



Future Grangemouth Vision 2025 Evaluation of Economic Effects

On behalf of



Project Ref: 36862 | Rev: AA | Date: January 2017

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For and on behalf of Peter Brett Associates LLP				

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On behalf of



Summary

In February 2015, Scottish Enterprise, Falkirk Council, Chemical Sciences Scotland and Grangemouth's key chemicals businesses adopted the following Vision for the future development of Grangemouth's chemicals sciences cluster.

The Future Vision – Grangemouth 2025

“A key European Hub for sustainable HV Chemical Manufacturing”

The vision for Grangemouth will be accomplished over the next 10 years, culminating in 2025 when the following scenario is envisaged:

Businesses

Businesses are all signed up to the promotion and advancement of Grangemouth to develop and maximise the opportunity it offers to Scotland and the UK.

Smart City

Grangemouth is recognised as a smart city focussed on the key 'smart' sectors including energy (costs and security of supply), and transport as well as utilities such as water and waste and taking into consideration emission and flood protection and the Sensor Shield Project is fully developed.

Collaboration

Government and industry are working in partnership to position chemical science industries and Grangemouth as an important growth sector in the Scottish and UK economy.

Competitive Port

An improved strategic road and rail infrastructure has placed Grangemouth Port as the key logistics and distribution centre for Scotland.

World Class Refinery

Grangemouth accommodates a globally competitive refinery with reduced support costs and improved supply chain management capabilities, focusing not just on traditional refining but also on biofuels.

Combined Heat & Power (CHP)

Power and heat is being provided by highly efficient CHP plants, selling on excess electricity to the National Grid, and geared towards utilising raw materials with no higher value use.

Unconventional gas

Extraction and import of shale gas is operating in parallel. Grangemouth is recognised as the on shore Gas Centre for Scotland. Shale Gas Upstream HQ established.

Bio based Industries

Grangemouth is globally recognised as a main location for biorefining using industrial biotechnologies as part of the chemical manufacturing process, with pilot and demonstration facilities alongside full- scale manufacturing facilities.

Carbon Utilisation

Grangemouth is a centre of excellence in carbon capture and utilisation, with pilot and demonstration facilities for CO₂ utilisation.

Workforce

The percentage of the Scottish workforce in the chemical industries has grown and Grangemouth's excellence in a fully skilled work force is recognised internationally.

Inward Investment

An agreed strategy is in place which attracts inward investment opportunities to Grangemouth.

High Value Manufacturing (HVM)

A HVM proposition has been developed for Grangemouth's chemicals businesses encompassing the full cycle of activities from R&D, through design, production, logistics and services, to end of life management.

The Vision acknowledges the considerable recent investment made by INEOS and other major companies in the area and the commitment of Scottish Enterprise, Falkirk Council, Chemical Sciences

Scotland to establishing Grangemouth as a major European focus of activity in the chemical sciences sector.

Recognising Grangemouth' significance to Scotland manufacturing industry and the country's exports, this strategy and supporting actions are developed to firmly position Grangemouth as Scotland's main chemicals and advanced manufacturing centre.

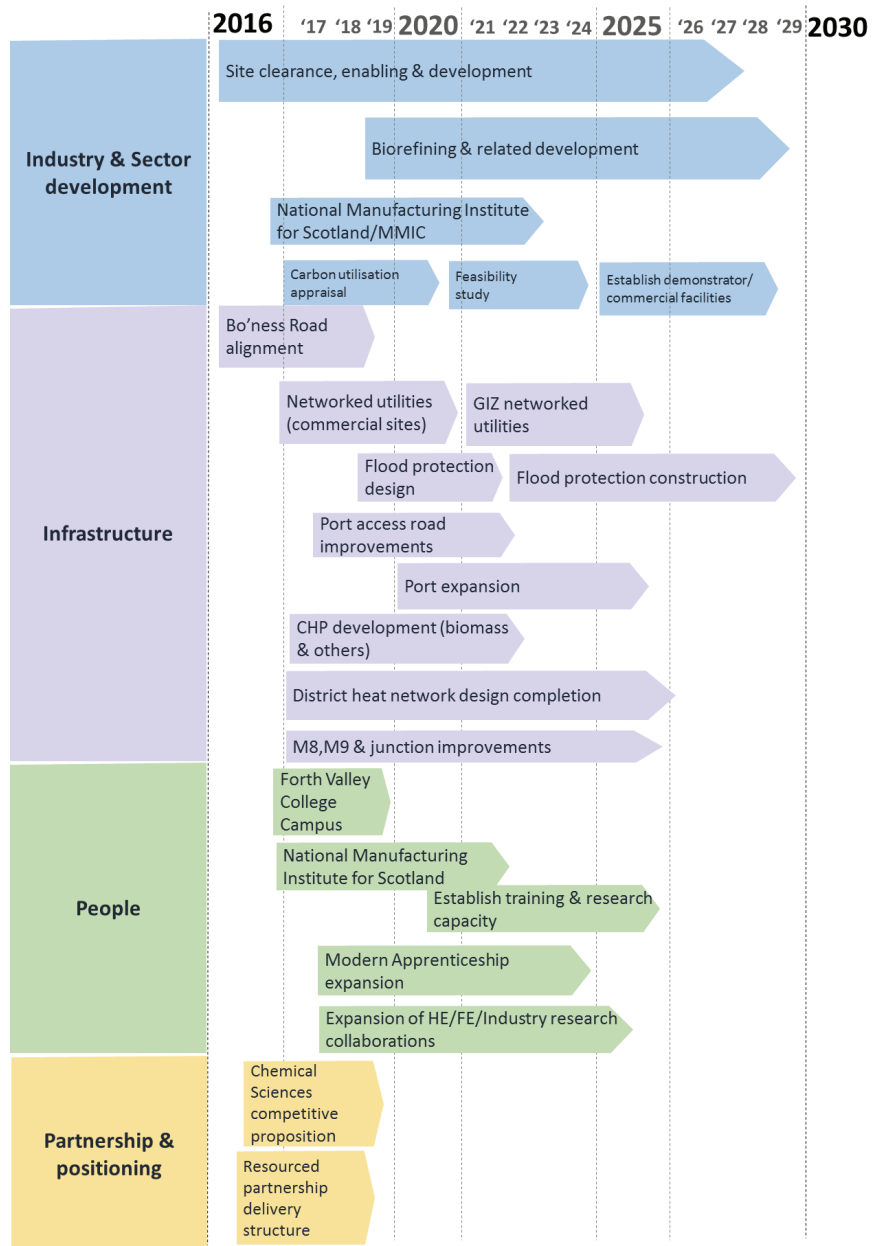
By 2030, strategy delivery will create some **3,591 additional jobs** in the local area, and 3,350 across Scotland. The effects of investment in the Grangemouth chemical sciences cluster in growing the economy will be similarly striking - with an additional **£206 million generated annually** in the local area, £182 million across Scotland

The strategy has 4 elements:

- **Industry & Sector Development: Extending sustainable & innovative advanced manufacturing**
- **Sustainable infrastructure to enable growth & attract investment**
- **People: Skills & capacity to support the Grangemouth Investment Zone**
- **Partnership & Positioning: a structure to support Vision delivery**

Partnership coordination in delivery is essential in achieving agreed goals. With national priority, its delivery clearly needs to be enabled by appropriate resource. While this will require commitment to investment to fund infrastructure, company expansion and skills development, it also needs to be supported by dedicated staff resource and clear leadership.

A series of actions has been identified. While lead responsibility differs in each case, strong central coordination by this dedicated resource will drive and promote strategy delivery. Key actions and responsibility for implementation are shown in the following thematic tables overleaf.



