



Impacts of climate change and global energy transitions on community security in Arctic Alaska

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Background

- Alaska's economy is driven by the **oil and gas industry**
- Global energy transitions** in line with climate change mitigation targets could result in declining fossil fuel demand
- Arctic Alaska will face **major climate change impacts** including:
 - Declining sea ice (with implications for offshore oil & gas access)
 - Changing heating & cooling demand in residential buildings
 - Vulnerability of civil infrastructure and subsistence food systems
- Impacts on **community security** (which includes economic, food, and energy systems) depend on **diverse local context**

Global Change Analysis Model (GCAM)

- GCAM is a long-term global integrated assessment model with linked socioeconomic, energy, land, water, and climate systems
- GCAM-USA provides state-level detail; we have added additional detail to the model's representation of fossil resource production
- We use GCAM to explore impacts of global drivers on the Alaskan oil and gas industry and residential energy needs

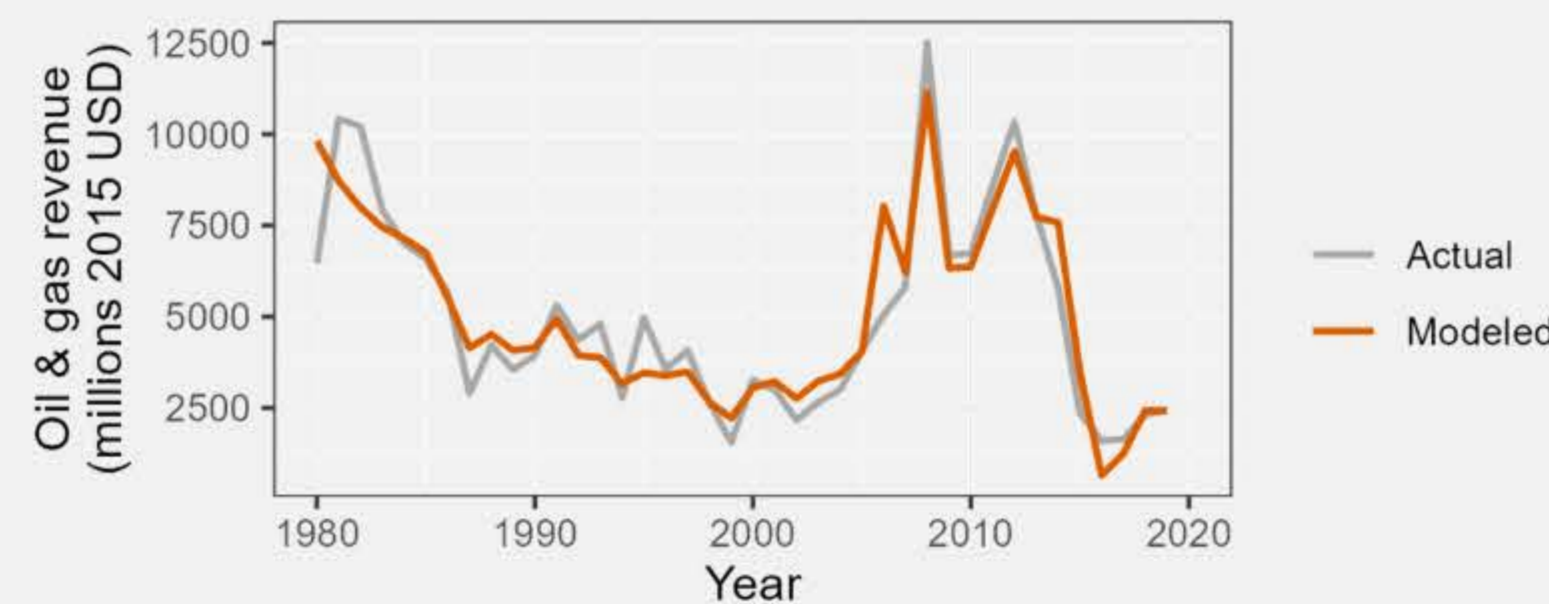
Scenarios

Scenario	Climate change impacts	Mitigation policy
Reference	None	None
RCP4.5	Heating/cooling degree days and sea ice thickness consistent with RCP	Carbon price needed to reach RCP target
RCP2.6	Heating/cooling degree days and sea ice thickness consistent with RCP	Carbon price needed to reach RCP target

