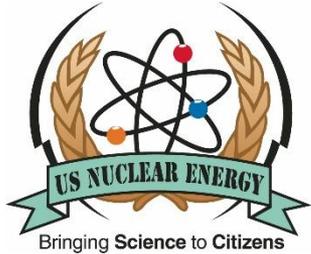


Nuclear Advocacy, an Independent Assessment



Gary J. Duarte, Director
US Nuclear Energy Foundation
www.usnuclearenergy.org

“Nuclear Advocacy Through Grassroots Education”

SMR Advanced Nuclear Technology

This Presentation deals with nuclear energy advocacy and the importance it is to bring this message and new research to the grassroots public . . . A mission we ALL need to engage

Some slides are provided with permission from the source companies below.



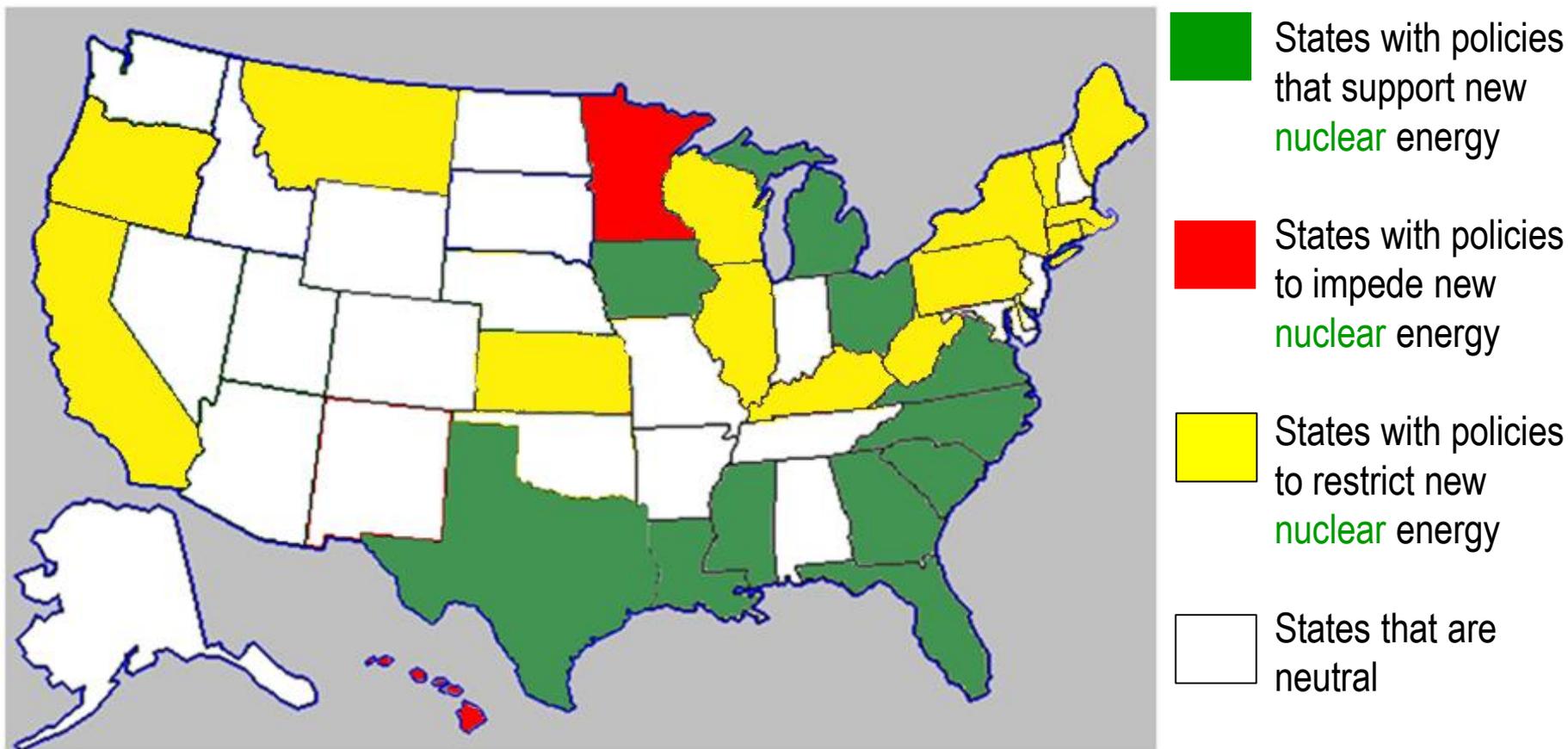
Idaho National Laboratory

The Idaho National Laboratory has been an integral part of nuclear power history since 1949.

