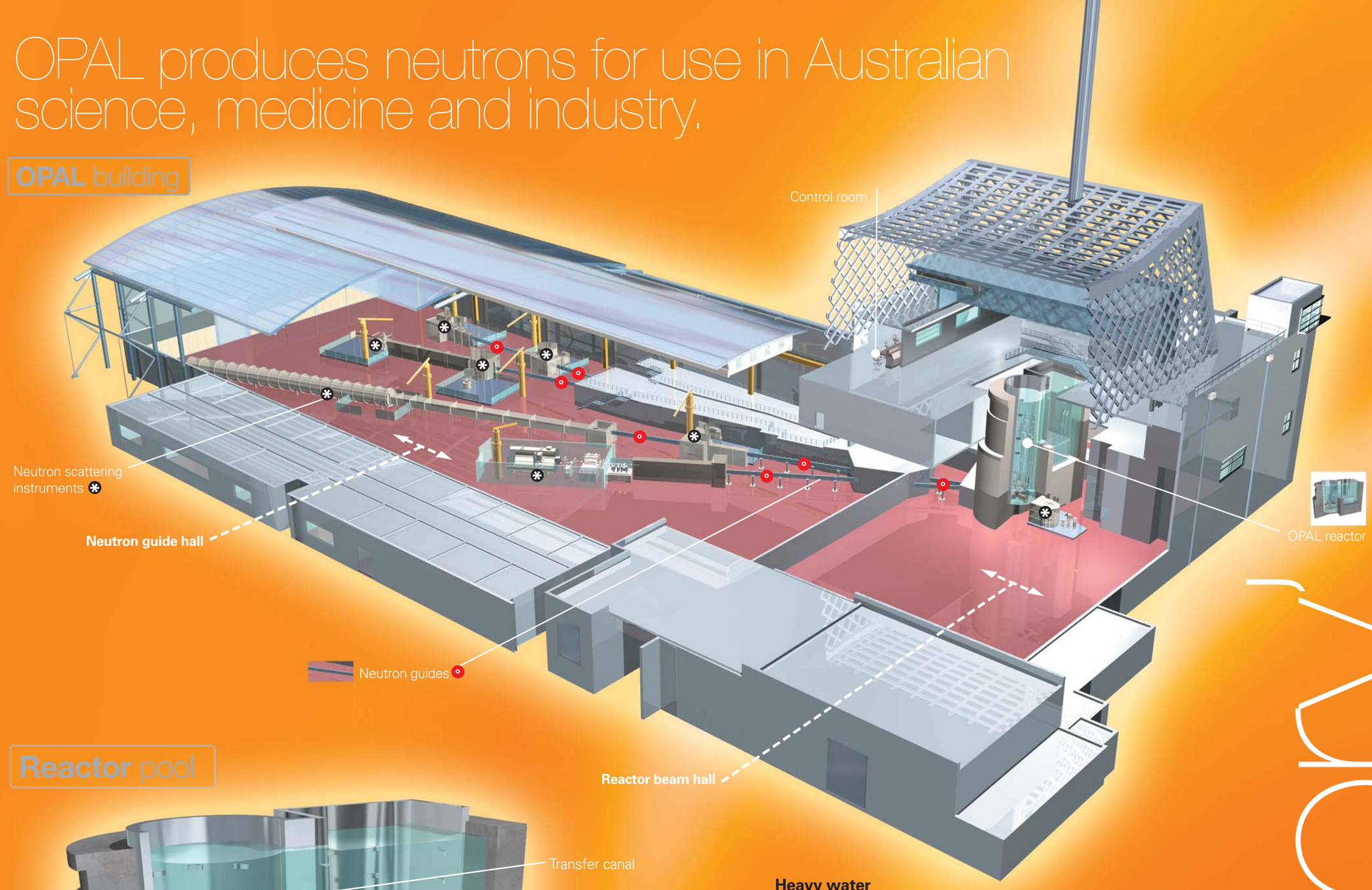
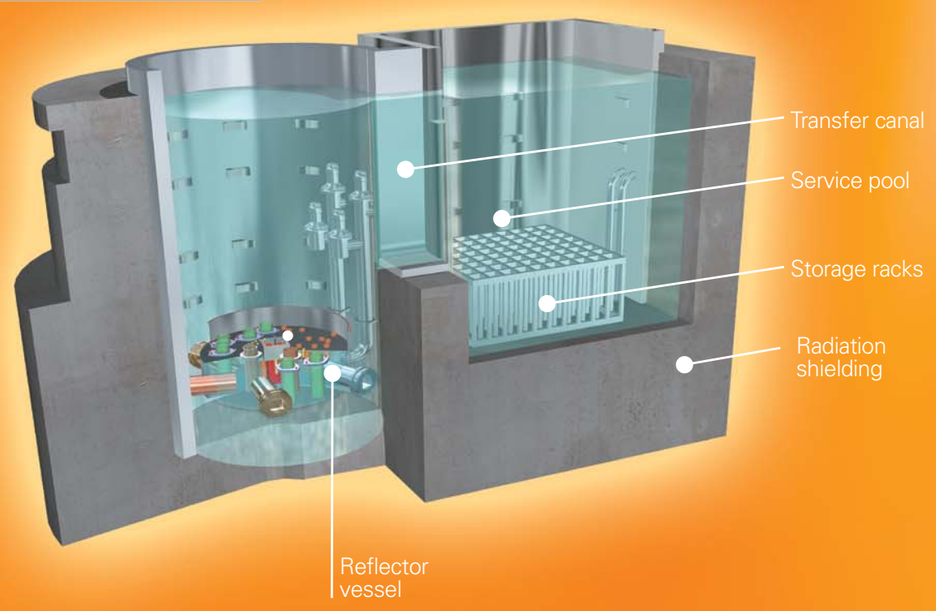
OPAL produces neutrons for use in Australian science, medicine and industry.

