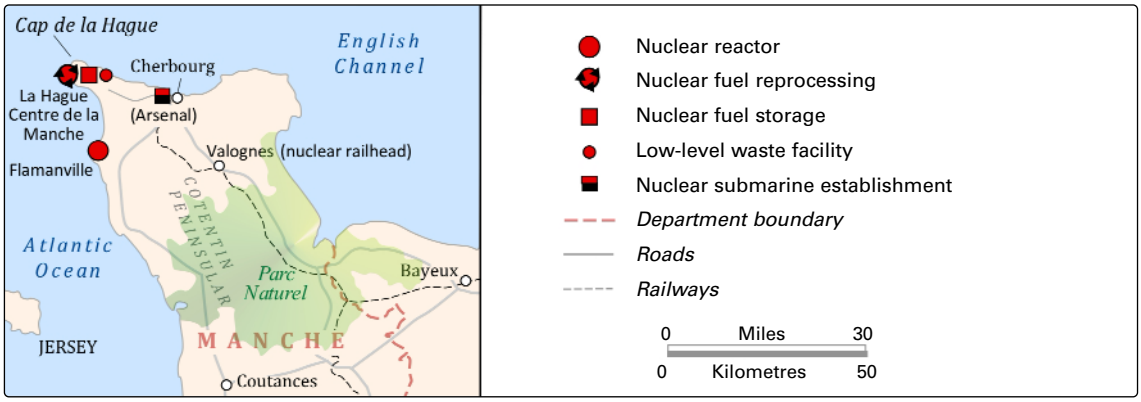
nuclear's wastelands part 4 – france, the core on the periphery

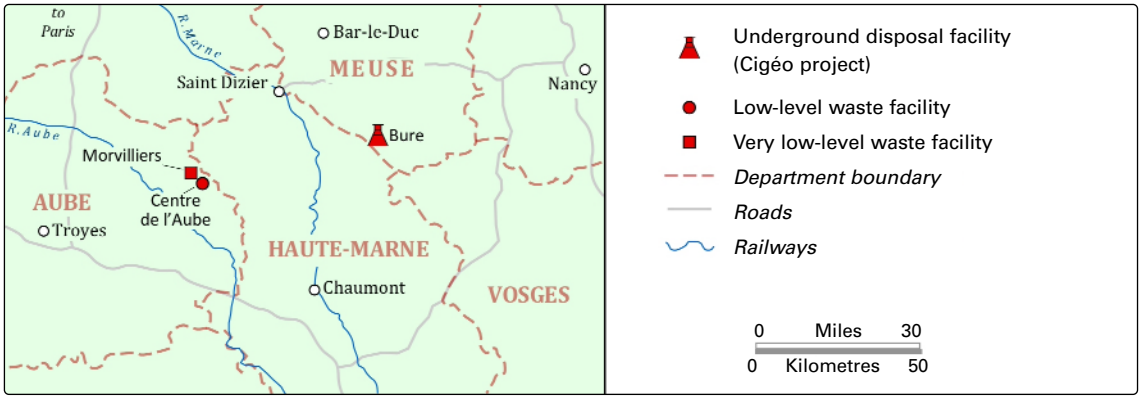
In the fourth of a series of articles on the local and social legacies of nuclear energy, Andrew Blowers looks at La Hague and Bure, two places with a crucial role in the storage and disposal of France's more highly radioactive wastes

La Hague reprocessing plant in 2008

La Hague is on the Cotentin Peninsula, the northernmost tip of Normandy, projecting into the Channel. Within this rugged, windswept, remote area is located a vast nuclear reprocessing complex that separates uranium and plutonium from spent fuel transported in from nuclear reactors scattered around France. The process creates large quantities of highly radioactive wastes (HLW) which are turned



Map of the Cotentin Peninsula



Map of Bure and the surrounding region

into glass blocks stored and ultimately destined for deep geological disposal. Nearby is a surface disposal facility, now closed, where low-level wastes were disposed until a new site, Centre de l'Aube, opened in the Champagne area of eastern France.

Not far away, on the western coast of the Cotentin, sunk into the cliff face, is Flamanville, where the latest nuclear reactor under construction is running long over schedule and well over budget. To the north at the Channel port of Cherbourg is the Arsenal, where submarines for the French nuclear fleet are constructed.

