The Timely Answer-

Nuclear Power:

Towards Net Zero Carbon and Solving our Energy and Clean Water Needs

September 2022

Jay Schabacker

The Timely Answer - Nuclear Power: Towards net zero carbon and solving our energy and clean water needs

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I would appreciate it if you would email me when you receive this report!: Jayschab@aol.com

The Timely Answer - Nuclear Power: Towards Net Zero Carbon and Solving our Energy and Clean Water Needs

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"The California Air Resources Board is expected to issue stringent rules to ban the sale of new gasoline cars by 2035 and set interim targets to phase the cars out." Other states to follow. www.cnn.com/2022/08/24/us/california/california-set-to-ban-all-gasoline-cars-by-2035

Climate Change – Nuclear Electrical Power Project

The US is on a path to cut emissions by 24%-35% below 2005 levels by 2030, far short of the nation's initial pledge to reduce emissions by 50%-52% in that time. It's a grim outlook! Most Major Nations Lag In Acting on Climate-Fighting Goals, Washington (AP), Breitbart News Network, July 19, 2022

Rush toward green energy has left US 'incredibly' vulnerable to summer blackouts, expert warns Fox News, July 4, 2022

Every area of the US could be in danger of experiencing power outages this summer amid a push to convert to renewable energy sources while taking traditional sources of power offline.

"I think the entire country is incredibly vulnerable, because the entire country is facing a huge energy shortage and I don't think there is any place that is truly safe," Daniel Turner, founder and executive director at Power the Future, told Fox News.

Turner said some states are under increased threat this year, especially those that have made political pushes to switch over to so-called "green energy."

"If you look at any country worldwide, or in any state in America, that has pushed green energy mandates by government action, not one of them has been successful," Turner argued. "And you can measure that on

multiple levels of success, in terms of what they've purported to or claim that they would produce in terms of electricity, reliability, cost, in terms of actual construction, or cost to consumers."

As I read the article (US 'incredibly' vulnerable) on July 4th, I started thinking a lot. I'm worried about energy shortage, electrical blackouts, carbon buildup, water security, and extreme weather – even China dominance over the US. When you read of the researchers and commentators views in this report, you might agree with me – that something needs to be done about it!

Grid operators warn of electricity shortage amid switch to renewables

Turner believes nuclear could be a solution in the U.S., but he notes that a move to more nuclear energy would receive plenty of pushback.

"Nuclear is absolutely one of the strongest solutions. Nuclear is absolutely a viable solution that has the smallest footprint," Turner said. "The biggest problem nuclear has against it is there is a very aggressive and very effective fear campaign."

"Nuclear is absolutely the best solution", Daniel Turner

Analysis: Global energy crisis drives rethink of nuclear power projects,

World Nuclear Association (WNA), Enrico Dela Cruz, August 4, 2022

The Philippines, Bataan Nuclear Power Plant (BNPP) has been put on hold for years, but there is now a potential revival, a sign of renewed interest in nuclear power. Governments across Europe and Asia are extending their aging fleet of nuclear plants, restarting reactors and dusting off plans to resume projects shelved after the 2011 nuclear crisis in Fukushima, Japan.

Both the administration of U.S. President Joe Biden and the International Energy Agency (IEA) have said nuclear power is critical for countries to meet global net-zero carbon emissions goals and ensuring energy security, as fossil fuel prices have surged after Russia cut natural gas supplies to Europe since the Ukraine war started in February 2022.

"If fossil fuel prices remain high for a period of three to four years, I think that would be enough to launch a golden age of nuclear development especially in Asia because that's where they are most price sensitive and because there's the most need," said Alex Whitworth, head of Asia power and renewable research at consultancy Wood Mackenzie.

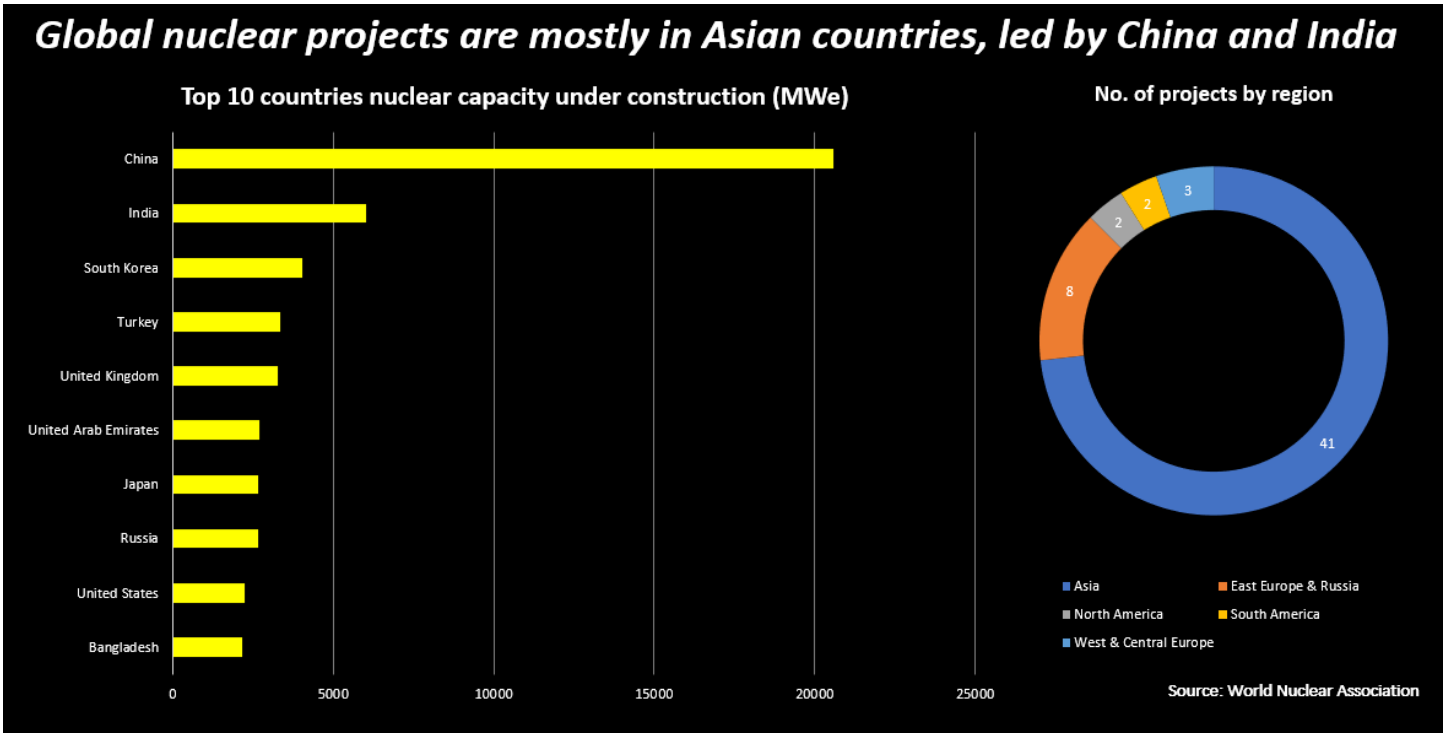
Japan to start nuclear again after Fukishima

"Prime Minister Fumio Kishida called for a policy shift towards nuclear energy now". Fukishima is in the past.

Japantoday.com/category/national/japan-signals-return-to-nuclear-power-to-stabilize-energy-supply

In Europe, Britain gave consent in July for what will be its second nuclear project in two decades. Funding discussions for the Sizewell C project are ongoing, and a final investment decision is expected in 2023.

