

# West Cumbria Vision: Results of Economic Modelling

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## Appendix 1 – The decommissioning model

# Introduction

## SUMMARY OF THIS REPORT

This report provides results of the econometric modelling around the impact of decommissioning undertaken by Experian Business Strategies with Grant Thornton support. It also sets out the scenarios which have been modelled around the transformational actions identified in the Interim Report.

For the purposes of this project, West Cumbria is defined as the local authority districts of Allerdale and Copeland.

The econometric model of West Cumbria takes into consideration past and present performance and considers the options open to policy makers to intervene in the local economy and the consequential benefits. The modelling consists of forecasts of the West Cumbria economy under a do-nothing scenario (with and without the impact of decommissioning) and forecast of the West Cumbria economy under five 'interventions scenarios'. The definition of the scenarios have been informed by the discussions with various stakeholders, the working groups and identified in the Interim Report. In total, 2 baselines and 5 scenarios have been modelled:

- Without Decommissioning Baseline: assuming the continuation of economic trends with Sellafield as an operational nuclear site for the foreseeable future
- Baseline: The West Cumbria economy with decommissioning
- Scenario 1: Anchoring decommissioning.
- Scenario 2: A nuclear energy cluster
- Scenario 3: Diversifying the economy through tourism and leisure.
- Scenario 4: Improving skills and enterprise.
- Scenario 5: Golden economy. This scenario brings together all the scenarios and measures the economic impact of the complete set of interventions.

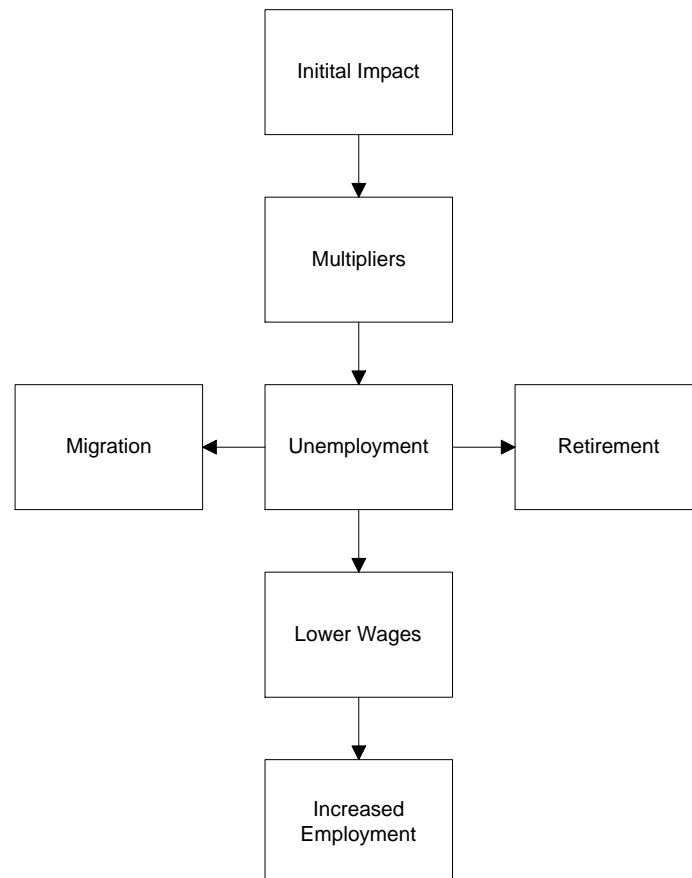
For each scenario, the following information is presented:

- A brief description of the scenario.
- What would West Cumbria's economic future look like?
- How does the scenario change GVA?
- How does the scenario change workplace employment?
- How does the scenario change employment by sector?
- How does the scenario change working age population?
- How does the scenario change residents in employment?
- How does the scenario change the unemployment rate?

The 'without decommissioning baseline' projection of the economic future of West Cumbria without nuclear decommissioning assumes the continuation of economic trends with Sellafield as a nuclear site beyond 2004. Clearly decommissioning is already underway, but the baseline serves as a comparison for different scenarios, particularly the future with decommissioning. The 'without decommissioning baseline' is presented in the first section of this report. The second section of this report looks at the direct impacts of decommissioning at Sellafield.

Figure 1 outlines the econometric model of West Cumbria. The model is designed to measure both the initial impact of decommissioning on output and employment and the subsequent

adjustment of the local labour market to these impacts. Underpinning the West Cumbria econometric model is Experian's fully specified UK macro model, together with Experian's experience of modelling the economies of the North West. The West Cumbria model produces forecasts of value added and employment over the next 20 years for the baseline, under a decommissioning scenario and a the scenarios detailed above. Further detail of the econometric model is available in Appendix 1.

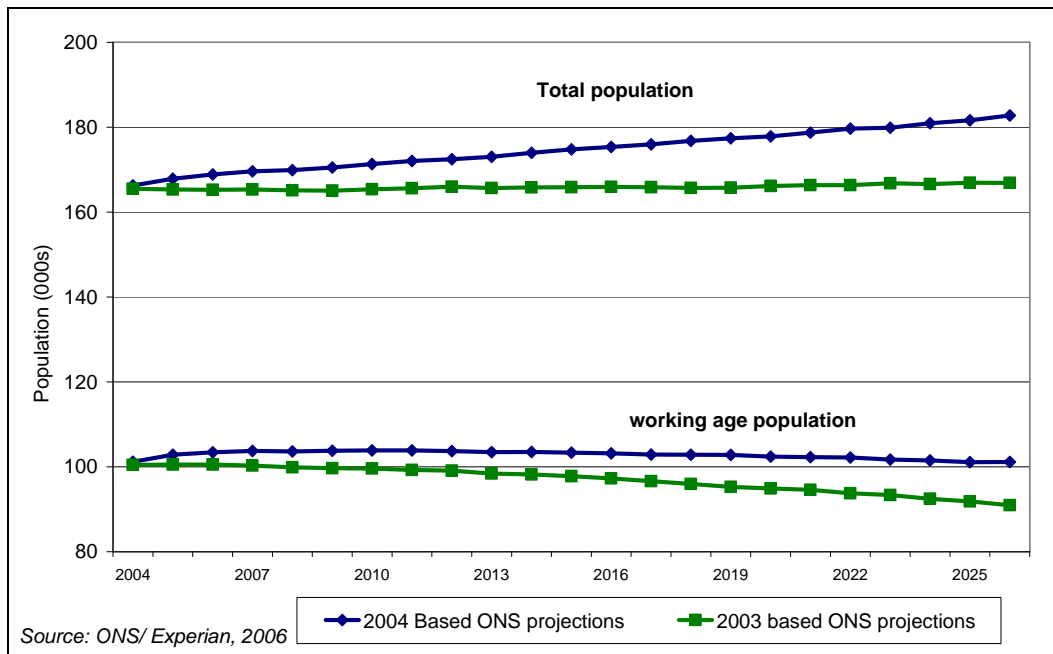


**Figure 1: The West Cumbria Econometric Model**

### **Population projections**

It should be noted that the modelling of the economic baseline and scenarios has been an ongoing process and this report represents the final output and results from this work. Since the draft version of these scenarios was produced, ONS have published 2004-based sub-regional population projections which are more optimistic for West Cumbria than the previous 2003-based population projections, originally included in our economic modelling. Figure 2 shows the total and working age population based on the 2003 and 2004 ONS sub-regional population projections. Under the 2003-based projections total population in West Cumbria was projected to remain stable at 166,000 residents over the next 20 years, but with a falling working age population. According to the 2004 based population projections, total population is projected to steadily increase over the same period from 166,000 in 2004 to over 180,000 in 2026. However, working age population, which is one of the key drivers of employment growth, remains broadly static. The model has been updated to include the 2004-based ONS sub-regional

population projections and the results for each of the scenarios have been revised in light of the changes to the model.



**Figure 2: Total and Working age population projections for West Cumbria based on the 2003 and 2004 ONS sub-regional population projections**

# 1 Counterfactual Scenario: The future without decommissioning

## 1.1 WHAT WOULD WEST CUMBRIA'S ECONOMIC FUTURE LOOK LIKE WITHOUT DECOMMISSIONING?

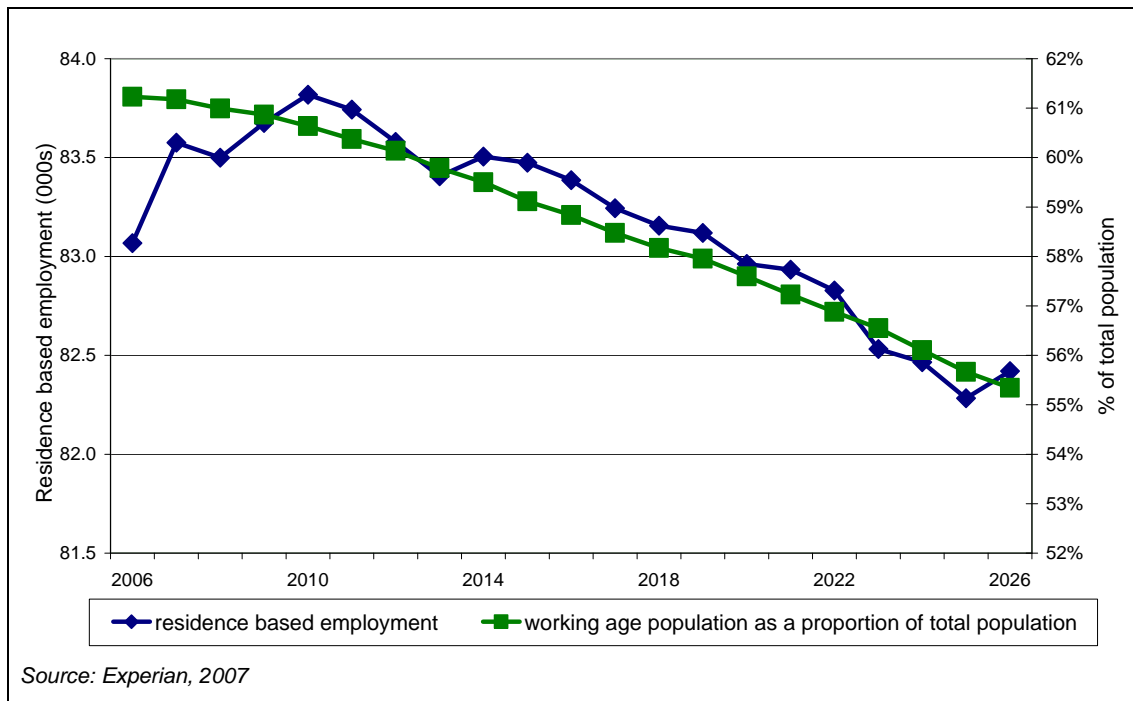
Our economic modelling has produced a “without decommissioning baseline” projection of the economic future of West Cumbria without nuclear decommissioning; which assumes the continuation of economic trends with Sellafield as a nuclear site beyond 2004. Clearly decommissioning is already underway, but the baseline serves as a comparison for different scenarios, particularly the future with decommissioning. Here we present a summary of the results.

Figure 1.1 below show the headline results for our baseline projection. This has estimates for employment (using a measure of full time equivalents, or FTEs), total resident population, working age resident population, residents in employment and unemployed residents.

	2006	2011	2016	2021	2026
GVA £ million (constant 2003 prices)	2,400	2,600	2,800	3,000	3,100
GVA per head £000s (constant 2003 prices)	14,300	15,200	16,000	16,500	17,200
Employment (full-time-equivalent)	64,900	64,400	63,600	63,000	62,600
Total resident population	168,900	172,100	175,400	178,700	182,800
Working age resident population	103,400	103,900	103,200	102,300	101,100
Residents in employment	83,100	83,700	83,400	83,000	82,400
Unemployed residents	3,100	2,700	2,600	2,500	2,500
<i>Source: Experian, 2007</i>					

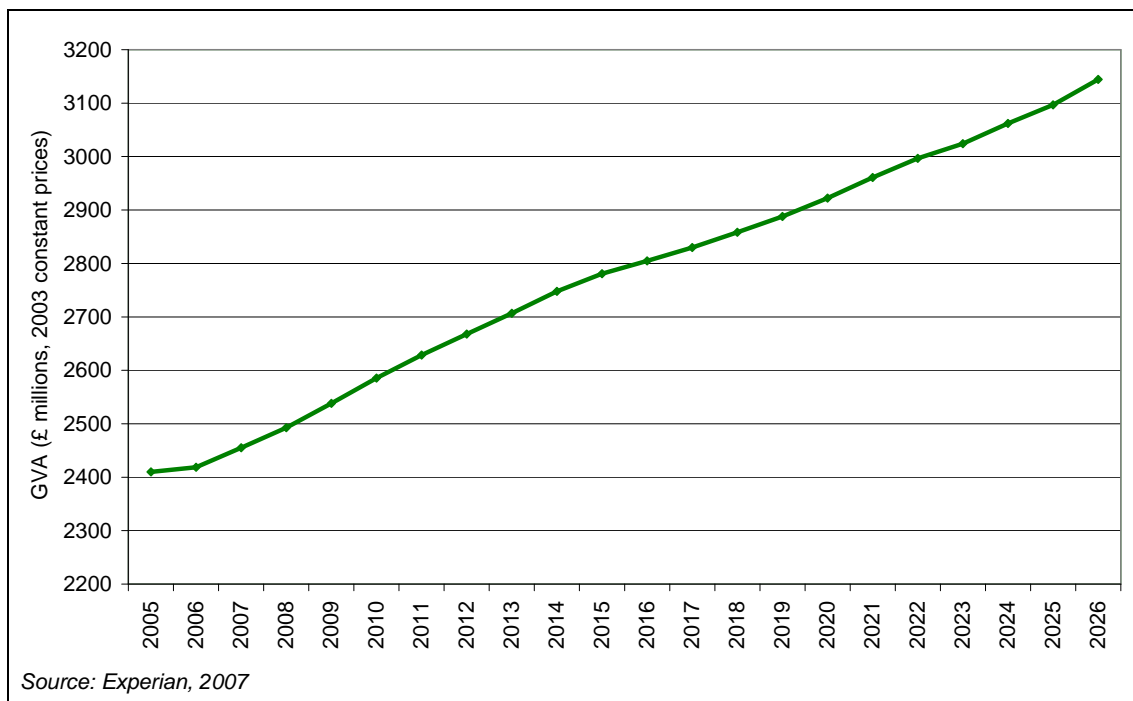
**Figure 1.1: Projections of West Cumbria's economic future without nuclear decommissioning**

Under the without decommissioning baseline, West Cumbria is gradually experiencing decreases in the numbers of people working and living in the area. The declining working age population is the key driver of falling employment. Figure 1.2 shows the relationship between the decline in the working age population as a share of total population and the fall in residence-based employment.



**Figure 1.2: Working age population and residence based employment**

Workplace-based employment is also expected to fall in the forecast period, a result that is unsurprising given the relative isolation of the West Cumbria economy and the resulting low levels of commuting. Despite falling employment, Gross Value Added (GVA) is expected to increase at a steady rate of 1.3 per cent per annum between 2006 and 2026 due to increasing productivity levels in the area.



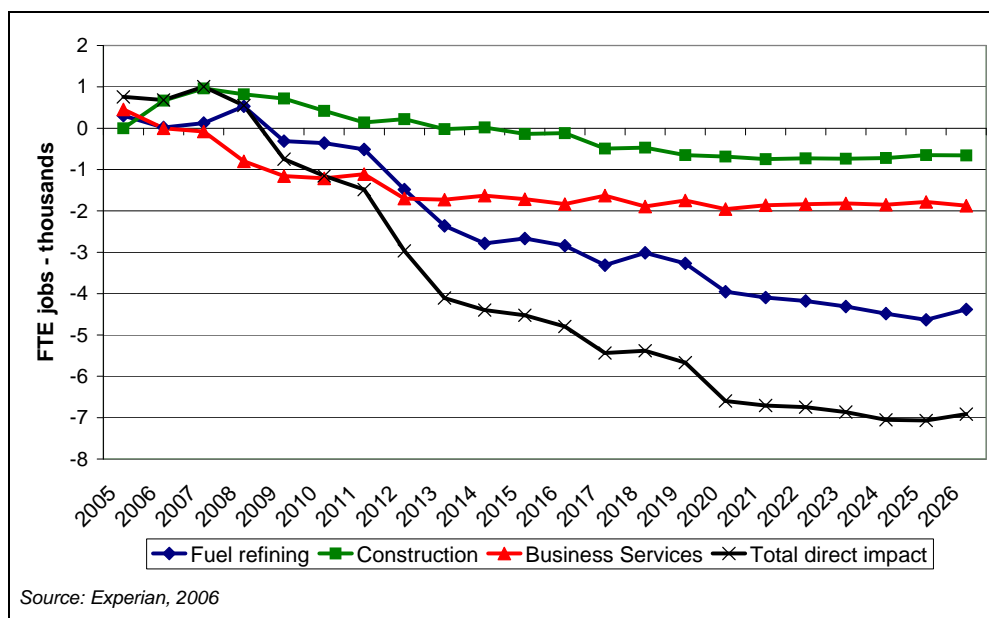
**Figure 1.3: GVA results for the without decommissioning baseline**

## 2 What are the economic impacts of decommissioning?

In appendix 1 we outline the workings of the econometric model of West Cumbria and how the impacts of decommissioning are estimated. There are essentially two facets to the model: the first models the multiplier effects that will occur as a result of decommissioning; the second models these multiplier effects as well as the labour market effects that will also occur as a result of decommissioning. Here we look at the multiplier impacts of decommissioning without the subsequent labour market adjustment.

In 2006 the Sellafield site employed 10,171 full-time equivalents (employees and agency staff). Of this total, over 87 per cent of these jobs are held by residents of West Cumbria. The total gross wage of these workers is over £310 million. The site also employs around 4,750 contractors, of which around half are believed to live in West Cumbria. Employment at Sellafield is mostly in the fuel refining sector, however there is also employment in business services as many of the agency staff are estimated to be employed in this sector. Many of the sub-contractors employed in Sellafield are employed in the construction industry. The scale of employment in each of these sectors will change over time due to decommissioning.

The direct impact of decommissioning on fuel refining, construction and business services is shown in figure 2.1<sup>1</sup>. Initially there are job gains as decommissioning requires additional labour, especially for required construction work. After 2009 more jobs are being lost across all sectors, with the job losses accelerating after 2011 with the closure of Thorp<sup>2</sup>.



**Figure 2.1: The direct impact of decommissioning by sector – FTE employment in West Cumbria**

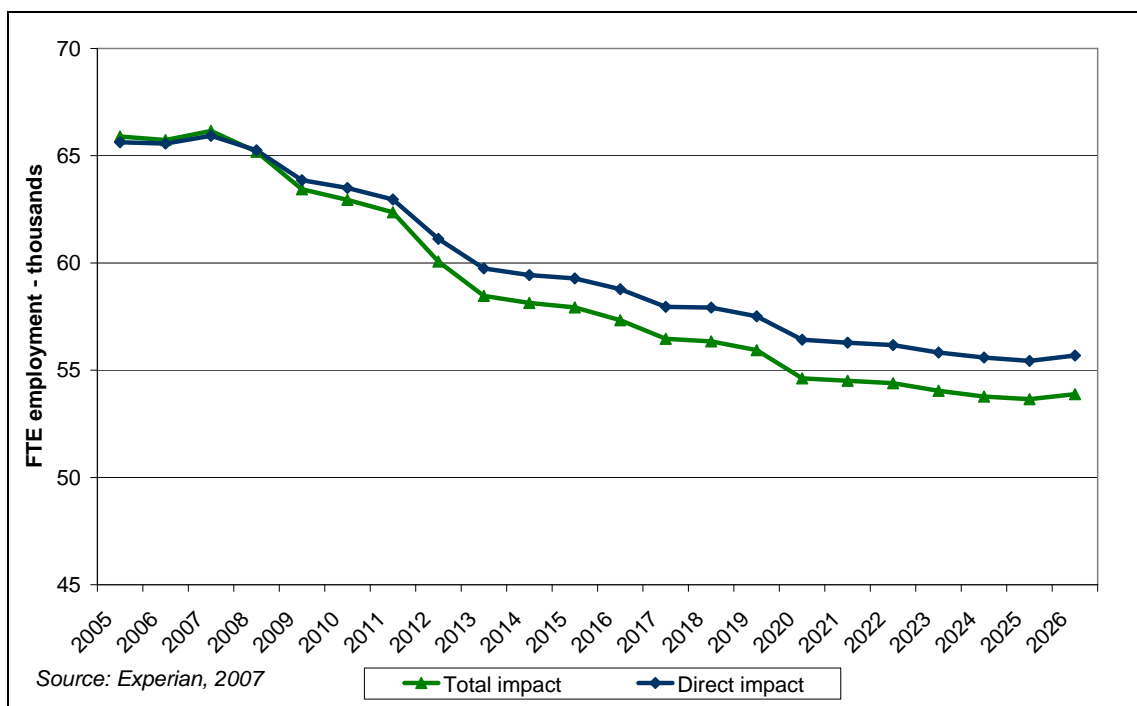
<sup>1</sup> The direct impact of decommissioning is the difference between the baseline in 2005 and the year-on-year decommissioning profile

<sup>2</sup> Profile of decommissioning taken from the Sellafield Lifecycle Plan 06/07 and data provided by BNFL.

