THE TOWN OF LYSANDER

Lysander Data Center Advisory Committee Meeting

September 11th, 2026

Electricity Concerns

Electricity Concerns from the spreadsheet

- Electricity overall priority: 2.4
  - Electricity Usage/Brown Outs/Capacity 2.8
  - Battery Storage 1.8
  - Nuclear Power generation onsite 2.1
  - Generator Usage 2.4
  - also covered in other areas
  - Who pays for Infrastructure upgrades? 3.0

Background:

- We already recommend that any water infrastructure upgrades for the project be paid for by the developer
- The planning board typically requires developers to pay for any required infrastructure additions
- The town does not manage or maintain the electric grid or electricity prices in any way
- The town has an existing moratorium on Battery Energy Storage Systems (BESS)
- The town is actively working on updating its BESS ordinance

Background:

- The town can designate that any on-site or “behind the meter” electrical power generation over a specific threshold (say 5 Megawatts) is a separate, or prohibited land use
- The town can explicitly limit on-site electrical power generation to emergency battery storage and generators meant solely for temporary use during blackouts
- The town can mandate security perimeters for high voltage generation or specialized fuel systems
- The town may be able to restrict high voltage transmission switch yards within the zone
- Existing town code (320-51) "There shall be no activities which emit radioactivity dangerous to health or adversely affecting the operation of any equipment."

Town vs Others Responsibilities

- New York Independent System Operator (NYISO) operates New York's high-voltage electric grid, runs competitive wholesale electricity markets, and plans for the state's future power needs
- New York Power Authority and companies like Constellation Energy own and operate the actual power generation plants
- National Grid owns the wires and delivers power to the end users, they do not generate the power
- The Public Service Commission (PSC) sets delivery charges, Service Classifications, and demand caps
- NYISO sets the supply charges

Town vs Others Responsibilities

- The town has no say in power delivery or rates
- The DEC has the authority to regulate generator air emissions, fuel types, and fuel storage
- The town can regulate the use of generators, including size, operating hours (outside of emergencies), setbacks, noise, etc. through code
- While the DEC regulates generator emissions, the town can influence generator types and pollution through the Planning Board SEQRA process

On-Site Power

On-Site Backup Power and Generation

- Generator
  - Diesel
  - Natural Gas
- Battery Energy Storage System (BESS)
- Nuclear, or Small Modular Reactor (SMR)

Background:

- There are two separate major power transmission lines crossing at the site
- The second transmission line may mitigate the need for additional back up power, but that is unlikely
- There is a large Natural Gas main running beneath the proposed data center site
- NRC guidelines for population density would prevent a large scale nuclear reactor at this site based on the combined population of Lysander, Van Buren, Salina, and Clay

Generators

- Diesel Generator
  - PROs
    - Higher energy density per gallon, more fuel efficient
    - Lower upfront equipment costs
    - Last longer under heavy use, fewer ignition parts
  - CONs
    - Require Liquid fossil fuel stored in on-site tanks
    - Stored fuel needs stabilizers
    - Higher fuel costs
    - Produce more greenhouse gasses, soot, and carbon emissions
    - Are louder when running

Generators

- Natural Gas Generators
  - PROs
    - Connects to municipal pipeline, no on-site fuel storage
    - Lower fuel costs
    - Quieter
    - Burns more cleanly, far fewer carbon emissions
    - May be less expensive in the long term
  - CONs
    - Lower energy density, less efficient
    - Upfront equipment costs are typically higher
    - Requires regular maintenance of ignition components

On-Site Power Continued: Reactors

Background - Reactors:

- There is currently *no application at the state or local level for a nuclear reactor at the proposed data center site*, or any other site in the town of Lysander.
- The state has received no applications for any Small or Micro Modular Reactors anywhere in the state.
- NRC guidelines for population density would prevent a Conventional Nuclear Plant at this site or anywhere within the town based on the combined population of Lysander, Van Buren, Salina, and Clay.
- Given their startup and shutdown time requirements, an SMR or MMR would primarily be used as a “behind the meter” primary power source for most use cases
- *Since we’re tasked with recommending updates to town code for data centers **AND other new technologies**, we’re discussing reactors as a proactive measure.*

