

Atom Valley: Vision

Context

Atom Valley is one of six growth locations in Greater Manchester (GM) and includes significant parts of Bury, Oldham and Rochdale local authority areas. It offers the greatest opportunity to deliver transformational economic growth in the north and east of the GM conurbation and improve people's lives.

The Atom Valley Mayoral Development Zone (MDZ) was established in August 2022 to enable public and private sector stakeholders to work together and accelerate the process of levelling up, ensuring joined-up thinking and integrated decision making that is aligned with GM's wider vision.

Made up of representatives from the public and private sector, the Atom Valley MDZ Board is responsible for developing the strategy for the Atom Valley area and overseeing its implementation.

This document provides the MDZ Board's vision for Atom Valley – setting out **why** Atom Valley is needed and **why**, based on robust evidence, we think it will be successful. It sits alongside the Atom Valley MDZ Business Plan which sets out **how** this vision will be delivered.

The document is structured in three sections:

- Section 1 presents the Atom Valley vision on one page.
- Section 2 takes a deeper look at the vision and its rationale.
- Section 3 outlines in more detail the evidence base on which the Atom Valley vision has been built.

Section 1: Vision on one page

1. Atom Valley's vision is to create a dynamic, interconnected manufacturing mega-cluster, blending innovative world-class industry with ground-breaking research and development.
2. Unmatched in its size and scale in Greater Manchester, it will create 1.6 million square metres of employment land for industrial uses and 7,000 zero carbon homes across three development sites in Bury, Oldham, and Rochdale, creating 20,000 new good quality jobs.
3. Led by a partnership of developers, industrialists, universities, and local government, Atom Valley will develop market-facing strategies to secure the public and private sector investment needed to realise the transformational opportunity.
4. Taking inspiration from successful examples such as the London Docklands and Salford Quays, Atom Valley will take a long-term approach to deliver large-scale regeneration and build a nationally significant industry cluster in one of the most deprived parts of the UK, enhancing national prosperity and delivering levelling up.
5. Atom Valley will attract UK and international firms who want to build new manufacturing plants, SMEs who want to scale-up into modern premises, spinouts and start-ups who are ready to move from the lab to the factory, as well as businesses and individuals who simply want to benefit from international standard R&D and skills facilities.
6. Atom Valley will capitalise on existing frontier sector strengths in advanced manufacturing, materials, and machinery in the local area. It will be integrated with Greater Manchester's internationally significant concentration of R&D and innovation assets in sustainable advanced materials and industrial digitalisation which are predominantly, but not exclusively, located on the Oxford Road Corridor.
7. To catalyse the Atom Valley cluster, specialist premises and facilities to deliver large-scale R&D, pilot new applications of cutting-edge manufacturing technologies, and deliver skills training will be created. These open access facilities will also accelerate the diffusion of innovative technologies and approaches to manufacturing firms across Greater Manchester and beyond.
8. Strategically located on the M62 corridor, and already just twenty minutes from central Manchester and 30 minutes from Manchester Airport, major new investments into road, rail, tram-train, and bus infrastructure will enable residents from across Greater Manchester to access jobs on the sites, Atom Valley firms to recruit from one of the UK's largest labour pools, and businesses to access suppliers and markets more effectively.
9. Based in a city region with industry, innovation and partnership in its DNA, Atom Valley will be a model for a new form of greener, inclusive development that drives shared prosperity for Greater Manchester, the North of England and the UK as whole.

Section 2: Vision and rationale – a closer look

Introduction

1. Atom Valley's vision is to create a dynamic, interconnected manufacturing mega-cluster, blending innovative world-class industry with ground-breaking research and development in a large area along the M62 motorway in North East Greater Manchester (GM).
2. This vision has been set in the context of the 2021-2031 GM Strategy and its ambition to create a greener, fairer, more prosperous, city region driven by opportunities in localities across the conurbation. Its implementation will be accelerated by the new devolved powers and responsibilities agreed in the March 2023 deal between the UK government and the GM Combined Authority.
3. The document is about Atom Valley itself rather than the GM Strategy or the devolution deal as such, important though the latter are. They are therefore not discussed in detail but mentioned when appropriate.

Size and scale

4. Atom Valley includes 1.6 million square metres of employment land suitable for manufacturing and space for 7,000 zero carbon new homes. It is expected to create 20,000 new jobs.
5. The main site of Atom Valley, the Northern Gateway, has 1.2 million square meters of occupancy space. The other two sites, Kingsway and Stakehill, both have around 0.4 million square meters.
6. The scale of Atom Valley means it has the potential to contribute to increasing productivity at each of four geographical scales: nationally, across the North as a whole, across GM, and in three of GM's poorest boroughs which are the lowest in terms of productivity levels.

An industry-led partnership

7. Atom Valley is led by a partnership of developers, industrialists, universities, and local government. Working together, these partners will develop market-facing strategies to secure the public and private sector investment needed to realise the transformational opportunity.
8. Local authorities have recognised the strategic opportunity Atom Valley presents, designating it as a Mayoral Development Zone and committing to drive investment into the area as one of GM's priority growth locations.
9. Atom Valley requires the skills of both the public and private sectors. The role of the public sector in delivering the enabling infrastructure and R&D assets on a significant scale in advance of the employment and housing developments is a necessary condition of success.

Developing a cluster

10. An explicit aim of Atom Valley is to build a nationally significant industry cluster. Geographic (spatial) inequality is driven by clusters, a concept which is one of long-standing in the discipline of economics. A cluster arises when companies in the same and related industries locate closely together. MediaCityUK in Salford Quays and Canary Wharf in the London Docklands are examples. There are three main benefits of clusters:
- Knowledge spillovers. Even in the age of the internet, knowledge can flow more easily through inter-firm collaboration when the companies are located closely together.
 - A common pool of labour force skills is developed. A result of this is that firms become more willing to invest in training their workforce.
 - Geographic clusters encourage greater levels of specialisation, and increased inter-firm cooperation with extensive activity links and resource ties. This enhanced cooperation reduces the cost of innovation.
11. In these ways, successful clusters generate “positive feedback”. The features which make them successful attract more and more of the same. In contrast, left-behind areas can experience this in a negative way. They get locked into low levels of productivity and income from which it is not easy to escape purely of their own accord.
12. A 2019 report of the European Commission on clusters in the EU identifies 2,950 regional industrial clusters which account for almost half of the employment in exporting industries. Productivity is much higher in companies located in a cluster than in those which are not. For the 198 high performance clusters identified by the Commission, it is a massive 140 per cent higher than average. Companies in clusters also outperform those which are not in clusters in productivity growth, employment growth and wage and salary levels and growth.
13. Significantly in the Greater Manchester context, a city region with a population of nearly 3 million, the European Commission report finds that there is a positive correlation between the size of the region and the number of clusters in the region. In other words, there is scope to have numerous successful clusters within a city-region and the success of one is not to the detriment of others.
14. The success of Atom Valley will therefore make it easier for the other growth locations in the city region to succeed. It will also strengthen the city centre economy and its cluster of knowledge intensive business services, which themselves are substantially driven by the presence of high value manufacturing in the city-region.