KEY ACTIONS:

Industry & Sector Development

2017-2019

- Resolve Bo'ness Road alignment INEOS, Falkirk Council
- Development of delivery vehicle for Grangemouth
- Review of assisted areas status e.g. EZ
- Core site clearance & rationalisation of redundant infrastructure
- Secure serviced site availability of 35 ha
- Secure core location for biorefining and related processes INEOS, Calachem, other landowners
- Secure functional operation of first Grangemouth biochemical process demonstrator(s) Scottish Enterprise, INEOS, Calachem, other landowners
- Build case and secure location of Scotland's National Manufacturing institute in Grangemouth & MMIC Scottish Enterprise, Industry, IBIOIC
- Establish commercial carbon utilisation potential of bio and non-bio feedstocks Scottish Enterprise, Scottish Government

2020-2025

- Secure serviced site availability of 60ha
- Secure 4 new company locations and investment of £125m INEOS, Calachem, other landowners
- Attract additional biochemical demonstrators and 2 commercial operators Scottish Enterprise, Industry
- Delivery & full occupation of Scotland's National Manufacturing Institute Scottish Enterprise, Scottish Government
- Attraction of carbon utilisation demonstrator linked to port expansion, biomass and other developments BEIS, Scottish Enterprise, Industry

Infrastructure

2017-2019

- Deliver Bo'ness Road alignment INEOS, Falkirk Council
- Establish networked utilities infrastructure (site specific) INEOS, Calachem, other landowners
- Investigate potential for linked GIZ network Scottish Enterprise, Falkirk Council, Industry
- Commence design of Grangemouth Flood Protection Scheme Scottish Government
- Design & secure funding for Grangemouth District Heat Network Falkirk Council, operator(s)
- Consideration of new routes development for Grangemouth Port Forth Ports, Scottish Government

2020-2025

- Development of linked GIZ utilities network, and regulatory infrastructure Scottish Enterprise, Falkirk Council, Industry
- Completion of Grangemouth District Heat Network Falkirk Council, operator(s)
- Expansion of Port of Grangemouth (harbour infrastructure & specialist storage) Forth Ports
- Improvement to Port approach roads Falkirk Council, Scottish Government
- Completion of M9, J5 & J6 improvements Falkirk Council, Scottish Government

KEY ACTIONS:

- Construction of initial stages of Grangemouth Flood Protection Scheme 2025-2030
- Completion of Grangemouth Flood Protection Scheme

Scottish Government
 Falkirk Council

Scottish Government
 Falkirk Council

People

2017-2019

- Construction & opening of Forth Valley College campus
- Expansion of sector Modern Apprenticeships programmes to 100 places
- Expansion of industry/HEI research collaborations

Forth Valley College

Industry, Forth Valley College
 Industry, Universities of Strathclyde (CMAC), Heriot Watt
 Industry, Forth Valley College, HEIs

2020-2025

- Establishment of research and training capacity at National Manufacturing Institute
- Expansion of sector Modern Apprenticeships programmes to 300 places

Scottish Enterprise,

Scottish Enterprise, Industry

Partnership & Positioning

2017-2019

- Early establishment of a coordinated, competitive proposition for Grangemouth’s chemical sciences sector
- Early establishment of a dedicated partnership structure resourced to deliver the Future Grangemouth Vision

Scottish Enterprise, Industry, CSS, Falkirk Council

Scottish Government, Scottish Enterprise, Industry, Falkirk Council

1 Introduction

- 1.1.1 In February 2015, Scottish Enterprise (SE) invited Grangemouth's chemical businesses, Chemical Sciences Scotland (CSS), Falkirk Council, and others to a briefing to discuss current and future priorities. The Vision emerging from this meeting was intended as the basis of the future direction of growth and the actions of Government, Falkirk Council and business to support it. It adopted the following objectives.

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Collaboration

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Competitive Port

An improved strategic road and rail infrastructure has placed Grangemouth Port as the key logistics and distribution centre for Scotland.

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A HVM proposition has been developed for Grangemouth's chemicals businesses encompassing the full cycle of activities from R&D, through design, production, logistics and services, to end of life management.

1.1.2 Alongside the views of business and public sector stakeholders, the Vision brings together the direction and aspirations from:

- Chemical Sciences Scotland (CSS) 2012 strategy refresh which recognised Grangemouth as a key chemical manufacturing location, and identified a range broad supporting actions for sector development; and
- The study which followed, “Falkirk Grangemouth Framework for Growth” was supported by CSS, Scottish Enterprise, Falkirk Council and key local organisations. It sought to promote Grangemouth internationally through skills development, improvements to port, road and energy infrastructure as well as development of key sites including Earls Gate Park and the INEOS site.

1.1.3 Subsequent developments have included:

- Designation of the Grangemouth Investment Zone as a national development in National Planning Framework 3;
- Strategic planning with INEOS resulting in the successful development of their Ethane Tank and associated infrastructure. The first deliveries of imported shale gas were received on 26 September 2016. INEOS has completed construction of its Olefins & Polymers(O&P) Europe HQ in Grangemouth;
- Deeper engagement with other major Grangemouth businesses including BP, CalaChem, Fujifilm and Exxon Mobil, generating increased investment;
- Following Falkirk Council’s successful submission, the award of Scotland’s largest TIF (Tax Incremental Funding) project, enabling road and other infrastructure improvements to take place. Improvements to Junction 6 of the M9 have already been completed;
- Collaboration with Skills Development Scotland (SDS) and Forth Valley College, to address skills issues in Grangemouth. Forth Valley College has attracted a UK Beacon Award for Innovation. It will relocate to a new £83 million, 20,000 sq. m campus in 2019, reinforcing its position as one of the leading providers of training and education for Scotland’s manufacturing sector, particularly the energy and oil and gas sectors;
- The development of the Grangemouth Energy Project which recognises the need to renew the area’s energy generation capacity. It is examining opportunities to link local providers of heat and energy with nearby residential areas, schools and other sources of demand, to share heat and power across local distribution networks. Initial work has indicated its potential feasibility and more detailed design work is progressing;
- The Regulatory Review Group’s work on the Grangemouth area in relation to Flood Protection; Industrial Emissions and Hazardous Substance Consents; and Land Use Planning; and
- The opening of the award winning Falkirk Helix in 2014, which is already attracting nearly 1 million visitors annually, increasing the area’s profile nationally and internationally.

1.1.4 In Spring 2016, SE commissioned Peter Brett Associates to prepare an Evaluation of the Economic Impacts of the Future Grangemouth Vision, working to a Steering Group including SE and other members of Chemical Sciences Scotland. The evaluation has had two main strands:

- Developing more detail of the components and actions needed to deliver the Vision objectives and setting this in the context of the area’s performance. This effectively defines the main elements of a strategy to deliver the Vision, including:



- The nature and scale of refining operations ('traditional' and bio-refining);
 - Other types of business activity potentially attracted to Grangemouth;
 - Transport and energy infrastructure supporting the economic Vision alongside wider community objectives;
 - Expansion and skilling of the local workforce;
 - Profiling the area as an acknowledged centre for advanced manufacturing;
 - Achieving change, securing focussed resources and investment as part of public and private sector partnership delivery; and
 - Examining the potential economic effects of Vision implementation
- 1.1.5 Key Stakeholders including Falkirk Council, INEOS, Calachem, Forth Ports and others have been closely involved throughout the process. After mapping Grangemouth's starting position against economic and other indicators, and comparing performance with competitors in the UK and elsewhere a series of individual discussions was completed with private and public sector organisations, identifying shared goals and priorities.

1.2 Process

1.2.1 The Strategy has been developed through:

- A comprehensive socio-economic and policy baseline review;
- Consultations with key stakeholders (including INEOS, Calachem, BP, Syngenta, Forth Ports, Falkirk Council, Chemical Sciences Scotland, IBIOC, SE officers and others);
- A stakeholder Workshop held at Callendar House in Falkirk in April 2016 which presented the baseline, identified key issues and discussed potential actions, investments and initiatives which may represent delivery of the Vision;
- Follow up discussions to refine the workshop ideas;
- Preparation of a draft concept; and
- An economic assessment of the effects of delivering the Vision.

1.2.2 Following this introduction:

- Chapter 2 summarises economic, policy and other baseline considerations;
- Chapter 3 presents the long term Vision and supporting strategic objectives for the Future Grangemouth Strategy, commenting on key milestones to delivery; and
- Chapter 4 examines the scale and nature of potential benefits.

2 Baseline

- 2.1.1 A description of current economic, policy and other conditions has been drawn together to help define the core elements of the Grangemouth Future Vision 2025 and the approach to the future development of its chemical and bio-chemical sciences sector. If it is to be effective, the vision and the actions underpinning it need to capture the opportunities which are present and address the issues which face the sector and the area generally.
- 2.1.2 The baseline draws out: general trends in global chemical manufacturing; Grangemouth's current status in the context of private and public investment; the priority afforded to the sector and the area in relevant economic and planning strategy, and a current socio-economic profile of the area. A SWOT analysis brings this information together.
- 2.1.3 A description of current economic, policy and other conditions has been drawn together to help define the core elements of the Grangemouth Future Vision 2025 and the approach to the future development of its chemical and bio-chemical sciences sector. If it is to be effective, the vision and the actions underpinning it need to capture the opportunities which are present and address the issues which face the sector and the area generally.
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2.2 An Industry Context

- 2.2.1 This section considers the chemical manufacturing industry in the context of global competition, in terms of Scotland's contribution and Grangemouth's fundamental positioning in the sector. It also considers the recent developments and interventions as well as those planned to secure its future competitiveness.

