

Energy in an Uncertain World A Frank Talk

Dr. Jennifer Richter

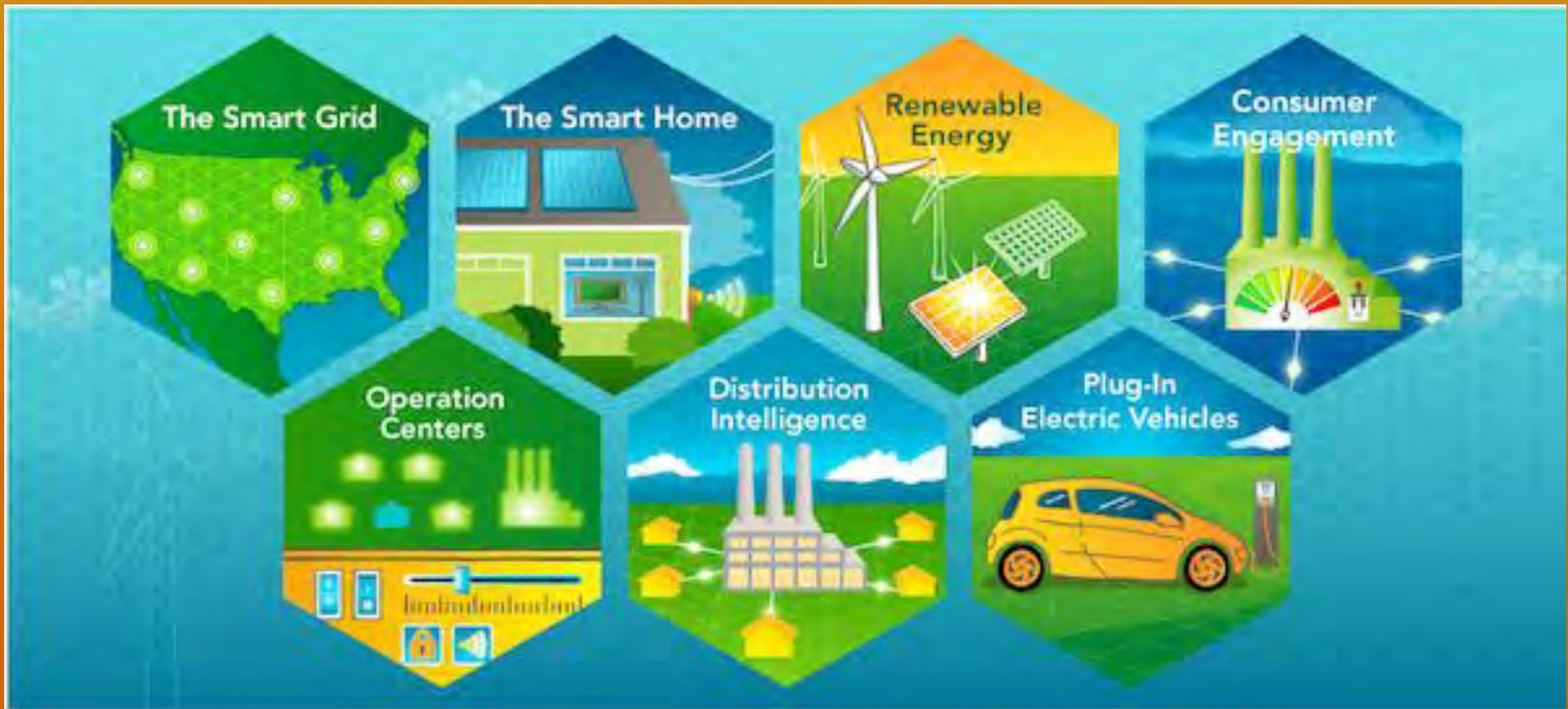
School of Social Transformation and
School for the Future of Innovation in Society
Arizona State University

Thank You!

