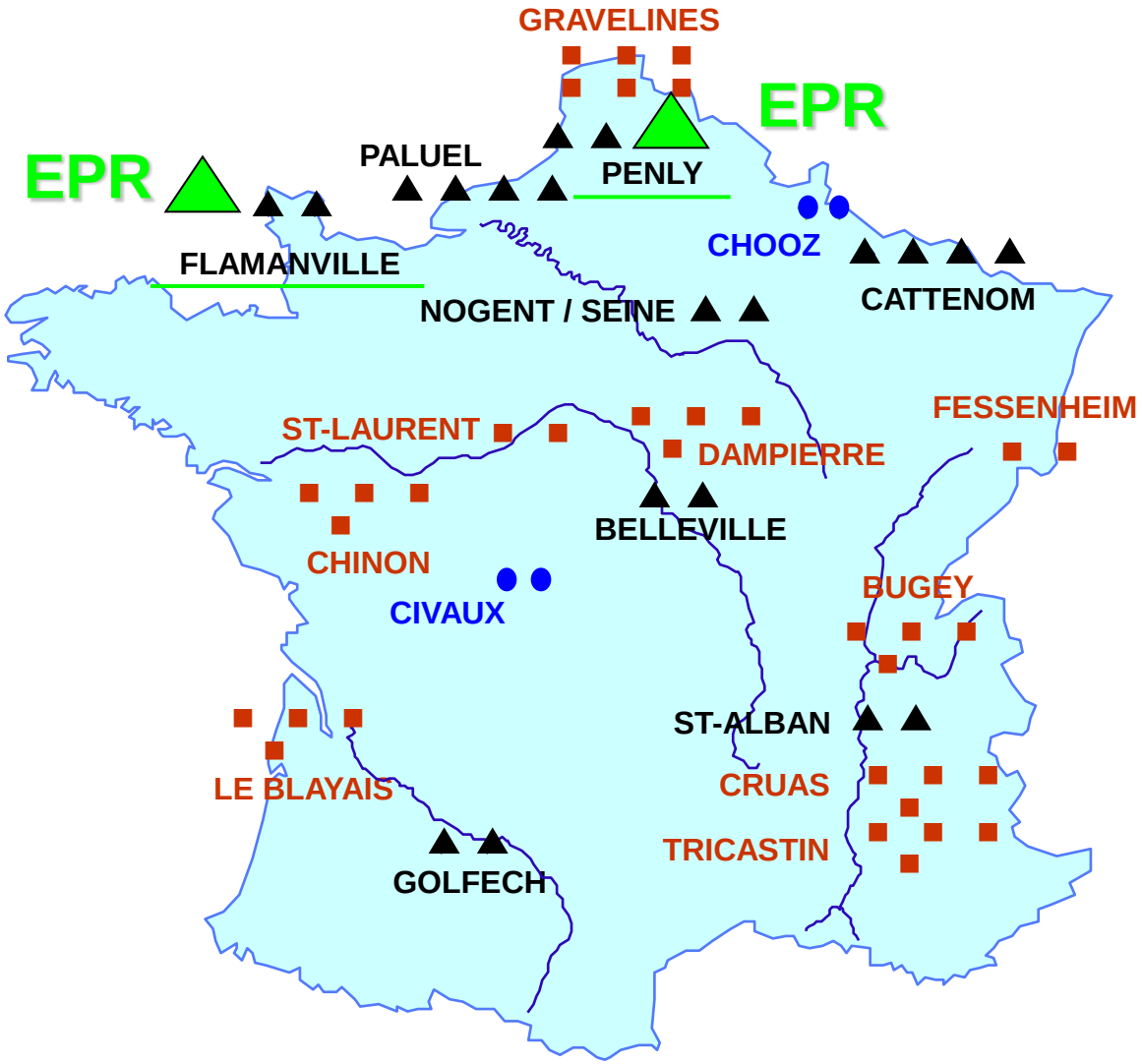
Expected roles of nuclear energy in France's energy policy

Pierre-Yves CORDIER
Nuclear Counselor
Ambassade de France, Tokyo

Outline

- Nuclear energy in France, status and perspective :
  - The nuclear fleet
  - Preparing and building the future.
- The energy mix, nuclear and renewables :
  - The French commitment.
  - Energy demand on a worldwide basis.
- The post Fukushima world :
  - France’s actions
  - International meetings.
  - Different reactions concerning nuclear policies.
- The stress tests :
  - Milestones and schedule for Europe and France The principles.
  - A transparent and open process.
  - The principles, technical specifications and mains points.