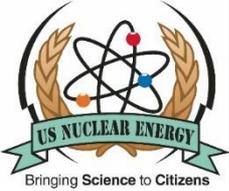
- ❖ People in Idaho know this. Across the country they don't.
- ❖ The public should know this. Most citizens don't.
- ❖ The nuclear industry needs to educate the grassroots public.
- ❖ In order to educate, knowledge must be distributed.
- ❖ USNEF offers an open invitation to legislators and stakeholders to tour the Idaho National Laboratory.
- ❖ World media no longer support technical writers
- ❖ **What can we do?**



Nationwide support of **nuclear** is a mixed bag we need to convert all states to **green** via public policy



Nuclear energy must address and rebrand the perception of the past in order to CLEAR the future. The industry should inform the public about advanced reactor designs, reprocessing advancements, etc. The public needs to be engaged as a stakeholder and they will help mold NEW NUCLEAR POLICY.



Future of nuclear will be **driven** by **grassroots education**

If you message the TRUTH about nuclear technology, you CANNOT remain politically correct.

- ✓ Bridging the gap between science, citizens & politics
- ✓ Does TRUTH suggest that DOE failed the Yucca Mountain public relations mission?
- ✓ Science & engineering do not make nuclear political – **politicians** make science & engineering political.
- ✓ Industry must accept that most political positions are opposition
- ✓ Discernment must help us separate truth, integrity & character from political correctness.

The future of nuclear energy is coming from SMRs “Small Modular Reactors”



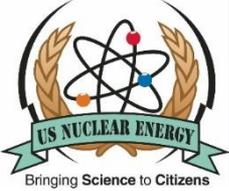
Are we politically correct but publicly inept?

US Nuclear Energy Foundation

***The TRUTH about nuclear technology,
must challenge politically correct.***

- ✓ Nuclear has been misrepresented and demonized for so many years, our industry, agencies, groups and foundations need to bang the doors of the grassroots public.
- ✓ Most industry, labs and agencies will not support grassroots education unless they “control” the message to remain politically correct, but, this cannot always be accomplished.

The majority of scientists & engineers support nuclear.



Are we politically correct but publicly inept?

US Nuclear Energy Foundation

- ✓ We are “fearful” of maintaining political correctness, for fear of media retaliation. We have to accept that politics and science should be a **FACT** based, not “opinion” based dialogue.
- ✓ The industry cannot expect to correct differences with lobbyists and legislators only. The issues of science and truth have to be brought to a public platform to engage the public to lobby a “political initiative” for public policy.
- ✓ We have to seek supporters who are willing to put their science and engineering “character” above politics in order to protect and preserve science when it is misrepresented by politics.

A more complex world requires more complex engagement



Nuclear Regulatory (*Safety*) Commission

Some issues between science & politics should upset all political parties, but, when science & politics can't solve them the issue must go to the public!

- ✓ 1974 the NRC was established to regulate, not promote or hinder **Nuclear** Energy. But, as politicians learned how to “manage” the government agencies and our national laboratories they removed scientific management to be replaced by political management.
- ✓ Regulate is a political term. “Moderate safety” is a “logical” term.
- ✓ The NRC is commissioned to regulate nuclear safety but 90% of its budget is paid by licensing fees. Seems like a disproportionate cost for submitting a nuclear license application?