Global nuclear capacity will need to double by 2050 to achieve net-zero targets, the IEA said last month, to power electric vehicles and produce non-fossil fuels such a hydrogen and ammonia to cut heavy industry emissions.



(On global nuclear projects, China is No. 1, U.S.A. is No. 9)

Lower Cost Power

New technologies such as small modular reactors (SMR), quicker to build and less costly than conventional units , are being discussed in Singapore, the Philippines and Japan, Paul Stein, chairman of Rolls-Royce SMR, a unit of Rolls-Royce (RR.L), said last month.

The average cost of electricity generated by a conventional nuclear power plant over its lifetime is less than half that of a gas-fired plant at current prices, and is the same range as coal power, Woodmac's Whitworth said, spurring governments to revive projects.

(Thomson Reuters, Reporting by Enrico dela Cruz in Manila, Joyce Lee in Seoul, Florence Tan in Singapore, Khanh Vu in Hanoi, Timothy Gardner in Washington, Nina Chestney, Susanna and Sarah McFarlane in London; Wrting by Florence Tan; Editing by Christian Schmollinger

Inflation vs Deflation: Nuclear Power actually has a Deflationary role

Greg Garlock, a senior advisor at Data for Progress, authored a report outlining policy proposals for the Green New Deal, argues that "Congress just authorize new spending, like it does everything else – not lay the cost on the states' citizens."Garlock also stated**: "<u>The driver of inflation is not how many zeros we've put out there. The driver of inflation is the lack of availability of limited biophysical resources that money is trying to go out and buy. And that's why when you think about this form of sustainability perspective, a Green New Deal and nuclear power that tries to improve the sustainability of our natural resources, is actually meant as a deflationary role!"</u>**

Global nuclear power capacity needs to double by 2050 IEA, Thomson Reuters, June 30, 2020

"In today's context of global energy crisis, skyrocketing fossil fuel prices, energy security challenges and ambitious climate commitments, I believe nuclear power has a unique opportunity to stage a comeback. However, a new era of nuclear power is by no means guaranteed. It will depend on governments putting in place robust policies to ensure safe and sustainable operation of nuclear plants for years to come," said the International Energy Agency (IEA) Executive Director, Fatih Birol.

"Global nuclear power needs to double by 2050", Fatih Birol

The United States – New 'Manhattan Project' & Climate Change

Let's talk about the United States. The United States has always been the number one nation, of late, in stature and power. We have worked hard for our laurels in many ways, and the Manhattan Atomic Bomb Project was just one of those ways. When we saw the need we sought to find a way – out of World War 2 – with the secret and high cost plan to build the atomic bomb – called the <u>Manhattan Project</u>. We saved our county and saved the world. The new Manhattan Project is to save the country and the world by solving our energy problem now – with the <u>Nuclear Energy Power Project</u>.

This lengthy article is about the need, the reason for it, the details, the prospects and the plans. Foremost is the need for our Federal Government, in a timely manner, to get fully and shrewdly behind this program, as they did in the 1940's with the Manhattan Atomic Bomb Project.

With the "Inflation Reduction Act" approval of the $740 billion economic package, one of those who voted for it stated, "<u>It was one of the defining legislative measures of the 21st century</u>." Lea Stokes of the University of California, Santa Barbara, said, "Absolutely historic; Senate budget deal would be biggest climate change action ever." <u>But, looking at the big picture, it was just a start</u>!

"It is only the first chapter," Sen. Sheldon Whitehouse, D. – R.I.

Others who are looking well into the future, implore us - let's build on this small start and start production. When our citizens and taxpayers see the results possible of the plans, leading to higher energy security,

increased productive employment, lower gas prices, lower inflation, and less pain from our climate crisis – they will wholeheartedly get behind the program – and will be glad to pay for it.

Enduring Bipartisan Support

The US Senate Environment and Public Works Committee passed the American Nuclear Infrastructure Act to support deployment of advanced reactors as well as limit closures of existing reactors.

The House Select Committee on the Climate Crisis and the Senate Democratic Special Committee on the Climate Crisis both recognized nuclear energy as part of the climate solution.

The US bipartisan Nuclear Energy Leadership Act, introduced in 2019, suggested funding building of two demo reactors by 2025 and potentially five more by 2035.

Congress needs to pass the "Federal Clean Energy Standard" to make new progress, and measures to maintain operation of our existing nuclear plants are key to success in the future.

What's next for Nuclear in 2022?

(nei.org/news/2022/whats-next-for-nuclear-in-2022), Emma Derr, Digital Communications Manager, emd@nei.gov)

"Nuclear provides for high salaries for America's workers"*, Emma Derr*

As the year begins, at NEI, we've identified five big moments to watch for in 2022.

1. Actions addressing the climate crisis
   As this year's IPCC report warned, global warming is happening much quicker than we originally thought. In short, the climate crisis isn't coming-it's here. Between uncontrollable wildfires, major hurricanes, droughts and heat waves, extreme weather is one of the most visible consequences of global warming, and is now the norm. The IPCC is planning to release its reports on impacts, adaption, and vulnerability, the mitigation of climate change, and the synthesis of the three Working Groups contributions this year.
2. Continued support for nuclear energy from the Biden Administration and Congress
   The Build Back Better Act is poised to hopefully pass in early 2022, which includes a production tax credit (PTC) for electricity generated by nuclear power plants in operation today, as well as a PTC for all clean electricity technologies, including advanced nuclear and power upgrades that begin construction after 2026. The bill also includes funding for the development of a domestic HALEU supply.
   We also saw a historic budget request from the administration in 2020, and early next year will look for strong funding for the DOE's Office of Nuclear Energy, along with a robust FY 2023 budget request.
3. Increased attention and funding towards climate finance
   Momentum continues to build around Environmental, Social, and Government (ESG) commitments, and the role of financial investments in the global clean energy transition is more important than ever. In the new year, we can expect to see continued efforts to explore climate-related financial

disclosures, corporate behavior promoting greener portfolios, and governments figuring out how to effectively assist developing countries to meet their climate goals.

4. Expanded applications for nuclear energy

   Existing nuclear plants will keep us on track to meeting our climate goals, and new nuclear technologies will propel us forward to meeting the moment-a net zero future. Advanced nuclear is designed to provide carbon-free energy in new and innovative ways and have valuable applications such as carbon-free hydrogen production. Nuclear also is uniquely positioned to fill the void created by coal plant closures by utilizing existing infrastructure and talent.

5. Focus on the green economy

   As we transition to a clean energy economy, job generation and economic stimulation will be essential to ensuring no community is left behind. Experts and economists will be looking for these hallmarks of green growth in the coming year. Nuclear energy is an important part of the equation because nuclear plants provide high-paying, lasting jobs. Nuclear employs a large number of veterans, creates jobs for multiple generations of workers, and pays higher salaries than other electricity generation sources.
   (By Emma Derr, Digital Communication Manager, emd@nei.org, 202.893.2022)

Also in work (from 2021:

The Georgia Vogtle3 and the Vogtle4 state of the art reactors will become the first new reactors built in the US in more than 30 years.

The Natrian and Xe-100 molten sodium reactor received funding from the US Department of Energy.

NuScalePower's small modular reactor (SMR) has been approved by the US Nuclear Regulatory Commission.

Utah Association of Municipal Power Systems secured a DOE award for its SMR project.

