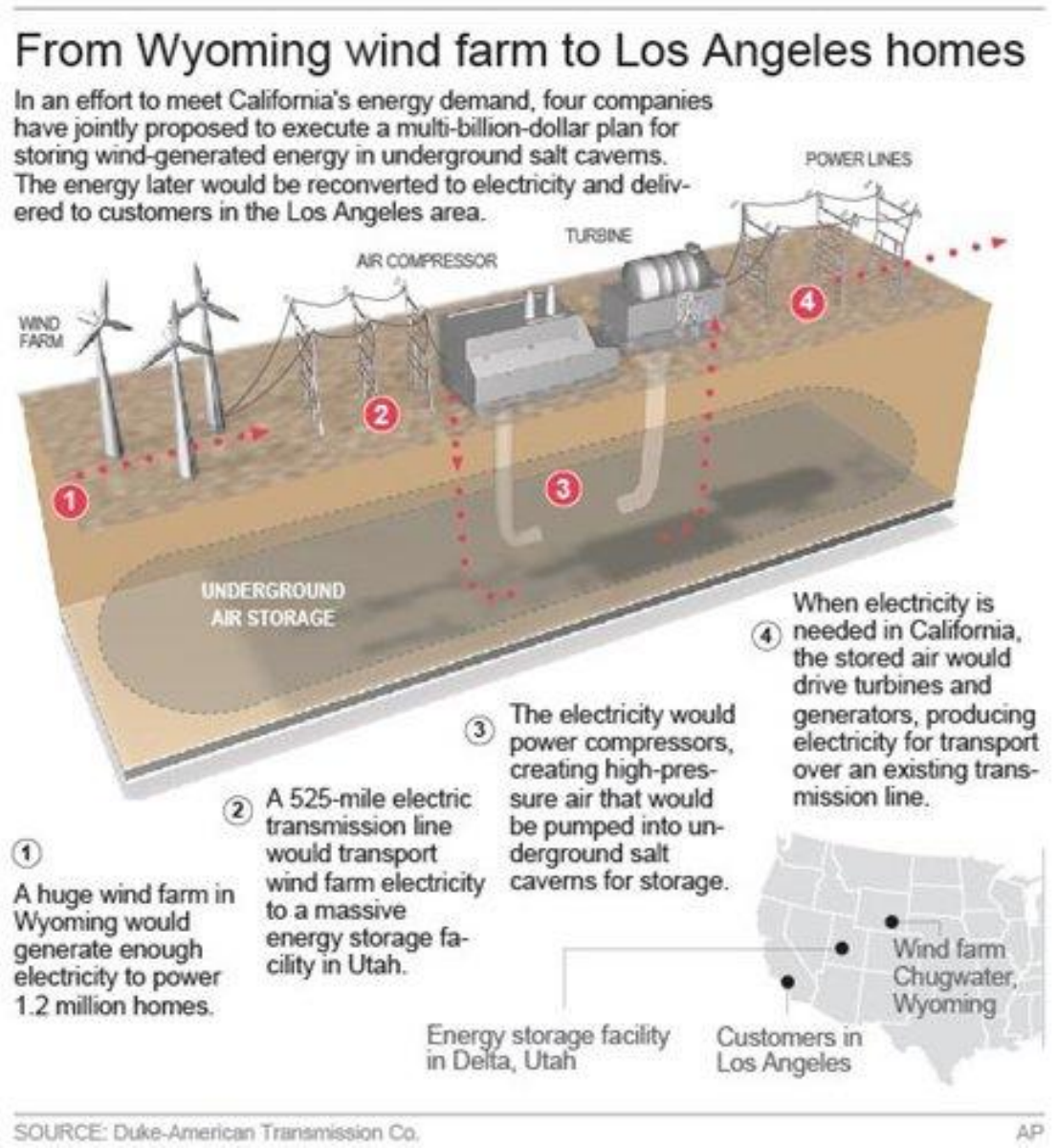
~ current and projected benefits to PacifiCorp

~ "greater reliance on renewable energy"?

EIM = Energy Imbalance Market

CAISO = California Independent System Operator

Other IRP items



Energy Storage

What may be the NEM valuation impacts of:

~ storage as ancillary resources for spinning reserves and voltage control

~ storage investments … utility vs. QF's?

Customer Charge and Energy Charge Increases

What may be the NEM valuation impacts of:

~ customer rate changes related to DSM and EE-related demand reduction

~ customer rate changes related to new fossil fuel emissions charges?

Additional questions relevant to identifying, quantifying, monetizing, and integrating potential affects of PacifiCorp's 2015 IRP items into the PSC's analytical framework for studying the net metering program.

Thank You