

# **SMR expectations near Marcoule and Sellafield: constrained pluralism and the future-proofing of legacy nuclear sites**

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**HORIZON-EURATOM-2021-NRT-01**



# Context of the research: the ESFR-SIMPLE project

**ESFR-SIMPLE: European Sodium Fast Reactor – Safety through innovative monitoring, power level flexibility, and experimental research**

## **HORIZON-EURATOM-2021-NRT-01-02 :**

- Four-year project : 2022-2026 (ongoing) ;
- 16 partners: CEA (coordinator); KIT; PSI; ANL; ENEA; LEMTA; IPUL; etc. ;
- Over 100 participants ;

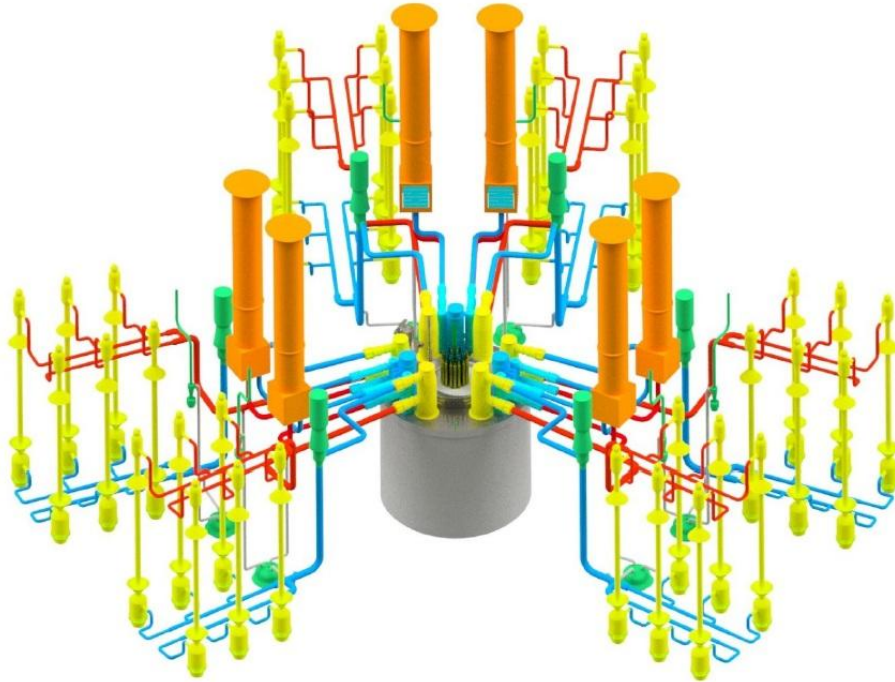
## **Development of an SMR concept based on the SFR (sodium-fast reactor) technology :**

- Scaling-down a large 1500 Mwe SFR concept (ESFR-SMART) : ESFR-SMR ;
- Experiment with new ideas: AI-assisted monitoring, passive decay heat removal, TES integration, etc. ;

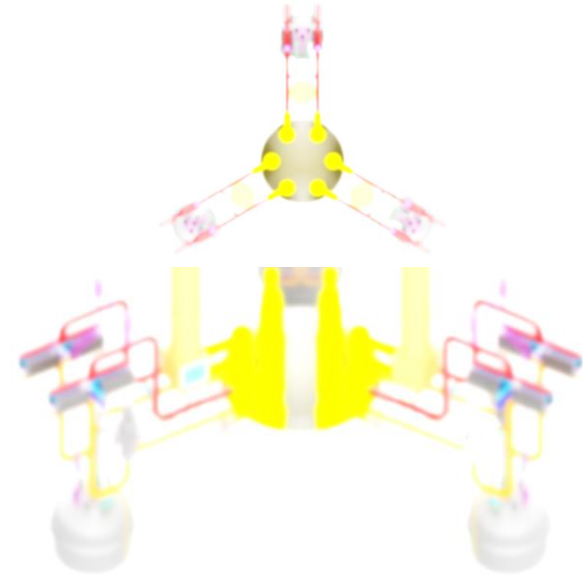




# Context of the research: the ESFR-SIMPLE project



ESFR-SMART primary & secondary systems (Bodi, 2017, p. 12)



ESFR-SIMPLE CAD drawings (ESFR-SIMPLE consortium meeting, 2025)



# Context of the research: the ESFR-SIMPLE project

## T9.8 – The so-called “social aspects” of ESFR-SIMPLE (2022-2025) :

- “Conduct an in-depth qualitative study on project partners’ and the public’s perceptions and expectations regarding SMRs & ESFR-SMR technology developments” ;

