An Introduction to Renewables & the User Guide Resources:

Setting the table for an E3A Buffet

Milton Geiger, University of Wyoming Extension

Applying the E3A Framework to Extension Programming

Fairbanks, AK

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This morning's performance

- Overview of key terminology & concepts
- What are the renewables?
  - Thermal
  - Electric
- Why people want to own a renewable energy system?
  - Why not…

What are the typical RE systems?

- Biomass
  - Heat, power, and transportation fuels
- Geothermal
  - Direct use and heat pumps
- Hydroelectric
- Solar
  - Thermal
  - Photovoltaic (PV)
  - Concentrated thermal
- Wind

Play along at home: Notice similarities to the E3A folders

Renewable technologies – Danger of "lumping"

All solar based (except direct use geothermal)

BUT

Diverse applications and cost structure

Renewable energy – Sources and uses

Examples of Alternative Energy Sources that Address Current Energy Uses	
Current Energy Use	Alternative Energy Source
Electricity	Wind Turbine Photovoltaic Panel Micro-Hydro System Anaerobic Digester
Hot Water *(Current source may be electric, gas, or propane)*	Solar Thermal System Concentrating Solar Power Technology/Parabolic Trough Geothermal (desuperheater)
Heated Air *(Current source may be electric, gas, wood, or propane)*	Solar Air Collector Transpired Solar Collector Geothermal (Ground Source Heat Pump) Biomass Passive Solar Design
Transportation Fuel	Biofuel Renewable Electricity (for electric or hybrid vehicles)

Play along at home: "User Guide: Sources and Uses Fact Sheet"

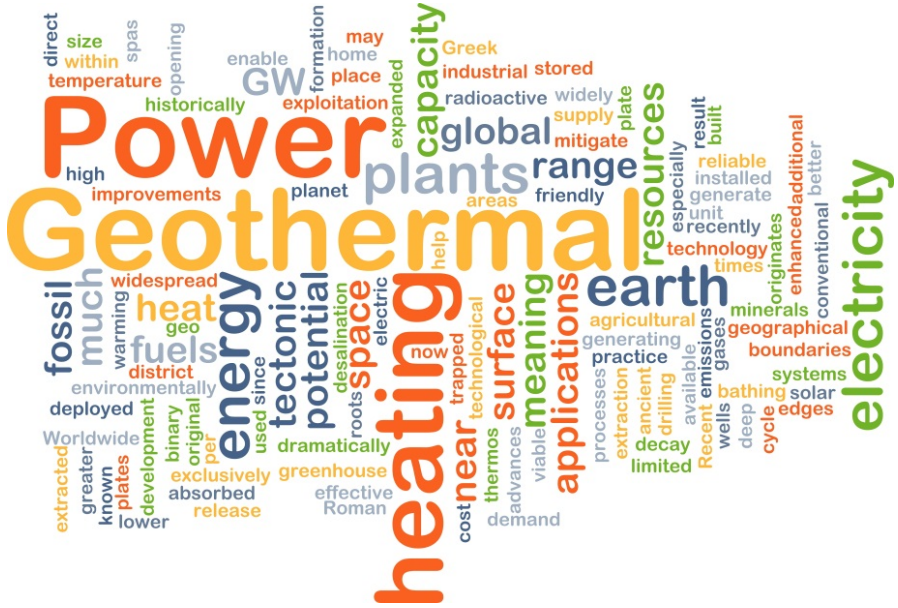
E3A

Terms and definitions – Size

- Very technical terms
  - "Large-scale"
    - Selling electricity (thermal energy) into the market
  - "Small-scale"
    - Designed to principally offset electricity consumption
      - Net metered
  - Actual defintion varies by technology (e.g. hydro vs. wind) and federal/state policies and incentives

Terms and definitions – Where

- On-grid
  - Uses existing utilities (e.g. electric or natural gas) to back-up
- Off-grid
  - Battery-based (e.g. residence), or
  - No battery (e.g. stock water pumping)



Play along at home: “Insert Sheet”

