

NUCLEAR TRANSPARENCY WATCH *SMR ROUNDTABLE*

☐ Main question submitted by NTW to ASNR

How does ASNR envisage **adapting the current regulatory framework** to accommodate the specific characteristics of SMRs, without lowering existing nuclear safety and transparency standards, regarding :

- **safety demonstration ?**
- **site licensing ?**
- **transparency and public participation ?**

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General overview of the 10 SMR projects in France

French Government's call for projects
launched march 2022

2



LWR



2



HTR



3



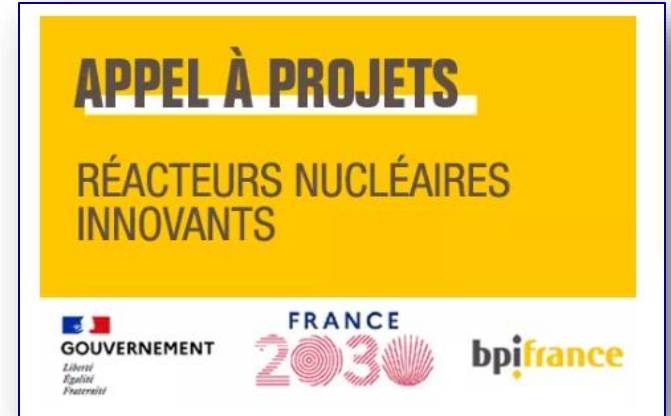
S/L-FR



3



MSR



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❑ ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

1. French environmental code
(law + governmental decree)

*Nuclear facilities :
governmental license required
conditioned to a safety demonstration*