- ❁ Litchfield Park Branch Library, and Nancy Stevenson
 - ❁ Tonight, a brief overview and then moderated discussion...
- ❁ Arizona Humanities for supporting the FRANK Talks Lecture Series
 - ❁ Arizona Humanities is a non-profit organization that is the Arizona affiliate of the National Endowment for the Humanities
 - ❁ Arizona Humanities builds a just and civil society by creating opportunities to explore our shared human experience through discussion, learning, and reflection
 - ❁ You can learn more at azhumanities.org

Energy and Social Values

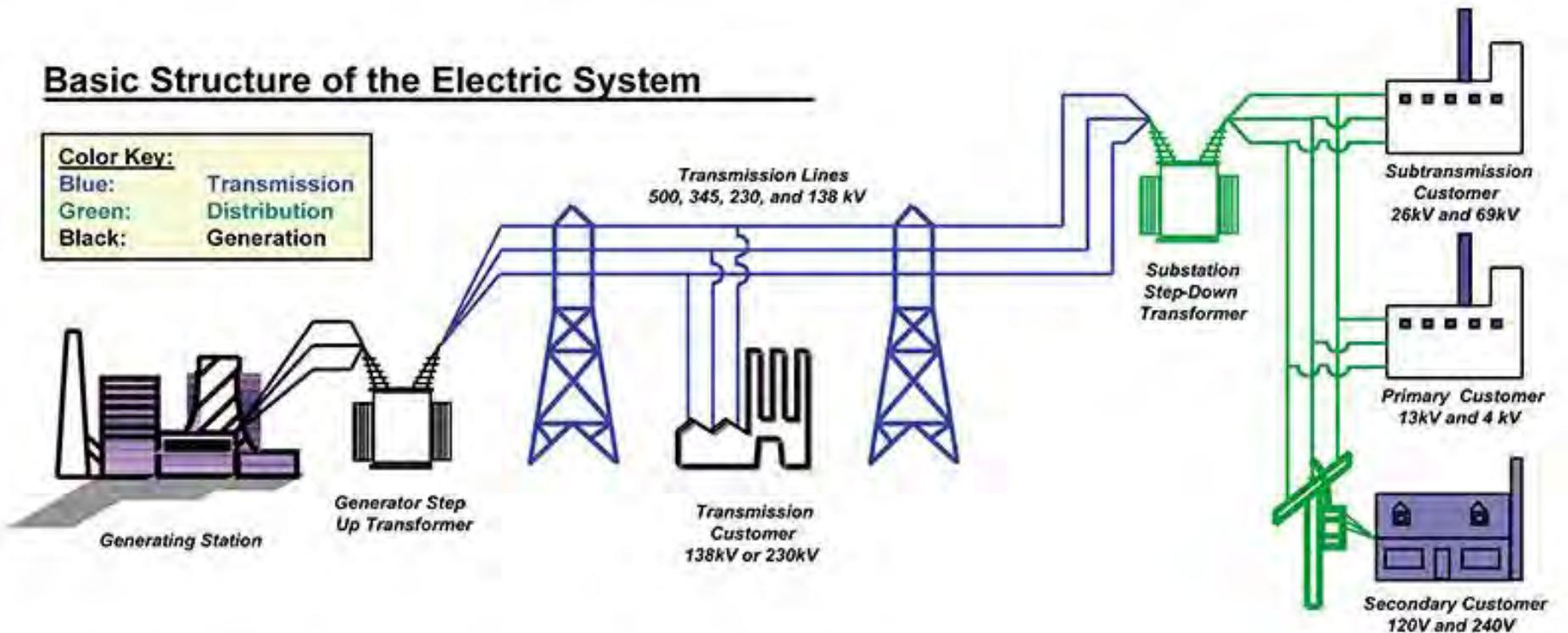
- ❁ Energy is both a social *and* a technological system
- ❁ Social: Involving people, their values, and their ideals
- ❁ Technical: The technologies we create
- ❁ Together, *sociotechnical values* are the values that shape, and are shaped by, our technologies, including their production and distribution.



Historical Snapshot

- Major energy sources in the US:
 - 1800s to the present: Biomass, Coal, Hydropower
 - 1950s: Nuclear
 - 2000s: Natural Gas, Renewables
 - 2020s: ?

