

JANUARY 31, 2018



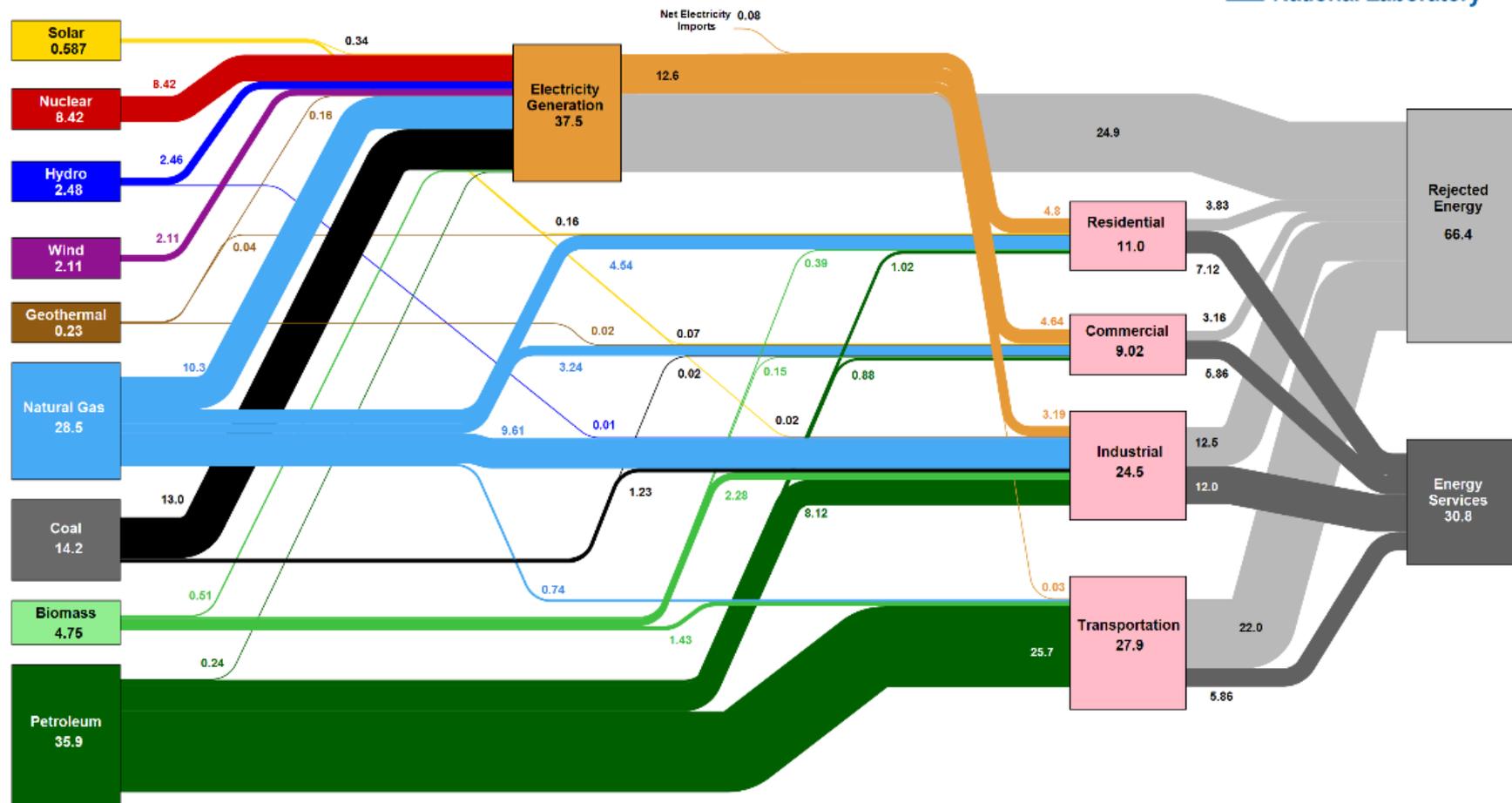
NATURAL GAS' FUTURE AS A VERSATILE GLOBAL COMMODITY