The Xe-100 high temperature reactor from X-Energy was approved.

nei.org/news/2020/whats-next-for-nuclear-energy-2021

Nuclear Reactor Technologies

Energy.gov/ne/nuclear-power-technologies; NECommunications@Nuclear.Energy.Gov

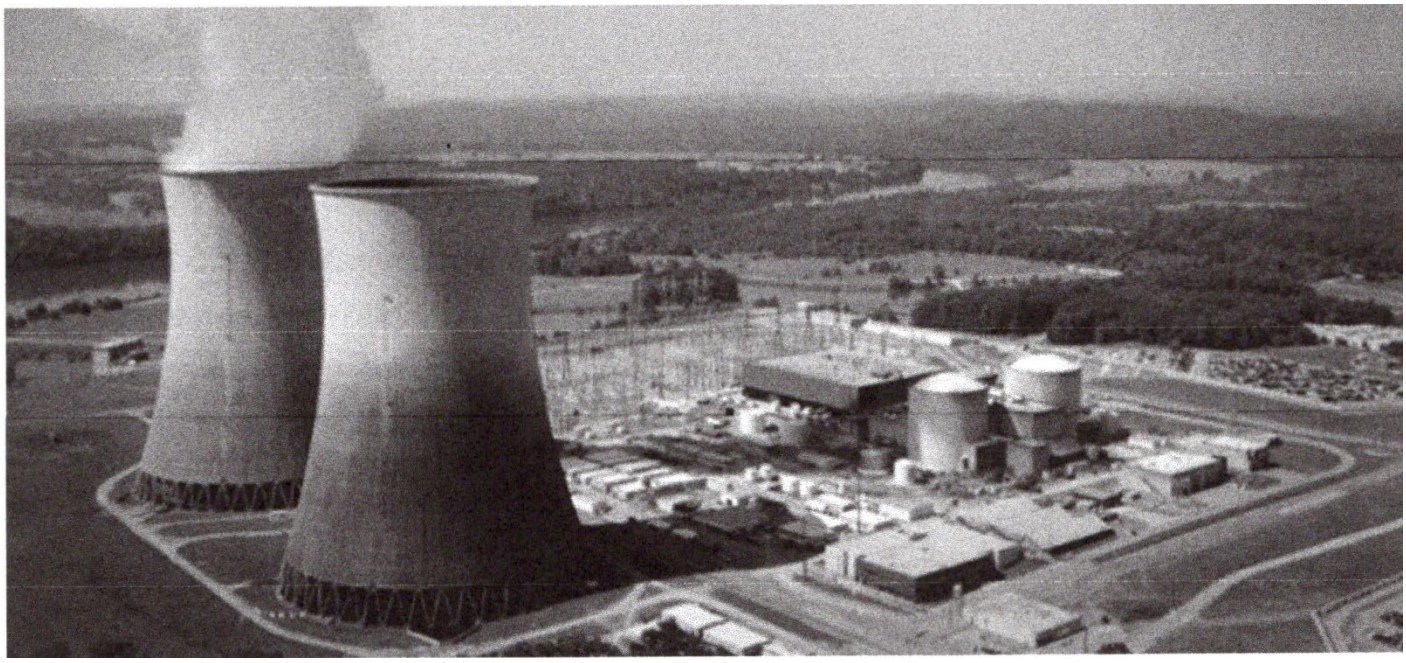
Nuclear power has reliably and economically contributed almost 20% of electrical generation in the United States over the past decades. It remains the single largest contributor (more than 70%) of non-greenhouse-gas-emitting electric power generation in the United States. Below are some of the technologies:

Small Modular Reactor Technologies (SMR)

Small modular reactors can also be made in factories and transported to sites where they would be ready to “plug and play” upon arrival, reducing both capital costs and construction times. The smaller size also makes these reactors ideal for small electric grids and for locations that cannot support large reactors, offering utilities the flexibility to scale production as demand changes.

Light Water Reactor Technology (LWR)

The existing US nuclear fleet has a remarkable safety and performance record. Extending the operating lifetimes of current plants beyond 60 years and, where possible, making further improvements in their productivity will generate early benefits from research, development, and demonstration investments in nuclear power.



Using the Light Water Reactor Technologies in East Tennessee, the TVA Watts Bar Nuclear Power Plant is a ‘dual plant.’ (see picture above). Unit 1 started in 1996 and Unit 2 started in 2016. Still in operation, combined, this is enough to supply 1.3 million homes daily. tvainfo@tva.com

Advanced Reactor Technologies (ART)

As a result of ARC research, nuclear energy will continue to provide clean, affordable, and secure energy while supporting the administration’s greenhouse gas reduction goals by introducing advanced designs into new energy and industrial markets. DOE will pursue RD&D on both advanced thermal and fast neutron spectrum systems.

Versatile Test Reactor (VTR)

In February 2019, the US Department of Energy announced its plans to build a Versatile Test Reactor, or VTR. This new research reactor will be capable of performing irradiation testing at much higher neutron energy fluxes than is currently available today.

Space Power Systems (SPS)

For over 50 years the Department of Energy and its predecessor agencies have been deeply involved in space research and exploration. Currently, the Office of Space and Defense Power Systems supplies Radioisotope Power Systems (RPS) to the to the National Aeronautics and Space Administration

(NASA), and national security applications for missions that are beyond the capabilities of fuel cells, solar power and battery supplies.

"Golden age of nuclear development", Alex Whitworth

Global primary energy: how has the mix changed over the centuries?