Due to indirect and induced impacts, Sellafield supports more economic activity in West Cumbria than just the direct jobs and output at the site itself:

- The indirect or industry effects are the impacts that stem from the supply chain of Sellafield. If the level of decommissioning activity on the site increases, the expansion will require more raw materials and services from other industries, some of which will be sourced locally. In turn, these other industries may need to increase production to meet the demand and they too will increase output and employment. Evidence suggests that over 20 per cent of the Sellafield supply chain is located in Cumbria<sup>3</sup>.
- The induced impacts (or spending effects) result from the impact of increased wages in the area. The additional wages will be partly spent within the local economy. This rise in consumer demand requires increasing production of goods and services, hence increasing employment.

The sum of all the direct, indirect and induced effects gives the total impact of site activity on the West Cumbria economy. The direct and total impact of decommissioning is shown in figure 2.2. Here, the importance of Sellafield to the local economy is clearly evident. By 2026, the industry and induced impacts lead to a loss of around 2,000 additional full-time-equivalents above the direct impact.

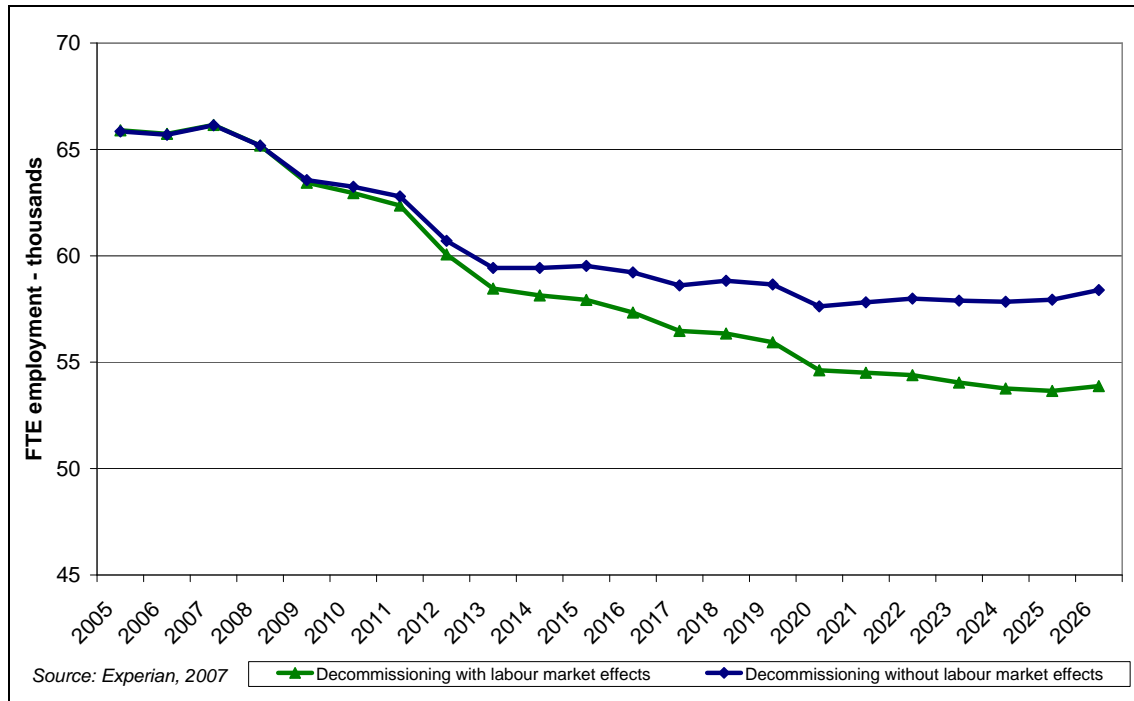


**Figure 2.2: Direct and total impact of decommissioning - FTE employment in West Cumbria**

Whilst such multiplier analysis captures the impacts of decommissioning on both the supply chain and consumer spending in West Cumbria, it fails to capture the reaction of the labour market to decommissioning. When a job is lost through decommissioning the redundant worker could find another job, retire, become inactive or unemployed, or migrate away from the area. The chosen option will affect the future economic prosperity of the area. We have developed the West Cumbria model so that it incorporates these labour market effects from decommissioning.

<sup>3</sup> Sourced from the Sellafield – Socio Economic Plan

Figure 2.3 shows the difference between the pure impact analysis and the results from the model once labour market adjustments have been included. By 2026 the model with labour market effects has almost 5,000 additional FTE jobs – partially offsetting the direct and indirect impacts of decommissioning. The decommissioning baseline that includes the reaction of the labour market to decommissioning provides a more realistic picture of how the real world West Cumbria economy might be expected to respond, and is used as the reference case with which to compare the intervention scenarios. The next section presents the results of the future with decommissioning.



**Figure 2.3: Decommissioning with and without labour market effects – FTE employment in West Cumbria**

### 3 Baseline scenario: The future under decommissioning

#### 3.1 THE FUTURE WITH DECOMMISSIONING

Our economic modelling has produced a ‘decommissioning baseline’ projection of the economic future of West Cumbria with nuclear decommissioning. It takes into account multiplier effects as a result of decommissioning as well as the labour market effects that will occur. This serves as an extremely useful benchmark against which the strengths and weaknesses of potential future scenarios can be evaluated.

Figure 3.1 below shows the headline results for our baseline projection with nuclear decommissioning. This has estimates for Gross Value Added (GVA), GVA per head, employment (using a measure of full time equivalents), total resident population, working age resident population, residents in employment, and unemployed residents:

	2006	2011	2016	2021	2026
GVA £ million (2003 prices)	£2,400	£2,500	£2,500	£2,600	£2,800
GVA per head (2003 prices)	£14,400	£14,800	£14,300	£14,500	£15,400
Employment (full-time-equivalent)	65,700	62,800	59,200	57,800	58,400
Total resident population	169,000	172,000	174,500	177,300	181,000
Working age resident population	103,500	103,800	102,500	101,100	99,700
Residents in employment	83,800	82,100	79,300	78,200	78,700
Unemployed residents	2,500	3,600	4,300	4,000	3,100

Source: Experian 2007

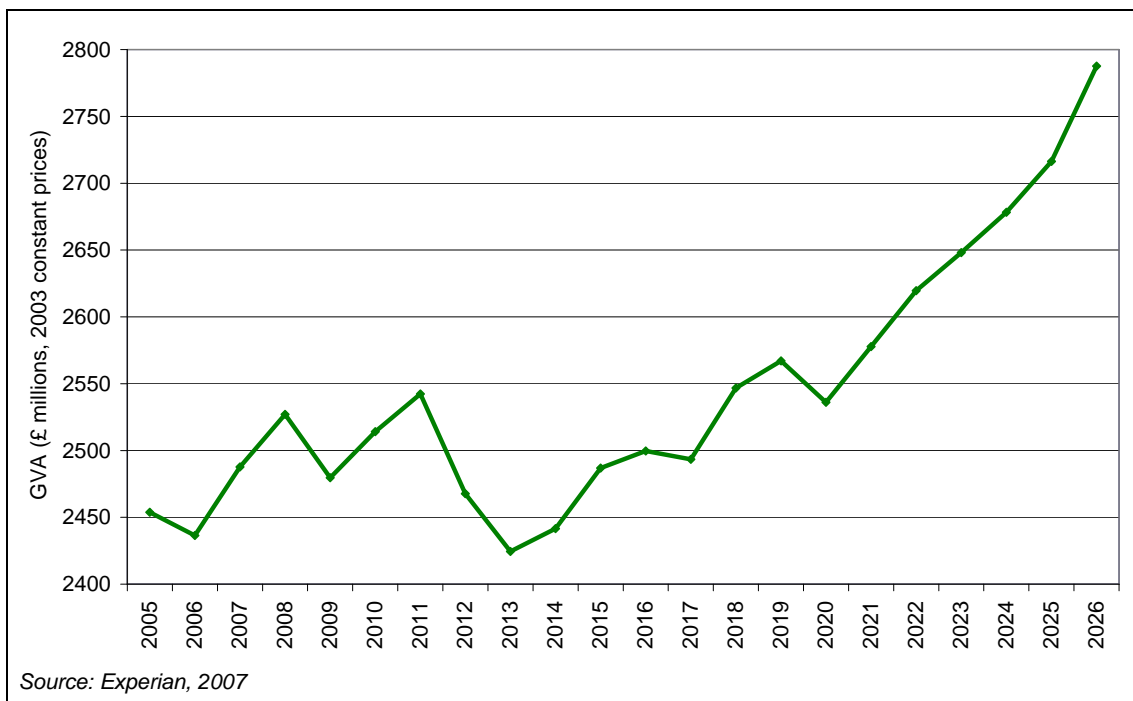
**Figure 3.1: Projections of West Cumbria's economic future with nuclear decommissioning**

#### 3.2 HOW WILL DECOMMISSIONING CHANGE GVA?

The decommissioning baseline estimates that GVA growth in West Cumbria will be positive but pedestrian over the next 20 years. Whilst employment falls over the period and population growth is stable, GVA is projected to increase.

- GVA growth is estimated to be an average of 0.6% per annum over 20 years between 2006-2026, with GVA growth of -0.5% each year between 2006 and 2014 and 1.1% per annum between 2015 and 2026.
- The sharpest rise in GVA is expected after 2013 when an upward trend becomes clear. This occurs during a period when the direct employment losses at Sellafield due to decommissioning ease. Productivity growth offsets declining employment, driving GVA growth. Productivity growth is, however, still relatively muted when compared

with the without decommissioning baseline due to the loss of highly productive jobs in the fuel refining sector.

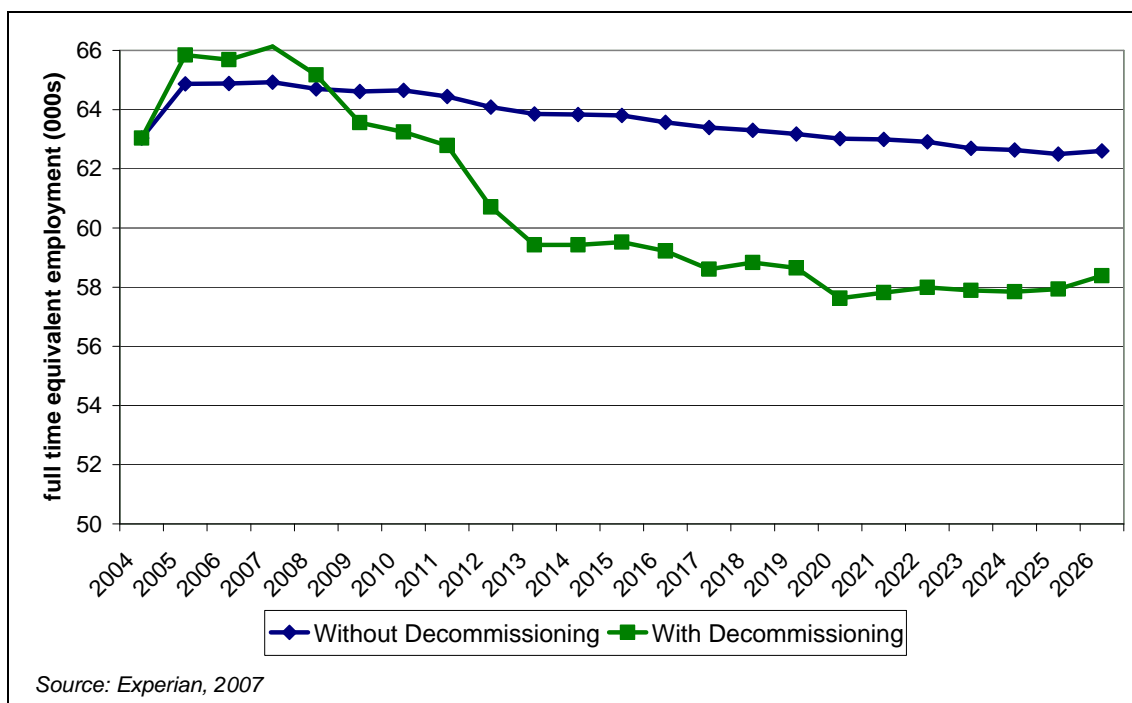


**Figure 3.2: GVA results for the baseline scenario.**

### 3.3 HOW WILL DECOMMISSIONING CHANGE EMPLOYMENT?

Our modelling results show the effect of decommissioning on employment (as measured by full time equivalents) in West Cumbria compared to the ‘without decommissioning’ baseline:

- In the near-term, 2004 through till 2008, the number of FTE jobs in West Cumbria will be slightly higher because of decommissioning. In 2006, we estimate there are over 65,700 FTE jobs in West Cumbria, 800 more than without decommissioning.
- Beyond 2008, we estimate that decommissioning means there will be fewer jobs in West Cumbria. By 2014, there will be over 4,000 fewer FTE jobs with decommissioning than in a situation without decommissioning.
- We estimate that from 2014, decommissioning will continue to mean 4,000 to 5,000 fewer FTE jobs each year within West Cumbria relative to a future without decommissioning. However, even in a situation without decommissioning, FTE employment in West Cumbria is projected to decline.



**Figure 3.3: Employment results for the baseline scenario.**

### 3.4 HOW WILL DECOMMISSIONING CHANGE EMPLOYMENT BY SECTOR?

The change in employment above consists of underlying changes in employment by sectors within West Cumbria. We have modelled employment changes across a range of different sectors. Some of the most significant differences between West Cumbria with and without decommissioning are in:

- **Fuel Refining** – Decommissioning directly affects the number of FTE jobs in the fuel refining sector. Without decommissioning, we estimate that employment in fuel refining would rise over the forecast period to a peak of 10,100 jobs in West Cumbria. With decommissioning, the number of FTE jobs climbs to 10,100 in 2008 but then begins to fall sharply, falling below 8,000 jobs in 2013 and below 6,000 jobs by 2023.
- **Industry** – The number of jobs in industry continues to decline under both baseline projections. However, in a situation with decommissioning, this decline is slowed. We believe that the decline of the nuclear sector in the area will reduce cost pressures in the area on other industries, for example in having to compete for staff. This increases the competitiveness of these firms and so extend their survival in the area.
- **Business and finance** – The number of FTE jobs declines because of decommissioning. Many business services, ranging from professional services such as research and engineering to support services such as cleaning and security are directly related to West Cumbria's nuclear industry. However, the bulk of direct job losses in businesses services due to decommissioning occur before 2014. After 2014 employment steadily increases but remains 1,000 jobs short of the without decommissioning figure for the business sector by 2026.
- **Retail and leisure** – The number of FTE jobs in retail and leisure is relatively static under both baseline projections. However, because of decommissioning, the retail and leisure sector performs a little more strongly.

Figure 3.4 below shows the sectors that will grow under decommissioning:

<b>Sector</b>	<b>Without decommissioning</b>	<b>With decommissioning</b>	<b>Difference</b>
Retailing	5410	5956	546
Hotels & Catering	3624	3932	308
Wholesaling	2572	2793	221
Transport	1741	1908	167
Other F&Bs	1446	1563	117
Rubber & Plastics	1311	1425	114
<b>Total</b>	<b>62604</b>	<b>58386</b>	<b>-4218</b>

Source: Experian 2007

**Figure 3.4: Sectors that gain employment under decommissioning  
(FTE employment in 2026)**

### **3.5 HOW WILL DECOMMISSIONING CHANGE THE WORKING AGE POPULATION?**

Our modelling results show the effect of decommissioning on West Cumbria's working age population:

- In the near-term, 2005 through till 2009, there are slightly more working age people resident in the area because of decommissioning. In 2006, we estimate there are 103,500 residents of working age in West Cumbria, 100 more than without decommissioning.
- Over 2009 to 2011, we estimate that there are a similar number of residents both with and without decommissioning.
- We estimate that from 2011, decommissioning will mean a slight but significant change in the working age population of West Cumbria. In a situation with decommissioning, the area's working age population will fall to 99,700 by 2026 compared to 101,100 without decommissioning.
- The working age population in West Cumbria is currently around 61% of the total resident population, which is in line with the UK average. Under both situations, the share of the population that is working age will fall to below 60% of the population by 2013 and will account for just 55 per cent of total population by 2026 under both baselines. The relative decline is greater under the with decommissioning baseline. The UK working age population is projected to account for 59% of total population by 2020.

### **3.6 HOW WILL DECOMMISSIONING CHANGE RESIDENTS IN EMPLOYMENT?**

Our modelling results show the effect of decommissioning on the number of West Cumbria's residents who are in employment:

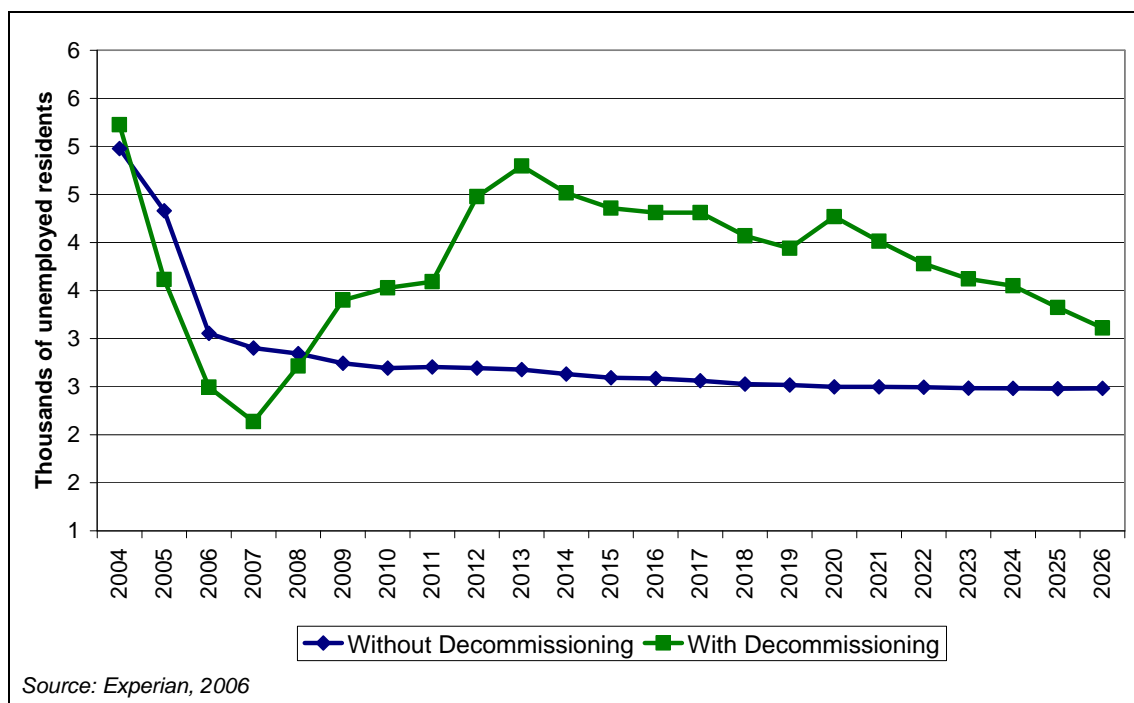
- In the near-term, from 2004 through till 2008, the number of working residents will be slightly higher because of decommissioning. In 2006, we estimate there will be 83,800 West Cumbria residents in work, 700 more than without decommissioning.
- Beyond 2008 we estimate that decommissioning means there will be fewer working residents in West Cumbria. By 2013 there will be over 4,000 fewer residents in employment as a result of decommissioning than there would be without decommissioning and this relationship is forecast to continue until 2026.

### 3.7 HOW WILL DECOMMISSIONING CHANGE THE UNEMPLOYMENT RATE?

Our modelling results show the effect of decommissioning on the unemployment rate compared to that without decommissioning.

- In the near-term, 2004 through till 2008, the unemployment rate will be lower because of decommissioning – a direct result of the increased employment resulting from the decommissioning process. In 2006, we estimate the unemployment rate to be 2.9% with decommissioning and 3.6% without decommissioning.
- Beyond 2008 and until 2013, we estimate that the unemployment rate will climb in West Cumbria because of decommissioning. In 2013, the unemployment rate peaks at 5.7% with decommissioning compared to 4.8% in a situation without decommissioning.
- We estimate that from 2014, the effects of decommissioning on unemployment in the area will gradually reduce. The unemployment rate will fall to 5.2% in 2020 and 3.8% by 2026.
- By 2026 the unemployment rate in the ‘with decommissioning’ baseline is approaching the ‘without decommissioning’ baseline level.

