ELECTRIC POWER RESEARCH INSTITUTE

Choosing Electricity Generation Technologies

Generation Technology Reference Card

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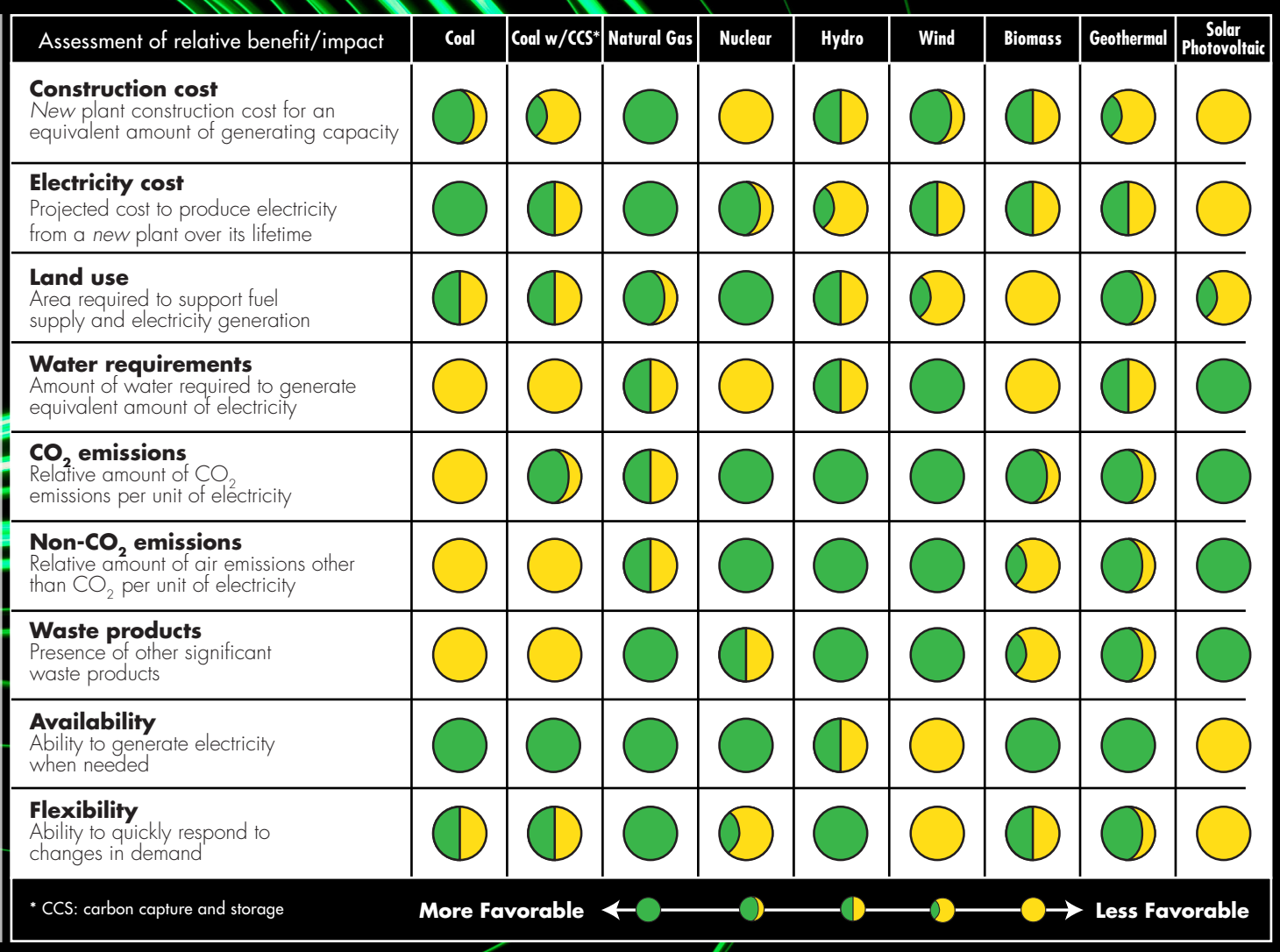
Electricity generation technologies all have advantages and disadvantages. Renewable technologies such as solar and wind use "free" resources and don't produce harmful greenhouse gases, but are not always available when needed and require significant amounts of land. Technologies such as coal and nuclear produce electricity in large quantities reliably around the clock, but result in significant greenhouse gases (in the case of coal) and long-term waste disposal considerations (in the case of nuclear).