2. Ministerial order
February 7th, 2012

*Safety demonstration
principles*

**3. ASN's decision
n° 2015-DC-0532**

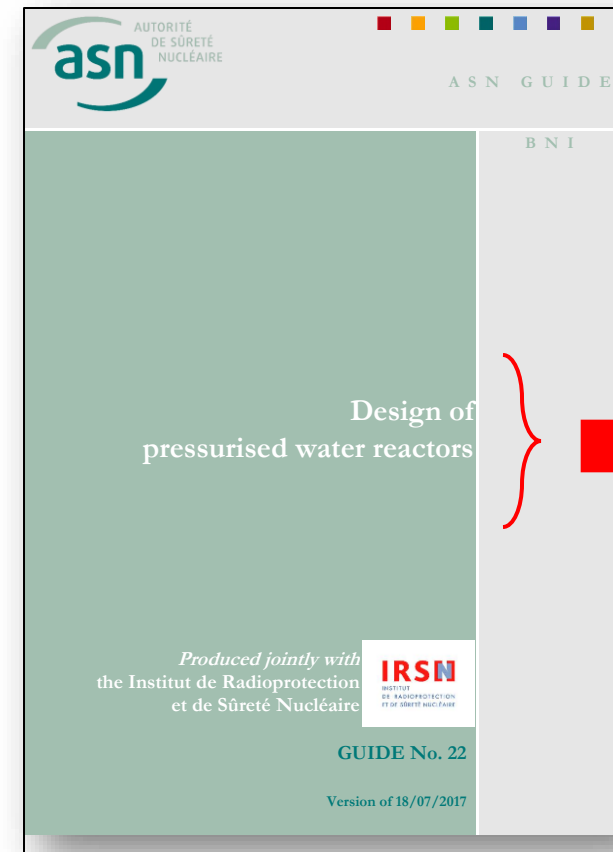
*Content of the
safety analysis report*

**French nuclear safety
regulatory framework**

✓ **Applicable to any kind of nuclear facility**

→ **Power Reactor specific consideration ?**

4. Safety guide n°22



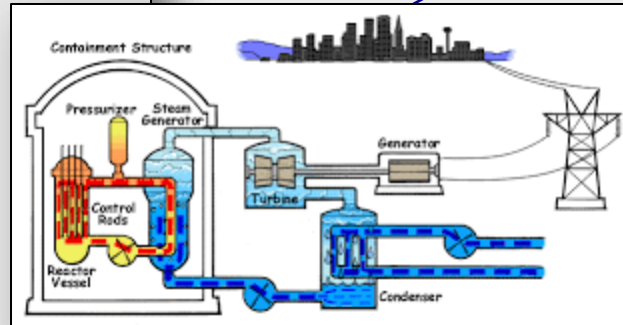
**PWR
technology**

❑ ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

Safety guide n°22



PWR



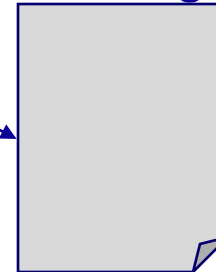
❑ Safety objectives



❑ Safety case



❑ Design

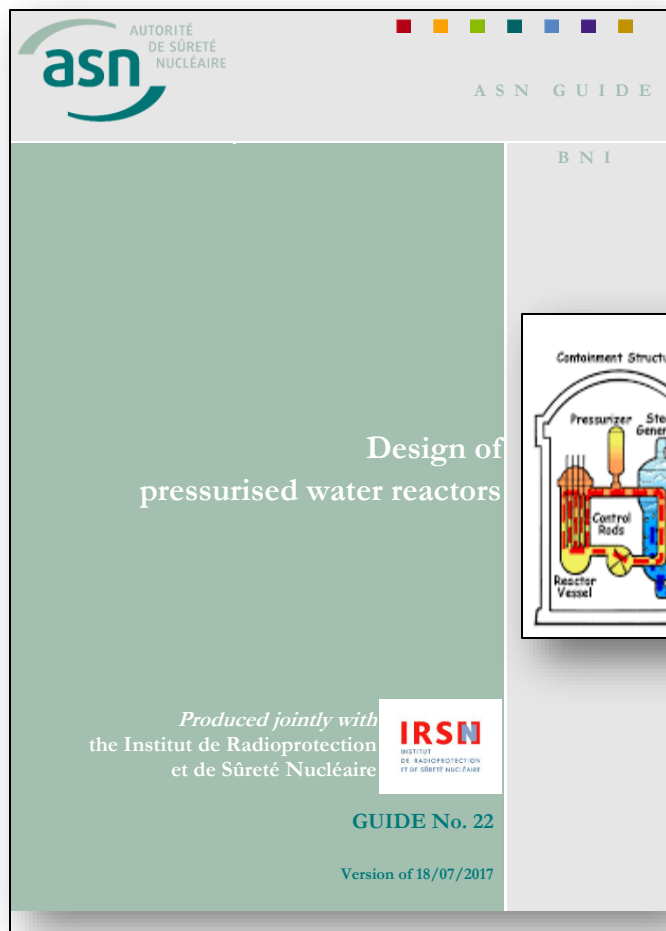


Applicability to
SMRs ?

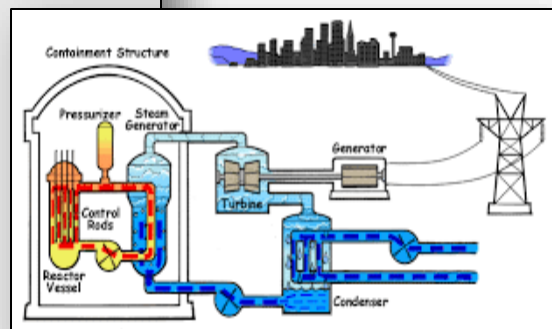


ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

Safety guide n°22

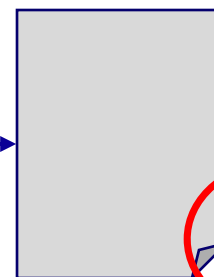


PWR



✓ Based on 3 years of 10 SMR projects reviews :
Guide n°22 used as reference safety guidance
by all SMRs projects, even AMRs

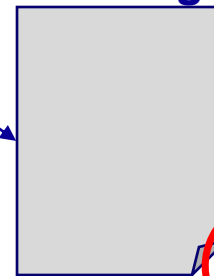
□ Safety case



Structure, methodology and
rules for safety studies

~~Specific cases/examples from
PWR experience feedback~~

□ Design



Design safety principles
(redundancy, diversification
qualification,...)

