Towards 100 % Sustainable Energy

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Free Energy, $10 A Barrel Oil By 2025 Says French Utility Company

December 28th, 2016 by Steve Hanley

"The promise of quasi-infinite and free energy is here," says Thierry Lepercq, head of research, technology and innovation for Engie SA. He thinks the cost of solar power will drop below $10 a megawatt-hour ($0.01 per kWh) before 2025 in the world's sunniest places. Engie recently conducted "very deep modeling" of the Provence-Alpes-Cote d'Azur region of France, which has about 5 million inhabitants. The study showed those regions could run entirely on renewable energy for about 20% less than the price of electricity today.

Saudi Arabia's second PV tender draws world record low bid of $0.0104/kW

The record low price was offered for the 600 MW Al-Faisaliah PV IP project, which competed in the second round of the country's procurement scheme for renewable energies.

AUGUST 24

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EMILIANO BELLENNI

MARKETS MARKETS & POLICY UTILITY-SCALE PV SAUDI ARABIA

"The output capacity of these projects, in addition to the projects of Sakaka and Dumat Al-Jandal, will amount to more than 3,800 MW," he said in a statement, adding that one of the projects — the 600 MW Al-Faisaliah PV IP project — will sell power at a world record low price of $0.0104/kWh. The project was selected by the Ministry of Energy in Round 2 of the procurement scheme that is being held under the umbrella of the country's National Renewable Energy Program (NREP)."
Industrial learning by experience

Electric Technologies in EU 1980-1995

- Photovoltaics
- Wind Power - Average
- Wind Power - Best Performance (82%)
- Electricity from Biomass
- Supercrit Coal
- NGCC (96%)
Global Wind power capacity 1980-2020

Data: GWEC, 2021
Wind power capacity leading countries 1980-2020

Data GWEC, EWEA, 2021
New low for wind energy costs: Morocco tender averages $US30/MWh

By Giles Parkinson on 17 January 2016

The north African country of Morocco has announced the results of its latest tender for large-scale wind energy projects, with the lowest average bid at $US30/MWh.

The pricing — revealed by its energy ministry at the annual Energy summit in Abu Dhabi on Saturday — sets a new benchmark, boosted by the remarkable wind energy resource available and the government’s desire for concessional finance.

Abderrahim El Hafidi, vice minister of energy and environment, described it as “revolutionary” and “amazing” and said it pointed to a “real revolution” in wind power in the US have been in and around $US25/MWh, although assessment.

Enel sets a new world wind record in Mexico, below $18/MWh

November 29, 2017 Paul Dvorak | 0 Comments

This Flash Note from Make Consulting examines the results of Mexico’s third long-term power auction held in November 2017. The note evaluates the event and its bidding within the context of previous auction rounds in Mexico as well as within the Latin American region. It analyses the dynamics that contributed to Enel’s record-low bidding and posits dynamics that favor low bidding in the Mexican market.

Key points:
- Mexico hosted a long-term power auction in November 2017 which awarded offtake agreements to wind power and PV projects totaling 5.5 TWh of annual production
- Enel submitted four successful bids for wind power sites with the lowest reaching $17.70/MWh
- In total, the auction awarded PPAs to 2 GW of new project sites, including 689 MW of new wind power sites which are due online in 2020.
Vattenfall wins tender to build the largest wind farm in the Nordics

Today, Vattenfall has won the tender to build Danish Kriegers Flak, a 600 MW offshore wind farm in the Baltic Sea. The winning bid was EUR 49.9 per MWh, which is among the lowest costs in the world for offshore wind power.

"The announcement is an essential milestone for our ambition to increase our production of renewable power. We are already the second largest offshore player globally. The winning bid of EUR 49.9 per MWh proves that Vattenfall is highly competitive and brings down the costs for renewable energy", says Magnus Hall, CEO Vattenfall.

Kriegers Flak will be Denmark’s largest offshore wind farm and can supply 600,000 Danish households with renewable energy — corresponding to 23 percent of all households in Denmark. Vattenfall’s investment in Kriegers Flak will be EUR 1.1 – 1.3 billion, pending a final investment decision.

"This is exciting news. I’m very proud of our people in the Wind organisation who once again delivered a winning bid. Vattenfall has won the three latest offshore wind tenders in Denmark; Horns Rev 3, Danish Near Shore and Kriegers Flak, equivalent to the energy consumption of 55 percent of the Danish households", says Gunnar Groebler, Head of Vattenfall Wind.
Vattenfall starts construction of offshore wind farm Hollandse Kust Zuid

The construction of the 1.5GW Hollandse Kust Zuid offshore wind farm has started. The first vessel transporting foundations to the construction site departed today. Over the next two years, the world’s first subsidy-free offshore wind farm will be built off the Dutch coast. The fossil-free energy generated by the wind farm will benefit both households, businesses and industrial partners.
Global solar PV capacity 1996-2020

Data: BP statistical review 2020, Bloomberg for 2020
Solar PV-capacity leading countries. 1996-2020

Data: BP statistical review of world energy 2020, for 2020 own collection from various sources
Saudi Arabia’s second PV tender draws world record low bid of $.0104/kW

The record low price was offered for the 600 MW Al-Faisaliyah PV IP project, which competed in the second round of the country’s procurement scheme for renewable energies.

