

## European Solar Energy Storage

# Thunder said energy Nicaragua



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### Power grid bottlenecks?

Posted on March 7, 2024 March 11, 2024 by Thunder Said Energy. Power grids: the biggest bottleneck in the world? Power grids will be the biggest bottleneck in the energy transition, according to this 18-page report. Tensions have been building for a decade. They are invisible unless you are looking. And power grid bottlenecks could last a decade.

### Global energy: supply-demand model?

This global energy supply-demand model combines our supply outlooks for coal, oil, gas, LNG, wind and solar, nuclear and hydro, into a build-up of useful global energy balances in 2023-30. We fear chronic under-supply if the world decarbonizes, rising to 5% shortages in 2030. Another scenario is that emerging world countries bridge the gap by ramping coal.



18650 3.7V  
Li-ion  
RECHARGEABLE BATTERY  
2000mAh



### Thunder Said Energy

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## Latest Ideas in the Energy

## Transition

The energy uplifts from solar trackers have been estimated at 10-50% in different studies. But we can do better than this broad range, and actually calculate both the energy uplift and the revenue uplift from first principles, on pages 5-8. The economics of solar trackers can therefore be modeled more effectively.



## Electricity prices vs CO2 intensity?

Electricity Prices and CO2 Intensity Data. Retail electricity prices average 11c/kWh globally, across 28,500 TWh of global electricity demand in 2021, which is mostly composed of electricity consumption in 80 larger countries. The lower quartile is 7c/kWh and the upper quartile is 17c/kWh. The lower decile is 4c/kWh and the upper decile is 22c/kWh.

## US natural gas: the stuff of dreams?

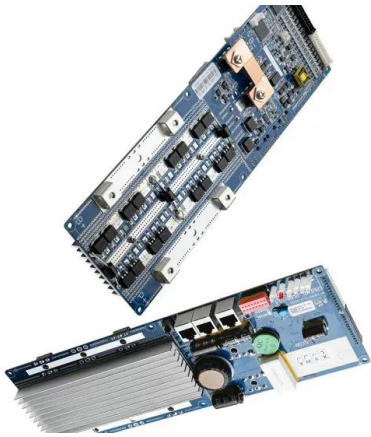
US gas supply-demand matters in the energy transition, in our US energy models and across the shale industry. But the forecasting can be woefully complex, as gas is the bottom of the US LCOE cost curve, and hence it acts as a balancing line.. Hence to forecast US gas consumption, first you need to forecast total US energy consumption, then you need to ...



## Energy research in the age of AI?

We have spent much of 2024 writing about the rise of AI, and how it will change the energy industry: unlocking new step-changes in industrial efficiency, next-gen DAC or

autonomous vehicles; while re-exciting gas ...



## Thunder Said Energy

Thunder Said Energy , 2,631 followers on LinkedIn. The research consultancy for energy technologies , Thunder Said Energy is a research firm focused on energy technologies and energy transition. We publish research reports, data, economic models and patent screens into opportunities that can meet the energy needs of the world, while removing all of the net CO2. ...



## **Global PGM demand: breakdown by metal and use?**

Core global PGM demand ran at 565 tons in 2023, which remains c6% lower than the all-time peak demand of 600Tpa in 2019. We model a recovery to 700 Tpa of demand for platinum, palladium and rhodium in 2030, then a long-run decline to 350Tpa if EVs ultimately reach 90% of vehicle sales by 2050.

## **US power generation under development over time?**

This data-file captures the development pipeline of new US power capacity, based on 860M reports from the EIA, which cover all existing and proposed generating units of >1MW of greater. As a leading indicator for wind, solar, gas

turbine and battery demand, we have aggregated the data in these c110 monthly reports, from 2015 to 2024, to track the pipeline ...



## Electricity prices vs CO2 intensity?

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## Global uranium supply-demand?

Our global uranium supply-demand model sees the market 5% under-supplied through 2030, including 7% market deficits at peak in 2025, as demand ramps from 165M lbs pa to 230M lbs pa in 2030. This is even after generous risking and no room for disruptions. What implications for broader power markets, decarbonization ambitions, and uranium prices?

## Thunder Said Energy

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## Why I Hate S-Curves: An Interview with Rob West from

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This week, our guest is Rob West, founder and CEO of Thunder Said Energy. Founded in 2019, the research firm aims to help decision-makers find economic opportunities in the energy transition. Rob lives nine time zones ...



## [What drives global oil demand?](#)

Posted on August 22, 2024 August 23, 2024 by Thunder Said Energy. Oil demand: making millions? What does it take to move global oil demand by 1Mbd? This 22-page note ranks fifteen themes, based on their costs and possible impacts, to show what drives global oil demand, where risks lie for oil markets, and where opportunities are greatest to

## [New Energies Research](#)

Today's lithium ion batteries have an energy density of 200-300 Wh/kg. I.e., they contain 4kg of material per kWh of energy storage. Technology gains can see lithium ion batteries' energy densities doubling to 500Wh/kg in the 2030s, trebling to 750 Wh/kg by the 2040s, and the best possible energy densities are around

1,250 Wh/kg.



