

# Worldwide Resurgence of Nuclear Power

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# RESURGENCE OF NUCLEAR POWER

- References

- NUCLEAR NEWS-October and November 2006 and all current issues.
- NUCLEAR PLANT JOURNAL-September/October 2006 and all later issues.



# RESURGENCE OF NUCLEAR POWER

- A little known or publicized fact:
- The nuclear power plants located the USA and some in the rest of the world are currently producing nuclear powered electricity at **2 CENTS** per kilowatt-hour! Including waste management the cost is \$0.03/k-h.
- This cost is directly competitive with hydroelectric power, as the lowest cost anywhere.
- This value demonstrates the true capability of nuclear power.



# RESURGENCE OF NUCLEAR POWER

- First let's review the projected need for new nuclear power plants in the USA.
- The US Nuclear Regulatory Commission (NRC) has recently received many (*thirty plus!!*) construction and operating license (COL) requests for new nuclear power plants of new and advanced designs. The NRC has therefore hired well over 300 engineers to work on these requests!!
- TXU or Texas Utilities has four COL'S in due for approval in 2008, plus 2 others for a total of some TEN new reactors and 11.5 GW (e) to be operational by 2015. Two of the new reactors will be WAP1000'S.



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- Other interested US nuclear utilities and plants
  - Pilgrim (MA)
  - Hope Creek/Salem (NJ)
  - Calvert Cliffs (MD)
  - Bellefonte (TN)
- Four new reactor designs have NRC approval!





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- Nuclear power plants internationally
  - FRANCE has 58 operating and more to come.
  - FINLAND has 4 with another being built.
  - JAPAN has 55 with at least 5 more planned.
  - KOREA has 20 and 4 more planned.
  - CHINA has 7 producing 6.6 GWe with 40 GWe! planned by 2020.
  - INDIA has 16 with 7 under construction, planning to have 29.5 GWe by 2022.



# RESURGENCE OF NUCLEAR POWER

- Internationally by country (Continued)
- PAKISTAN has 2 operating and 1 being built, expanding to 8 GWe by 2030.
- ARGENTINA has 2 and is planning another.
- ROMANIA has 1 and another being built.
- CANADA has 18 with expansion planned.
- The UK has 23 with many more new planned.
- RUSSIA has 30 and plans to increase nuclear power from ~22 to 35 GWe by 2016.
- Other countries: LITHUANIA 1 + 1; SO AFRICA 2+ 1; POLAND, TURKEY, INDONESIA & EGYPT.

# RESURGENCY OF NUCLEAR POWER

- Other applications for nuclear power
  - Process heat for various industries;
  - Seawater desalination;
  - Hybrid electric vehicles, and
  - Hydrogen production.



# RESURGENCY OF NUCLEAR POWER

- Related issue
- The USA and RUSSIA each have 24 metric tons of Plutonium to be converted in mixed oxide (MOX) nuclear fuel for power.
- The USDOE is building a MOX fuel plant at Savannah River.
- The usual antinuclear suspects are complaining:
  - Greenpeace;
  - Union of Concerned Scientists;
  - Nuclear Control Institute, etc.



# RESURGENCE OF NUCLEAR POWER

- Reprocessing nuclear fuel
- There are ~190,000 metric tons (tHM) now in interim storage, mainly in water with dry storage soon coming to pass.
- Global capacity for reprocessing is now at ~5,000 tHM per year and increasing in Japan and elsewhere in the nuclear world.



# RESURGENCE OF NUCLEAR POWER

- Major questions?
- Where in the world will we train the many new nuclear engineers and health physicists to support this resurgence in nuclear power?
- Which universities will be establishing new programs for nuclear engineering, health physics and related programs; and, where will the new teachers come from to make these programs successful.
- Here you can name your favorite professors. Some of my favorites here are Herman Cember (Purdue), Kathy Higley (Oregon State) and Alexander Lauber from Sweden.



# RESURGENCE OF NUCLEAR POWER

- Nuclear power
  - Safe
  - Clean
- Economical