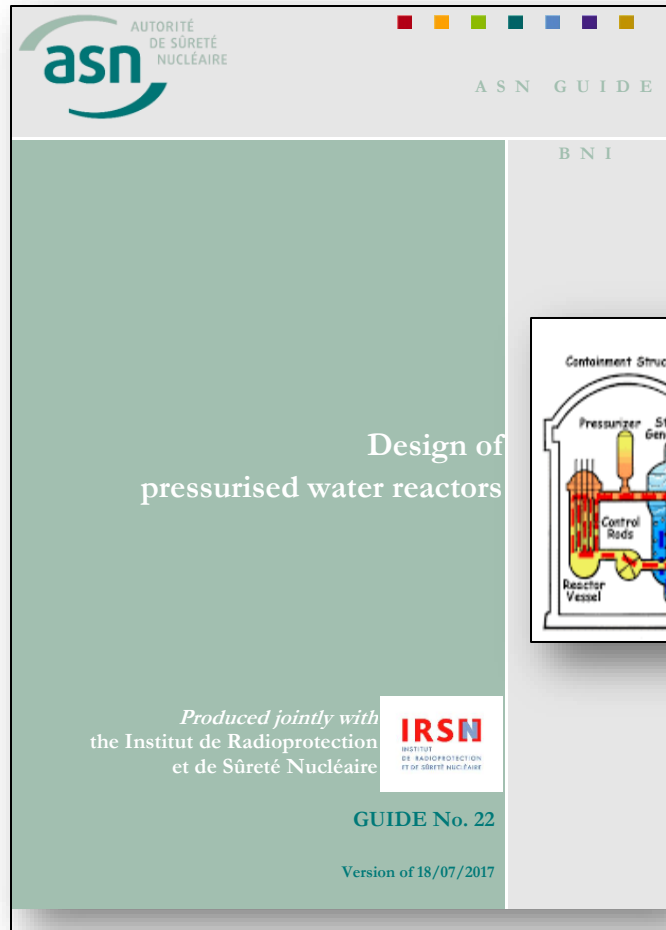
~~Specific cases/examples from
PWR experience feedback~~

« 80% » :
applicable to
any reactor type

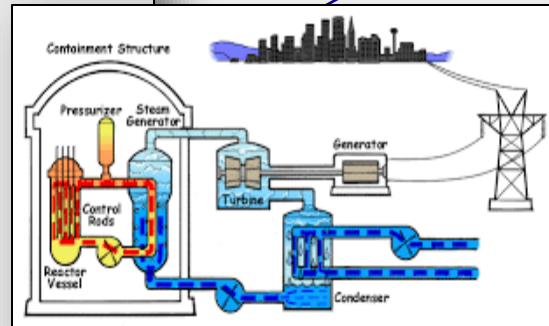
→ specific
innovative features
to be assessed
on a case by case basis
based on each project's
justifications

❑ ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

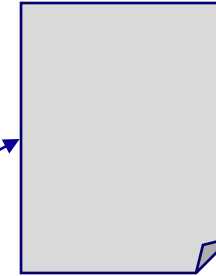
Safety guide n°22



PWR



❑ Safety objectives



maximum acceptable accidental radiological releases

Defined in a qualitative manner to be understandable by the public

Present safety objectives for NPP	
<i>accident, without core melt</i>	<i>core melt accident</i>
No need for emergency protective measures : - no necessity of iodine prophylaxis - no sheltering - no evacuation	Limited emergency protective measures : - no need for emergency evacuation outside the immediate vicinity of the plant, - limited sheltering Post accidental protective action : - no permanent relocation - no long term restrictions in food consumption

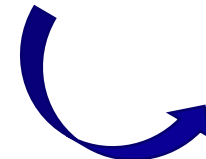
✓ Established for « gen III » large power reactors

