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We need Diablo Canyon and othernukes

Should it come to pass that we need additional nuclear power, and we had not acted when we could have had them in time, well, shame on us.
If we get to the point where all carbon-free energy (plus a surplus) that we will need is already on-line without nuclear, we can (a) shut down existing nukes or (b) leave new nukes unstarted. Since we don't know (and life is full of unpleasant surprises), and the possible future of our species could be adversely affected, it seems prudent to keep existing nukes going and ramp up planning and building new ones.

Attached: my 1 page derivation for the amount of electric energy needed to remove 120 ppm CO2 from the air using current technology

Additional submitted attachment is included below.

ENERGY TO CAPTURE 120 ppm CO2 from ATMOSPHERE over 100 Years

Radius of earth:	4,000 miles
Surface area of sphere:	$4(pi)R^2$
Weight of atmosphere:	15 pounds per sq inch (psi)
1 mile:	5,280 feet
1 foot:	12 inches
1 metric tonne:	2,200 pounds
CO2: Fraction of air	0.00012 (120 ppm added from 1800 to 2020, est)
1 GWh	1,000,000 kWh (= 1,000,000,000 Wh)
1 kWh	$0.30 cost of 1 KWh electricity in 2022
Hours per year	8,760
$200 - $600	Cost-to-capture 1 tonne of CO2 (using $200/tonne, here)
0.8	Electricity as fraction of cost-to-capture (guess)
2.2 GW	Operating output of both reactors at Diablo Canyon, CA
444	Existing nuclear plants, world-wide (2021) produce 400 GW

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$4{,}000\text{ mi}\ \frac{(5{,}280\text{ ft})}{\text{mile}}\ \frac{(12\text{ inch})}{\text{foot}} = 253{,}440{,}000$ Earth's radius in inches

$4(3.14)(253{,}440{,}000)^2 = 8.07\times10^{17}$ Earth's surface area $4\pi r^2$, in sq inches

$8.067\times10^{17}(15\text{ psi}) = 1.21\times10^{19}$ Weight of the entire atmosphere (pounds)

$1.21\times10^{19}\ (0.00012) = 1.45\times10^{15}$ Pounds of 120 ppm CO2 added to atmosphere

$\frac{1.45\times10^{15}}{2{,}200} = 6.6\times10^{11}$ Tonnes of 120 ppm CO2 added to atmosphere

$\$200\ (6.6\times10^{11}) = \$1.32\times10^{14}$ 120 ppm CO2 cost-to-capture @ $200/tonne

$1.32\times10^{14}\ (0.8) = \$1.06\times10^{14}$ Cost of electricity (80% of capture cost)

$\frac{\$1.06\times10^{14}}{100} = \$1.06\times10^{12}$ Electric cost/year spread over 100 years

$\frac{\$1.0610^{12}}{\$0.30} = 3.5\times10^{12}$ kWh per year required

$\frac{3.5\times10^{12}}{1{,}000{,}000} = 15{,}000{,}000$ GWh per year

$\frac{15{,}000{,}000}{8{,}760} = 1{,}700$ GW needed 24/7 for 100 years

$\frac{1{,}700}{2.2} = 770$ Number of Diablo Canyon sized reactors to produce 1,700 GW

Alternatively, use wind turbines instead of nuclear:

$\frac{1{,}700{,}000}{14} = 120{,}000$ Number of 14 MW wind turbines instead
Assuming: wind blows and turbines last 100 yrs

$\frac{120{,}000 \times 3}{0.80} = 450{,}000$ Windmills needed if wind blows 80% and turbines last 33 years.

This *does not* include:

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- Energy to sequester 10^{11} tonnes of CO2
- Energy to build DAC plants and make their chemicals (DAC = Direct Air Capture)
- Energy to make liquid fuels without using fossil fuels
- Energy to refreeze the Arctic (to restore northern jet streams)
- Energy to Replace existing FF plants, Desalinize seawater; charge EVs; produce cement, fertilizer, primary metals; replacing worn renewables; new world-wide refrigeration

And, assumes tipping points aren't exceeded in the meantime: thawing permafrost, AMOC, ...