## Nature based carbon removal projects

The "Nicaragua High Impact Reforestation Program" should remove over 100,000 tons of CO<sub>2</sub> from the atmosphere, by row-planting teak trees across >500 hectares of former pasture land in Nicaragua. It is our fourth detailed case ...



## Energy transition: the triple challenge?

A common framework is to call the energy transition a "dual challenge". The first task is meeting the energy needs of human civilization. And the second task is abating the world's CO<sub>2</sub> emissions. But we increasingly think this framework is incomplete. Energy transition is a triple challenge. The third component is raising competitiveness.



## Achieving net zero by 2050: losing faith?

Posted on November 28, 2024 November 28, 2024 by Thunder Said Energy. Energy transition: losing faith? What if achieving Net Zero by 2050 and/or reaching 1.5°C climate targets now has a <3% chance of success, for reasons that cause

decision-makers to backtrack, and instead focus on climate adaptation and broader competitiveness? This 14-page



## Energy transition research & technologies

Thunder said energy is the research consultancy for energy transition. We model technologies, economics and costs, for opportunities to reach net zero CO2.



## Solar trackers: following the times?

The energy uplifts from solar trackers have been estimated at 10-50% in different studies. But we can do better than this broad range, and actually calculate both the energy uplift and the revenue uplift from first principles, on pages 5-8. The economics of solar trackers can therefore be modeled more effectively.

## Decarbonize shipping: alternative fuel costs?

Shipping consumes 5Mbpd of global oil demand, emits 1.5% of the world's CO2, and adds c1% to the final cost of a typical shipped product, using \$1.8/gallon marine diesel at 9.0 kg/gal CO2 intensity.. This data-file appraises the costs of alternative shipping fuels, drawing on models

from our prior work into methanol, lower-carbon ammonia, renewable-diesel, green hydrogen, and ...



### Power demands of AI?

To contextualize the growth that lies ahead, we have compiled data on US power generation installations, year by year, technology by technology, running back to 1950, including implications for turbine manufacturers, on pages 14-16.. The impacts of AI on US gas and power markets sharply accelerate US electricity demand, upgrade our US shale forecasts, especially ...



### Recent Research Reports

Thunder Said Energy is a research firm focused on energy technologies and energy transition. We work with over 250 organizations, to help them find economic opportunities, which can improve the world's energy system, and ...



### Energy Transition Data

Thunder Said Energy subscription clients have access to all of our research and data-files. Nicaragua, Kenya, Uganda, Indonesia and Madagascar. The average nature-based reforestation initiative that we supported in 2022 scored 70/100 on our framework for assessing nature-based CO2 removal projects,



## Industry Research

Human civilization will consume 80,000 TWH of useful energy in 2023. This is equivalent to a kitchen toaster, running 24 hours per day, 365 days per year, for every man, woman and child on the planet. 35% of global energy is used in manufacturing and materials, 30% is used in transportation and shipping, 20% is used in homes as heat and electricity, and 15% is used in ...



## Thunder Said Energy

Thunder Said Energy is a new research consultancy, analyzing disruptive energy technologies that can change the world: the rise of renewables, shale oil, natural gas, the ...

## Downloads Insights

This is a simple model calculating the economics of a typical rooftop solar water heater, which can save around 1T of CO2 per household per year and lower water heating bills by 50-80%.. Economics are more challenging, due ti high upfront capital costs, which are quantified in the data-file. Under our base case estimates, it would

require a CO2 price of around \$130/ton, to ...



### [Downloads Insights](#)

Included in the file are different oil products, gas markers, coal, wood, nuclear, biofuels, methanol, hydrogen, CO2-EOR products and the US electricity grid for comparison.. Good rules of thumb are that \$60/ton coal equates to thermal energy at 1c/kWh-th, while emitting over 600 kg/boe of CO2 intensity; while \$3/mcf gas also equates to thermal energy at 1c/kWh, while CO2 intensity ...

### [Energy Transition Research Portal](#)

This database contains a record of every company that has ever been mentioned across Thunder Said Energy's energy transition research, as a useful reference for TSE's clients. The database summarizes over 3,000 mentions of 1,400 energy transition companies, their size, focus and a summary of our key conclusions, plus links to further research.



### **Costs of LNG trucking in China and India?**

The other angle that excites us in energy commodities is rising volatility, linked to geopolitics, and the ramp of volatile wind and solar, whose regional output varies +/- 10% per year, and whose global output varies +/- 5% per

year. This creates volatility in demand for backups - e.g., LNG - and greater regional arbitrage potential.



## Can GDP decouple from energy demand?

Some commentators argue that energy demand will naturally plateau as GDP rises in the future - or at least the beta between energy use and GDP will fall dramatically. As evidence, the energy consumption within developed world countries has hardly increased over the past 20-years, even as GDP per capita rose by 25%.



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