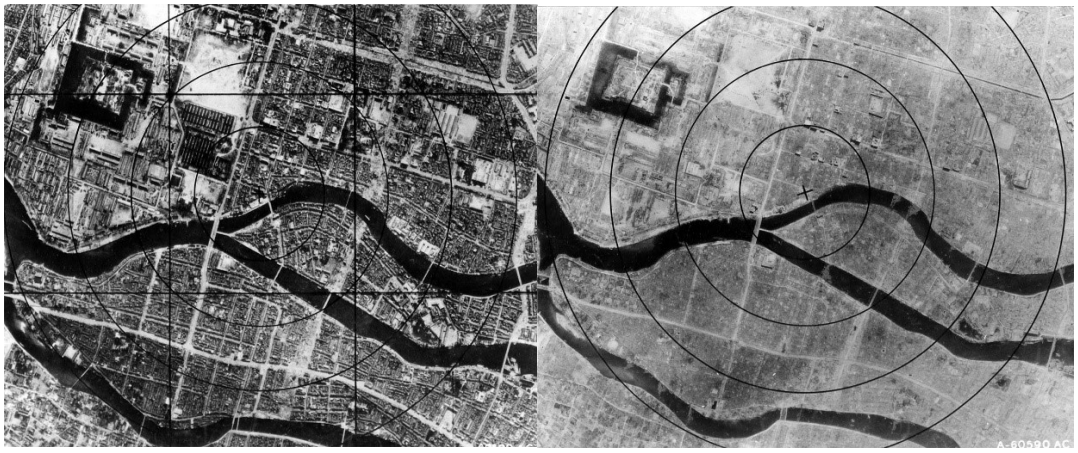
PLUTONIUM IS FATAL FOREVER. AND NO REMEDY FOR THE CLIMATE CRISIS

80 YEARS AGO, IN 1943, CANADA JOINED THE WW2 *MANHATTAN PROJECT* WHICH BEGAN TO DESIGN, BUILD AND TEST THE FIRST ATOMIC WEAPONS IN HUMAN HISTORY.

In August 1945, they virtually obliterated two Japanese cities, killing as many as 200,000, bestowing horrific burns and radiation poisoning, then bereavement and life-long nightmares for tens of thousands of *hibakusha* who survived.



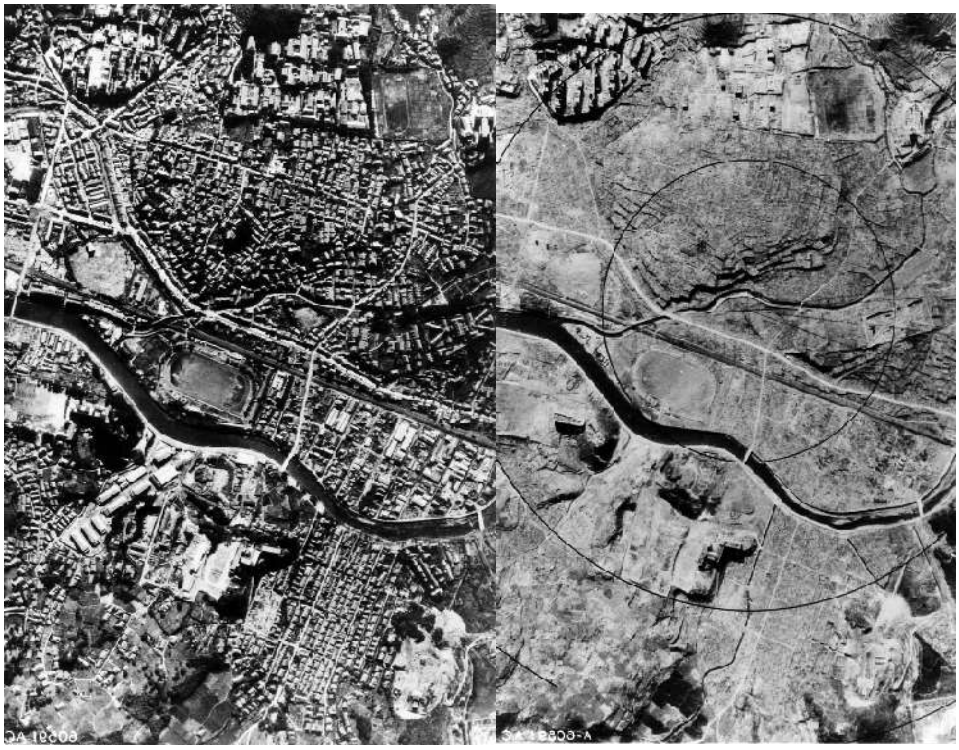
Hiroshima before and after 600 grams of Uranium 235

fully fissioned.