UT Energy Week 2018 – Austin, TX, USA

DR. CAREY W. KING

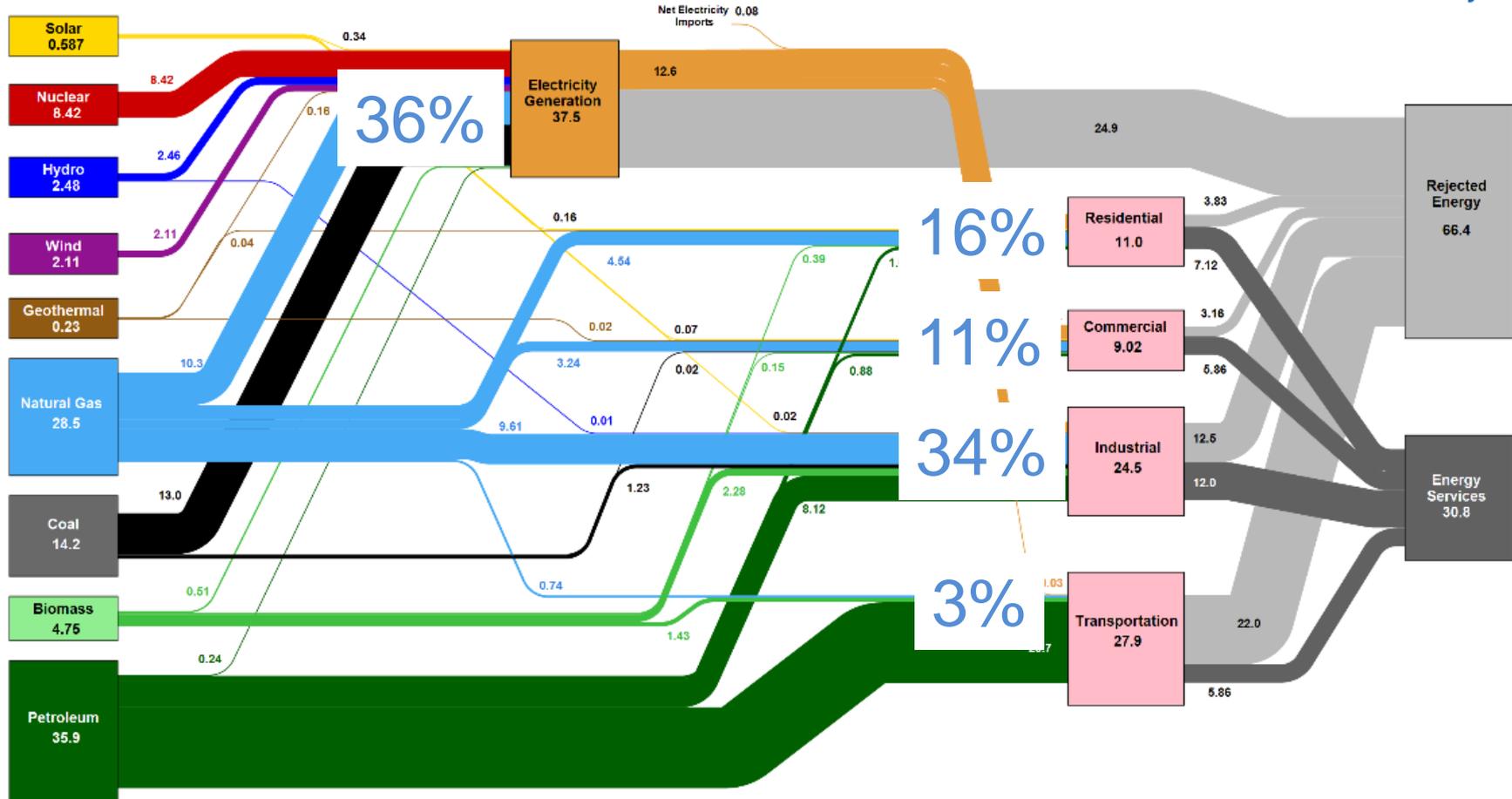
Research Scientist and Assistant Director, Energy Institute, The University of Texas at Austin

