

# Advanced Nuclear and Fusion

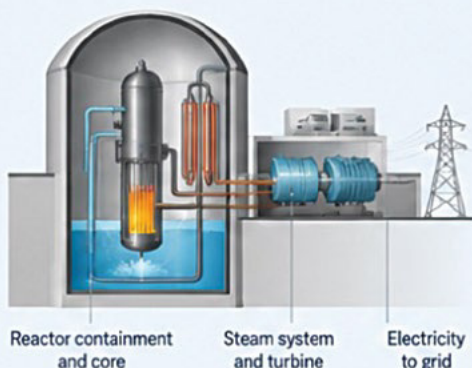
BROAD PARTICIPATION. TECHNICAL EVIDENCE. PEER LEARNING. A FOUNDATION FOR INFORMED CHOICES.

Fission and fusion share a nuclear origin, but they are at different points on the path to energy systems. The Roadmap compares them using a common set of questions—while recognizing that the evidence needed to advance each technology is different.

**Two technology pathways. A strong foundation in Massachusetts.**

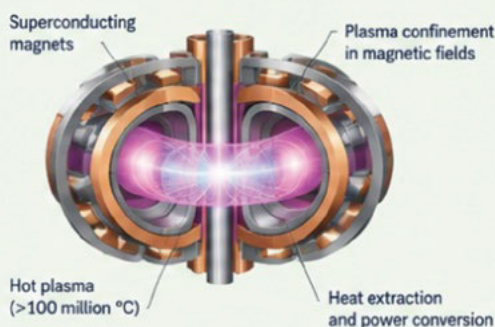
## ADVANCED NUCLEAR FISSION

Multiple reactor families are advancing from a deeply established commercial base toward new applications, modular deployment and improved construction models.



## FUSION ENERGY

An earlier-stage energy pathway moving from plasma science and experimental facilities toward integrated engineering demonstrations and prospective commercial systems.



**~7,000**  
**MEGAWATTS**

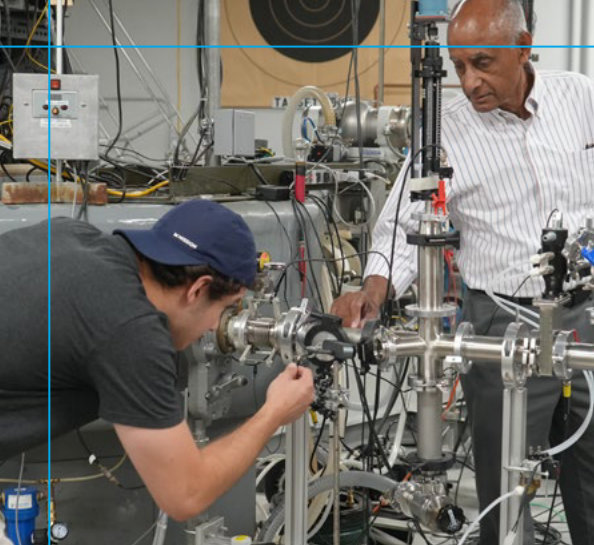
Peak Nuclear  
Capacity in New  
England (1990)

**8**

Stations Operated  
at the Peak in  
1990 across 5  
States

**3,347**  
**MEGAWATTS**

Currently  
Operating (3  
Reactors)



**For fusion, the pathway moves from research and experimentation toward integrated, repeatable plant performance. For fission, the same logic asks whether a design can move from demonstration to licensed, financeable, manufacturable and repeatable deployment.**

**UMASS  
LOWELL**

UNIVERSITY OF MASSACHUSETTS LOWELL  
One University Avenue  
Lowell, Massachusetts 01854  
[nuclearroadmap@uml.edu](mailto:nuclearroadmap@uml.edu)

## **A Common Framework**

The Roadmap applies a common framework while recognizing that fission and fusion require different evidence at different stages.

### **TECHNOLOGY MATURITY**

What has been demonstrated—from component tests to integrated operation—and at what scale?

### **SAFETY AND RADIATION PROTECTION**

What hazards exist, and can they be controlled with a defensible and tested safety approach?

### **MANUFACTURING AND SUPPLY CHAIN**

Can critical components and fuel be made repeatedly, qualified and delivered at scale?

### **OPERATIONS AND MAINTENANCE**

Can the system be operated, inspected, repaired and restarted safely and reliably? And can operational excellence be replicated across a growing fleet?

### **ENERGY PERFORMANCE**

Can the system deliver useful energy with acceptable efficiency, flexibility and availability?

### **FUEL AND MATERIALS**

Can fuel, materials and components perform reliably over the intended operating life?

### **LICENSING AND SITING**

Is there a transparent and known pathway to authorization, siting and operations?

### **ECONOMICS AND COMMERCIAL READINESS**

Can the complete system compete for customers, capital and long-term operation, and move successfully from first-of-a-kind to repeatable deployment?

## **Scan the QR code for more**

**information**, including complete analysis, supporting documentation, sources, references and the full Roadmap.

