



French Complementary Safety Assessments and European Stress Tests

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Japan November 2011





Nuclear Facilities in France

Fuel cycle
(enrichment, fabrication, retreatment)

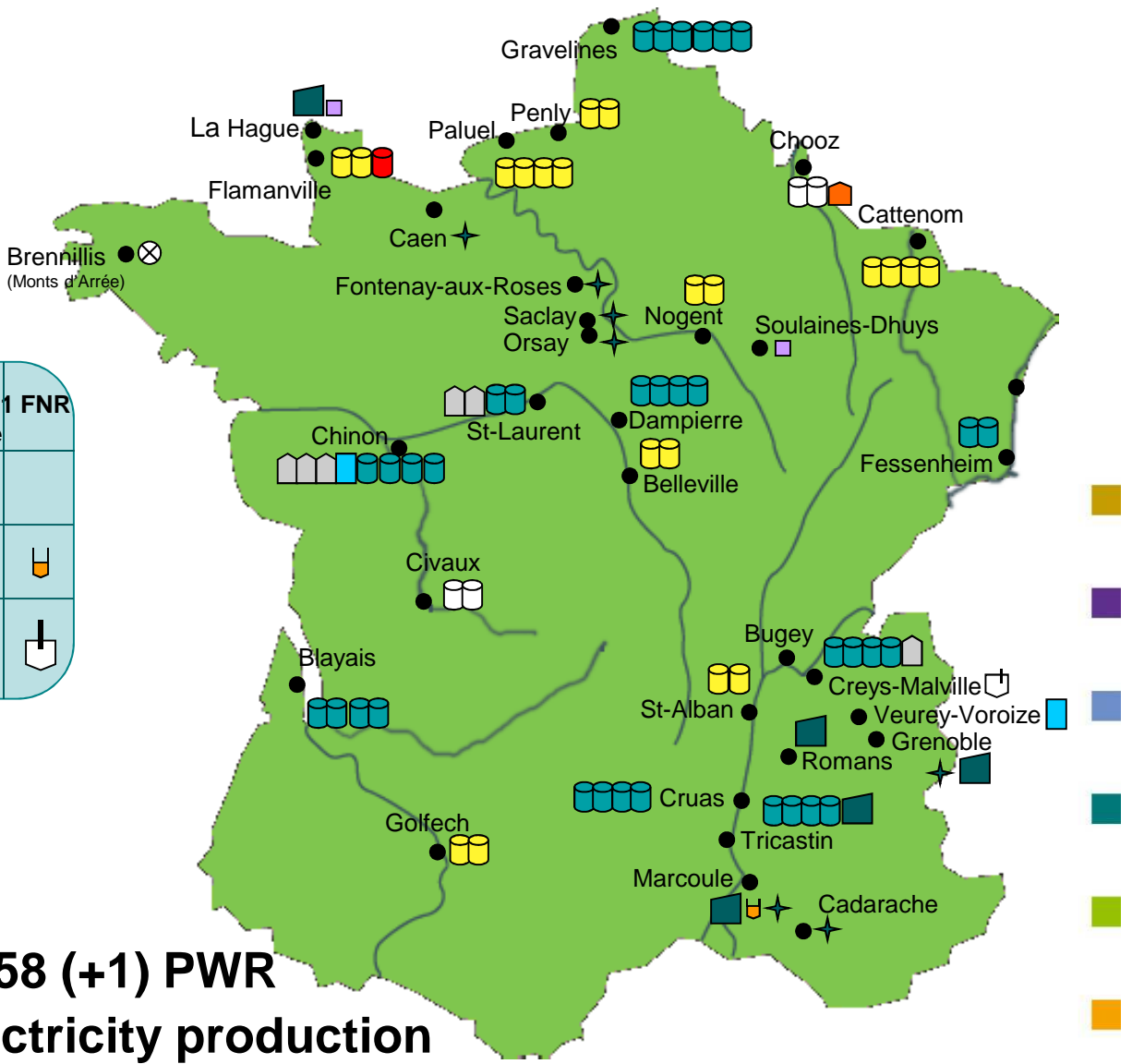
Waste disposal sites

Research centers

Laboratories

58 + 1PWR					Graphite Gaz	Gaz Eau lourde	1 FNR
300 MWe	900 MWe	1300 MWe	1450 MWe	1600 MWe			

