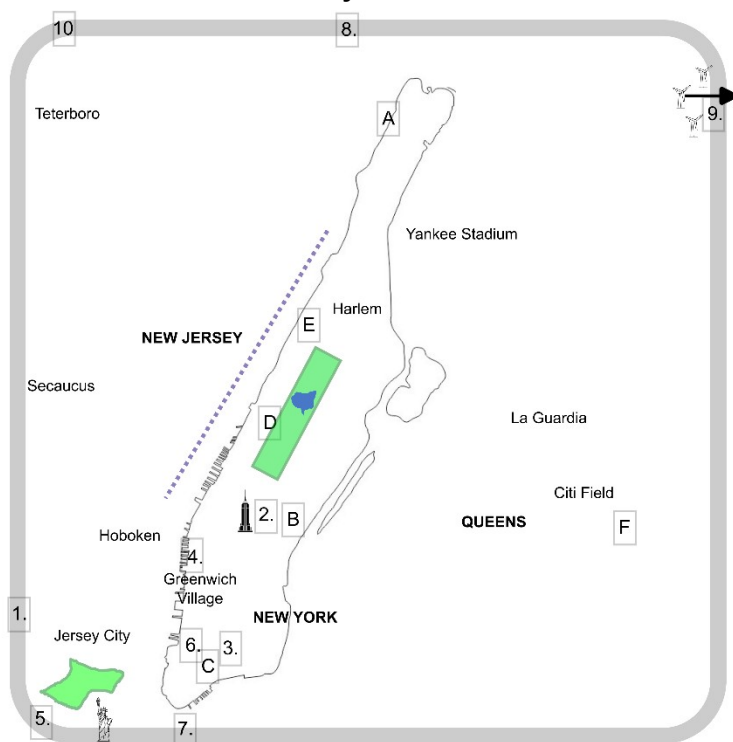


## New York City and environs: “New York, New York (So good they named it twice)”



### 1. Thomas Edison Centre ([Menlo Park, New Jersey](#)).

After numerous attempts in his large, purpose-built, Menlo Park lab, where he had tested 6,000 different “filament” materials, Thomas Edison finally improved on his earlier, rudimentary versions of electric illumination, producing in 1879 a safe, long-lasting glowing light, by electrically heating a high-resistance, carbonized cotton sewing thread in an evacuated glass bulb.

2. **The Morgan House** ([219 Madison Avenue](#)). One-off “isolated lighting” units were built by Edison for eager customers and demanding financiers who wanted to show off their newly lit wealth. [J. P. Morgan’s mansion](#) and William Vanderbilt’s brownstone double house on Fifth Avenue both sported electric lighting powered by a basement dynamo, although Vanderbilt’s system was removed when a smoldering fire appeared in the metallic-threaded wallpaper.

3. **Pearl Street power station** ([255–257 Pearl Street](#)). Powered by six, 27-ton, 100-kW “Jumbo” dynamos, Edison’s 1882 coal-fueled Pearl Street Station transmitted 100 volts of direct-current electricity underground to 400 lights in a one-square-mile area of Lower Manhattan’s First District (bounded by Wall Street, Nassau Street, Spruce Street, and Ferry Street).

4. **Bell Labs** ([463 West Street](#)). Before relocating across the river to New Jersey, Bell’s main research operations were at 463 West Street along the Hudson, where the telephone, switching, amplification, and long-distance telephony were developed. The first-ever transcontinental phone call was placed in July 1914, the audio signals transmitted to San Francisco via vacuum-tube repeaters in Pittsburgh, Omaha, and Salt Lake City.

5. **First PV solar cell** ([Holmdel, New Jersey](#)). In 1939, working at Bell Telephone’s radio lab in rural Holmdel, electrochemist Russell Ohl discovered a large voltage in a piece of commercial-grade silicon during his radar research on signal detectors after a current flowed under flashlight illumination. The newly discovered *p-n* junction would lead to the invention of the solid-state diode, transistor, and solar cell at nearby Murray Hill. The solar cell was developed primarily through the efforts of Daryl Chapin, Gerald Pearson, and Calvin Fuller.

6. **Standard Oil Building** ([26 Broadway](#)). At the time of Standard’s dissolution in 1911, the “Baby Standards” (including SONY/Exxon) were worth \$600 million, quintupling to \$2.9 billion a decade later. Much of the growth was from increased oil production prior to the Great Depression, the introduction of the internal combustion engine, increased demand for home heating oil, and the building of oil-fired electrical power plants. For a while, the price of oil was essentially dictated from Standard’s Broadway HQ.

7. **Stillwell Avenue Train Terminal** ([Coney Island, New York](#)). The arched roof of the Stillwell Avenue Terminal Train Shed in Coney Island is covered with 2,730 thin-film PV panels, generating almost 15% of the terminal’s annual power. Incorporated into the sweeping overhead structure, the panels are 5-foot square, triple-laminated, and 5% transparent, providing more than 200 kW.

8. **Indian Point Energy Center** ([Buchanan, New York](#)). Since 2000, the 4 nearest counties to the Indian Point nuclear power plant showed a 60% increase in thyroid cancer compared to the US average and underactive thyroid glands twice the national rate for babies. After numerous leaks and spills, recertification for another 20 years was finally denied and the 58-year-old plant closed in 2021.