This 'Nuclear Peninsula'[1] constitutes the core of the French nuclear industry on the periphery of the country.

Across the country, around 400 miles away in eastern France, in a rolling, rural landscape unremarkable save for the alien intrusion of an isolated scatter of undistinguished modern administrative, hotel and industrial buildings including headworks, is the country's newest nuclear site. Bure, hitherto a tiny hamlet set far from cities and main communications, in *la France profonde,* has emerged as the location for the Cigéo project, the place where the most highly active wastes from the French nuclear programme may, one day, be buried deep underground.

Bure, like La Hague, is on the periphery, an 'internal periphery' in a relatively empty, expansive landscape on the borders of Champagne and Lorraine, and the departments of Haute Marne and Meuse. Slowly, Bure is in the process of becoming host to the deep geological repository for the disposal of the nation's most dangerous wastes.

Nuclear energy in transition

La Hague and Bure together embody the end of the nuclear cycle, two places on the periphery intertwined by their focal role in the storage and disposal of France's more highly active wastes. France has the second-largest nuclear 'fleet' in the world, with 58 reactors contributing three-quarters of the country's electricity, roughly 40% of the country's total energy output. The industry developed rapidly during the decades after the Second World War in response to French espousal of a technocratic, state-centred conception of excellence. Gabrielle Hecht, in the *Radiance of France,* has described nuclear as reflecting a concept of radiance, representing modernity expressed through technology as saviour, redeemer and liberator. Nuclear power stations symbolised 'a tremendous spectacle, a drama propelled by scientists and engineers, and a display of national radiance'.[2]

The French nuclear complex displays a simple, logical geographical pattern. Nuclear reactors, mostly of PWR (pressurised water reactor) design, are sited on the Channel coast, along the country's north-eastern borders and on its major rivers. In the south east, on the Rhone, are the fuel fabrication plants, including a MOX (mixed-oxide fuel) plant, the now closed Superphénix fast breeder reactor, and the first reprocessing works at Marcoule, built to produce plutonium for the French nuclear deterrent.

The cycle is closed by reprocessing, sending plutonium to be made into MOX at Marcoule and vitrifying high-level wastes for storage at La Hague for eventual disposal in eastern France, at the deep repository for high-level wastes at Bure, if it goes ahead. Thus much of France's nuclear cycle passes through La Hague at some point. La Hague, although peripheral in its geographical location, has become the core of the country's nuclear complex.

In principle, the various components – fuel fabrication and enrichment, reactors, reprocessing and waste management – comprise a neatly functioning system. But the coherence and interdependence of the system is increasingly threatened as the nuclear industry faces a number of challenges.

In the first place, nuclear's role in the country's energy mix is now more open to question. Although French support for nuclear energy has been relatively strong, it has hardly been enthusiastic or unequivocal. Two decades ago, two-thirds of the population felt that nuclear power should be maintained at existing capacity but not expanded. By 2010 a Eurobarometer poll revealed majority support (45% maintain, 12% increase nuclear's role), just before the Fukushima disaster caused a marked downturn. A poll by the World Nuclear News in 2013 showed only around a third supported nuclear, although, perplexingly, over half agreed that nuclear should retain its share in the energy mix.