The bombs were incomprehensively terrifying. The one dropped above Hiroshima, code-named Little Boy, contained 64 kilograms of a fissile element called Uranium 235. But it was

crude by modern standards – only a mere 600 *grams* fully fissioned. The weight of a butterfly. Yet that produced an explosive force equal to 15,000 tons of TNT.

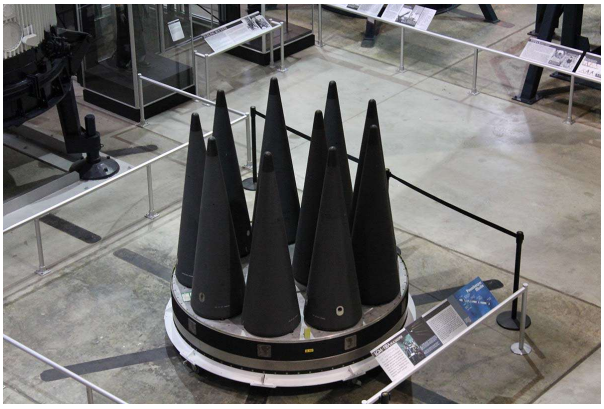
The bomb dropped on Nagasaki three days later was more complex and efficient. ‘Fat Man’ contained only 6.4 kilograms of another fissile element, Plutonium 239, of which about 900 grams fully fissioned. That mass (comparable in weight to a large caterpillar) produced over 20 kilotons (20 tons of TNT equivalent) of explosive force.



The city of Nagasaki was destroyed when a 900 gram mass of plutonium fissioned in one millionth of a second. A Luna Moth caterpillar weighs about 900 grams.

We might be tempted to think of this as ancient history, or a non-Canadian matter, or irrelevant to the climate crisis now imperilling our planet. But the opposite is true, because there are now some 13,000 nuclear weapons aimed at countless targets on our shared Earth. Most are far more powerful than those used against Japan, use less uranium and plutonium, and can be delivered from astonishing distances with diabolical accuracy.

Moreover, a single long-range missile can deliver up to fifteen warheads programmed to hit different targets. For these reasons, plutonium is by far the fissile component favoured by weapon designers.



Up to 15 plutonium warheads can be packed into the nose of a single long-range missile, and be programmed to hit different targets.

The biggest source of more plutonium is from the worlds 410 *civilian* nuclear power plants. Regardless of make, model, or country of origin, they collectively create 70 *tonnes* of plutonium each year as part of the uranium fission process. That compares to only 900 grams which fully fissioned in the Nagasaki bomb.

The global fleet of 410 civilian power reactors meets only 4 per cent of world energy demand, while creating 70 tonnes of plutonium each year. Only 900 grams destroyed Nagasaki.

This global reactor fleet accounts for only 4 per cent of world energy production. Doubling that to 8 per cent would mean building another 410 reactors, and doubling annual plutonium production to 140 tonnes per year.

Plutonium, once created, has an immutable half-life of 24,000 years. Due to laws of physics, it will take 240 centuries for it to lose half its atomic mass, and half its latent lethality. But only half. Even then, the plutonium made tomorrow or next year or next decade would haunt generations for effectively forever.

Early humans made these cave paintings some 24,000 years ago. That is how long into the future it will take for Plutonium to lose half its mass and lethality.

So nuclear power is no remedy to the climate crisis.