Wood, Biomass, Before 1800

Coal, 1850

Oil, 1900

Gas, 1950

Wind, 1955

Hydropower, 1960

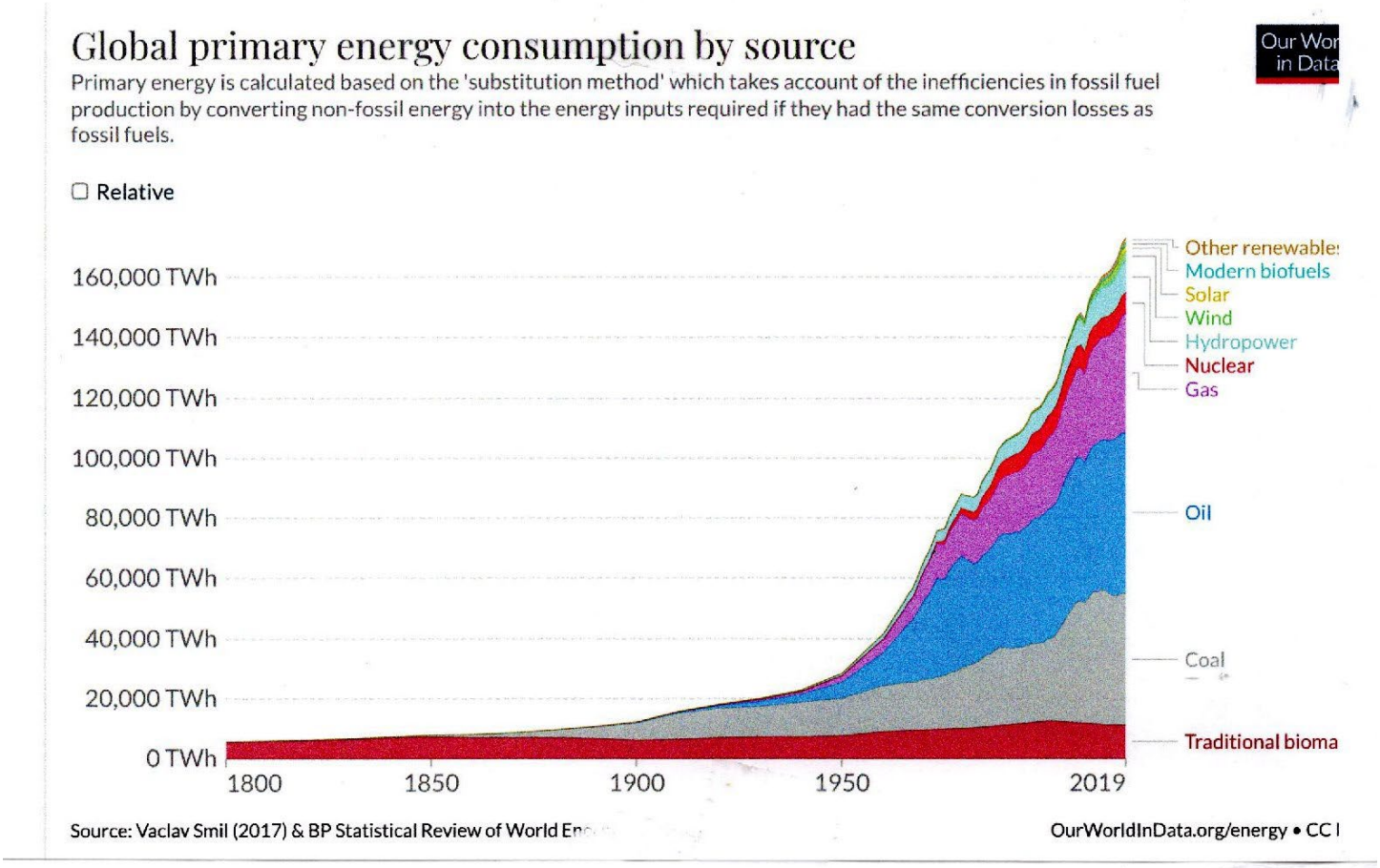
Nuclear, 1980

Solar, 2000

Modern Biofuels, 2010

Mike Rowe warns of a whirlwind of unintended consequences if fossil fuel, (such as coal) are eliminated too quickly. Fox News, with Brian Kilmeade, August 16, 2022.

"China and India are building coal plants every week for the next 30 years. There are 30 billion people right now still burning wood. If you want to bring them to a modern world, you are not going to do that with wind, and/or solar. You might be able to do that with nuclear!"



Today when we think of energy mixes we think about a diverse range of sources – coal, oil, gas, nuclear, hydropower, solar, wind, bio fuels. But if you look back a couple of centuries ago, our energy mixes were relatively homogeneous. And the transition from one to another was incredibly slow. In the chart shown we see global primary energy consumption dating back to the year 1800. We see that until mid-19th century, traditional biomass – the burning of solid fuels such as wood, crop waste, or charcoal – was the dominant source of energy used across the world. But with the Industrial Revolution came the use of coal, followed by oil, gas, and in the turn of the 20th century, hydropower. It wasn't until the 1960s that nuclear energy was added to the mix. Then what are often referred to as 'modern renewables' – solar and wind- were only added much later, in the 1980s. With recent experience and experimentation, it appears that nuclear power has major advantages over all the rest in this very large, populous, and energy hungry world.

Slow to catch on

When the automobile was just getting started it was slow to catch on and had safety and cost problems. When it got ironed out, it became a major healthy worldwide industry. That could be true of nuclear – a slow start with problems to iron out. The new engineering development of lower cost Small Modular Reactors has

shown the possibility of efficient electricity generation by nuclear power plants. Nuclear, if we put our mind to it, could be a major healthy worldwide industry.

Nuclear Goes Beyond Green

In his well respected 2010 book, ***Power Hungry: The Myths of the "Green Energy" and the real fuel of the future***, author, Robert Bryce argues that nuclear is 'the real fuel of the future'. Please get yourself a copy of the book. I have quoted, below, just a few items from the book:

For many people, nuclear power has not overcome some of its past. But progress on the issue is being made. Perhaps the best single rebuttal to these fears comes from James Lovelock, the British scientist who proposed the Gaia theory, which posits that the Earth is a self-regulation organism. In 2004, Lovelock wrote an opinion piece for "Independent" in which he made clear that nuclear power is the only viable option for large scale reductions in carbon dioxide emissions. He wrote, "let us use the small input from renewables sensibly, but only one immediately available source does not cause global warming and that is nuclear energy."

Nuclear power is the only always-on, no-carbon source that can replace significant amounts of coal in our electric generation portfolio. If the United States is serious about cutting carbon dioxide emissions and reducing the harmful environmental side effects of coal-fired power while keeping the lights on and the beer cold, nuclear has to be an integral part of the plan.

Fueling the Future

In his book, ***Fueling the Future***, 2007, Robert L. Evans described three types on nuclear reactors with diagrams:

"Nuclear is the real fuel of the future", Robert Bryce

The Boiling Water: The simplest type of Light Water Reactor is the direct-cooled Boiling Water Reactor (BWR) in which the same water is used as moderator and coolant, and as steam to drive the generator. Figure 8.1

Pressurized Water Reactor has two separate water circuits used so that the heat generated in the reactor core is transferred indirectly to the steam circuit used to drive the turbine generator. Figure 8.2

Heavy Water Reactor, developed in Canada by Canadian Deuterium Uranium, uses heavy water for both the moderator and primary coolant, and they use a pressure tube core design which allows thin wall tubes, cheaper to fabricate. Figure 8.3

The three nuclear plant diagram figures are on the next page.

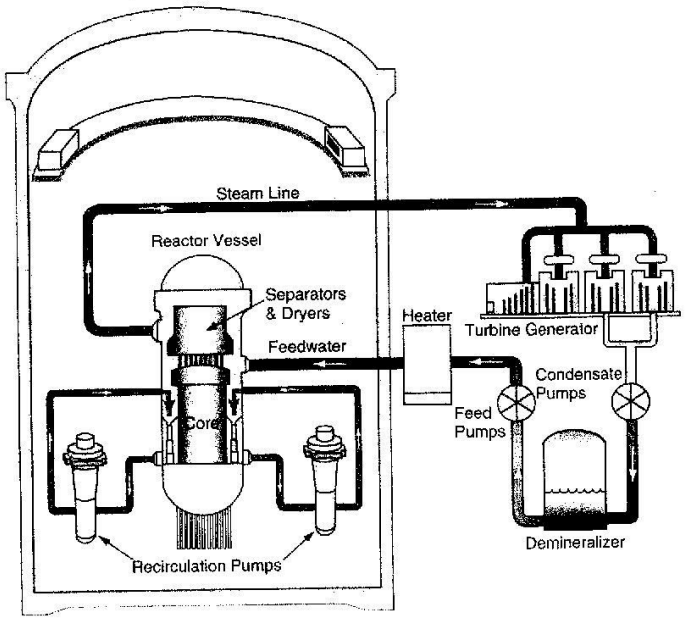


Figure 8.1 Boiling water reactor. *Source*: US Nuclear Regulatory Commission.