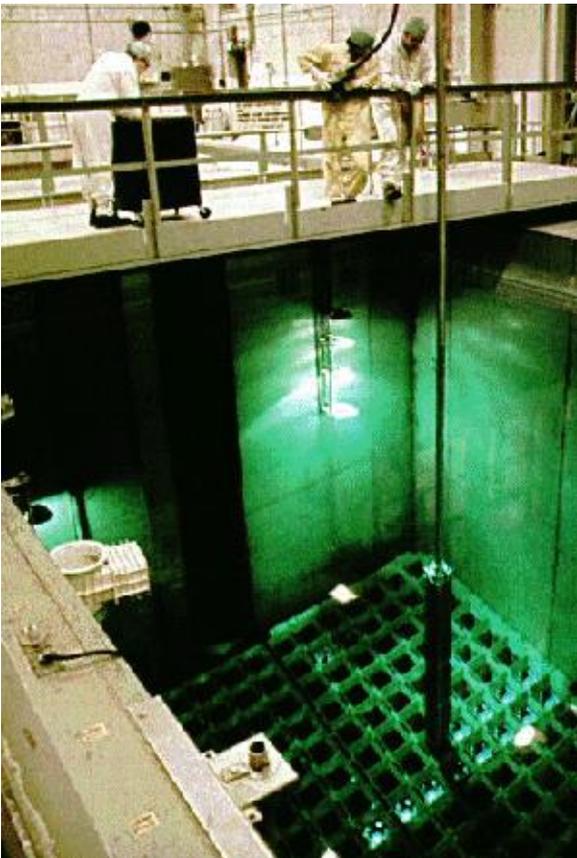
The costs of nuclear regulation are a deterrent to advanced technology



Address common people with common sense for the common good.

When compared to ANY other form of energy production in “loss of lives”, nuclear is by far the safest!

Dr. Cohen’s book “The Nuclear Energy Option”.



Temporary spent nuclear fuel storage casks.

After nearly 50 years, the PUBLIC doesn't know this because “we” have to do a better job at grassroots education!

Our business and science communities MUST engage public communications

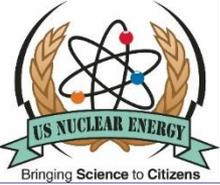
- ❖ We must establish apolitical public/private consortiums to build lower cost nuclear power, invest seed monies into industry, reduce government regulation and expand free enterprise industrial diversification.
- ❖ We need to recapture industrial manufacturing and we need to do it with the business community “driving” the government not the government “managing the business community”.
- ❖ Nuclear advocacy MUST be championed by the public, business and social organizations throughout our nation.
- ❖ A jobs stimulus is useless . . . a business stimulus is priceless!

We must re-capture public trust, so they know we are engineering things that are SAFE!

200 nuclear plants is the most powerful direction to energy independence & re-capturing industrial Mfg. in America

- ❖ We are losing generations of “**industrial entrepreneurs**” because our educational systems teach **employment training** rather than **self employment**, where entrepreneurs are born and REALLY add innovation to our free enterprise society.
- ❖ At some point, the **US Nuclear Energy Foundation** is hoping that industry, its organizations, policy makers and lobbyists will support the value of “**independent grassroots advocacy**” they have much to offer if they can “manage independence wisely”.
- ❖ Independent foundations offer industry a once removed voice to public advocacy. Establishment of “**local chapters**” could provide a diversified public voice. Such a **chapter plan** is in place, but support is needed to launch public **Nuclear Advocacy** on a national platform.

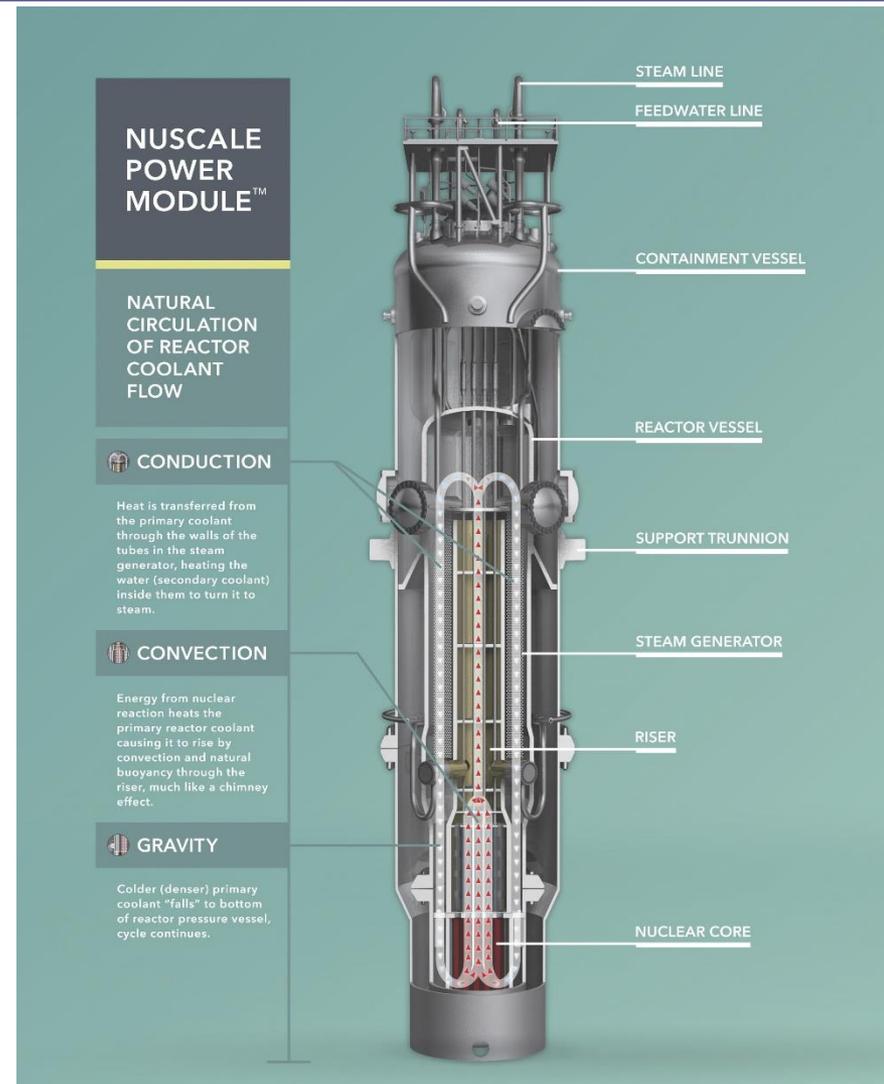
What I say is unimportant, what you understand me to say is all important!