### Four main research steps :

- Step 1 : Identifying project partners’ perceptions and expectations about SMRs & ESFR-SMR technology developments ;
- Step 2 : Identifying the publics’ perceptions and expectations about SMRs & ESFR-SMR technology in two contrasted socio-political contexts (France & UK) ;
- Step 3 : Identifying potential frictions points between the publics’ and the project partners’ expectations about SMRs & the ESFR-SMR ;
- Step 4 : Formulating recommendations for the use and development of the ESFR-SMR ;

### Here I will only focus on some specific results of Step 2 :

- General SMR expectations among key local stakeholders and civil society actors near two legacy nuclear sites in France and in the UK ; Marcoule (France) and Sellafield (UK)



# Context of the research: the ESFR-SIMPLE project

NB : the research also had a participatory component, with the intention to regularly feed-back my research results to ESFR-SIMPLE experts so that they could integrate them in the SMR design process



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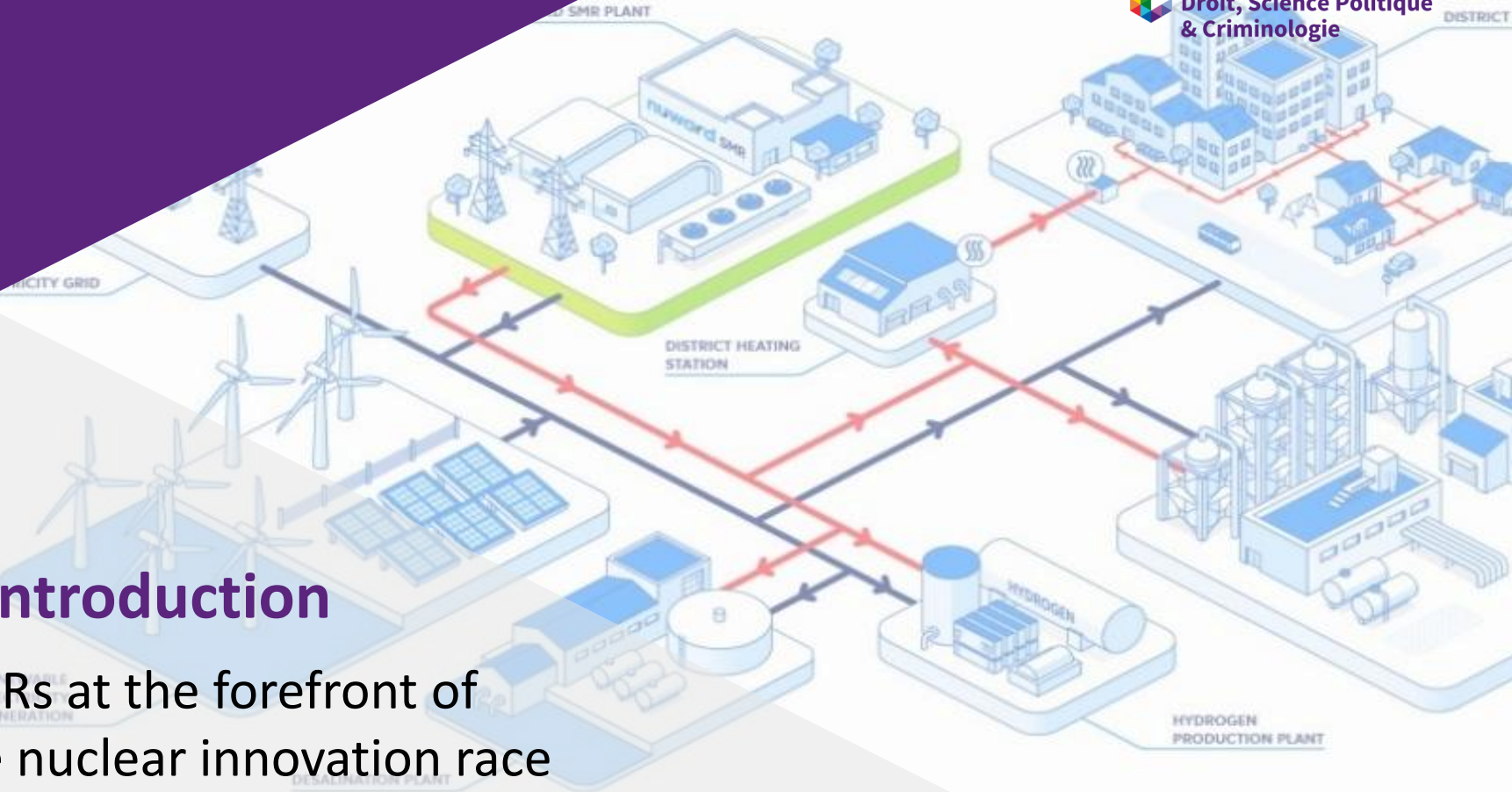
SUMMARY TABLE

With which public(s), for which reason(s), and how to discuss the public perceptions of a sodium-fast SMR concept?

