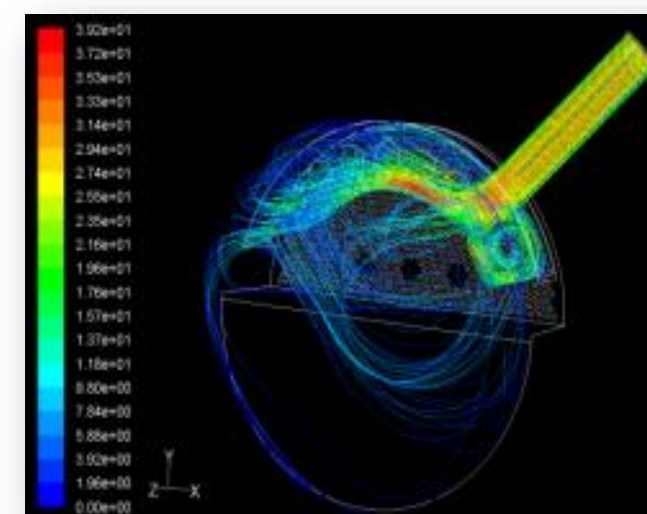
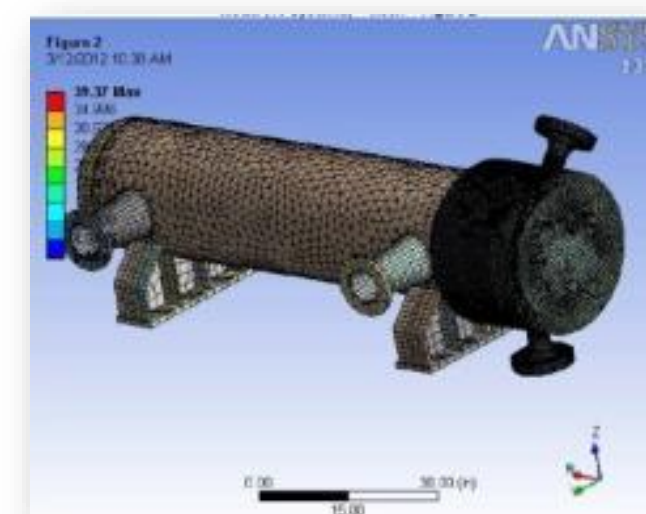
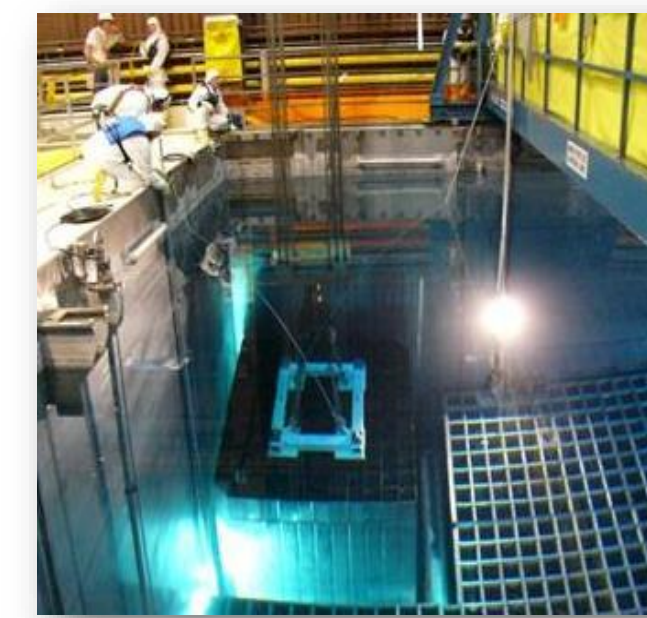




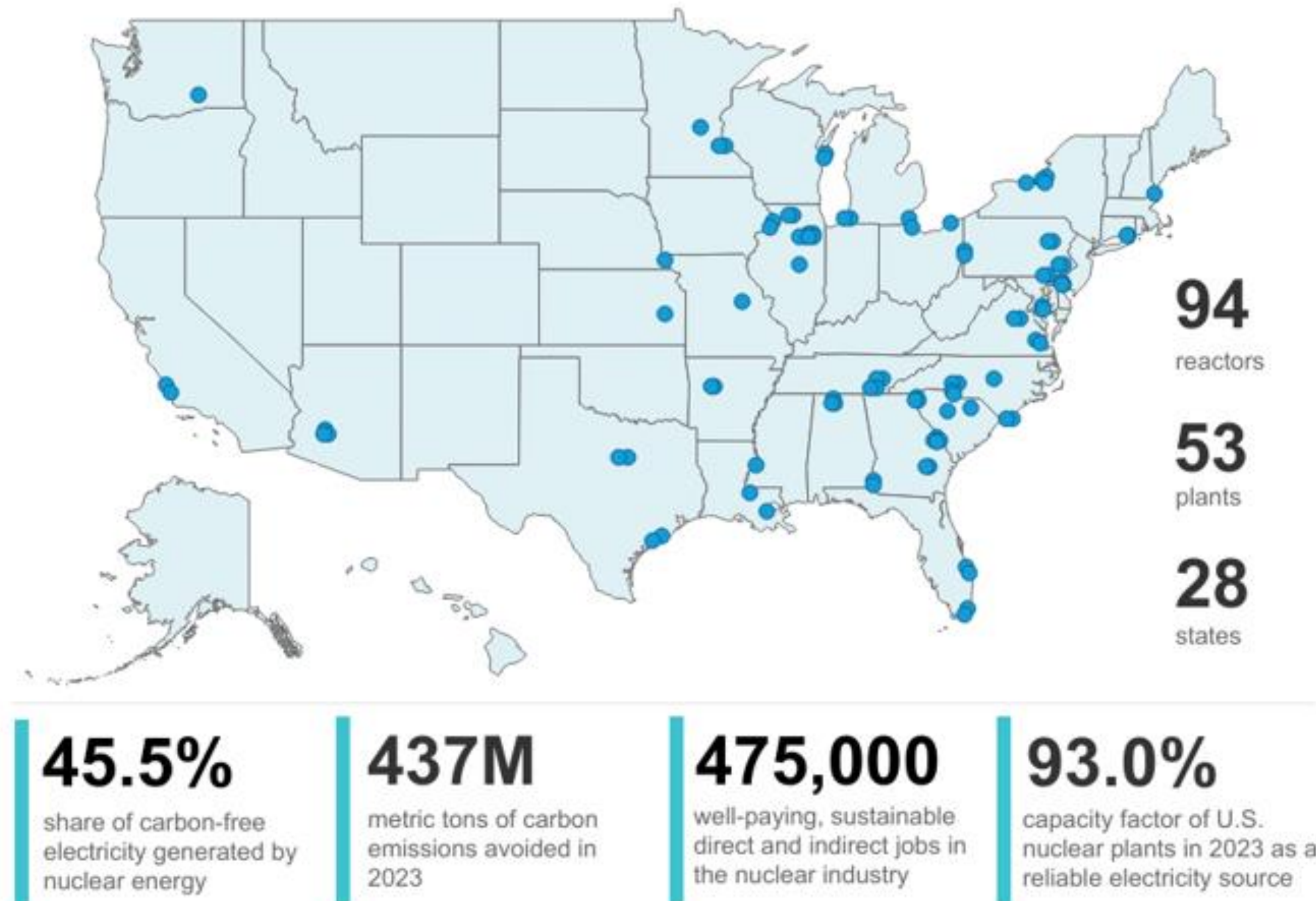
## Holtec International: Transforming the Nuclear Industry