Quantitative downscaling

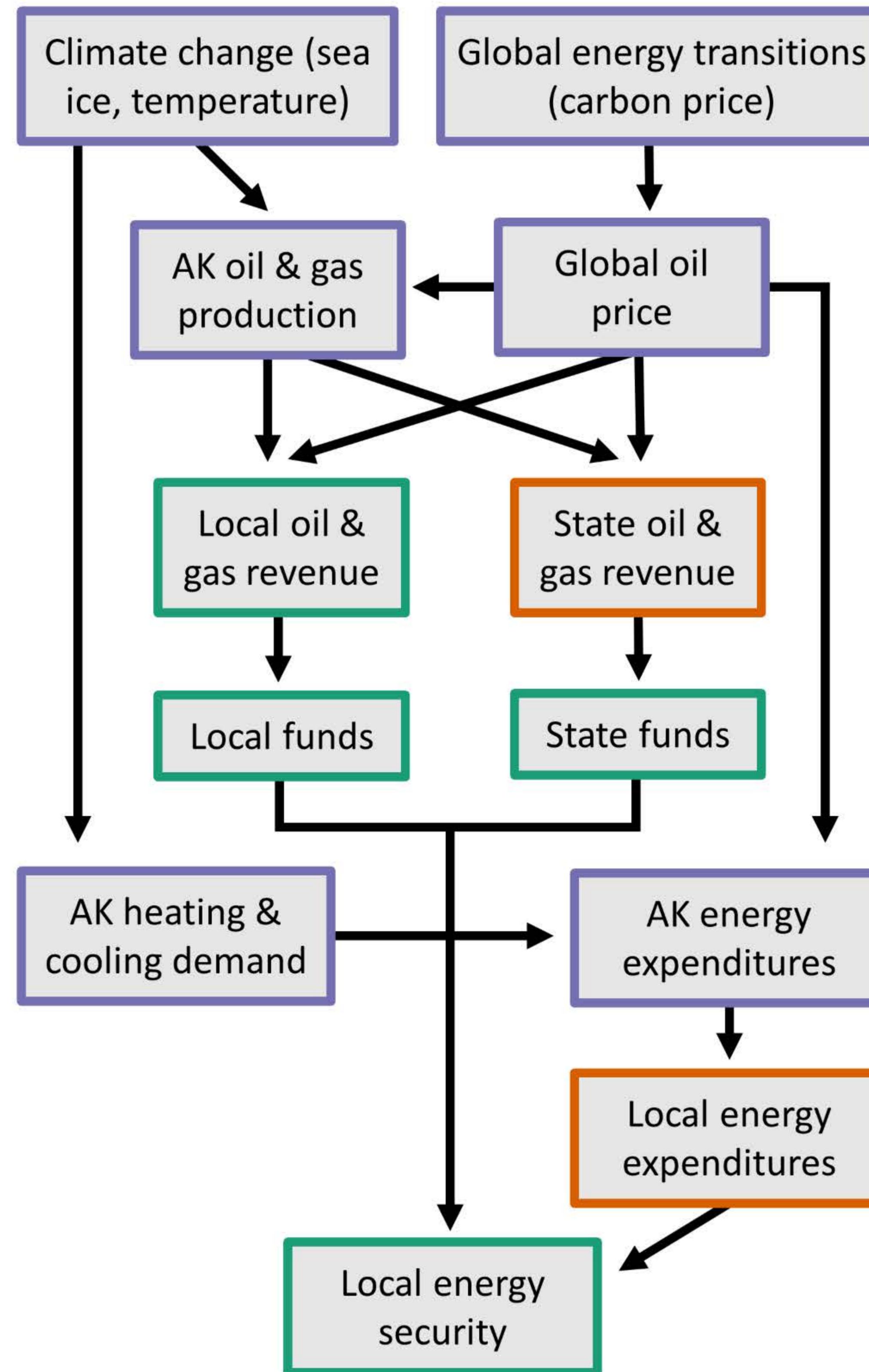
State oil & gas revenue

- Estimated from Alaskan production and global price based on regression model from historical data