	With who? Which public(s) should be targeted	Why? Why were they selected (or not)	HOW (and by who)? How to engage with the chosen public(s)
1	The "general public" (the average citizen)	Energy Crisis (Climate change, nuclear safety) or future site	website CO2 free - communication
1 7	The "concerned" publics (Communities in the vicinity of existing sites, local information committees, etc.)		jobs safety
2	Decision-makers (e.g., Governments, political parties, EU commission, etc.)	to accelerate transition in funding (support research)	Climate - Energy supply security / independence cost jobs
4	Industry & energy civil society actors (Industry & energy sector NGOs, interest groups, etc.)	to get industrial actors ready when necessary	flexibility - long term perspective
	Anti-nuclear civil society actors (Anti-nuclear NGOs, citizen collectives, etc.)	"Religion"	
3	The "youth" (future engineering & physics students, PhD students, etc.)	to rate bare next staff open minded	scientific presentation / information program in high school.
6	Safety authorities (regulators) (e.g., ASN, ONDRAFF, SÜB, ENSREG, etc.)	to prepare future discussions and licensing procedures	technical arguments early involvement
5	Other public(s): JOURNALISTS	influence on public opinion and decision makers	press release / society
	Other Public(s):		

## I. Introduction

SMRs at the forefront of  
the nuclear innovation race

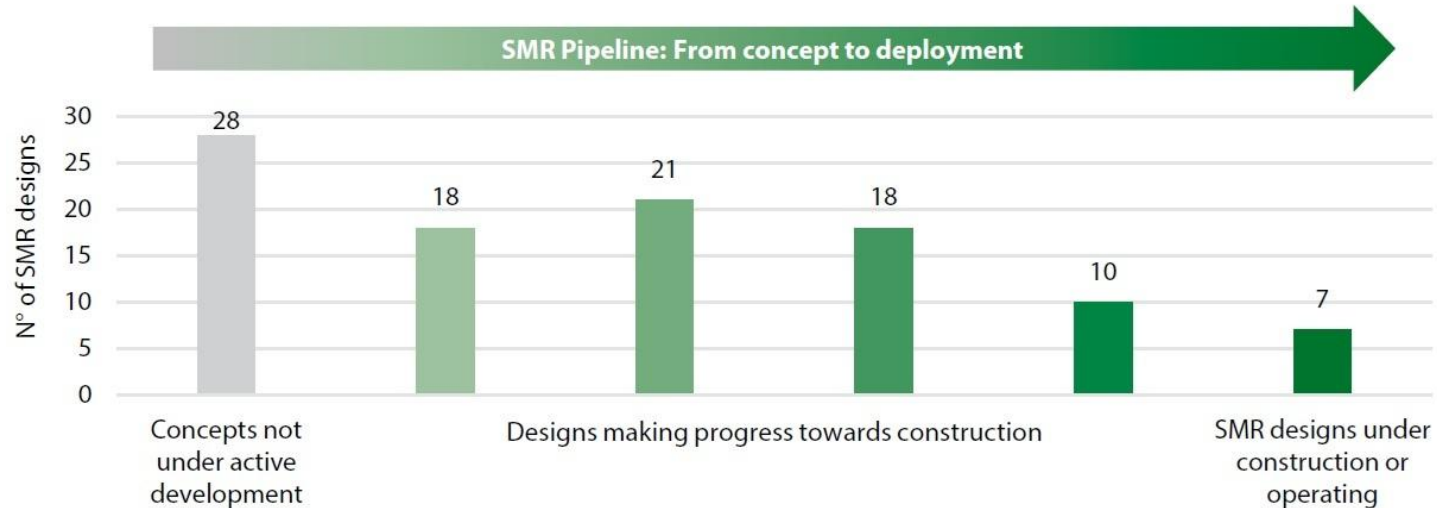




# I. Introduction – SMRs at the forefront of the nuclear innovation race

*“SMRs are a promising technology and there is a race underway. The race is among leading countries and companies to prove this technology and bring it to market.”*

(Von der Leyen, 2024)



# I. Introduction - SMRs at the forefront of the nuclear innovation race



**Vendors and proponents tend to tout SMRs as a cornerstone of future energy landscapes (e.g., Sovacool, 2019; Kari et al., 2023), notably promising :**

- Lower capital costs and lead times compared to large reactors ;
- Greater flexibility (in both use and siting possibilities) ;
- Cutting emissions in hard-to abate sectors ;
- Improved safety ;
- Greater social acceptability ;
- Etc.