**Michael D. Beal**, Senior Alliance Director and  
Senior Director of Client Relationships,  
Holtec International



# Domestic Nuclear Power: My Then and Now



Source: Nuclear Energy Institute, June 2024

## ■ Nuclear Power in the United States

✓ 1995: 112 Operational Power Plants

✓ 2000: 104 Operational Power Plants

✓ 2013-2022: 92 Operational Power Plants

### ■ Numerous Shutdowns (2013-2021)

➤ 12 Plants Shutdown

➤ 9,436 MW Generating Capacity Lost

➤ Various reasons: Economic and Major Repairs

### ■ Announced Shutdowns (2021-2025)

➤ All units continue to operate

➤ Palisades restart in late 2025

✓ 2024: 94 Operational Power Plants

✓ NEI Projects that by 2050, we could be adding upwards of 300 SMRs to the grid, 90,000 MW in Generating Capacity



# Holtec International: Corporate Profile



- Established in 1986
- Robust safety program
- Strong and effective quality assurance program
- Impeccable on-time delivery record
- Excellent financial strength
  - ✓ No history of long-term debt
  - ✓ Financially strong with self-financed Research & Development
  - ✓ Equipment delivered: 4.0 Billion USD
  - ✓ Decom Backlog: 2.0 Billion USD
  - ✓ Orders booked for future deliveries: 8.0 Billion USD
- Business mix:
  - ✓ 90% Nuclear power & nuclear waste
  - ✓ 5% Fossil power - combined cycle
  - ✓ 5% Renewables - solar, wind, etc.



Krishna P. Singh Technology Campus  
Located in Camden, New Jersey, U.S.A

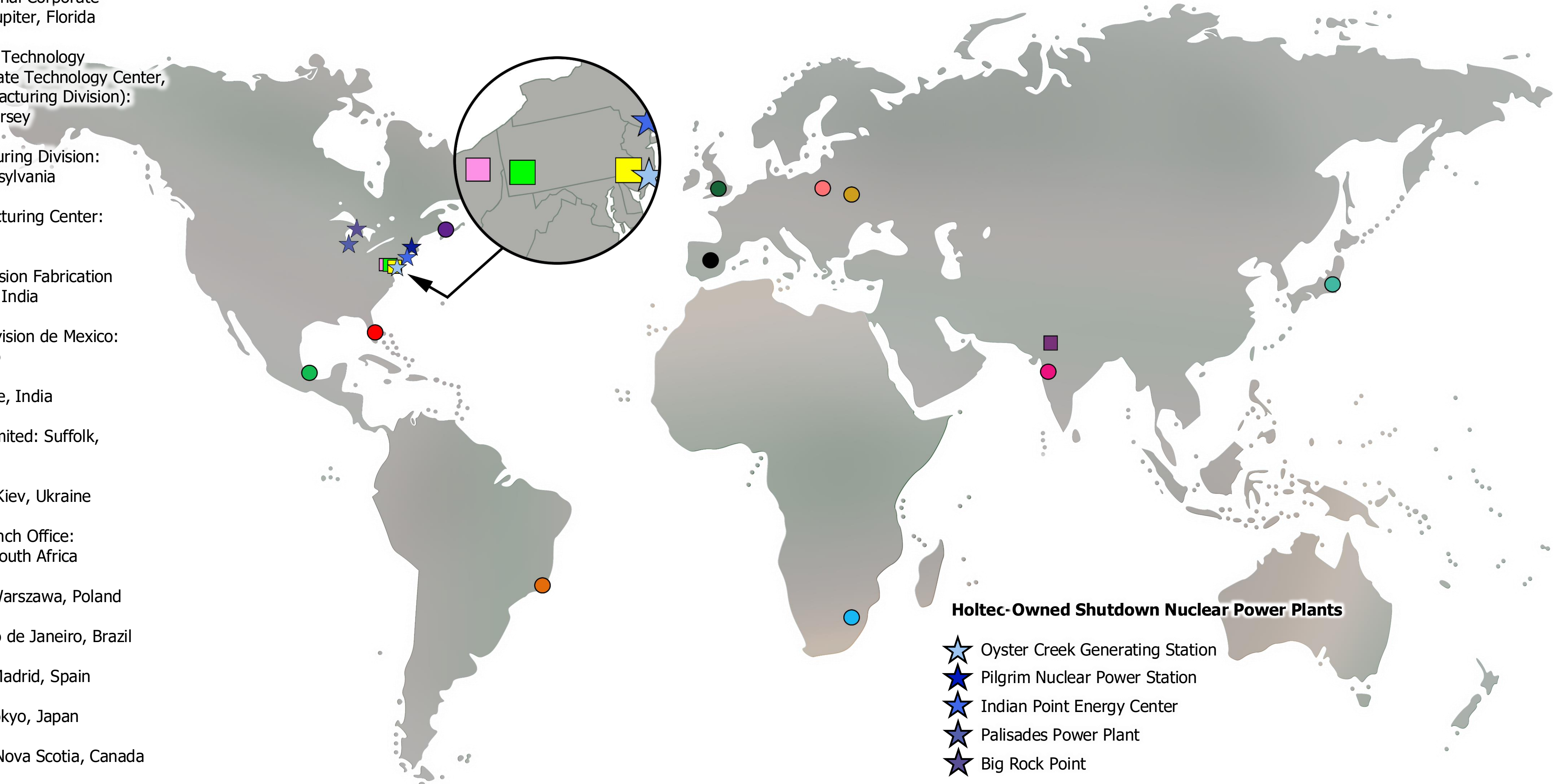
*Holtec is a Vertically-Integrated, Innovative  
Technology Leader with Unique Approaches to  
Design & Manufacturing*