Global Trends

- 2.2.2 With the importance of chemicals to industry, consumer goods, food products and pharmaceuticals, chemicals manufacturing remains a robust and growing sector worldwide generating turnover of €3.5 trillion in 2015. Growth in the industry is concentrated in Asian markets, the European share of the industry falling from 28% in 2005 to 15% in 2015.
- 2.2.3 The chemical industry is changing, particularly in terms of the market share of basic chemicals (bulk or commodity chemicals) and fine and speciality chemicals (e.g. agrochemicals, pharmaceuticals and food additives). The European production has become increasingly dependent on higher value fine and specialty segments, as Asian producers have increased output of low cost bulk and commodity chemicals.
- 2.2.4 As of 2015, the chemicals sector anticipated 8% growth per annum, with the bulk of demand generated in Asia. The UK's manufactured exports of chemicals and pharmaceuticals accounts for approximately 4% of total global chemical and pharmaceutical exports, accounting for £47.2 billion, and the £15.2 billion GVA generated from chemicals and pharmaceuticals accounts for 1.0% of the UK economy.¹

Chemical Sciences in Scotland

- 2.2.5 The chemical sciences sector is critical to Scotland's economy, and Grangemouth is central to this sector. Chemical manufacturing and pharmaceutical GVA is expected to reach £1.5 billion in 2016, though profit margins remain challenging according to Chemical Sciences Scotland. In 2014, it was Scotland's second most valuable export sector after food and drink accounting

¹ Chemical Industries Association, 2015. *UK Chemical and Pharmaceuticals Facts and Figures. £15.2 Billion.*

for international exports of £3 billion annually. This has since fallen to some £2.4 billion² in 2014 due to declining oil prices and also in part to reclassification of industrial companies in statistical reporting.³

- 2.2.6 Scottish Enterprise's Life and Chemicals Sciences adopts ambitious plans for growth in this sector, aiming to achieve sector turnover of £5.6 billion per annum, and a 50% increase in exports by 2020.⁴ The strategy recognises the importance of existing supply chain capabilities and workforce availability. Scotland has attracted several top global chemical companies, including Dupont Teijin, ExxonMobil, INEOS, Syngenta, and FujiFilm. Advances in biorefining based around indigenous companies are tied to Scotland's marine and terrestrial resources, with the largest coastline and continental shelf in Europe presenting opportunities for indigenous feedstock. The strategy recognises the need to work collaboratively to improve supply chain potential and competitiveness and to commercialise new technologies and products. Similarly, the Chemical Sciences Scotland Strategy notes that key to sectoral growth is harnessing low carbon life-cycle solutions and increased export growth and collaboration between academic and manufacturing bases.
- 2.2.7 There is also a robust refined petroleum market in Scotland. The main domestic use of refined petroleum product is as transport fuel, accounting for 60% of total demand in 2013, though other uses include by refineries, electricity generators, commercial users, industry, heat generation, blast furnaces and more.⁵

Grangemouth

- 2.2.8 Grangemouth has been a constant and central part of Scotland's chemical manufacturing sector. This remains the case despite several shifts in the sector landscape, including:
- The withdrawal of DECC Carbon Capture Storage Funding, impacting the Scottish Government's investment pipeline in January 2015;
 - SSE's 2014 withdrawal from renewable energy products, ceasing development of a woodchip fuelled biomass plant near Grangemouth;
 - Change in the supply of North Sea Gas leading to a focus on imported ethane from US Shale Gas; and
 - Global reduction in the commodity price of oil which has affected profitability, upstream sector employment and the wider supply chain. This sector will remain difficult while oil prices remain at lower levels.
- 2.2.9 Nonetheless, Grangemouth's refinery & petrochemicals complex remains the principal employer and industry in the Grangemouth and Falkirk area. It is home to Scotland's only crude oil refinery in addition to petrochemicals plants, accounting for 34% of the chemicals sector GVA in Scotland in 2015. Its major companies include INEOS, BP, CalaChem, FujiFilm, Versalis, and Syngenta. It is also a key location for oil and gas infrastructure, home to the terminus of the North Sea Forties Pipeline system.⁶
- 2.2.10 Grangemouth is Scotland's largest container port, handling 9 million tonnes of cargo per annum, of which 2.5 million is dry cargo for Scottish industry. With some 180,000 sq. ft. of

² Total includes Pharmaceuticals, drawn from Export Statistics Scotland, 2016.

³ This may be due to industrial reclassification. Scottish Annual Business Statistics Key Facts, 2016.

⁴ Life and Chemicals Sciences (2015) Manufacturing Strategy for Scotland. CSS, LSS

⁵ Scottish Government, 2013. *Scottish National Accounts Project (SNAP) Estimating Oil and Gas Flows for Scotland*

⁶ UKPIA, 2016. *Petroineos Grangemouth Refinery*. Crude oil also comes into the refinery via a 58-mile pipeline from Finnart Ocean terminal that can handle up to 324,000-ton deadweight tankers

warehousing and efficient rail services, goods accounting for nearly 30% of Scottish GDP go through the port.⁷

Investment

2.2.11 The shift in macroeconomic conditions and withdrawal of key government sponsored projects at such as DECC's withdrawal of Carbon Capture & Storage funding, Grangemouth has been balanced by investment, namely given a number of major investments have recently secured the medium to long term future of the petrochemicals complex.

2.2.12 Key private sector investments have included:

- £450 million by INEOS to develop Europe's largest ethane storage tank (60,000m³), new headquarter office accommodation and advance site clearance and preparation activities to enable co-location projects (future development includes a £100 million user network for high capacity energy, steam water, heat, and waste). This is in addition to investment in a fleet of ethane gas tankers to supply US-produced ethane over a 15-year period, safeguarding the price and supply of future feedstock and significantly improving the productivity and efficiency of existing operations;
- Forth Ports has invested c. £4.5 million in container terminal facilities to increase storage capacity from higher density stacks. A further £1 million has been invested in plant and machinery, with significant further investment planned;
- CalaChem, BP and INEOS have invested in or have plans to replace CHP units; Calachem has consent for its proposed 15MW steam and 15MW electrical output plant; and
- Silva also plan a 120MW biomass plant, operational by 2021, an investment of approximately £300 million (an assignation of the Forth Energy plant agreement).

2.2.13 Additional public sector investment in road infrastructure and education facilities has further enhanced the area's long term prospects and development potential. The first phase of the Falkirk Tax Incremental Financing (TIF) initiative has been completed. The upgrade to Junction 6 on the M9 at Earlsgate was completed in June 2014. Junction 5 upgrading has been brought forward to 2016/17 to reflect development around the INEOS and Forth Ports sites. The full TIF programme totals £67 million and is due to be completed by 2023/24.

2.2.14 Investment of c.£83 million is associated with a new 20,000 sq. m. Forth Valley College Falkirk Campus scheduled to open in 2019. The college is increasingly acting as a national centre of excellence for oil, gas and chemicals training, with companies across Scotland using its services.

Competitor Locations

2.2.15 With connections to a nationwide gas network and product (ethylene) pipeline as well as connections to North Sea oil fields, Grangemouth benefits from a well-established supply and distribution network. The key opportunities for Grangemouth associated with providing efficient infrastructure/storage, appropriate skills, and investment opportunities, has precedent in comparator locations in England and mainland Europe.

⁷ <https://forthports.co.uk/grangemouth/>

North of England

- 2.2.16 Primary competitor locations in chemical manufacturing are primarily located in the North of England. The Tees Valley, the Humber Estuary, and Runcorn/Widnes have similar industrial profiles with a history of manufacturing, concentrations in the chemicals industry and strong links to academia.

Teesside

- 2.2.17 The Tees Valley is the largest chemicals complex and one of the largest heavy manufacturing sites in the UK. It is promoted as a “national and European centre for chemicals, petrochemicals, and steel, and is recognised as an area for green technology investment”. It is home to the North East England Process Industrial Cluster, which has delivered projects valued at £4.3 billion since 2004, with more than 1,400 constituent companies with over 190,000 people.⁸
- 2.2.18 It benefits from relatively low industrial land values and is supported by the Tees Valley Enterprise Zone and relatively low living costs. The Tees Valley City Deal has also focused specifically on “providing the conditions to enable increased investment in the processing and chemicals industries; taking industrial carbon capture and storage (CCS) forward for Tees Valley and the UK; and creating new business and civic benefits from waste industrial heat”⁹. This corresponds closely to the aims and objectives of the Future Grangemouth Vision
- 2.2.19 To support greater capacity to deliver low carbon products, feasibility studies for waste industrial heat-sourced district heating schemes have secured commitment from local companies to develop an industrial CCS network.¹⁰

Humberside

- 2.2.20 The Humber provides a fifth of the UK’s petroleum requirement and is one of the fastest growing chemical bases in the UK.¹¹ Like Grangemouth, it is home to ports and logistic services. Its port is one of the largest in the UK by tonnage (and fifth busiest in Europe), handling 15% of the UK’s seaborne trade, including passenger services, transit services, chemical plant and import and export enterprises. The higher education sector has strong links with industry.
- 2.2.21 The Humber Strategic Economic Plan and investment schedule includes a Centre of Research and Design Excellence for Energy and Engineering, and 484 ha of Enterprise Zone sites. Several projects focus on developing skills, including college skills modernisation programmes, environmental logistics learning hubs, engineering pathways courses and skills capacity building.¹²
- 2.2.22 In terms of infrastructure, the Humber LEP allocates significant investment to support flood defences and drainage strategies between 2014 and 2020, with £48 million in Local Growth Funding secured for defences across the region.