Building on existing strengths and assets

15. Atom Valley builds on the manufacturing strengths of the three Atom Valley boroughs – Bury, Oldham and Rochdale – where 11.9 per cent of the labour force is currently employed in manufacturing compared to a nation average of 7.6 per cent.

16. Although productivity levels in the city-region of Greater Manchester remain below those of London, over the 2004-2019 period productivity growth outperformed that of other metro areas, being 16 per cent compared to 13 per cent in West Yorkshire, for example, 9 per cent in the West Midlands and zero in Merseyside. Atom Valley will build on this established strength of the city region as whole.
17. Within Greater Manchester itself, productivity growth in the North East (encompassing the Atom Valley boroughs) has been stronger over the same period than the North West and South East, areas which comprise other relatively poor boroughs in the conurbation. Again, Atom Valley is reinforcing and established positive trend.
18. Gross value added per worker in manufacturing is some 75 per cent higher than the average across the economy as a whole, and growing the manufacturing sector will make an important contribution to future productivity growth and shared prosperity.
19. Atom Valley will also integrate with GM's internationally significant concentrations of R&D and innovation assets in sustainable advanced materials and industrial digitalisation.
20. Strong links are being developed with existing R&D institutions, both in Greater Manchester (e.g. the Universities of Manchester, Manchester Metropolitan, and Salford, the Henry Royce Institute, the Graphene Engineering Innovation Centre, and Salford Energy House) and nationally (e.g. the High Value Manufacturing Centre, Made Smarter, and the National Physical Laboratory).
21. This alignment is being enabled by Innovation GM – the public/private partnership overseeing the development of innovation strategy for the whole city region. The GM Innovation Plan is co-created with, and endorsed by, central government, and explicitly refers to Atom Valley as the primary growth location for high value manufacturing.
22. The Strategic Innovation Partnership announced in the March 2023 devolution deal will build on this plan, and thereby ensure that Atom Valley's innovation aspirations remain central to and integrated with the development of a successful innovation ecosystem across the whole of the city-region. The promised dialogue with central government and its agencies will ensure that, as national strategy is developed, it will be cognisant of the opportunity that Atom Valley offers to drive innovation at a national scale.

A diverse occupier mix

23. Atom Valley aims to attract UK and international firms who want to build new manufacturing plants, SMEs who want to scale-up into modern premises, spinouts and start-ups who are ready to move from the lab to the factory, as well as businesses and individuals who simply want to benefit from international standard R&D and skills facilities.
24. The main site has the capacity to accommodate a mega-factory, one of only a small number of sites in the UK with this capability. However, the sites are suitable locations for

companies of all sizes and a diverse occupier mix will be targeted to create a dynamic ecosystem.

25. The main industry focus is on the frontier sector strengths of advanced manufacturing, materials and machinery which are already present in the Atom Valley and GM areas, coupled with new sustainable advanced materials and industrial digitalisation technologies which are being pioneered in the region's R&D institutes. A particular emphasis will be on scaling up innovative technologies which contribute to achieving the Net Zero target.
26. Attracting high value inward investment to GM and the UK will be critical for Atom Valley's success. The new joint Department for Business and Trade – GMCA 'Trade and Investment Board' - announced in the Devolution Deal is an opportunity to take a long-term approach to attract advanced manufacturing firms (and their supply chains) to the region that will build the cluster in Atom Valley.
27. An important element in the strategy of the Atom Valley board is to attract both start-up companies and those which are looking to scale up using innovative technology. Links with local venture capitalists are being strengthened.

Catalysing an innovation-led cluster through R&D and skills

28. An essential ingredient of high technology clusters is a close network of connections between companies and local universities and research institutes. Two advanced institutes are being developed for the Atom Valley sites to facilitate this connection.
 - The Advanced Manufacturing and Productivity Institute (AMPI). In the February 2022 White Paper on Levelling Up, the Secretary State, Michael Gove MP, announced that £23 million had been awarded under the Strength in Places Fund to the National Physical Laboratory "for the *Advanced Machinery and Productivity Initiative in Rochdale*" (p.283)."
 - The Sustainable Materials Translational Research Centre (SMTRC), being developed under the Innovation Accelerator process overseen by GMCA and Innovate UK. The partners in the project are the Rochdale Development Agency, the University of Manchester, High Value Manufacturing Catapult (including the CPI and other Centres) and industrialists.
29. An important task of the AMPI and SMTRC R&D centres is to ensure that the high-level technology embedded in the cluster is taken up by other manufacturing companies in the area. It is well documented that there are substantial and persistent differences in productivity levels between companies in the same industry, even when the industry is narrowly defined. Diffusion of innovation across not just the Atom Valley boroughs but elsewhere in the region is a key aim.
30. The mission of these research centres will go beyond applied R&D, to take on an explicit regional mission to enhance the industrial and innovation capabilities of the Atom Valley cluster. R&D activities will be supplemented with programmes for workforce

development (in collaboration with existing Further and Higher Education institutions) and innovation diffusion.

31. The March 2023 devolution deal for the GMCA facilitates even closer co-ordination in the Further Education sector across the whole of Greater Manchester. The skills working group of the Atom Valley board is also acting to bridge the divide between the HE sector and the FE sector.
32. The development of technical skills should not take place in a vacuum. It should mesh closely with the evolving demands of technology. To this effect, an innovation road map is being created. It will be a live document, being kept under review and developed and amended as necessary.
33. A key input to the innovation road map is the March 2023 document Materials and Manufacturing Vision 2050 published by UK Research and Innovation (UKRI). A manufacturing sector which is Net Zero is identified as a strategic imperative by UKRI, which fits exactly with the priorities of GM in general and Atom Valley in particular.

Enhancing an already highly strategic location

34. GM is now one of the fastest growing and most dynamics cities in the UK, with the scale to affect national economic performance. GM is the largest city region economy outside London with a gross value added of close to £75 billion. It is larger than the economy of Wales (£66 billion) and just over half that of Scotland (£145 billion).
35. Atom Valley is strategically positioned to benefit from, and drive further growth in, the GM economy. It is just twenty minutes from central Manchester and 25 minutes from Manchester Airport in a location with high market demand for new sites for industrial and housing uses.
36. However, investment in road, rail, tram-train, and bus transport is required to facilitate improved access to employment, recruitment of employees, and the delivery of inputs and finished goods. Transport developments for Atom Valley will be brought forward in line with the vision and objectives of the GM Transport Strategy 2040 to have “world-class connections that support long-term sustainable economic growth and access to opportunity for all”
37. Transport investment will also be critical to bring forward the 7,000 zero carbon high quality homes which will be delivered on Atom Valley sites. These are in close proximity to the cultural and leisure facilities of the city centre, but will cost considerably less than equivalent properties in the south of the city-region.