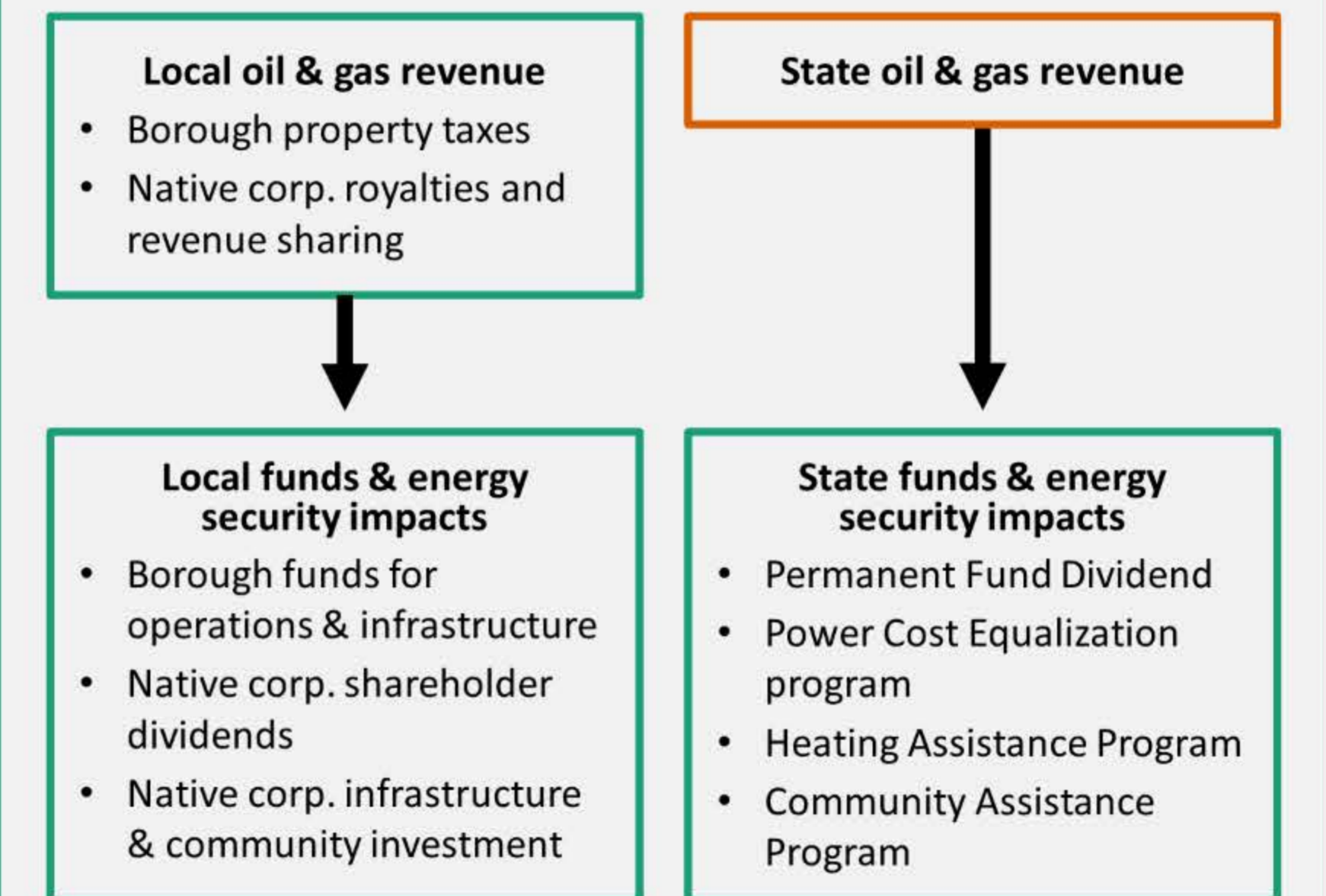
Local energy expenditures

- Downscaled from state expenditures based on population and historical data on per household energy consumption