9. **Block Island wind farm** ([Block Island, Rhode Island](#)). In 2016, the United States erected its first commercial offshore wind facility, the 5-turbine, 30-MW Block Island Wind Farm (10 miles east of Long Island). Spaced about half a mile apart in 90-foot-deep water, the turbines replaced sputtering diesel generators that once provided power to the roughly 1,500 year-round island residents, an annual savings of 1 million gallons of diesel.

10. **Robert Moses Niagara Power Plant** ([Lewiston, New York](#)). Built across from the two flagship Ontario Hydro Sir Adam Beck power plants on the Niagara River, the publicly funded Robert Moses plant was signed into law by President Eisenhower as part of the 1957 Niagara Redevelopment Act at a cost of \$750 million, which also included a parkway and public park to beautify the area. At the time, the plant was the largest construction project in the Western world, delivering more electric power than anywhere else to an ever-increasing customer base. Today, the power plant is still the number-1 producer of electricity in New York State and fifth largest in the US, while Niagara Falls in total generates almost 5 GW for American and Canadian customers combined.

Other interesting education sites: A [The Cloisters](#) (Washington Heights), B [United Nations](#) (Midtown), C [NYMEX](#) (Financial District), D [Museum of Natural History](#) (Upper West Side), E [Columbia University](#) (Upper Manhattan), F [Hall of Science](#) (Queens)



*The Truth About Energy: Our fossil-fuel addiction and the transition to renewables*

[Cambridge University Press John K. White](#)

**E21↑NS**

# *The Truth About Energy: Our fossil-fuel addiction and the transition to renewables*

Cambridge University Press John K. White

Many trade books on energy are light on technical details, while textbooks are full of equations, theory, and problem sets. *The Truth About Energy* aims to bridge the gap, giving the reader a comprehensive scientific grounding in energy technology without the complex mathematical or theoretical detail. Everyday power generation is explained with historical examples, taking the reader through each of the watershed energy technologies since the start of the Industrial Revolution — wood, coal, oil, natural gas, hydro, and nuclear — as well as modern renewables such as biomass, photovoltaics, concentrated solar power, wind, wave, and geothermal.

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### 1. Wood to Coal: A Short History of the Industrial Revolution

Harnessing steam for lifting and locomotion, the energy pioneers (Newcomen, Watt, Trevithick, Stephenson, Rumford, Joule, Carnot), fuel to burn (wood, peat, biomass, coal), the first global industrial economy, the heat engine and power

### 2. Oil and Gas: Twentieth Century Prosperity

Colonel Drake and Titusville, John D. Rockefeller and Standard Oil, the internal combustion engine and the auto industry, the quest for more, the Saudi connection, hydrocarbons and the dark sides to oil, the global oil economy, modern extraction (offshore, fracking, oil sands, M. King Hubbert and Peak Oil)

### 3. The Nuclear World: Atoms for Peace

Fission reactions and the bomb, atoms for peace, half-lives and waste management, nuclear dangers (Mayak, Windscale, Three Mile Island, Chernobyl, Fukushima), can nuclear coexist with green industry to reduce carbon emissions?, fusion and the future

### 4. Old to New: The Sun and all its glory

Solar basics, a short history of solar power, it's a silicon world, the photovoltaic solar cell (silicon wafers, thin-film, third-gen), utility-scale solar power (PV and CSP), Germany's revolutionary renewables economy and beyond

### 5. The Old becomes New Again: More Sustainable Energy

Wind (onshore/offshore), geothermal (the hot earth rises), hydro (dams, tidal, wave), the grid (old to new), virtual power plants, batteries (Zn-Mn, PbA, NiMH, Li-ion, .)

### 6. Driving the Revolution Revolution: From Volta to Tesla and back

Electric cars, the revolution revolution, autonomous driving, energy storage (more than just batteries), a whole new way of thinking, an even smarter grid (V2G)

### 7. Rethink, Rebuild, Rewire

Energy efficiency and conservation in the home (kilowatt hours and costs), taking it to the street, local green solutions (the traditional three Rs and other energy-saving tips), calculating our carbon footprint to promote simple sustainability (less is more), rooftop solar and off-grid setup, get involved

## SOME QUESTIONS ANSWERED

What type of radiation is heat? • Why was James Watt's steam engine unique? • Is all coal the same? • Where was the first commercial electric-generating station and who built it? • How is petroleum separated into components and what is the difference between petrol/gasoline and diesel? • How rich were John D. Rockefeller, Henry Ford, and J. Paul Getty? • What is the difference between conventional and unconventional oil? • How much oil is controlled by OPEC and what is "peak" oil? • What is the difference between natural, enriched, weapons-grade, and depleted uranium? • Should we be worried about Chernobyl and Fukushima? • Where does all the nuclear waste go? • Why does the temperature in a tokamak need to be 10 times that of the sun's core? • Who made the first functional solar cell? • What is the difference between a solar cell and a light-emitting diode (LED)? • What is the difference between a PV and a CSP solar installation? • Where is the world's largest solar farm? • Where are the world's largest onshore and offshore wind farms? • When and where was the first geothermal power plant? • Is hydroelectric power green? • Why did Nikola Tesla originally use AC current? • Which company was the first to use computer batteries for cars? • What is VPP and V2G? • Can we power a house from a car? • Why is lithium salt ("white petroleum") in such demand? • Will cutting down on plastic reduce petroleum use? • Can we make a difference to global warming from more conservation in the home?