Renewables and Alternatives – Definitions

Chugach Board of Directors
Worksession

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Overview

- Problem Statement
- State of Alaska Definitions
- Other Definitions
- Discussion
- Energy Generation Possibilities
- Conclusions

Why Are We Here and What Do We Want to Accomplish?

- To discuss and consider definitions
- Need to agree upon a set of definitions
- Need to agree upon an economic model
- Need to agree upon the level of environmental consideration for each generation technique – how and why
- Note that we have a Renewables Committee working away without Board-level agreement on what these things are

Definitions – Alaska Statutes

- Sec. 45.88.010. Fund established.

- (a) There is established in the Department of Commerce, Community, and Economic Development the alternative energy revolving loan fund to carry out the purposes of AS 45.88.010 - 45.88.090. Loans made under AS 45.88.010 - 45.88.090 are to be used to **develop means of energy production utilizing energy sources other than fossil or nuclear fuel, including, but not limited to, windmills, water and solar energy devices.**

Definitions – Alaska Code

- Sec. 45.88.090. Definition.
- (a) In AS 45.88.010 - 45.88.090, "alternative energy system"
- (1) **means a source of thermal, mechanical or electrical energy which is not dependent on oil or gas or a nuclear fuel for the supply of energy for space heating and cooling, refrigeration and cold storage, electrical power, mechanical power, or the heating of water;**
- (2) includes
- (A) an alternative energy property as defined by 26 U.S.C. 48(a)(3)(A) (Sec. 301, P.L. 95-618, Internal Revenue Code);
- (B) a method of architectural design and construction which provides for the collection, storage, and use of direct radiation from the sun;
- (C) a woodstove with a catalytic converter or a catalytic converter for a wood stove; and
- (D) a steam, hot water, or ducted hot air central heating system that uses wood or coal for fuel;
- (3) does not include
- (A) a stove that uses only wood, coal, or oil for fuel; or
- (B) a fireplace or fireplace insert.
- (b) *[Renumbered as AS 45.88.010 (d)].*

Definitions – Alaska Code

- Sec. 46.11.900. Definitions.
- In this chapter
- (1) "alternative energy system"
- **(A) means a source of thermal, mechanical, or electrical energy that is not dependent on oil or gas or a nuclear fuel for the supply of energy for space heating and cooling, refrigeration and cold storage, electrical power, mechanical power, or the heating of water;**
- (B) includes
- (i) an alternative energy property as defined by 26 U.S.C. 48(a)(3)(A); and
- (ii) a method of architectural design and construction that provides for the collection, storage, and use of direct radiation from the sun;
- (2) "department" means the Department of Commerce, Community, and Economic Development;
- (3) "energy audit" means a determination and written summary prepared under 42 U.S.C. 8216(b) of
- (A) the energy consumption characteristics of a building, including the size, type, and rate of energy consumption of major energy consuming systems of the building and the climate characterizing the region where the building is located; and
- (B) the energy conservation and cost savings likely to result from appropriate energy-conserving maintenance and operating procedures and modifications, including the purchase and installation of energy-related fixtures; for purposes of this subparagraph when a fossil fuel is the energy source, the energy cost savings shall be determined with reference to the projected price of that fossil fuel over a 10-year period;
- (4) "financial institution" means a bank, trust company, savings bank, savings and loan association, or credit union;

So what are we Really Talking About?

- Use of energy sources other than oil or natural gas in Alaska
- Coal only referred to in AS 45.88.010

What is an Alternative Fuel?

- Answers.com – any fuel that is not oil or natural gas
- Wiki – anything other than petroleum, coal, propane, natural gas
- Note that alternatives normally refer to vehicle fuels

What is Renewable Energy?

- Wiki – energy generation from natural resources which are naturally replenished
- NREL (National Renewable Energy Lab (DoE) – "… Fossil fuels are nonrenewable, that is, they draw on finite resources that will eventually dwindle, becoming too expensive or too environmentally damaging to retrieve. In contrast, renewable energy resources—such as wind and solar energy—are constantly replenished and will never run out."
- Note – the NREL definition does not consider environmental impact of renewable energy

Discussion – What Should We Base Our Decisions Upon?

- Economics
- Environmental Impact
- Long-Term Availability of Fuels
- Political Acceptability
- The Ability to Sell This to Our Members

Discussion – Generation Options

- With the previous discussion in mind, how then do we view various generation techniques?
- More importantly –
  - Why is one better than another?
  - What are the acceptable tradeoffs?
  - What are the quantifiable tradeoffs?
- Is it possible to rank order these?

Generation - Solar

- Positives –
  - Sunlight is free
  - Lots of wide open spaces for collectors
  - Zero emissions
  - Solar Power Satellites being pursued by DoD
- Negatives –
  - Collectors aren’t free
  - Efficiencies are low – 25% conversion at best
  - Long term energy storage required
  - Sun is gone for a long time in Alaska

Generation - Geothermal

- Positives –
  - There are available thermal heat sources
  - Zero emissions
- Negatives –
  - Largest geo project in CONUS is 35 mW
  - The closer you put one to an active volcano (Mount Spurr), the larger potential operational problem you have
  - Moderate capitol costs

Generation - Wind

- Positives –
  - Currently popular
  - Zero fuel, zero emissions
- Negatives –
  - Need backup power immediately available
  - Footprint 100X conventional generation
  - High O&M costs ~ 2-8 cents / kWh
  - Low availability ~ 10% or less of installed capacity

Generation - Biomass

- Positives –
  - Renewable
  - Good choice for Bush Alaska – small plants
- Negatives –
  - Same emissions problems as CTL
  - Nothing active in Alaska yet
  - Moderately high capitol costs

Generation – Coal to Liquids

- Positives –
  - Huge amount of coal available in Alaska
  - Same conversion technique as Biomass
  - Endothermic reaction – lots of available heat
- Negatives –
  - Need to sequester carbon dioxide
  - Uses coal- politically unpopular
  - Large, expensive plant required

Generation - Hydro

- Positives –
  - Fuels are essentially free
  - Zero emissions
- Negatives –
  - High capitol costs
  - Environmental footprint – fish / earthquakes
  - What happens if we have an extended cold spell?

Generation - Nuclear

- Positives –
  - Relatively cheap generation costs
  - Zero emissions
- Negatives -
  - How to handle expended fuels?
  - Traditional reactors are very large – high capitol costs
  - Environmental – what to do with expended fuels?
  - Public opposition – mushroom clouds / accidents

Generation - Coal

- Positives –
  - Lots of coal available
  - One of the lowest cost generation fuels
- Negatives –
  - Politically unpopular – MEA proposal / potential carbon taxes
  - Emissions, emissions, emissions
  - Not considered a renewable

Generation – Natural Gas

- Positives –
  - Very clean burning
  - We are currently doing this today
- Negatives –
  - Cook Inlet is running out – will have to get it from somewhere else – pipeline / CTL plant
  - Not formally a renewable

Generation – Petroleum-Based

- Positives –
  - Oil is well known and available
  - Pipeline and distribution network exists
- Negatives –
  - No way we can do this at $147/bbl
  - Emissions
  - Far more valuable as vehicle fuel
  - Not a renewable

Discussion

Conclusions

- What is our acceptable list of generation techniques?
- Is that list defensible?
- Upon what basis do we put something on that list and rank order one above another?
- What guidance do we need to give the Renewables Committee on this?