- Whole cycle
- 4 (5) major operators
- 1 manufacturer
- Standardized fleet of 58 (+1) PWR
- 80% of the French electricity production



Japan November 2011



French Complementary Safety Assessments and European Stress Tests

Milestones

11
March

- Beginning of Fukushima Accident

23
March

- Request from the French Prime Minister to perform a national audit

24-25
March

- Request from the European Council to define the European Stress Tests to be approved by the ENSREG

5 May

- **ASN resolutions** regarding the French Complementary safety assessments, based on WENRA specifications

25 May

- Adoption of Stress Tests Specifications by the **ENSREG**



French Complementary Safety Assessments and European Stress Tests *Specifications' scope*

- **Initiating events**
 - Earthquake,
 - Flooding,
 - Other extreme events.
- **Loss of safety functions**
 - Loss of electrical power, including station blackout (diesels, etc.),
 - Loss of the ultimate heat sink,
 - Combination of both.
- **Severe accident management issues**
 - Loss of the core cooling function,
 - Loss of the spent fuel storage pool cooling function.



French Complementary Safety Assessments and European Stress Tests

Specification general approach

- **Consistency between the two approaches**
 - Similar approaches
 - Similar definition
 - Complementary to the overall safety assessment
 - Targeted assessment of safety margins
- **Specificities of the French Complementary Safety Assessments :**
 - All major nuclear installations involved (not only NPPs) (150 nuclear installations – 12 licensees)
 - Includes human and organizational factors
 - High involvement of stakeholders



French Complementary Safety Assessments and European Stress Tests *Considerations (1/3)*

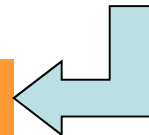
- **Scenarios chosen consistent with defense in depth**
 - Initiating events ⇒ Loss of some safety functions ⇒ Severe accident
 - Loss of safety functions (electrical power, heat sink) is considered irrespective of the origin and probability
- **All reactors and spent fuel storage shall be supposed to be affected at the same time.**



French Complementary Safety Assessments and European Stress Tests *Considerations (2/3)*

- **The plant conditions should represent the most unfavorable operational states permitted under plant technical specifications. All operational states should be considered.**
- **The targeted reassessment will consist in:**
 - A verification of the preventive measures already implemented
 - An evaluation of the nuclear installation response when facing the considered scenarios : Identification of cliff-edge effects and weak points

Define potential improvements





French Complementary Safety Assessments and European Stress Tests *Considerations (3/3)*

- **For each situations, mitigation dispositions 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...).



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Information expected from licensees (1/4)

- **General Information on the Licensee, nuclear installation and its location**
- **General information on each unit part of the considered installation**
- **References of documents used by the Licensee to justify its positions**



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Information expected from licensees (2/4)

For each considered action

- **Provisions taken in the plant design basis and plant conformance to its design requirements.**
- **Assessment of the plant robustness beyond its design basis**
- **Identification of means to maintain fundamental safety functions, including support functions taking into account the probable damage done**

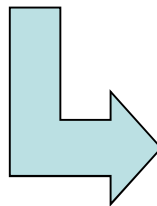


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Information expected from licensees (3/4)

For each considered action

- **Possibility of mobile external means and the conditions of their use,**
- **Possibility of mutual help between units from a same site**
- **Identification of weak points and cliff edge effects :**