Source : <https://www.rolls-royce-smr.com/press/the-future-of-nuclear-power>

# I. Introduction - SMRs at the forefront of the nuclear innovation race



**Yet, little is known about how SMRs are perceived in areas that will potentially host them in the future, especially near existing / legacy nuclear sites :**

- Strong local resistance is usually expected with greenfield nuclear projects (e.g., Di Nucci & Brunnengräber, 2017; Woo et al., 2017; Easterling & Kunreuther, 2013) ;
- So far, public authorities have typically resorted to concentrating new nuclear infrastructure within / near existing sites (e.g., Greenberg et al., 2017) ;
- This tendency to build new nuclear projects in nuclearized areas will also likely initially apply for many FOAK SMRs ;

What expectations do local civil society actors and key stakeholders hold regarding SMRs near existing / legacy nuclear sites ? And to what extent do these align with SMR vendors' techno-scientific promises ?

## II. Theoretical Framework





## II. Theoretical framework

### 1. The sociology of expectations (e.g., Van Lente et al., 2012; Borup et al., 2006; Joly, 2010):

- Expectations as “real-time representations of future technologies, situations and capabilities” (Borup et al., 2006, p. 286) ;
- Expectations carry values and are performative, shaping strategies and collective practices in the development of a technology or scientific field ;
- Techno-scientific promises as positive expectations, used as rhetorical devices by *promise makers* (Joly, 2010) ;

Instead of the usual focus on *promise makers*, what about the expectations held by *promise takers* ? SMR expectations held by local civil society actors and key stakeholders near legacy nuclear sites



## II. Theoretical framework

### 2. Nuclear communities (e.g., Vilhunen et al., 2022; Venables et al., 2012; Peele et al., 2019):

- Collective identity building and sense of belonging associated with the nearby nuclear site (i.e., *sense of place*) ;
- Local risk perceptions and trust in nuclear generally differ from those in areas located farther from a nuclear site ;
- Economic and social dependency (i.e., relative affluence as a compensation for accepting environmental and health risks, but this also creates a form dependency) ;
- Resistance and activism (i.e., often unspoken, grounded in local issues, local motivations tend to differ from national or global antinuclear movements) ;
- Etc.

Such aspects will be useful for interpreting local SMR expectations near existing nuclear sites

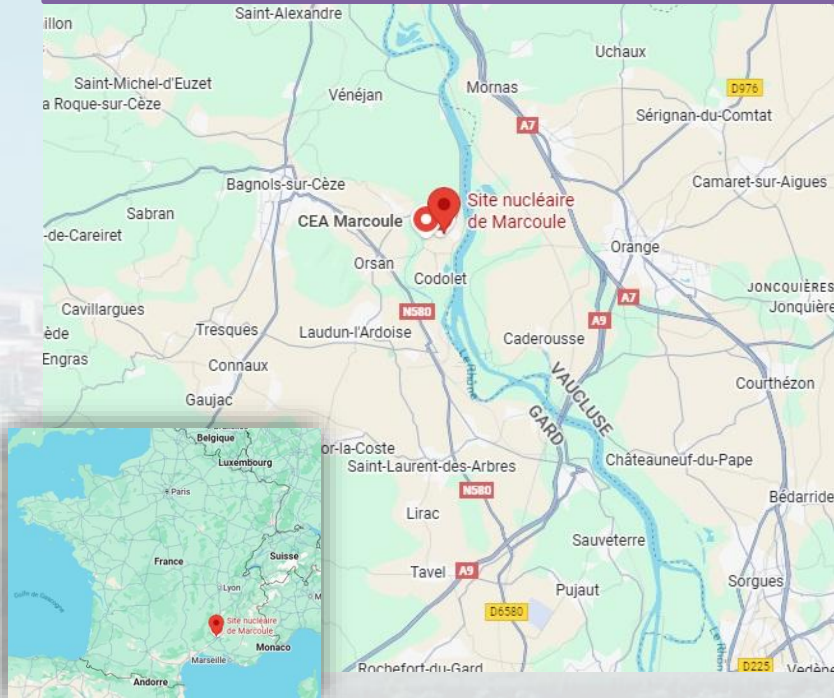
## III. Case Studies

Marcoule (France) and  
Sellafield (UK)



# III. Case studies – Marcoule (France) and Sellafield (UK)

## Marcoule: Gard department, Occitanie region, France



## Sellafield: West Cumbria, Cumbria, UK





### III. Case studies – Marcoule (France) and Sellafield (UK)

Two legacy nuclear sites with historic significance through past activities :



**Marcoule (1956, Gard Department) :**

First UNGG reactors (G1, G2, G3); Military PU production, Prototype / Experimental reactors (e.g., Phénix), Waste processing (e.g., HLW vitrification facility plant; waste reprocessing plant); etc.



**Sellafield (1942, West Cumbria) :**

First NPP in the UK (Calder Hall); Military PU production (Windscale Piles); Prototype / experimental reactors (e.g., WAGR reactor); Waste processing (waste vitrification facility; waste reprocessing plant); etc.