A sustainable growth location for North East Greater Manchester

38. Geographic inequalities in general are often higher within city-regions than they are between the larger regions of an entire country, as Andy Haldane, former Chief Economist at the Bank of England, has pointed out.

39. GM suffers from its own North-South divide. Both incomes and productivity levels are considerably lower in the three Atom Valley boroughs – Bury, Oldham and Rochdale – in the North and East of the conurbation than they are, for example, in the prosperous borough of Trafford in the South West.
40. A central aim of Atom Valley, articulated by Mayor Andy Burnham, is to address the North-South divide within the city region. However, it is intended to operate not just on the scale of the city-region, but on both a national and international scale.
41. By themselves market forces will not be sufficient to revive the Atom Valley boroughs. Two of the 2019 Nobel Laureates in economics, Abhijit Banerjee and Esther Duflo, offer strong endorsement of this view in their book *Good Economics for Hard Times*, when they write: “Economists have traditionally been unwilling to embrace place-based projects....This analysis seems to give too little weight to the facts on the ground” (p.85)”. Targeted public sector enabling and supporting investment will be required to realise the full Atom Valley opportunity.
42. Economic theory in general offers a strong rationale for state intervention to lift the Atom Valley boroughs out of their current low income, low productivity environment. The matter is discussed in detail in the supplementary document to the Vision, *Atom Valley and Levelling Up: Theory and Evidence*.
43. Delivering growth which is inclusive is a key aim of Atom Valley. All the residents of the three boroughs will have the opportunity to benefit from this. This will be achieved in three main ways:
 - In addition to the jobs directly created in Atom Valley, some of the monies generated within Atom valley will be spent either by high tech companies sourcing from local suppliers or from spending on consumption items by those employed on the sites.
 - The average worker in relatively low skilled occupations receives a considerable wage premium in innovative firms compared to non-innovative ones. Further, innovative firms invest in these workers.
 - At its inaugural meeting in October 2022, the Atom Valley board took the view that the Further Education colleges in the three boroughs, working together and in conjunction with higher education institutions, are the key to improving skills and delivering technical jobs in Atom Valley for local people.
44. By delivering this vision, Atom Valley will provide a model for a new form of greener, fairer development that drives shared prosperity for GM, the North of England, and the UK.
45. Governments across the world have recently become much more aware of the risks which globalised supply chains pose to both national security and national resilience. The American government in particular has become very active in promoting these aims, along with others, in the innovative manufacturing sector. Key examples are the Inflation Reduction Act, and the CHIPS and Science Act. The creation of a mega-cluster of advanced manufacturing on Atom Valley will enhance the national security and resilience of the UK as a whole.

Section 3: Atom Valley and Levelling Up: Theory and Evidence

1. The context

The purpose of this section is to set Atom Valley in the wider context of levelling up as a concept.

The key factors which both describe why levelling up is needed and why it will be achieved are the focus.

A key strategic goal of the UK government is to increase both productivity and innovation in the UK as a whole. The Prime Minister, Rishi Sunak, stated that: “Innovation will make this country a beacon of science, technology, and enterprise and lift our productivity, raise our growth rate, create new jobs for decades to come.”¹

Within the UK, it is well documented that the productivity levels of cities and city-regions outside London is low. The OECD², for example, noted that there is a marked gap between the productivity in second-tier cities³ in the UK and those in other countries. Average gross-value-added (GVA) was 30 per cent higher in similar German cities, 22 per cent in France and 18 per cent in Italy. As noted above, GM has outperformed other major metro regions in productivity growth since the early 2000s, but the level still remains relatively low.

At the same time, however, the OECD notes in the same report that “The productivity gap is a sign of significant untapped potential” (p.3).

Atom Valley is critical to increasing Greater Manchester’s productivity.

The Atom Valley vision is to create a mega-cluster of manufacturing innovation developed around materials and machinery in a large area along the M62 motorway. This is intended to operate not just on the scale of the city-region, but on both a national and international scale.

Gross value added in manufacturing is some 75 per cent higher than the average of the economy as a whole. The specialisation in manufacturing, both advanced machinery and sustainable materials, plus the physical size of the Atom Valley locations, means that Atom Valley has the ability to make a difference to productivity not just within Greater Manchester but on a national scale.

¹ <https://www.gov.uk/government/news/pms-plan-to-build-an-innovative-economy>

²OECD (2020), *Enhancing Productivity in UK Core Cities: Connecting Local and Regional Growth*, OECD Publishing, Paris

³Belfast, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield

The emphasis on manufacturing builds on the existing manufacturing strengths of the three Atom Valley boroughs – Bury, Oldham and Rochdale – where 11.9 per cent of the labour force is employed in manufacturing compared to the national average of 7.6 per cent.

Atom Valley is first and foremost a public-private partnership. Atom Valley requires the skills of both the public and private sectors. This involves the public sector working collaboratively to plan and galvanise investment with the joint venture developers to deliver the agreed objectives of the scheme. The role of the public sector in delivering the infrastructure on a significant scale in advance of the employment and housing developments is a necessary condition of success.

The public/private nature of Atom Valley means that it is a market-facing proposition which is sustainable in the long run.

2. Geographic inequalities: the North-South divide both in the UK *and* within the Greater Manchester city-region

The disparities in productivity and income levels across the regions of the UK are very well documented. For example, in 2019 gross value added per hour worked was 60 per cent higher in London than it was in Wales, the region with the lowest productivity levels. London was 49 per cent higher than Greater Manchester⁴.

A key point to note is that the inequalities which are observed across regions of countries can also be seen *within* both the regions themselves and *within* the city-regions of any given region.

Andy Haldane, former chief economist at the Bank of England, has presented evidence which suggests that “if anything, income inequalities within a region appear to be larger than income inequalities between regions”⁵. Indeed, recent research published in *Nature*, along with *Science* one of the world’s two top academic science journals, suggests that the larger a city becomes, the greater the inequalities within it which emerge⁶.

Haldane goes on to note that both regional and sub-regional inequalities exist not merely in incomes and productivity but in areas such as health. He uses the technical phrase “self-

⁴ Office for National Statistics (2022) <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/datasets/subregionalproductivitylabourproductivitygaperhourworkedandgaperfilledjobindicesbyuknuts2andnuts3subregions>

⁵ AG Haldane (2019), Is All Economics Local?, Sheffield Political Economy Research Institute (SPERI) Annual Lecture, available at <https://www.bankofengland.co.uk/-/media/boe/files/speech/2019/is-all-economics-local-speech-by-andy-haldane.pdf>; A G Haldane, *Making a Success of Levelling Up*, presentation to Policy Exchange 28 June 2021, Bank of England

⁶ Arvidsson, M., Lovsjö, N. and Keuschnigg, M., 2023. Urban scaling laws arise from within-city inequalities. *Nature Human Behaviour*, pp.1-10.

similar” to describe this phenomenon, meaning that the distributions of outcomes on incomes, productivity, and health look similar regardless of the geographical scale at which they are compared⁷.

