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Small Modular Nuclear Reactors (SMRs): Development of Small Nuclear Reactors (SMRs) to Supplement Power Needs

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Abstract

- Small Modular Reactor (SMR) is a small nuclear reactor that can operate as part of or independently of the electrical grid system
- 100 to 1,000 times smaller than typical nuclear reactors
- Modular and easily transportable
- Reliable and operationally flexible

Comments
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Small Modular Nuclear Reactors (SMRs)

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OVERVIEW
- Small Modular Reactor (SMR) is a small nuclear reactor that can operate as part of or independently of the electrical grid system
- 100 to 1,000 times smaller than typical nuclear reactors
- Modular and easily transportable
- Reliable and operationally flexible

COST
- Nuclear Battery/SMR should cost 70-115 USD/MWh to be competitive
- Disposal of spent fuel will cost around 1 USD/MWh (~every 3 to 10 years)
- Large scale production makes these figures much more attainable

APPLICATIONS
- Can act as power sources for remote areas (i.e. remote mining operations)
- SMRs have the ability to quickly generate power and shut down as needed. This makes the a reliable and safe energy source.
- Useful when power needs aren’t being met due to
  - Renewable energies being unreliable during a 24 hours cycle
  - Increased demand during evening hours and certain times of the year
  - Energy security for critical infrastructure such as hospitals, military installations, and emergency response centers.

BENEFITS
- Non Carbon emitting
- Easy installation and transportation
- Self regulating
- Reliable and resilient
- Easier to operate than large power reactors
- Long operation life
- Varied application potential
- On and Off grid uses

RECOMMENDATIONS
- Use SMRs when performing remote operations
  - Offset cost of trucking fuel and overloading power grid during operations
- Develop SMRs for communities that experience power extremes during certain times of the year
  - i.e unstable weather conditions
- Implement nuclear sector training programs for local talent and job growth
- Provides research opportunities to address industry challenges and encourage reactor design and safety innovation.

OBSTACLES
- SMRs may challenge current laws and regulations in the United States and internationally
- Adequate space and access to water, fuel, backup power
- Accessibility to site for security and emergency responses
- High capital and operations and maintenance (O&M) costs

REFERENCES (APA)