Estimated U.S. Energy Consumption in 2016: 97.3 Quads



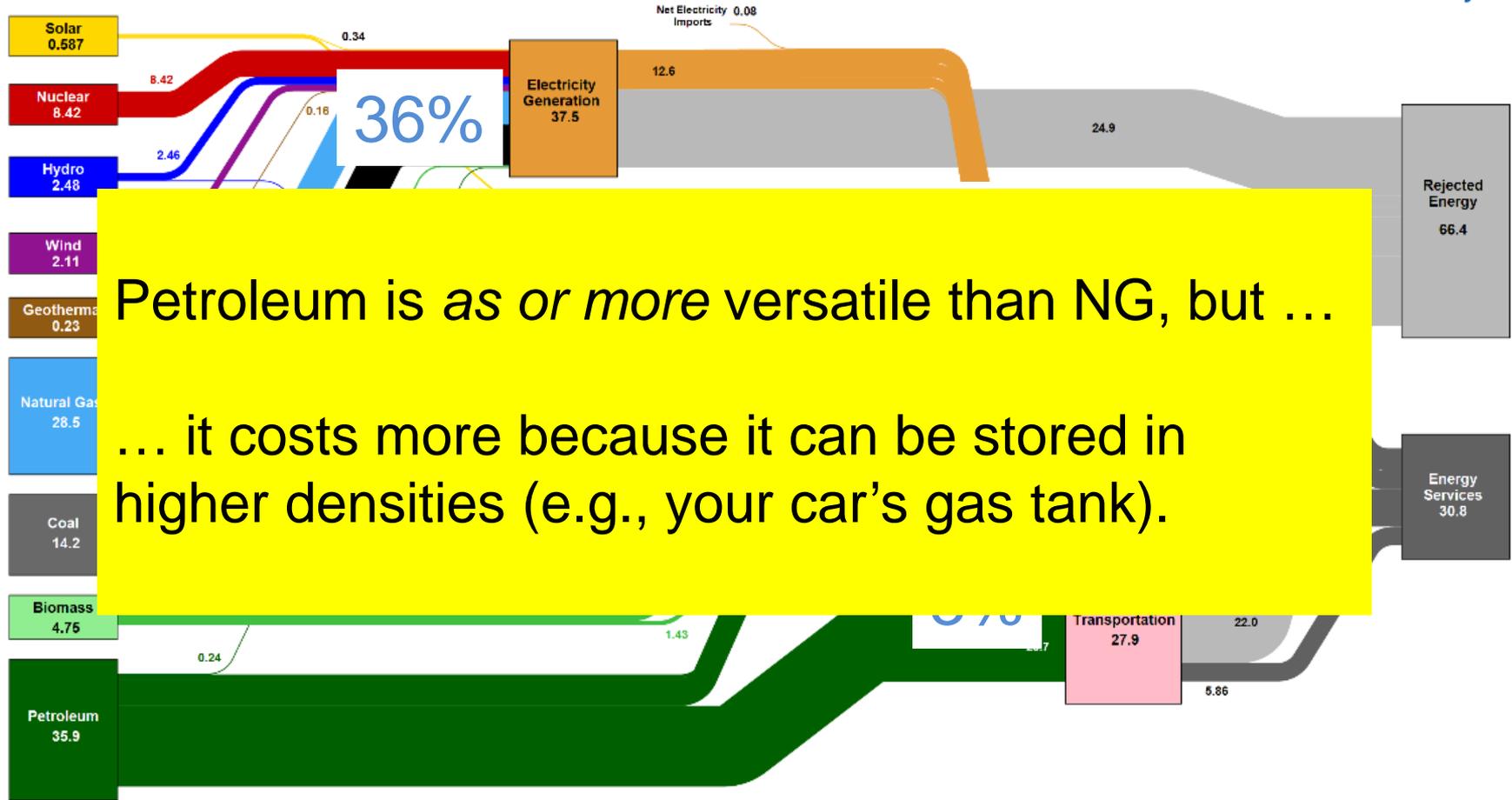
Source: LLNL March, 2017. Data is based on DOE/EIA MER (2016). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. This chart was revised in 2017 to reflect changes made in mid-2016 to the Energy Information Administration's analysis methodology and reporting. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 85% for the residential sector, 85% for the commercial sector, 21% for the transportation sector, and 48% for the industrial sector which was updated in 2017 to reflect DOE's analysis of manufacturing. Totals may not equal sum of components due to independent rounding. LLNL-RI-16-0527

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Petroleum is *as or more* versatile than NG, but ...
... it costs more because it can be stored in higher densities (e.g., your car's gas tank).