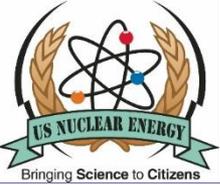
Let's take a look at the perspective in the design of the NuScale SMR (Small Modular Reactor.)

This is the basic reactor vessel. The core, riser, steam generator, containment vessel, steam & feed-water lines.

The next slide will demonstrate the “size” of an SMR, virtually no relationship to a conventional nuclear plant.



We are hoping that new nuclear designs will re-open your knowledge.



Renewable

NuScale's combined
containment vessel
and reactor system



This is a very good example of the SMR size perspective, the entire reactor & containment vessel. 76' x 15' feet.

Note the man standing on the bottom right of the unit.

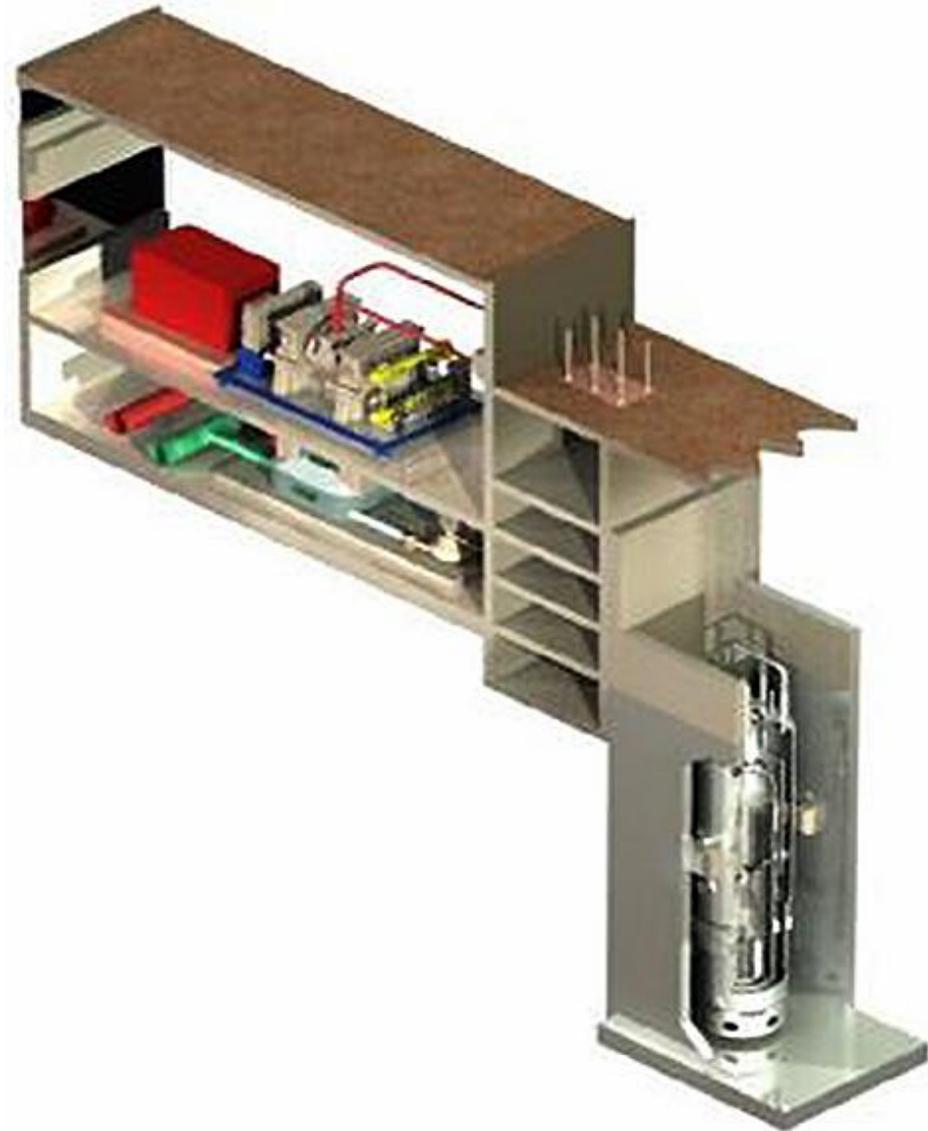
What I say is unimportant, what you understand me to say is all important!