# Holtec Worldwide Operation Centers



- Holtec International Corporate Headquarters: Jupiter, Florida
- Krishna P. Singh Technology Campus (Corporate Technology Center, Advanced Manufacturing Division): Camden, New Jersey
- Holtec Manufacturing Division: Pittsburgh, Pennsylvania
- Orrvilon Manufacturing Center: Orrville, Ohio
- Holtec Asia Precision Fabrication Systems: Dahej, India
- Holtec Power Division de Mexico: Veracruz, Mexico
- Holtec Asia: Pune, India
- Holtec Britain Limited: Suffolk, United Kingdom
- Holtec Ukraine: Kiev, Ukraine
- South Africa Branch Office: Johannesburg, South Africa
- Holtec Poland: Warszawa, Poland
- Holtec Brasil: Rio de Janeiro, Brazil
- Holtec Europe: Madrid, Spain
- Holtec Japan: Tokyo, Japan
- Holtec Canada: Nova Scotia, Canada



**Holtec-Owned Shutdown Nuclear Power Plants**

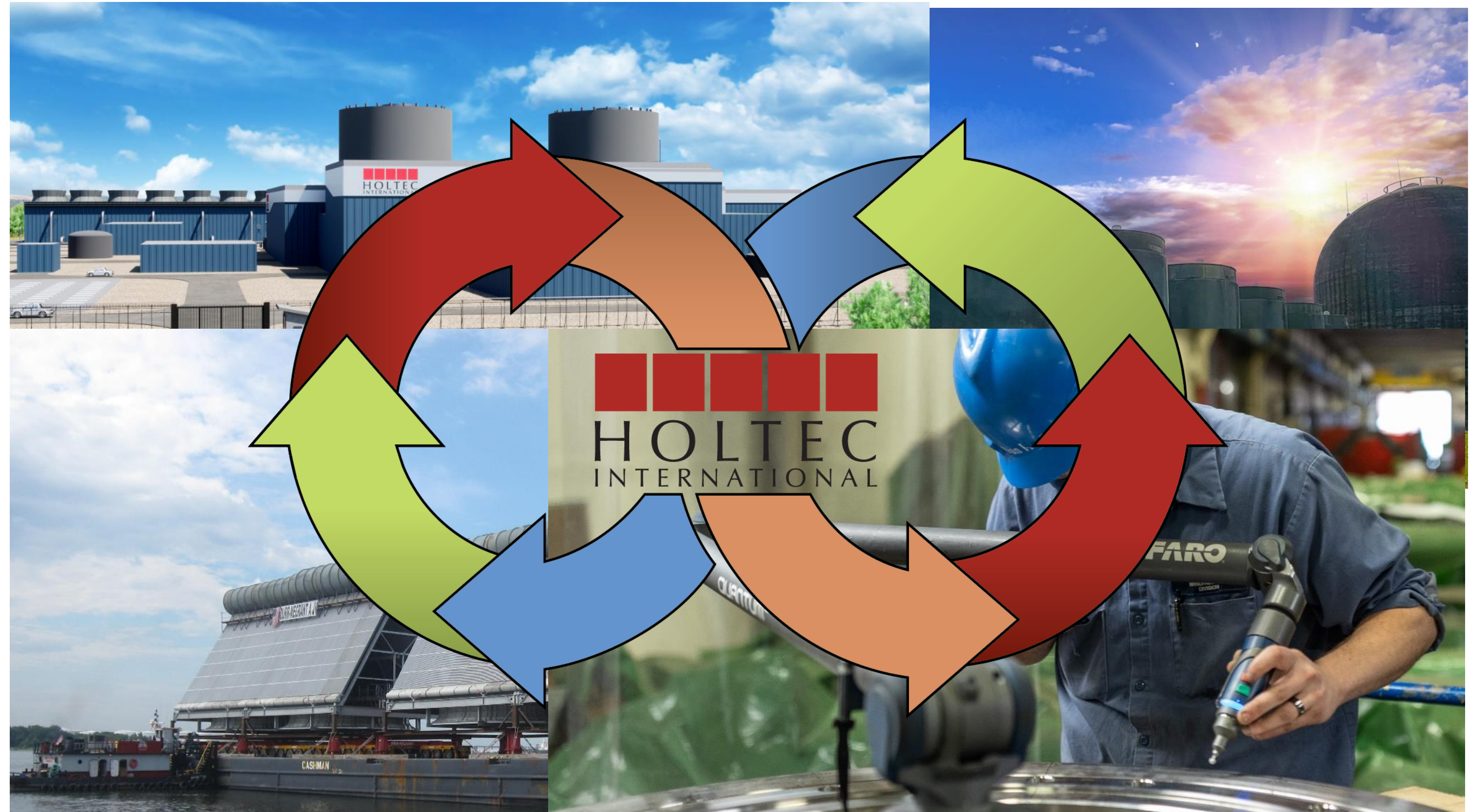
- Oyster Creek Generating Station
- Pilgrim Nuclear Power Station
- Indian Point Energy Center
- Palisades Power Plant
- Big Rock Point



# Holtec's Core Business Areas



- Clean Energy Technologies
- Small Modular Reactor: SMR-300
- Nuclear Fuel Management
- Engineering
- Manufacturing & Fabrication
- Site Services
- Government Services
  - ✓ Oak Ridge Technologies
  - ✓ CVN Dismantlement Partners
- Heat Transfer Equipment
- Security Services
- Maintenance & Modification Services
- Decommissioning

