Nuclear Technologies and Concepts:

1. Natrium Reactor

An advanced nuclear reactor developed by TerraPower, combining a sodium-cooled fast reactor with molten salt energy storage, allowing flexible power output and enhanced safety.

2. Sodium-cooled Fast Reactor

A type of nuclear reactor that uses liquid sodium as a coolant, operating at high temperatures and low pressures to achieve higher thermal efficiency and inherent safety.

3. Molten Salt Energy Storage

A system that stores thermal energy by heating salts to a molten state, effectively storing heat for later use in electricity generation.

4. Traveling Wave Reactor (TWR)

An advanced nuclear reactor that breeds its own fuel by converting fertile material into fissile fuel, enabling operation over extended periods without frequent refueling.

5. Small Modular Reactor (SMR)

Compact nuclear reactors producing up to approximately 300 megawatts per module, manufactured off-site and assembled at the location, offering flexibility, scalability, and enhanced safety.

6. Advanced Nuclear Fission Reactor

Innovative reactor designs that improve upon traditional nuclear reactors by enhancing efficiency, safety, fuel use, and sustainability.

7. Inherent Safety Mechanisms

Safety features integrated into reactor design that rely on natural laws (e.g., gravity, thermal expansion) rather than active human or mechanical intervention.

8. Passive Cooling Systems

Cooling systems that operate without external power or active components, utilizing natural processes like convection or gravity to prevent overheating.

9. High-Assay Low-Enriched Uranium (HALEU)

Uranium fuel enriched to between 5% and 20% uranium-235, providing higher efficiency and longer life for advanced reactors compared to traditional low-enriched uranium.

10. Medical Isotopes (Radioisotopes)

Radioactive isotopes used in medicine for imaging and targeted treatment, such as diagnosing diseases or treating cancer.

11. Liquid-metal-cooled Reactor

A nuclear reactor that uses liquid metals (like sodium or lead) as coolants, offering high heat transfer efficiency and operational safety.

Nuclear Fuel and Materials:

12. Uranium Enrichment

The process of increasing the concentration of fissile uranium-235 in natural uranium to levels suitable for use as nuclear reactor fuel or weapons.

13. Depleted Uranium (DU)

A byproduct of uranium enrichment with a reduced concentration of uranium-235, commonly used in applications requiring high-density materials.

14. Fertile Material

A nuclear material (such as uranium-238 or thorium-232) that isn't directly fissile but can be converted into fissile material through neutron absorption.

15. Fissile Material

Material capable of sustaining a nuclear fission chain reaction, such as uranium-235 or plutonium-239.

16. Thorium

A naturally occurring radioactive metal, more abundant than uranium, explored as an alternative nuclear fuel capable of producing fissile uranium-233 when irradiated.

17. Plutonium-239 (Pu-239)

An artificial, fissile isotope created from uranium-238 in reactors, used as nuclear fuel or in nuclear weapons.

18. Uranium Isotopes (U-235, U-238, U-239, etc.)

Variants of uranium atoms differing in neutron number; uranium-235 is fissile, uranium-238 is fertile, and uranium-239 is short-lived, rapidly decaying to plutonium-239.

Atomic and Subatomic Concepts:

19. Atomic Mass Number

The total number of protons and neutrons in an atom's nucleus, indicating the isotope of an element.

20. Isotopes

Atoms of the same element with identical proton numbers but different neutron counts, resulting in varying atomic masses and nuclear properties.

21. Proton, Neutron, Electron

Subatomic particles composing atoms: protons (positively charged), neutrons (neutral), and electrons (negatively charged).

22. Beta Decay

A type of radioactive decay in which a neutron converts into a proton, emitting an electron (beta particle) and altering the atom's element.

23. Alpha Particle

A particle consisting of two protons and two neutrons, emitted during radioactive decay, carrying a positive charge.

24. Gamma Radiation

High-energy electromagnetic radiation emitted from a radioactive nucleus without changing its composition, highly penetrating, and requiring dense shielding.

Energy and Related Terms:

25. Baseload Power

Continuous, reliable electricity production meeting the minimum level of demand at all times.

26. Grid Flexibility

The ability of an electrical grid to efficiently balance and adapt electricity supply to fluctuations in demand and renewable generation.

27. Carbon-free Energy

Energy sources generating electricity without releasing carbon dioxide, including nuclear, solar, wind, and hydroelectric power.

28. Renewable Energy Integration

Combining renewable energy sources like wind or solar into the electric grid, supported by technologies like storage to maintain grid stability.

29. Electrolysis (Hydrogen Production)

A process that splits water into hydrogen and oxygen using electricity, producing hydrogen fuel, especially important when using renewable electricity for "green hydrogen."

30. Lifecycle Carbon Emissions

The total carbon emissions produced over the entire lifespan of an energy source, including construction, operation, fuel production, and disposal.