The first efforts to use of wind to generate electricity was 134 years ago, and the photoelectric effect was discovered six decades earlier. So in a sense, these are old technologies — about the same age as the very first internal combustion engines. But the scientific and technological advances that made these technologies competitive with fossil fuels are much more recent. One thing you'll notice is the importance of government-funded research and deployment incentives in helping to launch the solar and wind sectors.

500-900. Early windmills developed in Persia. Persian experts were sent by Genghis Khan to establish the technology in China.

1200. Windmill use becomes increasingly widespread in Europe. (By the way, this timeline includes only photovoltaic solar, not thermal solar.)

1870s. Scientists discover the selenium produces electricity when exposed to light.

1890. La Cour builds windmill in Denmark to generate electricity.

1905. Einstein publishes paper explaining the quantum nature of the photoelectric effect.

1954. Researchers at Bell Labs create the first modern solar cell while researching silicon semiconductors.

1955. Western Electric sells first commercial licenses for photvolataic (PV) cells.

1958. PV array used to power Vanguard I satellite.

1963. Japan installs largest PV array up to that date, 242 watts, to power a lighthouse. Sharp corporation produces practical silicon PV modules.

1974. Beginning of an 8 year program funded by the National Science Foundation and the Department of Energy, NASA led efforts in Cleveland to develop wind turbines. Thirteen experimental turbines had generation capacities ranging from 200 KW to 3.2 MW.

1977. PV production exceeds 500 KW.

1978. Congress passed the Public Utilities Regulatory Policies Act, creating incentives for renewable energy generators.

1979. NASA’s first wind turbine over 1 MW begins operating at a price of about $0.40/ mWh.

1982. PV production reaches 9.3 MW.

1985. Due to incentive policies, California wind turbine capacity exceed 1000 MW (1 GW). By 1990. California wind will reach over 2.2 GW — over half of world wind capacity.

1986. First commercial thin-film PV.

2000. Sandia National lab develops a new inverter for solar systems.

2005. DOE’s advanced turbine program results in costs of $0.05/kw, an 88% reduction since 1979.

2022. Wind reaches 10% of U.S. generation. Levelized cost of electricity for onshore wind is $0.034/kWh. PV is 4.7% of generation but growing quickly, with a levelized cost of $0.05/kWh (a bit less for utility-scale solar). Both are below the levelized cost of new natural gas or coal generation.