Background - Reactors:

- The three types of reactors we're concerned with
  - Conventional Nuclear Plant
  - Small Modular Reactor (SMR)
  - Micro Modular Reactor (MMR)
- Conventional Nuclear Plants, like those found in Scriba, would not be allowed in the town of Lysander given the population density of Lysander and the Surrounding towns

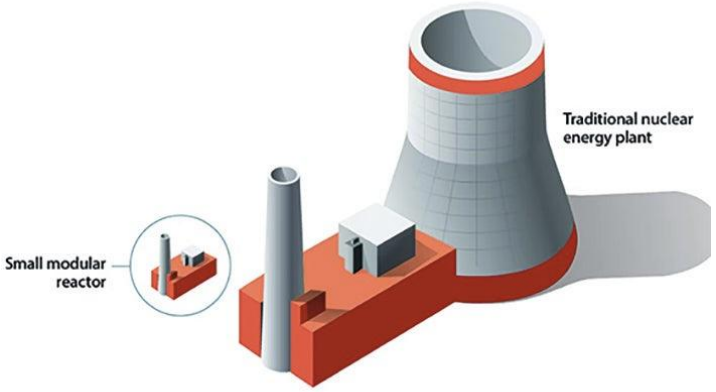


Image source: news.stanford.edu

Reactors:

- Small Modular Reactors (SMR's)
  - Up to 300 MegaWatts of power, but most operators don't want to continuously run at 100% capacity , 270 MW is more likely
  - Modular Design, manufactured off-site and trucked to the location
  - Uses "Passive" methods to prevent meltdowns
  - Fuel lasts 3 to 7 years. Spent fuel remains on site indefinitely
  - Requires between 5 and 30 acres, depending on the type, not counting the NRC required 0.22 mile safety buffer (97 Acres)
  - The reaction chamber is underground
  - SMR's are more prone to "Neutron Leakage" than Conventional Nuclear Plants, but concrete blocks can absorb those leaks
  - Considered safer than Conventional Nuclear Plants

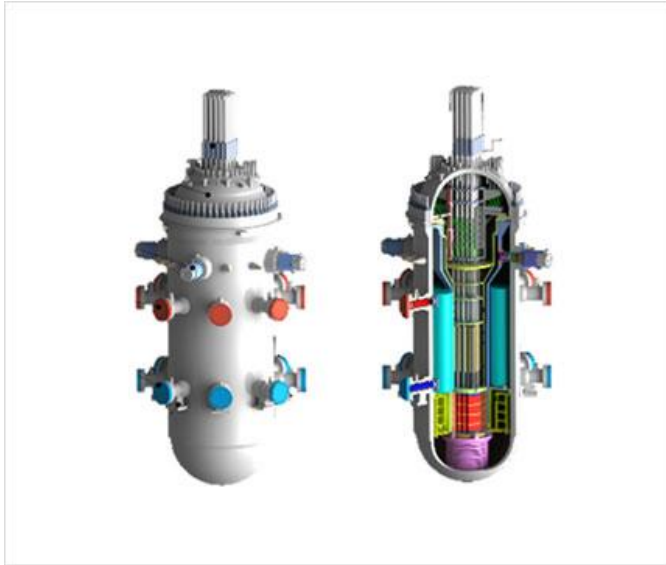


Image source: doosanenerbility.com

Reactors:

- Micro Modular Reactors (MMR's)
  - 1 to 20 MegaWatts of power, they can be installed in clusters
  - Modular Design, manufactured off-site and trucked to the location as a complete unit the size of a shipping container
  - Uses "Passive" cooling
  - The fuel is more highly refined than Conventional Nuclear Plants or SMR's
  - Fuel lasts 5 to 20 years. Spent fuel is returned for recycling
  - Requires only one or two acres depending on the type, the NRC required safety buffer is typically the facility fence line, even when multiple units are clustered together
  - The reaction chamber is usually underground
  - MMR's are more prone to "Neutron Leakage" than Conventional Nuclear Plants, but concrete blocks can absorb those leaks
  - Considered much safer than Conventional Nuclear Plants and SMR's

Modular Reactor Types:

- Water Cooled – SMR only
  - There are three distinct water systems in a water cooled modular reactor
  - The **Reactor Pressure Vessel** – pressurized to around 150 atmospheres to keep the water from boiling (liquid conducts heat better than a gas)
  - **Containment Vessel** – low pressure (sometimes a vacuum) to contain the high pressure liquid in the event of a rupture in the pressure vessel, escaping steam is condensed when it hits the cooler containment vessel walls and does not escape
  - These are submerged in a large **Heat Sink Pool** at standard pressure
  - Because of natural circulation inside the reactor vessel, and the size of the heat sink pool along with it's natural circulation, the system won't get hot enough for a melt down even if power is lost to the system

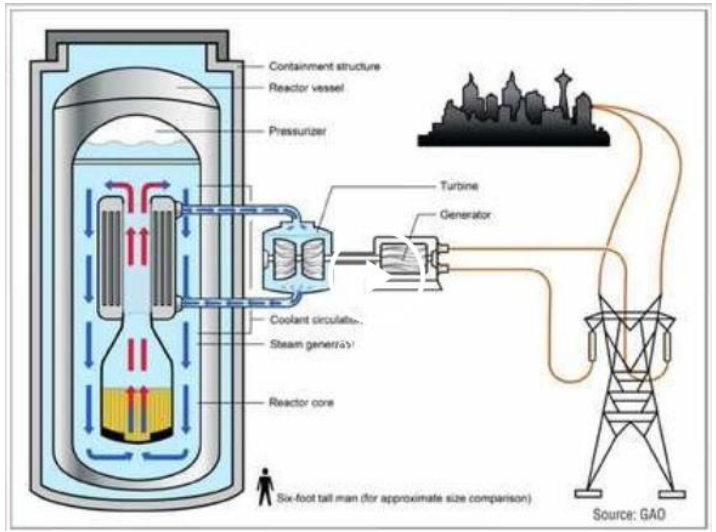


Image source: channelnewsasia.com

Modular Reactor Types:

- Gas Cooled – SMR and MMR

  - Helium cooled – Helium under high pressure is circulated with fans to transfer the heat (MMR does not need the fans)

  - The fuel is in small engineered capsules that ***cannot melt at reaction temperatures***

  - As the uranium particles at the core of these capsules get hotter, their atoms physically begin to absorb neutrons in a way that stops the nuclear fission chain reaction. This is a ***law of physics*** called a “strong negative temperature coefficient of reactivity”

  - The Graphite in the core of the capsules acts as a massive thermal sponge and helps distribute heat to the edges of the reaction vessel

  - In SMR’s, the Capsules are “circulated” through the reaction chamber very slowly, they make one pass every 3 or four months. They make 6 – 10 passes before they need to be replaced

  - In MMR’s, the capsules are embedded in graphite blocks and do not need to be circulated