Runcorn and Widnes, Cheshire

- 2.2.23 The primary concentration of chemical manufacturing is around Runcorn and a cluster of sites along the M62 and M56 motorway corridor. Cheshire and Warrington retains an increasingly high-value manufacturing sector in chemical, pharmaceutical and automotive manufacturing,

⁸ Process Industries of North East England, 2016.

⁹ Tees Valley City Deal Document, 2014.

¹⁰ Tees Valley City Deal Document, 2014.

¹¹ Humber Data Observatory

¹² Humber LEP, 2014. *Strategic Economic Plan 2014-2020*.

with nearly 700 businesses in life sciences and chemicals sectors, employing nearly 9,000 people. Alongside key chemical locations such as Ellesmere Port, the area also has significant concentrations of other high value sectors such as aerospace and defence, automotive, energy, as well as applied R&D facilities at nearby Daresbury Science and Innovation Campus.

- 2.2.24 By 2040, 250,000 new jobs are forecast in the area with approximately £14 billion in investment. The particular concentration of chemical industries around Ellesmere Port is further enabled by Assisted Area Status (a status afforded to Grangemouth as well)¹³, a regeneration framework¹⁴ and major infrastructure projects including HS2, the Northern Hub, and improvements to Manchester and Liverpool airports.¹⁵
- 2.2.25 Higher education and further education establishments contribute to the skills base for local industry, including University of Chester, Manchester Metropolitan University and Reaseheath Further Education College, with additional interests from University of Manchester and Liverpool University.
- 2.2.26 The Cheshire and Warrington LEP recognises the importance of linking educational institutions and enabling scientific manufacturing within the Science Corridor, linking the Manchester and Liverpool City Regions.¹⁶

UK Wide Initiatives

- 2.2.27 The Elite Technology and Innovation Centre was formed with investment of £140 million over six years between 2012 and 2019. It is formed from seven technology and research facilities, including industrial clusters at Coventry, Rotherham, Wilton, Teesside & Sedgfield, and universities in Glasgow (Strathclyde), Bristol and Warwick.
- 2.2.28 With a focus on high value manufacturing and drawing on university research to accelerate development and commercialisation of new technologies, there may be an opportunity to position Grangemouth as part of the UK's network of Centres, reinforcing the profile of recent and programmed activity and supporting investment.

Europe

- 2.2.29 Several comparators in continental Europe have also prioritised enabling infrastructure, production and storage capacities.

Antwerp

- 2.2.30 The Port of Antwerp is home to some of the world's largest chemical companies. It has a chemicals production capacity of 19 million tonnes, as well as 40 million tonnes refining capacity. (In context, Grangemouth's refining capacity is just over 10 million tonnes per year - INEOS can produce 1 million tonnes of petrochemicals annually, although this may potentially increase with reliable access to advantaged feedstock). It is a key European distribution hub for packed chemicals, due in part to customised logistics services, cost-efficient customs procedures, a transparent logistics chain and extensive transport network.
- 2.2.31 The site is served by continual investment by its host companies in production and storage facilities to increase capacity. Specialised logistic services and connectivity to overseas destinations and a guaranteed stable supply of feedstock from four refineries and steam cracker, and transport of processed products contribute to the site's competitive advantage.

¹³ Assisted Area Maps and Guidance, 2014 to 2020.

¹⁴ Ellesmere Port Development Board, 2011. *Vision and Strategic Regeneration Framework*

¹⁵ <http://www.871candwep.co.uk/strategic-priorities/atlantic-gateway/>

¹⁶ Cheshire and Warrington Strategic Economic Plan, 2014.

Lyon Chemical Valley

- 2.2.32 Chemical manufacturing and materials is a major industry, employer and exporter in France. Lyon's 800ha. Vallee de la Chimie (Chemical Valley) houses a reported 20,000 jobs, with further employment in their supply and distribution chains. It also accommodates the research centres of organisations such as Total, Solvay Arkema, Bluestar Silicones, IFP Energy Nouvelles and a combined Solvay/CNRS research unit.
- 2.2.33 The nearby Lyon Tech-la Doua university campus is France's leading educational and research site, as well as provide accommodation for spin out and startup businesses, linked to the University's innovation focus. This includes Einstein, a 3,300 sq. m Innovation Centre for biotechnology, ICT and engineering activity.
- 2.2.34 Other property propositions include: Axel One: promoting collaborative R&D and commercialisation projects; and the Gaya project which is trialling production of biomethane from biomass at scale. The Greater Lyon Authorities have provided 1.6ha to GDF Suez for the latter.

Conclusion

- 2.2.35 The global chemicals industry is diversifying, and the majority of growth is concentrated outside Europe. Chemical manufacturing is a key industry for the UK and Scotland is placed in a competitive fine and specialities chemical market, alongside several locations in other parts of the UK and Europe. Competitor strategies have a common thread linking their future success to infrastructure investment, access to a resilient transport network, links to research centres and ready access to appropriately skilled labour.
- 2.2.36 Recent investment by INEOS has secured long term competitive feedstocks which provide a long term platform for the plants future and Grangemouth's role as a significant European production centre. Investment by Calachem, BP, Silva and other firms will also provide additional energy generation capacity as well as further space for future expansion. Falkirk Council's investment in supporting transport and other infrastructure reinforces this.
- 2.2.37 In the context of the UK and Scottish chemicals manufacturing industry, the combination of existing policy, and recent and planned investment by business and the public sector, there is an opportunity for Grangemouth to further develop its strategic position at the heart of the chemical manufacturing sector. This can be achieved by: extension of the range of chemical science manufacturing processes (including fossil fuel and bio production technology); integrated utility and energy infrastructure; availability of appropriately-serviced sites and support services; supporting infrastructure improvements such as roads, port improvements and new direct route creation, rail (freight) infrastructure; skills and training investment, and development of a clear investment proposition to industry. This would target:
- Increased investor confidence from a coordinated package of site availability, integrated utilities provision and a consistent supply of appropriately skilled workers;
 - Increased competitiveness relative to other UK and European chemicals sciences locations;
 - Enhanced Grangemouth sector resilience, diversification and inward investment potential; and
 - More effectively organised transport and storage solution and enhanced transport efficiency (including port routes) and journey time savings.
- 2.2.38 Current investments are helping to capture these opportunities, though further co-ordination and infrastructure investment is required to support sustainable sector and site development.

2.3 Policy & Strategy Context

United Kingdom

2010 to 2015 Government Policy

- 2.3.1 The 2010 -15 UK Coalition Government targeted innovation and industry support, recognising that a lack of innovation could damage industrial sector prospects.
- 2.3.2 The establishment of Catapult Centres is designed to enable companies to access equipment, expertise and information for development and commercialisation. It also works alongside other initiatives and funding streams including Regional Development Policies, the operation of Enterprise Zones, Regional Growth Funds, and Local Enterprise Partnerships.¹⁷

Innovate UK Manufacturing Strategy (2012)

- 2.3.3 This strategy aims to accelerate business innovation by increasing investment in high value manufacturing innovation, focusing investment in the most attractive technologies and market sectors. Support is intended to be focussed where there is potential to deliver high-value economic impact across multiple market sectors. The High Value Manufacturing (HVM) Catapult network of Centres has been established to provide the equipment, and skilled resources businesses need to commercialise technologies, while also providing open access to effective platforms for knowledge exchange¹⁸, to help businesses combine manufacturing innovations to create products, processes and services.
- 2.3.4 The Strategy recognises that adopting new manufacturing processes both require demonstration at commercial scale and this step up is often expensive and risky. It therefore recognises key opportunities in developing resource efficiency, creating innovative manufacturing systems, supporting materials integration through new technologies and products, developing new manufacturing processes and building new business models. In achieving this, it is recognised that development of capabilities in pharmaceuticals and chemicals is central, including new processes and efficiencies. Only one of these is in Scotland, the Advanced Forming Research Centre at Inchinnan, near Glasgow. Of direct relevance to the chemicals sciences sector, the Centre for Process Innovation (CPI) has been established in Teesside. Various locations, including a number in Scotland, are presently being considered for the location of the UK's Medicine's Manufacturing Innovation Centre.

Current Government

- 2.3.5 Following its election in 2015, the new UK Government has created a new Department for Business, Energy and Industrial Strategy (BEIS), combining most of the functions of the old Departments for Business, Innovation and Skills, and Energy and Climate Change.
- 2.3.6 While few policies have been published which provide insight into its industrial strategy, statements from the Secretary of State have identified several key priorities including: encouraging scientific research through support for relevant institutions; developing new industries and technologies; and encouraging local area development through transport, skills and "pro-business leadership".¹⁹
- 2.3.7 Overall, UK industrial policy will continue a focus on regional development outside London and a strategy that focuses on regulatory, rather than sectoral, policies.

¹⁷ Parliamentary Briefing, April 2014, *Industrial Policy, 2010-2015*.

¹⁸ Including the Knowledge Transfer Networks, Knowledge Transfer Partnerships, Special Interest Groups and HVM Catapult

¹⁹ Parliamentary Briefing, October 2016. *Industrial Strategy*.