Define potential improvements





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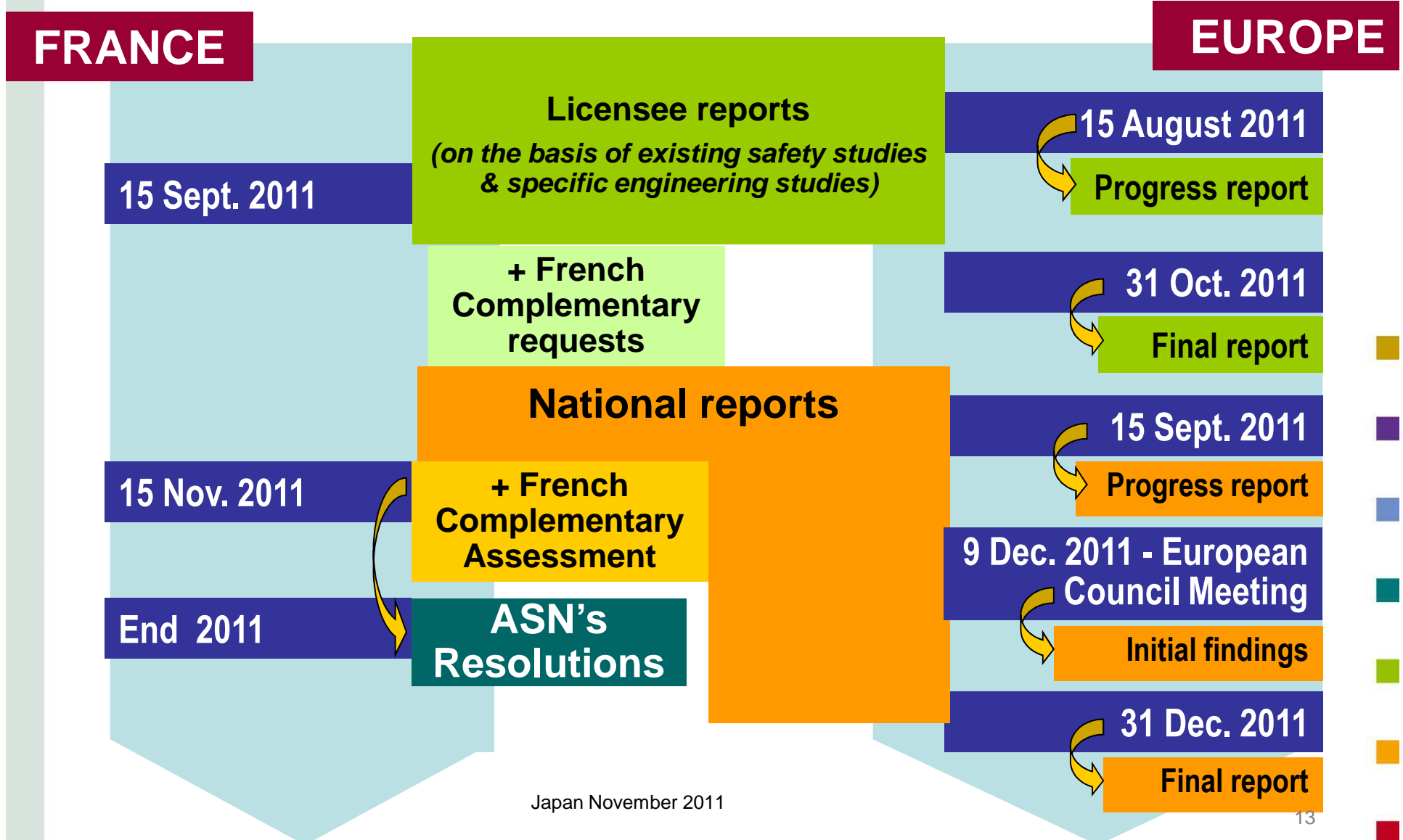
Information expected from licensees (4/4)

Site Specific Information

- **Earthquake**
- **Flooding**
- **Other natural extreme event**
- **Loss of electrical power and of the ultimate heat sink**
- **Loss of the core cooling function**
- **Loss of the spent fuel storage cooling function**



French Complementary Safety Assessments and European Stress Tests *Schedule*





French Complementary Safety Assessments and European Stress Tests **ECS Methodologies**

- **1st June : Licensee's ECS Methodologies**
- **6 July : Joint Meeting of the French Advisory Committees**
 - Participation of experts from EU countries
 - Advisory Committees' Opinions issued
- **25 July : ASN Opinions on Licensee's ECS Methodologies**
 - Released on ASN website : www.asn.fr



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Next steps (1/3)

- **On-going analyses of Licensees' ECS reports performed by IRSN and ASN**

Some propositions from EDF reports:

- Creation of a national fast emergency response team
- Supplementary diesel for power supply
- Possible implementation of an ultimate heat sink (groundwater)