Greater Manchester has of course its own inequalities in these areas, what Mayor Andy Burnham has described as “Greater Manchester’s own North-South divide”.

They are epitomised in the contrasting fortunes of the prosperous Borough of Trafford in the south-west of the city-region and Oldham and Rochdale in the north-east.

3. Economic clusters as the driver of prosperity

3.1 Why clusters matter

A key driver of such inequalities is clusters, a concept which is one of long-standing in the discipline of economics.

Alfred Marshall, who founded the faculty of economics at Cambridge at the beginning of the 20th century, developed the idea of clusters. He defined them as being "concentrations of specialized industries in particular localities"⁸. The concept was developed and refined in much more modern times by the Harvard Business School professor Michael Porter⁹.

Marshall, in his seminal work on clusters, identified a critical reason why companies in the same and related industries locate closely together. In the technical jargon of economics, spatial proximity facilitates the ability to take advantage of increasing returns to scale external to the firm.

Many areas of economic activity are subject to the opposite of increasing returns, namely diminishing returns. Until relatively recently, much of economic theory was set in the context of the latter¹⁰. A rising proportion of economic activity takes place under increasing rather than diminishing returns¹¹, and theory is advancing to incorporate this important empirical phenomenon.

Marshall cites three main benefits:

⁷ The phrase has a very specific technical definition, see for example https://en.wikipedia.org/wiki/Self-similar_process. In an economic context, outcomes should be thought as approximately self-similar rather than exactly so

⁸ Marshall, A., 2009. *Principles of Economics: unabridged eighth edition*. Cosimo, Inc., first edition published 1890

⁹ Porter, M.E., 1998. *Clusters and the New Economics of Competition* (Vol. 76, No. 6, pp. 77-90). Boston: Harvard Business Review.

¹⁰ A classic early article in which the importance of increasing returns is made clear is Young, A.A., 1928. Increasing Returns and Economic Progress, 38 *Economic Journal*, 527(529), pp.10-2307.

¹¹ See, for example, Arthur, W.B., 1996, Increasing Returns and the New World of Business, *Harvard Business Review*. July-August 1996

First, knowledge spillovers. Even in the age of the internet, knowledge can flow more easily through inter-firm collaboration when the companies are located closely together.

Second, a common pool of labour force skills is developed. An implication is that firms become more willing to invest in training their workforce. If few companies in an area do this, you can incur the costs involved only to find the employees being poached by rivals who do not spend on training. If relevant skills become easier to hire because of the specific talent pool in a cluster, this worry disappears.

The final reason is that geographic clusters encourage greater levels of specialisation, and increased inter-firm cooperation with extensive activity links and resource ties. This enhanced cooperation reduces the cost of innovation.

Although Big Tech is currently going through something of a downswing, Silicon Valley is a classic example of a cluster which generates all of the above. Much closer to home, the revived city centre of Manchester exhibits these characteristics, as does Media City in Salford.

An important implication of clusters is that the successful ones generate “positive feedback”. The features which make them successful attract more and more of the same.

In contrast, the left-behind areas can experience this in a negative way. They get locked into low levels of productivity and income from which it is not easy to escape purely of their own accord. Section 4 addresses this point in more detail.

3.2 Evidence on the practical impact of clusters

The practical advantages of clusters are well documented in the economics and business school literatures.

An important example is provided by a 2019 report of the European Commission on clusters in the EU¹². The report analyses 51 exporting industries across the EU. It identifies 2950 regional industrial clusters which account for almost half of the employment in exporting industries. Of these, 198 are designated as high performing clusters and a further 898 as medium-performing clusters.

Productivity is much higher in companies located in a cluster than in those which are not. Across the clusters as a whole, productivity is 25 per cent higher than the average for the industries. For the high performance clusters, it is a massive 140 per cent higher than average.

Companies in clusters also outperform those which are not in clusters in productivity growth, employment growth and wage and salary levels and growth.

¹² *European Panorama of Clusters and Industrial Change*, European Commission, 2019

Significantly in the Greater Manchester context, a city region with a population of nearly 3 million, the European Commission report finds that there is a positive correlation between the size of the region and the number of clusters in the region. The top 25 regions across the EU with the largest number of clusters includes 10 metropolitan areas with populations of over 2.5 million, such as Barcelona, Milan, Stuttgart and Warsaw. *In other words, there is scope to have numerous successful clusters within a city-region and the success of one is typically not to the detriment of others.*

4. The case for public sector involvement in Atom Valley

4.1 Market forces are relevant but are not sufficient in spatial contexts.

We might reasonably ask why it is necessary to involve the public sector in the creation of a mega cluster.

There are in fact very strong arguments as to how this can be justified, rather than simply leaving economic development in the “left behind” areas to market forces. But it is important to address this question at some length, drawing on aspects of economic theory.

There are already considerable monetary incentives for companies to locate in the boroughs of North and East Greater Manchester.

Land in the Atom Valley boroughs, for example, is cheap, not just in comparison to the centre of London, a world city, or to booming high tech towns such as Cambridge. It is cheap relative to the centre of Manchester itself, an area which has been completely transformed by a judicious balance of public and private sector activity over the past thirty years or so. Then, the resident population of the city centre was well under 1,000. Now, it is some 80,000 and still growing.

In principle, given sufficient time, it is possible that market forces would operate to improve the relative position of the Atom Valley boroughs, Bury, Oldham and Rochdale. However, this merely poses the question of how long it would actually take.

The length of time involved is the basis of the famous statement by the great economist John Maynard Keynes that “in the long run we are all dead¹³”. In the early 1930s the Western economies suffered a recession much deeper than that of the financial crisis of the late 2000s. Keynes advocated a policy of public spending to lift economies out of the slump. He conceded that, theoretically, his opponents in economics were correct and that the economies would

¹³ The remark was in fact first made not, as is commonly thought, in the context of his most famous work, the *General Theory of Employment, Interest and Money* and the policy debate about the role of public spending in lifting economies out of the Great Depression of the 1930s. It was in his 1923 publication *A Tract on Monetary Reform* whose focus was how to stabilise prices and control inflation.

eventually recover. But he believed that it would take a very long time, and so argued for active policies to deal with the problem.

Much more modern support for the idea that market forces operate slowly, especially in contexts which are place-based, is provided by two of the 2019 Nobel Laureates in economics, Abhijit Banerjee and Esther Duflo.

In their book *Good Economics for Hard Times*¹⁴, there is a long chapter, almost fifty pages long, devoted to the economic theory of trade, both between countries and between different regions of the same country.