UK Industrial Strategy Consultation

- 2.3.8 The consultation into the UK Government's emerging industrial strategy aims to address key challenges in productivity, growth and skills. It is supported by a Green Paper, *Building Our Industrial Strategy (2017)*, which sets out priorities in research and development, skills, infrastructure, business growth and investment, procurement, trade and investment, affordable energy, sectoral policies, UK-wide growth, and institutions that bring together places and sectors.
- 2.3.9 The consultation recognises a need to invest in science, research and innovation, in part through creating a UK Research and Innovation body, to expand Higher Education Innovation Funding, and capitalising on strengths by creating new funding streams to support research in all parts of the UK. It proposes a UK Industrial Strategy Challenge Fund which aims to capitalise on innovation in robotics, clean energy and bioscience/biotechnology and other key sectors. It will focus on where it is evidenced that government support will make a difference and where capability exists, where the global market is potentially large, fast growing and sustainable.
- 2.3.10 'Sector Deals' are proposed to enhance sectoral competitiveness, through organising strong leadership and emphasising collaboration to accelerate growth, develop particular clusters, increase exports boost skills and commercialise research. For emerging industries, it aims to strengthen the Challenger Business Programme and to address regulatory issues affecting new industries.
- 2.3.11 The consultation stresses the importance of increasing the capacity of public sector and private sectors to deliver infrastructure, including local authority involvement in infrastructure planning and investment, and aligning planning infrastructure with growth priorities. It identifies infrastructure as key to growth and supports local connectivity and strategic infrastructure investment, prioritising high value-for-money projects.
- 2.3.12 Energy is a key priority, particularly in addressing affordability of energy for households and businesses, and securing the industrial opportunities of energy innovation.

Scotland

National Strategy

- 2.3.13 Planning and Economic strategies set out a robust policy and evidence-based context for manufacturing and other development at Grangemouth. These include development and investment strategies focusing on nationally important industries and infrastructure relevant to Grangemouth. National and local strategies are considered below.

Scotland's Economic Strategy (2015)

- 2.3.14 Scotland's Economic Strategy identifies its four priorities to support sustainable economic development: investment, innovation, internationalisation and inclusive growth. It prioritises investment in infrastructure for business growth, innovation and employment opportunities, supporting the development of innovative businesses, engage in innovation and research and development; and commercialisation in academic research.
- 2.3.15 These actions will increase sustainable economic growth, supported by partnership working and through devolved powers. The strategy notes that rebalancing the economy requires a stronger role for exporting companies and sectors to increase sales in products and services, including manufacturing, which are more likely to export and to invest in research and development. This sector can also help achieve equality objectives while providing highly skilled and well-paid jobs.

A Manufacturing Future for Scotland (2016)

- 2.3.16 The Scottish Government's Manufacturing Future for Scotland strategy sets out the guiding principles and an Action Plan to enhance Scotland's manufacturing sector.
- 2.3.17 The Strategy promotes an "enhanced role for manufacturing" to stimulate investment, innovation, productivity and internationalisation. It also focuses on opportunities for inclusive growth through well paid and highly skilled employment opportunities.
- 2.3.18 The manufacturing strategy identifies key actions, focussing on promoting the circular economy, energy efficiency and decarbonisation, ensuring competitive infrastructure to ensure flexibility in modern manufacturing facilities and robust digital connections and transport options, emphasising technology innovation and investment in SMART manufacturing.
- 2.3.19 Actions planned with respect to chemical sciences include pilot projects in Life Sciences and Chemicals, investment in modern capital equipment to reduce costs and increase competitiveness, and seeking international investment in Scotland's industrial infrastructure.
- 2.3.20 Critically, the strategy recognises the need for a Centre of Excellence of Manufacturing and Academy as a hub for "continuous innovation in manufacturing that can sustain globally competitive businesses in Scotland". The Centre is to include a skills academy to promote further development of STEM subjects and encourage joint working between industry and education establishments. In its 2017-18 Draft Budget, the Scottish Government took this a further step, announcing commitment to, "support Scotland's manufacturing base through the Manufacturing Action Plan and by developing the business case for a new manufacturing centre of excellence and skills academy, the National Manufacturing Institute for Scotland"²⁰.
- 2.3.21 Given the concentration of manufacturing activity and output in Grangemouth, the close links between the sector, HEIs, the new campus being developed for Forth Valley College (arguably Scotland's leading FE provider of manufacturing skills training) this presents a potential opportunity for Grangemouth to be positioned as Scotland's centre for sector-based learning, knowledge-sharing and innovation.

Scottish Energy Strategy and Climate Change Plan

- 2.3.22 The draft Scottish Energy Strategy, published for consultation on the 24th January, sets out the Scottish Government's energy vision to 2050, while the draft Climate Change Plan sets out Scottish Government intentions to meet emission reduction targets in the period 2017-2032. The Climate Change Plan recognises the Grangemouth area as a key site with potential for demonstrating future low carbon technologies.

Local Heat & Energy Efficiency

- 2.3.23 The Scottish Government is consulting on regulation of district heating and on the creation of Local Heat & Energy Efficiency Strategies to support development of heat networks in local authority areas. The consultation sets out a potential scenario for regulation of surplus industrial heat, and seeks views on the most appropriate approach. Any subsequent decisions may have an impact on the Grangemouth Vision, given the area's significant industrial heat use.

Unconventional Oil and Gas

- 2.3.24 Following its January 2015 moratorium on consents for unconventional oil and gas (UOG) developments in Scotland, the Scottish Government published a suite of independent, expert reports in November 2016 which examined specific social, economic and environmental

²⁰ P80, Scottish Budget, Draft Budget 2017-18, 15 December 2016

issues relating to UOG. These reports have informed a public consultation on unconventional oil and gas: Talking “Fracking”, published on 31 January 2017, and will run until 31 May 2017.

- 2.3.25 The independently commissioned research, and the views and information gathered during the consultation will enable the Scottish Government to come to a considered judgement on the future of UOG in Scotland. Members of the Scottish Parliament will have the opportunity to consider this before a decision is made by the end of 2017. The moratorium on UOG development remains in place in the meantime.

National Planning Framework 3 (2014)

- 2.3.26 The National Planning Framework establishes the spatial planning priorities of the Scottish Government. The Grangemouth Investment Zone, as a National Development and Area of Co-Ordinated Action, is identified as of national importance for its strategic infrastructure.
- 2.3.27 Several elements within the Action Plan support Grangemouth’s development, including enhanced freight facilities, and the use of available excess heat from Grangemouth to fuel a district heating network.

Local Plans and Strategies

- 2.3.28 A number of strategies and planning documents reinforce the continued development of the Grangemouth area as a chemicals manufacturing focus.

Growth: Investment: Inclusion – An Economic Strategy for Falkirk 2015-25 (2015)

- 2.3.29 Grangemouth is central to Falkirk’s economic development strategy. It notes several challenges and opportunities, including attracting investment and jobs, promoting sustainability, acting on international opportunities, addressing financial pressures, and closing the employment gap.
- 2.3.30 Strategic priorities focus on growing Falkirk’s economy, attracting investment to enhance infrastructure, attract business, and promoting inclusive approaches encouraging broad community access opportunities. Ensuring “available and affordable” sites for development is one of its main priorities, alongside capitalising on the skills and training opportunities provided by Forth Valley College, leveraging support from international partners, and investment in research in development.
- 2.3.31 The Grangemouth Investment Zone is the strategy’s central pillar, supporting further action to promote the Grangemouth Energy Project, develop the Falkirk Gateway, promote the Chemical Sciences and Industrial Biotech innovation cluster, and integrating Smart Resilience (e.g. environmental monitoring and community protection).

Falkirk Local Development Plan and Review (2015)

- 2.3.32 The Local Development Plan Review identifies local development priorities, and provides policy support for Grangemouth’s development in the context of wider Council objectives.
- 2.3.33 Infrastructure for Grangemouth is specifically identified in the Plan, supported by policies identifying supporting procurement of flood protection and improved motorway connections, in addition to economic development policies²¹ supporting the development of existing supply business/industry sites within or near the Investment Zone and further policies²²

²¹ Policies ED12, ED13, ED15, and ED16

²² BUS1

Falkirk's Tax Increment Finance Initiative

- 2.3.34 Scottish Ministers approved Falkirk's £67 million TIF initiative in 2013, opening up a potential for £413 million in private investment, nearly 6,000 jobs and apprenticeship development over 25 years. It supports the Grangemouth Investment Zone with specific actions including the M9 and A road improvements and Grangemouth Foreshore Flood Protection—priorities “acknowledged by Scottish Government and by the freight industry” to require further action to hasten implementation.²³
- 2.3.35 Falkirk's LDP notes the importance of the TIF initiative in delivering essential infrastructure in Grangemouth.
- 2.3.36 By Spring 2015, TIF funding had supported completion of M9 junction improvements, A904 Corridor Improvements, and partial funding of the Grangemouth Flood Defences, with extensive ground investigation nearing completion.