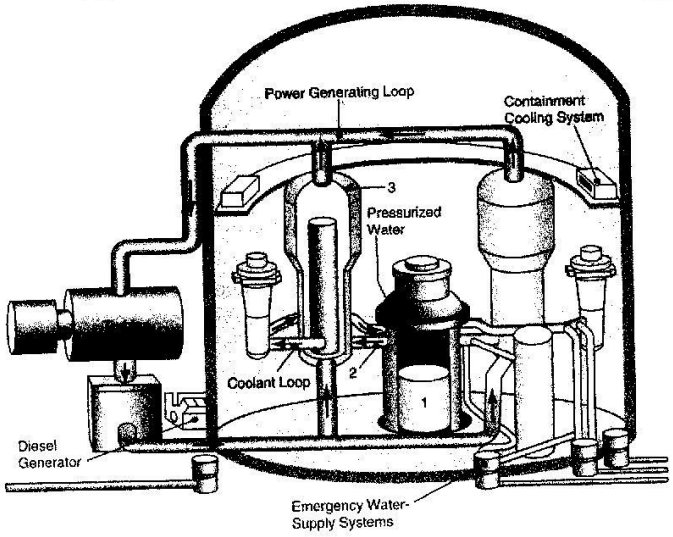


Figure 8.2 Pressurized water reactor. *Source*: DOE-EIA.

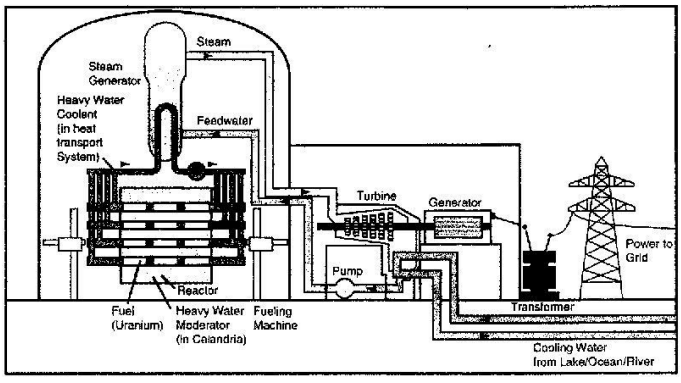


Figure 8.3 CANDU heavy-water reactor. *Source*: AECL.

How safe is Nuclear Power?

The radioactivity of spent nuclear fuel (SNF) drops continuously making it like all nuclear more safe as time goes on. No – nuclear power is not actually dangerous. Ourenergypolicy.org/how-safe-is-nuclear

Nuclear energy is incredibly safe. Three Mile Island and Fukushima caused zero deaths from the actual accident. In the case of the Chernobyl in the Ukraine, it was a USSR illegally designed and built plant for the unsavory purpose of plutonium production. Climatecoalition.org/how-safe-is-nuclear

The evidence over six decades shows that nuclear power is a safe means of generating electricity. The risk of accidents in nuclear power is low and declining. The consequences of an accident or a terrorist attack are minimized compared with other commonly accepted risks. world-nuclear.org/safety-of-nuclear-power

Some detractors state, "Nuclear plants are unsafe because they 'melt down' after an earthquake accident." The good news now is that advanced reactors such as Bill Gates' company's TerraPower can prevent accidents like what happened at the Fukushima Daiichi plant in Japan that relied on pumps that had to be powered by diesel electric generators and they shut down. The TerraPower and GE Hitachi 'Natrium' nuclear reactor uses passive cooling systems which rely on natural circulation or gravity and don't 'melt down' in an accident!

(Much more from World Nuclear Association starting on page 25)

"No – Nuclear power is not actually dangerous"

Nuclear now has financial advantages

The US IRA bill creates needed subsidies for nuclear technologies beyond just wind and solar, which have intermittent supply. Reuters.com/business/sustainable-business/us-renewables-investors-see-senate-bill-sparking-gold-rush

Problems with solar, wind, and electric vehicles

Detractors from uranium are many, but others have their difficulties, however.

Solar is useful only during the day and then only when the sun is shining. The net on-average production for a 24 hour day is about 30% efficiency. Energy.gov/eere/solar-futures-study

Wind machines have no power when there is no wind, and when there is wind, some must be shut off because of freezing weather conditions. Bird kills are also a problem. The net on average for a 24 hour period is around 20% - 40% efficiency.

See the next page for the problems of electric cars powered by energy supplied by our coal-fired utility plants.

Small Modular Reactors

As an update, ***The SMR Small Modular Reactor & Advanced Reactor Conference***, Atlanta, Georgia in May 2022 was well attended and a major success!

About Small Modular Reactors, Overview, Types & Characteristics small-modular-reactors.org

Small modular reactors (SMRs) are nuclear fission reactors that are smaller than conventional reactors. The term "small" in the context of SMRs refers to design power output. Small modular reactors have a power output of less than 300 MWe. The term "modular" in the context of SMRs refers to its scalability and to the ability to fabricate major components of the nuclear steam supply system (NSSS) in a factory environment and then transport them to a site.

Key characteristics: Modularity, Improved safety, and Easier construction

Four examples are shown:

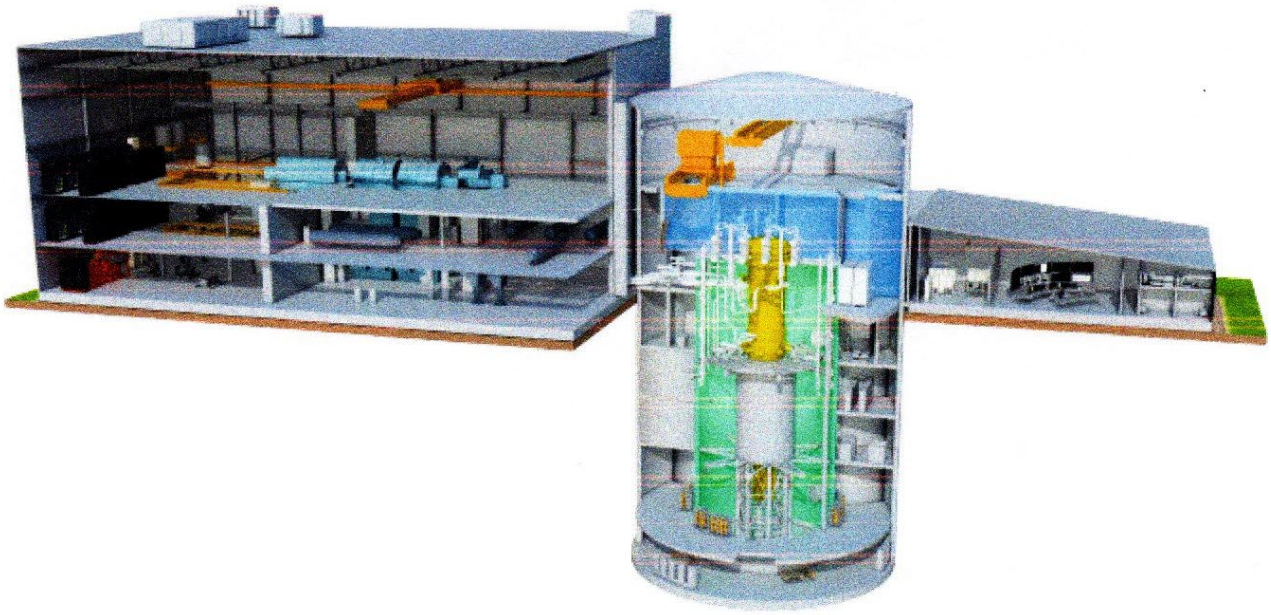
NuScale Power – SMR

The NuScale Power Module is a 250 MWt, 77 MWe gross integral PWR with natural circulation. Each power module operates independently within a multi-module configuration. Up to 12 modules are monitored and operated from a single control room.