The current nuclear power fleet in France



63 GWe installed

58 PWR with 900 MW (34 units), 1300 MW (20 units) and 1450 MW (4 units)

Closed cycle policy :

Up to 20 000 Mt of spent fuel reprocessed and more than 1200 Mt of MOX fuel reused

Around 2020, 60 units and 66 GWe installed

The future of nuclear energy in France

- Preparation for the near future :
  - Life extension for Gen II plants (safety assessment every 10 years).
  - 1 EPR in construction, another one scheduled.
  - Building GB II for enrichment needs and JHR for R&D needs.
  - SFR prototype for around 2020.
- Solutions for each category of radioactive wastes :
  - Deep geological repository as preferred option for High Level Waste (HLW), with detailed roadmap and process.
  - Search of candidacy for LLLL.
- Nuclear is and will be part of the energy mix :
  - 1 euro for nuclear energy = 1 euro for new energy technologies.
  - It's nuclear and renewables, not nuclear or renewables.
- And for the longer term…
  - GEN IV
  - ITER

Building literally the future : EPR, GB II and JHR

The GB II enrichment plant : full capacity in 2016 (7.5 M SWU)

The EPR in Flamanville : online in 2016

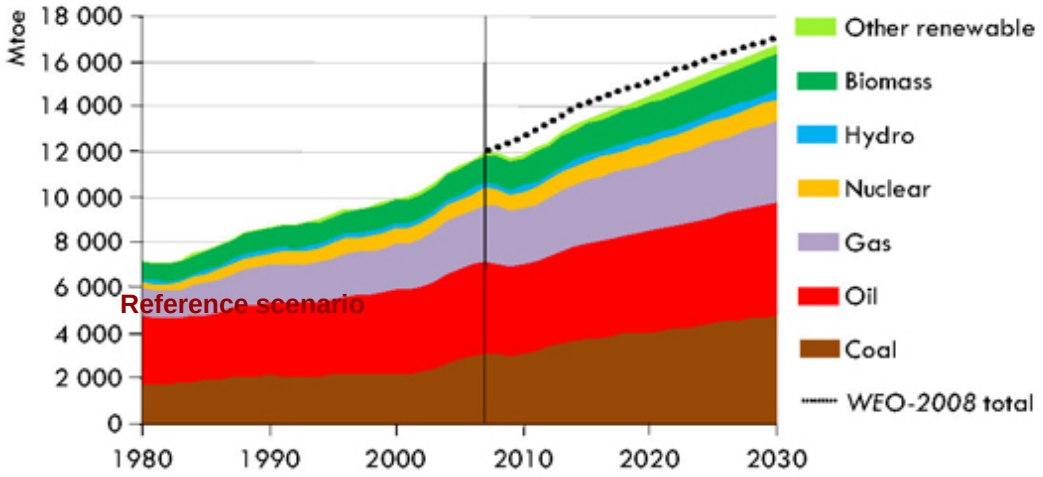
The JHR MTR : operational in 2016, for GenII, II and IV reactors R&D needs