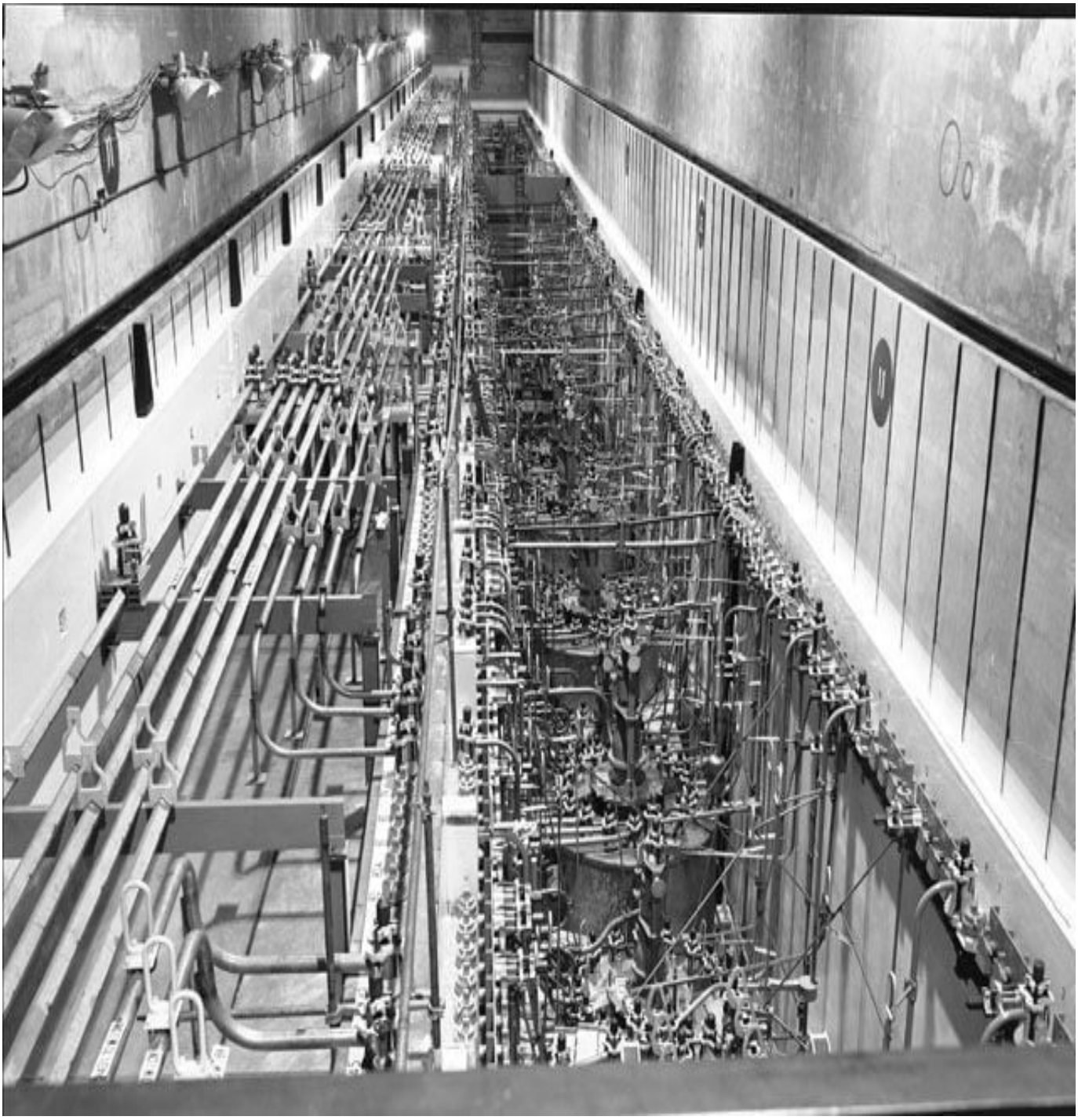
At best, it might fractionally reduce global greenhouse gas emissions while simultaneously accelerating plutonium production and nuclear weapons proliferation. Replacing carbon atoms with plutonium and uranium atoms is a deadly delusion which would only imperil world security and the future of our planet.

The genuine alternatives are renewable power, electric transport, efficiency devices like heat pumps, battery storage, and green hydrogen for industrial uses. Evidence for this can be found in the chapter ***Green Ascent***

available as a free pdf at: www.atomicaccomplice.ca

Please support the campaign to ban all future reprocessing and uses of plutonium in Canada.

Canada's NRX 'research' reactor: a prolific plutonium source



Canada's NRX reactor produced 250 kilograms of plutonium for the U.S. hydrogen bomb arsenal. It was secretly shipped to this vast re-processessing complex in South Carolina, where four NRX clones were also built. The site now ranks among the most contaminated on Earth.

Sadako Sasaki died at age 12 after bravely battling radiation effects from the Hiroshima bombing. Her last mission of hope was to make one thousand 'peace cranes' with fellow class-mates. You can listen to *Song for Sadako* on this site.

PART 2: THE GOOD GREEN NEWS!

This hydro plant at Niagara Falls has provided green power for 100 years. It erased Ontario's dependence on coal.