Economists regard trade theory as one of the jewels in the crown of the whole of economics. The reason why Banerjee and Duflo devote so much space to their discussion of it is that the empirical evidence, of which there is a great deal, frequently fails to confirm the predictions of the theory.

In essence, they conclude that the main reason for this is that, in their phrase, resources are “sticky”. By this they mean that in practice it often takes a long time for the full benefits of opening up an economy to more trade to emerge, so much so that any particular scientific study of evidence might not be over a long enough period to identify them. The concept of place is empirically important.

In the context of levelling up the North-South divide, both nationally and within Greater Manchester, a statement by the two Nobel Laureates is particularly relevant. They write:

“Economists have traditionally been unwilling to embrace place-based projects....This analysis seems to give too little weight to the facts on the ground” (p.85).

4.2 Market-shaping instruments

The idea that public intervention is a necessary complement to market forces in developing left-behind areas is one which is rapidly gaining important support within mainstream economics.

For example, Michael Kremer, the co-recipient of the Nobel Prize in 2019 with Banerjee and Duflo, runs the Development Innovation Lab at the University of Chicago. His work is especially symbolic given that the Chicago economics department has been seen for decades as the most important and influential exponent of free-market policies.

A key concept which Kremer has developed is that of “market shaping instruments”¹⁵. These are novel ways of the public sector intervening in ways which actively enhance market based solutions.

¹⁴ Abhijit V Banerjee and Esther Duflo, 2019, *Good Economics for Hard Times*, Penguin Random House

¹⁵ See for example <https://bfi.uchicago.edu/wp-content/uploads/2023/01/Market-Shaping-Accelerator-coming-soon.pdf>

An example is that of “advance market commitments” for innovative products. In traditional intervention policy, the states, whether national or local, will try and pick a winner in advance, and subsidise that company or product. Instead, Kremer and his colleagues at Chicago argue that funders should commit to subsidising future purchases of a new product. This leverages future demand to drive innovation now. They state that a major advantage of such market shaping instrument is that they can be open to all firms. They do not require picking a winner in advance.

Kremer suggests that market shaping instruments can be particularly effective in promoting the green economy and addressing the issue of climate change. New technologies are a crucial part of any solution.

One of the major goals of the Mayor and the Atom Valley board as a whole is to promote Net Zero. These innovative ideas from Nobel Laureate Kremer and his lab at Chicago are ones which deserve very careful policy consideration both by the UK government and Greater Manchester Combined Authority.

4.3 The theory of economic growth

The theory of economic growth is yet another area which gives rise to powerful justifications for public sector intervention in the process of economic development.

The modern theory of economic growth was developed by the MIT economist Robert Solow in the 1950s, for which he was subsequently awarded the Nobel Prize¹⁶. At the time, it represented a major advance within economics. Growth in output is explained by growth in the labour force and the capital stock and by technological innovation. This may seem simple, but it has many subtle properties.

The model itself is still highly regarded by economists, but it has over the years attracted two main strands of criticism. Perhaps more precisely, these are not criticisms, but areas in which the model needs to be extended to incorporate other features. There are links between the two themes, but it is helpful to discuss them separately.

A key prediction of the Solow model is that eventually (in the long run, as we might say), income per head in different countries or regions will converge to be at the same level everywhere.

There are various technical definitions of “convergence” which need not concern us here. The point is, rather, that convergence does not seem to be happening in the way the theory suggests.

¹⁶ Solow, R.M., 1956. A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), pp.65-94.

Instead, countries around the world¹⁷ appear to be forming three separate groups, based on the levels of income per head. There is convergence within them, but not between them. It is not impossible for poor or medium income level countries to become rich, but it is the exception rather than the rule. Examples include Japan in the 19th century, which started its development many decades after the West, and South Korea and Singapore in the 20th.

The Stanford economist Moses Abramowitz was the first to raise the idea¹⁸ that countries might form different groups in terms of the level of their economic development. He emphasised the need for “social capabilities” in order to be able to benefit from catch-up growth. These include an ability to absorb new technology and to attract capital.

A much more substantial body of work exists around the second extension to the basic growth model of economics. This is known as “endogenous” growth theory. The American economist Paul Romer was awarded the Nobel Prize in 2018 for his work in this area¹⁹.

To recall, the basic model developed by Solow argues that growth depends on the quantity of the inputs, namely capital and labour, and on technology.

However, when the model is used to analyse actual data on growth rates – what economists call “growth accounting” – it turns out that most of the work is done by the technology variable. And the theory does not explain how developments in technology come about. These are, in the jargon, “exogenous”, they arise outside the model itself.

From the mid-1980s onwards, economists expanded the original Solow model to try to account for innovation by factors contained within the model itself. No single version is regarded as better than the rest, but a common feature is that they rely on the kinds of positive externalities and spill-over effects in a knowledge economy – concepts raised above in the discussion on clusters.

¹⁷ Much of the empirical work in this areas uses country level data which is well documented over a long period rather than regional data within countries. The same conclusions can, however, be drawn from the latter data. For example, even over a 20 year period, the *relative* unemployment rates of both regions in the UK and states in the US are very stable. A region or state which had relatively high unemployment 20 years ago is likely to have it now (the actual rates of unemployment will vary with the business cycle, whether the economy is booming or in a recession). The finding extends to local authorities *within* a region and to counties within states (Ormerod, P., 2014. The persistence of unemployment at the local area level: evidence from the US and the UK. *Applied Economics Letters*, 21(1), pp.28-30.)

¹⁸ Abramowitz, M., 1986. Catching up, forging ahead, and falling behind. *Journal of Economic History*, 46(2), pp.385-406 is probably his most cited work, though he raised the ideas behind years before. Durlauf, S.N. and Quah, D.T., 1999. The new empirics of economic growth. *Handbook of Macroeconomics*, 1, pp.235-308 is another highly cited scientific paper in this area.

¹⁹ Two of his papers are amongst the most heavily cited in the whole of economics: Romer, P.M., 1986. Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), pp.1002-1037; Romer, P.M., 1990. Endogenous technological change. *Journal of Political Economy*, 98(5, Part 2), pp.S71-S102.

In this approach, the underlying rate of growth can be increased by policy measures. It is not simply a matter of market forces working of their own accord. Examples include subsidies for R&D or for education.

In summary, this rather long discussion establishes that there are very strong arguments within economics to justify an active role for public policy in developing areas such as Atom Valley.

5. Transport

Good quality transport links are a self-evident requirement to make any development site attractive for occupiers and accessible to the labour force. The What Works Centre for Local Economic Growth²⁰ identifies two ways in which transport spending can support local economic growth:

- first, in response to growing demand, to ensure that increased congestion, longer travel times and higher costs to producers and consumers, do not constrain growth.
- second, and related, to stimulate the UK and local economies, for example, by raising the productivity of existing firms and workers or by attracting new firms and private sector investment.