Source: NuScale Power

BWRX-300

The BWRX-300 is a 300 MWe water-cooled, natural circulation Small Modular Reactor (SMR) with passive safety systems developed by GE Hitachi Nuclear Energy. The BWRX-300 power plant is approximately 10% of the size and complexity of a large nuclear project.

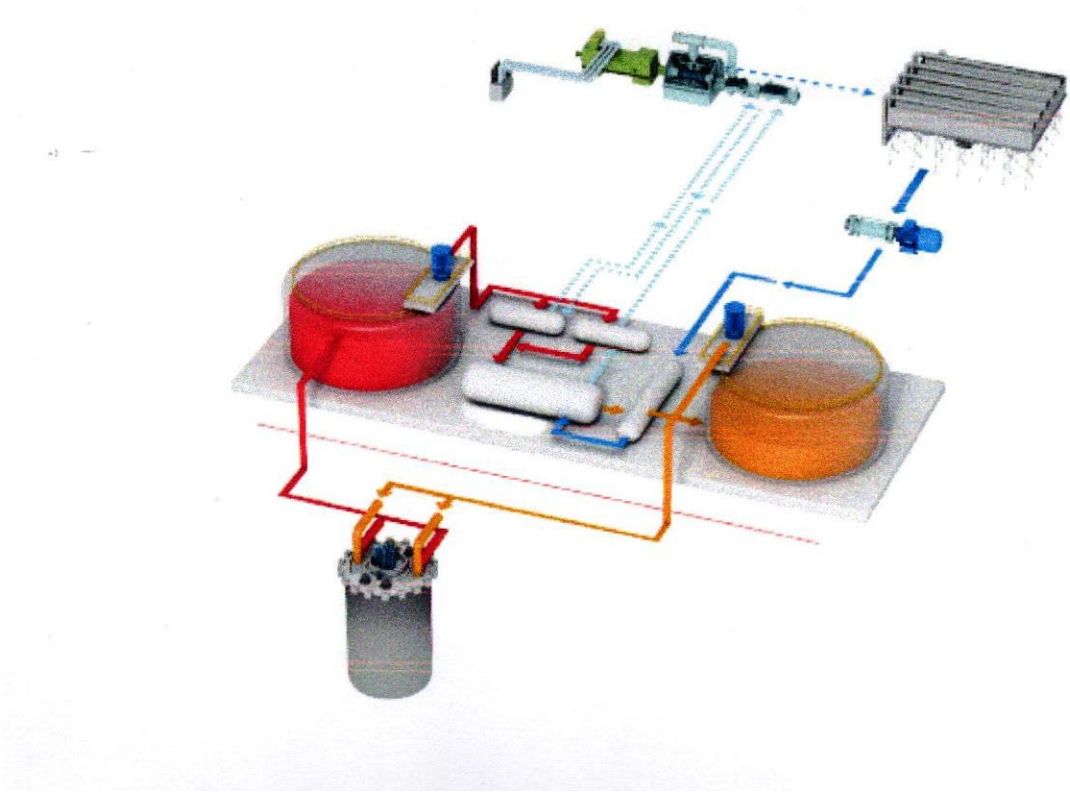


Natrium

TerraPower and GE Hitachi Nuclear Energy developed the 345MWe Natrium reactor with a gigawatt-hour-scale, molten salt energy storage. The unique combination will provide clean, flexible energy and stability, and integrate seamlessly into power grids with high penetrations of renewables.

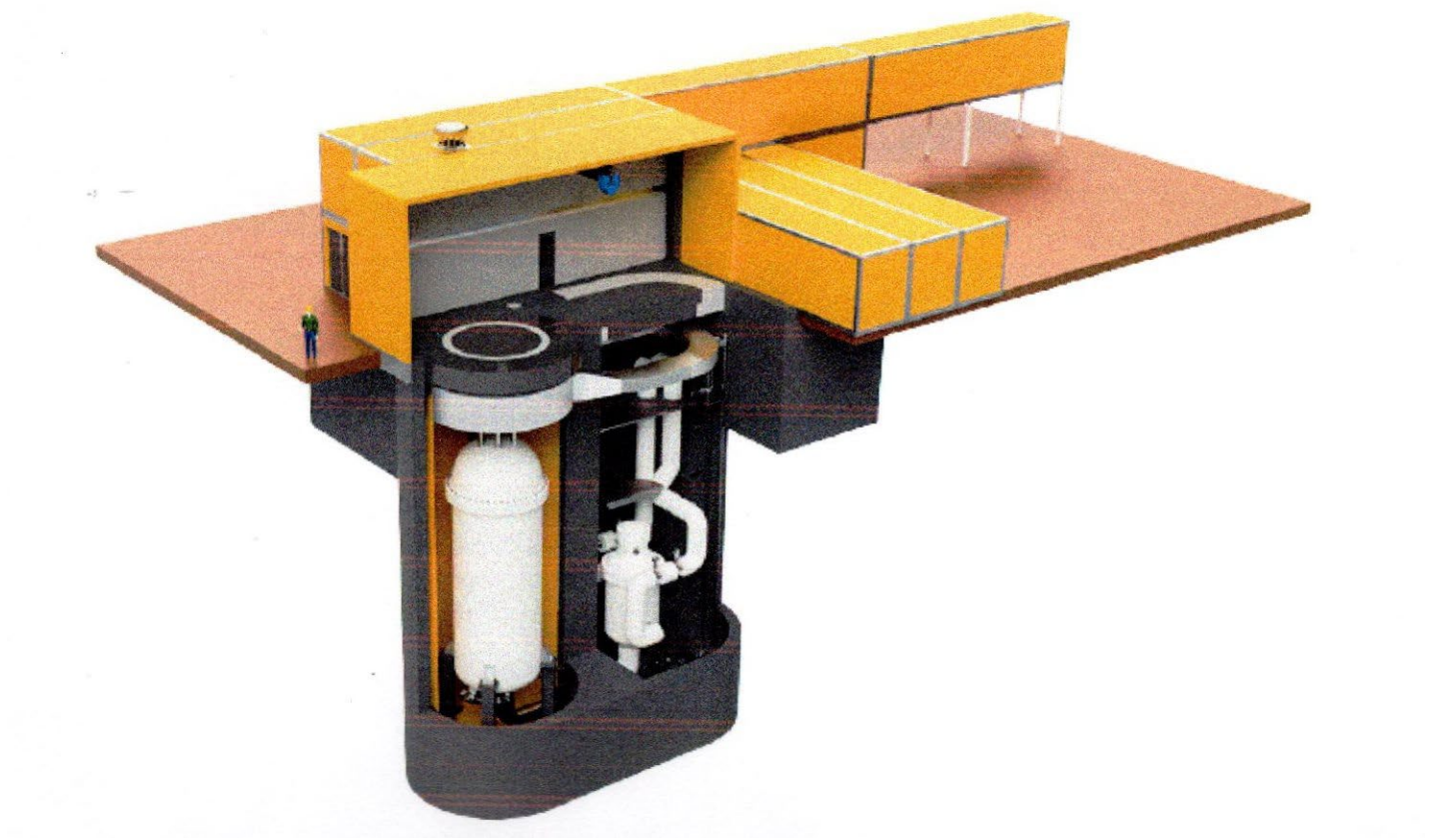
Bill Gates reveals his involvement in pushing the climate bill with his TerraPower Natrium reactor that uses liquid sodium as a cooling agent. Natrium means “sodium” in Latin. It will not ‘melt down’ in an earthquake.