### III. Case studies – Marcoule (France) and Sellafield (UK)

**Both sites are now mostly dedicated to decommissioning and dismantling activities, waste processing activities, research, and MOX production (Marcoule) ;**

- Marcoule est. workforce : +/- 5000 ;
- Sellafield est. workforce : +/- 10000 ;

**Main operators and institutional actors :**

- Marcoule : CEA (Atalante); Orano (Melox); Cyclife (EDF); Steris; ASNR ; ANDRA; etc.
- Sellafield : Sellafield Ltd.; NDA; ONR ; etc.

**At one point, both sites were earmarked for possible SMR siting :**

- Marcoule : NUWARD SMR ;
- Sellafield : Rolls-Royce SMR, Westinghouse AP300 ;

## IV. Data collection & analysis



## IV. Data collection & analysis

**A total of 34 semi-structured interviews (18 in France; 16 in the UK)**

### **With local / regional stakeholders near Marcoule and Sellafield :**

- Belonging to *nuclear communities* near these two legacy sites ;
- Local civil society representatives (community foundations, NPOs, environmental activists, etc.); local elected officials; local industrial actors; etc. ;
- Both pro- and anti-nuclear ;

### **With national / state-level actors active at, or near these sites :**

- Supply chain actors; National pro- and anti-nuclear advocacy groups; Nuclear decommissioning authorities; Site operators; etc.

**Thematic analysis identifying these various actors' (positive and negative) expectations about SMRs ;**



Level	France	UK
Local & regional stakeholders : industries, local elected officials, civil society members	Local Mayors	Cumberland Councilors
	Departmental Councilors	Sellafield Ltd.
	Local Chamber of Agriculture	Lake District National Park
	CLI	ZeroCarbon Cumbria
	Business Development Office	Local Enterprise Partnership
	Cyclium	Cumbria Trust
	CEA Marcoule (Atalante lab)	Sellafield Consultants
	Halte aux Nucléaires	Cumbria Community Foundation
National & state-level actors active at / near these sites	ASN	ONR
	IRSN	NDA
	OPECST	NIA
	CRIIRAD	CND
	ANDRA	NFU (NFU North)
	APNI	BECBC
	Réseau Action Climat	



## V. Results



## V. Results

### A. Marcoule and Sellafield: willing candidates for future SMR projects

- At national level, both sites actively compete with other potentially adequate sites (e.g., Tricastin in France, Bradwell in the UK, etc.) ;
- Local elected officials, local economic actors, local territorial development divisions actively develop strategies to attract SMR projects in the area ;

*"We're doing everything we can. In fact, recently, **the president of the agglomeration wrote a letter that was signed by all 44 mayors, the senator, the deputies, all the local politicians.** We all signed the letter, which was **sent to the President of the Republic.**"*

(Local Mayor, Marcoule area)



## V. Results

### **Marcoule :**

*“We are currently preparing a promotional dossier that we intend to send to all SMR actors whose projects have been labeled and supported by the State under France 2030. The message is: ‘Marcoule exists, the territory wants to host an SMR, and we are open to working with you.’ [...] We will not simply wait for stakeholders to come to us”*

(Direction of the local Planning and Territorial Development department, Marcoule Area)

### **Sellafield :**

*“it’s a very competitive process — there are some really strong contenders”* (Local LEP direction, Sellafield area)

*“Our MP, Josh McAllister, has been lobbying in government to get the NDA to release the land, but since the NDA is government-owned, they’re still steadfast in wanting to keep it in case they need it.”* (BECBC Nuclear Group

Chair, Sellafield area)



## V. Results

### B. High (reported) local support for SMR projects near Marcoule and Sellafield

**A dominant narrative near both sites is that local areas are characterized by a high degree of support and trust in nuclear :**

- The nuclear sector was generally depicted as a historic and important component of local economies with multigenerational familiarity among local residents ;
- Local nuclear opposition was generally depicted as limited and is also actively marginalized (some testimonies of verbal threats and physical abuse) ;

*“We wouldn't send our children to work there if we didn't have confidence in it was safe.”* (Local LEP representative, Sellafield Area)



## V. Results

Local residents have (reportedly) high hopes regarding the economic benefits and job creation potential of SMRs (as for any kind of “innovative” nuclear construction project) :

*“For them, [local residents] regardless of the SMR technology, **it’s more about bringing a new facility to the site that could create jobs** or... something along those lines” (Local CLI representative, Marcoule Area) ;*

*“An SMR at Sellafield, [...] for the general public, **I think if there was a credible model and credible financing, then it would be a shoo in for one to get built because the local community would support it.**” (Cumbria Trust representative, Sellafield area)*