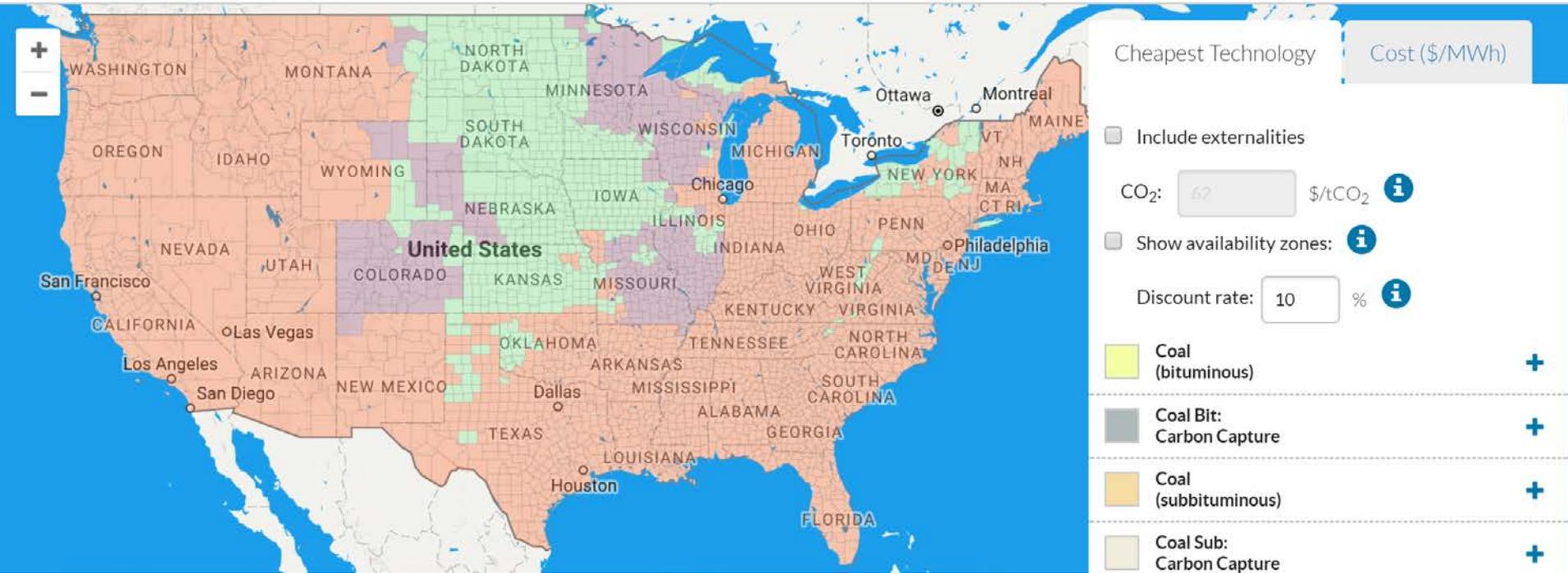
Generation Technology with lowest LCOE

CHANGES THE WORLD

LEVELIZED COST OF ELECTRICITY 
In the United States by County* Version 1.3.2



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Energy Institute: <http://calculators.energy.utexas.edu/>