Cnbc.com/2021/04/08/bill-gates-terrapower-is-building-next-generation-nuclear-power.html



MMR

The Micro Modular Reactor (MMR) system is a 5MWe 4th Generation nuclear energy system that delivers safe, clean, and cost-effective electricity and heat to remote mines, industry, and communities. Helium gas is the MMR reactor's primary coolant. The MMR reactor is fueled once for its lifetime. A fuel cartridge is rated at 20 years at full power.



For additional information, please see, also:

www.iaea.org/newscenter/news/what-are-small-modular-reactors-(SMRs)-?-iaea

www.energy.gov/ne/advanced-small-modular-reactors-(SMRs)-department-of-energy

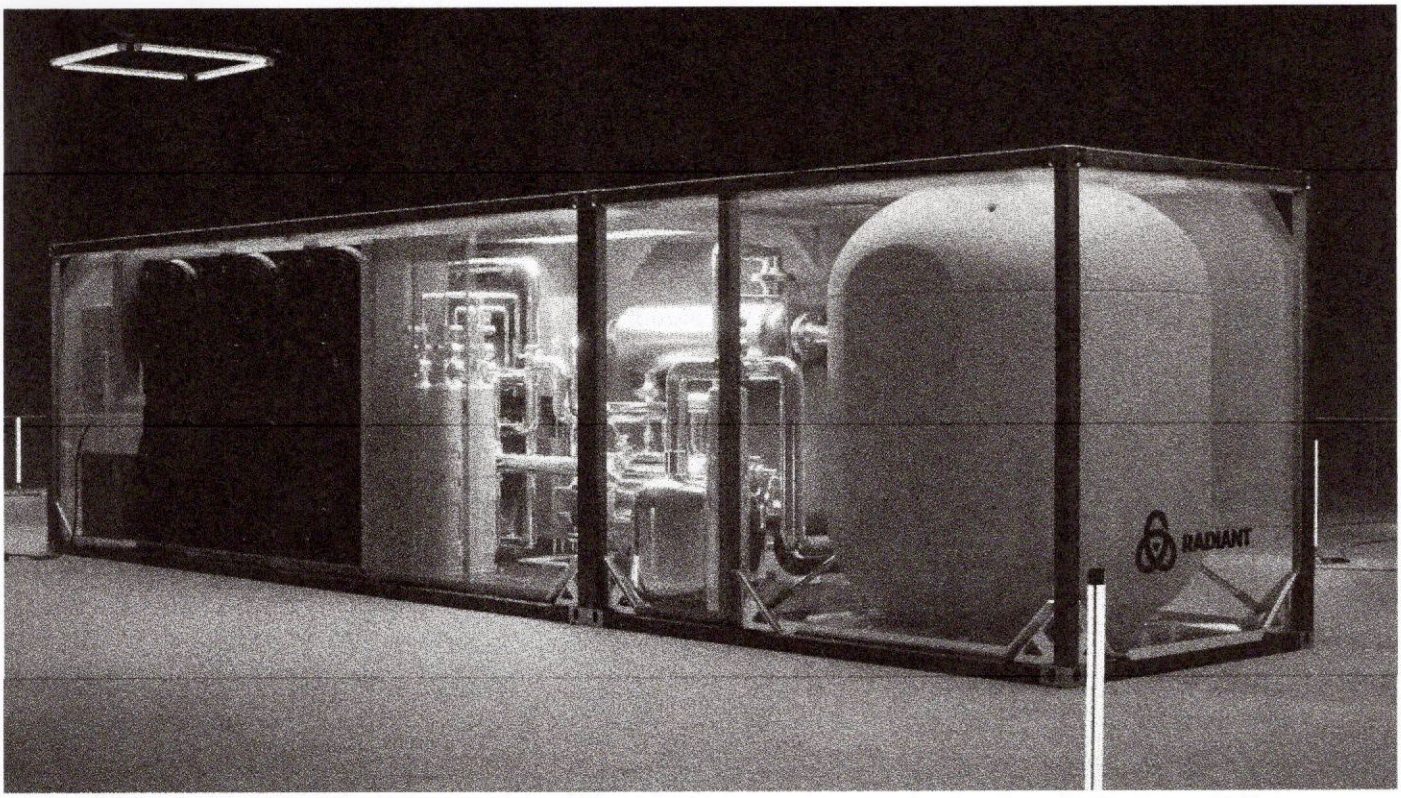
www.smrstart.org/small-modular-reactor-technology

A Small Small Modular Reactor (SSMR)

Radian Nuclear could provide safe, portable nuclear energy (SSMR) within the next 5 years

https://interestingengineering.com/innovative/radiant-could-provide-safe-portable-nuclear-energy-within-the-next-five-years

Radian Nuclear is developing a micro-reactor that they call the "world's first portable, zero-emissions power source." The idea for the micro-reactor, called Kaleidos, stems from CEO Doug Bernauer's time working at SpaceX, where he was tasked with devising methods for producing enough power on Mars to allow future colonies to survive and also travel between Earth and the red planet. Bernauer found that his work could also be applied on Earth to bring power to remote communities and military sites, and could also be used as an easily deployable fleet of reactors for populous sites. The Kaleidos will output more than 1MW, which is enough to power about 1,000 homes for up to eight years. It uses TRISO fuels and helium coolant instead of water, both of which should make the micro-reactor safer than traditional nuclear reactors.



A render of the Kaleidos microreactor. *Radiant Nuclear*

Radiant Nuclear is developing a microreactor that they call the "world's first portable, zero-emissions power source."

The idea for the microreactor, called Kaleidos, stems from CEO Doug Bernauer's time working at SpaceX, where he was tasked with devising methods for producing enough power on Mars to allow future colonies to survive and also travel between Earth and the red planet.