Terms and definitions – Net metered

- Net metering & interconnection
  - A policy that allows the connection of electricity-producing RE systems to the grid;
  - Allows owner to use the reliability of the grid while receiving the full retail rate for production;
  - Serves as an incentive that varies by state.
    - 43 states have a specific policy

Play along at home: “User Guide: Net Metering

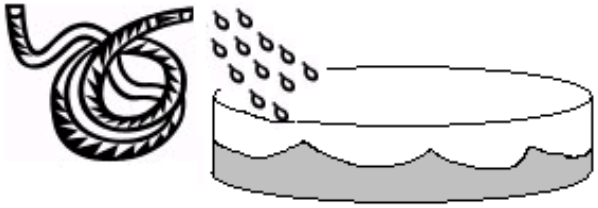
Net Metering:

Some Common Myths in Net Metering

Myth	Reality
I will get paid for any excess electrical generation	The utility will pay, but at a avoided cost rate.
One turbine will off-set all electrical consumption on my property	This is only true if all electrical consumption is tied to one meter (one turbine per meter)
I will run my electrical system seasonally, and then use several months of wind generation to credit that account for a smaller total utility bill	This will depend on the billing period used by your utility
I can use my existing kilowatt hour meter	Most meters will have to be converted for a net metering application. Some utilities will provide this meter, others will ask you to pick up the expense. Ask your utility.
If the utility power goes out, I will still have power from my wind turbine.	This is only true if you have a battery backup or other storage system in place.

Play along at home: "User Guide: Net Metering

Terms and definitions – Power vs. Energy



Energy = Power x Time

Play along at home: “Net Metering”

Source: Our Wind Coop

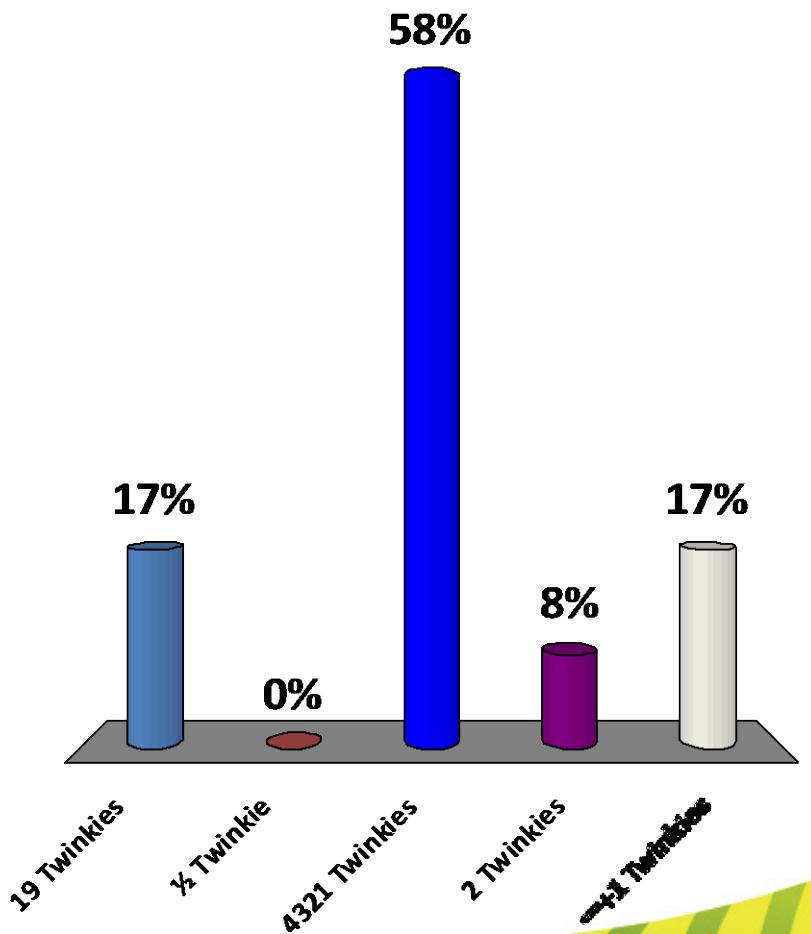
Terms and definitions

- Electricity
  - Kilowatt: Power
    - kW
  - kilowatt-hour: Energy
    - kWh
  - Megawatt-hour: 1000 kWh
    - MWh
- Thermal
  - British Thermal Unit: Power
    - Btu: Power
    - Btu-h: Energy
  - MBtu: 1000 Btu
  - MMBtu: 1,000,000 Btu
  - Ton: 12,000 Btu/h

Play along at home: “User Guide: Net Metering & Understanding Your Energy Consumption Fact Sheets”

What's a kilowatt-hour (kWh)? How many Twinkies to provide an equivalent of 1 kWh of electricity?