Can the grassroots help make the case for advanced nuclear technology development?

Why We Should Understand Advanced Reactors

A few bullet items from,
Jose Reyes, CTO NuScale Power

- A new era of investing in clean nuclear energy.
- Nuscale receives major NRC certification, April 2018.
- A single module is 76' tall & 15' in diameter.
- 1-module = 60 mw of power, 55,000 homes.
- A 12-module plant = 660,000 homes.
- Why safer? Sits in a one-time fill of water as a heatsink.
- It is housed in a category-1 seismic building.
- All modules can shut down without computer or human intervention.

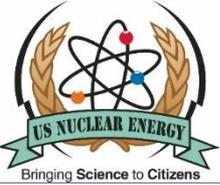




Industry must engage grassroots public policy

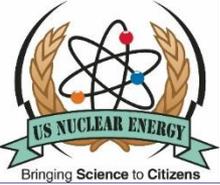
- ✓ The nation's primary example of science versus media & political gridlock is **NUCLEAR TECHNOLOGY** and the **FACT** is that the nuclear industry doesn't make nuclear political, media & politicians do. The DOE and NRC didn't make nuclear technology political. ANS, NEI, our universities and national laboratories didn't make nuclear political, they spend thousands of hours doing the **HARD CORE RESEARCH!**
- ✓ The **ONLY** way that our nuclear industry can counter the misrepresentation of media and political opinion is to **EDUCATE** the grassroots public on the **FACTS**. Citizens, must make the decision to adjust the perception that **MEDIA & POLITICS** have given us!
- ✓ Until America's industries, agencies and associations recognize the need for grassroots (voter education) on these **ISSUES**, nuclear advocacy will continue its 50 year failed public relations record.

What I say is unimportant, what you understand me to say is all important!



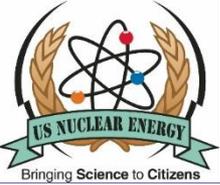
The road to a community friendly nuclear technology Is an educated grassroots citizen.

- ✓ The nation's failure to support nuclear technology has been responsible among other issues for the prevention of new nuclear research in the US.
- ✓ Grassroots public education is required for public policy reversal. E.G. NIMBY politics: Over 50% of Nevada Counties favor completion of the Yucca Mountain Application Review Process.
- ✓ USNEF has spent a decade developing & distributing educational facts about the Yucca Mountain Study for the Nevada grassroots public.