Basic Structure of the Electric System



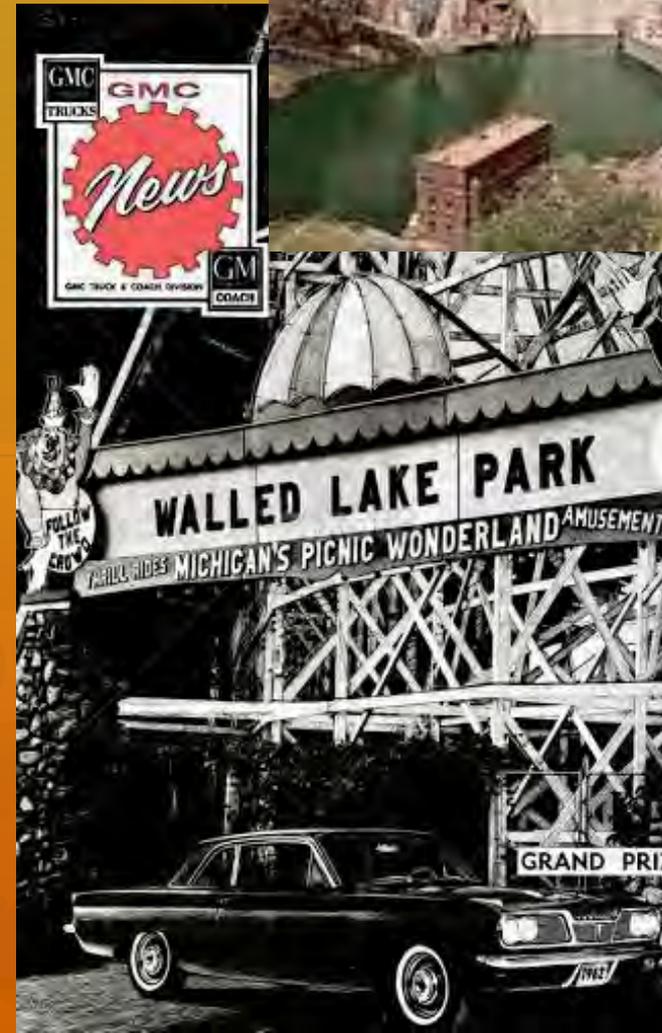
Technological Shifts

- ❁ Biomass: Rural America
 - ❁ Local production and use
- ❁ Coal and Hydro: Electrification
 - ❁ Emergence of electricity grid
 - ❁ Production and use separated
- ❁ Nuclear: Urbanization, industrialization, and modernization
- ❁ Natural Gas: “cheap” and domestic
- ❁ Renewables:
 - ❁ Rooftop solar (distributed generation)
 - ❁ Commercial solar (similar to gas and coal)



Historical Values

- ❁ What were values shaping energy production and distribution?
 - ❁ Emergence of regulated monopolies; utility system; baseload and peak
 - ❁ Centralized production; widespread distribution; federal investment
 - ❁ Values: Stability, Reliability, Security, Cost
 - ❁ Non-considerations: geographically remote, environmental costs, timescales, access
 - ❁ Human aspects: ratepayers and “load”; training consumers



America's Energy Mix

Major energy sources and percent shares of U.S. electricity generation at utility-scale facilities in 2016 (EIA):

- Natural gas = 33.8%
- Coal = 30.4%
- Nuclear = 19.7%
- Renewables = 14.9%
 - Hydropower = 6.5%
 - Wind = 5.6%
 - Biomass = 1.5%
 - Solar = 0.9%
 - Geothermal = 0.4%
- Petroleum = 0.6%