The potential increase in unemployment is reduced because many of those who may have become unemployed either retire (and so become inactive) or move away.



**Figure 1.3: Unemployed residents results for the baseline scenario**

## 4 Scenario one: Anchoring decommissioning

### 4.1 DESCRIBING THE SCENARIO

Scenario 1 is centred on anchoring and leveraging decommissioning. This is essentially a future in which West Cumbria is, or becomes, home to businesses engaged in the decommissioning activities within the area; then subsequently retains those businesses beyond the completion of decommissioning activities as a location for their functions in administration, project management, research and development, training and education.

In 2003, BNFL ceased power generation at Sellafield's Calder Hall power station. This was a small part of operations at Sellafield and employed around 500 people. In April 2005, the Nuclear Decommissioning Authority (NDA) assumed ownership of the complex and contracted British Nuclear Group (BNG) for decommissioning. The main activity is nuclear reprocessing at Magnox and THORP both of which are scheduled to close between 2012 and 2014. It was estimated that this would lead to 8,000 job losses although this may be less.

Therefore, decommissioning at Sellafield implies a loss of jobs in West Cumbria. However, there is a belief that decommissioning offers the opportunity for significant investment to the area through the NDA. Decommissioning activity provides guaranteed work for firms in the market for the next 20 to 30 years and possibly longer. As such the market is likely to attract investment in search of guaranteed returns. It is therefore possible that decommissioning businesses will remain in the area to take advantage of West Cumbria being recognised as a nuclear centre of excellence with a large pool of skilled staff.

The feasibility of this scenario rest on assumptions that:

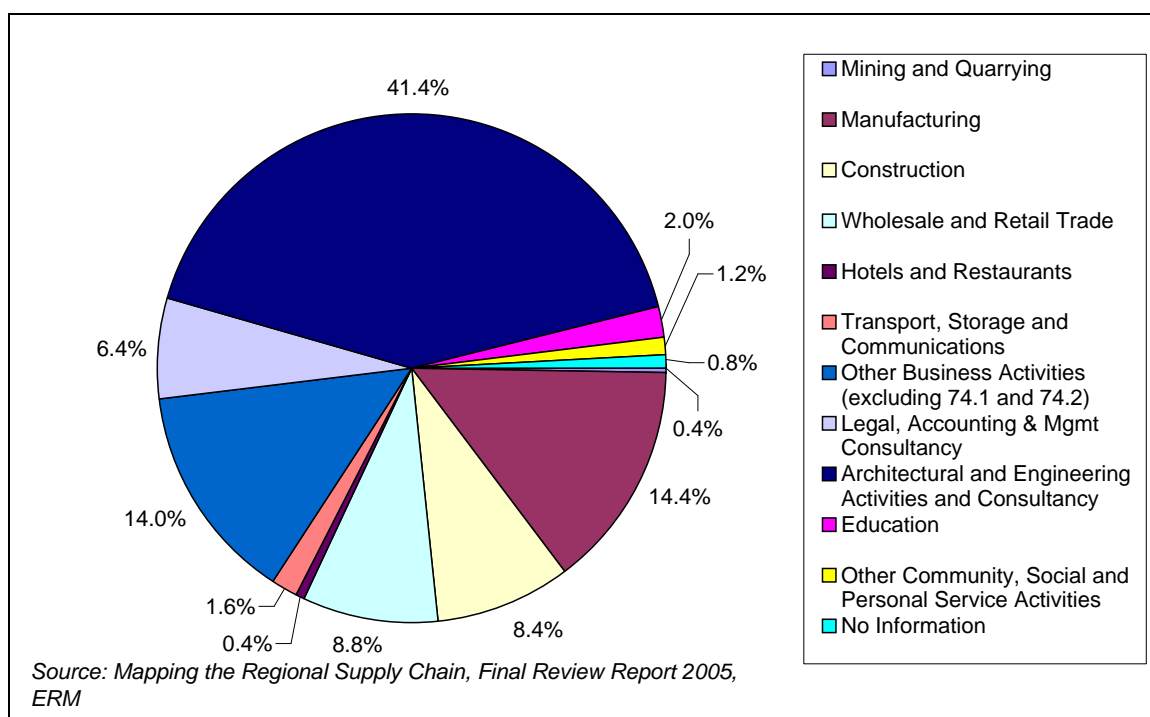
- The decommissioning process at Sellafield draws substantially from contractors based within West Cumbria and that the main likely contractors base their headquarters in West Cumbria. The number of jobs this generates depends on the type of presence companies expect to have.
- The presence of contractors in decommissioning establishes supply chain linkages between firms within West Cumbria. It is likely that much of the actual decommissioning work is "hands-on" and so presents opportunities for local businesses.
- As local opportunities diminish after 2025, there would need to be a legacy of a concentration of local expertise remaining. This includes standing in a strong position to export services for the growing market of decommissioning activities in USA and Europe.
- Businesses involved in nuclear decommissioning move to a wider decommissioning market encompassing the whole energy sector, particularly UK offshore decommissioning, fossil power plan, defence, green ship recycling, industrial plant, mining and refining.

The scenario relies on an increasing number of firms involved in decommissioning locating in the area as well as Tier 2 firms locating their satellite offices in the local economy. These firms will have interests not only in the local nuclear decommissioning market but also in the wider UK, European and global decommissioning market. They will also diversify into other non-nuclear decommissioning, utilising research and technology that can be transferred to these sectors.

## 4.2 HOW MUCH OF THE CURRENT SUPPLY CHAIN IS LOCATED IN WEST CUMBRIA AND HOW MIGHT THIS CHANGE DUE TO DECOMMISSIONING?

Clearly the onset of decommissioning, locally, in the UK and globally, represents a significant opportunity for West Cumbria. It is, however, difficult at this stage to quantify how much of this market can be captured locally.

Evidence suggests that around 38% of Sellafield expenditure is captured within Cumbria in terms of procurement value. This is based on information from 2003/04, and it is reasonable to assume that the supply chain has changed in recent years in light of changes to the procurement process and the different inputs required for decommissioning. Figure 4.1 shows a sectoral breakdown for the nuclear supply chain in the North West. As noted in the ERM Mapping the Regional Supply Chain report, four sectors are key to the regional nuclear supply chain as they supply much of the project management, design engineering and instrumentation services and decontamination services all of which form the core of decommissioning activity. These sectors are detailed in figure 4.3.



**Figure 4.1: % Share of Companies by sub Sector in the Cumbrian Nuclear Supply Chain**

To further explore the industry sectors that are involved in decommissioning we have looked at the employment profile of the area surrounding Dounreay, both pre and post-decommissioning. Figure 4.2 shows that the largest employment impact in Caithness (the district in which Dounreay is located) is in the processing of nuclear fuel. Other key sectors involved in decommissioning are labour recruitment and provision of personnel services (which provide many of the agency staff) and architectural and engineering activities. Manufacture of engines and turbines along with manufacture of accumulators, primary cells and primary batteries are two of the largest employment impacts in the Caithness area following decommissioning. Neither of these sectors currently has any representation in West Cumbria.

Sector	Change 2003 -	
	2004/5	% of total
Processing of nuclear fuel	1221	41%
Labour recruitment and provision of personnel services	725	24%
Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	374	13%
Architectural and engineering activities and related technical consultancy	249	8%
Management of real estate on a fee or contract basis	195	7%
Manufacture of accumulators, primary cells and primary batteries	112	4%
Fire service activities	30	1%
Legal activities	20	1%
Catering	15	1%
Other human health activities	13	0%
Manufacture of hollow glass	10	0%
Other provision of lodgings not elsewhere classified	10	0%
Total	2972	100%

Note: Compares average employment for 2004/5 in Caithness (Dounreay area) with that for 2003 (pre-decommissioning)

Source: Experian analysis 2007, ABI 2003 - 2005

**Figure 4.2: Estimated Employment Impact of Dounreay Decommissioning (ABI Employee Jobs)**

The assumptions behind this scenario are that more of the supply chain required for decommissioning is captured locally. We have identified 4 sectors which are key to the process and where West Cumbria has an opportunity through the decommissioning of Sellafield to expand operations and increase employment. It is assumed that due to the increasing activity in the nuclear and non-nuclear decommissioning sectors that these additional jobs can be supported in the future.

The key decommissioning SIC sector in terms of jobs that can be captured within West Cumbria are those in architectural and engineering activities and consulting. This SIC code is where many of the firms associated with decommissioning such as AMEC NNC, NIS, RTS and Capula are to be found. In 2004, the sector accounted for the same share of total employment in West Cumbria as in the GB as a whole. Aside from refuse and sanitation the other two key sectors are less well represented locally compared with the GB average.

Sector	SIC	West Cumbria 2004		GB 2004	
		FTE employment	% of total FTEs	FTE employment	% of total FTEs
Architectural and Engineering Activities and Consultancy	74.2	826	1.3%	330490	1.3%
Manufacture of fabricated metals	28	818	1.3%	354350	1.4%
Manufacture of machinery & equipment	29	269	0.4%	289400	1.2%
Refuse & sanitation, remediation services	90	309	0.5%	112870	0.5%
<b>Total</b>	-	<b>2222</b>	<b>3.5%</b>	<b>1087110</b>	<b>4.4%</b>

Source: ABI 2004/ Experian 2006

**Figure 4.3: Key Decommissioning Sectors in the West Cumbria and Great Britain**

The two manufacturing sectors are required for the production of materials used in the decommissioning process. In 2004, West Cumbria had a slightly lower proportion of firms involved in the manufacture of fabricated metals than the GB average. West Cumbria is under-represented in terms of employment in the manufacture of machinery and equipment. Refuse & sanitation and remediation includes activities central to decommissioning such as collection of construction and demolition waste. West Cumbria is again currently under-represented in this sector.

Whilst there has recently been some evidence of Tier 2 companies locating in West Cumbria (AMEC NNC, NIS, RTS and Capula for example), it is still too early to quantify these movements in terms of employment. We have been provided with some initial estimates of the types/ numbers of firms who have either moved or committed to move to the region but these are still provisional and contain little detail. Whilst this information clearly shows the magnitude of some of the movement into the local economy the information is still incomplete for modelling purposes.

The assumption for this scenario is that the guaranteed investment in the West Cumbria area will mean that the key decommissioning sectors identified above will employ an increasing number of West Cumbria residents. The direct gains associated from the increased demand are then run through the West Cumbria economic model. The analysis assumes additional employment above the 'with decommissioning' baseline. The assumption is that the key decommissioning sectors take on increasing shares of North West and UK employment in these sectors. The figures used in this scenario are illustrative; larger gains would result if West Cumbria is more successful in capturing decommissioning business than the figures assumed. The impact on the fuel-refining sector is already captured by the decommissioning baseline. The assumptions are as follows:

- Architectural and Engineering Activities and Consultancy (SIC7420) employment grows at 1% per annum from the 2006 point baseline point. Under this assumption West Cumbria would account for 4% of total employment in the sector in the North West compared with 2% in 2004. This is equivalent to 700 full-time equivalents in employment in West Cumbria by 2026.

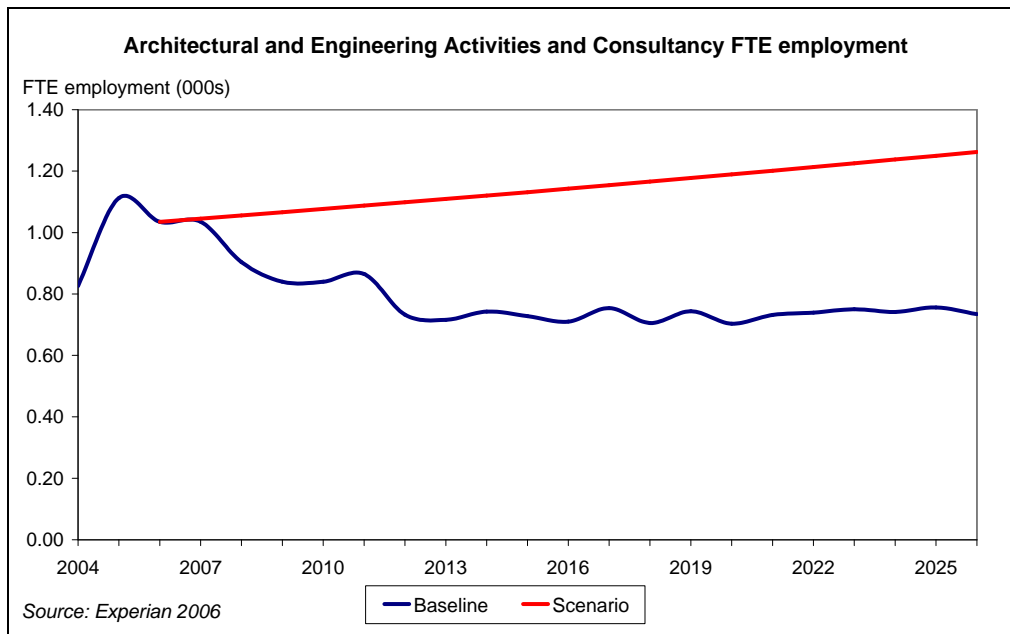


Figure 4.4

- Manufacture of fabricated metals (SIC28) employment increases to 3% of the North West total by 2026 from a starting point of 2% in 2004. This assumption is equivalent to 360 full-time equivalents by 2026.

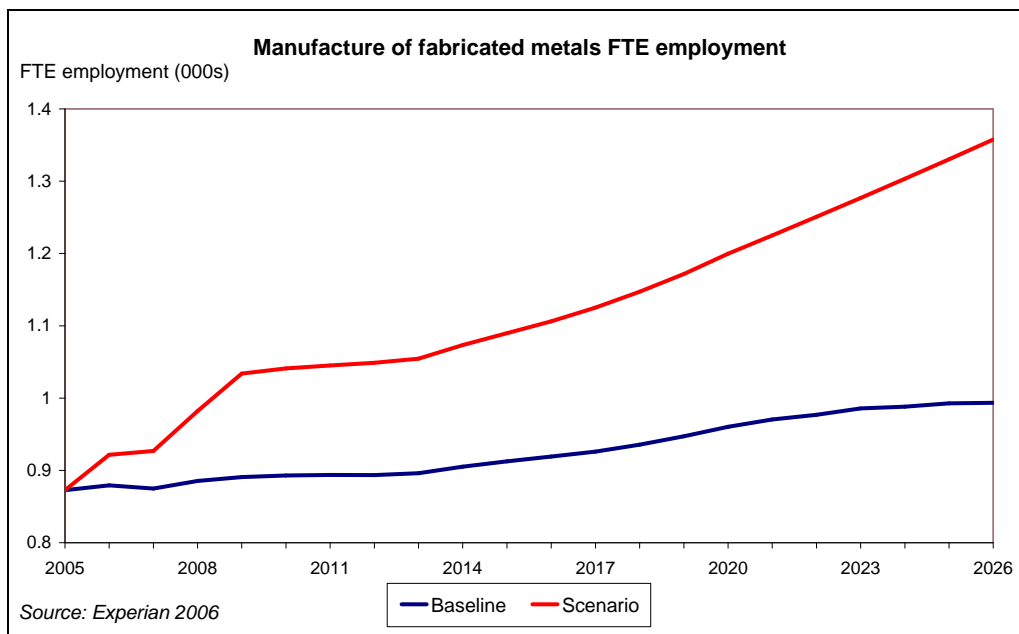


Figure 4.5

- Manufacture of machinery and equipment (SIC29) employment growth such that West Cumbria accounts for 20% of the regional share of this sector by 2026 from a starting position of 11% in 2004. This assumption is equivalent to 100 additional full time equivalents by 2026.

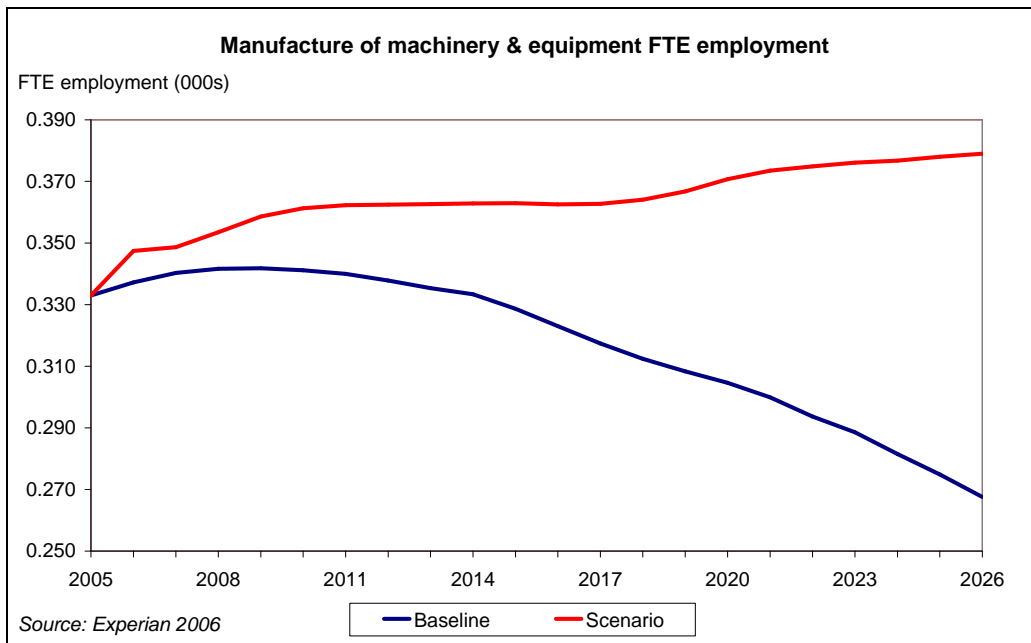


Figure 4.6

- Refuse and sanitation, remediation services employment increases to 8% of the North West total by 2026 from a starting point of 6% in 2004. This assumption is equivalent to an additional 160 full-time equivalents above the decommissioning baseline by 2026.

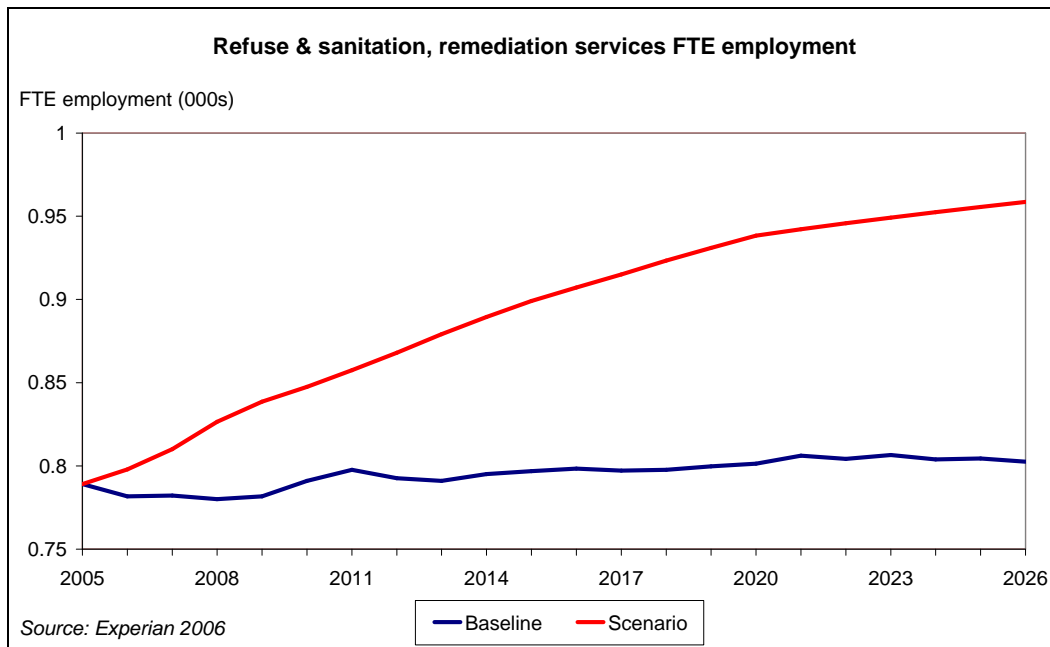


Figure 4.7

The explicit assumptions outlined above enable the impacts of the growth of the local supply chain in these sectors to be input to the decommissioning model. Together, the additional employment in these sectors accounts for 1,545 additional direct jobs in the West Cumbria economy by 2026. In the next sections we assess what this means for the West Cumbria economy before assessing the potential opportunity of the global decommissioning market.

### 4.3 WHAT WOULD WEST CUMBRIA'S ECONOMIC FUTURE LOOK LIKE?

The headline economic results for scenario 1 are presented below. This illustrates increases in output, employment, population and decreases in unemployment compared to the baseline scenario.