Grangemouth Energy Project

- 2.3.37 The resilience of Scotland's chemical sciences sector is tied to Grangemouth's sustainability. The Grangemouth Energy Project is intended to innovate the area's energy generation capacity by exploring shared heat and power networks, introducing new models for renewable power generation and supply, and promoting new finance and distribution mechanisms. It aims to identify a “resource efficient, low carbon, low cost energy solution” to supplying energy to homes and businesses, while also securing employment and creating jobs, improving energy security, enhancing business competitiveness and international reputation, increasing environmental protection.
- 2.3.38 Feasibility studies identified energy security and resilience as significant concerns for local businesses and support agencies. Future management and reduction of carbon emissions and the potential socio-economic benefits of developing heat and power networks to the area's residents are key considerations as the project develops.
- 2.3.39 The proposed district heat networks, based around a demand profile and underpinned by balanced supply options, focus on low carbon solutions and the re-use of waste heat. The developing business case is focused on demand generated from various sources including Falkirk Gateway sites²⁴ - including Falkirk Stadium, the new Forth Valley College Campus and other developments, - and the interface between the Grangemouth Industrial Complex and the local community. The challenges of implementation are acknowledged, A recent feasibility study for Falkirk Council (through the Low carbon Infrastructure transition Programme) has identified various challenges to creation of a commercially viable network

Industry & Sector Strategies

- 2.3.40 Grangemouth's development will meet a number of strategy objectives particularly those emphasising increasingly efficient production processes, appropriate skills provision, research and design and industry engagement as areas of action. Relevant strategies are discussed below.

Making Things Last—A Circular Economy Strategy for Scotland (2016)

²³Falkirk Council, 2014. *Submission to the Scottish Parliament's Infrastructure and Capital Investment Committee*

²⁴ Key aims of the Gateway are focusing the identity of Falkirk and the Gateway site, providing a growth-orientated zoning framework, to attract new business and investment, to increase visitor footfall and usage of pedestrian links to and around major attractions, and provide a focus for low carbon technologies and sustainable living and working in Scotland.

- 2.3.41 Anticipating a transition from a linear to a circular economy, the Government's Circular Economy strategy identifies a number of priority areas, including recycling, remanufacture, repair, reuse, waste prevention, design, producer responsibility for reuse and recycling, and energy recovery. While Grangemouth is not specifically identified, the strategy highlights the area's potential to "recover value from biological resources", including increasing the proportion of "biological wastes to be used for production of high value materials and chemicals and... replacing non-renewable chemical feedstocks". The Strategy also emphasises the need for skills development supported by STEM education, reinforcing broader skills policy.²⁵
- 2.3.42 Given its industrial profile, Grangemouth has clear potential to lead in developing related processes and technology at scale.

Life and Chemical Sciences: Manufacturing Strategy for Scotland (2015)

- 2.3.43 The expansion of Scotland's life and chemical sciences manufacturing base is one of the Manufacturing Strategy's stated ambitions, reflecting the aspirations developed for the Grangemouth sector. This follows Scottish Enterprise's Chemical Sciences for Scotland Strategy (2011), Platform for Growth (2012) and the 2020 Vision (2012), which prioritised key actions to improve the industry's reputation, processes, increase indigenous chemical capacity and address climate change. With its established concentration in chemical sciences, Grangemouth has a central role.
- 2.3.44 The strategy considers the manufacturing life cycle and the impact sustainable manufacturing can have in developing innovative products, processes, and solutions to "drive export opportunities, strategic partnerships, and long-term growth". Biotechnology, speciality, fine and commodity chemicals, and pharma service and medical technology are identified as key intervention areas.
- 2.3.45 The Strategy also prioritises development of a comprehensive skills pipeline across all disciplines and roles. It emphasises partnership working with key stakeholders to improve innovation and performance. Sustainability objectives will be supported by effective supply chain development, extending support services to attract manufacturing activity, access to research and other expertise, and development of the circular economy.

National Plan for Industrial Biotechnology (2013)

- 2.3.46 Scottish Enterprise's National Plan for Industrial Biotechnology (IB) targets a £400 million turnover in IB business by 2020, rising to £900 million by 2025. Key elements in supporting this growth include: an increasing number of IB businesses; and a Scottish Innovation Centre for Industrial Biotechnology by 2020. The £10 million Innovation Centre, IBioIC has subsequently been established at the University of Strathclyde (2014).
- 2.3.47 A 2015 progress report shows improvement in skills provision, industry engagement, and in developing Scotland's biorefining and biochemical capabilities. Two IB training courses have been developed linked to IBioIC following development of a Skills Investment Plan for the sector. Engagement with industry has resulted in more companies adopting IB technology or processes, evidencing progress in establishing market access for products and processes. Furthermore, two equipment centres were opened (also associated with IBioIC) and Scotland's first biorefinery has been established in Fife. This builds capacity to continue identifying sources of biomass as feedstock for bio-based chemicals and processes.
- 2.3.48 The Strategy views biochemicals as key for sustainable manufacturing in Scotland. It identifies the skills and infrastructure needed to support this, including establishment of an appropriate 'skills portfolio' in Scotland alongside provision of R&D facilities, demonstration facilities and

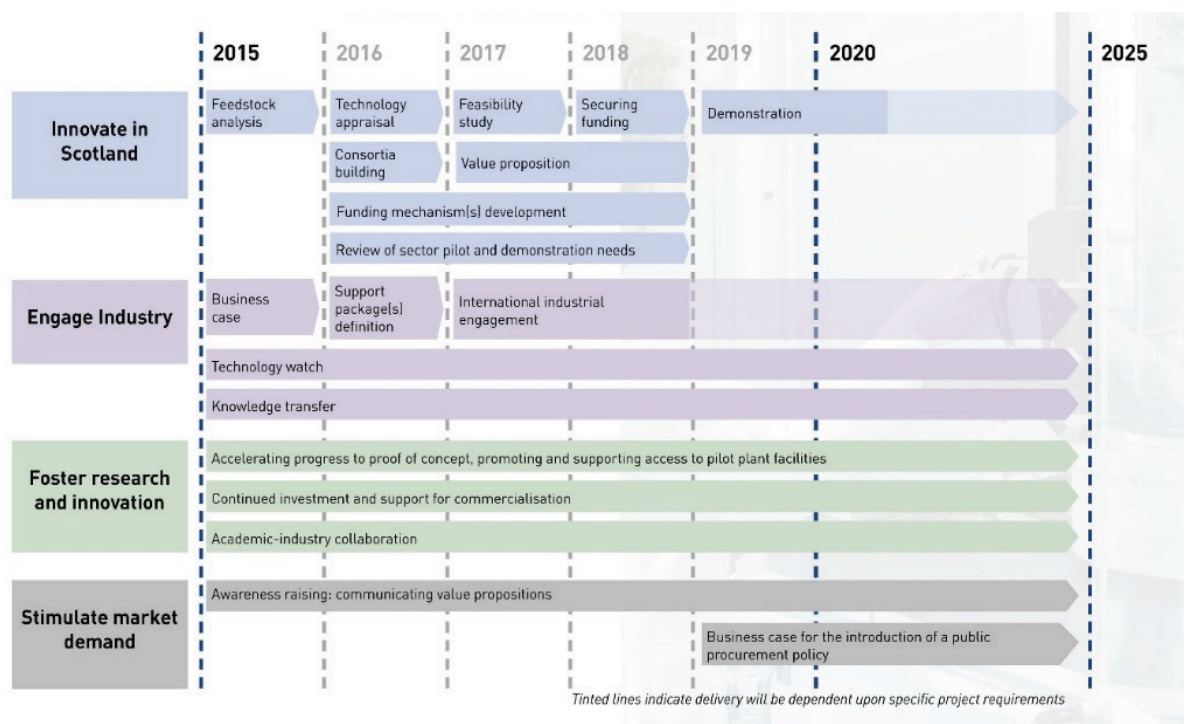
²⁵ As identified in the Scottish Government's *Developing the Young Workforce* (2014) publication.

‘scaled up’ infrastructure. Future work will continue to emphasise international collaboration and linking research to business applications, and addressing regulatory and legislative barriers. Further work is required: to facilitate access to funding and investment; and better link companies with bio-economy support organisations (e.g. Zero Waste Scotland).

Biorefining Roadmap 2015

2.3.49 The Biorefining Roadmap seeks to develop Scotland’s biorefining sector as an internationally recognised leader over the next ten years. It builds on Scotland’s established strengths in industrial biotechnology, chemical synthesis and material science, production of and use of micro and macroalgae and pyrolysis, to generate further global interest focussing on high volume commodities.