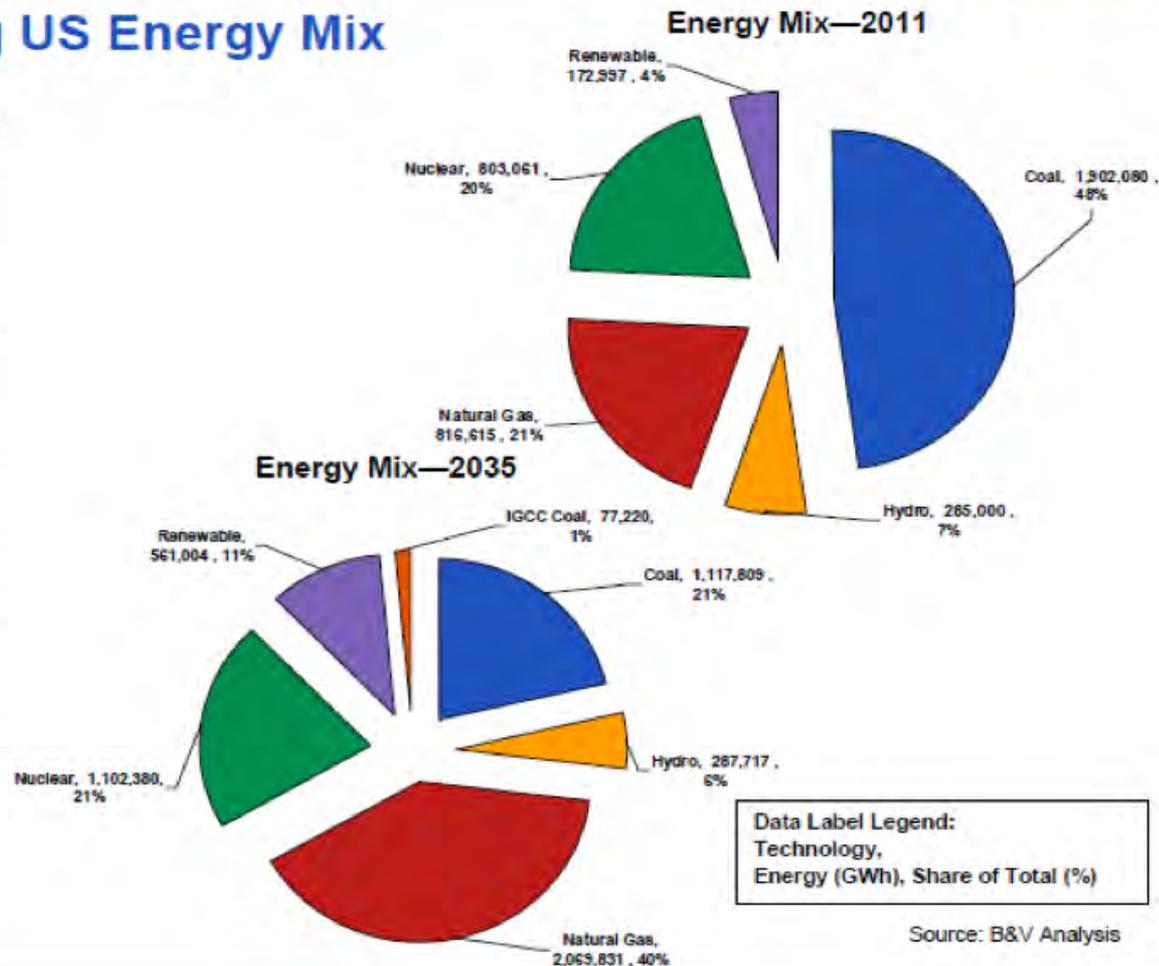
America's Energy Portfolio

BUILDING A WORLD OF DIFFERENCE®

BLACK & VEATCH

The Changing US Energy Mix

- Natural gas's "market share" increases from 21% of electricity consumption to 40%, while coal decreases from 49% to 25%, and renewables increase from 4% to 11%
- The shift to new gas-fired technologies is part of a multi-prong power industry strategy that also includes wind, solar, nuclear and some IGCC w/ CCS



Governing Innovation



Federal Policies:



Energy Policy Act (2005): Investment Tax Credit for Solar; Exemption from Clean Water and Air Acts for Natural Gas (state regulated)



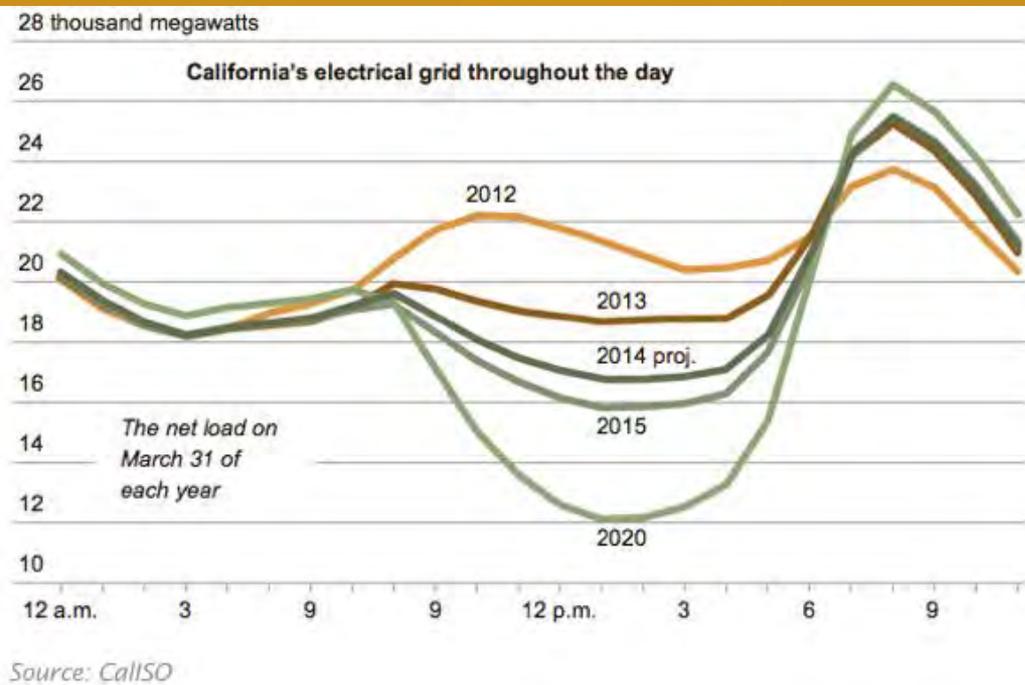
American Recovery and Reinvestment Act (2009): Funding for “Green” jobs and economy