❑ ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

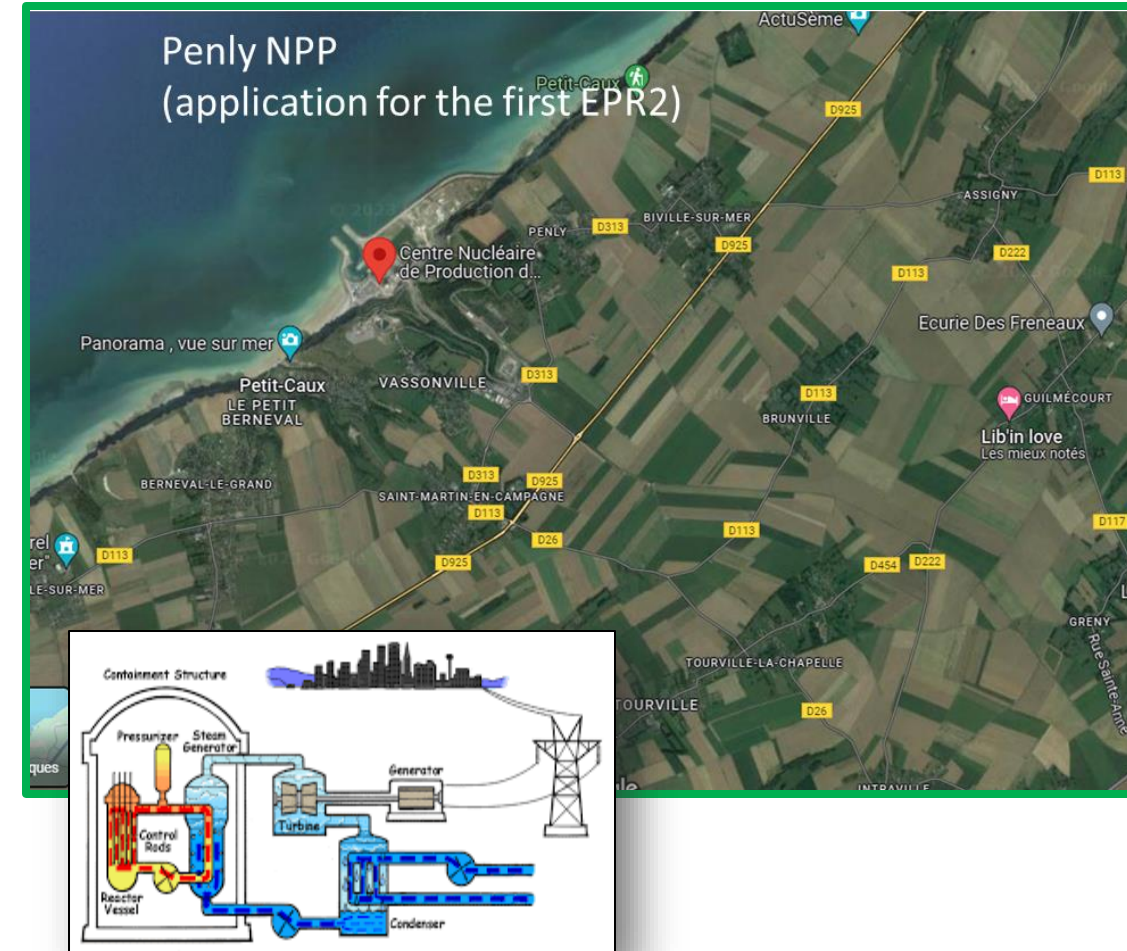
❑ *Safety objectives*

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- ✓ *maximum acceptable accidental radiological releases*
- ✓ Established for « gen III » **large power reactors**

