

# Is Bigger Best in Renewable Energy?

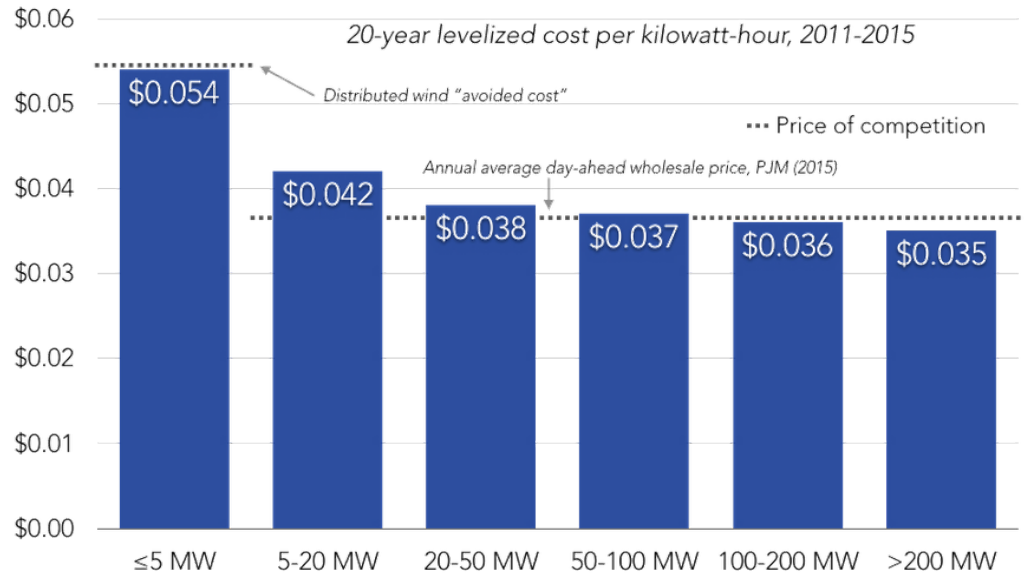
Conventional wisdom suggests the biggest wind and solar power plants will be cheapest, but where they deliver power, and who will own them, matters more.

John Farrell, September 2016

## Limits to Scale in Wind:

- Most of the economies of scale in producing wind electricity are from scaling up from 1-2 turbines to about 10.
- Local delivery of distributed wind can compete with avoided costs at the distribution level just as large projects can at the wholesale level.

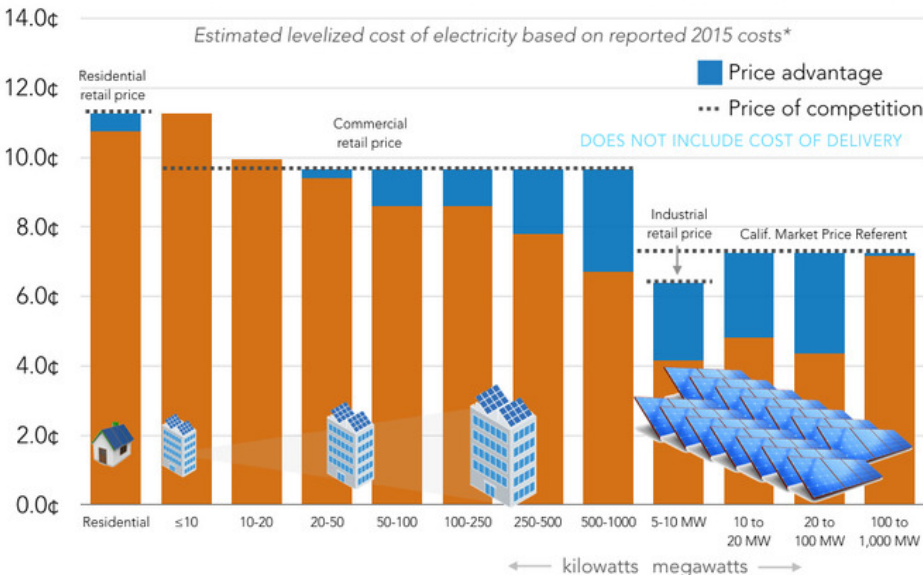
### WIND PRICES V. THE MARKET



Source: Wind Technologies Market Report

## Limits to Scale in Solar:

### SOLAR COMPETES AT MOST SIZES



- Solar power is competitive at nearly any scale, if compared to the price of its competition. (Note: figures for large-scale solar do not include transmission costs.)
- Community solar projects may hit the sweet spot for competitive solar, capturing economies of scale but delivering power locally.