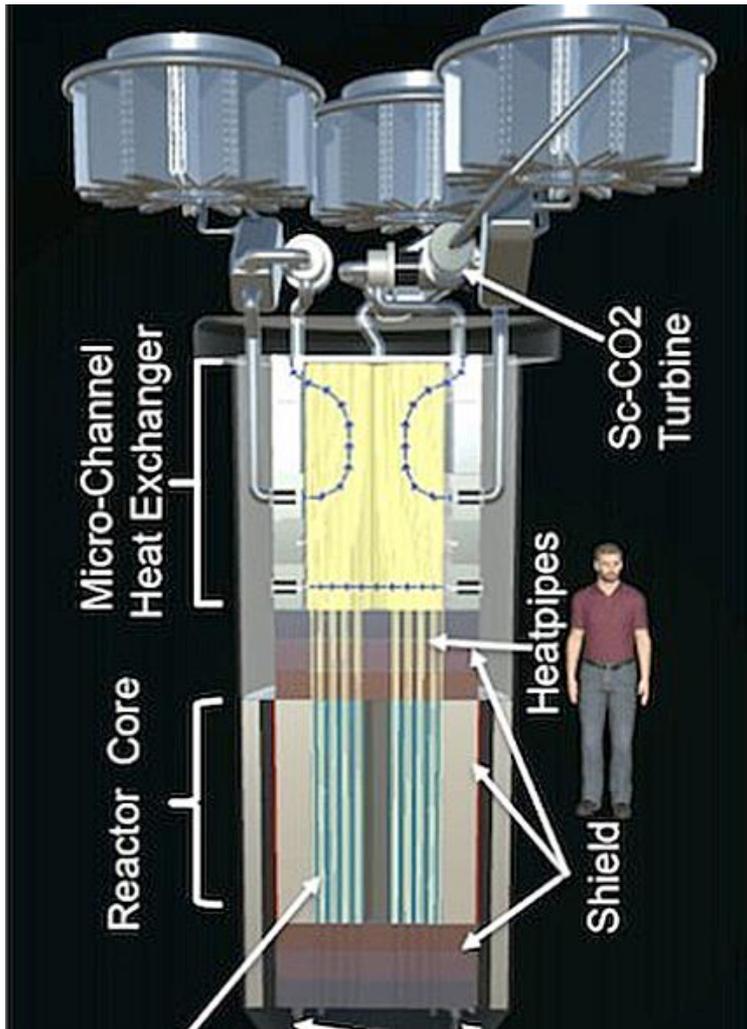
The Road to a Community Friendly Perception is GRASSROOTS EDUCATION

- ✓ **The nuclear rebranding will have to demonstrate proven safety, longevity and security.**
- ✓ **We need to encourage the public to engage representatives to support advanced nuclear energy.**
- ✓ **The industry, agencies and associations will have to sign-on to supporting this grassroots public policy mission in order to bring the program to success.**
- ✓ **It is a vital step in proving that the public can alter political direction through an educated grassroots voter.**



Some great \$ numbers about micro-nuclear

Brian Wang | January 16, 2019



Micro-reactors As Cheap As Natural Gas Without Air Pollution.

Full Story:

<https://www.nextbigfuture.com/2019/01/micro-reactors-as-cheap-as-natural-gas-without-air-pollution.html>

- Westinghouse about the **eVinci reactor** which is their commercial evolution of Megapower.
- They are working on automated mass production of the heat pipes. Heat pipes are the critical technology for the reactor. They are looking to reduce the cost of heat pipes by ten times. After the first reactors are built, they will scale up to factory mass production. They will be able to build complete units in one month or less.
- The cost of the micro-reactors has a capital cost goal of \$1.98 per watt. This is the capital cost for natural gas reactors. They would be **4 times cheaper than large nuclear reactors** in the USA or Europe. They would be lower cost than large nuclear reactors in China or South Korea. There would not be the costs for containment. There would not be interest rate costs and risks for long construction times.

- The reactors would operate at 800 degrees celsius, which is optimal for process heat for co-generation. This would enable the reactor to fully utilize the heat and not just the electricity. This doubles the economic value of reactors.
- The newest design shows supercritical CO2 turbines. Supercritical CO2 is **many times smaller than regular steam turbines**. The small modular power enables the current supercritical CO2 turbines to be used. Large supercritical CO2 turbines have not been built.
- This reactor design does not change what is happening with nuclear waste. Nuclear waste is unburned fuel. It would be a breakthrough in construction cost, construction time, enabling higher and more valuable operating temperatures, operating safety and staffing levels.
- The \$2 per watt of electricity target price means a cost of **\$20 million for a 10 MWe reactor** that fits on truck. This will be a breakthrough technology for many space applications. We will be able power space bases and colonies and new propulsion. \$20 million reactors that take one month to build will be a huge breakthrough that **puts nuclear power back as a major solution for global warming and for electrical and industrial transformation**.