South African Network

Nuclear Education, Science and Technology

Ensuring the ecological safety of nuclear power from a technological standpoint: global trends

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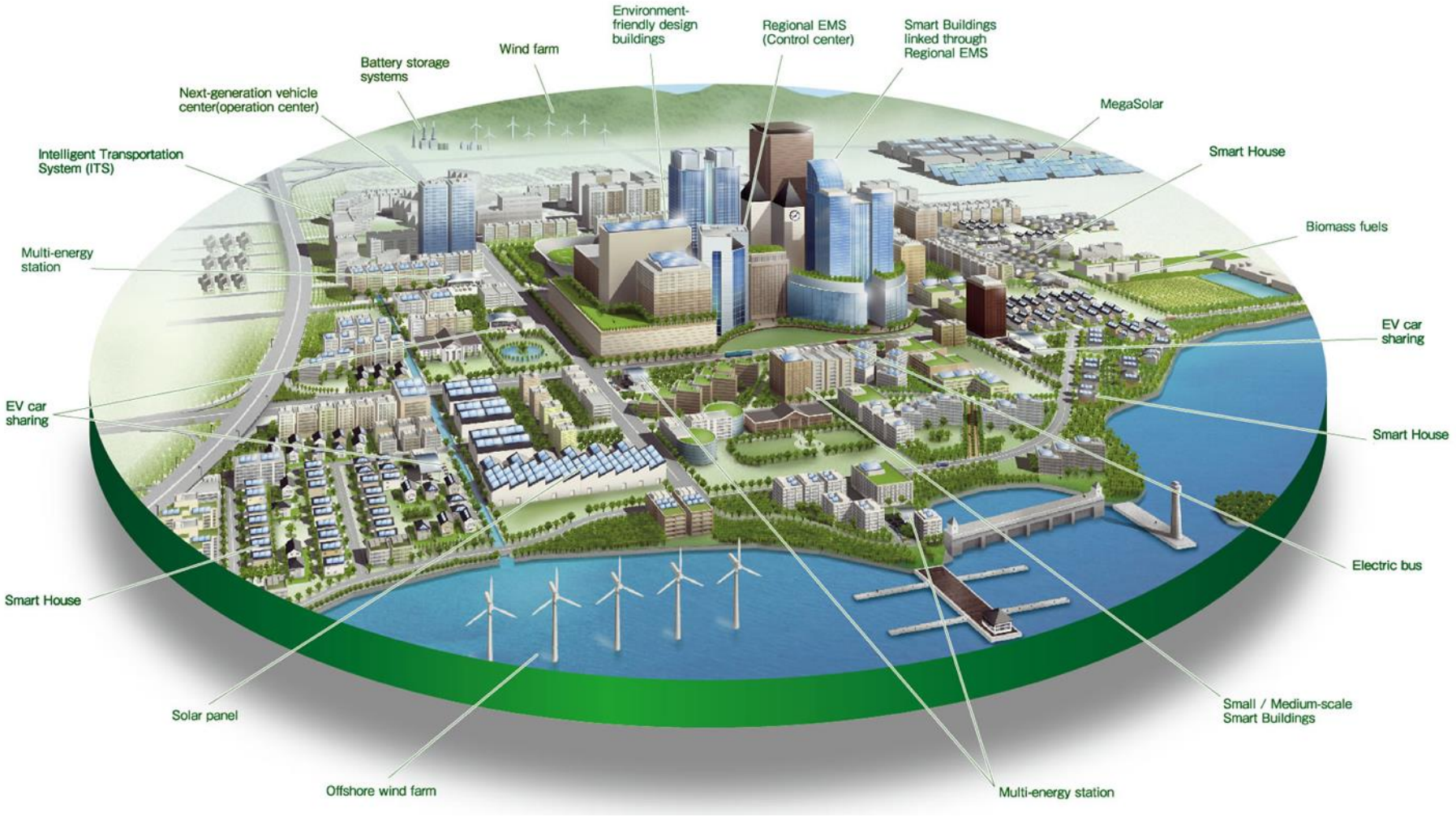
Where does nuclear power fit into a green smart city?