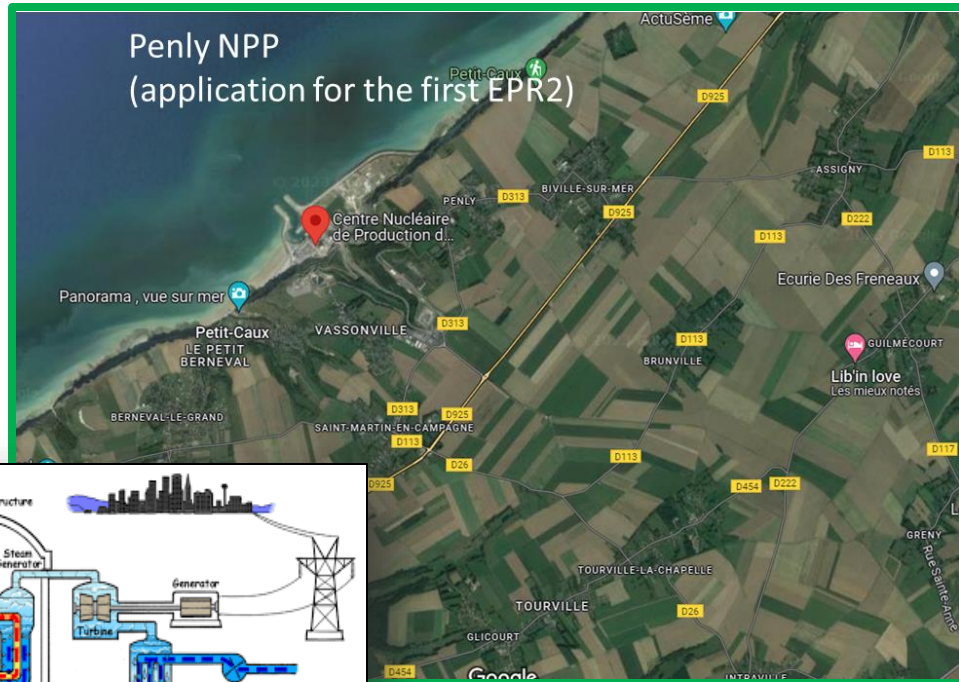


Goal : **electricity production on the grid**
Site is a choice : **reactors built in the countryside**
(far from high density population zone)



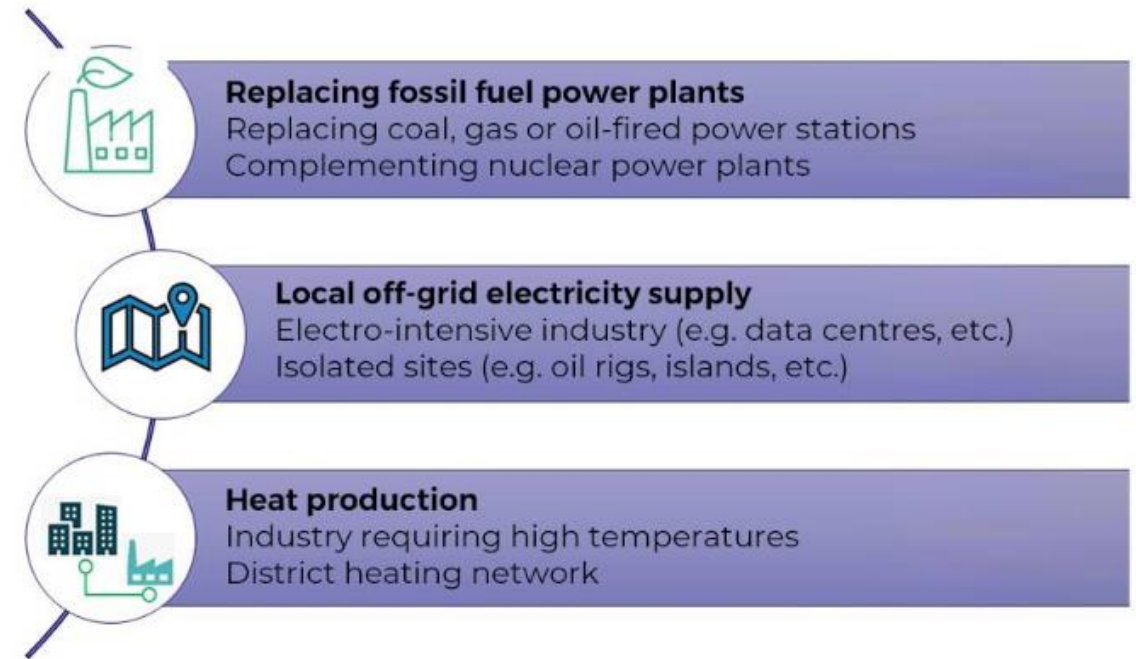
❑ ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

Large LWR



Goal : **electricity production on the grid**
Site is a choice : **reactors built in the countryside**
(far from high density population zone)