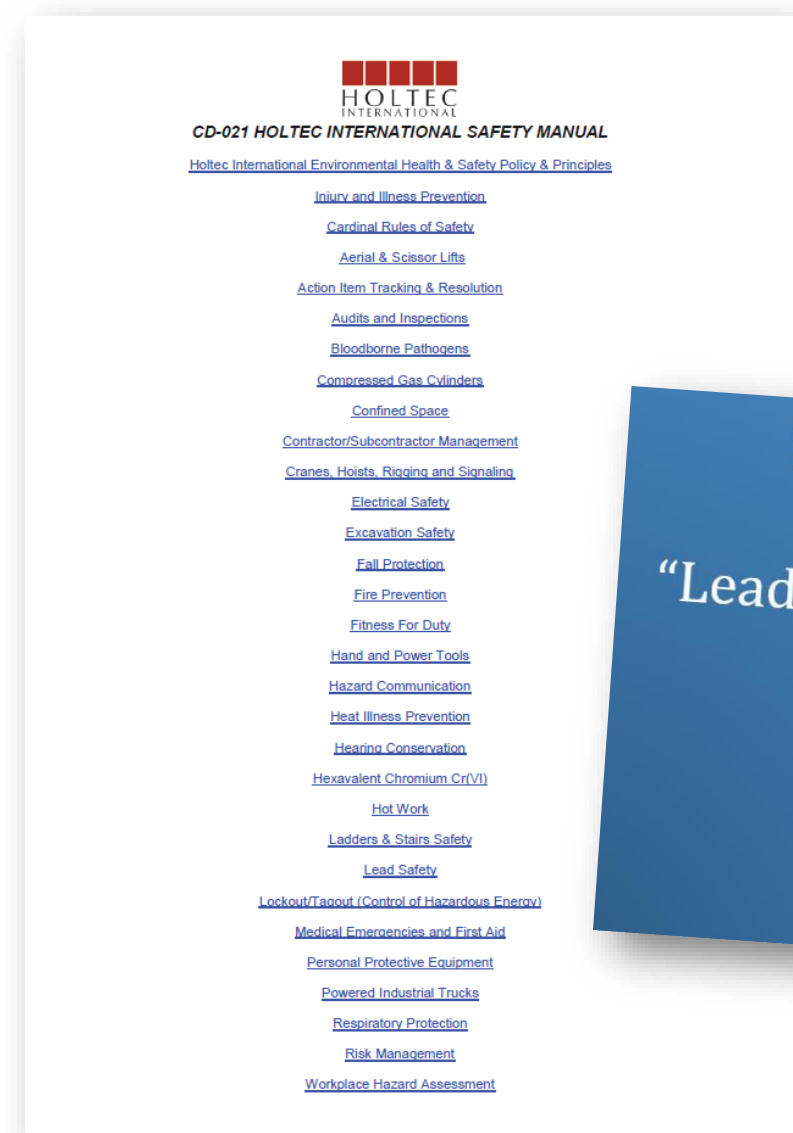


***SMR-300: A Natural Progression for Holtec's Technology Portfolio Started Over 10 Years Ago***



# Safety & Quality Programs

- Holtec approaches safety through a holistic and proactive Injury and Illness Prevention Program (IIPP)
- The elements of Holtec's safety program consist of:
  - ✓ Management Commitment
  - ✓ Employee Involvement
  - ✓ Hazard Recognition and Mitigation
  - ✓ Program Evaluation and Continuous Improvement
  - ✓ Employee Training and Knowledge Management
  - ✓ Safety Procedures



*Safety Starts With Me!*



- Holtec's QA Program has been approved to meet the following applicable industry quality assurance standards:
  - ✓ 10CFR50 Appendix B
  - ✓ 10CFR71 Subpart H (Approval Number 0784)
  - ✓ 10CFR72 Subpart G
  - ✓ NQA-1
  - ✓ ISO 9001:2008
  - ✓ ISO 14001
  - ✓ ISO 45001
  - ✓ ASME III N-Stamp (N1, N2, N3, NB)
  - ✓ ASME III NPT-Stamp (design and fabrication)
  - ✓ ASME III R-Stamp (in-shop repair)
  - ✓ ASME U-Stamp
- Triennially audit results provided by the U.S. NRC, NUPIC, and other organizations
- Holtec design centers and fabrication facilities operate under the same QA Program
- Holtec holds all ASME code stamps actively used in the industry (nuclear and non-nuclear)



# Industry Leadership

- Holtec's senior staff has authored over 300 technical papers and books
- Holtec personnel has pioneered and contributed theory and analytical methods for the research and development of heat exchangers for over 50 years
- Over 15 Engineers on staff with a PhD and over 75 Master's degrees
- 300+ Patents
- Member Associations





