



## U.S. Clean Carbon Costs:

*An Investigation of Georgia Markets and Solar Technology*

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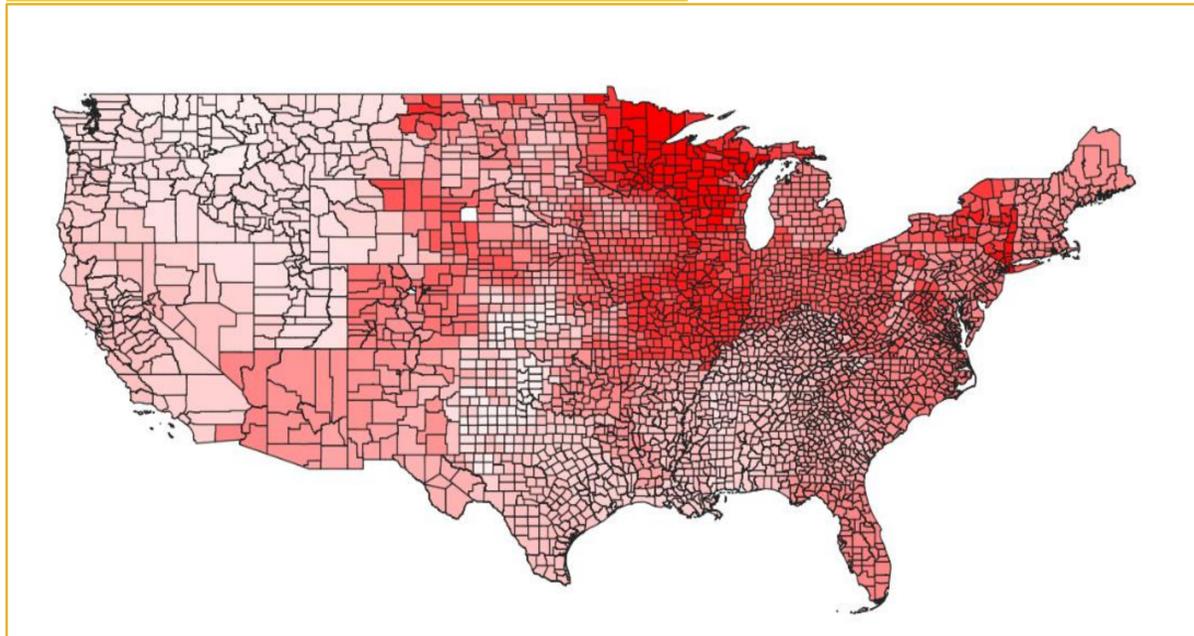
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## Energy Costs in the United States



- The Levelized Cost of Energy allows different methods of power generation to be assessed in terms of their costs. Power generating assets require an upfront investment to create and expenses over the course of their lifetimes to maintain. The LCOE offers a powerful metric for policymakers, researchers, and others to compare sources of energy when considering the long-term cost-benefit analyses.
- To create a nationwide LCOE model for all energy types, several assumptions made in order to simplify the calculation. For my calculations, I used a simple LCOE equation that excluded the environmental costs for each energy source because I only wanted to conduct a financial analysis without in regards to environmental costs analyses.

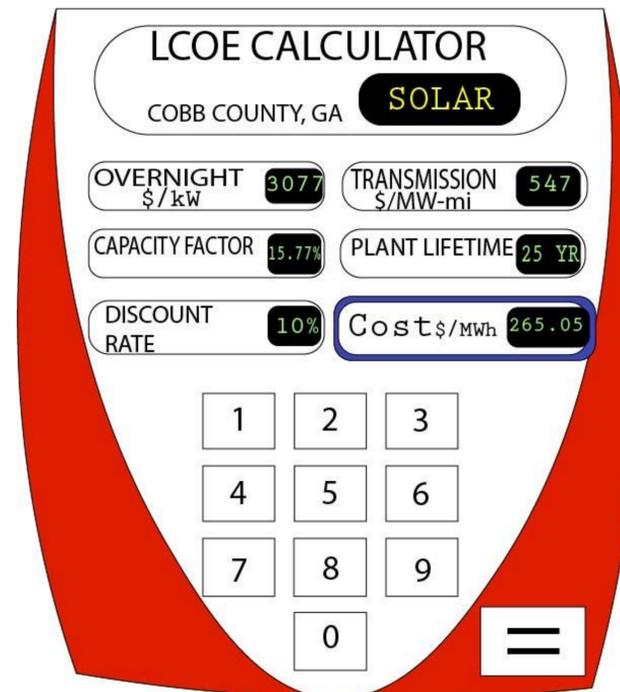
## Georgia's Energy Costs

- Average Power Capacity ( $P_{avg}$ ): 1876 Megawatts
- Average Transmission costs in Georgia: \$1.03 million/mile
- Average Transmission costs nationwide: \$4.12 million/mile
- LCOE for GA assuming nat'l trans cost: \$256 MWh
- LCOE for GA assuming state trans cost: \$262.71 MWh
- Average Capital Cost for Natural Gas in Georgia: \$939.8/kW
- Average Capital Cost for Solar in Georgia: \$3082.0/kW
- Three types of utilities occupy the electric service industry in Georgia with the first being investor-owned utilities, customer-owned utilities, and government-owned utilities. Customer-owned utilities power almost 40% of the population with 4.1 million people using their services in the state. Their unique features allow the generation, transmission, and distribution of electricity to be operated by three separate, non-profit corporations.
- According to my findings, Georgia's transmission costs are a quarter of that used in national averages which indicates some level of market efficiency that possibly originates from customer-owned utilities.

## Georgia's Energy Grid



Georgia Transmission Corporation  
Site Tour: 2 April, 2019



**KENNESAW STATE UNIVERSITY**

## Case Study: Solar

- The Sun emits energy in the form of electromagnetic radiation, and a small fraction of it reaches Earth. This value is known as solar irradiation. Geographical location, and time of year affect the amount of solar irradiation that actually reaches the ground or whichever surface is in question.



KSU, Marietta campus

- I calculated maximum value for solar irradiation and divided it by the electrical power that was captured by the solar panels on campus in order to derive the efficiency of the system. This "efficiency" directly affects the price of electricity. By increasing the amount of kW captured, the cost per unit of energy delivered decreases.

