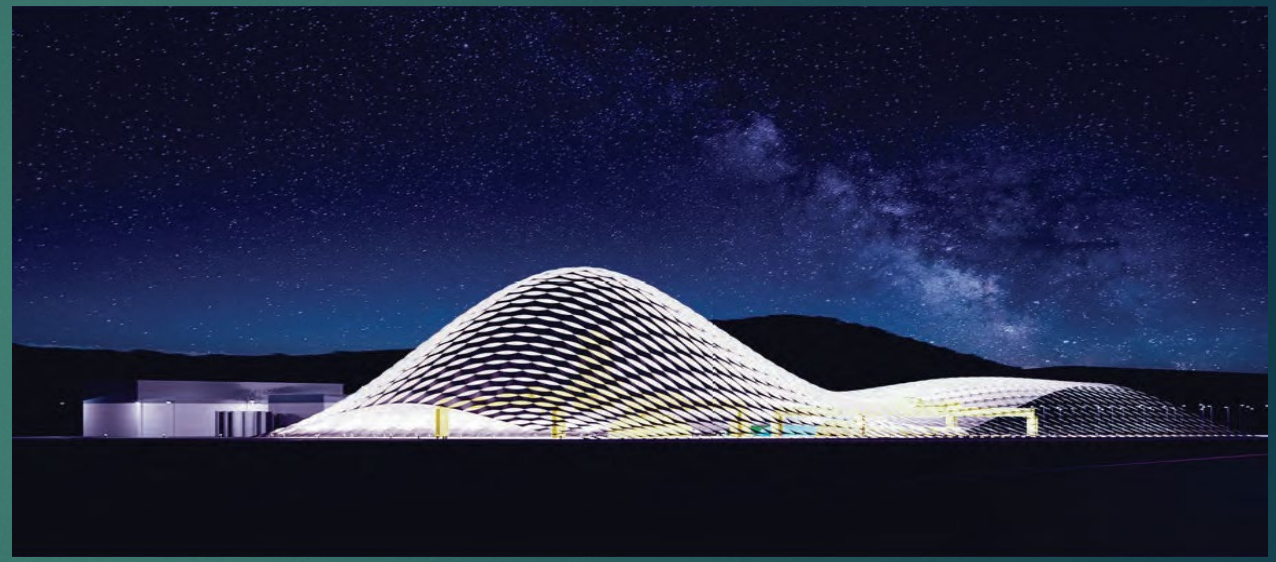
SB 194

ADVANCED NUCLEAR REACTORS



Architectural rendition of Power Plant, Clean Air Task Force report page 29

Advanced Nuclear Reactors

- Advanced nuclear reactors are
  - small enough to transport easily
  - run for 10 or more years without needing to be refueled
  - can power rural Alaskan villages, mining operations, military installments, or provide backup electricity to existing power grids
- Clean, safe, and reliable power can be provided to bring rural Alaska out of energy poverty
- SB 194 ensures that investments can be made with the knowledge that advanced nuclear reactors have a market here in Alaska

Current Law:

- AS 18.45.025 requires a **law** to be passed by the legislature for each individual location of use
  - This is in addition to licensing by the Nuclear Regulatory Commission and the Alaska Department of Environmental Conservation

What SB 194 does:

- Adds "**advanced nuclear reactor**" to the siting requirements in AS 18.45.025
- Removes requirement of a law being passed by the legislature for each parcel of land used by an **advanced nuclear reactor**
  - Only applies to advanced nuclear reactors
  - Leaves in local control
  - Leaves in DEC licensing
  - NRC licensing is federally required
- Signals to the industry that Alaska is open for business

Advanced Nuclear Energy

What is it?

- Advanced nuclear energy is not a specific technology.
- There are many companies who are developing advanced nuclear

- To be classified as "advanced nuclear energy," a reactor or fuel cycle must offer some of the following attributes:
  - lower capital and/or operational costs
  - manufacturability or rapid deployment capability
  - passive safety systems and inherent safety strategies
  - ease of operation and maintenance
  - reduced emergency planning zones, reduced offsite impact during an accident, and increased flexibility/scalability of siting
  - increased proliferation resistance
  - decreased water use
  - decreased waste production and/or an actinide management capacity
  - more efficient use of fuel resources
  - hybrid generation adaptability (e.g. hydrogen production, desalination) and/or load following
  - reduced material inputs

Why Alaska?