# Holtec's Manufacturing Capabilities

## Three Major U.S. Manufacturing Plants



### ■ Holtec Manufacturing Division (HMD)

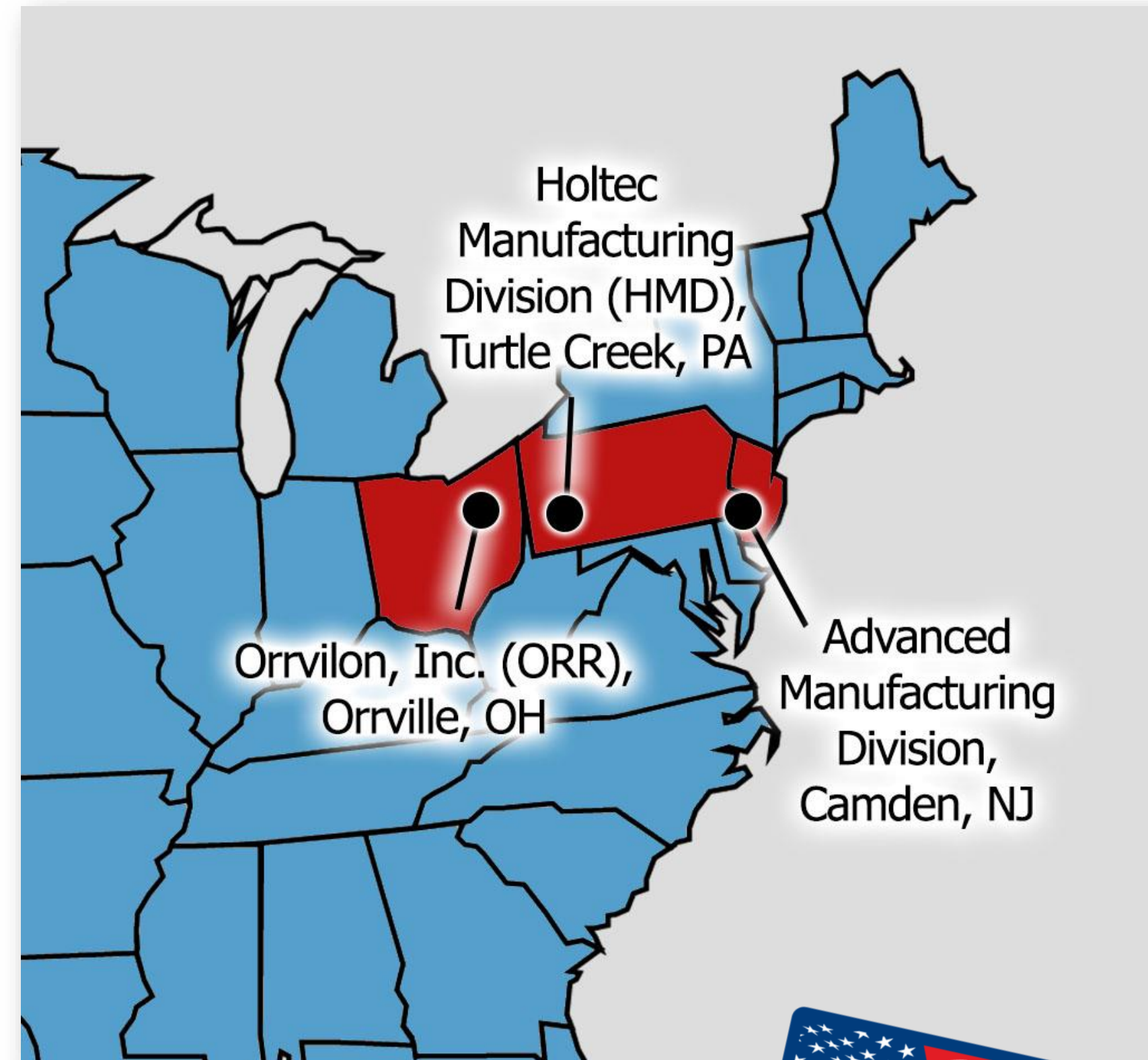
- Turtle Creek, PA
- 425K Ft<sup>2</sup>
- Focus: Dry Storage, Heat Exchanger, and Feedwater Heaters

### ■ Orrvilon, Inc. (ORR)

- Orrville, OH
- 280K Ft<sup>2</sup>
- Focus: Production and extrusion of Metamic neutron absorber material

### ■ Advanced Manufacturing Division (AMD)

- Camden, NJ
- 385K Ft<sup>2</sup>
- Focus: Dry Fuel Storage, HI-LIFT, HI-TRAC, Transportation Systems, Specialty Equipment, SMR-300



***Over 1M ft<sup>2</sup> of Total Shop Space***



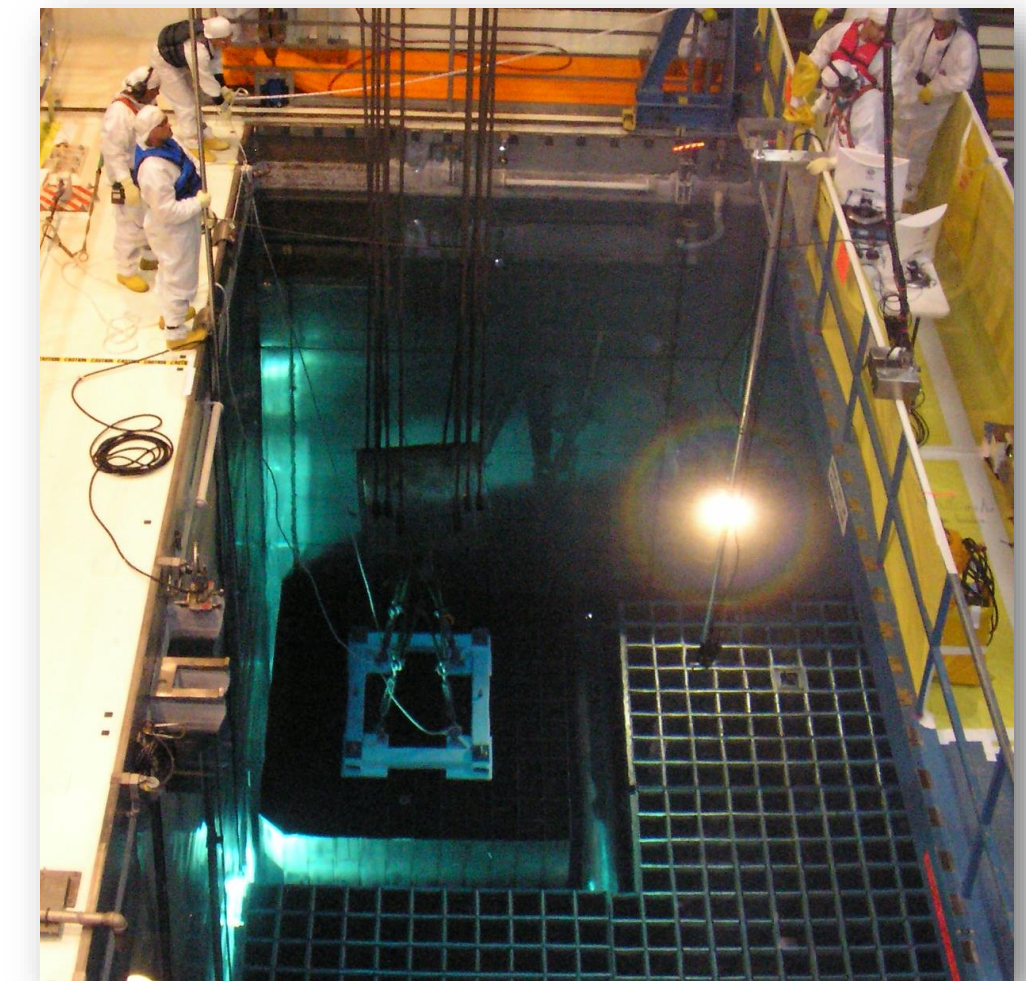


# Safe and Secure Used Fuel Storage and Transport Technologies

- Spent nuclear fuel dry storage & transport systems for all fuel types
  - ✓ 149 nuclear plants worldwide are under contract for use of Holtec's dry storage systems
    - 7 new transition nuclear sites added in 2023
    - 170 dry storage systems safely loaded in 2023
  - ✓ Almost one half of the available world market
  - ✓ 79% of the domestic market
  - ✓ 2,083 Holtec systems have been safely and successfully loaded. This number is consistently over 100 canisters per year.
- High density in-pool spent nuclear fuel storage systems
  - ✓ Over 120 nuclear plants on four continents racked with Holtec's wet storage technology
  - ✓ Over 60% of available world market
  - ✓ 100% of the domestic market