	2006	2011	2016	2021	2026
GVA £ million (constant prices)	£2,400	£2,600	£2,500	£2,600	£2,800
GVA per head (constant 2003 prices)	£14,200	£15,100	£14,300	£14,600	£15,400
Employment (full-time-equivalent)	65,900	63,900	60,400	59,100	59,900
Total resident population	169,000	172,100	174,800	177,700	181,600
Working age resident population	103,500	103,900	102,800	101,500	100,200
Residents in employment	84,100	83,200	80,500	79,500	80,100
Unemployed residents	2,300	2,800	3,600	3,400	2,600
<i>Source: Experian 2006</i>					

**Figure 4.8: Headline economic results for scenario 1**

### 4.4 HOW DOES THE SCENARIO CHANGE GVA?

Our modelling results show the effect on GVA of the occurrence of scenario 1, compared to the decommissioning baseline. The chart below shows that the effect on GVA of scenario 1 is relatively slight:

- In the near term, up until 2011, GVA under scenario 1 is almost exactly the same as under the decommissioning baseline.
- After 2011, GVA under scenario 1 rises slightly above GVA under the baseline scenario, with both scenarios following the same gradual upward trend, but with GVA under scenario 1 rising at a slightly greater rate, causing the gap between the two to widen.
- By 2026, the estimated difference in GVA is around 2%.

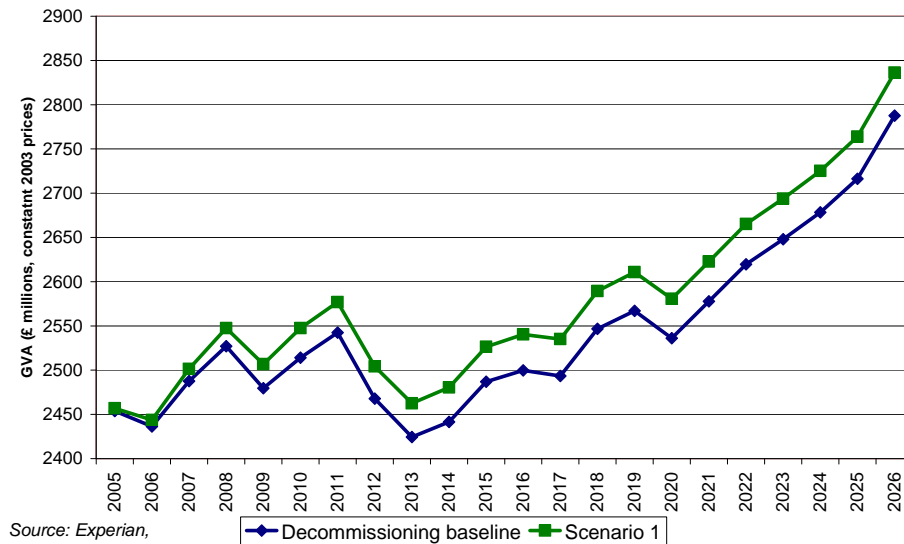


Figure 4.9: GVA results for scenario 1

#### 4.5 HOW DOES THE SCENARIO CHANGE WORKPLACE EMPLOYMENT?

Our modelling shows the changes in workplace employment in terms of full-time equivalents. The graph shows that employment falls over the period for both scenarios, but over time, the gap between the baseline and scenario 1 widens, with employment under scenario 1 falling at a slightly slower rate than under the baseline scenario:

- Between 2007 and 2013 the decline in employment becomes more noticeable, and employment under the baseline scenario starts falling at a greater rate than scenario 1. In 2013 the difference between total full-time equivalent employment under the baseline and scenario 1 is around 1,100.
- After 2013, the rate at which employment falls begins to slow, and the gap between the baseline and scenario 1 still increases, but very slowly. The difference between the two in 2026 is almost 1,500 FTEs.

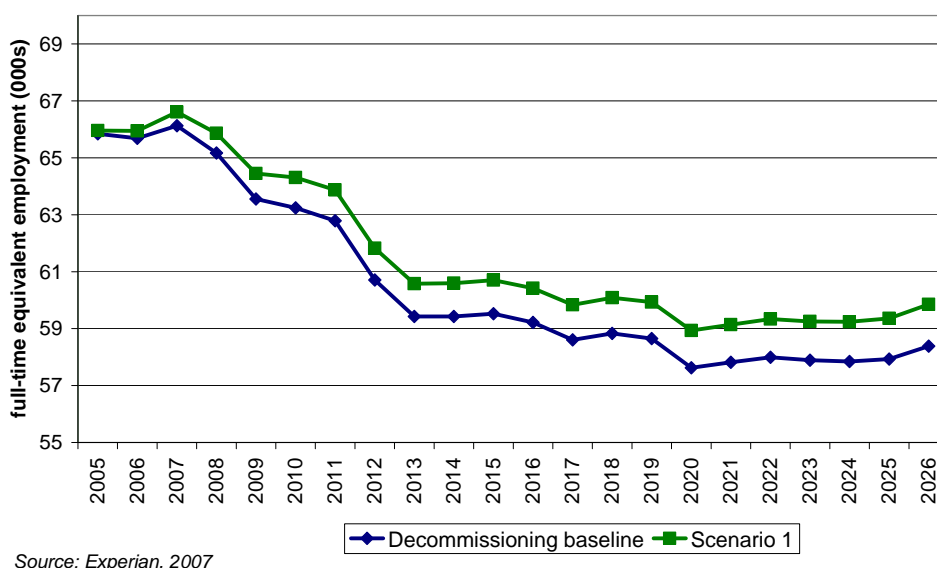


Figure 4.10: Employment results for scenario 1

#### 4.6 HOW DOES THE SCENARIO CHANGE EMPLOYMENT BY SECTOR?

The table below shows the eight sectors which we estimate will experience the greatest increase in employment as a result of the occurrence of scenario 1 compared to the baseline decommissioning scenario in 2026.

- The biggest difference between expected employment under the baseline and scenario 1 in 2026 is the metals sector which increases by 800 jobs as a result of scenario 1.
- The business services sector also sees a large increase due to scenario 1. Under the baseline scenario, employment in this sector in 2026 is estimated to be 3,339 while under scenario 1 it is expected to be 3,563. This is a difference of 224.
- The machinery and equipment sector is also estimated to see an increase in employment if scenario 1 occurs, from 282 under the baseline, to 386.

Sector	Baseline	Scenario 2	Difference
Metals	1489	2319	831
Other	5467	5948	481
Business Services	4862	5032	170
Machinery & Equipment	253	359	106
Retailing	5956	6008	52
Hotels & Catering	3932	3962	30
Health	8488	8516	28
TOTAL	58386	59852	1466

*Source: Experian 2007*

**Figure 4.11: Employment by sector for scenario 1**

#### 4.7 HOW DOES THE SCENARIO CHANGE WORKING AGE POPULATION?

Our economic modelling results show only a slight difference between working age population for the decommissioning baseline and under scenario 1, both experiencing a gradual decline over the period 2005 to 2026:

- Between 2005 and 2013, the difference between the number of working age residents under the baseline and scenario 1 is relatively small, with our estimates suggesting the difference peaks in 2013 at 170 people.
- After 2013, the effect of scenario 1 begins to emerge, with more working age residents under scenario 1 than the baseline.
- After 2019 the effect of scenario 1 on the working age population begins to increase, and by 2026, we estimate that there will be almost 500 additional working age residents as a result of scenario 1.

#### 4.8 HOW DOES THE SCENARIO CHANGE RESIDENTS IN EMPLOYMENT?

Our modelling results show that over the period 2005-2026, the fall in the number of residents in employment will be marginally less severe under scenario 1 than the decommissioning baseline:

- In the near term, up until 2011, the effect of scenario 1 is that the fall in residents in employment is very slightly less severe than under the decommissioning baseline. In 2011 we estimate there will be 83,200 residents in employment under scenario 1, and 82,100 under the baseline scenario.
- After 2011, the rate of decline under both scenarios begins to slow slightly and the difference between the two becomes slightly greater, as residents in employment under scenario 1 falls at a slightly slower rate than the baseline. The difference though, is

slight. By 2026, we estimate there will be 80,100 residents in employment under scenario 1 compared to 78,700 residents under the baseline scenario, a difference of 2%.

#### 4.9 HOW DOES THE SCENARIO CHANGE THE UNEMPLOYMENT RATE?

Our economic modelling results show that over the period 2005-2026, the general pattern of unemployment rates is increasing until 2013, and then slowly beginning to decline to a level slightly below that in 2005.

- Between 2007 and 2013 we estimate that under both the baseline scenario and scenario 1 there is a sharp rise in the unemployment rate. In 2013 the unemployment rate under scenario 1 is estimated to be 4.8%, while under the baseline scenario it is estimated to be 5.7%.
- After 2013, the unemployment rate begins to decline under both scenarios at a very slow rate until 2019, when there is a slight increase, followed by a sharper decline. The unemployment rate under scenario 1 is consistently lower than that under the baseline scenario. By 2026 the unemployment rate is estimated to be 3.8% under scenario 1, and 3.1% under the baseline scenario.

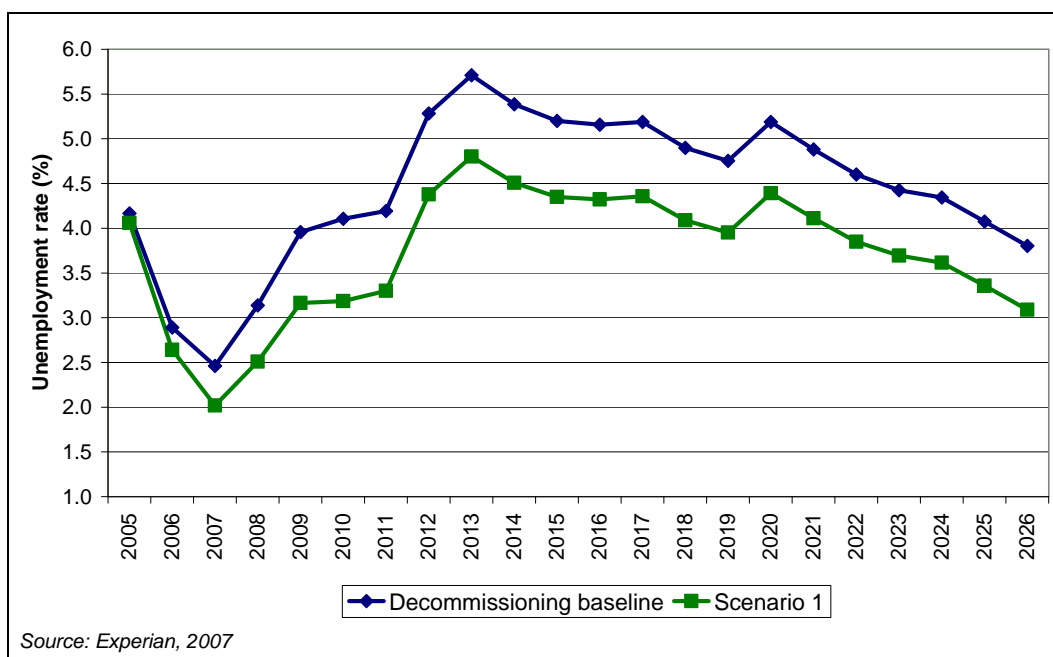


Figure 4.12: Unemployment results for scenario 1

#### 4.10 GLOBAL NUCLEAR DECOMMISSIONING AND THE NON-NUCLEAR DECOMMISSIONING MARKET – THE OPPORTUNITIES FOR WEST CUMBRIA

So far we have concentrated on the opportunity for the local area to capture more of the decommissioning supply chain and to establish a local base for the decommissioning activity in West Cumbria. However the wider scope of this scenario is to look at the opportunities open to West Cumbria to capture part of both the global nuclear decommissioning and the non-nuclear decommissioning markets.

Figure 4.13 details the estimated market size of nuclear and non-nuclear opportunity. The figures are vast (between £300-500bn, although this is over a long time period, at least 50 years), and whilst they highlight the opportunity for the West Cumbria region if it is to be able to develop itself as a recognised centre of decommissioning excellence, the sheer size of the sums of money involved create problems for estimating how much can realistically be captured by

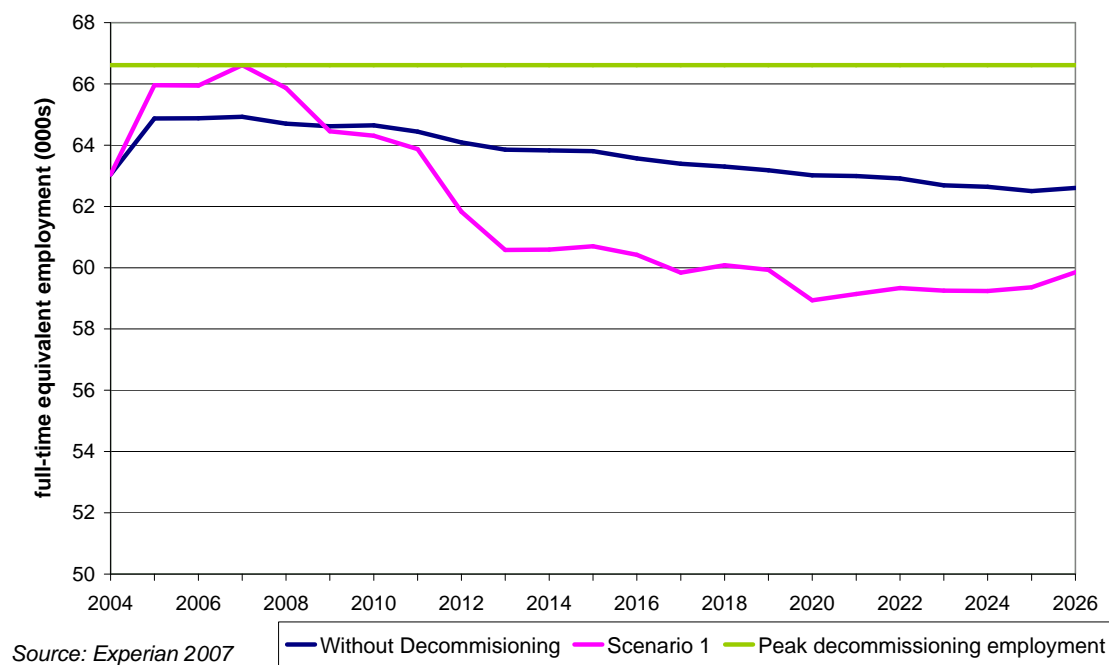
West Cumbria. We therefore take a different approach to modelling the potential impact of further expansion of decommissioning-related activity within West Cumbria. As such, in this section we identify the employment gap that is expected to be created by decommissioning in the West Cumbria economy and use this to estimate the scale of external decommissioning that would need to be captured to offset this employment loss. We also examine the implications of a moderate further expansion of decommissioning employment in West Cumbria. These simulations are intended to illustrate the effects of modest, but significant, engagement by West Cumbria in the vast potential market for global decommissioning, rather than as predictions of likely outcomes. We do not believe that there is sufficient evidence to make realistic projections at this time.

Opportunity	Estimated Market Value (£bn)
<b>Nuclear Decommissioning</b>	
UK Civil decommissioning programme	£62.7
UK British Energy power stations decommissioning	>£10
Aldermaston defence opportunities	£2.5bn over 70 years
Global decommissioning opportunities	£244bn plus £150bn support infrastructure
<b>Non nuclear opportunities</b>	
UK offshore decommissioning	£15-19bn
Fossil power plant	£4bn
Defence	£6bn

Source: *Global Nuclear Decommissioning Opportunities*, DTI October 2005

**Figure 4.13: Decommissioning opportunities**

Figure 4.14 shows the gap between Sellafield at the height of decommissioning against scenario 1, which focuses on capturing more of the decommissioning supply chain locally. It also shows the gap between ‘without decommissioning’ and Scenario 1.



**Figure 4.14: West Cumbria Employment Gaps**

In 2013 the gap between Scenario 1 and the ‘without decommissioning baseline’ is some 3,200 full-time equivalents, although this falls to 2,750 by 2026. Clearly the gap between Scenario 1 decommissioning and employment at the height of decommissioning is substantial – equivalent

to 6,000 full-time equivalents by 2013, with a peak in 2020 of 7,700. Assuming a value added per head figure of £54,000<sup>4</sup> for all decommissioning activity, it is possible to estimate the likely size of the global market that would need to be captured locally to offset the impact of decommissioning on employment. Such analysis suggests that an additional average of £0.13bn a year between 2009 and 2026 would be required from the wider decommissioning market to restore employment to the ‘without decommissioning’ baseline. To maintain employment at the level achieved at the height of decommissioning is equivalent to a total £5.8bn between 2007 and 2026. This is a substantial figure for West Cumbria given GVA in the area is estimated to be £2.8 billion in 2026 under the decommissioning baseline, and therefore to achieve this would be a considerable accomplishment.

The challenge for West Cumbria will be to capture this activity locally in terms of employment. Much of the actual physical decommissioning work is hands on work (construction, engineering etc) that by its nature is located on site. As with the decommissioning at Sellafield much of the employment will be sourced from the current local labour force with a pool of specialist architectural, engineering and construction consultants responsible for designing and project managing the different facets of the decommissioning process. Other opportunities will exist for the manufacture and provision of machinery and equipment used in the decommissioning work.

To a large extent, the potential for West Cumbria to become a major global centre for decommissioning activity will depend on the strength of forces leading to geographical ‘clustering’ of these activities, and on West Cumbria’s competitive advantage vis-à-vis other potential locations. The tendency of industries to cluster geographically has been a major focus of recent research in economic geography, and has had a substantial influence on development policy. Theory suggests that geographical clustering is encouraged by ‘agglomeration economies’ associated with reduced transportation costs for inputs (from suppliers) and products (to markets); increased reliability of supply (which is critical under ‘just-in-time’ type supply-chain systems); sharing of information among related suppliers; and labour market ‘pooling’ which stimulates the co-location of appropriately skilled workers and firms demanding those skills. On the other hand, high transport costs for final goods and dispersed markets will encourage the geographical dispersion of production. Available evidence<sup>5</sup> largely supports these predictions. The tendency for industries to localise is quite widespread, although there is substantial variability between industries, with some being widely dispersed, and with extreme localisation being unusual. The geographical scale at which clustering takes place also varies between industries. Many industries cluster within relatively small geographical areas, mainly within and around cities. Others cluster over larger geographical areas – of the scale of UK regions or larger. Industries rarely cluster in rural areas which are not close to cities. Industries which do cluster will generally do so at several locations, both nationally and internationally.

We could find no evidence directly related to clustering in industries associated with decommissioning. However, the more general evidence suggests that extreme clustering of

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<sup>4</sup> ERM site a figure of £40,000 in Mapping the Regional Supply Chain. However, Sellafield GVA per worker is estimated to by Grant Thornton to be £73,150. This figure is not necessarily representative of decommissioning activity as around 50% of decommissioning activity is captured by industries outside of the fuel refining sector – namely business services and construction. To calculate the average figure Experian have taken the figure provided by Grant Thornton as representative of decommissioning jobs in fuel refining and used output per worker figures for business services and construction from the ABI and ABI2 providing a figure of £54,000.

<sup>5</sup> There is a rapidly growing body of academic empirical research in this area. Recent examples include Devereux et al (2004) “The geographical distribution of production activity in the UK”, *Regional Science & Urban Economics*; Duranton & Overman (2005) “Testing for localization using micro-economic data”, *Review of Economic Studies*; and Duranton & Overman (2006) “Exploring the detailed location patterns of UK manufacturing industries using microgeographic data, *Centre for Economic Performance*.

such activity is unlikely. This is primarily because a large proportion of decommissioning work must be conducted on or close to the site of the facility being decommissioned. This is equivalent to the case of high transport costs with dispersed markets – pointing to dispersed locations. However, the highly-specialised nature of skills involved in some aspects of decommissioning, and the need for sophisticated facilities, would be expected to encourage some degree of clustering for off-site work. Given this, we believe that the scenario presented is fairly ambitious in terms of the share of global work captured by West Cumbria once Sellafield decommissioning has been concluded.

## 5 Scenario two: A nuclear energy cluster

### 5.1 DESCRIBING THE SCENARIO

Scenario 2 is about developing a global centre of excellence for nuclear and environmental remediation. This scenario is incremental to scenario 1. In this scenario, West Cumbria further develops its nuclear industry in activities other than decommissioning. All aspects of nuclear clusters are included in this scenario to show the economy under a renaissance of the nuclear industry in West Cumbria. This in turn attracts more businesses and people to the area.

The end of power generation has not meant end of nuclear reprocessing at Sellafield. There is THORP (Thermal Oxide Reprocessing Plant), which went into operation in 1997 and has a projected lifetime until 2020. In April 2005 the plant reported leakage of radioactive waste and continues to be closed. Current contracts were scheduled to terminate in 2014 which is when decommissioning begins unless new contracts are placed. The area also currently has the B205 Magnox Reprocessing Plant opened in 1971 which is expected to close in 2010 and decommissioning to begin from 2012; the continued operation of Low Level Waste Repository near to the village of Drigg; and interim storage of intermediate and high level waste is also located at Sellafield and is likely to expand with decommissioning.