Clean Power Plan (2014): Decreasing carbon emissions



Current: DOE reviewing subsidies for renewable energies and grid security



Emerging Values



What are emerging values that are, or should, shape energy transitions?

Arizona



Major energy infrastructure

- ☼ Mojave (1971-2005, SRP) and Navajo (1976, APS) Coal Plants: 2250 MW
- ☼ Palo Verde Nuclear Generating Station (1986, APS): 3800 MW

New additions...

- ☼ Solana Solar Plant (2013, APS): 280 MW
- ☼ Gila Bend PV Plant (2014, APS): 32 MW

Competing groups: TUSK, Chispa, Utilities

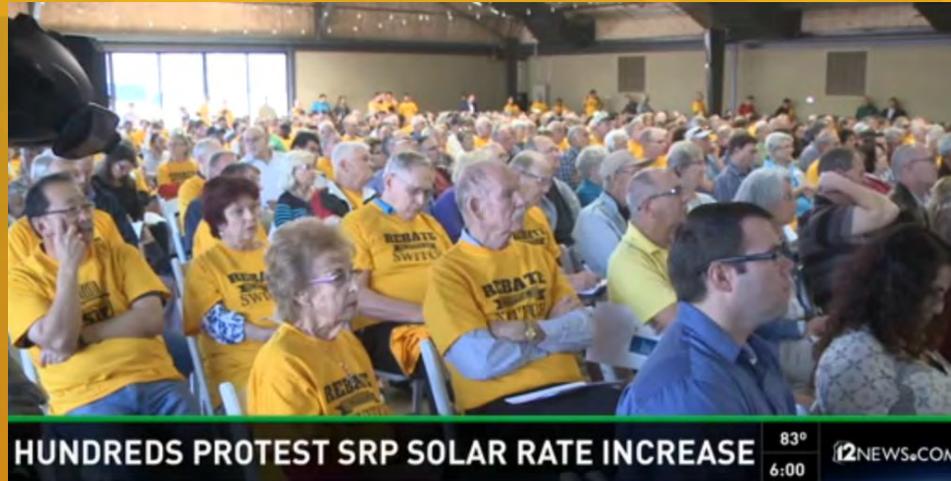
- ☼ TEP's new deal for solar...

New policies, New Values

- ☼ Renewable Portfolio Standard (2006)
 - 15% Renewables by 2025
 - 30% from distributed, 50% of that from residential
- ☼ Value of Solar ruling from ACC (2016)
 - ☼ End net metering



Bringing Values Together



- ❁ Sustainability: Timescales of production and effects, esp. environmental issues around climate change

- ❁ Democracy: Input into energy planning; access and participation; low income, minority, rural, etc.

- ❁ Geographical scales: Expansion and contraction of the grid; rural/suburban/urban; commercial/industrial

 - ❁ Also, local to international concerns!

- ❁ Choice and Independence: From consumer to producer; energy justice

Discussion!

- ❁ Keep in mind: Distribution of benefits and risks; recognition of different values and needs; participation into energy discussions
- ❁ How do new energy technologies mesh historical values with new values?
 - ❁ Security, stability, reliability, cost
 - ❁ Sustainability, carbon emissions, democracy and access, independence (but from what?)
 - ❁ Predictable yet flexible plans...
- ❁ Who should plan this, and how? On what geographical scale?
 - ❁ National, state, municipal, community, residential...
- ❁ How should it unfold? What is your vision for energy systems over the next...
 - ❁ 5 years? 10 years? 20 years? 50 years?
 - ❁ Social considerations: employment/retraining, education, regulation, investment, etc.
 - ❁ Technological considerations: efficiency, storage, infrastructure, automation, smart tech, transportation, etc.

Thanks once again!

- ✿ Contact:
- ✿ Jennifer Richter
- ✿ Jennifer.richter@asu.edu