The required transport investment in Atom Valley addresses factors related to both of these aims.

In relation to the first issue, the M62 corridor on which the sites are located is one of the most congested parts of the UK – reflecting the fact that the transport connections are principally by road and that the main highway (the M62 motorway) is heavily used by local users (commuters, domestic and leisure, and goods transport) and acts as the primary UK ‘intercity’ east-west axis for the North of England. Poor transport connectivity is therefore already imposing significant costs on both producers and consumers through congestion, which acts as a brake on growth.

In relation to the second issue, transport investment will have a number of effects. Investment in the road infrastructure will stimulate the local economy through attracting new firms and private sector investment to the area who will be attracted by the improved road connectivity and network reliability for the movement of inputs and final goods. It will also enable more workers to be able to commute to the sites, which would be expected to increase productivity as firms are able to better access the skills they require. Second, investing in public transport and connecting Atom Valley sites into Greater Manchester’s extensive bus, rail, and tram network will further increase the size of the workforce, again boosting productivity by allowing better matching of jobs to skills for firms on the site.

Finally, it is known that access to ‘economic mass’ boosts productivity through agglomeration effects. Improving transport connections to the large, dense and knowledge-intensive regional core of Manchester through road and public transport effectively increases the size

²⁰ https://whatworksgrowth.org/wp-content/uploads/15-06-25_Transport_Review.pdf

of the local economy. As a larger local economy means higher agglomeration economies this means that firms should be more productive.

In summary, there are clear economic arguments for investment into transport improvements to drive productivity and growth. However, the evidence on the cost-benefit analysis of different interventions is less clear cut and detailed analysis will need to be undertaken on a scheme by scheme basis to ensure they deliver good value for money.

6. Networks of innovation

6.1 Atom Valley, research centres and the universities of the city-region

An essential ingredient of high technology clusters is a close network of connections between companies and local universities and research institutes.

Two advanced institutes are being developed for the Atom Valley sites.

As Michael Gove MP stated in the Levelling Up White Paper which he presented to Parliament in February 2022²¹, £23 million has been awarded to the National Physical Laboratory “for the *Advanced Machinery and Productivity Initiative* in Rochdale” (p.283). Known as AMPI, the project is further supported by the fact that Rochdale Council has already committed £15 million from the Towns Fund towards a specialised building.

A pilot project has been awarded to establish a *Sustainable Materials Translational Research Centre* (SMTRC) on Atom Valley under the Innovation Accelerator process overseen by GMCA and Innovate UK. The partners in the project are the Rochdale Development Agency, the University of Manchester, High Value Manufacturing Catapult (including the CPI and other Centres) and industrialists.

The focus on manufacturing, and advanced machinery and sustainable materials, reflects the comparative strength of the Atom Valley boroughs in manufacturing. In the three boroughs, 11.9 per cent of the existing labour force is employed in the manufacturing sector compared to a national average of 7.6 per cent.

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052706/Levelling_Up_WP_HRES.pdf

A sub-committee of the main Atom Valley board has been established to oversee the development of these two institutes, headed by Professor Richard Jones, Vice-President for Regional Innovation and Civic Engagement & Professor of Materials Physics and Innovation Policy at the University of Manchester²².

The strength of the links between Atom Valley and the university sector is further evidenced by the connection with the Productivity Institute²³, a world-class ESRC funded research body based at the University of Manchester. The Productivity Institute and Rochdale Development Agency have signed a Memorandum of Understanding reflecting their commitment to collaborate to better understand and improve the productivity of in Rochdale Borough, providing valuable lessons for other parts of the UK.

The agreement signifies a shared ambition from the two organisations to identify successful strategies and interventions to improve productivity. Once an initial phase of research is complete, the plan is to extend the MoU to include the other Atom Valley Boroughs, Bury and Oldham.

6.2 The diffusion of innovation across existing companies to raise productivity.

An important task of the AMPI and SMTRC research centres is to ensure that the high-level technology embedded in the cluster is taken up by other manufacturing companies in the area.

It is well documented that there are substantial and persistent differences in productivity levels between companies in the same industry, even when the industry is narrowly defined.

The Chief Economist of the Bank of England, for example, has argued that “A long and lengthening tail of stationary companies explains why the UK as a one third productivity ap with its international competitors”²⁴

The importance of this wide spread of performance is shown by the fact that the United States Bureau of Labor Statistics and Census Bureau has recently developed a new data product, Dispersion Statistics on Productivity, to measure and track it over time²⁵.

The insights from a range of social sciences provide valuable insights on how to promote diffusion.

²² See Richard A.L. Jones, 2022, Science and innovation policy for hard times: an overview of the UK’s Research and Development’s landscape, The Productivity Institute, Productivity Insights Paper no. 014

²³ <https://www.productivity.ac.uk/>

²⁴ <https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/the-uks-productivity-problem-hub-no-spokes-speech-by-andy-haldane>, p.3

²⁵ “Dispersion in Dispersion: Measuring Establishment-Level Differences in Productivity” C Cunningham et al. September 2020, <https://www.bls.gov/osmr/research-papers/2020/pdf/ec200120.pdf>

For example, in the past twenty years or so, a great deal of heavily mathematical analysis has been carried out on the concept of diffusion across networks, whether it is ideas or behaviour. A seminal paper is by the mathematical sociologist Duncan Watts²⁶, at the time at Columbia University. There are many useful insights from this technical literature.

But there is a much longer tradition of the study of the diffusion of technology in the social sciences. Everett Rogers, a professor of communication studies, first published his hugely influential book on the topic nearly sixty years ago²⁷. Two of the key elements which influence the diffusion of innovation – more modern, high technology in this case – in Rogers' approach are the channels of communication and a social system. Additionally, of course, potential adopters need to consider the costs and benefits of so doing.

But whether it the more descriptive approach or the highly mathematical one, the key common feature is the importance of networks.

In addition to the links with universities, networks involving industrialists are being actively developed by, for example, Greater Manchester's Graphene, Advanced Materials and Manufacturing Alliance (GAMMA).

7. Innovation

7.1 Innovation and the new devolution deal

The key driving factor to address the North-South divide in Greater Manchester, and the one which will deliver the success of Atom Valley, is that of innovation.

This is recognised very clearly in the new devolution deal agreed between the UK government and the Greater Manchester Combined Authority.

Building on the Innovation Accelerator programme, a Strategic Innovation Partnership has been created to give GMCA a new and influential role informing the national research and innovation ecosystem. A knowledge transfer programme has been created focused on local strengths along with a pilot to boost innovation and adoption by local businesses. Overall, more autonomy has been transferred to the GMCA to develop the regional innovation ecosystem.

A new Strategic Productivity Partnership has been created to enable GMCA to raise local priorities for future business, alongside a new role for GMCA in the governance of the next generation of British Business Bank UK funds in the North of England and stronger strategic and operational relationships with the UK Infrastructure Bank.