## V. Results

### C. SMRs as an opportunity to futureproof Marcoule and Sellafield

**According to local elected officials and local economic actors (but not only) :**

- Marcoule and Sellafield are mostly dedicated to decommissioning and dismantling activities (which generate long term, well-paid jobs) ;
- However, decommissioning and dismantling are usually negatively perceived by local stakeholders :
  - These activities will eventually come to an end ;
  - This conveys the sentiment that the sites are in decline ;

*“[Dismantling] It still carries somewhat of a negative perception. **We’re removing an installation, not creating one. As a result, it doesn't have a positive connotation, either economically or in terms of human resources.**” (Local CLI representative, Marcoule Area)*



## V. Results

### Marcoule :

*“Apart from that, we are more of a laboratory for how to carry out decommissioning than a site for new and dynamic projects. **This places us in a paradoxical situation regarding the attraction of young talent and the ambition to offer ‘jobs of the future’.**” (Head of local supply chain association, Marcoule area)*

### Sellafield :

*“Decommissioning will take a long time and **it does create jobs, but as the work progresses it becomes less hazardous. At that point there’s a risk that funding is pulled,** even though the cleanup still needs to continue. Decades from now, once the most hazardous parts are dealt with, some of those jobs might disappear” (Cumberland Council Councillor, Sellafield area)*



## V. Results

**Additionally, near Sellafield (and Marcoule to a lesser extent) this appetite for new nuclear projects is also fueled by a sense of pride in past local industrial achievements :**

- Pride in the old steelworks and mining industry, but also deep social scars following to the end of these industrial activities ;
- Now that the sites are ageing, there is a fear of loosing relevance as nuclear industry leaders and innovators (fear of loosing another leading industry that is a source of local pride) ;

**Consequently, SMRs are perceived by many local stakeholders as way to maintain the relevance of ageing / declining sites, and preserve local economies :**

- Replace a perceived symbolic decline (dismantling, decommissioning) with a new future-oriented construction project ;
- Ensure new, long-term contracts for the local nuclear supply chain (a significant part of local economies) ;
- Attract new businesses in the local area with clean / decarbonized energy and possibly revive old industrial activities (e.g., “green steel”) ;
- Boost the revenues for local municipalities by attracting new businesses (help maintain and improve local infrastructures and services) ;



### **Marcoule :**

*“The objective is to restore Marcoule’s momentum for development with new value. Showing that **we are not only engaged in dismantling Phénix [...] the question is how to secure the site’s future by introducing new activities, new jobs, and a renewed ecosystem built around these new installations.**”* (Direction of the local Planning and Territorial Development department, Marcoule Area)

### **Sellafield :**

*“There is no steel industry anymore. **If you had a source of clean energy [SMR] and could bring about green steel, and regenerate the steel industry in west Cumbria... they would build statues for you to commemorate it. It would be absolutely massive**”* (Local LEP representative, Sellafield Area)

*“It would also **give Sellafield a new sense of purpose. At the moment, there’s no clear vision for the future. We're just winding down, and I think that has an effect on people’s morale.**”* (Innovation Lead expert at Sellafield)



## V. Results

### D. Yet some site-specific reasons for concern were also voiced

#### **Possible concerns among farmers (Marcoule and Sellafield) :**

- Winemakers in the Marcoule area may express concerns over a possible negative image consequence for their products ;

#### **Environmental and landscape preservation (Sellafield) :**

- Sellafield is located a few kilometers west from the Lake District National Park, a World Heritage site that attracts much Tourism ;
- Park authorities are particularly concerned with landscape preservation and any new nuclear development should preferably happen away from the park (could potentially affect the World Heritage status) ;
- Local residents' strong resistance to large scale grid updates in the area (pylons, high voltage lines, transformers) ;



## V. Results

*“I think, is that any nuclear development, including things like **disposal facilities or new reactors**, **should happen at a certain distance from the Park**. So, if new proposals come forward — for SMRs, for instance, or for geological disposal — I believe our position would not be to support or oppose the idea in itself, but to say: **‘keep this away from the Park’.**”*

(Lake District National Park direction, Sellafield area)