Remote Capability

Rural communities

- Alaska has ~300 remote communities that have small independent grids

Mining

- Current challenges accessing reliable and affordable energy
- Lower power costs could help extend mine life by making lower grade ore more profitable

Military

- Long-term operation without refueling
- Independent grids to supply secure and resilient power
- Black-start capable

Cost Effectiveness

Reduce electricity and heating costs significantly

Refuel every 10+ years

Projected cost:

$.09-.41 / kwh

Climate Friendly

Improving air quality in remote communities in Alaska

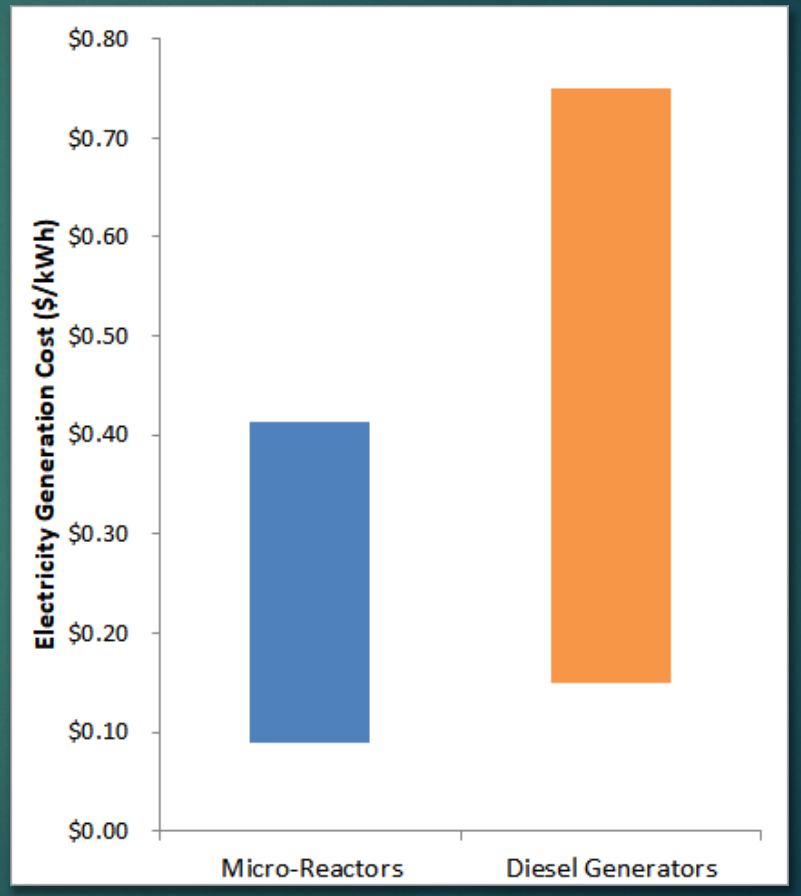
Diesel and coal account for 13% and 10% of the electricity generation, respectively

-2018 US Energy Information Administration Report

Carbon free

Cost of Energy Provided

- Microreactors can be cost competitive for remote applications such as arctic communities, islands, mines, and defense installations
- 1st generation micro-reactors
  - Estimated between 14-41 cents/kwh
- Future generations
  - Estimated between 9-33 cents/kwh



NEI Cost Competitiveness Report April 2019

PCE communities:
Example of electricity rates in rural Alaska

	Population	$/KWH*	
Adak	309	$	1.43
Stevens Village	41	$	1.07
Takotna	64	$	1.02
Chalkyitsik	79	$	0.95
Igiugig	53	$	0.92
Ruby	178	$	0.75
Napakiak	355	$	0.70
Galena	488	$	0.67
Fort Yukon	558	$	0.66
Tanana	224	$	0.65
Tenakee Springs	140	$	0.65
Aniak	517	$	0.63
Ambler	260	$	0.54
Unalaska	4448	$	0.50
Bethel	6294	$	0.35
Nome	3777	$	0.33