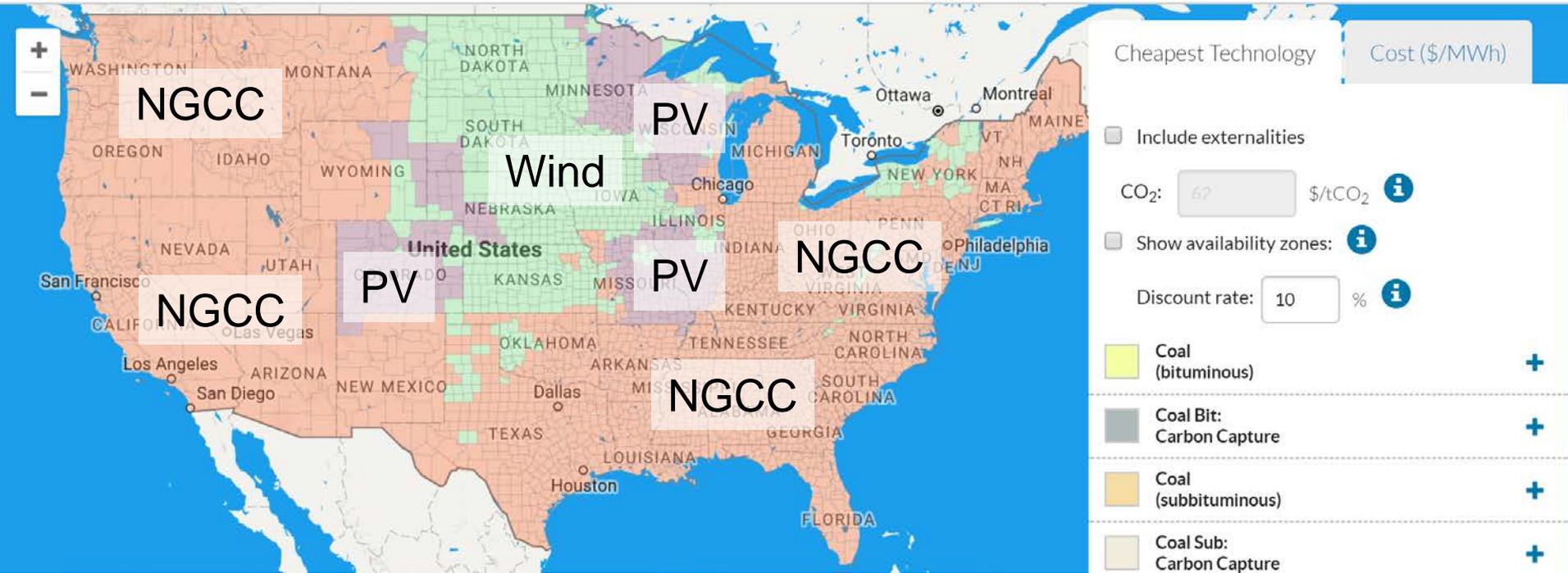
Generation Technology with lowest LCOE

NGES THE WORLD

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