Figure 2-1 Roadmap for Development of a Biorefining Sector in Scotland



2.3.50 It has four delivery strands:

- **Innovation** - encouraging development from research to pilot concept validation, demonstrator and production facilities, and vertical relationships between suppliers, technology developers, operators & end users;
- **Engaging Industry**—Promoting knowledge and technology transfer, working with industry to build an internationally competitive sector and developing a supportive and competitive environment for R&D, manufacturing & investment;
- **Fostering Research & Innovation**—Developing existing academic and industry collaboration to harness opportunities and to progressively target higher value product and market development; and
- **Stimulating market demand**—Scotland’s biorefining proposition will be matched to emerging and developing markets for biorefining activity.

Conclusion

- 2.3.51 With the diversification of chemical manufacturing and investment in innovative technologies, Grangemouth has an important role in building Scotland's biochemical and biorefining sector.
- 2.3.52 With the most integrated chemicals production location, serviced sites in public and private sector ownership, a concentration of sector expertise and commercial interests, and strategic positioning at the centre of Scotland's road, rail and sea freight networks, it presents the most realisable opportunity to develop a concentrated biorefining proposition in Scotland.
- 2.3.53 Developing innovative approaches which meet industry requirements is a core element of national strategy. Furthering Grangemouth's role as Scotland's main focus for this activity is supported by: the availability of appropriately serviced sites; the presence of Forth Valley College, the sector's leading FE provider of targeted training; established relationships between the company base and Heriot Watt and Strathclyde Universities; skilled labour specific to the sector, and the areas excellent strategic transport connections.
- 2.3.54 For national growth strategies to be delivered, Grangemouth's development as an integrated facility, building its biorefining capacity on the back of its chemicals sector heritage, needs to be supported with appropriate infrastructure capacity to support wider and effective communication of Scotland's proposition.

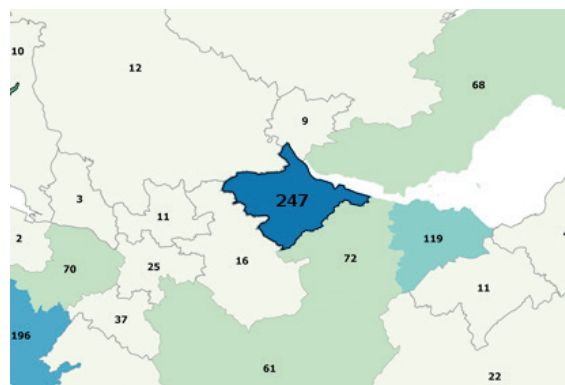
2.4 Sector & Area Performance

- 2.4.1 This section brings together existing information and data describing chemicals sector performance alongside that of the Grangemouth and surrounding area.

Sector Performance

- 2.4.2 Grangemouth is central to Scotland's chemical sciences industry. Comparison of chemical manufacturing GVA at local authority level shows the Falkirk Council area outperforms other parts of Scotland. Forecasts indicate Grangemouth's proportion of Scotland's market share is likely to increase further. Moreover, as they were prepared without reference to the effect of INEOS recent investment in the area, forecasts are likely to understate Grangemouth's significance.

Figure 2-2 Chemical Manufacturing GVA (£m) by Local Authority



- 2.4.3 At £247m in 2016, Falkirk's GVA in chemical manufacturing and pharmaceuticals²⁶ accounted for 17% of Scotland's related GVA, or 34% of its chemical manufacturing GVA.

²⁶ Including Pharmaceuticals.

Figure 2-3 Chemical GVA in Falkirk

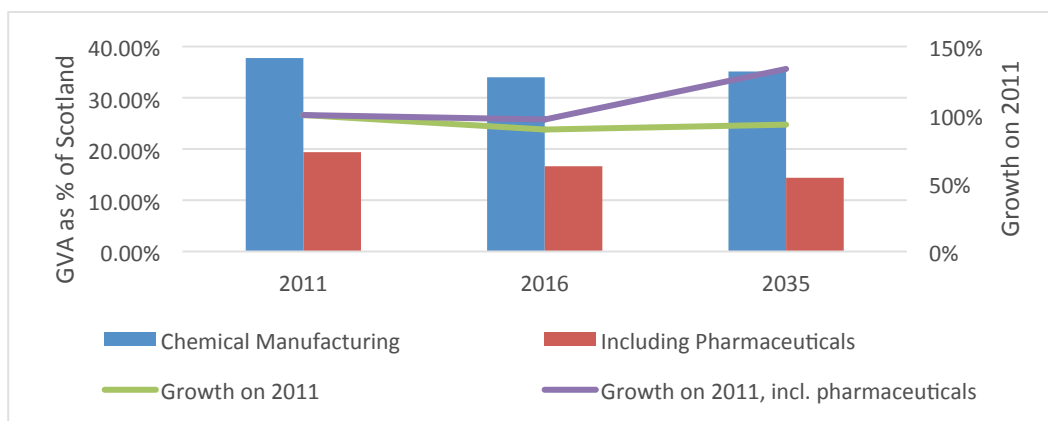


Table 2-1 Chemical GVA in Falkirk

GVA	2011	2016	2035
Chemical Manufacturing GVA, Falkirk	£269.5m	£215.6m	£232.3m
<i>incl. pharmaceuticals</i>	£298.8m	£247.5m	£297.2m
Chemical Manufacturing GVA, Scotland	£712.0m	£633.4m	£662.0m
<i>incl. pharmaceuticals</i>	£1.54b	£1.48b	£2.06b

2.4.4 Chemicals manufacture is expected to remain a significant element in Scottish manufacturing into the future - rising slightly from 13% of total manufacturing GVA in 2016 to 14% in 2035 - and forecasts indicating that Grangemouth will maintain its central position.

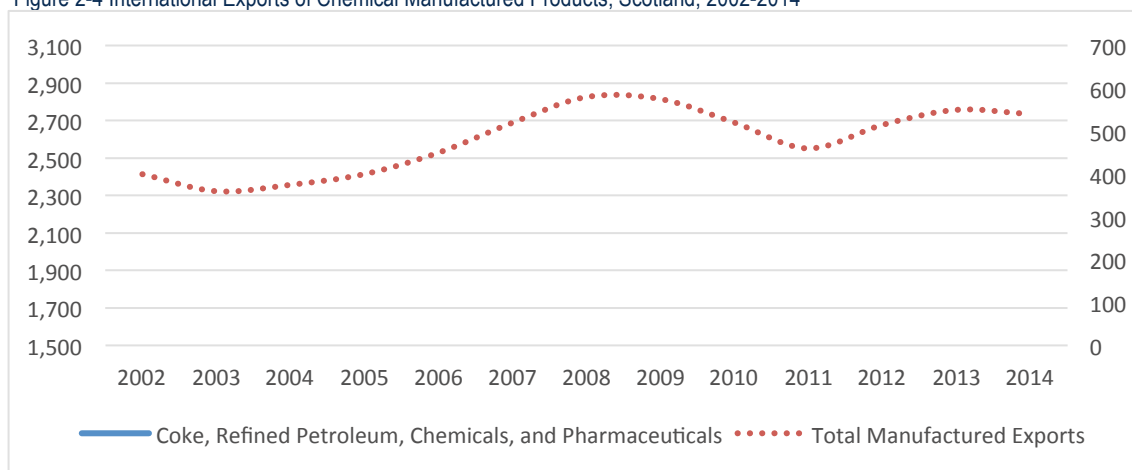
Exports

2.4.5 Grangemouth's exports are vital to Scotland's economy. Chemical products²⁷ accounted for 15% of total manufacturing exports in Scotland in 2014, accounting for £3.8 billion in international and RoUK exports.²⁸

²⁷ Including SIC 2007 19,20 and 21, based on Export Statistics 2014 (2016).

²⁸ % Growth

Figure 2-4 International Exports of Chemical Manufactured Products, Scotland, 2002-2014



Area Performance

- 2.4.6 This section considers key socio-economic and demographic indicators for the Grangemouth and Falkirk area, drawing out opportunities for Grangemouth’s development and potential challenges.
- 2.4.7 Demography is a potential challenge to Grangemouth’s future development. Of Falkirk’s population (158,460), 64.1% are of working age²⁹, slightly above the Scottish average, falling from 65.5% in 2011. The population is ageing, with over-65s increasing by 12% from 2011-2015, and representing 18% of the population (though below the 24% Scotland).
- 2.4.8 While the population of Falkirk and surrounding areas will increase (by about 10%) between 2012 and 2037, the age profile will continue to reflect an ageing population³⁰, highlighting retention of a young, skilled labour force and appropriate skills development as priorities.
- 2.4.9 Falkirk has an active workforce and limited unemployment. In 2015, 79% of the working age population was economically active,³¹ above the Scottish average (77%). There has been limited growth in the proportion of economically active people in Falkirk, though this is above Forth Valley levels (which includes Stirling and Clackmannanshire), and the wider employment area (which includes Fife and West Lothian) where activity fell from 78% to 77%. Falkirk also has lower unemployment compared to the Scottish average--the percentage of JSA claimants falling from 2011 to 2016 (4.2% to 1.6%), below the Scotland average (1.9%).
- 2.4.10 Despite recent closures, available data indicates the number of opportunities available in the Falkirk area is also increasing. From 2011- 2015, the number of jobs in the area increased by over 7% (62,500). While 41% of the employees in the wider employment area are in highly skilled occupations³², the proportion employed in unskilled occupations (21%) is well above the Scottish average (18%). The gap between high skilled and unskilled labour may be explained by the high proportion of manufacturing employment (which may rely on a combination of low and high-skilled labour³³), which constitutes 13% of local employment (4.5 % in Scotland).³⁴ Chemical manufacturing³⁵ in Falkirk accounts for 3% of workforce jobs in the

²⁹ 2014.