A century ago, Canada was *the* global leader in delivering renewable power. Facing formidable technical, financial and political odds, the province of Ontario borrowed heavily and created a public electric utility to build the world's largest hydro generating plant on a cliff just downstream from the famous Falls at Niagara.

It was universally praised – and envied – as an elegant engineering masterpiece because its giant, hidden turbines turned 24/7 simply by harnessing infinitely endless tons of falling water. Those turbines spun monster magnets, which created high voltage electric power that could supply far distant cities, commercial buildings, homes, factories and farms.

No dam was needed, because an underwater wall upstream diverted enough flow into a dedicated canal that ended just above the Niagara powerhouses. Then gravity did the rest. Many decades later, a big adjacent reservoir and giant pumps allowed a remarkable reversal: some water that had already poured over the Falls was pumped *up* the cliff, stored, then dropped into turbines to match peak grid demand. In effect, this created the world's biggest on-demand battery.

This Niagara marvel has operated flawlessly for a century. Its prodigious power was even dubbed "white coal" because it replaced dependence on filthy, high-cost coal imported from Pennsylvania – and the reviled moguls who owned it. With recent refurbishments and upgrades, it should perform as well for another century. While generating the cheapest, greenest power possible.

No wonder other provinces across Canada, many U.S. states, countries in Europe, Russia, Brazil, China and Africa replicated the Niagara template to harness countless rivers for many decades after.

Fast forward to 2010, when Ontario again turned to green power after a half century dominated by coal and nuclear power plant additions. Using an ingenious model from Germany, which promised developers a long-term contract at guaranteed prices for delivered 'green electrons', a boom in solar, wind, landfill gas and farm biomass projects occurred. That came to a screeching halt when politics intervened, and a new premier unilaterally annulled almost 800 green power projects, ordered one new wind farm dismantled, and even had

electric vehicle chargers stripped from commuter train stations. This cost taxpayers at least $231 million in penalty payments. Much more might stem from lawsuits.

Luckily, few other places on the Planet appear inclined to copy *that* vengeful template. Instead, global green power investments and installations have achieved a mass and velocity that is now unstoppable. Even in Alberta, solar, wind and hydro power has now eclipsed coal generation.

Starting with Niagara, it took a century to build out Canada's electric power systems. Until the 1960's, hydro was virtually the only player, and today it still dominates the grids in B.C., Manitoba, Quebec and Newfoundland-Labrador. But coal came back with a vengeance in Ontario, Nova Scotia, Alberta and Saskatchewan, then nuclear came to dominate Ontario's grid. Today the national peak output is about 150,000 Mw.

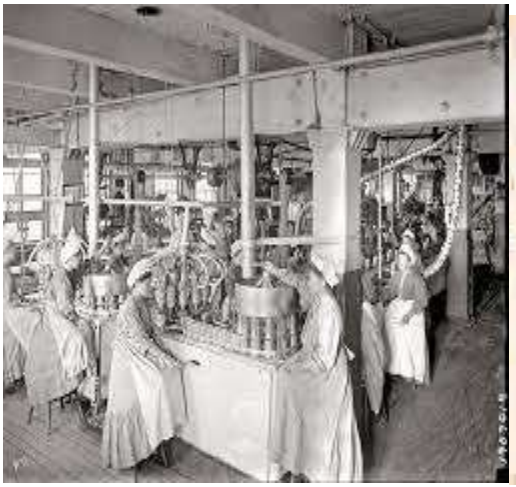
Now here's the astonishing, good green news.

In 2022, just the top six global solar panel manufacturers punched out enough of their product to collectively generate *300,000* peak Mw's. They are still largely invisible because they will be erected at sites across the globe by 2025. Even more panels are slated to exceed that total in 2023, and each year after for decades to come. Put another way, it now takes a mere six months for global solar panel makers to match the peak capacity it took Canada a century to build. World wind turbine production and installation shows a similar pattern.

How is this possible, and why isn't this thrilling news widely known?

WE WILL GET TO THAT FAST, BUT FIRST A SKILL TESTING QUESTION? WHAT PICTURE DOES *NOT* BELONG IN THE FOLLOWING PHOTO SEQUENCE?