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Next steps (2/3)

- **8-10 Nov. 2011 : Joint Meeting of the French Advisory Committees (AC)** (foreign participants)
- First outcomes:
 - Press conference: 17 November



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Next steps (3/3)

- **End of 2011 :**
 - **ASN resolutions** (taking into account inspections & ACs' conclusions and including technical requirements)
- **Lower Priority nuclear installations**
 - 15 Sept. 2012 : ECS reports to be sent by Licensees to ASN







French Complementary Safety Assessments and European Stress Tests *Specific inspections*

- **Campaign of specific inspections**
 - Complementary process to ECS
 - 38 inspections carried out (June-Oct. 2011) = 110 days
Teams composed of ASN inspectors + IRSN experts
+ 47 external experts (HCTISN, CLI, foreigners
- Belgium, Germany, Luxembourg, Switzerland)
- **Specific inspections for checking installation consistency to the safety regulatory framework**
 - Focus on the stress tests topics
 - Inspection follow-up letters published on ASN website
- **Conclusions to be publicly released by end 2011**



French Complementary Safety Assessments and European Stress Tests *Specific inspections*

Some outcomes

- Good consistency to the regulatory framework 
- Improve the alert in case of flooding (NPPs) 
- Improve the staff training in case of an earthquake 
- Improve the resistance of emergency command posts against external hazards 





French Complementary Safety Assessments and European Stress Tests

Public information and stakeholder involvement

- Regular press conferences (next: **17 November**)
- Consultation of the High Committee for Transparency and Information on Nuclear Security (HCTISN)
- Parliamentary Hearings organized in May/June, new hearings scheduled by end of 2011
- All documents published in a specific section on ASN website (**Licensees' reports**, ASN inspection follow-up letters, opinions and resolutions)

The screenshot shows the ASN website interface. At the top, the ASN logo and the text 'ASN | AUTORITÉ DE SÛRETÉ NUCLÉAIRE' are visible. Below this, there is a navigation menu with categories like 'L'ASN', 'LA RÉGLEMENTATION', 'LE CONTRÔLE', 'LES APPUIS TECHNIQUES', 'INTERNATIONAL', 'ACTUALITÉS', and 'AGENDA'. The main content area is titled 'Evaluations complémentaires de sûreté' and features a sidebar with a list of activities: 'PRODUCTION D'ÉLECTRICITÉ', 'AUTRES ACTIVITÉS INDUSTRIELLES', 'ACTIVITÉS DE RECHERCHE', 'UTILISATIONS MÉDICALES', 'TRANSPORTS DE MATIÈRES RADIOACTIVES', and 'DÉCHETS / INSTALLATIONS EN DÉMANTÈLEMENT'. The main text area displays 'Les calendriers des évaluations complémentaires de sûreté' with a date 'Mis à jour le 16 Septembre 2011' and a paragraph of text starting with 'Les 12 décisions du Collège de l'ASN du 5 mai 2011 prescrivait aux différents exploitants d'installations nucléaires la réalisation d'un rapport répondant à un cahier des charges précis selon le calendrier suivant :'. A bullet point indicates '1er juin 2011 : remise d'une note présentant la méthodologie retenue pour mener l'évaluation, l'organisation mise en place pour respecter les échéances fixées et la structure détaillée envisagée pour le rapport;'. Social media icons for Facebook, Twitter, and others are also present.



**French Complementary Safety Assessments
and European Stress Tests**
European stress tests

- **French National Progress Report sent to the EC on 15 Sept. 2011**
 - Report available on ASN website (in English)
- **Next steps**
 - French National report to EU be sent by 31 Dec. 2011
 - will include ASN findings and requirements



French Complementary Safety Assessments and European Stress Tests

European stress tests - 2012

- **Peer Review of National Reports occurs in two phases**
 1. Topical Review – 3 topical areas
 - External Events
 - Loss of Safety Function
 - Severe Accident Management
 2. Country Review
- **Peer Review Summary Report with 17 Country Reports**





French Complementary Safety Assessments and European Stress Tests

**These only constitute the first steps
of a long-term work programme**

**“A journey of a thousand miles begins
with a single step »**

Lao Tseu 老子