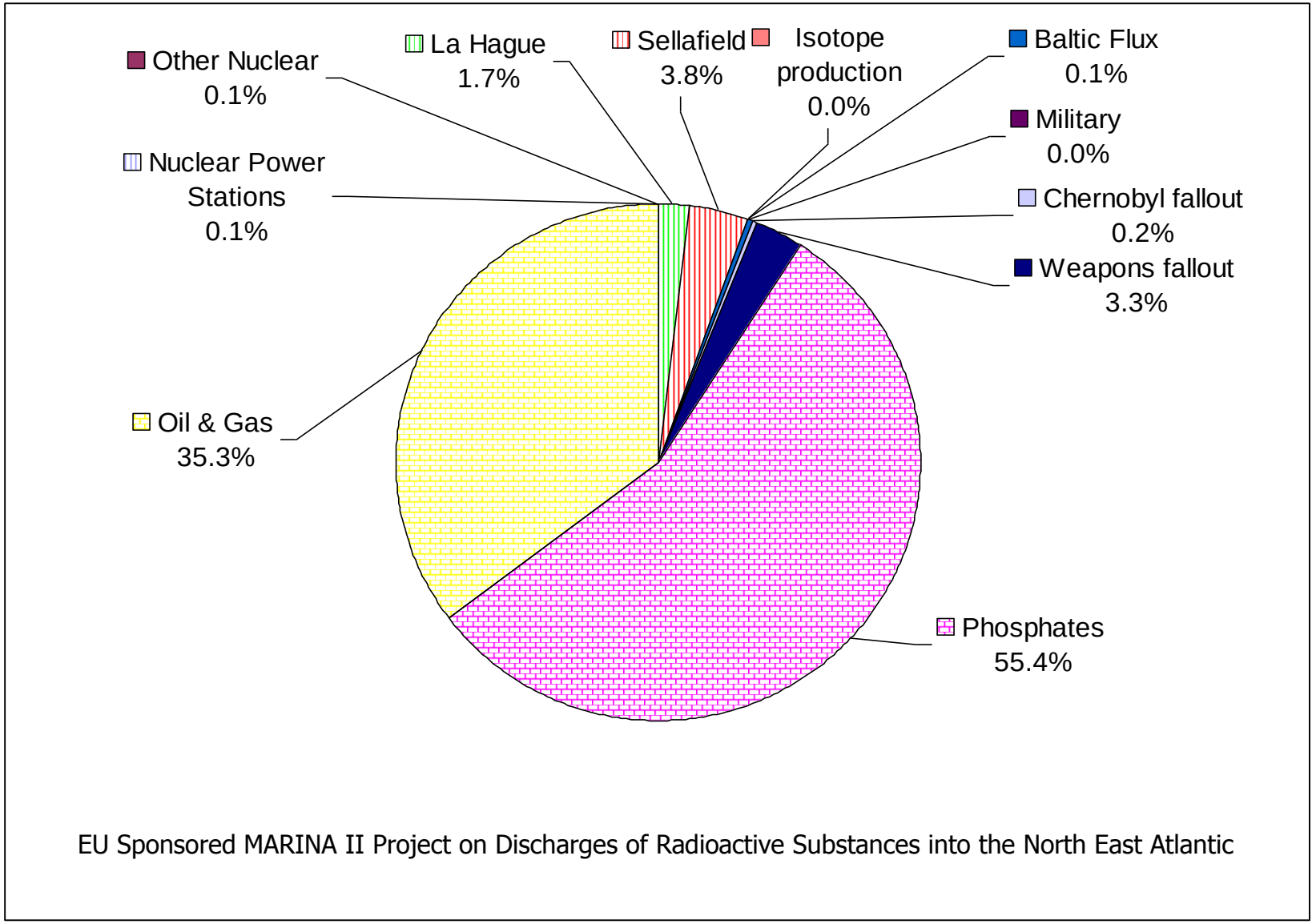
Safety of Energy Sources

Energy Source	Mortality Rate (deaths per 10^9 kWh)	
Coal – global average	161	(50% of global electricity)
Coal – China	278	(75% of China's electricity)
Coal – U.S.	15	(44% of U.S. electricity)
Oil	36	(36% of global energy, 8% of global electricity)
Natural Gas	4	(20% of global electricity)
Biofuel/Biomass	24	(21% of global energy)
Solar (rooftop)	0.44	(< 1% of global electricity)
Wind	0.15	(~ 1% of global electricity)
Hydro – global average	1.4	(15% of global electricity, 171,000 Banqiao dead)
Nuclear	0.04	(17% of global electricity w/Chernobyl&Fukushima)