Ford car plant Detroit



Heinz ketchup bottling plant Pittsburgh

Vinyl record plant

Flat screen tv plant Japan

iPhone assembly plant

Solar panel plant

The answer, of course, is all of the above. The ‘secret sauce’ to this green power success is as old and boring as Henry Ford’s Model T, and mainstream media typically report only about new green projects in the area they serve. So we never get a satellite view of the scale and scope of this astounding global surge of zero carbon generation.

The Atomic Accomplice chapter Green Ascent takes a deep dive into the evidence, and time limits mean I can only summarize the key features now.

But the essential fact is that solar panels, wind turbines and state-of-the-art companion batteries are more akin to flat screen tvs, laptops and cell phones than giant nuclear, coal or natural gas plants. In the case of solar panels, new ones are typically being made every 40-seconds, 24/7, in many dozens of plants world-wide.

Many more, far larger panel factories are under now construction in the U.S., China, Europe, India, Brazil, Asia and Africa – and this escalating production scale underpins lower unit costs. Meanwhile, solar panel output per square meter has almost doubled since 2010 due to improved designs, chemistries, materials and manufacturing techniques. So the total value and output of each new iteration has gone up, while the production cost has gone down.

A second key feature of this global green power surge is an increasingly prevalent – and ingenious – purchasing tactic call the 'reverse auction'. It is used by major electric utilities or government entities to acquire large blocks of new solar, wind or battery capacity for their grids.

But, in direct contrast to a Sotheby art auction, green power producers are invited to compete against their rivals by submitting their *lowest* possible bid. The advantage to the utility (and its customers) is that this form of price discovery leads to lower power purchase costs. The

advantage to the winning supplier is that it gets a huge, long-term contract to generate solar, wind or battery electrons at a guaranteed price.

This ‘reverse auction’ tactic also has important collateral benefits. It not only sends project costs down, but forces the green power bidders to continually invest in ways to increase performance and reliability – so they can win future ‘reverse auctions’.

The hidden drivers for this are two-fold:

First, the winning bidders are only paid for *electrons they actually deliver* under strict ‘pay for performance’ contracts with the utility. If the technology proves faulty, or there are construction delays or cost overruns, the utilities will not pay for those mistakes. So the supplier has to suck up such losses.

Secondly, the green power suppliers cannot even take part in the bidding unless they meet stiff qualifying standards. In the case of solar developers, for example, they must provide proof from independent testing labs that their panels will perform at their rated output for a minimum of 25 years. And, without that certification, the developer cannot attain project insurance or capital financing from banks. So this shuts out inept or shady bidders, and directs project investment dollars to the very best companies.

These combined features also rule out nuclear, coal, and natural gas generators because they simply cannot meet the metrics of cost, reliability, guaranteed performance, or meeting construction budgets and deadlines – let alone the environmental and public safety attributes of green power. None could even gain entrance to such ‘reverse auctions’.

Lastly, due largely to recent, hugely beneficial green power tax credits in the U.S., Europe, and Australia, all signs point to an ever sharper incline in this Green Ascent. Annual global capital investment in clean tech has now hit the $1 Trillion mark, and reached parity with global fossil fuel funding.

Most thrilling, investment capital is now pouring into battery technologies, and ‘trifecta’ sites which combine large solar, wind, and storage generation on the same property. This will drive down total project costs, allow shared use of transmission infrastructure, and earn new revenues for delivering power at times of peak demand while improving grid stability and voltage balances.

These trends have now led to an astonishing clean tech production and cost convergence, an accelerating scale of global green power production, and collateral innovation.

Large solar projects on lakes and on hydro dam reservoirs.

Solar providing shade, light and power.

Animal manure makes biogas power.

Solar farms are sheep and pollinator compatible.