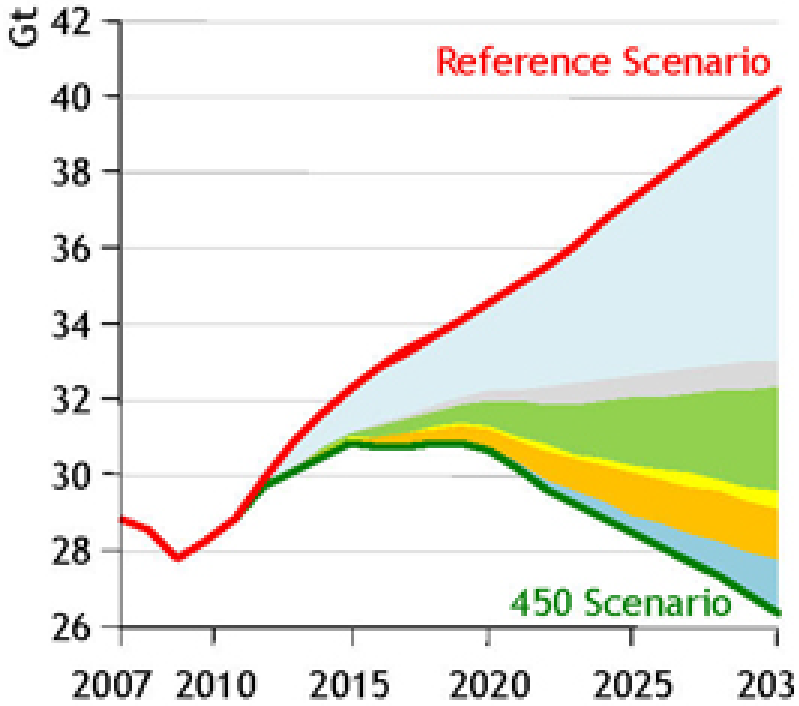
A balanced energy mix between nuclear AND renewables

- New national priorities in 2009 :
  - An energy mix based on both nuclear energy and renewables.
  - Keeping the leadership in nuclear energy while becoming a leader in renewable technologies.
  - Equal investment in nuclear and renewable energy research.

- Commitment to renewable energies :
  - Objective of 23% of renewable energy in the final energy consumption in 2020 (currently at 13%).
  - 15% of electricity produced by renewables in 2010 (hydro, wind (1.7%), solar (0.1%).
  - Wind power (x4 since 2006) and solar (x10 since 2008).

Fact : the world energy demand is expected to steeply grow





- Before or after Fukushima, the fundamentals stay the same :
  - Fossil fuels will become more expensive, and more difficult to secure.
  - Global warming is still a threat.

- Nuclear energy is and will stay a part of the energy mix in many countries :
  - Stable source of energy, no CO2 emission.
  - Treatment of used fuels, MOX use and Gen IV reactors make it a sustainable resource.

France's reaction

- Immediate technical help :
  - First shipments through WANO, directly from AREVA and EDF.
  - Special shipment with technical and humanitarian aid (Antonov 225).
  - Additional shipment through Gaimusho and French MOFA.
  - In general : protective suits, gloves, masks, personal dosimeters, radiameters, monitoring van…
- AREVA's involvment in contaminated water treatment :
  - Opportunity : AREVA had the process and know-how, Veolia had the equipment and the way to adapt it.
  - Urgency : less than 3 months from request to start of operation.
  - Teamwork : AREVA, Veolia, Toshiba, JGC were involved. Kurion provided the first step of the process.
- And now…
  - Different fields can lead to more cooperation.
  - France is open for cooperation on post accidental management, spent fuel retrieval, waste management, etc….
  - Any request could be taken into account.

International meetings with a focus on nuclear safety

- G8 Summit, Deauville, France, May 2011 :
  - 10 articles out of 93 on nuclear safety.
  - Importance of IAEA, international cooperation.
  - Promoting the highest level of safety worldwide
- Ministerial meeting on nuclear safety, Paris, June 7th, 2011 :
  - 33 countries, a set of suggestions for IAEA conference.
  - Periodic safety reviews, review of IAEA safety standards, international crisis management training.
- AIEA ministerial conference on nuclear safety, June 20-24 :
  - Strengthen IAEA Safety Standards and ensure that they are universally applied.
  - Regulators must be genuinely independent.
  - Strengthen the global emergency preparedness and response system.