Sources –World Health Organization; CDC; ICAP - significant coal use increases health care costs approximately 11%

Source of Radioactive Dose in Europe – 2000

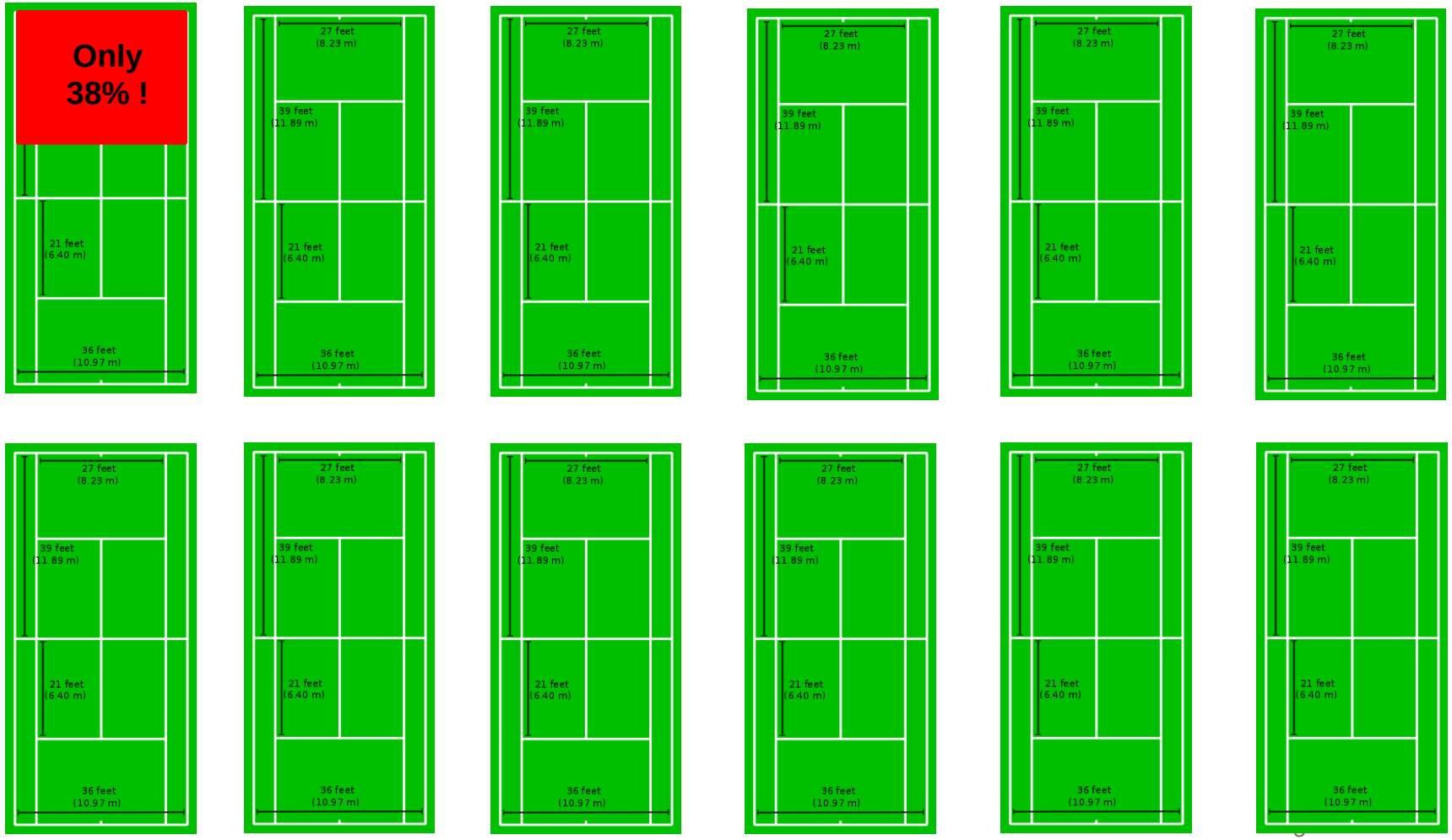
Excludes existing natural background



EU Sponsored MARINA II Project on Discharges of Radioactive Substances into the North East Atlantic

Spent Fuel Volume in Perspective

How many **tennis courts** will be covered when placing all Koeberg's spent Fuel Assemblies (FA), generated by both units since 1984 (2 173 FAs), up-right next to one another?



