Global Paths to Fusion

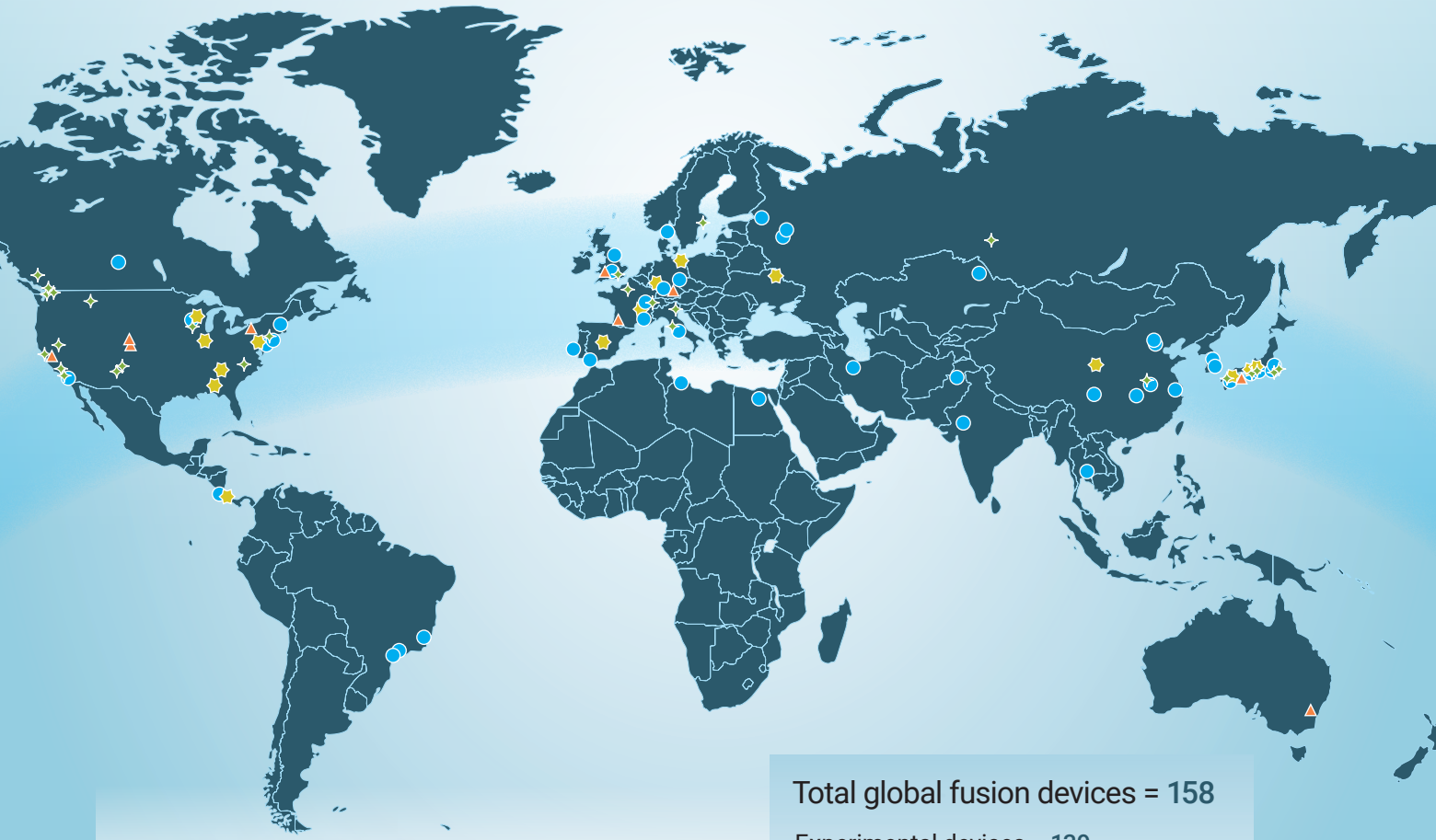
Governments (see "Conversations," p. 18) and private-sector startups (see "Market Report," p. 20) are pursuing projects to advance laser-driven fusion as a possible power source. But laser fusion is far from the only option. Here's a look at public and private experimental fusion efforts that are planned, under construction or in operation worldwide. For details, technical data and country statistics, visit the Fusion Device Information System (FusDIS) portal at nucleus.iaea.org/sites/fusionportal.

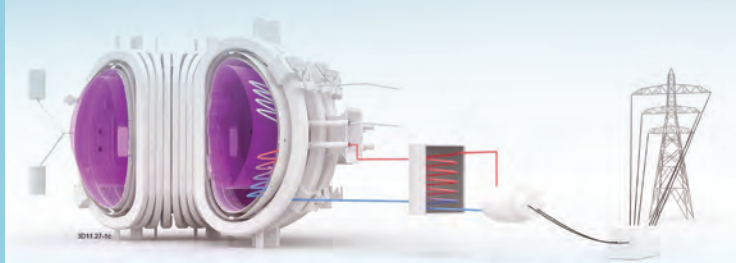
Tokamaks = 79
Tokamaks drive hot plasma around in a magnetically confined torus with an internal current.

Stellarators and heliotrons = 22
Stellarators create twisted rings of hot plasma using external magnets.

Laser/inertial = 12
Lasers indirectly or directly heat a fuel pellet, causing it to collapse inward to compress the fuel.

Alternative concepts = 45
- Dense plasma focus
- Field-reversed configuration
- Inertial electrostatic fusion
- Levitated dipole
- Magnetic-mirror machine
- Magnetized-target fusion
- Pinch/reverse-field
- Simple magnetized torus
- Space propulsor
- Spheromak





Concept diagram for a DEMO fusion power plant.
EUROfusion; CC-BY-4.0

Total global fusion devices = 158

Experimental devices = 139
Facilities with dedicated machines for experiments directed toward developing fusion power.

OPERATING: 100 | UNDER CONSTRUCTION: 14
PLANNED: 25 [PUBLIC: 105 | PRIVATE: 34]

Demonstration (DEMO) power plants = 19
A proposed class of nuclear fusion experimental reactors intended to demonstrate the net production of electric power from nuclear fusion.

PLANNED: 19 [PUBLIC: 6 | PRIVATE: 13]

Source: International Atomic Energy Agency, Fusion Device Information System – FusDIS database, updated July 2024 / Infographic: Alessia H. Kirkland