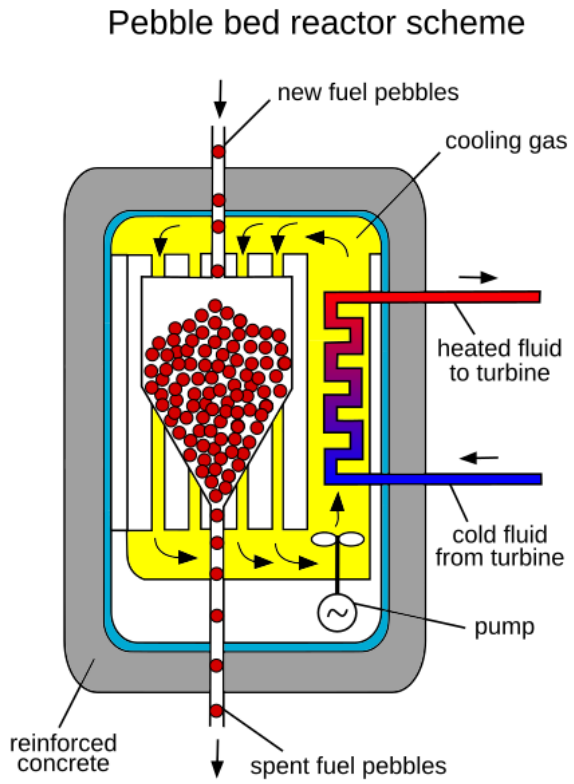


Image source: wikipedia.com
(this image was sourced from wikipedia, because I couldn’t find a better one, I did not source any of the text content in these slides from wikipedia)

Modular Reactor Types:

- Gas Cooled Capsules– TRISO Fuel
  - There are Spherical and Cylindrical versions
  - They are engineered so they cannot melt at reactor temperatures
  - The **Kernel** is made up of tiny grains of nuclear fuel mixed in graphite
  - The **Buffer** is porous carbon designed to let the kernel expand and contract
  - The **Inner Pyrocarbon** protects the kernel from corrosive gasses
  - The **SIC** (Silicone Carbide) is the pressure vessel for the capsule, it also provides structural strength
  - The **Outer Pyrocarbon** layer protects the capsule
  - The entire capsule is sometimes called a **Fuel Compact**

Image source: US Department of Energy

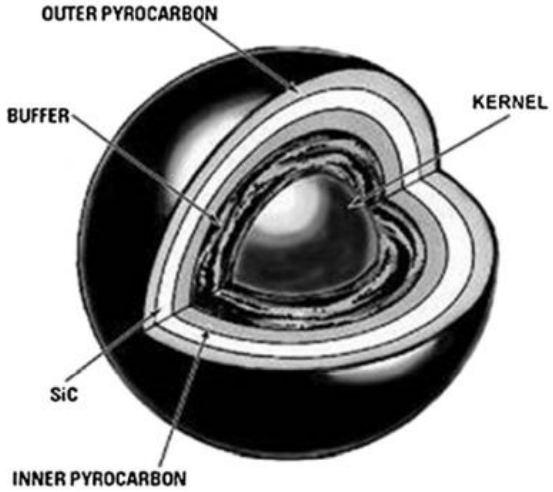
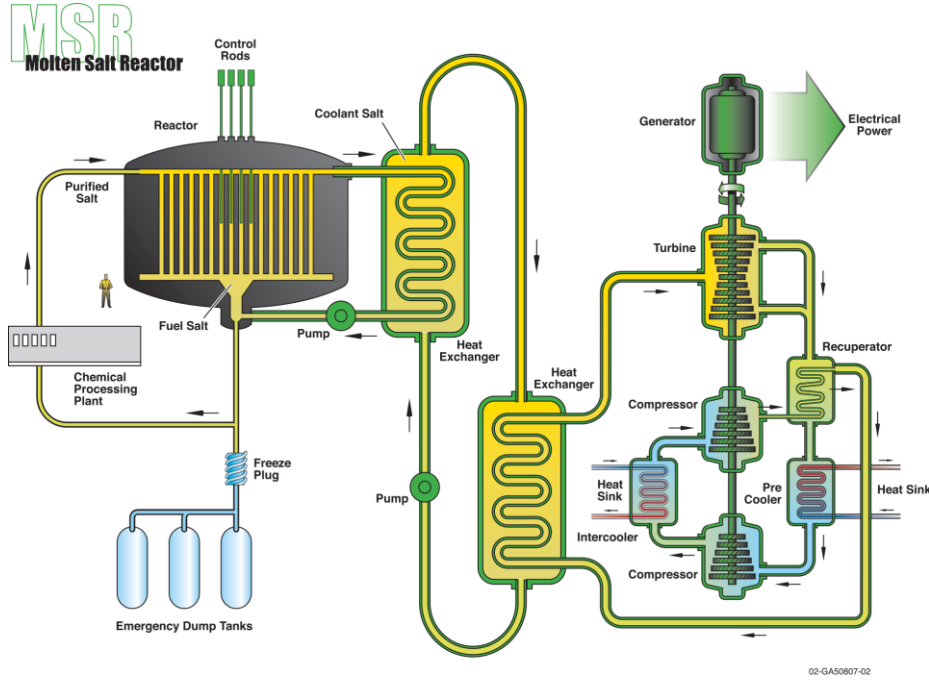