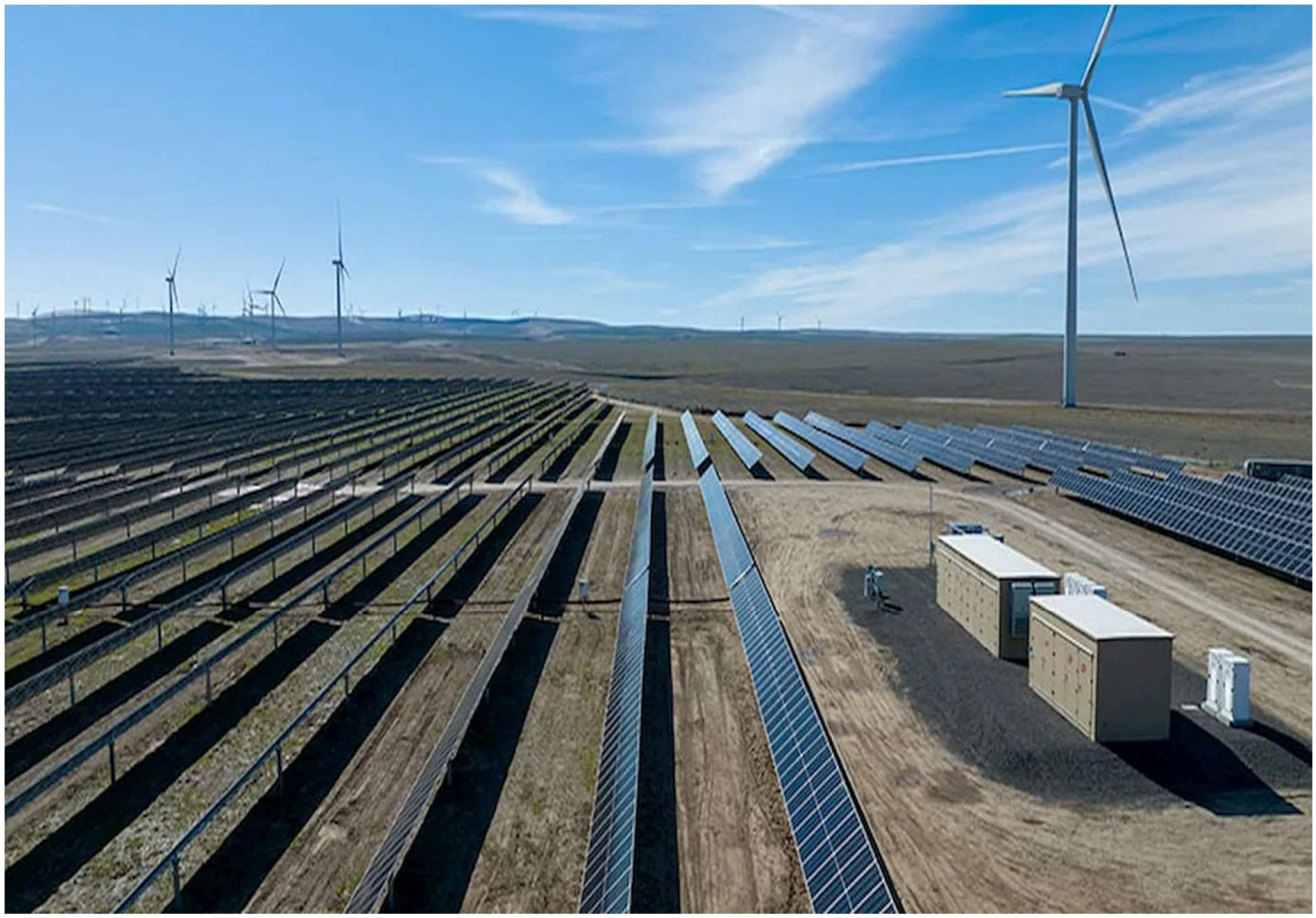
This solar project in India provides grid power, irrigation pumping, and reduces evaporation of precious water.

Eight million diesel water pumps in India can be replaced by solar.

A combined wind and solar project in Senegal, Africa.

This Chinese company now mass produces giant wind turbines.

Which can make hydrogen at sea.



A wind, solar and battery project in Australia. Many more are coming.

The roof of Asia’s largest train station.

A solar integrated building.

For the first time, global green power has the money, mass, multiple value package and velocity to out-compete the old, dirty energy incumbents, and is already beating them on price, performance, safety, environmental and world security metrics. It will take decades more to replace them, but now we know green innovators will inevitably win the contest for a safer, cleaner, more equitable and prosperous future.

That is where, none too soon, the Carbon Club and plutonium pushers are doomed to disappear as relics of a reckless past.

The fight for a safe climate cannot include plutonium.AN FIRST A BOMB – 25 KT OCTOBER 1952 montebelo islands australia

NUCLEAR ACCOUNTS FOR ABOUT 4 % OF GLOBAL ENERGY CONSUMPTION; DOUBLING TO 8% (ADDITIONAL 400 REACTORS) = 70 metric tonnes per year PLUTONIUM in spent fuel _____

BERTRAND GOLDSCHMIDT – TOLD DE GAULLE ABOUT A BOMB IN OTTAWA HOTEL LAVORATORY IN 1944!