JUST SCIENCE: GLOBAL WARMING AND FISSION POWER

Climate Science

CO_2 in the atmosphere acts as an insulating blanket.

Sunlight passes through CO_2 transparently, heating the earth. Warm objects cool by radiating away heat energy. Earth's radiated infra-red light is partly absorbed by CO_2 in the atmosphere. Adding more CO_2 adds more insulation, slowing the cooling, warming the Earth a bit, so it can radiate as much infra-red energy as it absorbs sunlight energy.

There are also other, varying causes of climate change, but the CO_2 insulation effect is consistent and persistent as CO_2 dissolves slowly in the ocean over centuries.

The atmosphere already holds 2000 gigatons (Gt) of CO_2 insulation. Doubling this will add 1.5°C to world temperatures.

The world is adding 51 Gt/year, set to increase to 59 Gt/y, so CO_2 will double by 2050. Thus temperatures will rise by 1.5°C, then continue rising as more CO_2 is added.

Limiting the rise to 2°C by 2100 requires big CO_2 emissions reductions, from 51 Gt/y now, to 42 Gt/y by 2030, to 25 Gt/y by 2050. The Paris pledges reduce emissions by just 6 Gt/y, not nearly enough.

Cutting CO_2 emissions requires stopping burning fossil fuels, which importantly provide 80% of world energy. Developing nations are rapidly increasing energy use. For electric power they choose burning coal, the most cost-effective route to prosperity. Alternative energy sources must be cheaper than coal to dissuade them.

Alternatives include wind, solar, hydro, and uranium fission. Hydro sources are too limited. Wind and solar sources are too intermittent, and energy storage solutions at grid scale are way too expensive. We can't power up our world on 100% renewables.

Fission power is essential for checking CO_2 emissions driving global warming.

Fission Energy Science

Lots of energy is trapped in each uranium atom created when 235 protons and neutrons were compressed together during supernovas 6 billion years ago. Some of that cosmic dust was incorporated into the solar system as it condensed and Earth formed.

Fissioning uranium into two smaller atoms releases that bound-up energy and a few neutrons. Fission power plants use the neutrons to fission more uranium, making enough heat to make steam to run a electric turbine-generator.

Uranium fuel is a million times more energy dense than coal. So it makes a million times less waste, and it's energetically cheaper.

Many people fear radiation, though uranium fission has been the safest source of energy. Including the Chernobyl accident deaths, fission is 2X as safe as solar or hydro, 4X wind, 500X natural gas, 5000X coal.

Moderate levels of radiation are harmless. Surprisingly for many people, nobody was hurt by radiation at Fukushima. The max dose was 50X a year's normal background radiation from rocks and cosmic rays. Radiation fear disrupted Japan more than the deaths of 15,000 drowned by the tsunami.

Radiation fear is a holdover from 1940s science errors and misconduct. The fear arose before scientists understood the human immune system and ongoing cellular repair of assaults from radiation, disease, cancer, stress, and metabolism.

Today medical therapies expose patients to radiation 40,000X a year's background dose. US nuclear and emergency workers are allowed about 25X.

Fear and over-regulation have made building new fission power plants too expensive in the US. New, simpler technologies like liquid fission will provide the developing nations with the economic, ample, zero-emission energy they need for prosperity.

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