

Supplemental material

An Environmental and Societal Analysis of the US Electrical Energy Industry Based on the Water-Energy Nexus

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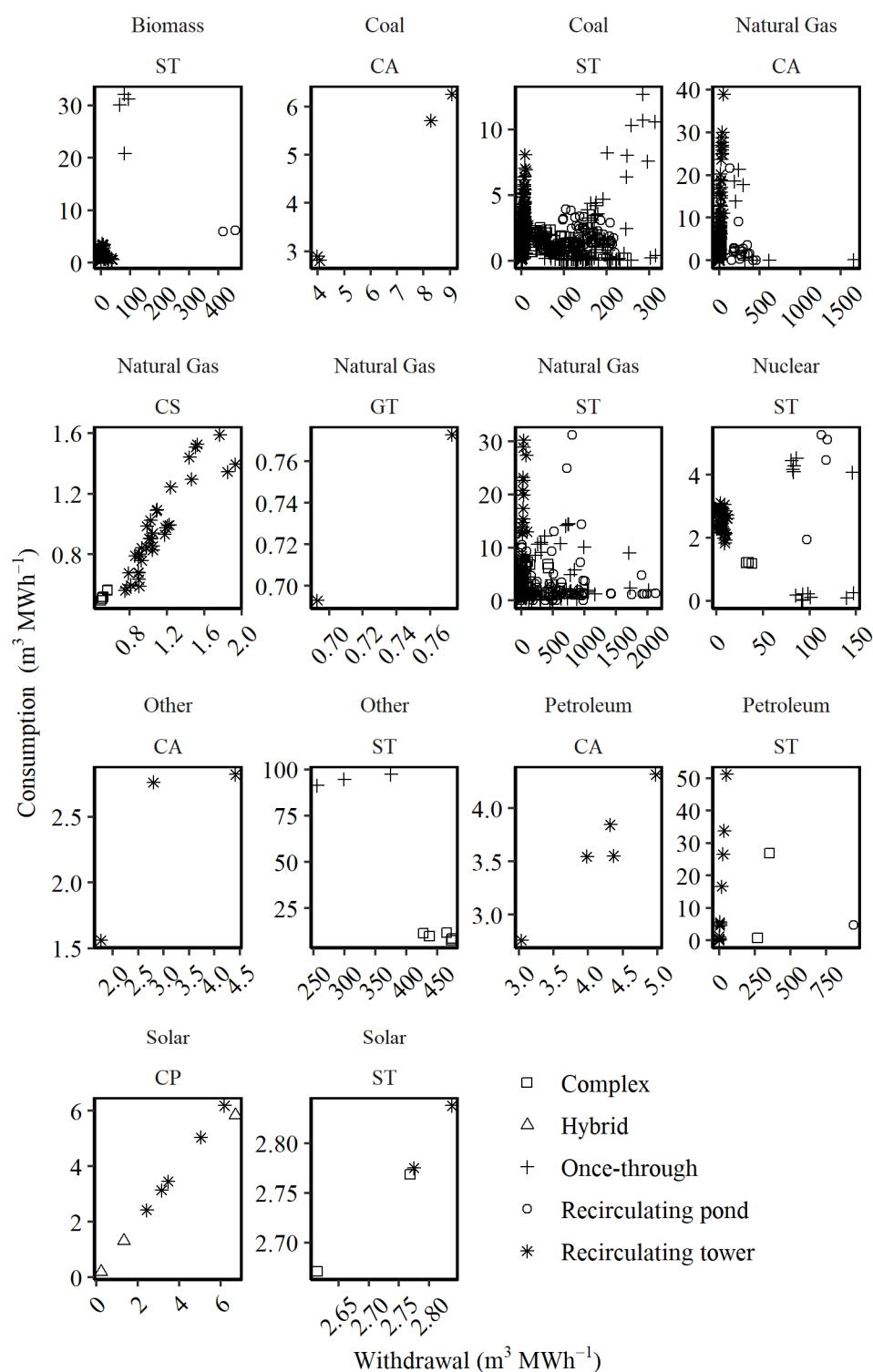