A. 19 Twinkies
B. ½ Twinkie
C. 4321 Twinkies
D. 2 Twinkies
E. ∞+1 Twinkies



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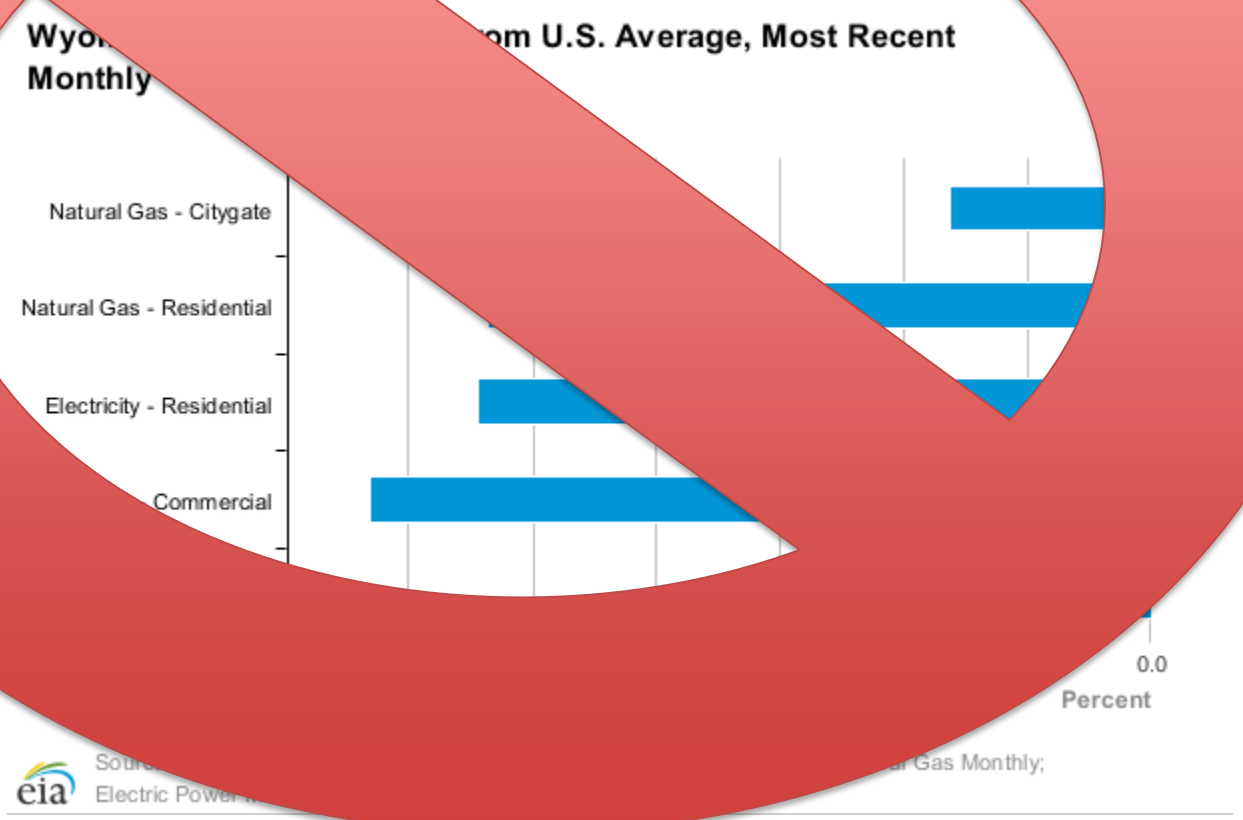
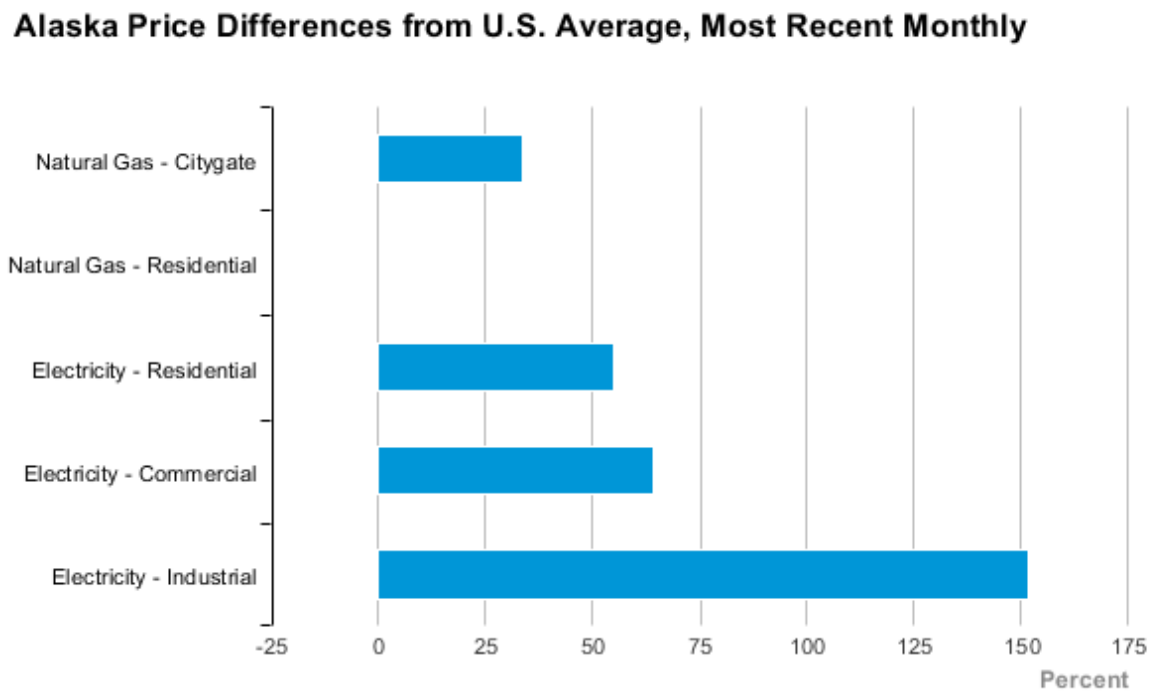
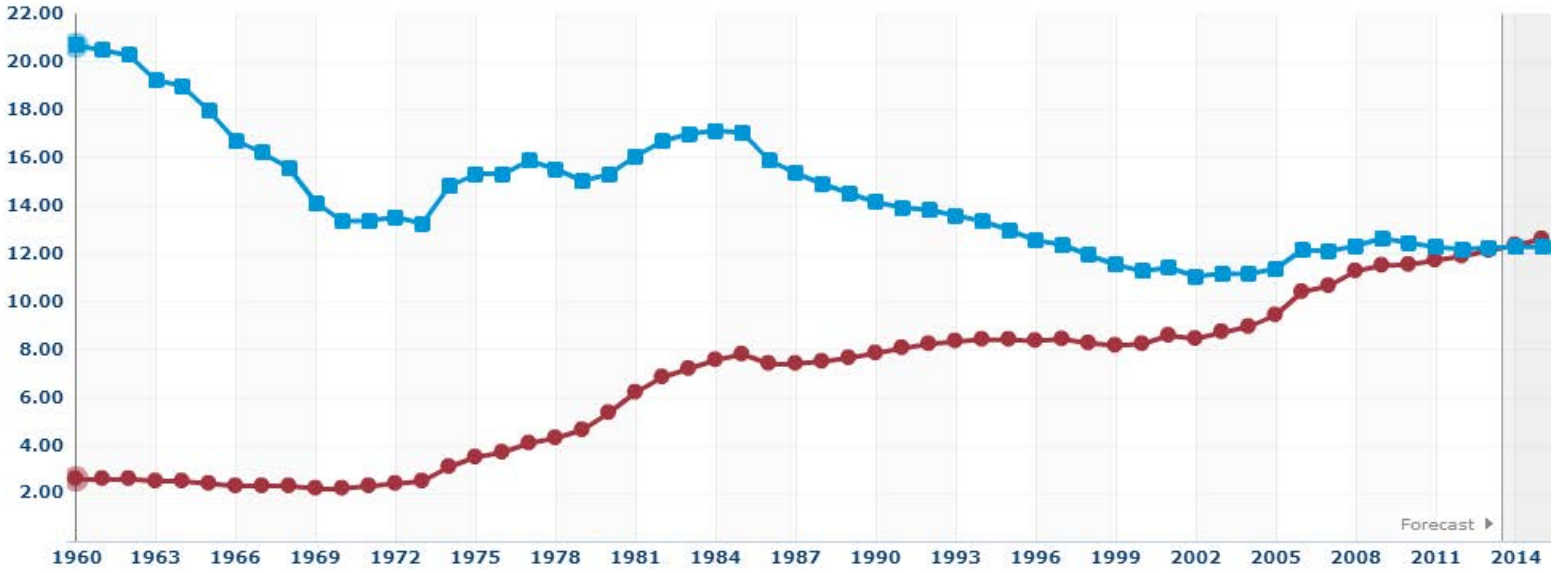