OPAL building



Reactor pool



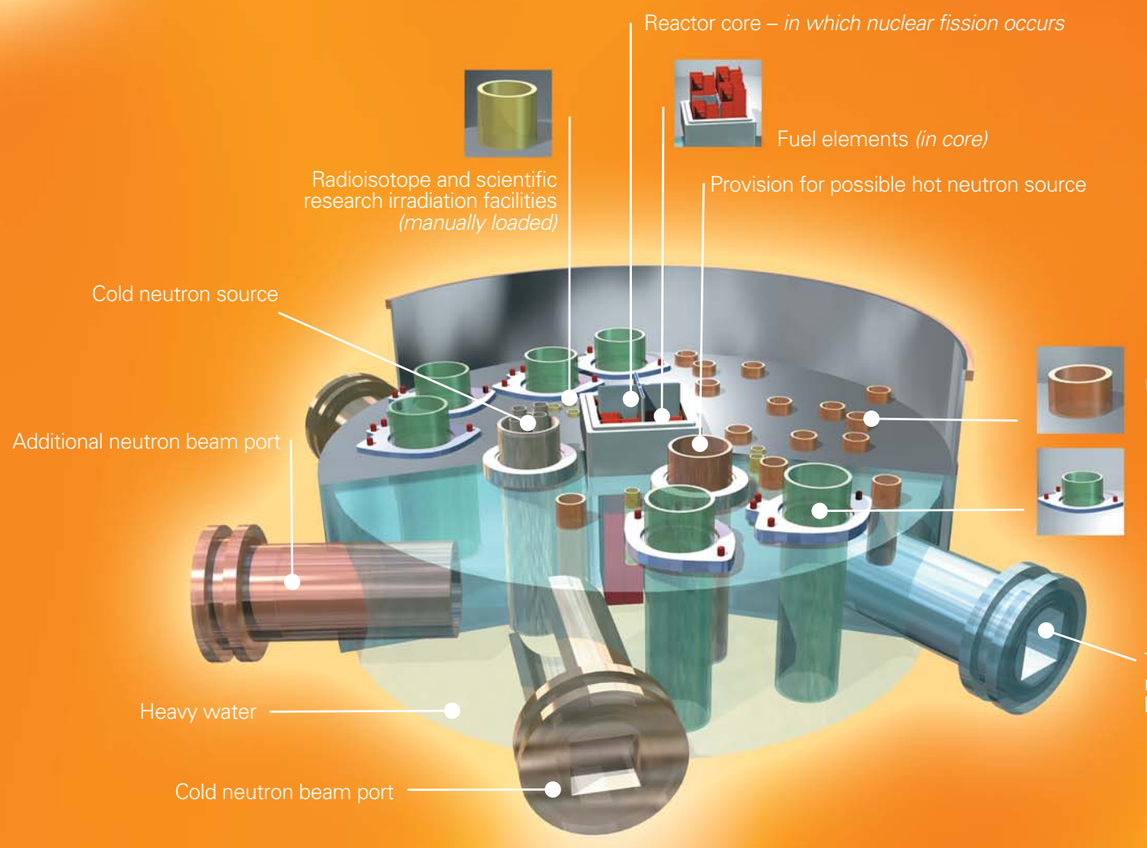
Heavy water

Heavy water uses deuterium rather than hydrogen. It is a good substance for slowing the neutrons down, thus making them suitable for irradiation, neutron scattering and perpetuating the nuclear chain reaction.