WIKIPEDIA

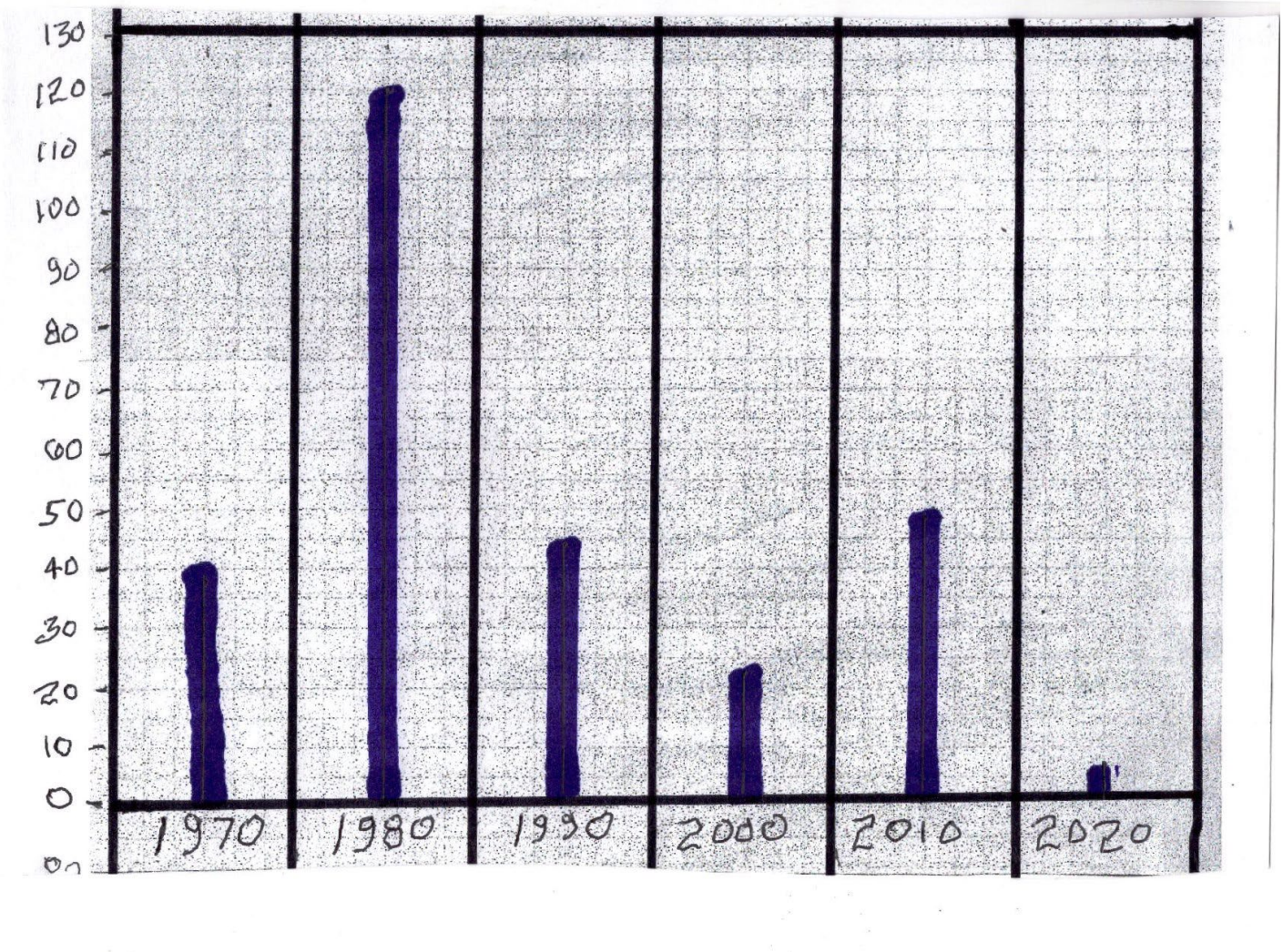
List of countries by uranium production

Rank	Country/Region	Uranium production (2018) (tonnes U)[1]	Percentage of World Production (2018)
	World	53,498	100.00%
1	Kazakhstan	21,705	40.57%
2	Canada	7,001	13.09%
3	Australia	6,517	12.18%
4	Namibia	5,525	10.33%
5	Niger	2,911	5.44%
6	Russia	2,904	5.43%
7	Uzbekistan	2,404[2]	4.49%
8	China	1,885[2]	3.52%
9	Ukraine	1,180[2]	2.21%
10	United States	582	1.09%
11	India	308[2]	0.79% [3]
12	South Africa	346	0.65%
13	Iran	71[2]	0.13%
14	Pakistan	45[2]	0.08%
15	Czech Republic	0	< 0.01%
16	Romania	0[2]	< 0.01%
17	Brazil	0[2]	< 0.01%
18	France	0	< 0.01%
19	Germany	0	< 0.01%
20	Malawi	0	< 0.01%

Number of world nuclear power plants put in operation, excluding reactors in the United States

The list put out by the NEI shows countries in the world, in alphabetical order, and the date of each nuclear plant energy connection. Also shown is the reactor type and plant capacity.

The graph, below, depicts the number of Nuclear power plants connections each decade. The 1980s was the major time of nuclear plant activity. After the Fukushima nuclear disaster in 2011, there became some second thoughts about building nuclear plants. That could be the major reason for slower activity in recent times.



Summarizing Notes

A Complaint – and a Plea

Recent politics, red tape, (and greed) obliterated our ability to get things done as a country – on time and on cost, as it was In the past. In the past we were great – because we acted that way.

The cost of the 1940s Manhattan Project was $30 billion in today's dollars, and it was on schedule.

The cost of Hyman Rickover's Nautilus Nuclear Submarine Project was $3 billion in today's dollars. It was within cost and on schedule!

The cost for the new 12 vessel Columbia class US nuclear submarines has grown from $3.4 billion to a projected $112 billion before its planned 2031 deployment. The project has been hampered by poor contractor performance, work delays and design changes.

The Plea

As a country, can we start doing things faster (as China does) and with more urgency – so we can have a successful new national Manhattan Nuclear Electric Power Project?

As Emma Derr sumarizes some of the nedds on pages 7 and 8, we need:

1. Contimnued actions and support
2. Increased attention
3. Expanded application
4. Focus on the green economy

Do you think we, as a country can now move forward with gusto? Now it is time for a high power Federal 'Manhattan Project'. It would be timely, effective, and the money would be well spent!

Please get back to me with your thoughts and ideas.

Jay Schabacker

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About the Author

Jay Schabacker graduated with a Bachelors degree in Mechanical Engineering (BME) in 1958 and joined the NASA Apollo Moon Program as a Ground Systems Engineer. Later, with a Masters Degree in Finance & Investments, from the George Washington University he started the firm Schabacker Investment Management and wrote the book ***Jay Schabacker's Winning in Mutual Funds,*** in 1994.

After his retirement from investing, he spread out and wrote ***Purposeful Design:Understanding the Creation***, 2013, ***Scientific Challenges to Evolutionary Theory: How These Challenges Affect Religion***, 2019, and ***Did the Hebrew Exodus Truly Happen?***, 2021.

His latest as of 2022, is the report, ***The Timely Answer – Nuclear Power: Towards Net Zero Carbon and Clean Water.***

Jay is proud of his four daughters, six grandchildren, and two great-grandchildren. He and his wife, Nancy, now enjoy living in Lexington, South Carolina, and are members of the First Presbyterian Church (ARP) of Columbia, South Carolina.

More at www.Jayschabacker.com. Please contact him at Jayschab@aol.com

Appendix

Those Looking for a New Nuclear Power 'Manhattan Project'

Agencies and groups in the Nuclear Field

American Nuclear Society (ANS), Greenpeace USA, International Nuclear Agency (IEA), Nuclear Energy Agency (NEA), Nuclear Energy Institute (NEI), Office of Nuclear Energy, Secretary of the Department of Energy – Jennifer Grandholm, The Climate Group, UN International Panel of Climate Change

US Senate Committee on Energy and Natural Resources

Chairman Joe Manchin, John Barmasso, Maria Cantwell, John Hichenlooper, James Lankford, Mike Lee, Roger Marshall, James Risch, Bernard Sanders, Ron Wyden

US House Committee on Energy and Commerce

Chairman Frank Pallone., Kelly Armstrong, Michael C. Burgess, G.K. Butterfield, John R. Curtis, Dan Crenhhaw, Michael F. Doyle, Jeff Duncan, Bill Johnson, John McNerney, Tom O'Hollereran, Robert E. Latta, Cathy McMorris Rodgers, Paul Rutz,Paul Tonko, John P. Sarbanes, Steve

Scalise, Ken Schrader

US Senate Special Committee on Climate Crisis

Chairman Brian Schatz, Michael Bennet, Tammy Duckworth, Martin Heinrich, Ed Markey, Jeff Markley, Catherine Cortez Mastro, Tina Smith, Sheldon Whitehouse

If you would let me know when you receive this report it would be much appreciated!