²⁶ DJ Watts, A simple model of global cascades on random networks, *Proceedings of the National Academy of Sciences*, vol 99, 9, pp. 5766-71, 2002

²⁷ Rogers, E.M., 2010. *Diffusion of Innovations*. Simon and Schuster, first edition published 1962

7.2 Innovation and Net Zero

It is innovation which is needed to ensure that Greater Manchester leads the way in sustainable advanced materials and manufacturing to become carbon neutral by 2038.

The concept of *economic complexity* offers a powerful framework in which to illustrate the empirical importance of innovation in the sustainability of economic activities. The seminal paper on the concept was published in 2009 by Cesar Hidalgo of MIT and Ricardo Hausman of Harvard in what has become a heavily cited paper²⁸.

The Economic Complexity Index²⁹ looks to explain the knowledge accumulated in a population and that is expressed in the economic activities present in a city, country, or region. Unlike aggregate metrics such as GDP, economic complexity metrics capture information about the sophistication of activities. They have been validated by their ability to explain international variations in economic growth and income inequality³⁰.

In essence, the more the activities within an economy are based on knowledge and innovation, the more sustainable is the development of that economy.

Within the scientific research community across the world, major steps forward have been taken which will facilitate the achievement of Net Zero targets.

By way of illustration, *Nature*, one of the world's two leading scientific journals, has carried a series of articles based around this topic. These are in addition to the much more technical papers which the journal publishes on these issues.

For example, on 16 November 2022 *Nature* published a feature on the circular economy³¹ which covered topics such as making plastics less of an environmental burden and how to fit clothing into the circular economy. Regarding the latter, textiles still has a distinct presence in the economies of the Atom Valley boroughs, and vast amounts of textiles end up in landfill. Technology to recycle the cellulose in fabric could make clothing more sustainable. The city-region's universities have great strengths in these areas.

A specific example is the development of concretene by the University of Manchester's Graphene Engineering Centre (GEIC) in collaboration with Nationwide Engineering Research & Development (NERD). Concretene is a graphene-enhanced admixture for concrete. Graphene was properly isolated and characterized in 2004 by Andre Geim and Konstantin

²⁸ Hidalgo, C.A. and Hausmann, R., 2009. The building blocks of economic complexity. *Proceedings of the National Academy of Sciences*, 106(26), pp.10570-10575.

²⁹ <https://oec.world/>

³⁰ See, for example, Hausmann, R., Hidalgo, C.A., Bustos, S., Coscia, M. and Simoes, A., 2014. *The atlas of economic complexity: Mapping paths to prosperity*. MIT Press. The recent paper in *Nature Communications* contains numerous other references Stojkoski V, Koch P, Hidalgo CA. Multidimensional economic complexity and inclusive green growth. *Communications Earth & Environment*. 2023 Apr 21;4(1):130.

³¹ <https://www.nature.com/collections/aiehecifha>

Novoselov at the University of Manchester, for which they received the Nobel Prize in Physics in 2010. Concrete is the most widely used substance on Earth, after water, but it has a very high carbon footprint. Some 8 per cent of the planet's total carbon emissions come from the production of concrete, and concretene has the potential to reduce these by substantial amounts.

The links with the city-region's universities and research centres are a key way in which Atom Valley will deliver the target of carbon neutrality by 2038.

7.3 Innovation and inclusive growth

The growth in jobs and prosperity in Atom Valley will be inclusive. All the residents of the three boroughs will have the opportunity to benefit from this.

7.3.1 Opportunities within and created by Atom Valley businesses plus high quality, zero carbon housing.

In addition to the jobs directly created in Atom Valley, some of the monies generated within Atom valley will be spent in Bury, Oldham and Rochdale (and elsewhere in Greater Manchester), either by high tech companies sourcing from local suppliers or from spending on consumption items by those employed on the sites.

Some of the workers will choose to live in the 7,000 zero carbon high quality homes which will be delivered on Atom Valley sites. These homes will be complemented by additional housing provision being brought forward in the surrounding area by the three local authorities.

Already, 1,000 family homes are planned, and 300 are already being delivered, in the South Heywood HPARK development. Major attractions of the site are both the proximity to the centre of Manchester and the fact that they will be available at not much more than half the price of equivalent properties in affluent parts of South Manchester. Queen Elizabeth II Way, the link road to J19 on the M62, was opened at the end of 2022 and can help unlock the potential of the whole of Heywood, at present a rather deprived part of the Metropolitan Borough of Rochdale.

7.3.2 Innovation and employment creation

But the direct impact on jobs itself will not be sufficient to deliver the full scope of inclusive growth which is a central aim of the Atom Valley project. The two foundation stones of this target are:

- *Innovation*
- *Developing the skills of local residents*

Innovation has been feared by many throughout the industrial era, beginning with the Luddites in the early 19th century. But, properly harnessed, it is a powerful way in which to reduce inequality and promote social mobility.

Innovation has a positive impact both at the level of the economy as a whole and at the level of individual firms.

Section 4 above on setting out the case for state intervention to address geographical inequalities described the central role which economists ascribe to innovation as a driver of growth. Countries with higher rates of both the creation and adoption of new technologies grow faster.

Importantly within the Atom valley context, the same result obtains at finer, more granular levels of geography.

For example, a study published by the National Bureau of Economic Research in the US compared the performances over a long period of time of the individual states of America in terms of their growth rates in real income per head and the number of patents which were filed³² (adjusted for population size). There is a very clear causal link between the number of patents – a well-recognised measure of innovation – and the growth in living standards.

The same finding applies at the level of individual firms. Essentially, companies that innovate more become more productive. This enables them to obtain higher market shares because their products become both better and cheaper than competitors who do not innovate. The growth in sales leads to an increase in employment in innovative firms. Innovate firms create jobs³³.

7.3.3 Innovation and inequality

In a very specific sense, innovation leads to an increase in inequality. We have only to think of the huge fortunes amassed by the founders of companies such as Facebook and Google.

But this phenomenon is confined to a very small group in the total working population. *More generally, innovation both reduces inequality and promotes social mobility.*

A recent study of British labour market data³⁴ illustrates these points clearly. One of the principal authors of the analysis summarises the findings: “The innovative firm is a lever of social mobility insofar as it trains and promotes its employees, especially the least skilled

³² Akcigit, U., Grigsby, J. and Nicholas, T., 2017. *The rise of American ingenuity: Innovation and inventors of the golden age* (No. w23047). National Bureau of Economic Research.

³³ See, for example, Aghion, P., Antonin, C., Bunel, S. and Jaravel, X., 2022. The effects of automation on labor demand: A survey of the recent literature. In *Robots and AI* (pp. 15-39). Routledge.