## V. Results

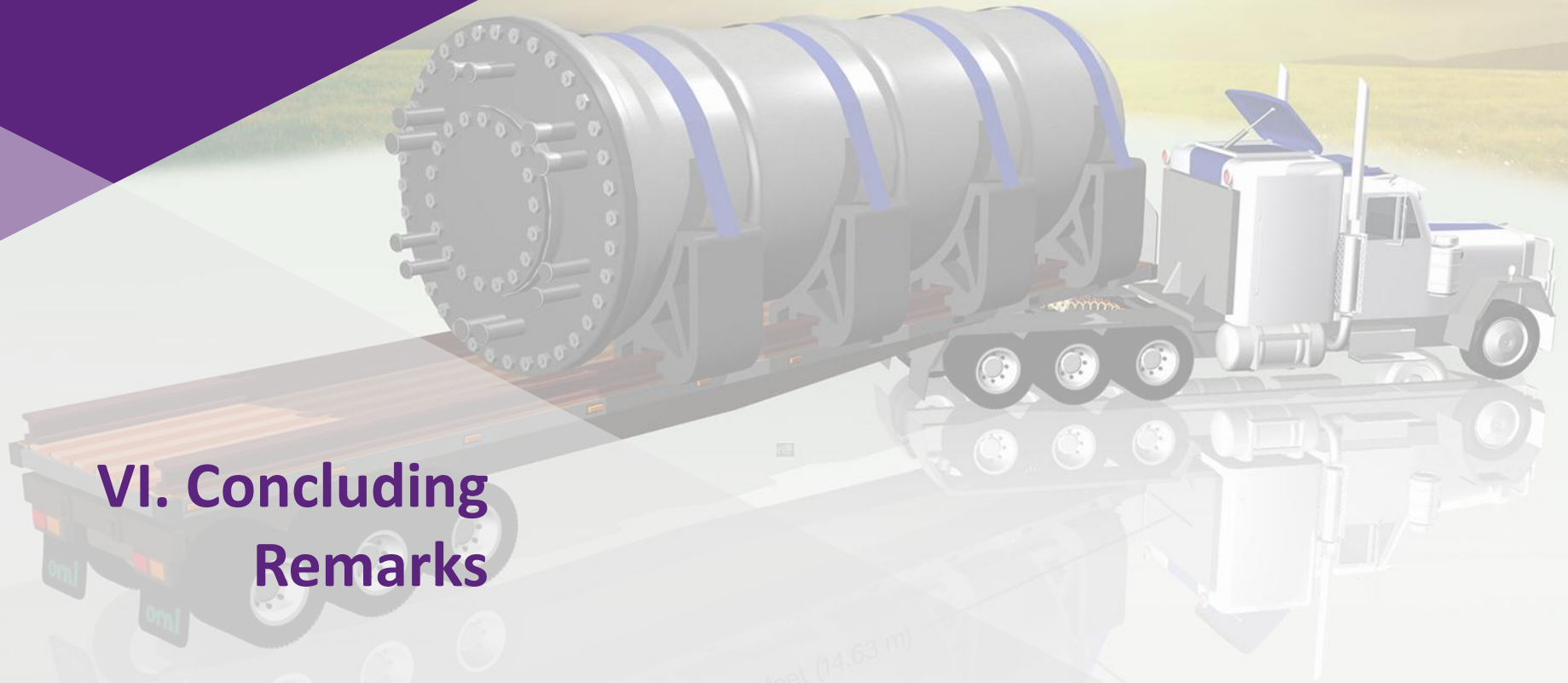
### **Safety concerns associated with the co-location SMRs and other high risk infrastructures (Sellafield):**

- Sellafield is a sensitive site which stores and manages large amounts of high-level waste in vulnerable infrastructures ;
- Adding an SMR would add yet another layer of complexity for safety and security at the site ;

### **It is unclear what energy needs an SMR can fulfill locally (Marcoule and Sellafield)**

- Besides providing energy for site operations at Marcoule and Sellafield, there are few energy intensive industries in the wider area ;
- West Cumbria already exports energy to the national grid; The Gard region already has large hydroelectric capacity installed ;

*“Sellafield is a peculiar beast. I understand the common sense of building new nuclear facilities next to old nuclear facilities. But there is a question... And **this is something that [...] concerns me about co-location, particularly co-location to a site like Sellafield, which has such massive amounts of high level nuclear waste within it for which there will be no solution for many years.**” (Cumbria trust representative, Sellafield area)*



## VI. Concluding Remarks



## VI. Concluding remarks

### **A local appetite for new “innovative” nuclear projects near Marcoule and Sellafield**

**According to interviewees, nuclear has a strong social license in the communities near both Marcoule and Sellafield ;**

**Key local stakeholders are actively developing strategies to attract SMR projects :**

- Local territorial development divisions, local economic actors, local elected officials, local supply chain, etc. ;
- Lobbying, contacting SMR startups, preparing promotional material to attract developers, etc. ;
- There is a fierce competition between the few suitable sites at national level ;

**This appetite is fueled by a perceived necessity to *futureproof* ageing nuclear sites :**

- Maintain and revitalize local economies, preserve nuclear expertise locally, and maintain the quality of life and attractiveness of local communities ;
- Replace activities associated with decline (dismantling, decommissioning) with a new future-oriented construction project ;



## VI. Concluding remarks

### The relative quietness of dissenting voices near these legacy sites

**While support for the continuation of nuclear sector activities was reported as particularly near both sites, opposition appears more prevalent in areas less dependent on the nuclear industry which located farther from these sites :**

- France : Nimes, the Cévennes area
- UK: East Cumbria, the Lake district national park