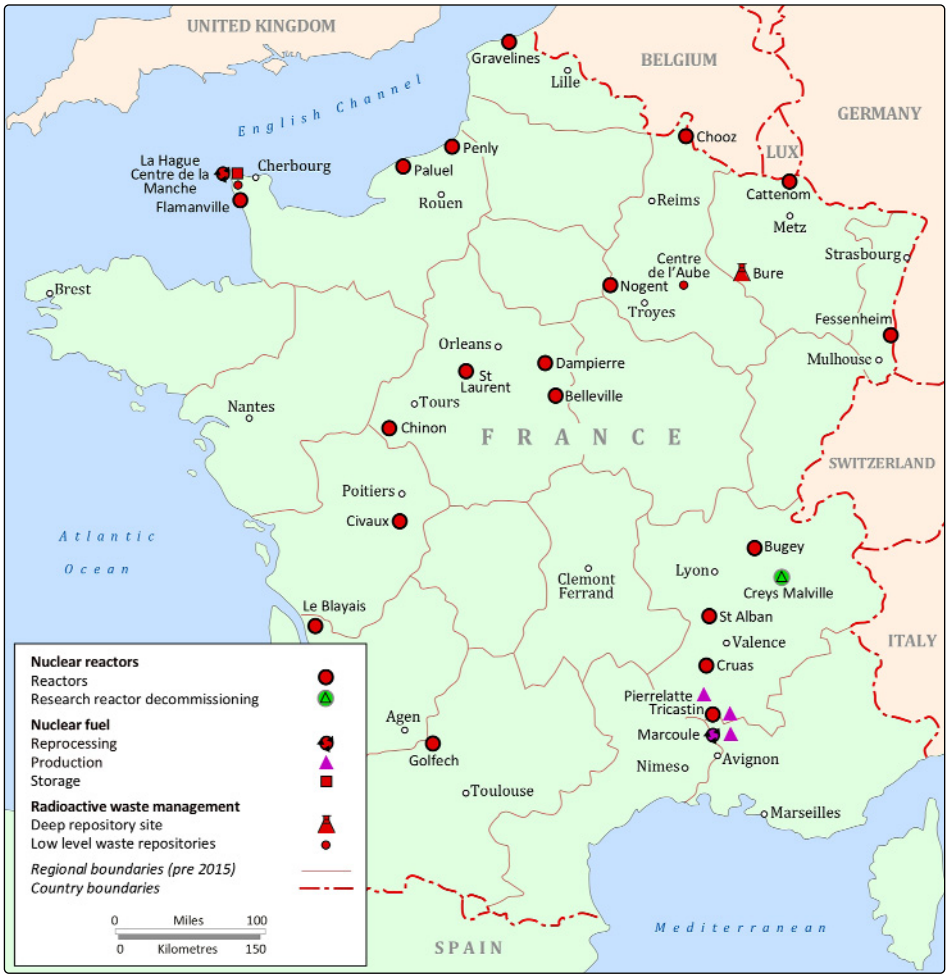
Opinion on a nuclear phase-out seems divided. Perhaps the best that can be said is that opinion on the advantages and disadvantages of nuclear energy has been roughly evenly divided over the past few years.

A second challenge is political. The election of President Hollande, in the wake of Fukushima, led to a policy reappraisal, including the aim of gradually reducing nuclear's share of electricity supply from three-quarters to half the total by 2025. The policy has since been modified but remains essentially a long-term aim. This responded to two factors: one, a progressive energy transition with the rise of renewables as a cost-effective alternative; the other, the impending decline of nuclear as a result of an ageing nuclear fleet. The delays and technical problems surrounding the new nuclear station under construction at Flamanville and the escalating costs associated with the French reactor project at Hinkley Point in the UK indicate a faltering prospect for nuclear new build.

The fate of new build, coupled with the costs of maintaining the nuclear fleet, reprocessing and impending decommissioning and waste management, has revealed a third challenge: the

ANDRA

The Cigéo facility at Bure



© John Hunt 2018

Map of nuclear facilities in France

parlous state of nuclear finances in France. Électricité de France (EDF), the country's nuclear energy supplier, faces a combination of falling revenues and increasing liabilities as it absorbs the loss-making reactor business of Areva (renamed Orano), making it dependent on state support and, in the longer term, revenue from customers in the UK and France paying premium rates for electricity.

All these problems lead to a fourth challenge: the nature of the industry itself as it comes to terms with its declining role and the shift in the balance of its operations from production to the rear end of the nuclear cycle – reprocessing, waste management, and clean up. Above all, the moment of transition raises questions about the purpose and function of reprocessing, at the heart of operations at La Hague.