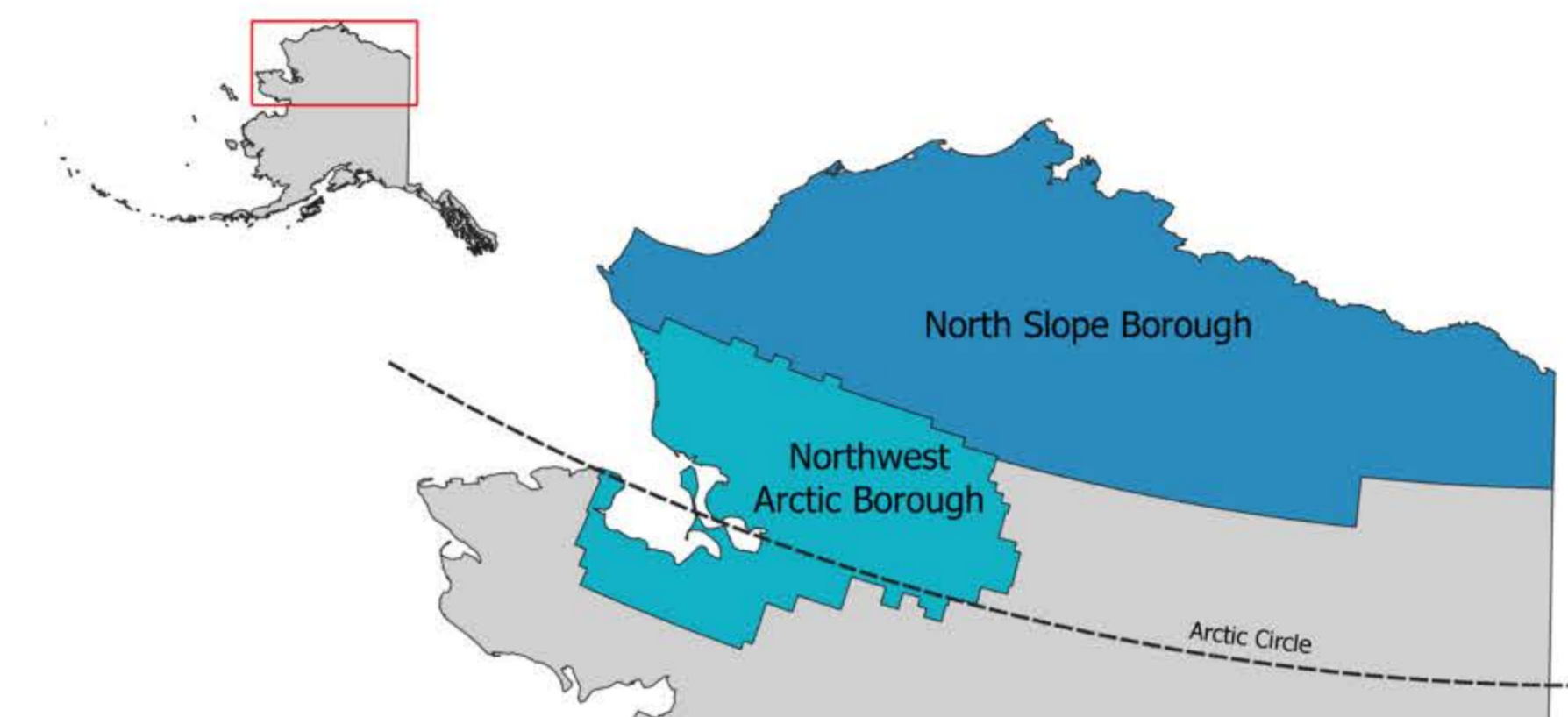


Conceptual diagram depicting some of the global, regional, and local drivers and dynamics related to energy security in Arctic Alaskan communities. The analysis will also explore economic and food systems.

Qualitative downscaling



Regional comparison



	North Slope Borough	Northwest Arctic Borough
Borough revenue sources	<ul style="list-style-type: none"> 95% oil & gas property taxes < 5% state & federal 	<ul style="list-style-type: none"> 83% Red Dog Mine payments 6% state and federal
Native corp. revenue sources	<ul style="list-style-type: none"> Oil & gas royalties Revenue sharing Other 	<ul style="list-style-type: none"> Revenue sharing Other
Fossil fuel subsidies	<ul style="list-style-type: none"> Diesel heating fuel subsidy 	<ul style="list-style-type: none"> None
Status of RE	<ul style="list-style-type: none"> No current capacity No confirmed plans 	<ul style="list-style-type: none"> Solar in all communities & other RE in many Plans to expand RE