The feasibility of this scenario rests on assumptions that:

- West Cumbria is chosen by the DTI as the site for “National Nuclear Laboratory”. This laboratory would undertake research and work with other research bodies, joint working with decommissioning contracts and other consultancy work, development of intellectual property for licensing and exploitation by the private sector with technical advice and infrastructure provision to companies. The Laboratory has been given the go ahead and will be located in West Cumbria.
- West Cumbria becomes site of a Nuclear Skills Academy, along with Westlakes Research Institute and Dalton Nuclear Institute (part of University of Manchester), all developing nuclear related skills in the area.
- There is a commercialisation agency and technology centre providing firms with technology support, product development support, ICT support and meeting facilities.
- Waste storage continues in the area.
- There is continuation of reprocessing with the existing facility continuing till 2020, and with new reprocessing after 2020.
- There is new nuclear build and a new nuclear power station included as part of the overall renaissance, with construction beginning in 2012.
- The presence of all the above attracts new nuclear businesses into the area through inward investment, start-up enterprises and supporting business.
- This scenario is cumulative to scenario 1.

The direct jobs gains included in this scenario have been considered in terms of the construction and direct jobs each element of the scenario will support.

#### 5.1.1 Construction Jobs

The nuclear new build is assumed to be a Twin AP 1000 as detailed in the ERM, Potential New Build in Cumbria report. Figure 5.1 shows that there are 8,800 full time equivalent construction jobs required to build the new nuclear power facility. To estimate the construction jobs associated with the other developments we have used labour coefficients which state that £1mn

worth of construction output requires 8.5 full-time equivalents<sup>6</sup>. For example, the build of the National Nuclear Laboratory is assumed to be worth a value of £15.8mn which will require 150 full-time equivalent workers to construct the building.

<b>Construction FTEs (000s)</b>	<b>2008-2010</b>	<b>2012-2017</b>
Nuclear New Build	0	8.8
National Nuclear Laboratory	0.15	0
Dalton Nuclear Institute	0.15	0
Technology centre	0.15	0
Low Level Waste	0.1	0
Commercialisation Agency	0.15	0
Nuclear Skills Academy	0.15	0
<b>Total</b>	<b>0.85</b>	<b>8.8</b>

*Source: Experian 2006*

**Figure 5.1: Estimated construction jobs**

### 5.1.2 Direct jobs

The direct jobs associated with scenario 2 are shown in figure 5.2. The largest element is derived from the assumption of continued nuclear reprocessing. Nuclear new build provides 600 jobs per year on completion and will be important in off-setting the employment losses from the decommissioning of Sellafield. The education and research and development facilities together are expected to support over 4,100 jobs by 2026 and will be vital to the region becoming a nuclear centre of excellence.

<b>Initiative</b>	<b>Full-time equivalent employment (000s)</b>
National Nuclear Laboratory	1
Reprocessing	2
Nuclear new build	0.6
Dalton Nuclear Institute	0.15
Technology centre	0.75
Low level waste	0.03
Commercialisation agency	0.05
Nuclear Skills Academy	0.15
<b>TOTAL</b>	<b>4.73</b>

**Figure 5.2: Direct employment estimate for each nuclear sector development**

### 5.1.3 Attracting new nuclear jobs and encouraging diversification and spill-over activity

The scenario assumes that additional investment in education and research and innovation will encourage enterprise in the area and encourage existing firms to diversify into different sectors where there is the potential to transfer technology and skills from the nuclear sector. There is a great deal of research which looks at the relationship between innovation and the catalytic effect it has on the rest of the economy, creating spill-over activity. We could not, however, find relevant empirical research on *local* spillovers from education and R&D. Most of the research on R&D spillovers looks at benefits (in terms of enhanced innovation and productivity in the broader economy) over countries as a whole, or even internationally. There is some evidence that these benefits are at least partially localised in some cases – with larger productivity improvements being observed closer to R&D facilities (within 50 or 150 km). Such effects are,

<sup>6</sup> Estimate of labour coefficients for the construction industry, University of Dundee, December 2005

however, variable across industries and are often observed within city regions. There relevance to the West Cumbria case is therefore highly questionable. Evidence on the location of industries around research centres suggests strong local linkages in sectors which are highly reliant on formal academic research (pharmaceuticals) but greater dispersion for other industries. City effects are also important. Again there is little available evidence directly relevant to the nuclear sector in West Cumbria. Given this, we do not think it is possible to predict the possible spillover effects from nuclear education and R&D spillovers within West Cumbria with any confidence.

For the purposes of the modelling exercise described below, we have assumed that more businesses will be created within the sectors that are directly related to decommissioning and that these firms will operate within sectors closely related to nuclear decommissioning.

This scenario builds upon scenario 1 and is cumulative to scenario 1. We have therefore assumed that the development in businesses involved in decommissioning and the subsequent diversification are implicit within scenario 1.

## 5.2 WHAT WOULD WEST CUMBRIA'S ECONOMIC FUTURE LOOK LIKE?

The headline economic results for scenario 2 are presented below. This illustrates increases in output, employment, population and decreases in unemployment compared to the baseline scenario.

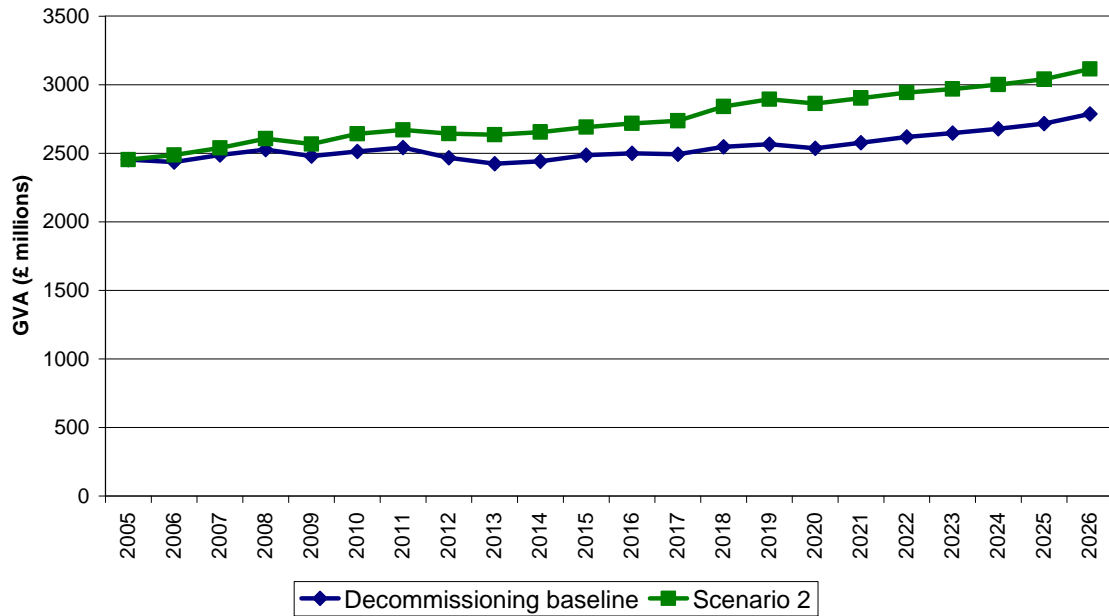
	2006	2011	2016	2021	2026
GVA £ million (constant 2003 prices)	£2,500	£2,700	£2,700	£2,900	£3,100
GVA per head (constant 2003 prices)	£ 15,000	£16,000	£15,000	£16,000	£17,000
Employment (full-time-equivalent)	66,800	66,100	64,700	63,600	64,000
Total resident population	169,400	172,900	176,400	180,300	184,900
Working age resident population	103,900	104,700	104,200	103,800	103,100
Residents in employment	84,900	85,500	84,800	84,000	84,300
Unemployed residents	1,600	1,400	1,800	2,300	2,400
<i>Source: Experian 2007</i>					

**Table 5.3: Headline economic results for scenario 2**

## 5.3 HOW DOES THE SCENARIO CHANGE GVA?

Our modelling results show the effect on GVA of the occurrence of scenario 2, compared to the decommissioning baseline:

- Over the period, GVA under scenario 2 is greater than GVA under the baseline.
- In the near term the increase as a result of scenario 2 is relatively small. There is a difference of 5% between what GVA would be under the baseline scenario, and what it would be if scenario 2 occurred.
- In the longer term, the difference between GVA under the baseline and GVA under scenario 2 increases each year.
- By 2026 there is a difference of 11.7% between GVA under scenario 2 and the baseline



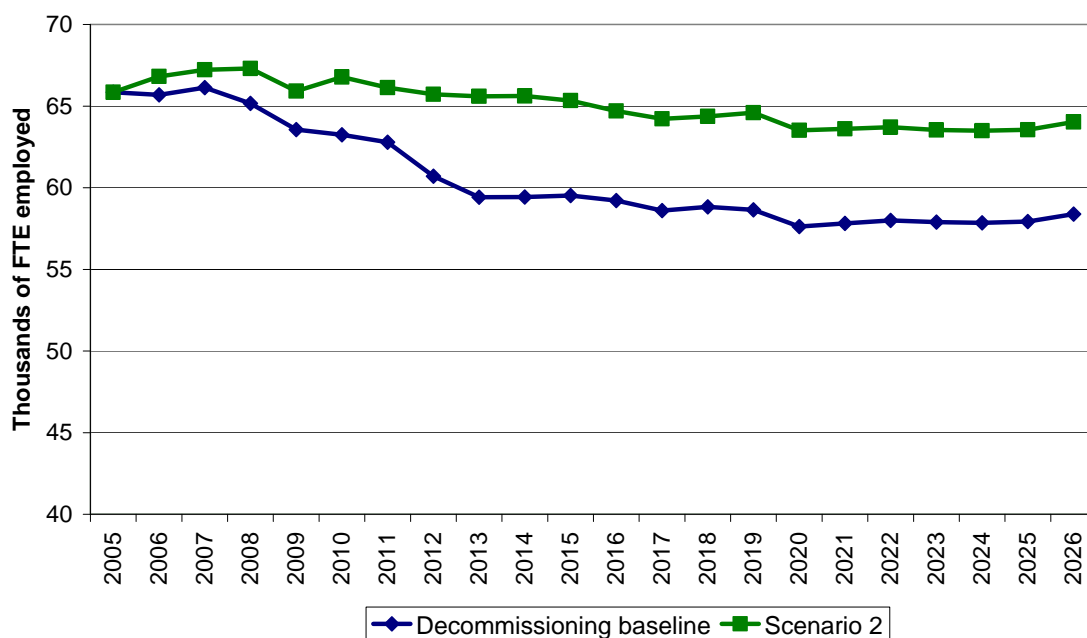
Source: Experian, 2007

Figure 5.4: GVA results for scenario 2

## 5.4 HOW DOES THE SCENARIO CHANGE WORKPLACE EMPLOYMENT?

Our modelling shows the changes in workplace employment in terms of full-time equivalents:

- Employment over the period is expected to be significantly higher if scenario two occurred than the decommissioning baseline. Employment under the baseline falls sharply from 65,800 in 2005 to 59,400 in 2013, a fall of 6,400. This is compared to a fall of just 200 over the same period under scenario 2 to 65,600 in 2013.
- After 2013, the rate of decline under scenario 2 is similar to that of the baseline, but because the fall between 2005 and 2013 was much lower, the level is consistently higher than the baseline.
- By 2026 we estimate that the additional number of FTEs employed as a result of scenario 2 is 5,600.



Source: Experian, 2007

**Figure 5.5: Employment results for scenario 2**

## 5.5 HOW DOES THE SCENARIO CHANGE EMPLOYMENT BY SECTOR?

The table below shows FTE employment in 2026 for the eight sectors which we estimate will be the largest in terms of employment:

- The fuel refining sector will experience an increase of 2,200 FTEs as a result of scenario 2, increasing from 5,800 to 8,000. This is a direct result of the additional reprocessing capacity.
- The business service sector also benefits from scenario 2, with an increase of 2,300 FTEs.

Sector	Baseline	Scenario 2	Difference
Fuel refining	5,800	8,000	2,200
Health	8,500	8,600	100
Business services	4,900	7,200	2,300
Retailing	6,000	6,300	300
Other	5,500	6,200	700
Hotels & Catering	3,900	4,100	200
Education	2,900	3,300	400
Construction	4,500	4,600	100

Source: Experian, 2007

**Table 5.6: Scenario 2 FTE employment by sector**

## 5.6 HOW DOES THE SCENARIO CHANGE WORKING AGE POPULATION?

Our economic modelling results shows working age population to be higher under scenario 2 than the baseline.

- Under the baseline working age population declines from 102,900 in 2005 to 99,700 in 2026.
- Under the scenario working age population remains broadly stable throughout 2005-2026. Working age population falls slightly to 101,800 by 2026.

## 5.7 HOW DOES THE SCENARIO CHANGE RESIDENTS IN EMPLOYMENT?

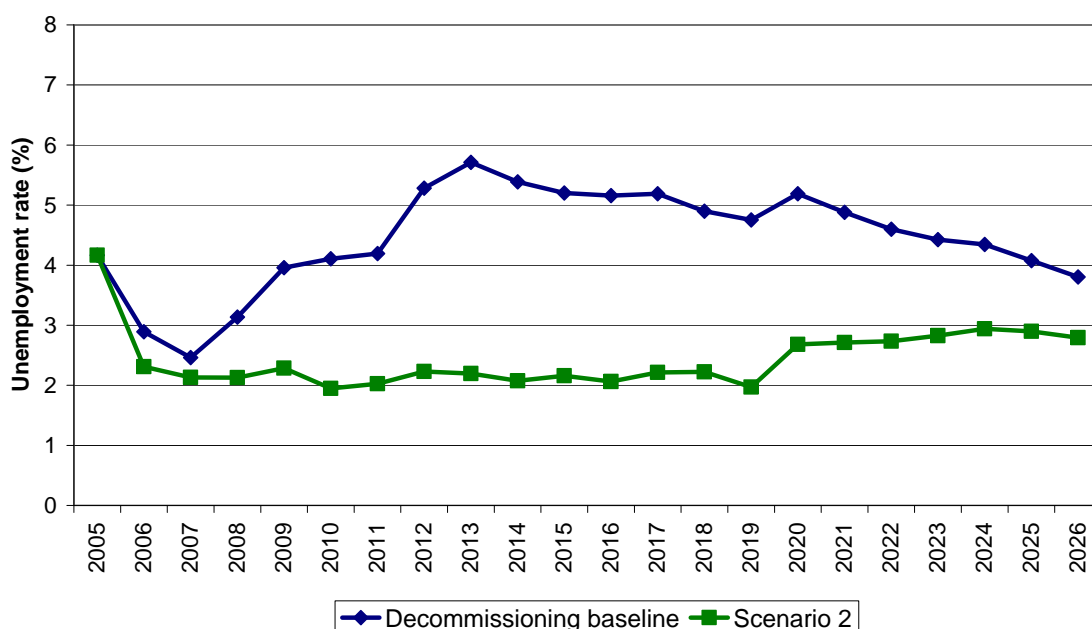
Our modelling results show that over the period 2005-2026, the fall in the number of residents in employment will be less severe under scenario 2 than the decommissioning baseline:

- Under the baseline residence-based employment falls from 83,200 in 2005 to 79,200 in 2013. Thereafter the number of residents in employment remains steady to 2026 with an estimated 78,700 people in employment.
- In the scenario residents in employment increases from 2005 to peak at 85,950 in 2010. From 2010 onwards there is an overall decline to 84,300 people by 2026. This implies an additional 5,600 residents in employment by 2026.

## 5.8 HOW DOES THE SCENARIO CHANGE THE UNEMPLOYMENT RATE?

Our economic modelling results show that over the period 2005-2026, unemployment will be significantly lower as a result of scenario 2.

- Under the baseline, the unemployment rate rises sharply to 5.7% by 2013. In contrast scenario 2 sees the unemployment rate broadly constant and around 2% from 2007-2019. Thereafter the unemployment rate increases to 2.8% by 2026.
- The difference between the scenario and baseline peaks in 2013, with the scenario 3.5 percentage points lower than the base. After this, as the baseline unemployment rate falls and the scenario unemployment rate increase post 2019, the gap narrows. By 2026, the scenario unemployment rate is only 1% below the baseline.



Source: Experian, 2007

**Figure 5.7: Scenario 2 unemployment rate**

## 6 Scenario three: Diversify to leisure and tourism

### 6.1 DESCRIBING THE SCENARIO

Scenario 3 examines the economic benefit of increasing tourism and leisure in West Cumbria. The provision of tourism and leisure facilities in the area is believed to be poor. The leisure offer available to residents in the area is limited and relatively few tourist visitors are drawn westwards from the busy Lake District National Park. However, the area's coastal and rural environments are believed to offer opportunities both for lifestyle and tourism.

The feasibility of this scenario rests on tourism developments that are already occurring in the area. These include:

- “Destination Maryport” with the development of a concert centre, heritage attraction and tourist information office
- Hadrian's Wall and Roman heritage visitor attraction in Maryport
- The market town initiatives (MTIs)

However, the scenario would also require further potential tourism development and some of the proposals for this include:

- Derwent Forest – potentially with second homes in a parkland setting and a championship golf course. This area of land is currently contaminated.
- Investment in St Bees coastal town
- A coastal park with significant remediation of the coastal environment
- Major hotel development in Whitehaven

There is little available evidence to explain why visitors to the Lake District may not choose to go to West Cumbria. Increased investment in attractions may not increase tourist numbers distance or poor access act as barriers. However, the modelling for this scenario assumes that the proposed tourism developments attract sufficient funding. This in turn stimulates increases in visitor numbers to the area which is successful in promoting perceptions of West Cumbria as a tourist destination over perceptions of the area as an industrial or nuclear location.

#### 6.1.1 Scenario assumptions

The scale of the impact of the tourism scenario is based on estimates of additional visitor days by project type and location provide by Grant Thornton. These are shown in figure 6.1 below.

	<b>Visit days</b>
Hotels	72,818
Attractions	325,813
Vibrant	96,650
Other enhancements	190,263
<b>Total</b>	<b>685,543</b>
<i>Source: Grant Thornton</i>	

**Figure 6.1: Additional visitor days under Tourism scenario**

We have assumed that the total additional visitor days of 685,500 is achieved by 2016 and grows at the same annual rate thereafter until 2026. The additional visitor days are then converted to visitor numbers and expenditure using data on the average length of stay and spend of tourists from the Scarborough Tourism Economic Activity Monitor (STEAM) and Cumbria Tourist Board.

	<b>2004</b>
Visitors (Millions)	4.4
Length of stay (days)	1.95
Spend per day (£, 2004 prices)	34.6
<b>Total expenditure (£ millions)</b>	<b>294.5</b>

**Figure 6.2: West Cumbria Tourism Statistics**

The key assumptions under the scenario are that the average length of stay increases to 2.2 days per visitor from the current 2.0, and spend per visitor reaches £39.6 per day from the current £34.6. These changes bring tourist spending in West Cumbria up towards the regional average. The result is an extra £66.3 million of tourism expenditure in West Cumbria by 2026.

## 6.2 WHAT WOULD WEST CUMBRIA'S ECONOMIC FUTURE LOOK LIKE?

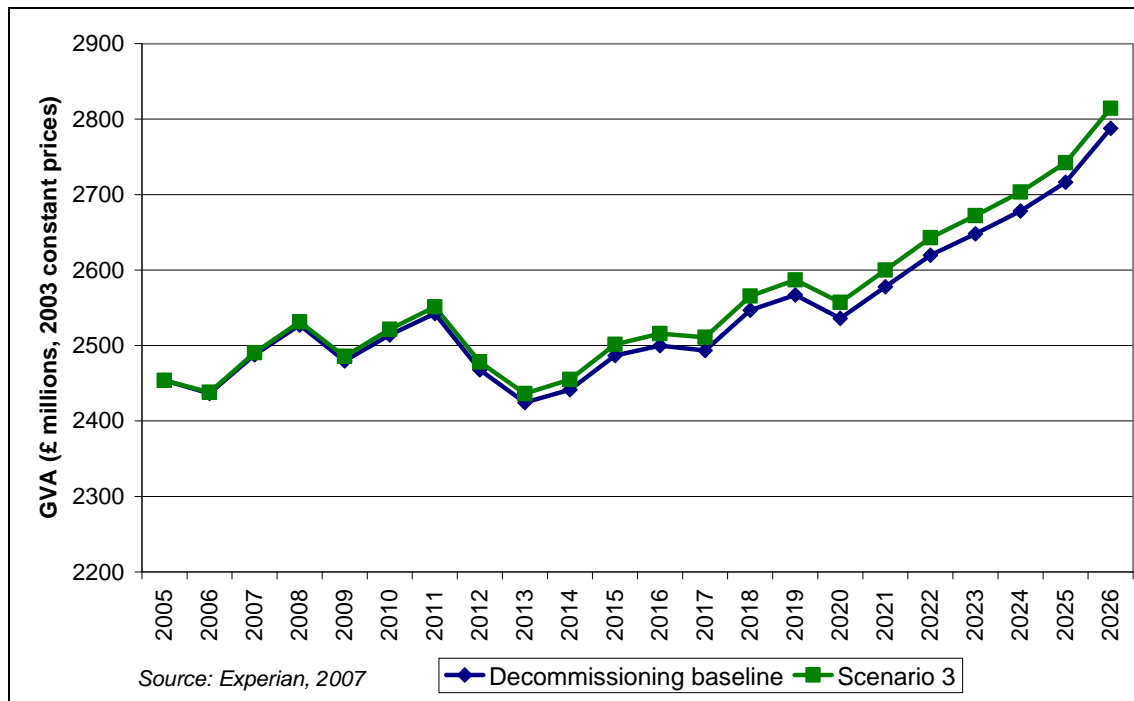
The headline economic results for Scenario 3 are presented below. This illustrates small increases in output, employment, population and decreases in unemployment compared to the baseline scenario.