On the one hand, La Hague has a declining production role. As the French nuclear industry begins to shrink, and as the foreign market for reprocessing has disappeared, the original purpose of the plant is diminishing. The market for MOX fuel is limited to 24 French power stations, leaving a surplus of plutonium and uranium stored at La Hague. On the other hand, La Hague is slowly but surely realising if not, perhaps, fully recognising its purpose as the nation's centre for the management of higher-level wastes. In common with other parts of the nuclear sector, La Hague 'must urgently shift its focus to the maintenance of current reactors and decommissioning and nuclear waste management services'.[3]

La Hague – adaptation and survival

The rationale for reprocessing spent fuel at La Hague for plutonium and MOX fuel has been sustained by a combination of denial, policy inertia and adaptation to changing circumstances. But, in reality, reprocessing has become an *idée fixe,* a persistence based more on belief than truth. Yves Marignac of WISE (World Information Service on Energy), a critic of the policy, described the problem to me back in 2004:

> *'Nothing much changes. But it's like opening Pandora's box – the whole logical construction falls apart. The more the reality becomes different to what you want to believe, the more difficult it is to recognise it.'*

And the reprocessing works have, over the years, become embedded in the landscape and the community. The region is described by Zonabend as 'a great plateau consisting of a series of dome-like moors where gorse and broom, heather and bracken are swept by incessant wind'.[4] It has an austere beauty with ever-changing weather, a harsh unyielding land where farming and fishing are the traditional occupations.

In such an underdeveloped and remote area located *au bout du monde* according to Didier Anger, a veteran campaigner, the works evolved during the 1970s, more welcomed than resisted. Anti-nuclear opposition in the area focused on the coastal nuclear plant at Flamanville. At La Hague, too, strikes and demonstrations focused on working conditions and environmental risks. There was opposition to shipments of foreign spent fuel through Cherbourg, and the repatriation of wastes by rail to Germany triggered the mass protests at Gorleben over the years which have had such a profound impact on nuclear policy in that country.[5] La Hague, a peripheral location, has been the fountainhead of international protests, with profound repercussions elsewhere along the sea lanes and rail routes that link it to controversial sites elsewhere.

The La Hague reprocessing plant has become increasingly integrated into the traditional local community. It has played a role in the modernisation of the area, reducing its former isolation and bringing high technology and jobs to offset the decline in its manufacturing base centred on the port of Cherbourg. Areva (the company that manages the plant, now renamed Orano) is a dominant economic player, directly employing 5,000 people and with a significant multiplier impact on the economy. There was, in earlier years, a palpable ambiguity in the relationship between the industry and the community, put to me by a trade unionist I interviewed: 'The industry is not necessarily popular… but it is necessary… it would be a catastrophe if it closes.'

Areva has made conscious efforts to overcome the wariness and reserve through a policy of openness and participation, support for investment research, and training to contribute to diversification in the region. La Hague has become an established element in the community; indeed it might almost be said that it has become a traditional part of the landscape in the North Cotentin – so much so that even trenchant anti-nuclear activists like Didier Anger of CRILAN recognise the role of the industry in the region:

> *'The soup is good and we want more. Yet everyone is fearful of nuclear at the same time. They are stuck between fear of nuclear and fear of the economy. We are all* ***immediatistes****.'* (Interview, 2013)

Concern about the radioactive risk to the environment has become institutionalised through the CLI (Local Information Commission). Anti-nuclear activities tend to focus on monitoring, and protests over the very presence of the plant and its activities have long since disappeared. Today, it is the continuing presence of the plant that is at issue, although, here too, fears tend to be internalised rather than expressed. There seems to be a reluctance to challenge and an unwillingness to confront the realities of the changing role of reprocessing.

Cotentin landscape
Inset photos by the author

Didier Anger explained the passive acceptance to me:

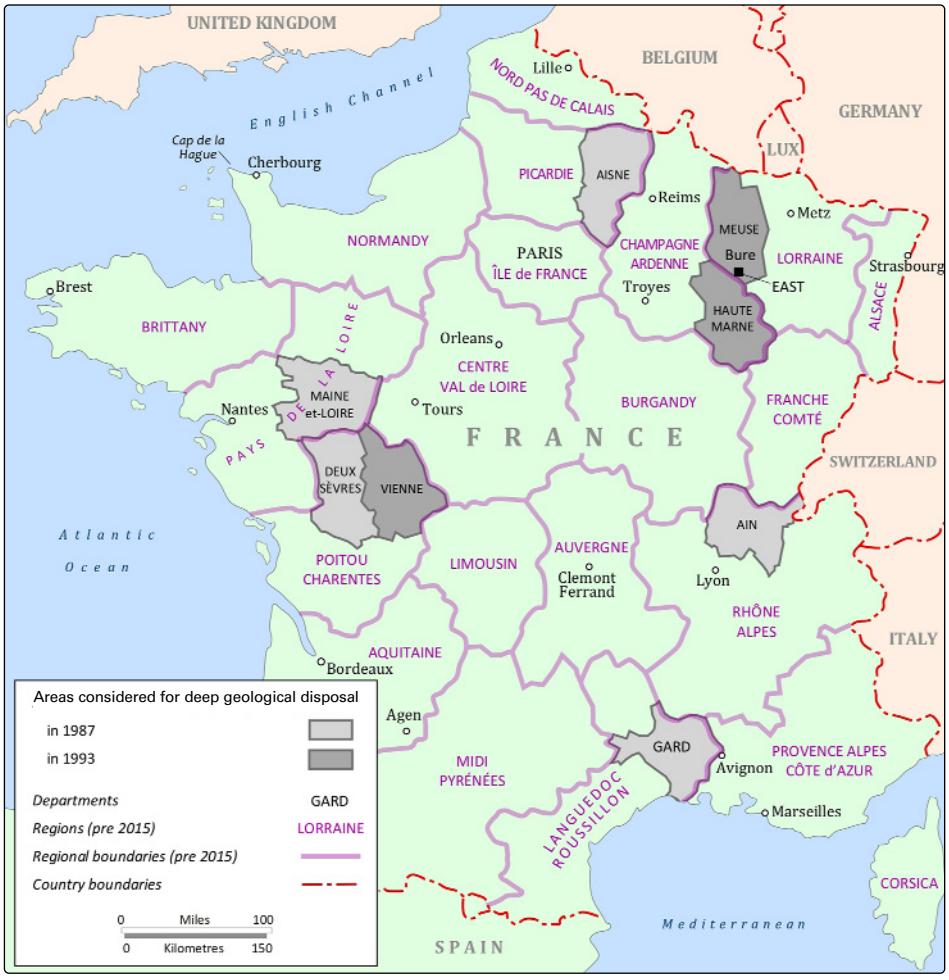
> *'Le Cotentin ressemble à l'autruche: elle met la tête dans le sable, elle ne voit pas le chasseur, mais le chasseur lui tire dans les fesses avec son fusil.'*[6]

As the nuclear industry in France declines and the original role of reprocessing is questioned, so La Hague will adapt to survive as the centre for management of radioactive waste. It is on that basis that its presence in the Cotentin is secure for the foreseeable future.

Finding a disposal site

Bure is the outcome of a long and contentious process of site selection, the unwitting choice of least resistance. As in other countries, deep geological disposal has become the favoured approach for the long-term management of the most highly active wastes. In France, as elsewhere, the problem was to find a site which could satisfy both geological conditions of safety and social conditions of acceptability.

Early attempts focused on finding suitable geological conditions. During the 1980s four sites with four different rock types were identified: two in western France, in the adjacent departments of Maine-et-Loire (schist) and Deux-Sèvres (granite), one in the north, Aisne (clay), and one in the south east, Ain (salt). In a classic exercise of 'decide-



© John Hunt 2018

Map showing areas under consideration for deep disposal in 1987 and 1993

announce-defend-abandon', the sites were revealed to unsuspecting communities, immediately provoking tenacious and resolute opposition and leading in turn to withdrawal of the programme in 1990.

The process of site selection was restarted during the 1990s, this time backed in typical French fashion by the Law on Research in Radioactive Waste Management (1991), which sets out the legislative framework that still governs the process of evaluating and developing approaches. There were three 'axes' of research: one on possibilities of transforming wastes through partitioning and transmutation; another on long-term storage techniques; and a third on evaluating deep-disposal options. The law specified public involvement, including the setting up of a Local Information and Oversight Committee (CLIS).

It was recognised that a successful site selection process would need to satisfy both scientific safety criteria and social acceptability, based on the willingness of local communities. Furthermore, the call for expressions of interest was backed by packages of incentives for economic development.