SMR

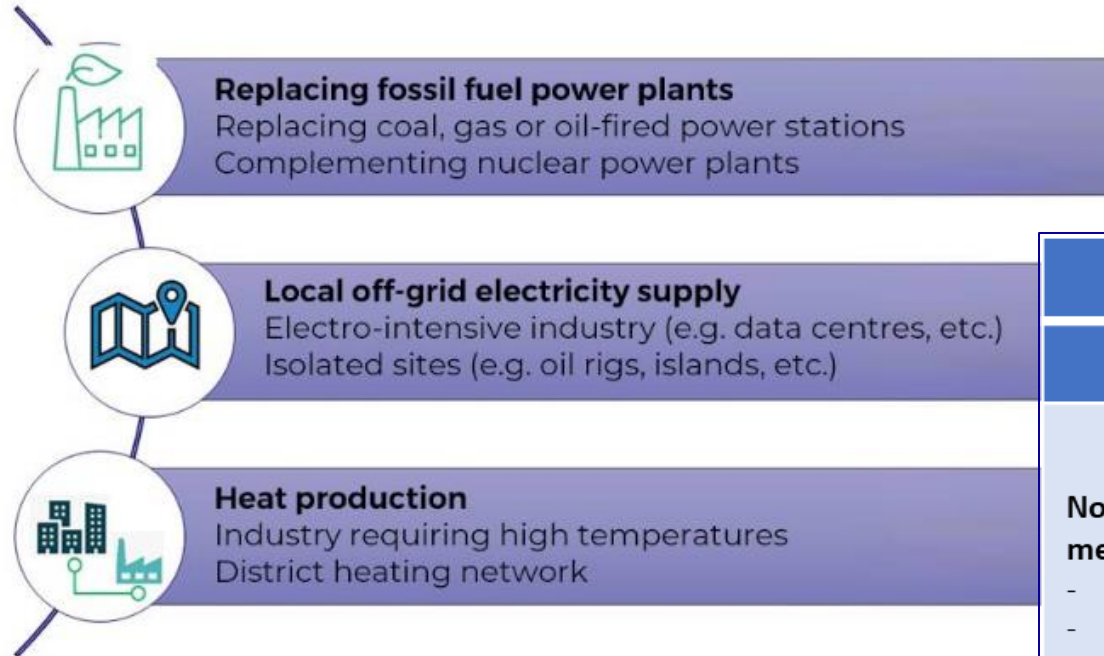


Example of SMR use

Site may not be a choice
→ **reactors to be built near the energy user (client)**
Mainly : **industrial zone / high density population zone**

❑ ADAPTING THE CURRENT REGULATORY FRAMEWORK TO ACCOMMODATE THE SPECIFIC CHARACTERISTICS OF SMRS (WITHOUT LOWERING EXISTING NUCLEAR SAFETY) ?

SMR



Example of SMR use

Present safety objectives for NPP	
<i>accident</i>	<i>severe accident</i>
No need for emergency protective measures : - no necessity of iodine prophylaxis - no sheltering - no evacuation	Limited emergency protective measures : - no need for emergency evacuation outside the immediate vicinity of the plant - limited sheltering Post accidental protective action : - no permanent relocation - no long term restrictions in food consumption

Site may not be a choice

→ **reactors to be built near the energy user (client)**

Mainly : **industrial zone / high density population zone**

under revision :

→ not adapted for a reactor
in a high density population zone

❑ ASN's Director General

« The key difference between large and small reactors lies in their locations : **small reactors will have to be operated on industrial sites, which are sometimes much closer to densely populated areas** than large nuclear sites are today. It is unthinkable to have to evacuate the population in such areas, contrary to what is currently provided for in emergency plans around present nuclear sites. **Therefore, safety demonstrations for these reactors must provide proof that releases remain negligible.**

From this point of view, small reactors have favorable characteristics, but this still needs to be rigorously demonstrated. One of the difficulties here is the lack of feedback on these technologies.

The two conditions for safety are therefore the reduction of the consequences of accidents in proportion to the proximity of densely populated areas and the rigor of the demonstrations expected to this end. »

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ASNR : PUBLIC INFORMATION ON SMR

ASNR

Agence nationale de sûreté nucléaire

Q

REGULATION

OVERSIGHT

INFORMATION

INTERNATIONAL RELATIONS

OTHER ACTIVITIES

FR | EN

Small Modular Reactors

Oversight of the Flamanville EPR reactor

European stress tests

The Small Modular Reactors (SMR)

Reduced power (from 10 to 540 MWe)

Table of contents

Definition

Context of the emergence of SMRs

Different SMR sectors in France

Fuel cycle for SMR

ASNR adapts to innovative SMRs

Table of contents

Safety objectives

Dialogue and assessment procedures

Standardisation and international ...

SMR projects

Table of contents

Overview of current projects

Status of technical exchanges on ...

SMR news