	<b>2006</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>
GVA £ million (2003 constant prices)	£2,400	£2,500	£2,500	£2,600	£2,800
GVA per head (2003 constant prices)	£14,400	£14,800	£14,400	£14,600	£15,500
Employment (full-time-equivalent)	65,800	63,100	59,800	58,600	59,400
Total resident population	169,000	172,000	174,650	177,500	181,300
Working age resident population	103,500	103,870	102,600	101,300	100,000
Residents in employment	83,870	82,460	79,920	79,100	79,800
Unemployed residents	2,440	3,330	3,910	3,520	2,570
<i>Source: Experian 2006</i>					

**Figure 6.3: Headline economic results for scenario 3****6.3 HOW DOES THE SCENARIO CHANGE GVA?**

Our modelling results show the effect on GVA of the occurrence of scenario 3, compared to the decommissioning baseline:

- Throughout the period there is only a slight increase in GVA under scenario 3 compared to the decommissioning baseline.
- By 2026, the estimated GVA for West Cumbria under scenario 3 is £2.8 billion compared to £2.78 billion under the baseline. This is a difference of a little over 1%.

**Figure 6.4: GVA results for scenario 3****6.4 HOW DOES THE SCENARIO CHANGE WORKPLACE EMPLOYMENT?**

Our modelling shows the changes in workplace employment in terms of full-time equivalents:

- Between 2005 and 2013, employment for both the baseline scenario and scenario 3 falls relatively sharply compared to the rest of the period – employment falls by 6,000 in 8 years. This is largely a result of the direct job losses at Sellafield.
- After 2013 the gap between scenario 3 and the baseline employment numbers begin to widen as the decline in employment slows down. Between 2013 and 2026, employment falls by 1,000 under scenario 3 and 450 under the baseline.
- By 2026, workforce FTE employment is 59,400 under scenario 3 compared to 58,400 under the baseline – a difference of around 2%.

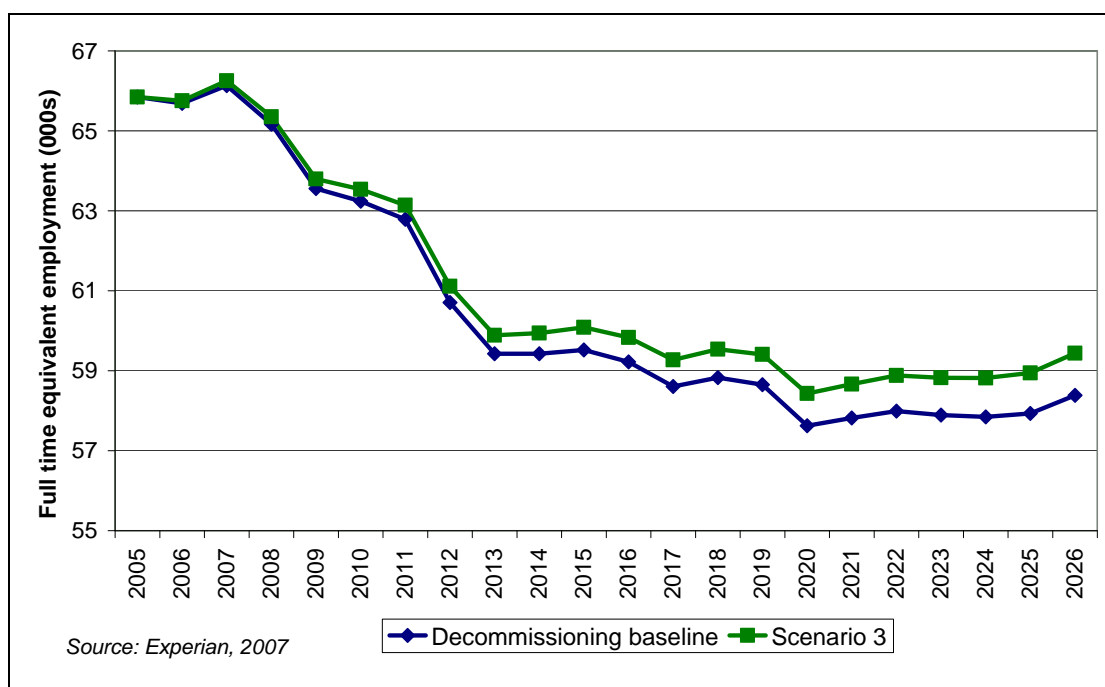


Figure 6.5: Employment results for scenario 3

## 6.5 HOW DOES THE SCENARIO CHANGE EMPLOYMENT BY SECTOR?

Scenario 3 has an impact on employment at the level of individual sectors – but mostly direct impacts on tourism related sectors. In 2026, employment is higher, relative to the baseline in hotels & catering and retailing.

- The hotels and catering sector experiences the greatest increase in jobs as a result of scenario 3. Under the baseline scenario there are expected to be 4,000 jobs in the sector in 2026 compared to 4,770 under scenario 3. This is a difference of just over 19%.
- The retailing sector also sees an increase under scenario 3, although the change is not as great as in the hotels and catering sector. There is a difference of almost 4% between the baseline and scenario 4 in the estimated number of jobs in the sector in 2026.

Sector	Baseline	Scenario 3	Difference
Hotels & Catering	3,930	4,710	770
Retailing	5,960	6,180	230
Other	5,470	5,590	130
Total	58,390	59,440	1,050

Source: Experian 2007

Figure 6.6: Employment by sector for scenario 3

## 6.6 HOW DOES THE SCENARIO CHANGE WORKING AGE POPULATION?

Our economic modelling results show only a slight difference between working age population for the decommissioning baseline and working age population under scenario 3:

- Working age population follows the same growth path for both scenario 3 and the decommissioning baseline in the years to 2013. After 2014 working age population falls at a slightly slower rate under scenario 3 than under the baseline as the direct job losses

from Sellafield ease and the impacts from increased tourism filter through to increased tourism related jobs, offsetting the losses from decommissioning.

- In the longer term there is little difference between scenario 3 and the baseline. By 2026, under scenario 3 the working age population is 100,000 compared to 99,700 under the baseline – a difference of only 0.3%.

## 6.7 HOW DOES THE SCENARIO CHANGE RESIDENTS IN EMPLOYMENT?

Our modelling results show that over the period 2005-2026, the fall in the number of residents in employment will be marginally less severe under scenario 3 than the decommissioning baseline:

- In the near term, 2005-2013, the fall in the number of residents in employment is similar for both the baseline and under scenario 3, falling by 3,500 under scenario 3 and by 4,000 under the baseline.
- After 2013 residents based employment is relatively stable under scenario 3, remaining at around 80,000 until 2026. During the same period residents based employment declines under decommissioning.
- By 2026, under Scenario 3, the number of residents in employment is 79,800 compared to 78,700 under the baseline – a difference of 1.4%.

## 6.8 HOW DOES THE SCENARIO CHANGE THE UNEMPLOYMENT RATE?

Our economic modelling results show that over the period 2005-2026, the general pattern is the same under scenario 3 and the baseline scenario. Unemployment rates increase until 2013 and remain steady until 2020 when there is a sharp fall.

- Up until 2013, the unemployment rate increases at a greater rate under the decommissioning baseline, reaching 5.7 %, compared to an unemployment rate under scenario 3 of 5.3%.
- Between 2013 and 2020 the unemployment rates fall slightly. In 2020 the unemployment rate on the baseline is 5.2% and under scenario 3 is 4.6%.
- After 2020 the unemployment rates fall sharply. By 2026 the baseline unemployment rate is 3.8% and the unemployment rate under scenario 3 is 3.1%.

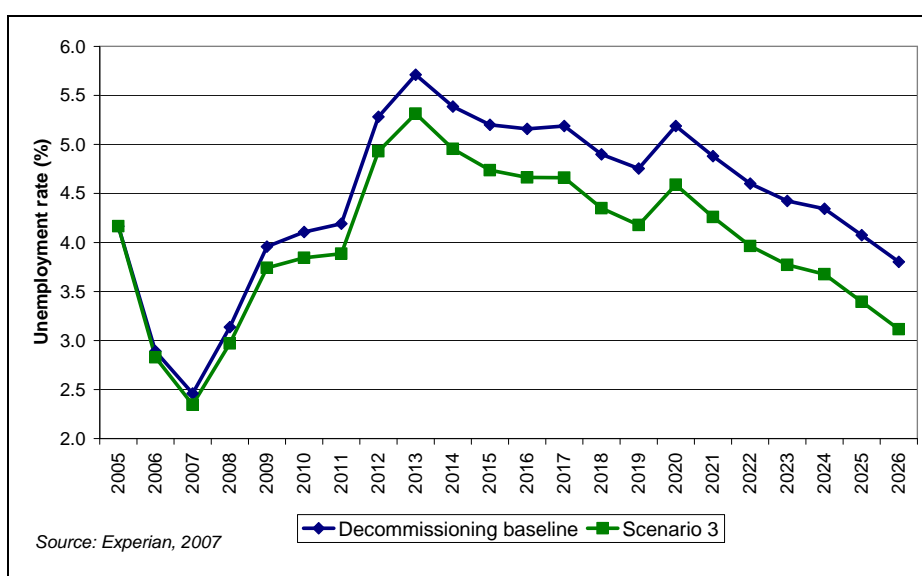


Figure 6.7: Unemployment results for scenario 3

## 7 Scenario four: Enhancing enterprise and skills

### 7.1 DESCRIBING THE SCENARIO

Scenario 4 is positioned as transformational through looking at a potential future for West Cumbria in which the nuclear sector is less important and that increasing enterprise in other sectors and strengthening qualification levels of the workforce shape the future.

There is evidence that the general situation for skills and enterprise in West Cumbria is poor. Entrepreneurship is not good in the area and the business start up rates low (as measured by VAT registrations). This may partly be explained by the dominance of a single high-wage employer, namely the nuclear industry. Higher education opportunities are limited and currently there is no university in Cumbria. At present an estimated 22% of those in employment have graduate level (NVQs 4 and 5) qualifications. This is against a figure of 27% for the North West as a whole and 31% for the UK. However West Cumbria does have a lower proportion of working age people with no qualifications than the North West and England. 10% of the working age population in West Cumbria have no qualifications compared with 17% for the North West and 14% for England.

The feasibility of the scenario being achieved rests on:

- The declining dominance of a big single employer which may reduce the potential disincentive to business start-ups. However, fewer job opportunities is not, in itself, sufficient to encourage self-employment.
- The proposed University of Cumbria, expected to be centred in Carlisle, may make higher education more accessible. Whilst none of the four campuses comprising the University of Cumbria are located in West Cumbria, one university centre is located near Workington (Lakes College) and another is located in the neighbouring district of Barrow (Furness College). Lakes College student numbers are proposed to reach 240 full-time equivalent students by 2016/17 compared with 33 in 2007/08. Furness College is proposed to reach 367 FTE students by 2016/17. The majority of courses provided at these institutions will be part-time higher education courses.
- New and improved schools in the area strengthening educational attainment.

It is assumed that improved skill levels allow residents to become connected to opportunities for diversification and enterprise development activities. A better educated workforce could enhance the area's occupational and sectoral mix, with higher wages and higher employment rates.

### 7.1.1 Scenario assumptions

This scenario is based around improvements in three areas which help determine the performance of the West Cumbria economy: firm formation rates, proportion of the working age with no qualifications and the proportion of those employed with graduate level qualifications.

#### 7.1.1.1 Firm formation

The assumption underpinning the modelling of this scenario is that an increase in the rate of firm formation will lead to an increase in economic growth. This is based on findings from a cross-sectional analysis of growth rates across regions compared with business start-up rates by region undertaken by Experian in 2004. This research found a statistically significant positive relationship between firm formation and economic growth. However, there is some degree of debate concerning causality i.e. does an increase in firm formation lead to an increase in economic growth or does an increase in economic growth lead to an increase in firm formation. For this exercise the relationship is assumed to be the former - that increased firm formation leads to increased economic growth.

Firm formation rates in the model are based on VAT registration data. The baseline is derived from the average firm formation rate for the last two available data points (2004 and 2005), giving a baseline of 19.8 start-ups per 10,000 people per annum and 24.2 per 10,000 adults per annum.

The current North West firm formation rate per 10,000 *adults* is 32.5, 6.3 higher than West Cumbria. The assumption is that West Cumbria closes this gap by 2026. This implies a firm formation rate per 10,000 *population* of 27.9 by 2026, 8.1 higher than the current value.

The employment and productivity effects are allocated among industries using data on firm formation by industry. By 2026 the effects are allocated according to the industrial mix of firm formation in England. An assumption is made that none of the employment and productivity gains fall in the public sector.

#### 7.1.1.2 No qualifications

The key factor underlying the modelling of this scenario is that employment rates are lower amongst people of working age with no qualifications than for other NVQ levels. Accordingly by reducing the number of people with no qualifications, employment levels will increase.

According to the latest (2005) data from the Annual Survey of Population (APS) West Cumbria has a lower proportion of working age people with no qualifications than England; 10.4% compared with 14.1% in England as a whole – a gap of 3.7%. Under the baseline the gap between West Cumbria and England is forecast to narrow by 2026. This would suggest that West Cumbria would effectively lose any competitive edge it may have in this area relative to the UK and the wider North West region.

The assumption under the scenario is that the gap with England is maintained at current levels by 2026. This implies a reduction in the percentage of the working age population with no qualifications to 4.3%.

At this stage we have a new qualifications profile for people of working age. The model estimates the impact of this new profile by using data on the employment rate by NVQ level. The employment impact is allocated amongst industries by looking at the level of employment change by NVQ level, and what industries people with different NVQ levels are likely to work in. Changing the skills mix of employment under the scenario will also affect productivity. Increases in productivity are measured by changes in average earnings.

### **7.1.1.3**      *Graduate qualifications*

This component of the scenario involves increasing the proportion of employed people qualified to NVQ level 4 and above. The assumption underpinning the modelling of this scenario is that more people with graduate qualifications will boost productivity levels across the North West economy. Increases in productivity are measured by changes in relative earnings.

An estimated 22% of employed in West Cumbria have graduate (NVQ 4 and 5) qualifications in 2005. The figure for the North West is 27.3%, meaning a gap of 5.3%.

Under the baseline West Cumbria increases to 27.2% by 2026 and the North West to 32.5%, maintaining the gap. The assumption in this scenario is that West Cumbria reaches North West proportion by 2026 (the gap reduces to zero) and that people upskill from NVQ level 3.

A new average earnings level is calculated for the scenario based on the new qualifications profile from which the productivity gain is derived.

As with the “No Qualifications” part of the scenario, the effect is allocated to industries by looking at the industries that people with different levels of qualifications are likely to work in. An assumption is made that extra employment in NVQ 4 and 5 can not be in the public sector, but some of employment lost from NVQ 3 can be from the public sector; so overall there will be a fall in public sector employment. This assumption aids the diversification of the economy in West Cumbria.

## **7.2      WHAT WOULD WEST CUMBRIA’S ECONOMIC FUTURE LOOK LIKE?**

The headline economic results for scenario 4 are presented below. This illustrates small increases in output, employment, population and decreases in unemployment compared to the baseline scenario.

	2006	2011	2016	2021	2026
GVA £ million (2003 constant prices)	£2,400	£2,600	£2,600	£2,700	£3,100
GVA per head (2003 constant prices)	£14,200	£15,300	£15,300	£15,800	£18,100
Employment (full-time-equivalent)	65,800	63,500	61,100	61,000	63,200
Total resident population	169,000	169,800	170,200	170,700	171,400
Working age resident population	103,500	103,900	102,700	101,600	101,200
Residents in employment	83,900	82,800	81,100	81,400	83,400
Unemployed residents	2,440	3,070	3,110	2,080	2,700

Source: Experian 2006

Figure 7.1: Headline economic results for scenario 4

### 7.3 HOW DOES THE SCENARIO CHANGE GVA?

Our modelling results show the effect on GVA of the occurrence of scenario 4, compared to the decommissioning baseline:

- In the near term, 2005 through until 2008, the GVA increase as a result of scenario 4 is only very slight.
- Between 2008 and 2018, the increase in GVA becomes increasingly greater in scenario 4 compared to the decommissioning baseline.
- We estimate that from 2019, the growth in GVA due to the occurrence of scenario 4 will continue to increase at a greater rate than the baseline.
- By 2026, the estimated GVA for West Cumbria under scenario 4 is £3.1 billion compared to £2.8 billion under the baseline. This is a difference of over 11%.

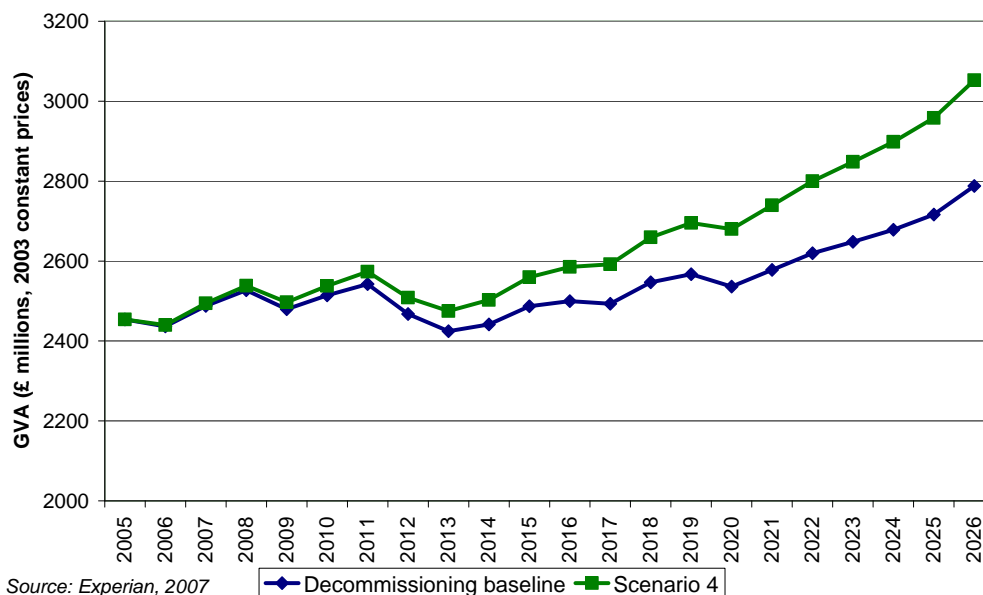
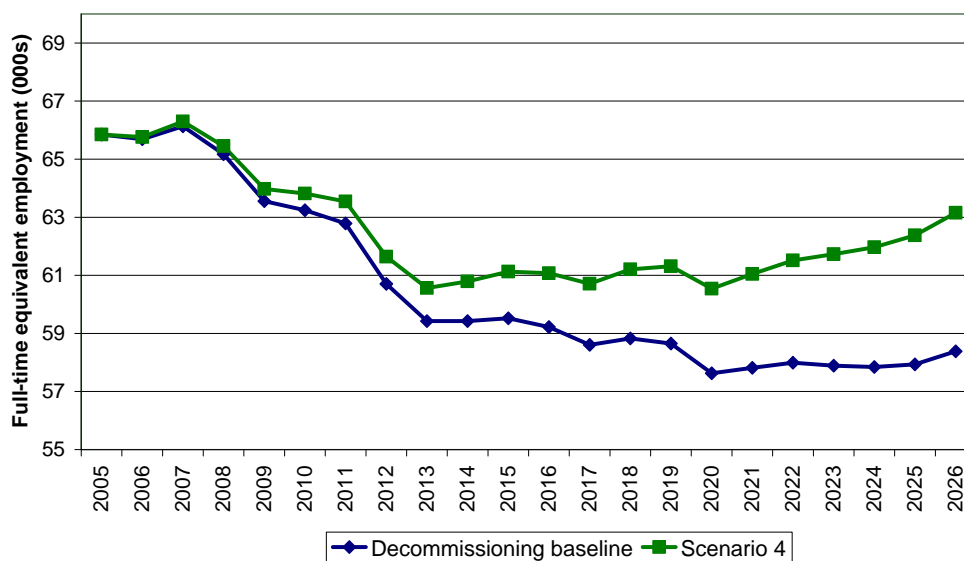


Figure 7.2: GVA results for scenario 4

#### 7.4 HOW DOES THE SCENARIO CHANGE WORKPLACE EMPLOYMENT?

Our modelling shows the changes in workplace employment in terms of full-time equivalents:

- Between 2005 and 2013, employment for both the baseline scenario and scenario 4 falls relatively sharply compared to the rest of the period.
- Between 2013 and 2020, employment under the scenario stabilises around 61,000. During the same period, employment under decommissioning continues to decline.
- By 2026, workforce full-time equivalent employment has risen to 63,000 under scenario 4 compared to 58,000 under the baseline.