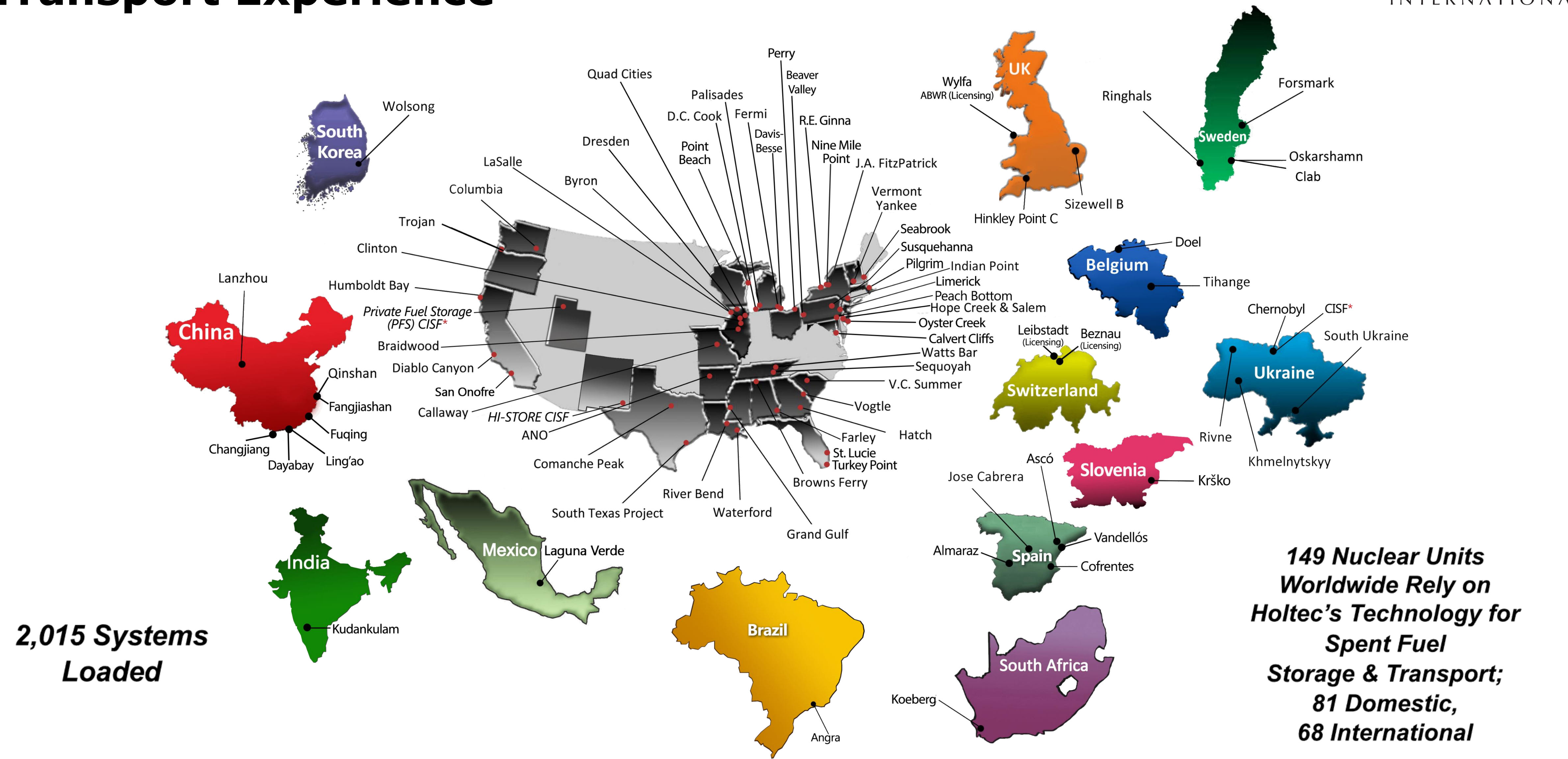
Spent Fuel Dry Storage and Transport



High Density Wet Storage Racks



# Holtec's Worldwide Dry Storage and Transport Experience



**2,015 Systems Loaded**

**149 Nuclear Units Worldwide Rely on Holtec's Technology for Spent Fuel Storage & Transport; 81 Domestic, 68 International**