Ensuring a clean ecological environment at a Nuclear Power Plant

A radiological environmental monitoring program begins even before the plant starts producing electricity to establish a baseline survey of background radiation in the local environment.

- Establishes fixed monitoring stations around the plant to sample air, surface and ground water, milk from local dairies, and vegetation.
- Plant operators also send

Most nuclear power plants are along lakes, rivers or seacoasts because the facilities use water to cool the reactors.

- The water used to make steam in nuclear power plants remains in strictly enclosed, recirculating systems.
- Cooling water discharged from a plant must meet clean water legislation requirements national standards to protect water quality and aquatic life.
- The regulatory authority also reviews plant operations to ensure no adverse impacts to water quality and aquatic ecology.
- Samples to regulatory authorities for independent verification.

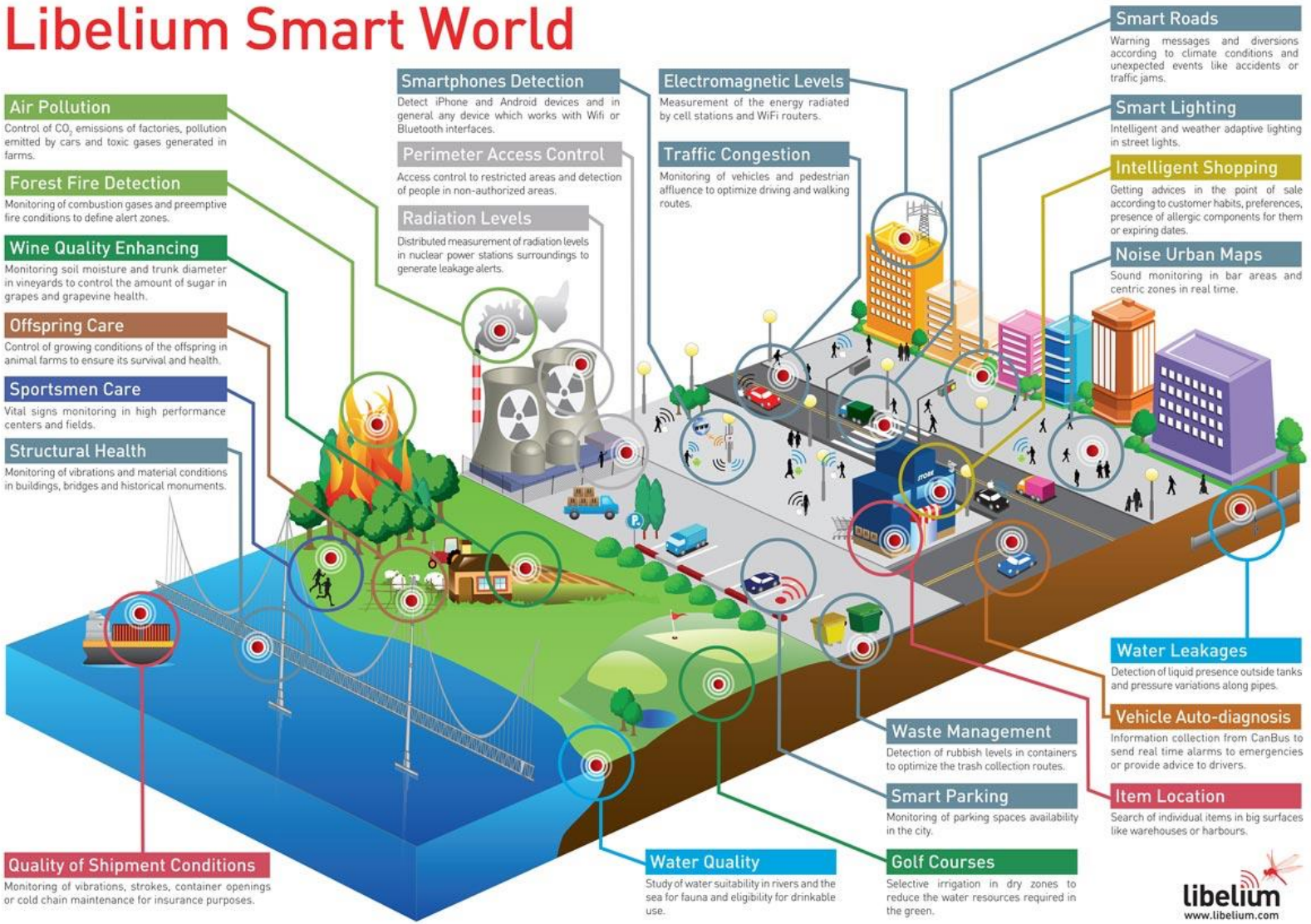
Koeberg Nuclear Power Plant