Source: Experian, 2007

Figure 7.3: Employment results for scenario 4

#### 7.5 HOW DOES THE SCENARIO CHANGE EMPLOYMENT BY SECTOR?

Scenario 4 also has an impact on employment at the level of individual sectors. In 2026, employment is substantially higher, relative to the baseline in business services, retailing, and hotels and catering.

- By far the biggest sector increase in jobs under scenario 4 is in business services. The model estimates there will 1,500 additional jobs in the sector relative to the decommissioning baseline in 2026.
- The retailing sector also sees a substantial increase in jobs by 2026 under scenario 4, with a difference of almost 1,000 between scenario 4 and the baseline.
- The hotels and catering sector is third in terms of estimated growth in employment with 700 extra jobs in 2026 compared to the baseline scenario.

Sector	Baseline	Scenario 4	Difference
Business Services	4862	6384	1522
Retailing	5956	6942	986
Hotels & Catering	3932	4634	702
Other F&Bs	1563	2152	589
Construction	4500	5031	532
Wholesaling	2793	3080	287
Chemicals	220	355	135
Electrical & Optical Equipment	297	429	132
Transport	1908	2031	123
Transport Equipment	22	144	123
Banking & Insurance	472	594	122
<b>TOTAL</b>	<b>58386</b>	<b>63152</b>	<b>4766</b>

Source: Experian 2007

Figure 7.4: Employment by sector for scenario 4

## 7.6 HOW DOES THE SCENARIO CHANGE WORKING AGE POPULATION?

Our economic modelling results show working age population declining at slower rate under scenario 4 than under the decommissioning baseline:

- Between 2005 and 2017, the working age population remains very similar for both scenarios.
- Only after 2017 does a difference begin to emerge, when the decline under scenario 4 starts falling at a lower rate than the rate under the decommissioning baseline, as the employment growth offsets the declines experienced due to decommissioning.
- By 2026, under scenario 4, the working age population is over 101,000 compared to 99,700 under the baseline scenario.

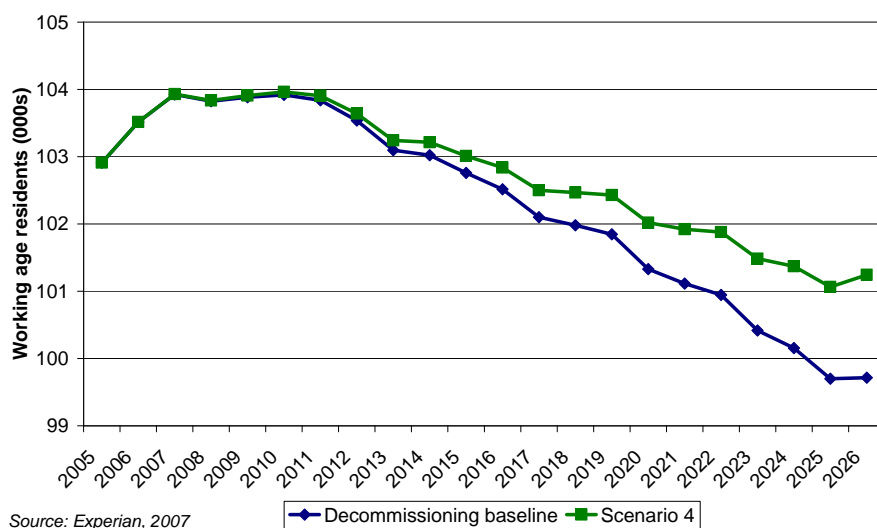


Figure 7.5: working age population under scenario 4 and the baseline

## 7.7 HOW DOES THE SCENARIO CHANGE RESIDENTS IN EMPLOYMENT?

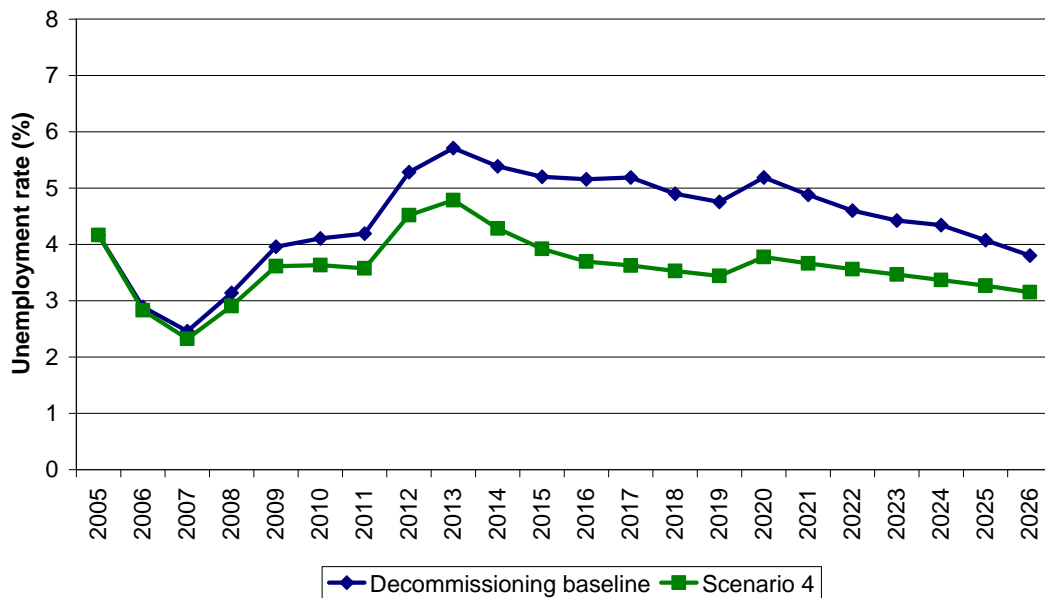
Our modelling results show that over the period 2005-2026, the fall in the number of residents in employment due to the decommissioning will be less severe under scenario 4 than the decommissioning baseline:

- Between 2006 and 2013 the decline in residence based employment follows a similar profile.
- After 2013 residence based employment under scenario 4 begins to grow as the transformational effects of skills and firm formation growth offset the losses experienced through decommissioning.
- By 2026, under Scenario 4, the number of residents in employment is 83,400 compared to 78,700 under the baseline.

## 7.8 HOW DOES THE SCENARIO CHANGE THE UNEMPLOYMENT RATE?

Our economic modelling results show that over the period 2005-2026, the general pattern is similar under scenario 4 and the baseline in that the unemployment rate rises until 2013, followed by a downward trend.

- Up until 2013, the unemployment rate increases at a greater rate under the decommissioning baseline, peaking at just under 6%, compared to an unemployment rate under scenario 4 of just under 5%.
- After 2013, the unemployment rate falls, apart from a slight increase in 2020.
- By 2026, the baseline unemployment rate is just under 4% whilst the unemployment rate under scenario 4 has fallen to 3.2%.



Source: Experian, 2007

**Figure 5.3: Unemployment results for Scenario 4**

## 8 The Golden Scenario

### 8.1 DESCRIBING THE SCENARIO

Scenario 5 is incremental to the baseline and is a combination of the sum of the four scenarios.

- Scenario 1: anchoring and leveraging the benefits of decommissioning.
- Scenario 2: the creation of an international recognised leading 'energy, environment and technology' business cluster in West Cumbria.
- Scenario 3: diversification of the West Cumbria economy via the development of leisure and tourism
- Scenario 4: enhancing enterprise and skills to make a step change in entrepreneurialism and start up activity, as a way of improving the nuclear sector but predominately about improving skills and enterprise in the wider economy.

The impact of combining scenarios 1-4 together is shown below, and is largely additive – that is derived by summing the impacts of each individual scenario. Each of the scenarios modelled are mutually exclusive with the exception of whether the tourist economy can be improved at the same time as the nuclear and technology industry is improved.

### 8.2 WHAT WOULD WEST CUMBRIA'S ECONOMIC FUTURE LOOK LIKE?

The table below details the headline results of scenario 5.

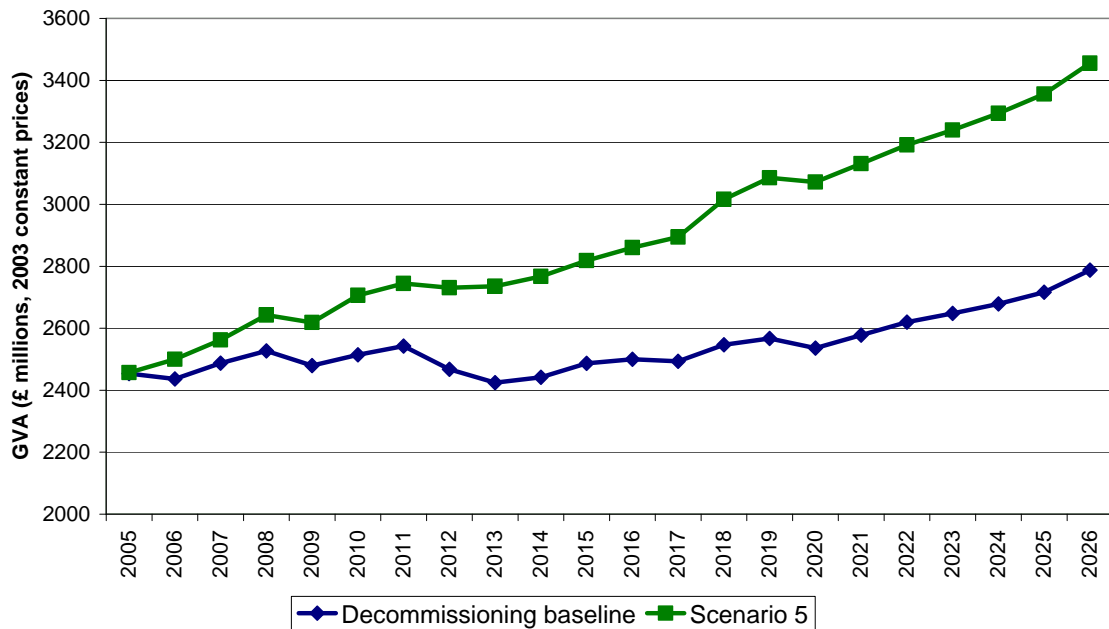
	2006	2011	2016	2021	2026
GVA £ million (2003 constant prices)	£2,500	£2,700	£2,900	£3,100	£3,500
GVA per head (2003 constant prices)	£14,700	£15,400	£16,200	£16,900	£18,500
Employment (full-time-equivalent)	67,200	68,300	68,400	69,000	71,300
Total resident population	170,200	175,000	179,200	182,900	188,700
Working age resident population	104,700	106,700	106,900	106,400	107,000
Residents in employment	85,300	87,700	88,400	89,400	91,600
Unemployed residents	2,400	2,000	1,600	1,600	2,500

Source: Experian 2007

**Figure 8.1: Headline economic results for scenario 5**

### 8.3 HOW DOES THE SCENARIO CHANGE GVA?

Under the Golden Scenario GVA growth in West Cumbria is on average 1.6% per annum between 2006 and 2026 compared with 0.7% under the baseline. By 2026 this means GVA is 24% higher under the scenario than in the baseline.

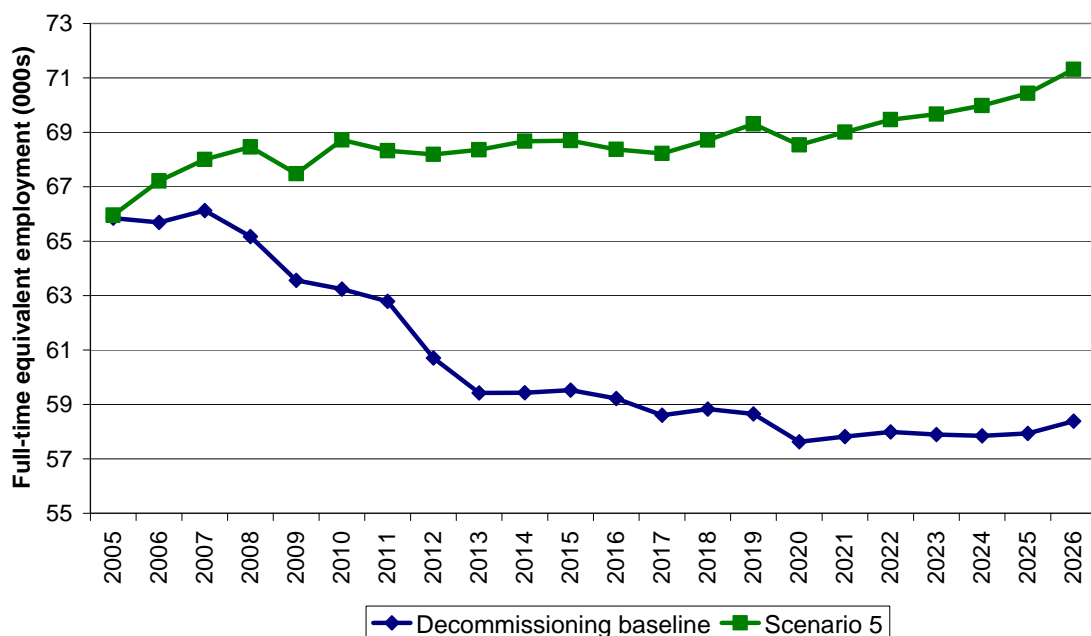


Source: Experian, 2007

Figure 8.2: Gross Value results for scenario 5

#### 8.4 HOW DOES THE SCENARIO CHANGE WORKPLACE EMPLOYMENT?

Workplace employment grows from 67,200 in 2006 to 71,300 in 2026 under scenario 5. In contrast FTE employment falls to 58,400 under the baseline. The effect of the scenario is therefore to increase FTEs by 12,900 people.

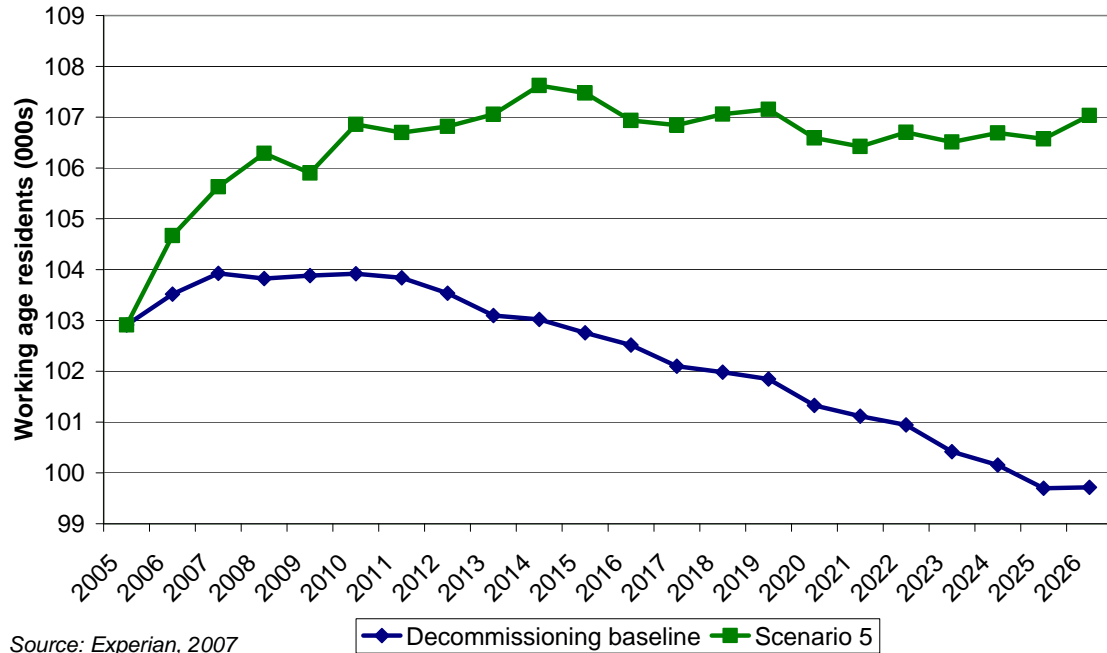


Source: Experian, 2007

Figure 8.3: Total FTE Employment results for scenario 5

## 8.5 HOW DOES THE SCENARIO CHANGE WORKING AGE POPULATION?

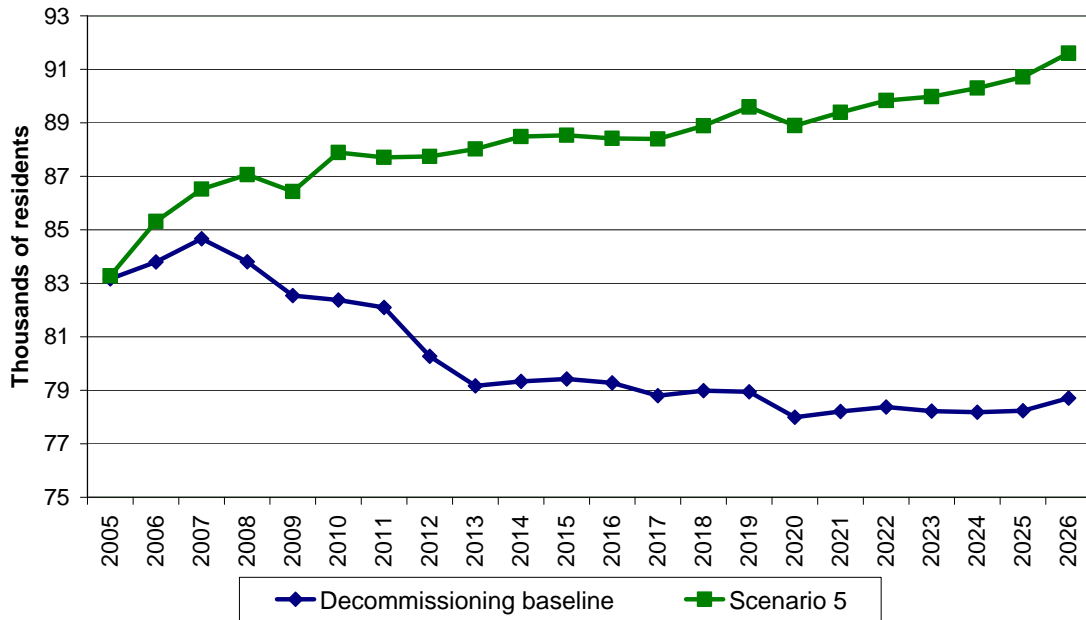
Working age population increases to 107,000 by 2026 under scenario 5 from a figure of 104,700 in 2006. Baseline working age population meanwhile falls to 99,700 by 2026, meaning scenario 5 sees an additional 7,300 persons of working age in West Cumbria relative to the base in 2026.



**Figure 8.4: Total working age population results for scenario 5**

Scenario 5 sees residence-based employment increase to 91,600 people in 2026 from 85,300 in 2006. This is in contrast to the baseline which sees a fall in residents in employment to 78,700 by 2026. As a result residence-based employment is 12,900 higher under scenario 5 compared with the baseline.