**Pluralism under pressure - in some instances (especially near Marcoule) anti-nuclear discourses are actively suppressed by pro-nuclear activists :**

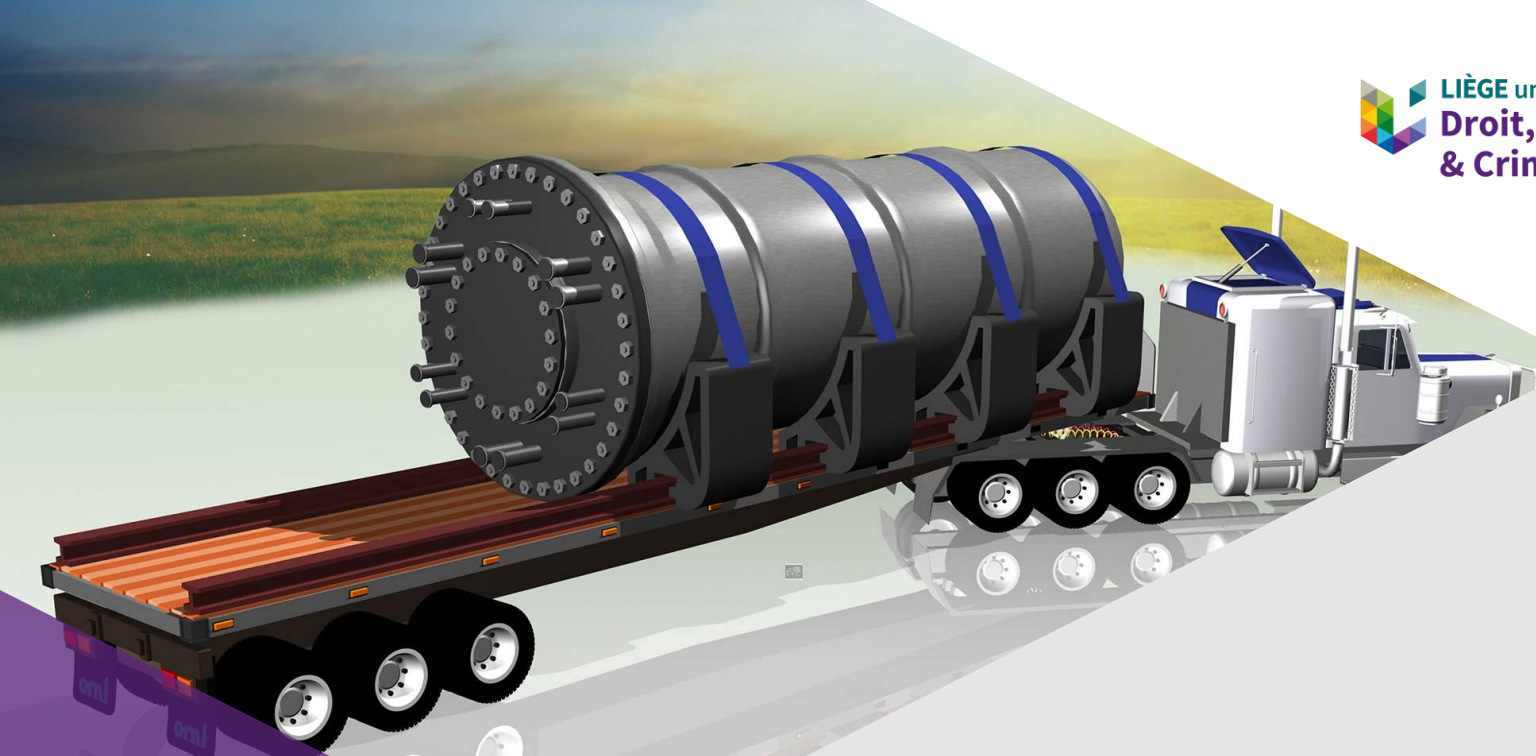
*"When we go to the nearest significant town to Marcoule, called Bagnols-sur-Cèze, and try to hand out leaflets or put up posters, we are not well received. **Once, a small team of us was even cornered by someone who, armed with a rifle, prevented us from moving while calling the gendarmerie to intervene.** The gendarmerie, having other priorities, told them to leave it alone."* (Environmental activist, Marcoule area)



## VI. Concluding remarks

**This parameter is of paramount importance when envisioning any future participatory process near legacy nuclear sites :**

- Some stakeholders' urge to defend local economic, professional, or identity-based interests can effectively jeopardise the conditions for genuinely pluralistic participation ;
- This raises critical questions about who is able to speak, under what conditions, and with what degree of legitimacy in local nuclear governance processes ;
- Future participatory arrangements must explicitly address power asymmetries, local dependencies, and informal pressures if they are to move beyond this constrained pluralism ;



**Thank you for your attention !**

Any questions ?

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