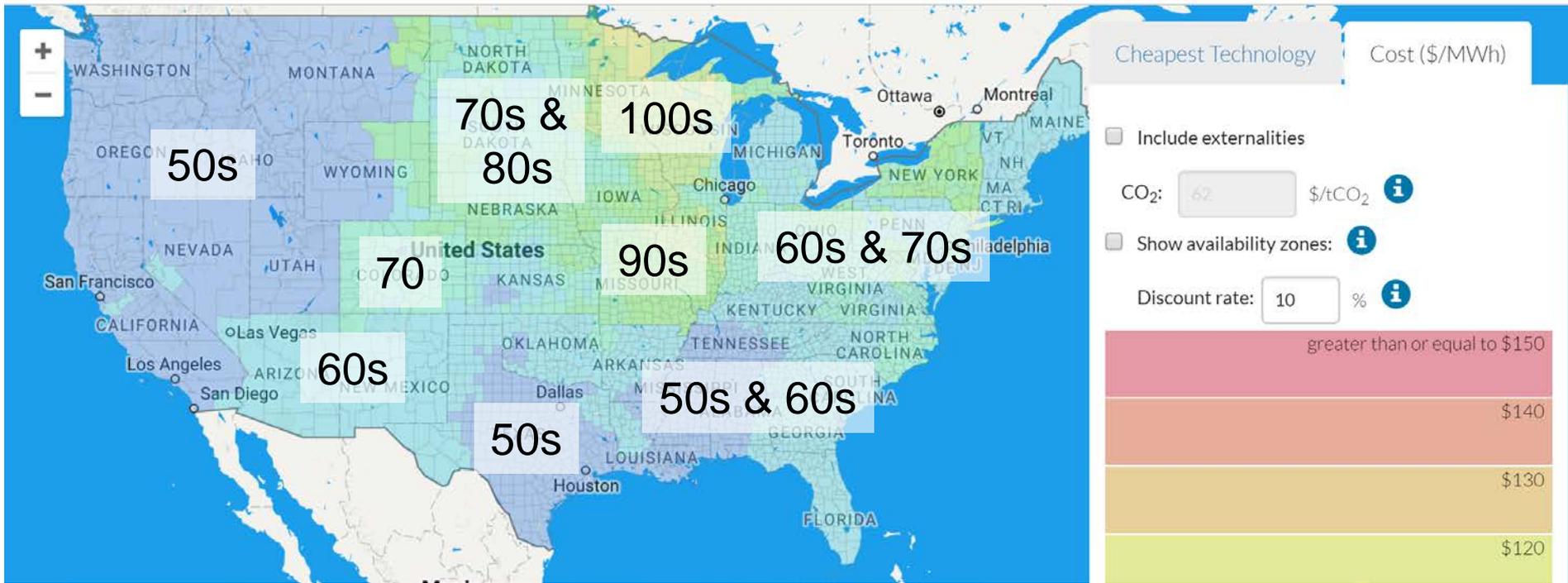
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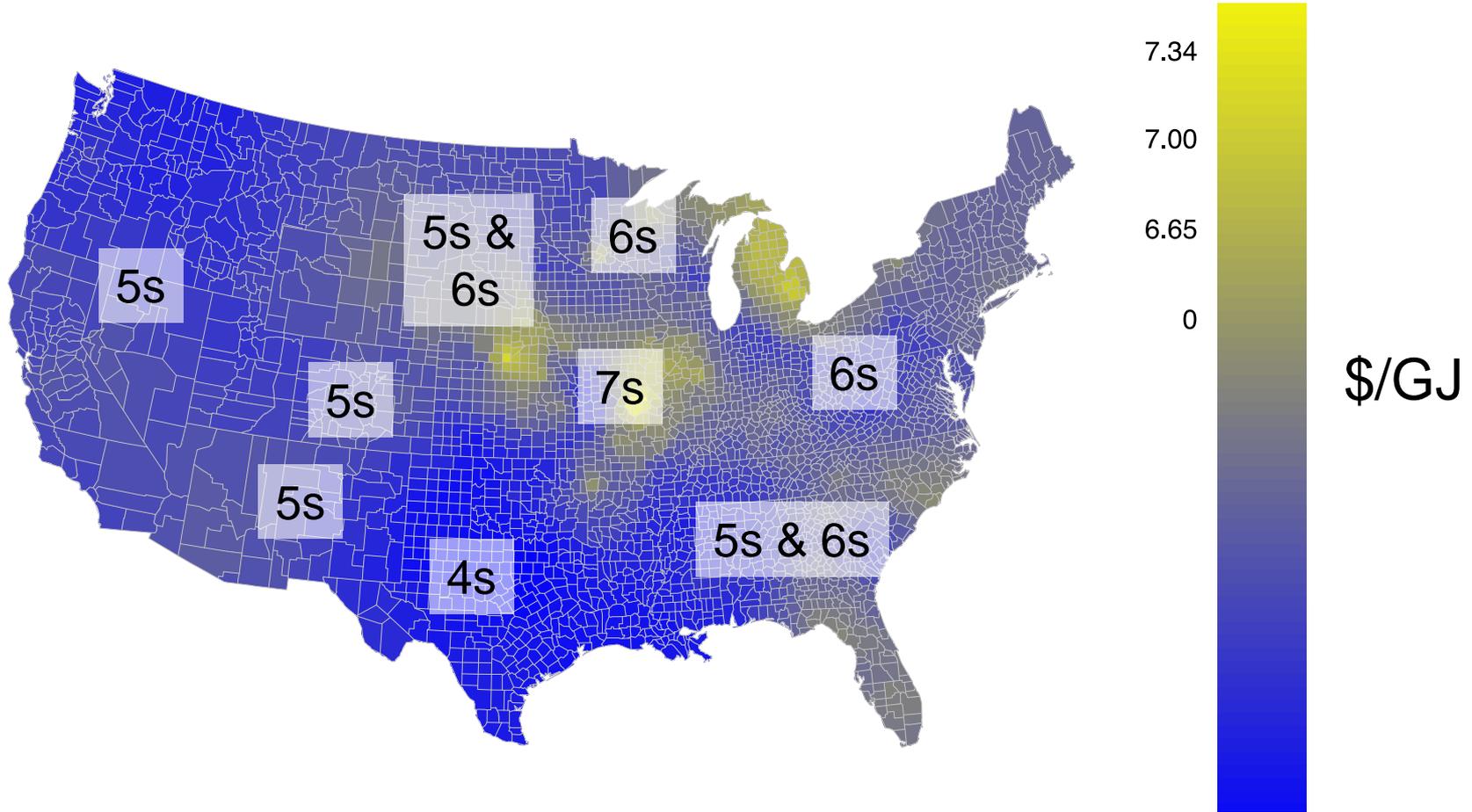
What are the LCOEs across the U.S? (\$/MWh)