Safe Habitat for Wildlife

Koeberg NPP Nature Reserve

- Eskom controls 3000 ha of West Coast around the Koeberg Nuclear Power Station.
- In keeping with both Eskom's environmental policy and national conservation trends - Eskom has decided to open this property to the public.
- The property was proclaimed as a private nature reserve on 18 October 1991 and was officially opened by the then administrator of the Cape, Kobus Meiring.

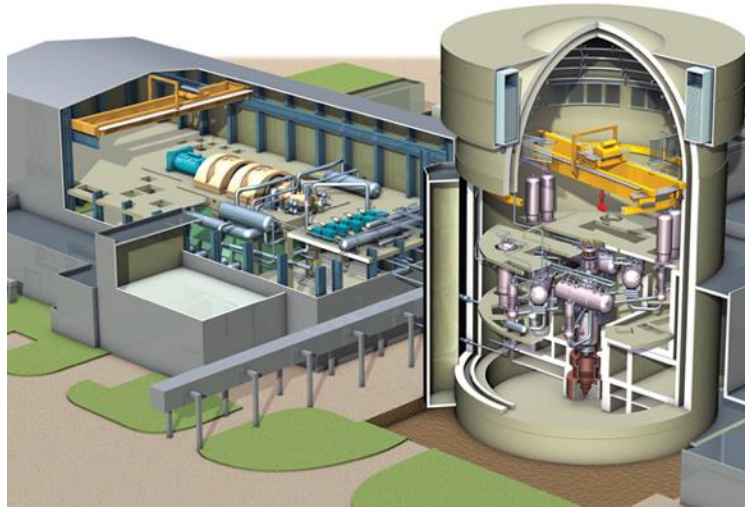
Ensuring a clean and safe environment through technology



Ensuring a clean and safe environment through technology

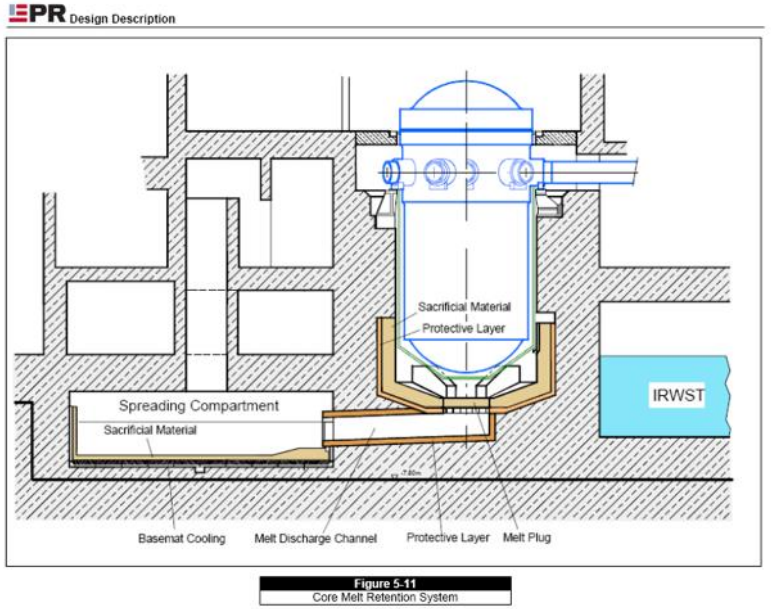
The functions of the core catcher:

- Retaining the reactor vessel bottom in case of detachment or deformation;
- Protection of reactor shaft structure elements from corium;
- Retention of liquid and solid corium components, core fragments and structural materials;
- Heat transfer to cooling water;
- Maintenance of corium in sub-critical state;
- Minimisation of releases of radioactive substances/ hydrogen to the containment.