Site selection was a state-based process led by government through a mediator, Christian Battaille, the architect of the 1991 law and implemented through ANDRA, the national radioactive waste management company. An oversight body of experts, the Commission Nationale d'Evaluation (CNE), provided oversight and advice. Decision-making was partially devolved in a semi-voluntaristic and semi-elitist system of governance. Typically, decision-making was through the representative political institutions of regional, departmental and local governments (communes and mayors). The broader public interest was to be taken into account at national level through public consultations called *débats publics* (two of which, in 2005-06 and 2013 have been on radioactive waste) and locally through the CLIS, composed of trade unions, business, agriculture, national, regional and local elected representatives, and environmental groups.

The search for candidate sites was narrowed down to eight departments considered potentially suitable in geological terms, half of which were rejected on grounds of potential opposition. Of the remaining four,

ANDRA

Rural scenes around Bure
Inset photos by the author

which had local support, the western site in Vienne was eliminated on the advice of the CNE as too complex geologically, while the southern site in Gard, near the reprocessing works at Marcoule and in silt formations, was regarded as unfavourable geologically and, perhaps more importantly, opposed by the local wine industry, who felt that their labels could be compromised by association with radioactivity. This left the two adjacent departments of Meuse and Haute-Marne astride favourable clay formations and with public and political support to combine in the selection of a single, so-called East site.

Bure – a nuclear no-man's land

According to Professor Jean-Claude Duplessy, President of the CNE, whom I interviewed in 2013, 'Bure is one of the best sites we might imagine in France.' The local geological conditions are optimal, with deep, thick, hard clay with a good hydro-geological gradient in the Callovo-Oxford clay formation which underlies a wide area in this part of eastern France. The precise site was chosen at the border of the two departments, giving each a share in the benefits for economic investment and development put forward in the 1991 law.

Bure is the end of the line, the place where much of the high- and intermediate-level waste from Marcoule and other nuclear sites, and ultimately from La Hague, may eventually be buried. As yet, there are few physical signs of its manifest destiny. In Bure the industry's footprint is growing, although the tranquillity of the region is not yet disrupted. 'Bure is in the middle of nowhere,' according to Gerald Ouzounian of ANDRA, in a 'no-man's land',[7] deeply rural with few inhabitants, tiny settlements and small towns – Bar-le-Duc, Joinville and St Dizier – nearby and bigger cities such as Nancy an hour away.

This obscure area is undergoing a gradual transformation as the modern intrudes on the traditional, in the creation of the country's latest nuclear wasteland. But it will be a wasteland only partly visible, for the idea of the project is to bury the wastes in galleries below 500 metres deep in the body of the earth, with engineered and geological containment that will remove it from the surface for hundreds of thousands of years. It is a wasteland silent and invisible, its function at once transcendent and immanent.

Bure is peripheral in terms of its remoteness, a borderland on the edge of geographical, administrative and cultural regions. It is also economically marginal, underdeveloped and sparsely populated – a rural backwater where development is difficult. The underground laboratory has been created and tests have been undertaken to determine the containment properties of the clay, waste disposal methods, monitoring, and security. The repository itself, if it is eventually constructed, will be in a different nearby location, a 'pilot' project receiving some wastes from Marcoule before taking wastes from La Hague towards the end of the century.

In such a peripheral location the project was able to develop almost by stealth, like a thief in the night. There has been a process of narrowing the options.

Of the research axes, deep disposal has become the option for long-term management. The favoured geology has become clay and, therefore, Bure has become the favoured location. The first stage of development at Bure was an underground laboratory, a testing ground for technological feasibility. The repository will be developed as a pilot industrial phase in the first instance, and, in the spirit of cautious compromise of the 1991 law, the project will be reversible for around 100 years before closure. 'Thus, and no one had thought of this before, we can now envisage getting rid of the waste without really getting rid of it, since we bury it while being able to reverse the decision at any time.'[8]

Bure has undergone a metamorphosis over the years, from being one of several possible sites, to a site under investigation, to its present status as an underground laboratory before its future transformation via a pilot phase into a separated, fully fledged deep-disposal facility. Such a gradual evolution from possible to potential to palpable has been achieved with relatively little resistance from a small local population, acquiescent and passive, accepting of the benefits that go with the project.