³⁴ Aghion, P., Bergeaud, A., Blundell, R.W. and Griffith, R., 2019. The innovation premium to soft skills in low-skilled occupations, Centre for Economic Performance Discussion Paper no.1665

amongst them. Innovative firms act as a social ladder for workers, including such low and middle-skilled employees as secretaries, security guards, specialised blue collar workers, transport operators and salespeople”(p.84)³⁵.

The average worker in relatively low skilled occupations receives a considerable wage premium in innovative firms compared to non-innovative ones. Further, innovative firms invest in these workers and the difference in wages in the two types of company increases with age.

8. Developing skills and the “innovation road map”

Innovation itself creates employment and promotes inclusive growth. But this must be augmented to further ensure that residents of the three boroughs are able to take advantage of the higher wage jobs which will be created.

Some of the jobs in Atom Valley will be in the national/international markets, with which local residents must compete. However, this is a clear opportunity to increase the levels of graduate retention in the three boroughs, which are currently low.

But most of the jobs will be filled mainly by residents in the city-region. They will require various levels of technical skills.

At its inaugural meeting in October 2022, the Atom Valley board took the view that the further education colleges in the three boroughs³⁶, working together and in conjunction with higher education institutions, are the key to delivering these technical jobs for local people.

A skills subcommittee of the Atom Valley board was set up to co-ordinate activities in these areas, comprising the Principals of the three FE colleges, local authority representatives, university members of the board’s research centre sub-group, and industrialists.

The March 2023 devolution deal for the GMCA is a very welcome development in this respect, facilitating even closer co-ordination in the sector across the whole of Greater Manchester. A new Partnership for post-16 Technical and Education and Skills will provide oversight of post 16 technical education and skills. Non-apprenticeship adult skills functions and grant funding for post-19 will be devolved in the next Spending Review period.

The development of technical skills should not take place in a vacuum. It should mesh closely with the evolving demands of technology.

³⁵ Aghion, P., Antonin, C. and Bunel, S., 2021. *The Power of Creative Destruction*. Harvard University Press.

³⁶ Bury College, Hopwood Hall (based on two campuses in the borough of Rochdale), and Oldham College

To this effect, an *innovation road map* is being created and will be presented at the July 2023 board meeting. It will be a live document, as it were, being kept under review and developed and amended as necessary.

A key document is the *Materials and Manufacturing Vision 2050* developed by UK Research and Innovation (UKRI)³⁷.

Details are available in the 50 page document itself, but it is important to note that **a manufacturing sector which is Net Zero is identified as a strategic imperative, which fits exactly with the priorities of the GMCA in general and Atom Valley in particular.**

In addition, the Innovation Roadmap will build on a considerable volume of analysis carried out by the GM Combined Authority over the last decade. Most recently, as part of the “Innovation Accelerator” process announced in the Levelling Up White Paper, GM has produced an Innovation Plan³⁸, which will be further developed with colleagues in Innovation UK and DSIT. This identifies Atom Valley as the North West’s largest development site focused on high-value manufacturing and R&D, ensuring that the ambitions for Atom Valley will be integrated in the wider vision for the innovation economy across the whole city-region.

The innovation road map is based on the views on how technology will advance in both advanced machinery and materials and an appropriate timelines for the development. The curriculums of the FE colleges can then be designed to ensure that the labour force in the three Atom Valley boroughs acquires the skills required to take advantage of the types of jobs which will be created.

9. Types of firm

The main site of Atom Valley, known as the Northern Gateway, has 13 million square feet of occupancy space. The other two sites, Kingsway and Stakehill, have 4.0 and 4.4 million square feet respectively. The latter is made up of 2.9 million square feet on the existing site and 1.5 on the extension.

The main site has the capacity to accommodate a mega-factory, one of only a small number of sites in the UK with this capability. However, the sites are suitable locations for companies of all sizes.

The main focus on the type of industry is on the strengths created by the two research centres and the strong links established with the universities of the city-region. Namely, advanced machinery for manufacturing and advanced sustainable materials, with a special emphasis on innovative technologies which contribute to achieving the Net Zero target.

³⁷ <https://www.ukri.org/publications/innovate-uk-materials-and-manufacturing-vision-2050/>

³⁸ <https://gmlep.com/wp-content/uploads/2022/11/IGM-Exec-Summary-Nov-22.pdf>

An important element in the strategy of the Atom valley board is to attract both start-up companies and those which are looking to scale up using innovative technology. Links with local venture capitalists are being strengthened.

Attracting existing, well-established companies from inside outside the city region will obviously be a feature of job creation on the Atom Valley sites. But start-ups and scale-ups are essential in creating *net* new jobs.

A heavily cited analysis, for example, of US Census Bureau data in the Longitudinal Business Database showed that in a typical year new firms created more than 100 per cent of all the new jobs in the United States³⁹.

Of course, far more young firms fail than more established ones, but those which survive continue to create jobs, and some grow very rapidly. A key reason is that innovative firms in their early years do not just innovate far more than a typical firm in an industry, in terms of the innovations themselves they are more radical and more significant than those generated by large firms⁴⁰.

Turnover in new firms is in fact something to be welcomed. For example, analysis of data covering 587 regions in seventeen European countries shows that the annual rate of growth of GDP is greater in regions where the average between the rate of firm creation and destruction is high⁴¹.

10. National security and resilience

Governments across the Western world are increasingly concerned about the potential risks which globalised supply chains pose to both national security and national resilience.

The American government is leading the way, with two major acts, the Inflation Reduction Act and the CHIPS and Science Act⁴². These acts have other important purposes, The former, for example, aims to catalyze investments in domestic manufacturing capacity, encourage procurement of critical supplies domestically or from free-trade partners, and jump-start R&D and commercialization of leading-edge technologies such as carbon capture and storage and clean hydrogen. The latter is intended to bolster US semiconductor capacity, catalyze R&D, and create regional high-tech hubs and a bigger, more inclusive STEM workforce.

³⁹ Haltiwanger, J., Jarmin, R.S. and Miranda, J., 2013. Who creates jobs? Small versus large versus young. *Review of Economics and Statistics*, 95(2), pp.347-361.

⁴⁰ Akgigit, U. and Kerr, W.R., 2018. Growth through heterogeneous innovations. *Journal of Political Economy*, 126(4), pp.1374-1443.

⁴¹ Aghion, P., Antonin, C. and Bunel, S., 2021. The power of creative destruction. In *The Power of Creative Destruction*. Harvard University Press pp. 8-9.

⁴² See, for example, <https://www.mckinsey.com/industries/public-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it> and <https://www.mckinsey.com/industries/public-sector/our-insights/the-chips-and-science-act-heres-whats-in-it>

The advanced, innovative manufacturing sector is the key focus of these two massive policy initiatives in the United States. It is openly recognised that the active promotion of this sector will enhance both national security and national resilience.

In comparison to these, both of which involve federal spending of hundreds of billions of dollars, Atom Valley is of course on a modest scale. But, as we document in the Vision, it has the scale to make an impact at a national level in the UK.

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