Sources: Tracking the Sun IX and Utility-Scale Solar 2015 (SunShot, Berkeley Labs); EIA (2014 data); CPUC (2011); NYMEX (2016); ILSR

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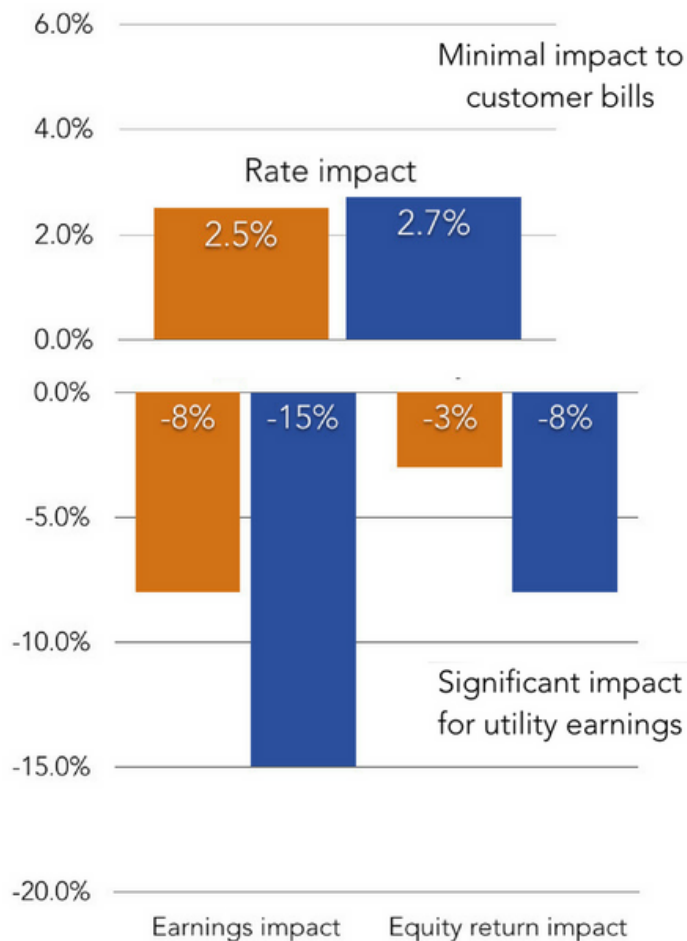
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## Why Economics Isn't The Issue:

- The proper size of solar is a proxy fight: Distributed solar isn't at odds with utility-scale solar as much as it runs counter to the traditional utility business model.
- The question is whether our regulatory and business models are capable of most effectively seizing technology of the 21st century to create an efficient and reliable electricity system AND whether the profits from participating are distributed according to their value to the system, rather than a legacy of control.

## BOTTOM LINE of 10% customer-owned solar



Source: Berkeley Labs, 2014

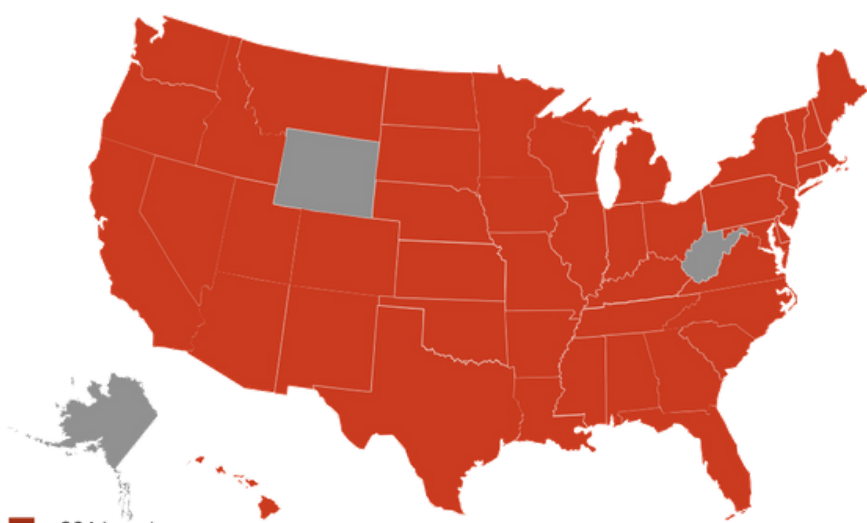
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## FREEDOM TO GENERATE UNDER FIRE

■ STATES FACING CHALLENGES TO DISTRIBUTED POWER



■ - 2016 action  
■ - No recent action

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Source: The 50 States of Solar: Q4 2016, NC Clean Energy Technology