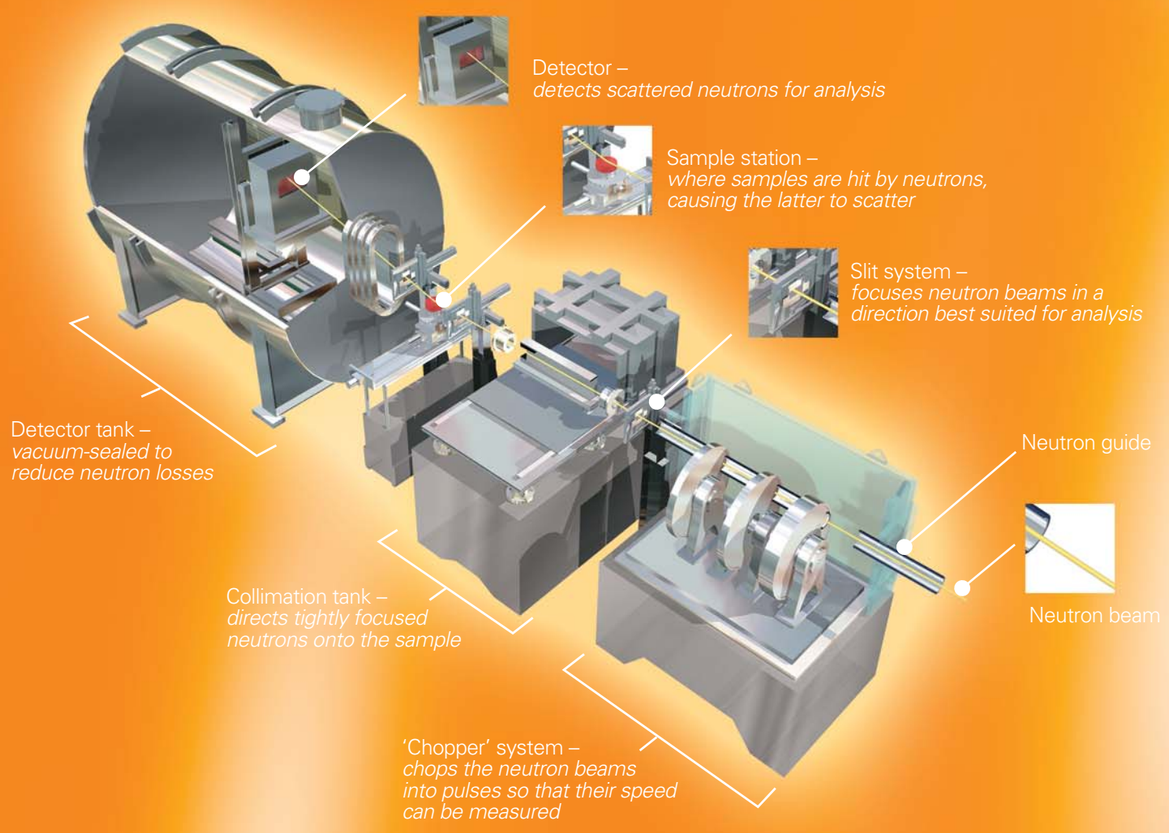
Nuclear fission

When a neutron collides with the nucleus of a uranium atom it can be absorbed. For some atoms, this makes them unstable so the nucleus will then split, with the release of some heat energy and several neutrons. These neutrons can then induce more uranium atoms to fission, which in turn release more neutrons, thus establishing a nuclear chain reaction.

Reflector vessel



Neutron scattering instrument



OPAL's core is about the size of a small washing machine and contains the uranium in which nuclear fission occurs.

Neutrons are used to study the structure of materials including metals, polymers and biological material such as food. This is the science of neutron scattering.

By capturing neutrons, naturally occurring materials can be turned into radioactive isotopes (radioisotopes), which can be used for scientific research in fields such as:

- Agriculture
- Health
- Transport
- Climate change

Radioisotopes are also the radioactive component in radiopharmaceuticals, used in nuclear medicine.

During irradiation, some silicon atoms change to phosphorus atoms, so making a semi-conductor for use in high quality electronic devices.

Neutrons can be used to analyse rock and soil samples to assist in minerals exploration.

OPAL

WORLD-CLASS NEUTRON SCIENCE

ALL ABOUT **ANSTO**

OPAL reactor