Figure S1. Power plant (>100MW) rates of water use by energy source and composition of prime mover and cooling system type observed and applied for mean estimates by energy source. Hybrid cooling is recirculating with induced draft cooling tower(s) with dry cooling. Complex indicates there is more than one cooling system. Prime movers include steam (ST), combined-cycle – steam part (CA), combined-cycle single-shaft combustion turbine and steam turbine share of single generator (CS), combustion gas turbine (GT), and energy storage concentrated solar power (CP).

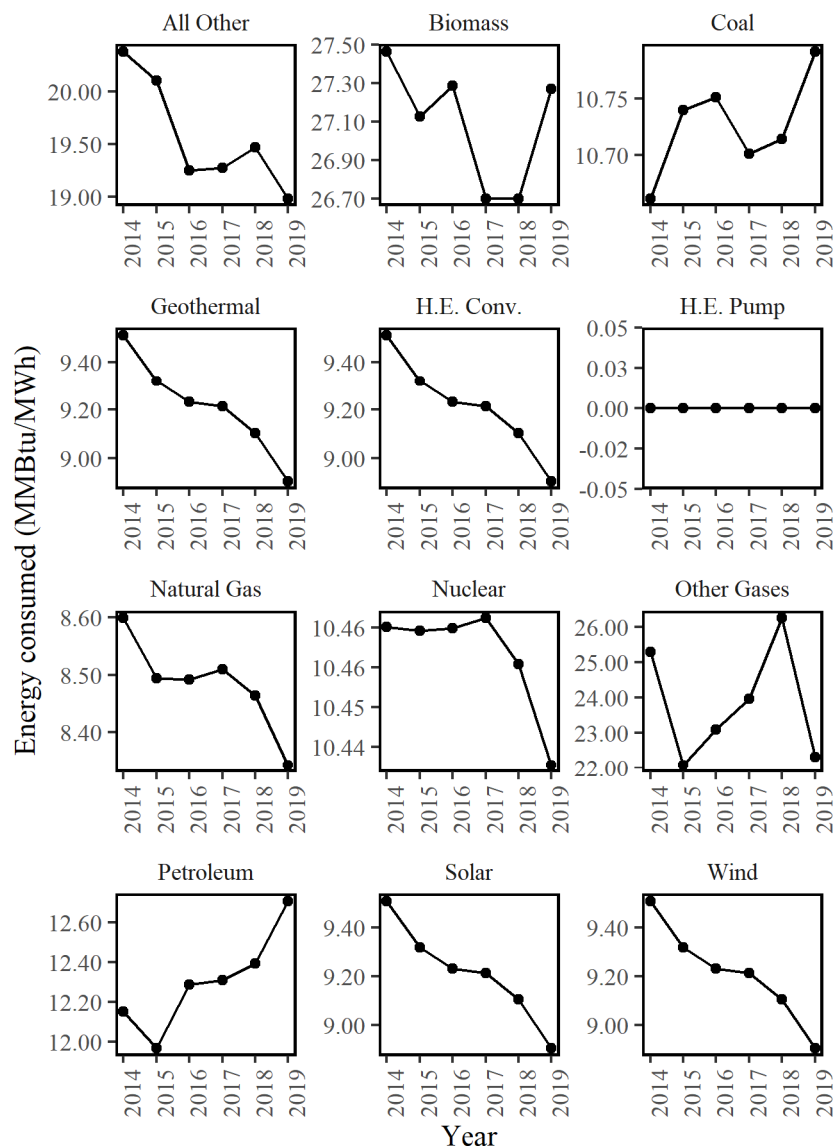


Figure S2. Rate of primary energy consumption (MMBtu/MWh) by energy source 2014-2019, where H.E. Pump represents hydro-electric pump storage, which reported zero primary energy consumption, and H.E. Conv. Represents hydro-electric conventional. Other gases include blast furnace gas; and all other includes batteries, hydrogen, purchased steam sulfur, tire-derived fuels and other miscellaneous energy sources.

