

# FIDIUM Ideas from Bonn

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14<sup>th</sup> April, 2023

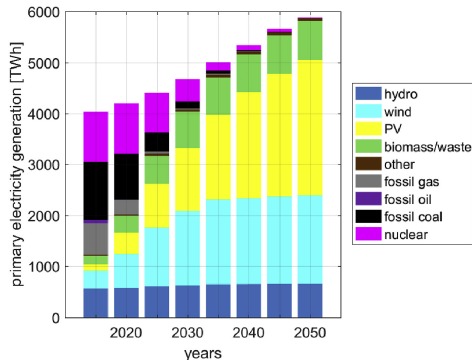
# Overview

- Continue toolbox around COBaID/TARDIS to enable opportunistic computing everywhere
- Finalize connected older ideas on Compute Site in a Box
- Catchy new project (in collaboration with others?):  
**Computing in the age of strong sector coupling**
- Premise: We are headed towards a 100 % Renewable Energy (RE) based power infrastructure
- Transition has to take place in  $\mathcal{O}(10-20)$  years, and there are no alternative technologies at even remotely reasonable price available on that timescale
- Volatility of RE sources has far reaching implications

# The 2 Key Paradigms of the New Age Of Energy Abundance

## Paradigm 1

There will never be a cheaper source of energy again than solar (and to a certain extent, for a limited time, wind).

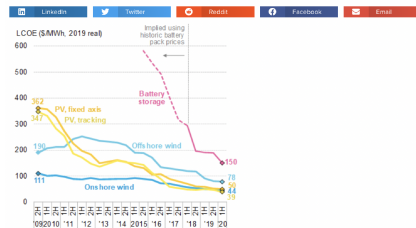


## BloombergNEF: 'Already cheaper to install new-build battery storage than peaking plants'

By Andy Colthorpe

April 30, 2020

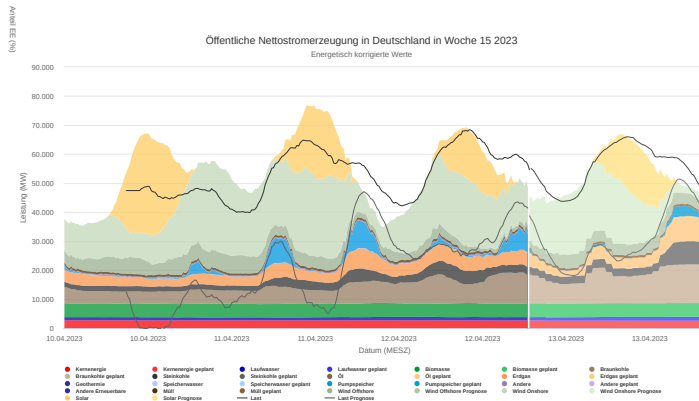
Africa & Middle East, Americas, Asia & Oceania, Europe Grid Scale Market Watch



# The 2 Key Paradigms of the New Age Of Energy Abundance

## Paradigm 2

Volatility of source availability will (probably — with caveats depending on the cost & price of Power-to-X) mean that *energy is for free when the sun is shining and the wind is blowing.*



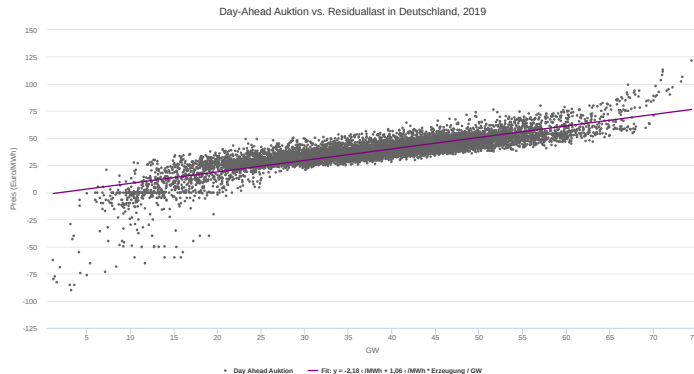
Energy-Charts.info; Datenquelle: ENTSO-E, AGEE-Stat, Destatis, Fraunhofer ISE, AG Energiebilanzen, EEX; Letztes Update: 12.04.2023, 22:34 MESZ

<https://www.energy-charts.info/charts/power/chart.htm?l=de&c=DE>

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[https://www.energy-charts.info/charts/price\\_scatter/chart.htm?l=de&c=DE&year=2019&residual\\_load=1&solar=0&wind\\_onshore=0&wind\\_offshore=0](https://www.energy-charts.info/charts/price_scatter/chart.htm?l=de&c=DE&year=2019&residual_load=1&solar=0&wind_onshore=0&wind_offshore=0)

# Project Idea

- Get long-term real fluctuations of renewables from <https://energy-charts.info/>
- Parametrize energy price dependents of RE power on wind/sunshine from [https://www.energy-charts.info/charts/price\\_scatter/chart.htm?l=de&c=DE&wind\\_onshore=1&wind\\_offshore=1&hydro\\_run-of-river=1&biomass=1&geothermal=1&hydro\\_water\\_reservoir=1&hydro\\_pumped\\_storage=1](https://www.energy-charts.info/charts/price_scatter/chart.htm?l=de&c=DE&wind_onshore=1&wind_offshore=1&hydro_run-of-river=1&biomass=1&geothermal=1&hydro_water_reservoir=1&hydro_pumped_storage=1)
- Get energy price projections e.g. from <https://ieeexplore.ieee.org/document/9837910>
- Project computing hardware price from past experience
- Optimize 'Computing Overcapacity' as a function of the duty cycle
- 'If we want to have a duty cycle of  $X\%$ , we will save  $Y$  k€ on electricity and have to spend  $Z$  k€ more on hardware to make up for lost time'
- Regulation of COBaID/TARDIS drone count, feedback from AUDITOR possible
- Key ingredient: 'Checkpoint and restore' of compute jobs such that jobs can be started, stopped or moved without loss, ideally on the container level.

Thank you  
for your attention!