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UK's Largest Solar Project Approved, Will Snub Government Subsidies

A 350-megawatt U.K. solar project won its planning approval in Britain, hinting at a revival of a once-booming market.

John Parnell | May 29, 2020

Unsubsidized solar is gaining ground in Denmark.

Image: Kirstinsforos/Pixabay
Conclusion no 1

- Renewable electricity provides the lowest cost electricity
- Countries efficiently deploying renewable electricity will get the cheapest electricity benefitting industrial competitiveness as well as households
Growing markets for electric vehicles

Global fleet of electric cars

United Airlines to buy 100, 19-seat electric planes from Heart Aerospace

Allison Lampert

In conjunction with Fjellet, technology for the world’s first purely electric ship, which will enter service in part due to the electric ship’s emissions-free and silent operation. As silently as a crocodile, the white electric ship glides through the water, and the only sound that can be heard is the water lapping against the hull. Odd Morten Saemundsen, Norway’s economy and communication minister, said: “The opening of the world’s first purely electric ship is a major step forward in our efforts to reduce greenhouse gas emissions.”

Airbus is to put its first commercial electric plane into service in France. Construction began in 2018 on the electric plane, which will be able to travel up to 500 kilometers on a single charge. The plane is designed to reduce greenhouse gas emissions by 80% compared to a traditional airplane.

The electric plane is expected to enter service in 2023, and will be used for short-haul flights. The plane is powered by four electric motors, each of which can produce up to 1,000 horsepower. The plane is expected to be able to carry 20 passengers.

Comment by LU LU, LuLu

Diesel buses—a mainstay of public transportation in most cities. But what if there was a better option? In Norway, one company is testing out the future of electric transportation.

The southeast of Norway connects Hordaland, Rogaland, Voss, and Stryn, and it is one of the main regions in Norway. In 2021, the electric bus fleet, a project that has been promoted by the World Bank, is expected to have 100 electric buses in operation.

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BNEF Battery price survey results

Real 2020 USD/kWh

battery costs

87%↓

80%↓
Methane price USD/MMBtu
German energy grids say plan 100MW hydrogen plant

Amprion, OGE say have completed plans for a solar-driven electrolysis facility

* Follows hot on heels of national coal exit announcement
* Could start 2023 to help usher in alternative energy era

FRANKFURT, Feb 11 (Reuters) - German energy company Amprion and Open Grid Europe (OGE) said on Monday they have completed plans for the country’s first large hydrogen plant, with a production capacity of 50,000 tonnes per year. The solar-driven electrolysis facility, when combined with two additional hydrogen-based plants, will result in an annual production capacity of 100,000 tonnes. The plants will convert excess wind and solar energy into hydrogen for use in industrial processes and the transport sector.

Vattenfall-led consortium plans 50 MW power-to-gas project in Germany

The energy company plans to build the “HySynGas” project in the Brunsbüttel Industrial Park with ARGE Netz and MAN Energy Solutions. The consortium wants to establish a power-to-gas hub for cross-sector decarbonization in northern Germany.

APRIL 4, 2019 SANDRA ENKHARDT
eMPowering our Future.

It’s time to electrify fuel and empower our sustainable future.
HYBRIT: SSAB, LKAB and Vattenfall first in the world with hydrogen-reduced sponge iron

SSAB, LKAB and Vattenfall have now produced the world’s first hydrogen-reduced sponge iron at a pilot scale. The technological breakthrough in the HYBRIT initiative eliminates around 90% of emissions in conjunction with steelmaking and is a decisive step on the road to fossil-free steel.
Future competitiveness?

World 4 largest steel producers, & Sweden; Mton steel/a

Cost of renewable H2 in 2021; $/kg
Conclusion no 2

- Renewable energy will provide the lowest cost Energy
  Milestones:

  - *Fuel to produce electricity*: $\text{Electricity price} \approx \text{fuel price} \times 3$
  - *Electricity substitutes fuel*: $\text{Electricity price} \approx \text{fuel price}$
  - *Electricity -> fuel*: $\text{Electricity price} < \text{fuel price}$

  Supporting factors:
  - Market growth and learning curves
  - Capital cost opportunities
  - Power balancing
Fossil Share of Global Electricity generation 1985-2019

60% 62% 64% 66% 68% 70%


Data: BP statistical review 2020
Fossil Share of Global Electricity generation 1985-2019

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