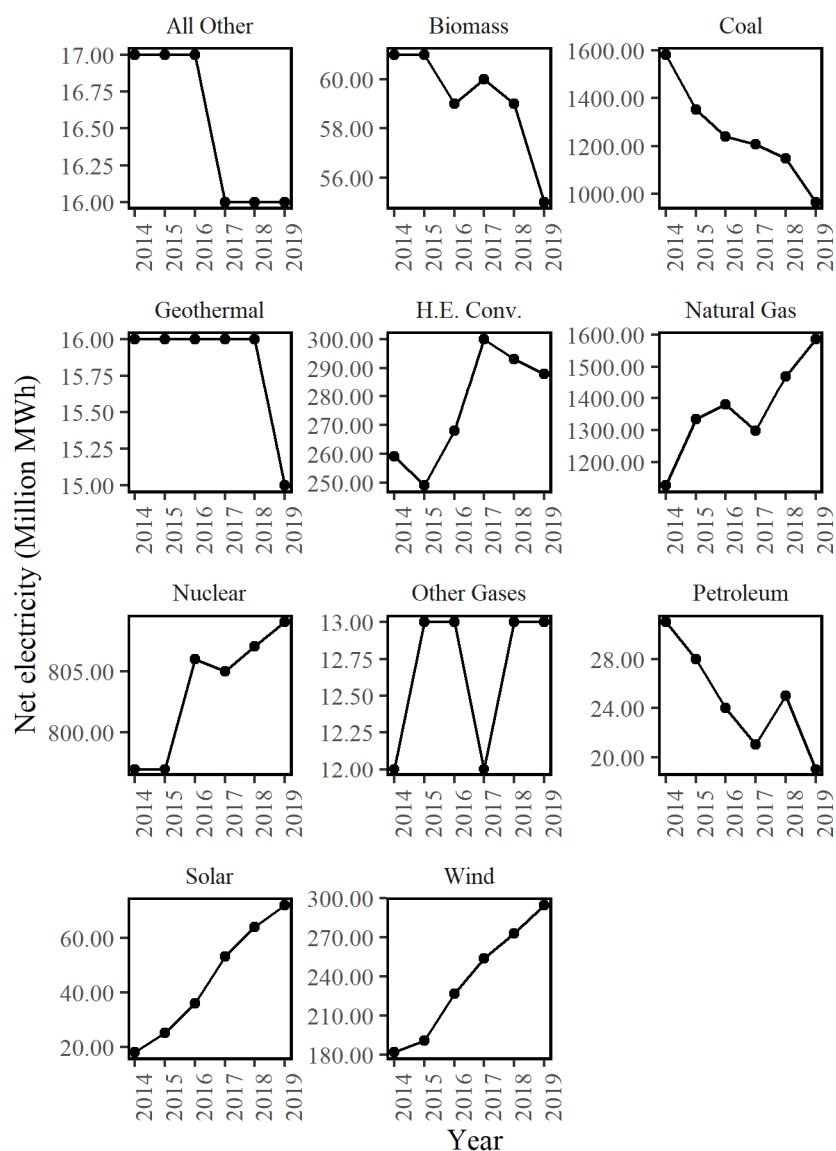


Figure S3. Net electricity produced by energy source 2014-2019, where H.E. Conv. represents hydro-electric conventional. Other gases include blast furnace gas; and all other includes batteries, hydrogen, purchased steam sulfur, tire-derived fuels and other miscellaneous energy sources. H.E. pump is not shown due to negative net generation caused by the nature of its infrastructure.