LEVELIZED COST OF ELECTRICITY 
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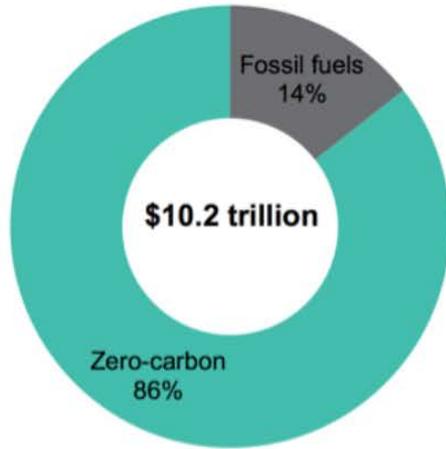
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Low delivered NG prices rely on infrastructure



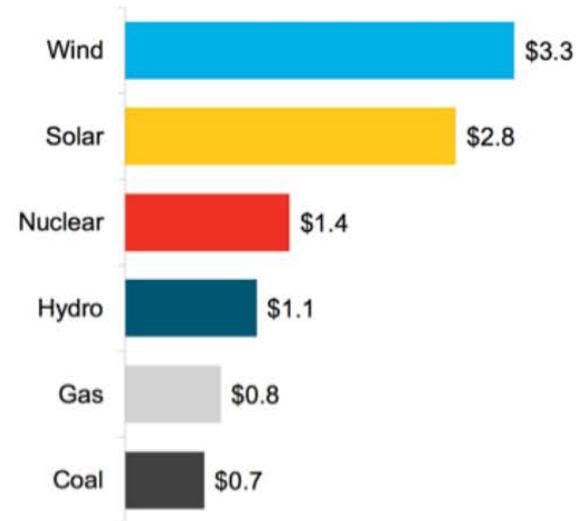
New investment landscape: wind + solar 60% of investment

Investment, by technology, 2017-2040



Investment, by technology, 2017-2040

(\$ trillion - 2016 real)

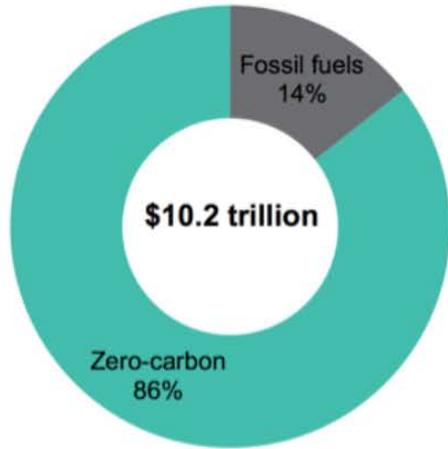


Source: Bloomberg New Energy Finance

<https://rmi.org/news/5-reasons-clean-energy-future-cant-stopped/>

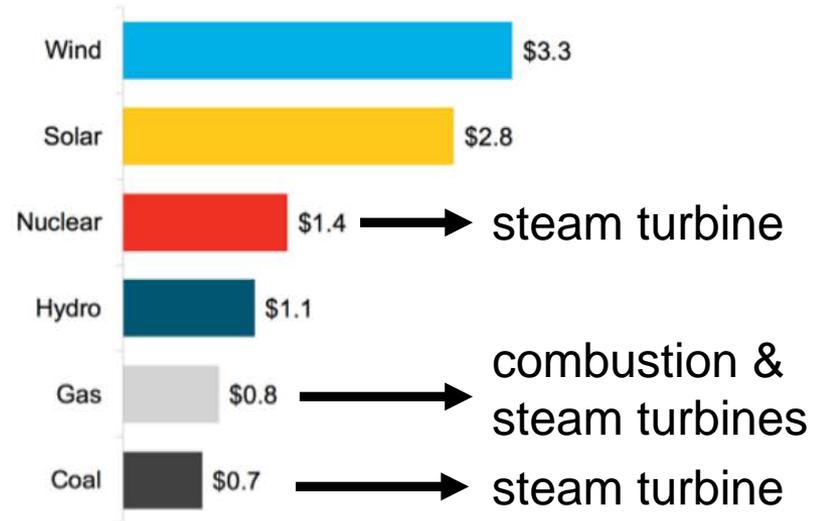
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Markets Now
GE is broken. Fixing it will be long and difficult

by Matt Egan @MattEganCNN

“Consider GE's \$9.5 billion acquisition of Alstom's power business, which makes coal-fueled turbines used by power plants.”