Opposition to Cigéo locally is necessarily thin on the ground, and public concerns have tended to be represented through the CLIS. The relationship between community and industry, mediated through the CLIS, has been crucial and creative, although its Secretary-General, Benoit Jacquet, confessed in 2005 that the 'CLIS doesn't have a place in the decision-making process – so it must make its place', which it does through investigations, consultations and raising awareness of issues.

More vigorous and antagonistic opposition has been fomented in typical French fashion through ephemeral 'manifestations', mass rallies organised by anti-nuclear networks drawing on a wider regional base.

More recently opposition has taken a more vigorous turn as opponents have occupied the woodland under which the repository is intended to be built, giving a permanent base for various actions, including damaging the hotel built near the site. The protest settlement was cleared in a confrontation with police in February 2018, while a network of support groups staged protests in other French cities. The insurgency, anarchistic and political, is redolent of the mass protests and confrontations against nuclear power in France in the 1970s. It is set against the erstwhile resignation and patriotic acceptance of this part of eastern France, summed up by Bernard Fauchier of ANDRA: 'We had Verdun, we had Sedan, we are tough people – see what we are ready to do for France.' But, as the project proceeds, so its hitherto relatively untroubled progress will inevitably meet with more resistance as Bure, no longer a backwater, becomes a focus of the conflict over nuclear power.

On the edge but in the frame

La Hague and Bure are two places on the geographical margins but increasingly intertwined as the emphasis of the French nuclear project shifts gradually but inexorably towards the back end of the nuclear cycle – reprocessing, clean-up, and radioactive waste management. La Hague's role is being reinvented as reprocessing of spent fuel moves from producing nuclear materials to vitrifying and storing waste. For the present, La Hague has an accepted role and has become integrated within the local community. By contrast, Bure is at a very early stage in becoming the place where wastes reach their final destination. Industry and community co-exist, but modernity has barely touched the traditional communities that make up this relatively empty landscape.

So, the periphery becomes the centre as the nuclear cycle revolves and resolves the problem of nuclear waste management. There are many social and scientific issues to be resolved before it will be possible to claim that the problem will be solved, if it can ever be. Therefore there is still some way to go before La Hague and Bure can assume their ultimate destinies. France is only now reaching the point where its vast but ageing nuclear fleet will be gradually decommissioned. The future of reprocessing may be open to question, and the repository at Bure is not yet established. But, for a long while to come, inertia is likely to prevail and reinforce these places in their role as guardians of the nation's most dangerous nuclear wastes.

● ***Andrew Blowers OBE*** *is Emeritus Professor of Social Sciences at The Open University and is presently Co-Chair of the Department for Business, Energy and Industrial Strategy/ NGO Nuclear Forum. This series of articles draws on his latest book, The Legacy of Nuclear Power (Earthscan from Routledge, 2017). The views expressed are personal.*

Notes

1 As described by Françoise Zonabend in *The Nuclear Peninsula*. Cambridge University Press, 1993

2 G Hecht: *The Radiance of France: Nuclear Power and National Identity after World War II*. MIT Press, 1998

3 Y Marignac and M Besnard: *The French Nuclear Industry in Deadlock: The Burden of France's Nuclear Gamble in the Era of the Energy Transition*. WISE-Paris, for Greenpeace France, Jun. 2015. www.sortirdunucleaire.org/IMG/pdf/wise-greenpeace-2015-the_french_nuclear_industry_in_deadlock-executive_summary.pdf

4 F Zonabend: *The Nuclear Peninsula*, p. 13 (see note 1)

5 Gorleben and its role in the German nuclear conflict is the focus of the next article in this series

6 'The Cotentin is like the ostrich. It puts its head in the sand. It doesn't see the hunter. But the hunter fires into its backside with his gun.'

7 B Cramer and C Saïsset: *La Descente aux Enfers Nucléaires: Mille Milliards de Becquerels dans la Terre de Bure*. L'Esprit Frappeur, Paris, 2004

8 M Callon, P Lascoumes and Y Barthe: *Acting in an Uncertain World: An Essay on Technical Democracy*. MIT Press, 2009, p.151