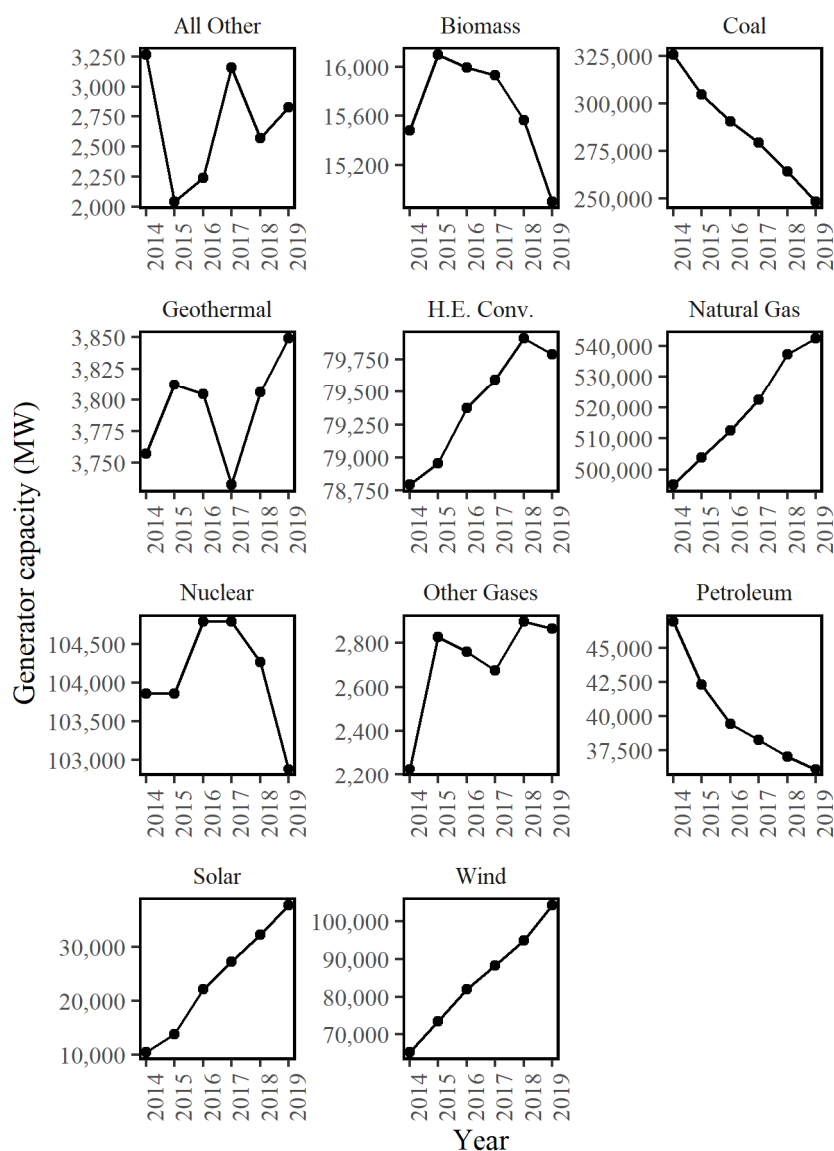


Figure S4. Temporal changes in generator nameplate capacity 2016-2019 by energy source, where H.E. Conv. represents hydro-electric conventional. Other gases includes blast furnace gas; and all other includes batteries, hydrogen, purchased steam sulfur, tire-derived fuels and other miscellaneous energy sources.

Table S1. The average emissions (kg) of CO₂, SO₂ and NO_x per MWh by energy source 2014-2019. AVG is average of 2014-2019.

| Energy Source | CO ₂ | SO ₂ | NO _x |
|---------------|-----------------|-----------------|-----------------|
| | (kg/MWh) | (kg/MWh) | (kg/MWh) |
| Petroleum | 1,081.92 | 3.35 | 1.75 |
| Natural Gas | 449.18 | s* | 0.28 |
| Coal | 1,019.79 | 1.37 | 0.77 |
| AVG | 850.30 | 1.57 | 0.93 |

* Denotes value < 0.01.