Ouch…



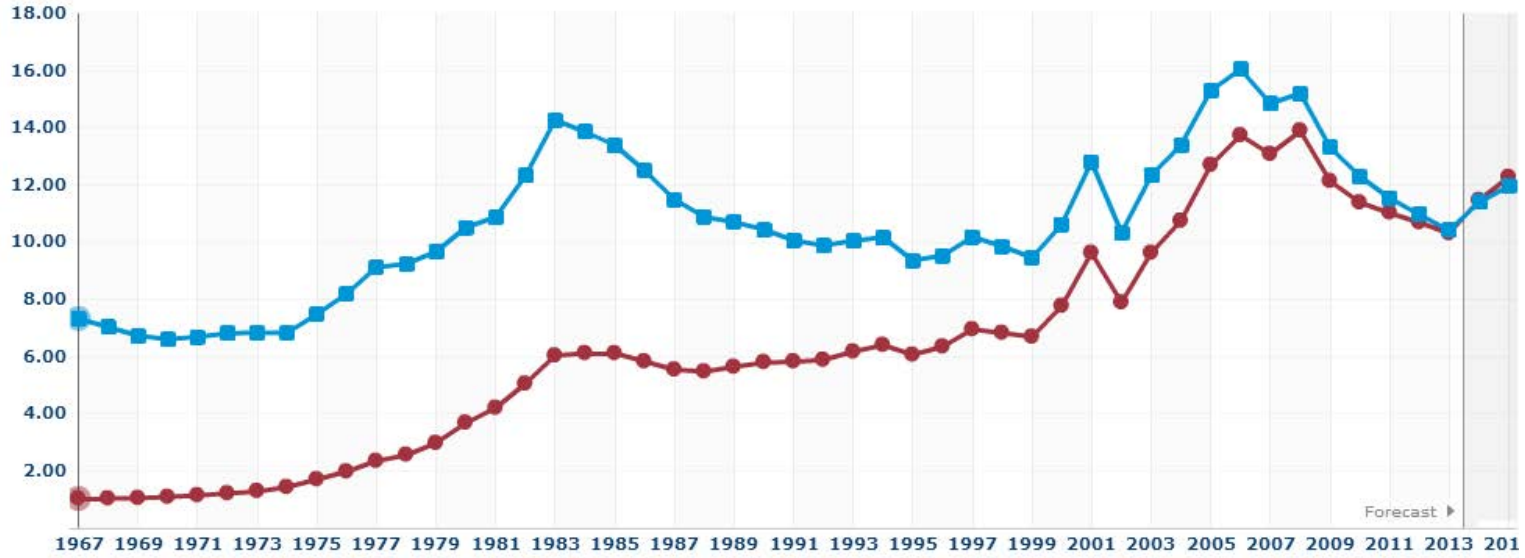
Source: Energy Information Administration, Petroleum Marketing Monthly; Natural Gas Monthly; Electric Power Monthly