## 8.6 HOW DOES THE SCENARIO CHANGE RESIDENTS IN EMPLOYMENT?

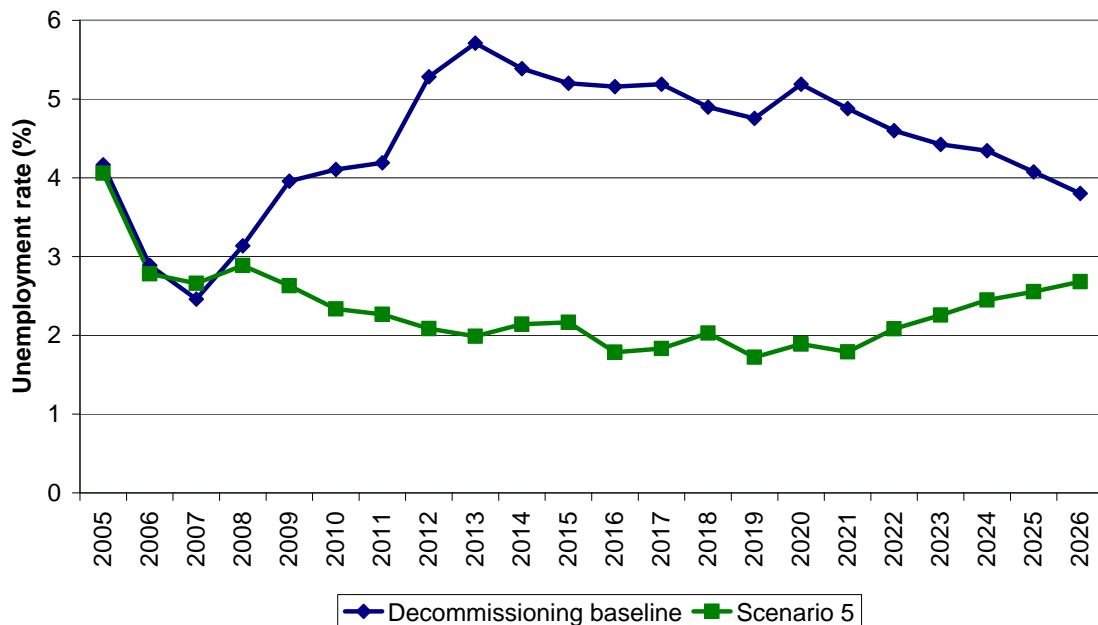


Source: Experian, 2007

**Figure 8.5: Total residents based employment results for scenario 5**

As a result of the various interventions the unemployment rate in West Cumbria falls to a low of 1.7% in 2019 before increasing to 2.7% by the end of the forecast in 2026. The unemployment rate under the baseline increases from 2007 to peak at 5.7% by 2013. Thereafter there is a general decline throughout the remainder of the forecast period to 3.8% by 2026. As a result the two series diverge until 2013 where the gap between the scenario and baseline is at its greatest at 3.7 percentage points. By 2026 this gap narrows and the scenario unemployment rate is only 1.1% below the baseline.

## 8.7 HOW DOES THE SCENARIO CHANGE THE UNEMPLOYMENT RATE?



Source: Experian, 2007

**Figure 8.5: Unemployment results for scenario 5**

## 8.8 DISPLACEMENT AND SYNERGIES

The analysis presented in the previous section assumes that the effects of scenarios 1-4 are purely additive – i.e. that each is independent of the others. Here we consider the potential for either negative (displacement) or positive interactions between the four intervention scenarios. Displacement could occur if one or more of the interventions became less effective in the presence of others.

It is possible for example that Scenario 3, diversification of the West Cumbria economy through the development of leisure and tourism, might be hampered by the achievement of Scenarios 1 and 2 (Anchoring Decommissioning and a Nuclear focused energy cluster).

More generally, the presence of supply constraints within the West Cumbria economy (such as those associated with limitations on the supply of skilled labour or of appropriate development sites) could, under pressure from Scenarios 1-4, lead to inflated prices for key inputs (property rents; wages for skilled workers) and inhibit expansion of those activities directly supported by the intervention scenarios and/or displace other elements of local economic activity. The results presented in Figure 8.1 incorporate a highly elastic labour supply, at least in the long run, so that employment growth driven by the intervention scenarios does not put strong upward pressure on wages. The scale of (net) population migration into West Cumbria required for this does not, however, appear unrealistic. The ‘additive’ approach also assumes that sufficient development land can be made available to allow both achievement of the intervention scenarios themselves and consequent growth in supporting activities,

consumer services and housing supply. These requirements are dealt with by a range of infrastructure improvements set out within the masterplan, and are discussed below.

On the other hand, it is possible that synergies exist between the two or more of the intervention scenarios – so that their combined effect is greater than a simple addition of their separate impacts. This is particularly likely for Scenarios 1, 2 and 4. We have already noted that Scenarios 1 & 2 are essentially complementary. It is also likely, however, that enhancing enterprise and skills (Scenario 4) will both support and be supported by growth of a decommissioning and energy cluster. If this occurred, then the estimates in Figure 8.1 would tend to understate the potential impact of combining Scenarios 1, 2 and 4. Attempting to quantify these synergies is, however, necessarily highly speculative given available information.

### 8.8.1 Adding Infrastructure Investment to the Golden Scenario

The masterplan also identifies transformation projects in quality services, transport, land and property. As noted above, such improvements will be required in order to support the intervention scenarios, and avoid displacement of other local activities. However, to the extent that these infrastructure investments lead to significant improvements in infrastructure quality, rather than merely increases in capacity, they might also themselves be expected to provide an additional stimulus to the development of the West Cumbria economy. This section considers three types of infrastructure investment proposed within the masterplan: namely improvements to local healthcare infrastructure; improvements to transport infrastructure; and enhanced housing development.

### 8.8.2 Improved Healthcare Infrastructure

A key project is to deliver a replacement hospital to the threatened acute services hospital in Whitehaven and extend the facility to include a research and teaching facility. There are currently around 1,800 employees based working on-site at Whitehaven. By securing the existence of the hospital in West Cumbria we estimate that around 1,700 FTE jobs would be secured in the West Cumbria region, predominately Copeland. This is based on direct jobs of 1,200 safeguarded and a further 700 FTE indirect jobs located in the supporting activities and the wider supply chain, as shown below. Grant Thornton have indicated, based on discussion with health experts about the impact of the closure, that around three-quarters of existing services in terms of employment would be likely to transfer to Carlisle under the hospital closure scenario, leaving a rump of one-quarter of 'core' services within West Cumbria.

	Existing jobs	Impact with hospital closure	Loss of jobs
Direct	1,800	450	1,350
Indirect (supporting activities and supply chain)	500	150	350
Total	2,300	600	1,700

*Source: Grant Thornton*

**Figure 8.6: Health sector impacts**

### 8.8.3 Improved Transport Infrastructure

A significant amount of investment is also identified for transport schemes, including rail, road and air infrastructure improvements. Transport infrastructure provides essential support to economic activity. Mobility, of goods and people, is central to modern economic life. Improvements to transport infrastructure lower transport costs (a key element of trading costs) and support additional gains from trade, through enhanced specialisation and scale economies. High quality transport infrastructure is also a requirement for securing inward investment – which, evidence suggests, acts as a spur for local productivity and innovation. The precise impact of transport infrastructure improvements is, however, difficult to quantify without detailed information on the proposed projects.

Grant Thornton have provided suggestions of the types of spillover benefits that might be expected from transport infrastructure improvements in West Cumbria – over and above the support that these improvements provide to securing the benefits from the 4 intervention scenarios. The resulting estimates are presented figure 8.7. These estimates should be regarded as illustrative, given that many of the schemes identified in the masterplan are only defined in high level terms, and that there is only very limited evidence on which to derive estimates of spillover benefits from transport projects.

	<b>Passenger user benefits</b>	<b>Additional catalytic (£m benefits)</b>	<b>Employment (additional catalytic effect)</b>
Road	£2.0 m	£6.0 m	150
Rail	£3.1 m	£9.0 m	250
Air	£1.0 m	£3.0 m	100
<b>Total</b>			<b>500</b>
<i>Source: Grant Thornton estimates</i>			

**Figure 8.7: Transport impacts**

### 8.8.4 Enhanced Housing Development

The masterplan proposes expanded house building in West Cumbria to accommodate the additional population which would be expected to result from achievement of the intervention scenarios and supporting infrastructure improvements. The Regional Spatial Strategy provides for an expansion in West Cumbria's housing stock from 69,000 homes currently to 76,000 by 2021 (or 78,800 by 2026, assuming similar growth between 2021-6). The masterplan argues for a total housing stock of around 84,300 by 2026 – around 5,500 more than suggested by extrapolating the RSS allocation from 2021 to 2026.

It is possible that the resulting improvements in the local housing stock will go beyond those required to accommodate the higher local population resulting from the intervention scenarios. High quality new housing could draw in higher skilled workers and entrepreneurs, further supporting the developments considered under Scenario 4. Grant Thornton have suggested that this may stimulate a further 500 FTE jobs within

West Cumbria. We have no information with which to verify this estimate, which we would regard as suggestive. Assuming an average level of GVA per job of £40,000, this would imply a further increase in West Cumbria's GVA of around £20 million by 2026, in constant price terms. Grant Thornton have also suggested that additional benefits of a similar magnitude could accrue from proposed infrastructure improvements to business sites within West Cumbria (in excess of those required to support the intervention scenarios).

The overall impacts of infrastructure improvements in the masterplan, based on Grant Thornton's analysis, are presented in Figure 8.8. These are additional to those impacts considered in sections 8.1- 8.7 above.

Key infrastructure improvements	Jobs	GVA (£m)
Quality services and facilities	2,000	40
Transport	500	20
Housing market	500	20
Business sites	500	20
<b>Total</b>	<b>3,500</b>	<b>100</b>

**Figure 8.8: Infrastructure impacts**

### 8.8.5 Summary Impact

The table below shows the overall economic impact under the golden scenario including the estimated infrastructure impacts detailed above. Overall it is estimated that successful interventions could potentially deliver around £800 million of net benefits to the West Cumbria economy above the with decommissioning baseline. This would also mean an additional 16,400 jobs.

	GVA (2003 constant prices)	FTE Jobs
Scenarios 1-4 Additive	£3,500	71,300
Infrastructure	£100	3,500
<b>Total</b>	<b>£3,600</b>	<b>74,800</b>
<i>Source: Experian/ Grant Thornton 2007</i>		

**Figure 8.9: Summary Impact, 2026**

Clearly, nuclear decommissioning presents a challenge to the West Cumbria economy and will mean job losses and reductions to Gross Value Added as a direct result. However, decommissioning also presents an opportunity for the region, largely due to the scale of decommissioning investment and activity that is planned both in the UK and globally. The scenario analysis presented in this report provides an insight into the potential scale of benefit that each of the interventions in the economy could bring. It is also likely that elements of each scenario are complimentary, for example, for the region to be a recognised centre of nuclear excellence it will require a pool of highly qualified labour, which will require the up-skilling of residents as explored in scenario 4. Indeed achieving the scale of skills and enterprise improvement detailed in the scenario would mean a huge boost to the economy in terms of increased employment, increased economic wealth and diversification of the economy,

irrespective of the successful implementation of the other scenarios. Successful delivery of the masterplan could potentially make the economy of West Cumbria substantially better off in terms of economic and social wealth than it would have been with or without Sellafield. The key challenge will be to capture the UK and global decommissioning market locally, coupled with the education and retention of the required highly skilled and therefore geographically mobile population.

## Key points

Our economic modelling of the future of West Cumbria has allowed us to produce economic projections for the area with nuclear decommissioning and without decommissioning. This allows us to better understand what the economic impacts of nuclear decommissioning may be and allows us to run a number of intervention scenarios<sup>7</sup>.

The main results and findings from our economic modelling of West Cumbria are:

1. Our with and without decommissioning baselines both show continued decreases in West Cumbria's employment. The effect of decommissioning is to boost jobs and population in the short term and then to accelerate the relative economic decline over the next twenty years.
2. Multiplier analysis overstates the impact of decommissioning on employment losses in the future as it fails to account for the labour market adjustment to decommissioning. For this reason we have used a model that captures both the multiplier and labour market effects of decommissioning to consider the future of the West Cumbria economy.
3. In the near-term, decommissioning increases total jobs in West Cumbria but means fewer jobs beyond 2011. The economy settles at around 4,000 to 5,000 fewer jobs in the area with decommissioning.
4. GVA growth is much weaker under the decommissioning scenario. This is a direct result of the loss of jobs across the economy but also the loss highly productive jobs in the fuel-refining sector.
5. Despite the lower levels of employment in the area under decommissioning, by 2027 the level of unemployment will approach the 'without decommissioning' baseline level. The effect of decommissioning of lower employment and sector change lowers the average wage rate in West Cumbria by over 5% than it would otherwise be.
6. Decommissioning has direct impacts on reducing long-term employment in sectors such as fuel refining and business services. However, it may provide a small boost to industrial manufacturing and retail and leisure services.
7. The West Cumbria model has been used to run the following intervention scenarios:
  - Scenario 1: anchoring and leveraging the benefits of decommissioning.
  - Scenario 2: the creation of an international recognised leading 'energy, environment and technology' business cluster in West Cumbria.
  - Scenario 3: diversification of the West Cumbria economy via the development of leisure and tourism
  - Scenario 4: enhancing enterprise and skills to make a step change in entrepreneurialism and start up activity, as a way of improving the nuclear sector but predominately about improving skills and enterprise in the wider economy.

The difference between each scenario and the with decommissioning baseline in 2027 is presented in the table below:

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<sup>7</sup> The original time profile for the Masterplan and the economic scenario was from 2006 to 2026. The profile has since been rolled forward to 2007 to 2027 and these changes are reflected in this final section. All prices are presented in 2007 constant prices.

	GVA (£millions, constant 2007 prices)	FTE employment (000s)	Working Age Population (000s)	Residents in Employment (000s)
Scenario 1	54	1.5	0.5	1.5
Scenario 2	362	5.7	3.5	5.7
Scenario 3	30	1.1	0.3	1.1
Scenario 4	314	5.1	1.7	5.0

*Source: Experian 2007*

8. Each of the scenarios is assessed relative to the ‘with decommissioning’ baseline. All the scenarios have a beneficial impact on the West Cumbrian economy - increasing employment, Gross Value Added and working age population. However the size of the impact varies substantially by scenario. For example, scenario 3 has the weakest effects with an additional 1,100 full-time equivalents relative to the baseline in 2026. Scenario 2 has the largest impact on the West Cumbria economy, creating an additional 5,700 jobs by 2027 and adding an additional 362 million on to GVA.
9. The impact of combining scenarios 1-4 is also assessed and is derived by summing the impacts of each individual scenario. Adding the impact of the scenarios together presents a highly positive future for West Cumbria, relative to the baseline and historic trends. Under the Golden scenario, GVA per head is boosted from 16,400 under decommissioning to 20,600 by 2027. This is over £1,600 higher than the without decommissioning counterfactual.

The summary of the Golden Scenario is presented in the table below:

	2007	2012	2017	2022	2027
GVA £ million (2007 constant prices)	2,795	2,978	3,157	3,481	3,880
GVA per head (2007 constant prices)	16.4	17.1	17.7	19.0	20.6
Employment (full-time-equivalent)	68.0	68.2	68.2	69.5	72.2
Total resident population	170.4	174.0	177.9	182.8	188.5
Working age resident population	105	105	105	105	106
Residents in employment	170	174	178	183	188
Unemployed residents	2,400	1,900	1,700	1,900	2,700

*Source: Experian 2007*

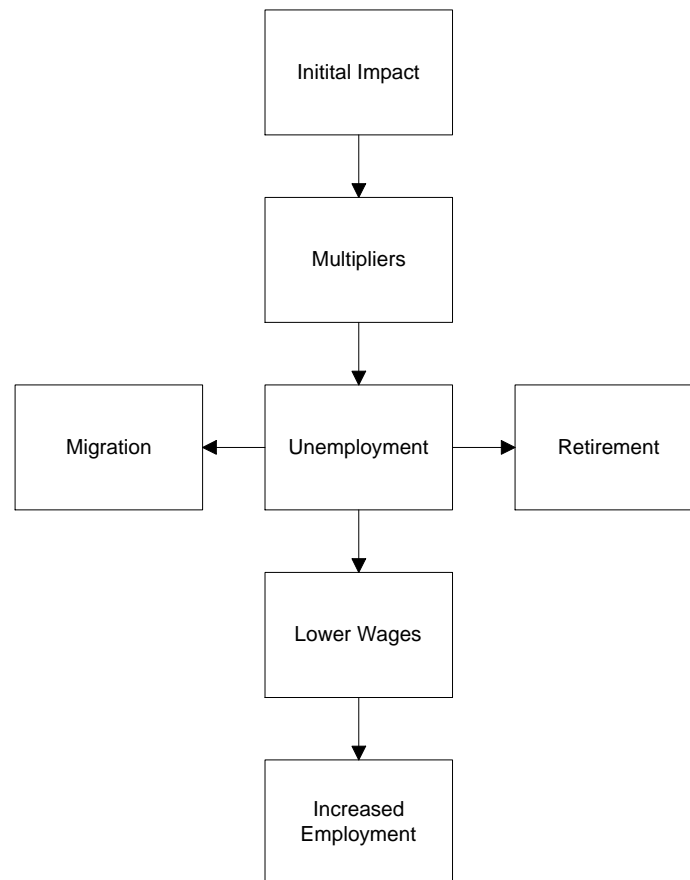
10. Simply accumulating the impacts of each scenario may over, or in some cases, under estimate the combined impact of the scenarios since there may be positive interactions or negative displacement effects. The presence of supply constraints (such as those associated with the supply of skilled labour or of appropriate development sites) could, under pressure from each of the scenarios lead to inflated prices for key inputs and potentially displace other elements of local economic activity. However it is also possible that synergies exist between two or more of the scenarios so that their combined effect is greater than their parts. Attempting to quantify these synergies is, however, necessarily highly speculative given available information.
11. As an illustrative exercise, combining the scenarios and including some of the potential infrastructure impacts, shows that successful delivery of the Masterplan would mean an additional £800-900 million in GVA above the decommissioning baseline as well as around 16,000 to 17,000 jobs by 2027. This would mean that the West Cumbria economy would be better off than a future with a fully operational Sellafield still in place.



# Appendix

## The decommissioning model – an overview

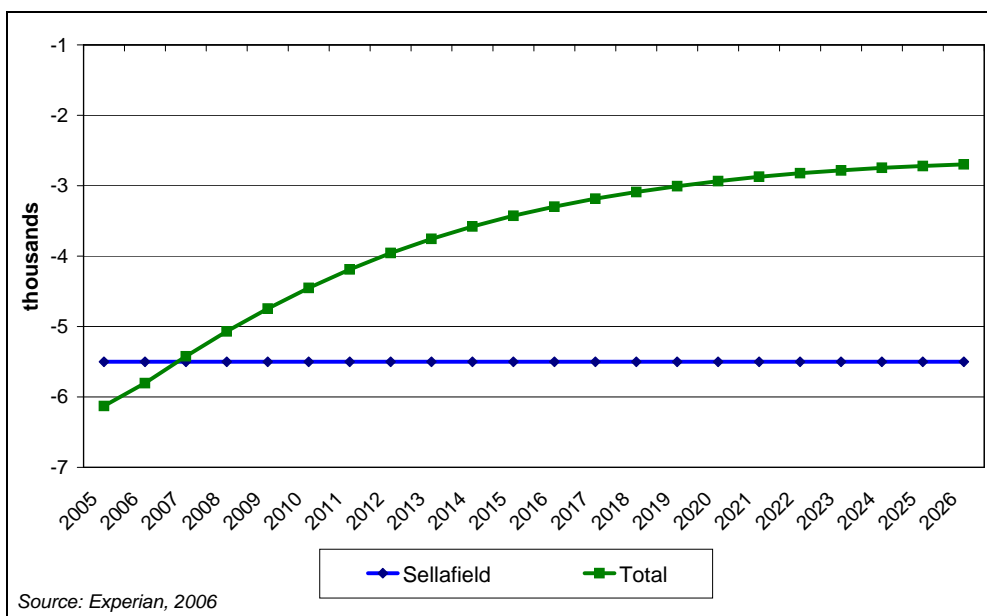
Figure A1 shows an outline summary of the econometric model of West Cumbria. The model is designed to measure both the initial impact of decommissioning on output and employment and the subsequent adjustment of the local labour market to these impacts.



**Figure A1: The West Cumbria Econometric Model**

The initial impact from decommissioning comprises both the direct employment and output losses at Sellafield and the local multiplier effects on other industries (through the supply chain and as a result of the impact on consumer spending). Some of the job losses at Sellafield lead to early retirement, others lead to increases in unemployment. Higher unemployment also leads to increased out-migration generally. The increases in unemployment lead to lower wages. The lower wages cause an increase in competitiveness in the rest of the local economy as firms move to the area to take advantage of the lower factors of production or as existing forms expand. The increased competitiveness leads to an increase in output, which feed through to gains in employment and over time, partially offset the losses to jobs through decommissioning.

This relationship is shown in figure A2. In this example decommissioning is equal to a loss of 5,500 full time equivalent jobs per year. Initially this causes total employment across all sectors to fall by over 6,000 jobs due to multiplier effects. Over time the decommissioning impact at Sellafield remains constant but as unemployment increases and wages fall, total workplace based employment begins to compensate for the losses due to decommissioning and by 2026 has offset around half of the job losses.



**Figure A2: Impact on Workplace-Based FTE Employment**