Image source: sciencedrirect.com

Modular Reactor Types:

- Molten Salt – SMR and MMR
  - In SMR's
    - The Nuclear Fuel is dissolved into a liquid fluoride or chloride salt
    - The fuel can't melt because it's already liquid
    - The radioactive salt is circulated in the reactor chamber with Graphite strips it place to limit the reaction
    - Freeze Plugs at the bottom of the reaction chamber melt if the reaction gets too hot, draining the fuel into underground tanks where it spreads out enough to stop the reaction
  - In MMR's
    - Fuel capsules are used instead of radioactive salt
    - The core transfers its heat through graphite blocks
  - Heat is transferred using a secondary cooling loop of clean (non-radioactive) molten salt to a heat exchanger
  - The Heat Exchanger loop runs the turbines



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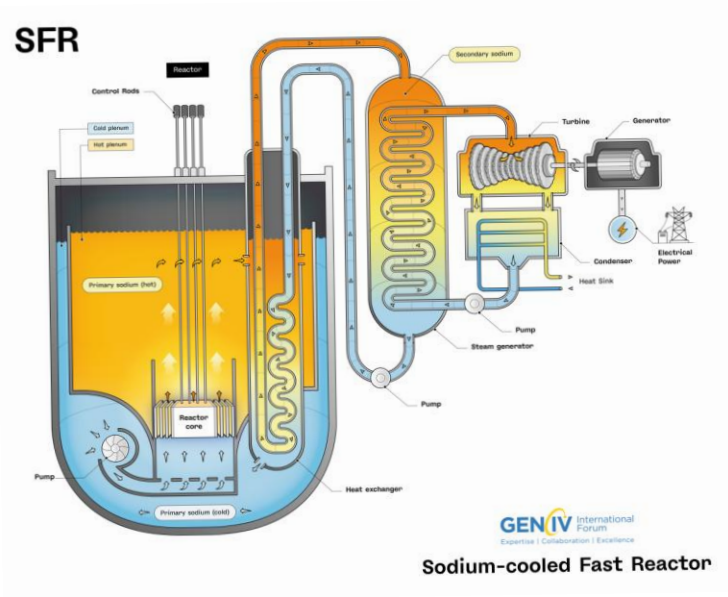
Modular Reactor Types:

- Liquid Metal Cooled – SMR and MMR
  - Use traditional style solid fuel rods submerged in molten metal
  - Molten Lead or Sodium is circulated around the rods to transfer heat away from the reaction (SMR's use electromagnetic pumps, MMR's rely on natural convection)
    - Sodium reacts violently to air and water
    - Lead is extremely corrosive to steel piping and its density requires immense pumping pressure
    - But both metals transfer heat extremely well
    - Liquid metals don't slow neutrons down so they squeeze more energy out of the fuel rods
    - These metals don't boil at reaction temperatures so they don't need to be housed in a pressurized vessel
  - Natural convection and the thermal properties of the molten metals will prevent a meltdown if the circulation pumps fail in an SMR
  - Lead is a natural gamma radiation shield



Modular Reactor Types:

- Heat Pipe Cooled – MMR only
  - Acts as a solid state nuclear battery
  - A solid Graphite block is precision drilled with vertical channels filled with alternating fuel rods and heat pipes
    - The fuel rods are often TRISO in the form of a rod
    - The Heat Pipes are sealed tubes filled with a liquid metal, like sodium or potassium, and a porous wick structure
  - The liquid metal is vaporized by the heat and rises to the top where it's condensed by the heat exchanger
  - The condensed liquid metal returns to the bottom of the tube using gravity and capillary action inside the wicking material
  - The reaction automatically slows if the chamber starts to get too hot because of the property of Uranium that stops the nuclear fission chain reaction as it absorbs neutrons (as previously discussed)

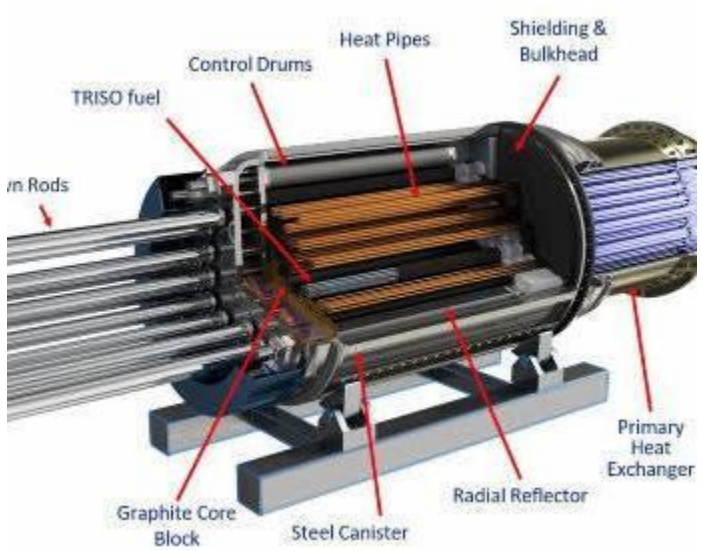


Image source: westinghouse

Considerations – Reactors:

- SMR's and MMR's are designed to be "Walk Away Safe", meaning they won't melt down even if they lose power and the operators walk away
- A Small Modular Reactor would likely be allowed in Lysander by EPA and NRC regulations, on lots as small as 100 acres
- A Micro Modular Reactor would likely be allowed by the EPA and the NRC on sites as small as two acres
- The safety exclusion zones for each would often be the fence line of the property
- State DEC rules prevent SMR's and MMR's from being sited in disadvantaged communities, but other areas don't have that protection
- SMR and MMR applications should go through full SEQR review

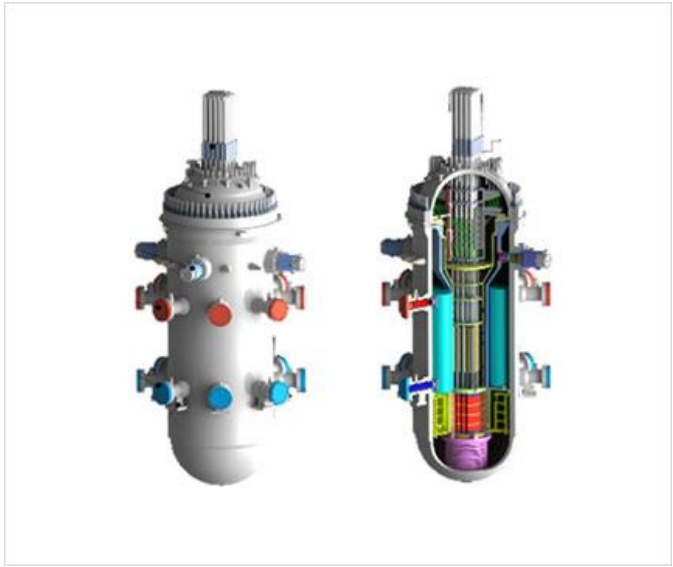


Image source: doosanenerbility.com

Considerations – Reactors:

- Code updates are necessary to prepare for this possibility
- Possible code requirements include
  - Defining which zones they are allowed, if any
  - Defining them as a separate, special use requiring additional review and permits regardless of zone or other use approval
  - Creating an Aquifer zone overlay to prevent a reactor from being sited above the drinking water supply
  - Requiring additional setbacks and fencing for nuclear site security
  - Requiring that exclusion zones avoid protected wildlife areas and wetlands
  - Disallowing them within XXX feet of parks and schools
  - Requiring monitoring at the property edge and surrounding areas
  - Requiring regular Third Party audits

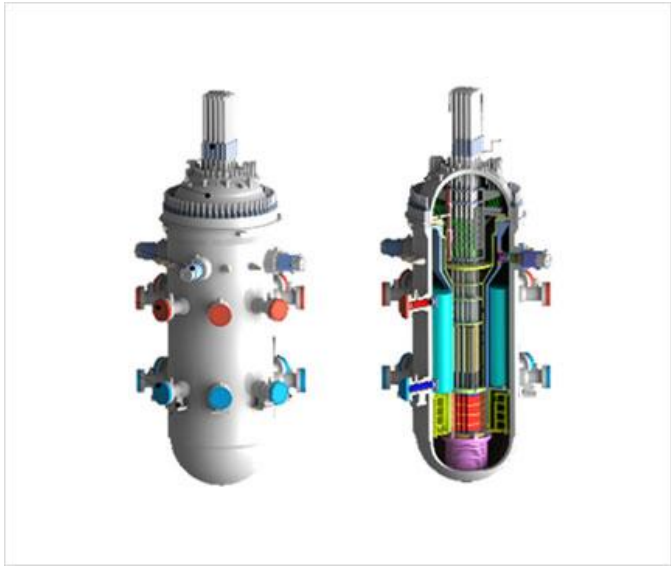


Image source: doosanenerbility.com

Considerations - Reactors:

- X-energy is already partnering with DOW Chemical in Texas to build four 80 MW SMR's to provide 320 MW for their industrial use
- An MMR is already planned for Fort Drumm with construction expected to start in 2028
- As the technology becomes more mainstream, it is likely that we will see requests for these in the (semi-near) future
- This is not just a Lysander concern, other towns and villages will need to update their codes as well
- Home rule still applies, but it's feasible that the state will control them through the Office of Renewable Energy Siting (ORES) in the future, especially if towns start enacting full bans. ORES can override home rule

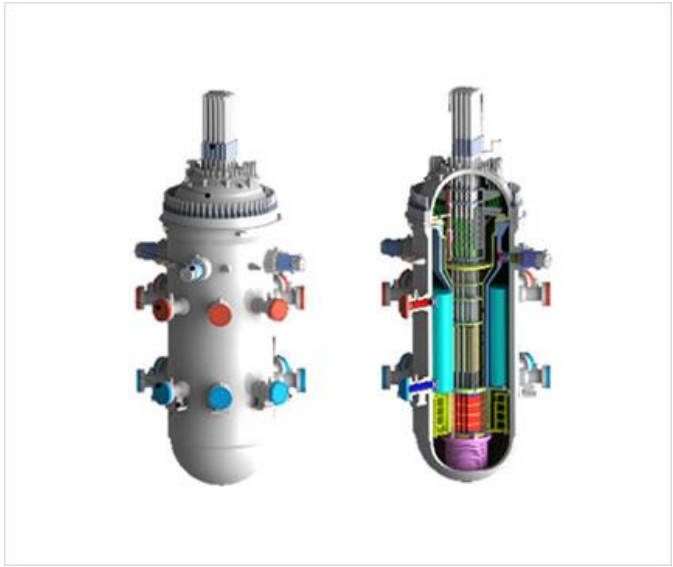


Image source: doosanenerbility.com

Next Steps

Next Steps

- Continue the discussion on electricity usage and on-site generation
- Begin talking about electricity recommendations
- What did we miss?
- What needs clarification?

Thank You