Prices Change: Residential Electricity Prices



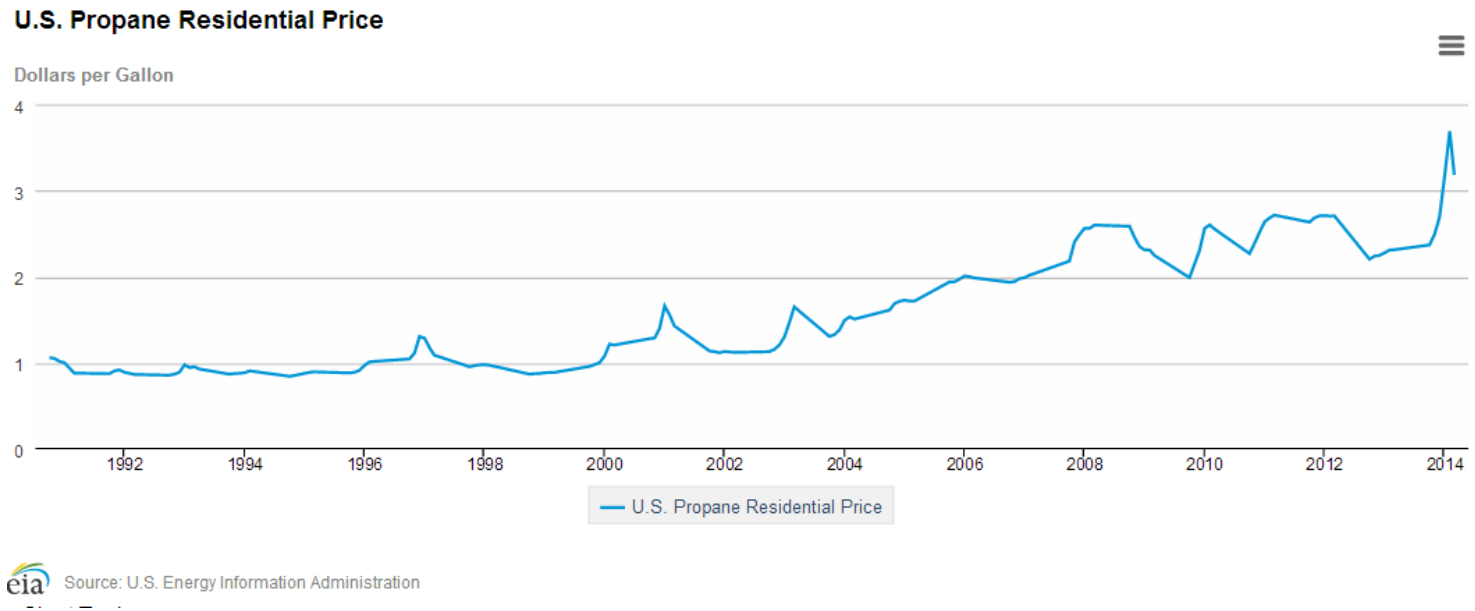
Source: EIA http://www.eia.gov/forecasts/steo/realprices/