“For GE, the deal represented a doubling down on fossil fuels, ...”

<http://money.cnn.com/2017/11/20/investing/general-electric-immelt-what-went-wrong/index.html>

GE to cut 12,000 jobs as demand for fossil fuel power stations falls

By Aaron Schrank
 December 07, 2017 | 3:39 PM

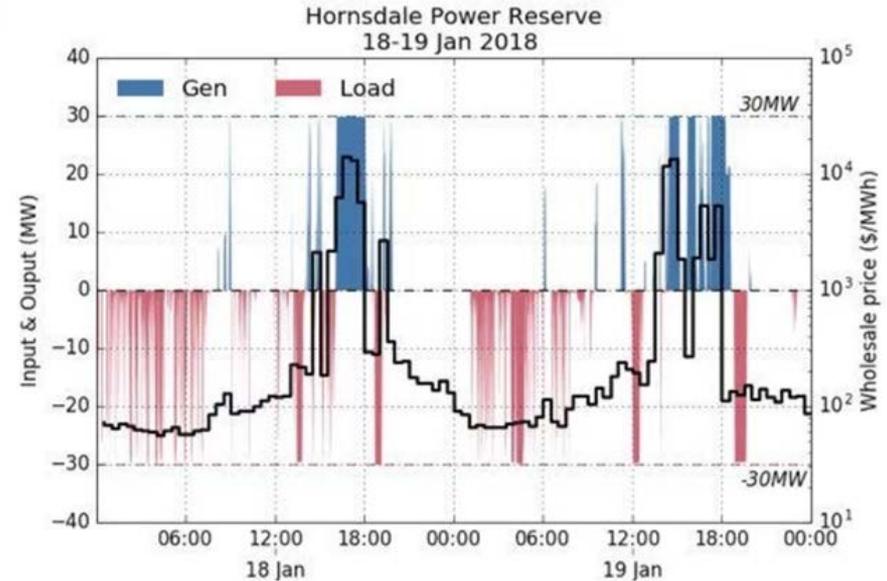
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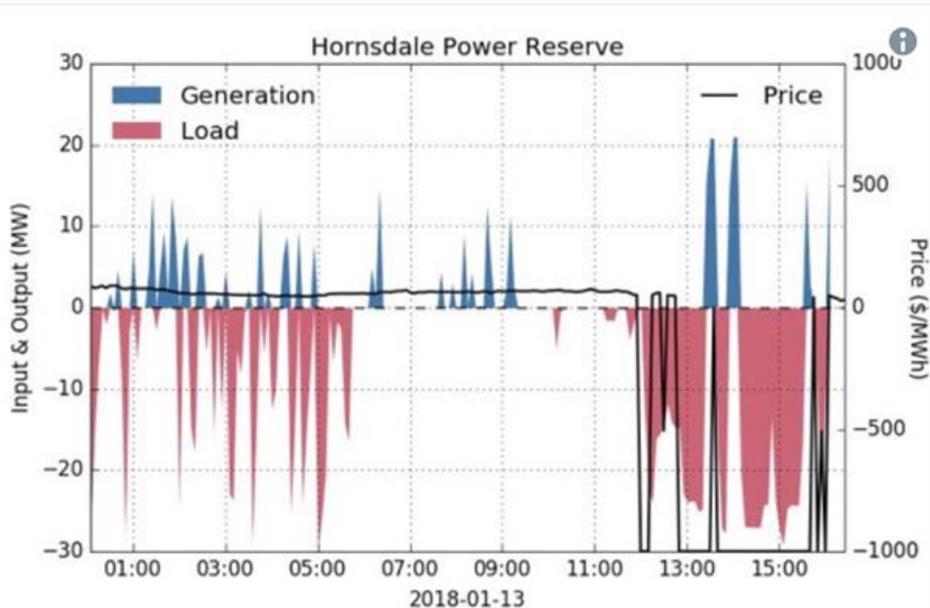
Will Australian grid go battery instead of NG for renewable integration (& export NG)?

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“Normal” Summer day:
 selling at 1000 \$/MWh,
 charging at 10 \$/MWh



Will Australian grid go battery instead of NG for renewable integration (& export NG)?



Lack of grid flexibility:
charging at -1000 \$/MWh

<https://electrek.co/2018/01/14/teslas-massive-battery-in-australia-was-paid-up-to-1000-mwh-to-charge-itself/>

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