NUCLEAR SERIES PART 4

WYOMING'S NUCLEAR SUPPLY CHAIN OPPORTUNITIES AND CHALLENGES: HEAT APPLICATIONS

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WHY THE STUDY WAS NEEDED

This report is one of a series evaluating the feasibility of developing an integrated nuclear sector in Wyoming. From the mine mouth to spent fuel processing, each step in the nuclear supply chain has unique economic considerations. To compare the opportunities for Wyoming across the nuclear supply chain, a qualitative scoring system of advantages and obstacles is applied (Gebben & Peck, 2023). The summary of these scoring criteria for nuclear heat applications of nuclear energy is provided in Table 1.

ABOUT THE STUDY

This report quantifies the economic outcomes of potential non-electricity uses of nuclear power in Wyoming. The unique opportunities and challenges of expanding the industry are identified. Additionally, an event study is performed that estimates economic outcomes under a range of technological adoption scenarios.

WHAT THE RESEARCHERS CONCLUDED

The analysis concludes that there is potential to apply nuclear technology to non-electricity generation uses in Wyoming. Directly applying nuclear produced heat to industrial processes creates economic cost savings compared to using nuclear energy exclusively for electricity generation. The unique attributes of nuclear power, including reliable heat output and high operational uptime, create technological benefits for nuclear reactors.

Table 1:
Significant Economic Factors Related to Wyoming Nuclear Heat Uses

	Industrial Applications		Hydrogen Production		Shale Oil Extraction	
	Level	Summary	Level	Summary	Level	Summary
Economic	Moderate Obstacle	Alternatives are cheaper	Major Obstacle	Developing infrastructure	Severe Obstacle	High cost of production. Not competitive with other oil sources
Existing Industries	Minor Advantage	Trona mines and manufacturing	Minor Advantage	Existing oil refineries	Major Obstacle	No current projects
Tax Structure	Major Advantage	Tax exemptions from State and Federal Government	Major Advantage	Tax exemptions	Major Advantage	Tax exemptions
Location	Minor Obstacle	Existence of trona resources. Low infrastructure	Minor Obstacle	Storage locations for hydrogen. (sandstone)	Major Advantage	Large reserves
Legal	Minor Obstacle	Costs from NRC reports	Minor Obstacle	Cost from NRC reports	Minor Obstacle	Costs from NRC reports
Technology	Minor Obstacle	Cost reductions expected	Minor Obstacle	Cost reductions expected	Moderate Obstacle	Cost reductions expected

Table 2:
Wyoming: Yearly Benefits of Direct Heat Applications of Nuclear[4]

	Tax Revenue (Million USD)		Employment
	Gross (Yearly)	**Total Revenue[5] (Over 50 Years)**	**Full Time Equivalent (Yearly)**
Industrial Heating	$37.0	$634	2,545
Hydrogen Production	$61.3	$1,052	4,225
Oil Shale Extraction	$886	$15,200	61,019

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