Prices Change: Residential Natural Gas Prices



Source: EIA http://www.eia.gov/forecasts/steo/realprices/

Prices Change: Residential Propane Prices



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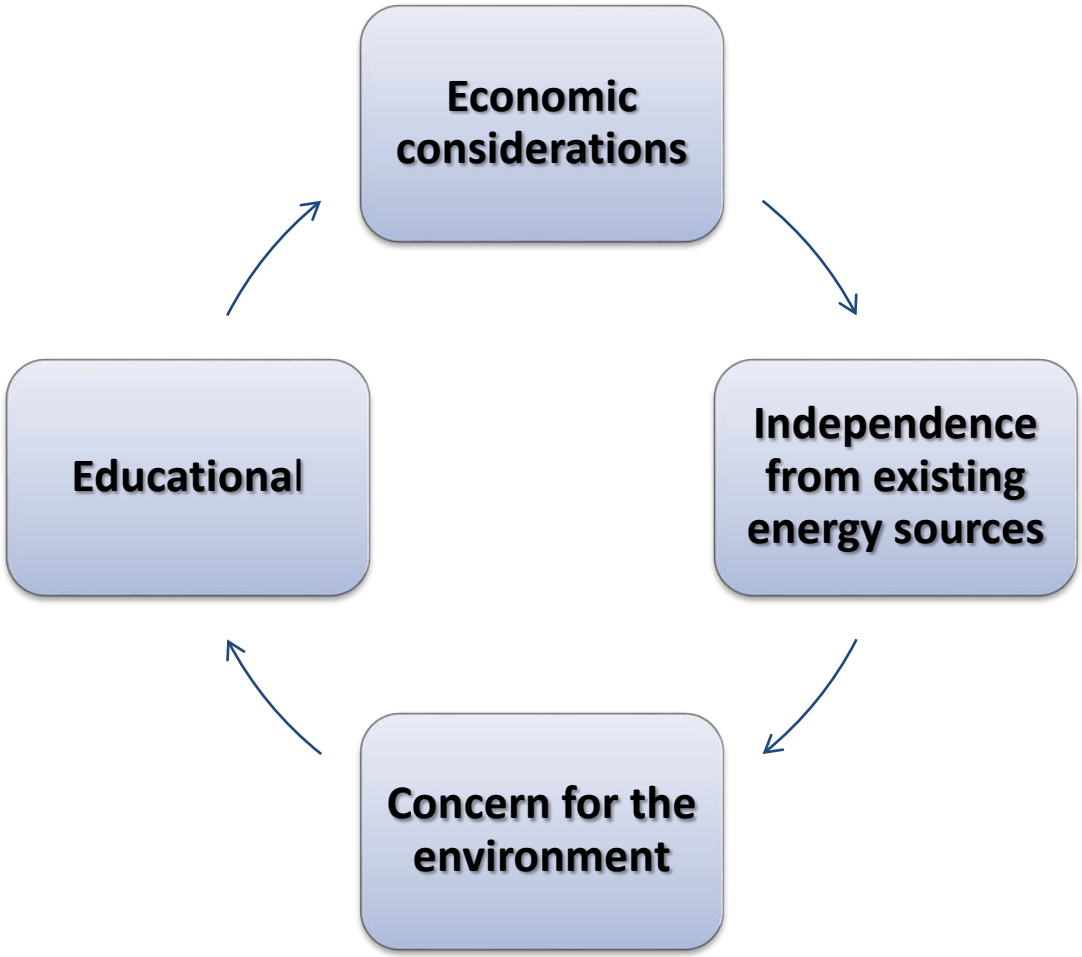
Why renewables!



Why renewables!

- Economic considerations
  - Offers “acceptable” rate of return
    - Determined by individuals discount rate and expectations
  - Price stability
    - Most renewables limit exposure to volatility
- Independence
  - Personal: “$%@&@ the utility!” OR “Thus I live in Alaska.”
  - National: Must focus on petroleum to be truthful
- Environment/Sustainability
  - Air/water pollution, climate change, intergenerational equity, etc.
  - Most powerful message for many
- Educational
  - Teaching tool (public sphere)
  - Technical fascination (private realm)

Why not renewables!?!

- Maintenance
  - Responsible for energy production, not simply delivered as a service
- Intermittent resource
  - Sun and wind cannot economically be stored
- **Opportunity cost**
  - Want to do it for the environment, future generations, independence?
  - Is this the best use of limited funds to achieve that aim?
- **Financial Cost**
  - Can be more expensive than existing energy from electric grid or fossil fuel resources

Why not renewables – Opportunity cost

- If value “non-market” benefits, is a particular renewable energy the best use of resources?
  - One renewable vs. another vs. efficiency vs. fossil fuel vs. local vs…

Questions/Discussion

Let’s talk…

Thank You for Attending

www.E3A4U.info