Different reactions at the international level

- Commitment to nuclear energy, with highest safety :
  - Nuclear countries : France, UK, Russia, USA, China, India,
  - Newcomers : Poland, Lithuania, Vietnam, UAE, Turkey…
- Phase out, or scrapping of projects :
  - Germany : immediate closure of 8 old BWRs, and back to the phase out policy decided in 2002.
  - Swiss : no more new NPPs.
  - Italy : a referendum cancelled the nuclear revival program initiated since 2 years by the government.
- Importance of stress tests :
  - At the European level, and more and more neighboring countries.
  - Discussion between WENRA, ENSREG and the Commission.
  - Final report by the licensee by the end of October 2011.
  - National report by the regulators by the end of December 2011.
  - Also in Korea, USA, Russia…

Milestones

23 March	**Request of the French Prime minister to perform national audit**
24-25 March	**The European Council asks WENRA to define the European Stress Tests to be approved by ENSREG and the European Commission**
21 April	**Release on WENRA website of Stress Tests specifications for Stakeholders consultation**
3 May	**High Committee for Transparency and Information on Nuclear Safety (HCTISN) approval of the French audit program**
5 May	**• First public hearing by the Fukushima Parliamentary Mission** **• ASN resolutions regarding the French Complementary safety assessments**
25 May	**Adoption of Stress Tests Specifications by ENSREG and the European Commission**

Schedule of both European and French safety assessments

- For France
  - **15 September 2011** for NPP licensees to carry out the work according to the specifications and to issue the report
    - On the basis of existing safety studies
    - On the basis of specific engineering studies
  - **15 November 2011** for ASN and IRSN to review the licensees' reports.
  - **2 weeks (early December 2011)** for ASN to issue its resolution

- For Europe
  - **Licensees report :**
    - **15 August 2011** to issue a progress report,
    - **31 October 2011** to issue a final report

      On the basis of existing safety studies

      On the basis of specific engineering studies
  - **National reports by the regulatory body:**
    - **15 September** to issue a progress report,
    - **31 December** to issue a final report

Consultation Process - HCTISN, CLI, etc.

- Before the adoption of the French Specifications
  - HCTISN / CLIs Consultation started mid-April 2011

    The HCTISN approved the Draft French CSA Specifications on 3 May
- During the French CSA (Complementary Safety Assessments)
  - CLI members can participate in ASN inspections as observers
- At the end of the French CSA
  - HCTISN / CLIs consultation before ASN resolution release
  - Organization of public hearings

▪*HCTISN* ***: High Committee for Transparency and Information on Nuclear security = national committee***

▪*CLIs* ***: Local information committee (~ 1 per major nuclear installation)***

Technical scope of the assessments

- **Initiating events**
  - o Earthquake.
  - o Flooding (not only by tsunami, any causes will be investigated).
  - o Other natural extreme event :
    - ✓bad weather conditions
    - ✓Combination of both earthquake and flooding, beyond design basis
- **Loss of safety functions**
  - o Loss of electrical power, including station blackout (diesels, etc.),
  - o Loss of the ultimate heat sink,
  - o Combination of both.
- **Severe accident management issues**
  - o Loss of the core cooling function,
  - o Loss of the spent fuel storage pool cooling function.

Specifications – Considerations

- **The plant conditions should represent the most unfavorable operational states permitted under plant technical specifications. All operational states should be considered.**
- **All reactors and spent fuel storage shall be supposed to be affected at the same time.**
- **For each situations, mitigation measures considered to be gradually ineffective ⇨ several scenarios.**
- **The licensee considers :**
  - Automatic actions and operator actions specified in emergency operating procedures and any other planned measures of prevention, recovery and mitigation of accidents
  - Off-site conditions (flooded roads…).

Main points of the stress tests

- First step of a long process
- Responding to requests from French Prime Minister and the European Council
- Ensuring maximum consistency between national and European approaches
- Focused as a first priority on safety issues raised by the Fukushima accident, which have to be urgently investigated
- Including extensive consultation with stakeholders