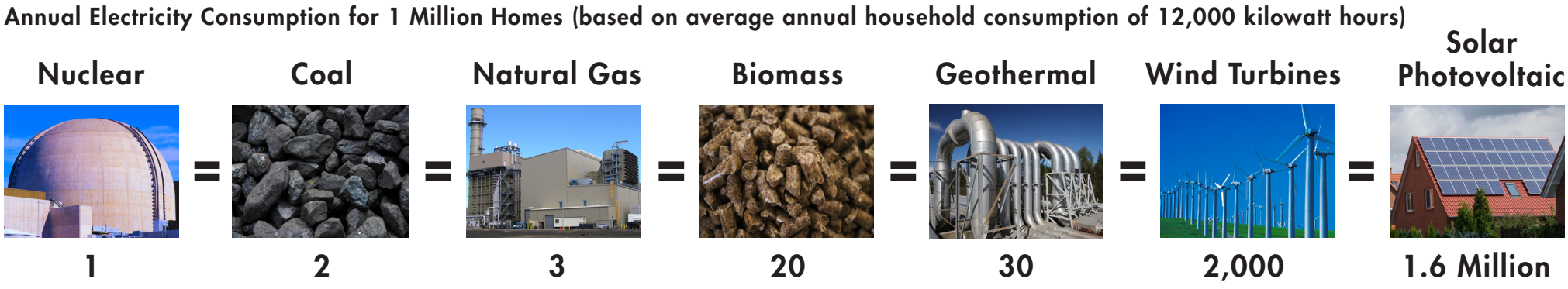
Recognizing these tradeoffs helps everyone understand why analyses such as EPRI's Prism emphasize the importance of a diverse array of technologies for reducing carbon dioxide (CO_2) emissions while economically and reliably meeting electricity demand and complying with existing environmental regulations. When properly applied as part of an integrated portfolio, all generation technologies play useful roles that capitalize on their strengths.



HOW MANY PLANTS DOES IT TAKE TO POWER A CITY?

Americans consume large amounts of electricity. Meeting this demand requires a vast network of power plants, big and small, connected by a network of transmission lines. For a sense of scale, the graphic below shows how many power plants of a given type would be required to generate the same amount of electricity. One nuclear plant or two coal plants, for example, produce enough electricity to meet the yearly needs of one million households (about the size of Chicago). In actual practice, a number of power generation options work together within and across regions to reliably provide electricity.

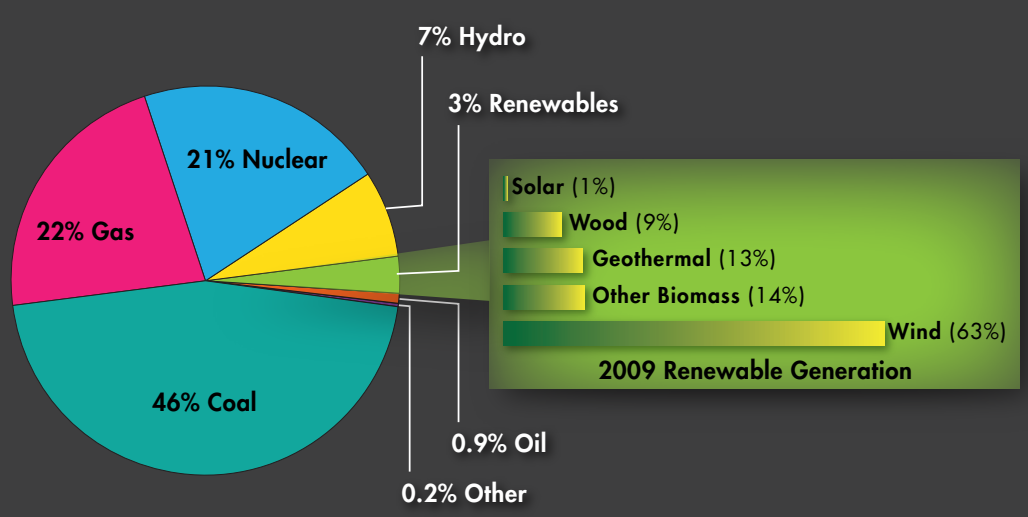
Annual Electricity Consumption for 1 Million Homes (based on average annual household consumption of 12,000 kilowatt hours)



WHERE DOES OUR ELECTRICITY COME FROM?

The electricity that powers American homes and businesses comes from a variety of sources. Coal, nuclear, and natural gas account for about 90% of the electricity generated each year. Renewable energy is becoming much more important, but currently only meets about 3% of U.S. demand. After hydroelectric power, wind energy is the largest renewable resource, accounting for more than one-half of all renewable electricity.

2009 ELECTRIC SECTOR GENERATION



Source: U.S. Energy Information Administration

WHICH PLANTS ARE USED THE MOST TODAY?

Power plants are not always available to generate electricity. Electricity output depends on many factors, including power plant operating characteristics, fuel prices, the availability of renewable resources, and daily and seasonal changes in electricity demand. Wind turbines only operate when the wind is blowing; natural gas plants are called on to manage fluctuations in demand; coal plants schedule maintenance for the Spring and Fall when electricity demand is down. The graphic below shows how many days each generation type typically operates over the course of a year in the United States. This diverse mix ensures that affordable electricity is available year-round.