VVER-1200 Molten core retention system

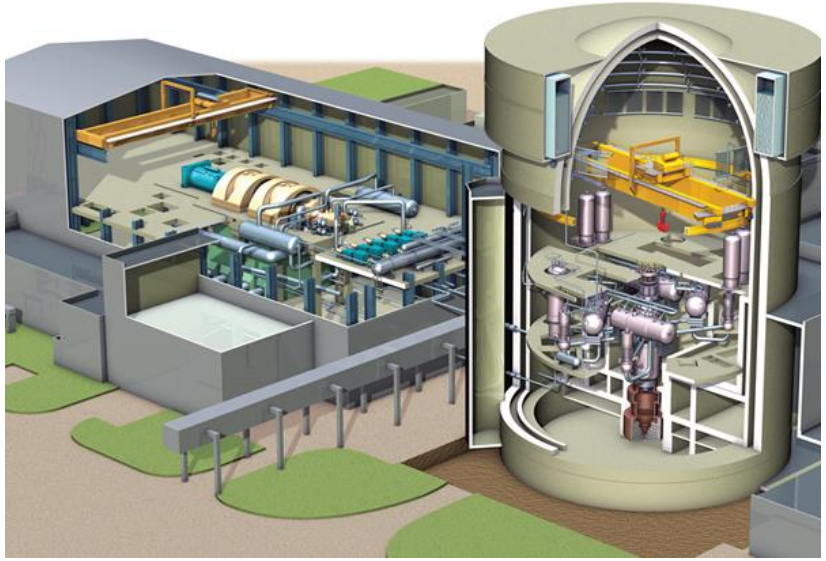
EPR Molten core retention system



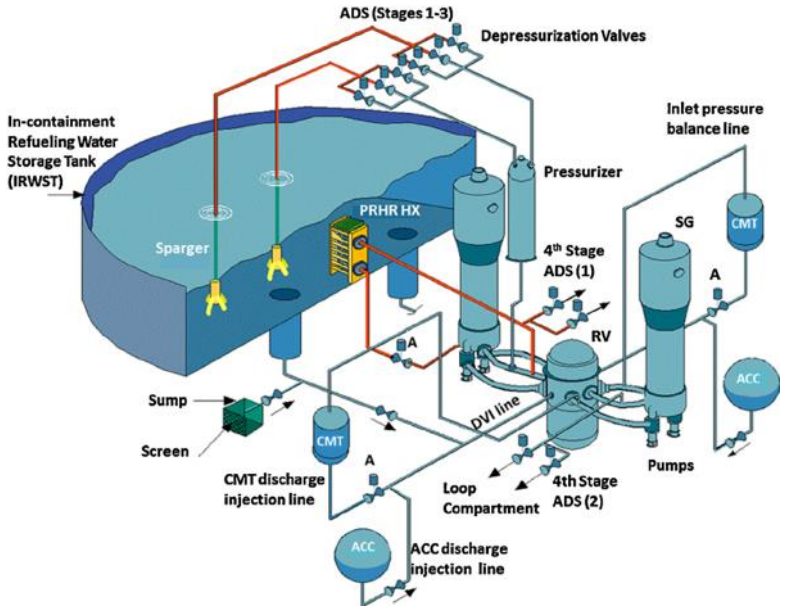
Ensuring a clean and safe environment through technology

The containment PHRS is intended to

- Reduce and maintain pressure within design limits inside the containment during beyond design basis accidents, including those accompanied by severe core damage
- Transfer to the ultimate heat sink the heat released into the containment during beyond design basis accidents, including those accompanied by severe core damage;
- Serve as a redundant system for the containment spray in order to enhance safety.



VVER-1200 Passive Heat Removal System



AP1000 Passive Heat Removal System

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Thank you – any questions