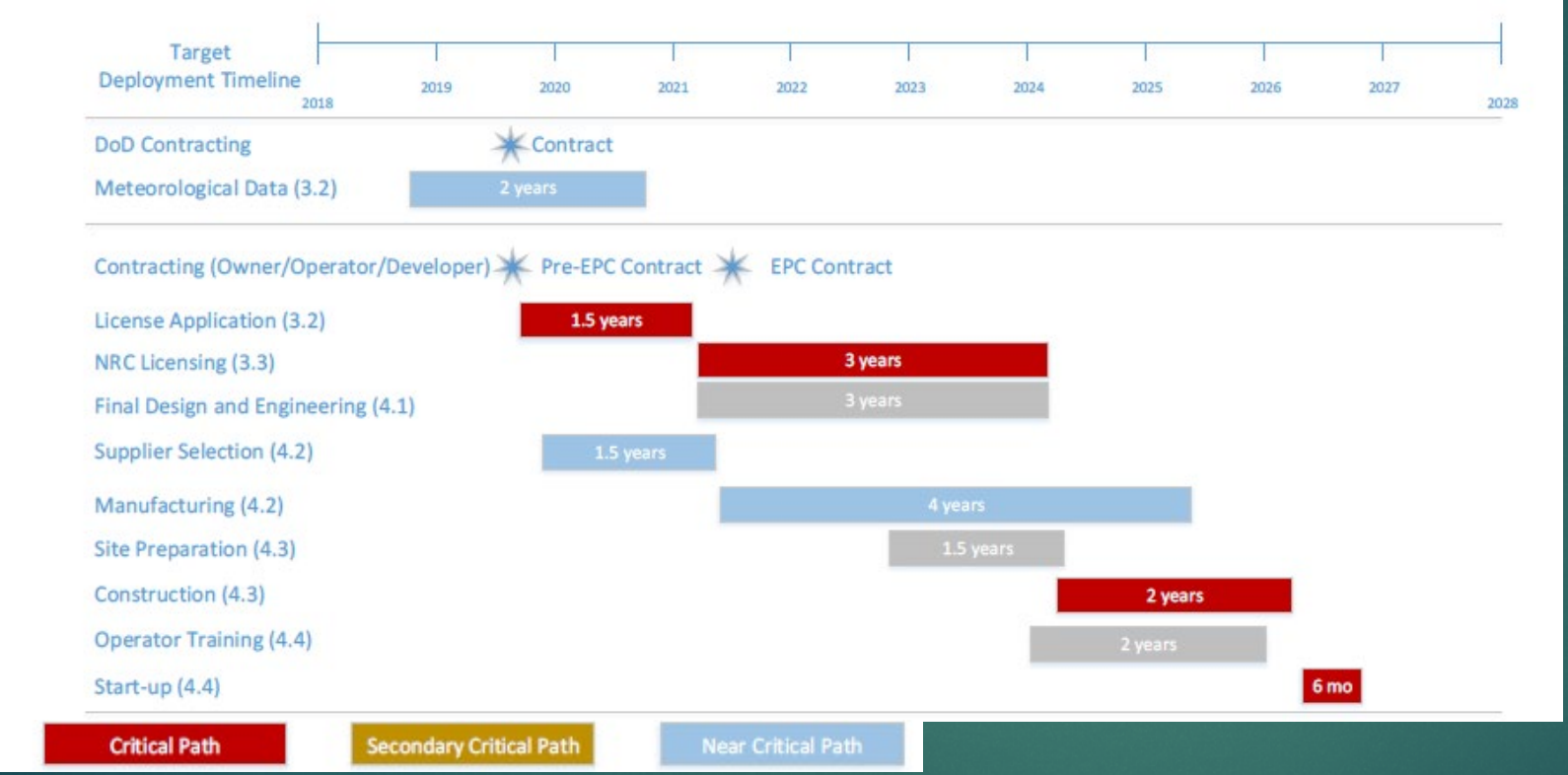
PCE Floor
17.58 cents

*before PCE

The Power Cost Equalization Program provides economic assistance to communities and residents of **rural** electric utilities where the cost of electricity can be **three to five** times higher than for customers in more **urban** areas of the state

-PCE Fact Sheet April 2019

Estimated Timeline



Micro-reactor technology is maturing rapidly, with over a dozen designs under development, and an expected deployment of the first commercial micro-reactor in the mid-2020s.