# Decommissioning: Building a Fleet

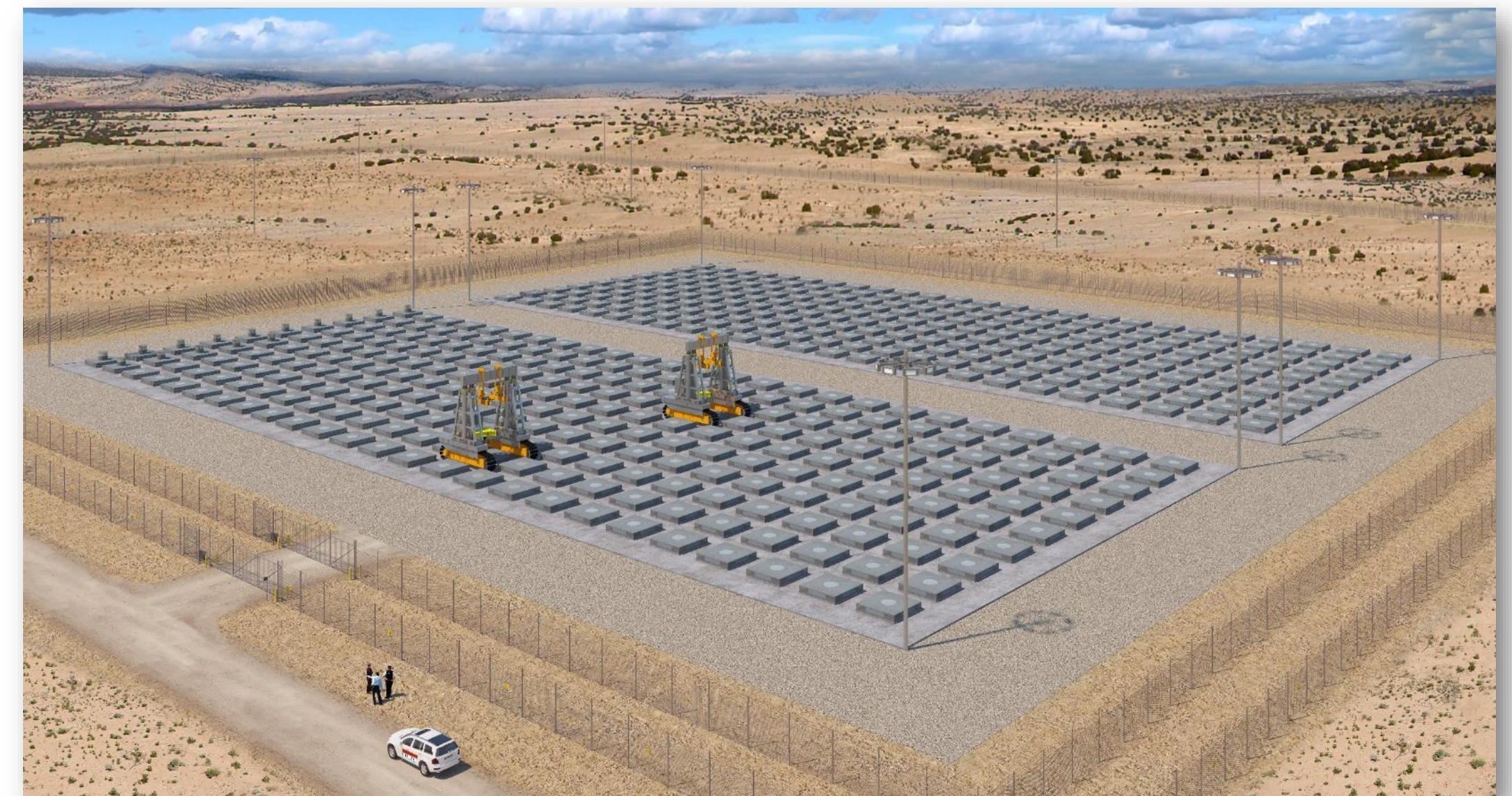
- Decommissioning Goals:
  - ✓ Establish, implement & advance industry decommissioning
  - ✓ Improve safety, cost and efficiency
- Fleet-based approach
  - ✓ Largest owner of Decommissioning NPPs in the U.S.
  - ✓ 3<sup>RD</sup> largest owner of Spent Fuel (300+ Systems)
- Qualified and experienced personnel
- Procedures & processes
- By accelerating movement of spent fuel into dry cask storage and deploying state-of-the-art technologies, Holtec is well-equipped to decommission nuclear plants decades sooner than if utility owned
- Decommissioning Sites continue to be our proving grounds for innovation, technology advancement, and a steady supply of spare parts
- **RECOMMISSIONING:** Palisades Restart by late 2025





# Consolidated Interim Storage Facility: HI-STORE

- Holtec is partnered with Eddy Lea Energy Alliance (ELEA) to design and build an underground Consolidated Interim Storage Facility in New Mexico incorporating Holtec's HI-STORM UMAX spent fuel storage system
- Universal solution for the Nation's SNF & HLW
- Has strong support in New Mexico
- Stores the loaded canisters in a subterranean configuration: HI-STORM UMAX
- NRC Licensing secured in May 2023
  - 5<sup>th</sup> Circuit Court directed the NRC to vacate the HI-STORE CISF License in March 2024
  - Holtec has joined the US NRC and US Federal Government to file petitions asking the Supreme Court to overturn the 5<sup>th</sup> Circuit Court ruling and reinstate the license
- HI-STORE could be constructed as soon as 2026





# Holtec's SMR-300 Technology at a Glance



- **MATURITY:** Over 150 MM USD of government investment (USDOE, UKDESNZ) and substantial in-kind investment by Holtec, Hyundai E&C, and Mitsubishi Electric during 10-year development
- **LOW-RISK TECHNOLOGY:** based on proven PWR reactor technology and existing LWR licensing basis considering ongoing regulatory feedback (USNRC pre-application engagement and UK Generic Design Assessment)
- **ECONOMICAL:** Highest power density of any light water reactor SMR in development, which translates to cost-effectiveness
- **WALK-AWAY SAFE:** Passive engineered safety systems relying on natural circulation; no need for off-site power, off-site water, or operator action (Fukushima-proof)
- **SIMPLIFIED:** Drastically reduced number of safety systems compared to reactors operating today
- **VALUE:** 80-year design life for non-replaceable components by eliminating causative failures in equipment, leveraging Holtec's OPEX and manufacturing expertise (design for manufacture)
- **SUPPLY CHAIN CERTAINTY:** Conventional, off-the-shelf technology and components, including fuel and control rod drive system
- **SECURE:** Robust containment enclosure system with spent fuel pool within containment and integrated dry spent fuel storage system
- **FLEXIBLE:** Fast ramp, dispatch-capable; Island Mode; Black Start; Load-Following. Designed with option for Air Cooled Condensers for siting away from water



SMR-300 Dual-Unit Configuration

Plant Type	PWR (Proven & Licensable)
Thermal Power	1000 MWth (nominal)
Electrical Power	300 MWe (net)
Design Life	80 years
Coolant	Water
Primary Circulation, Normal	Pump Driven
Primary Circulation, Accident	Gravity
Fuel Type	PWR 17x17 (standard)
Fuel Cycle	18 months
First Commercial Operation	2030+ (Palisades, MI)



# Palisades Restart & SMR-300

- **Holtec is Site Owner and 10CFR50 License Holder through subsidiary companies with responsibility for decommissioning**
- **Holtec acquired Palisades Nuclear Generation Station in June 2022**
  - ✓ Application to restart the existing plant (CE 2-Loop PWR, 805 Mwe net)
  - ✓ Partnering with an established nuclear utility for operation of the unit
  - ✓ Electricity purchased by Wolverine through Power Purchase Agreement
  - ✓ NRC application for restart has been filed with ongoing regulatory engagement
  - ✓ Plant modifications/upgrades are underway (DOE LPO Loan Approved)
  - ✓ First step of INPO Operations Certification Completed
  - ✓ Provisional fuel order has been placed
  - ✓ Expected Operation: August 2025
- **Holtec will also build two (2) SMR-300 units (dual-unit) at the Palisades site**
  - ✓ Following the 10CFR50 Two-Part Process (more flexible than Part 52)
  - ✓ Location at site selected, environmental report in preparation, clearing for geotechnical and ground water monitoring underway
  - ✓ Long-lead procurements such as forgings, RCPs, turbine (2024)
  - ✓ Submittal of Construction Permit Application for Palisades (June 2026)
  - ✓ Commence Nuclear Island Construction Activities (June 2027)
  - ✓ Submittal of Operating License Application (2028)
  - ✓ Start of Commercial Operation (2030+)



**Palisades Nuclear Generation Station**



**SMR-300**



# Clean Energy Technologies Under Development



## ■ Green Boiler

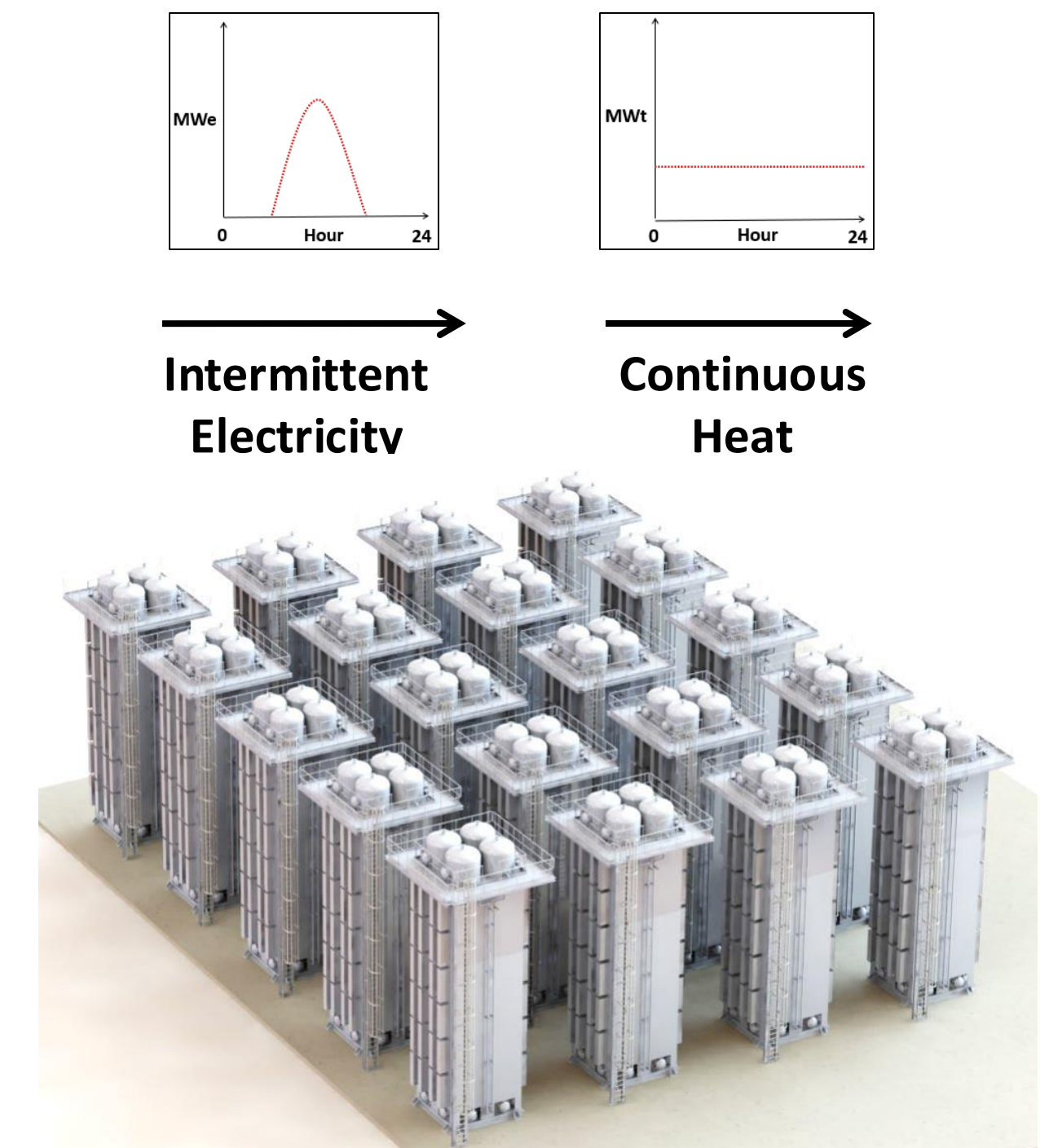
- ✓ Electric steam generator with integrated thermal energy storage for decarbonization of industrial heat production
- ✓ Proprietary material development and testing nearing completion
- ✓ Scale-model integration testing planned in 2025  
(DOE FOA application in progress with industry and national labs)

## ■ HI-THERM Concentrated Solar Plant

- ✓ Holtec is developing a Concentrated Solar Plant (CSP) technology for 24/7 carbon-free energy production targeted to be lower cost than PV + Storage
- ✓ Turbine used for electricity production provides inertia to grid

## ■ Regional Clean Hydrogen Hubs

- ✓ Holtec is part of the MACH2 team awarded by USDOE for a clean hydrogen hub (<https://mach-2.com/>)
- ✓ Holtec is currently working with the MACH2 team on a technical and commercial assessment of the proposed SMR-300 powered hydrogen generation center at Oyster Creek, one of several projects under consideration by the consortium



**Holtec's Greenboiler**



# Conclusion

- Holtec is a leading Clean Energy Supplier
- Proven technologies that cover the cornerstones of the nuclear fuel cycle – cradle to grave
- Modular design of our SMR-300 using proven technology
  - ✓ Not reinventing the PWR - using proven technology with an innovative approach for delivery and supply
- Palisades restart is real
- Nuclear Power – we are moving in the right direction

***Holtec International – Transforming the Nuclear Industry***



# Thank You



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