- NEI Cost Competitiveness report

Safety

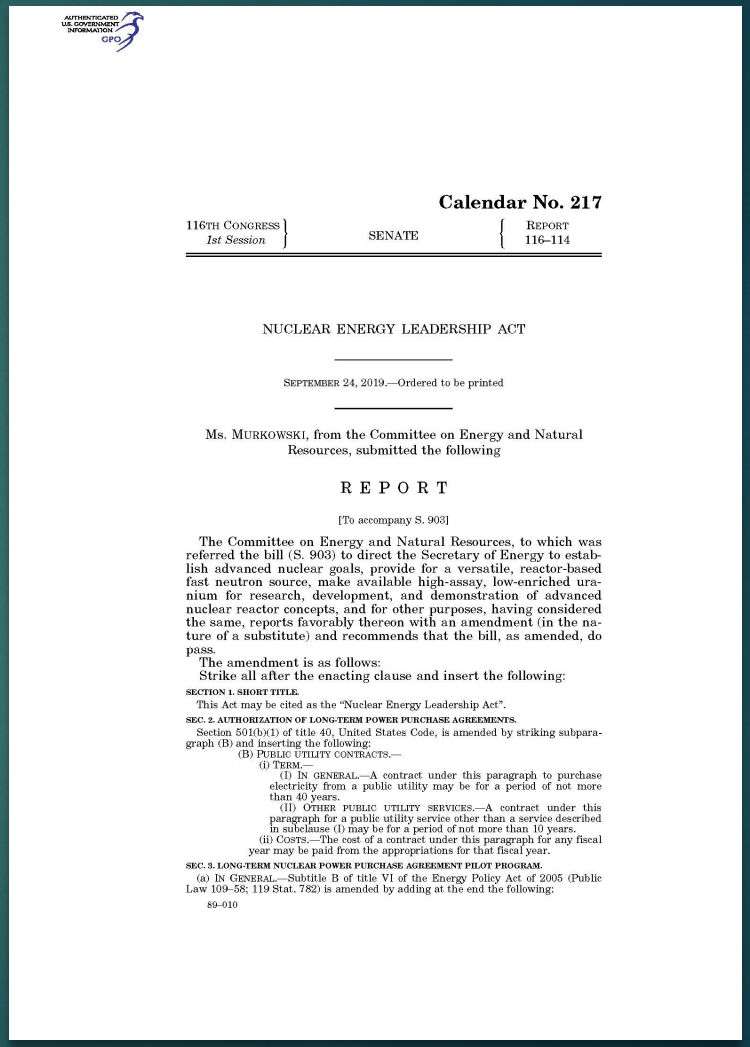
- Many technologies incorporate passive or inherent safety features
- Require no active controls or operational intervention to avoid accidents in the event of malfunction, and may rely on gravity, natural convection or resistance to high temperatures

* Traditional reactor safety systems are 'active' in the sense that they involve electrical or mechanical operation on command

- Designed to reduce the probability of an accident
  - Atmospheric Pressure
  - Cooling system that doesn't use water
    - Liquid Metal
    - Molten Salt
  - Minimal or no moving parts

Nuclear Energy Leadership Act (S. 903) Senator Lisa Murkowski

- SB 194 aligns with Senator Murkowski's efforts at the national level
- NELA sets goals for nuclear energy in the US
  - Calls for demonstration of two advanced nuclear reactors by end of 2025
- Defines "advanced nuclear reactor" the same as SB 194



Calendar No. 217

116TH CONGRESS, 1st Session | SENATE | REPORT 116–114

NUCLEAR ENERGY LEADERSHIP ACT

SEPTEMBER 24, 2019.—Ordered to be printed

Ms. MURKOWSKI, from the Committee on Energy and Natural Resources, submitted the following

REPORT

[To accompany S. 903]

The Committee on Energy and Natural Resources, to which was referred the bill (S. 903) to direct the Secretary of Energy to establish advanced nuclear goals, provide for a versatile, reactor-based fast neutron source, make available high-assay, low-enriched uranium for research, development, and demonstration of advanced nuclear reactor concepts, and for other purposes, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill, as amended, do pass.

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Nuclear Energy Leadership Act".

SEC. 2. AUTHORIZATION OF LONG-TERM POWER PURCHASE AGREEMENTS.

Section 501(b)(1) of title 40, United States Code, is amended by striking subparagraph (B) and inserting the following:

(B) PUBLIC UTILITY CONTRACTS.—

(i) TERM.—

(I) IN GENERAL.—A contract under this paragraph to purchase electricity from a public utility may be for a period of not more than 40 years.

(II) OTHER PUBLIC UTILITY SERVICES.—A contract under this paragraph for a public utility service other than a service described in subclause (I) may be for a period of not more than 10 years.

(ii) COSTS.—The cost of a contract under this paragraph for any fiscal year may be paid from the appropriations for that fiscal year.

SEC. 3. LONG-TERM NUCLEAR POWER PURCHASE AGREEMENT PILOT PROGRAM.

(a) IN GENERAL.—Subtitle B of title VI of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 782) is amended by adding at the end the following:

89–010

Questions?

Presentation by:
Cody Grussendorf
Staff to Senator Click Bishop