³⁰ According to the NRS, this is modelled on improved mortality, potential lower than expected in-migration and increasing long-term fertility rates amongst women aged between 30 and 40.

³¹ <https://www.nomisweb.co.uk/reports/lmp/la/1946157418/report.aspx>,

<https://www.nomisweb.co.uk/reports/lmp/la/1946157418/report.aspx>

³² Managers, directors and senior officials, professionals, and associate professional or technical occupations

³³ PERI British Political Economy Brief, 2016.

³⁴ As of 2014.

council area. Employment in the local chemicals sector accounts for 20% of sector employment in Scotland, indicating Grangemouth's importance to the Scottish industry.^{36 37}

2.4.11 Grangemouth benefits from a skilled and mobile workforce. It is a strategically accessible location, attracting significant volumes of workers from Stirling and West Lothian (over 2,000). However, there is also a large outflow to Stirling and the City of Edinburgh (over 6,000).³⁸ The level of mobility is a function of available opportunities and Falkirk's strategically accessible location relative to transport infrastructure.

2.4.12 While the area is becoming increasingly skilled,³⁹ an increasing number of people are also entering employment from school, and gaining qualifications for jobs with routine tasks.⁴⁰ The relative deprivation of Grangemouth in terms of education, skills, training and employment highlights the potential role of skills development and educational attainment in supporting an increasingly advanced manufacturing sector, through provision of apprenticeships, training and transitions from school to work.⁴¹ The higher proportion of leavers finding work emphasises the current importance of local training programmes.

2.4.13 Current wage rates indicate the relative affordability of the Falkirk area and potential for increased productivity. Household and gross weekly wages are above the Scottish mean (by 1% and 3% respectively). However, annual workplace earnings – which reflect those paid by local industry and other employers – are at average levels.⁴²

Conclusion

2.4.14 The socio-economic baseline indicates the availability of a strong, economically active and increasingly skilled workforce locally. Grangemouth's strategic accessibility extends its travel to work area to a wider area, which extends to parts of West Lothian and Clackmannan as well as Stirling. A significant number of workers are employed in manufacturing and chemical manufacturing, indicating the importance of Grangemouth to the local and wider economy.

2.5 Summary

2.5.1 The preceding analysis indicates Grangemouth has an opportunity to capitalise on its central position in Scotland's chemical manufacturing industry. It is recognised in policy and strategy as key to achieving policy aims and meet the growth targets set in sector strategies.

2.5.2 The baseline shows: clear policy support for the development of a Grangemouth Proposition, linked to Scotland's Economic Strategy, A Manufacturing Future for Scotland, NPF3 and the designation of the Grangemouth Investment Zone. While investment from private and public sectors is securing production and storage capacity, shifting demography, investment in competitor locations, and the limited investment in additional infrastructure to date (e.g. pilot and 'scale up' facilities, sustainable feedstocks) may restrict the area's future competitiveness.

³⁵ Including Pharmaceuticals

³⁶ Scottish Annual Business Statistics, 2014.

³⁷ The number of businesses 2008 to 2014 in Falkirk fell (12%), though below the Scottish level (14%), while employment in the chemical manufacturing fell (13%), though also below the Scottish level (22%).

³⁸ Census 2001.

³⁹ The proportion of those with the highest qualifications increasing at a greater rate than the national average over the past five years (13% in Falkirk compared to 10% in Scotland)

⁴⁰ <http://www.sqa.org.uk/sqa/315.html>

⁴¹ SIMD 2015

⁴² Gross weekly pay and hourly earnings have increased (3% and 8%, respectively) at a lesser rate than the Scottish average since 2011 8.7% for gross weekly pay and 9.1% for hourly pay since 2011

Table 2-2 Future Grangemouth Vision SWOT Analysis

Strengths

- Advantaged, secure long term access to low cost feedstock, ensuring continued production with INEOS investment.
- Continued investment from BP, Calachem, Forth Ports, Silva and others in site development, storage & energy infrastructure.
- Scotland's largest port with associated storage facilities.
- Strategic transport accessibility.
- Skilled and mobile workforce.
- Established research links to Strathclyde and Heriot Watt Universities.
- Proximity to lead sector training facilities at Forth Valley College.
- Expansive storage capacities.
- Existing transport infrastructure.
- Designated National Development.
- TIF funding to support strategic infrastructure improvement.
- Largest concentration of chemical manufacturing in Scotland.

Weaknesses

- Delay in establishing biorefining and related activity. Uncertainty over biorefining feedstock capacity.
- Limited skills development and R&D compared to competitor locations.
- Limited coordination and communication of the 'Grangemouth proposition' to wider markets.
- Absence of competitive designation and public sector assistance (e.g. City Deal, EZ status) relative to competitor locations.
- Present road layout limits the potential to introduce extensive integrated utility networks and opportunities to rationalise sites to cater to market requirements.

Opportunities

- Grangemouth Investment Zone aligns public sector policy and funding from UK and Scottish Governments behind an advanced chemicals sector in Grangemouth
- Willingness of industry players to lead clearance and rationalisation of redundant plant and sites offers expansion and colocation space to attract new sector operators
- Forth Valley College redevelopment and continued development as sector lead raises investment profile
- Deepening of research and other relationships with HEIs
- Industry concentration, labour factors, FE/HE links and private sector commitment support development of Centre of Excellence in Advanced Manufacturing/ sector Innovation Centres
- Potential development of biorefining and bio-production focus at Grangemouth providing availability of appropriate sites
- Biomass power generation increases specialist storage and handling facilities at Port of Grangemouth
- Potential for coordination and expansion of range of bio feedstocks
- Surplus of energy, heat and other resources provides building blocks for development of integrated networks
- Potential to address site rationalisation issues at Bo'ness Road through alternative transport solutions
- Company expansion and inward investment facilitated by regulatory, organisational and financial coordination
- Coordinated proposition increases competitive position with UK/ European locations
- Shared services and co-location
- Secure, low cost heat & energy for businesses and residents.
- High value employment in chemical manufacturing.
- Increased area spending through increased high value employment and investment.

Threats

- Clearance and availability of sites for expansion stalls
- Limited space for introduction of new processes
- Competing locations acquire lead position in emerging technologies
- Limited coordination between private and public sector restricts inward investment and company expansion.
- Lack of coordination limits scope for integrated utility networks, with duplication of infrastructure
- Fragmented site and service proposition
- Demographic challenges, including an ageing population.
- Commodity price of oil and other macroeconomic factors.
- Limited benefits from investment and lack of engagement with local community reduces political support
- Shifting national priorities.

3 Refining the Vision

3.1 Identifying key Themes

3.1.1 The local labour market extends across the Forth Valley, including the Falkirk and Clackmannan Council areas as well as parts of neighbouring West Lothian, Stirling and Fife. As the previous chapter shows, with the concentration of industrial activity in and around Grangemouth and supporting supply chains, skills and expertise in this wider area, its significance and the importance of its ongoing development is reflected in national and local policy.

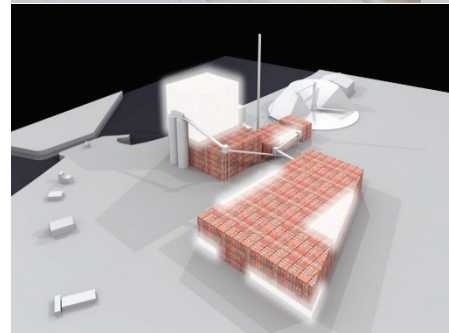
3.1.2 Future Vision Grangemouth 2025 has emerged in this context. While it defines Grangemouth-specific actions consistent with policy direction, it promotes the area's resilience as a dynamic centre for chemicals development & manufacture and related activity, embracing traditional and bio feedstocks, energy generation, integrated utilities and services and wider community gains.

3.1.3 It identifies developmental strategies and actions, but as shown in the Introduction (paragraph 1.1.3), it also builds on existing strengths, recent investment and changes of emphasis in policy direction.

3.1.4 The baseline analysis and individual discussion with key stakeholders informed the specification of draft supporting strategy and high level actions which might form part of the Strategy. This was then further considered at a wide-ranging stakeholder workshop in April 2016⁴³. A logic model describing the relationship between identified requirements, how the Vision responds to them, specific initiatives and how they generate economic and wider benefits was presented and agreed at this session. This is presented overleaf.

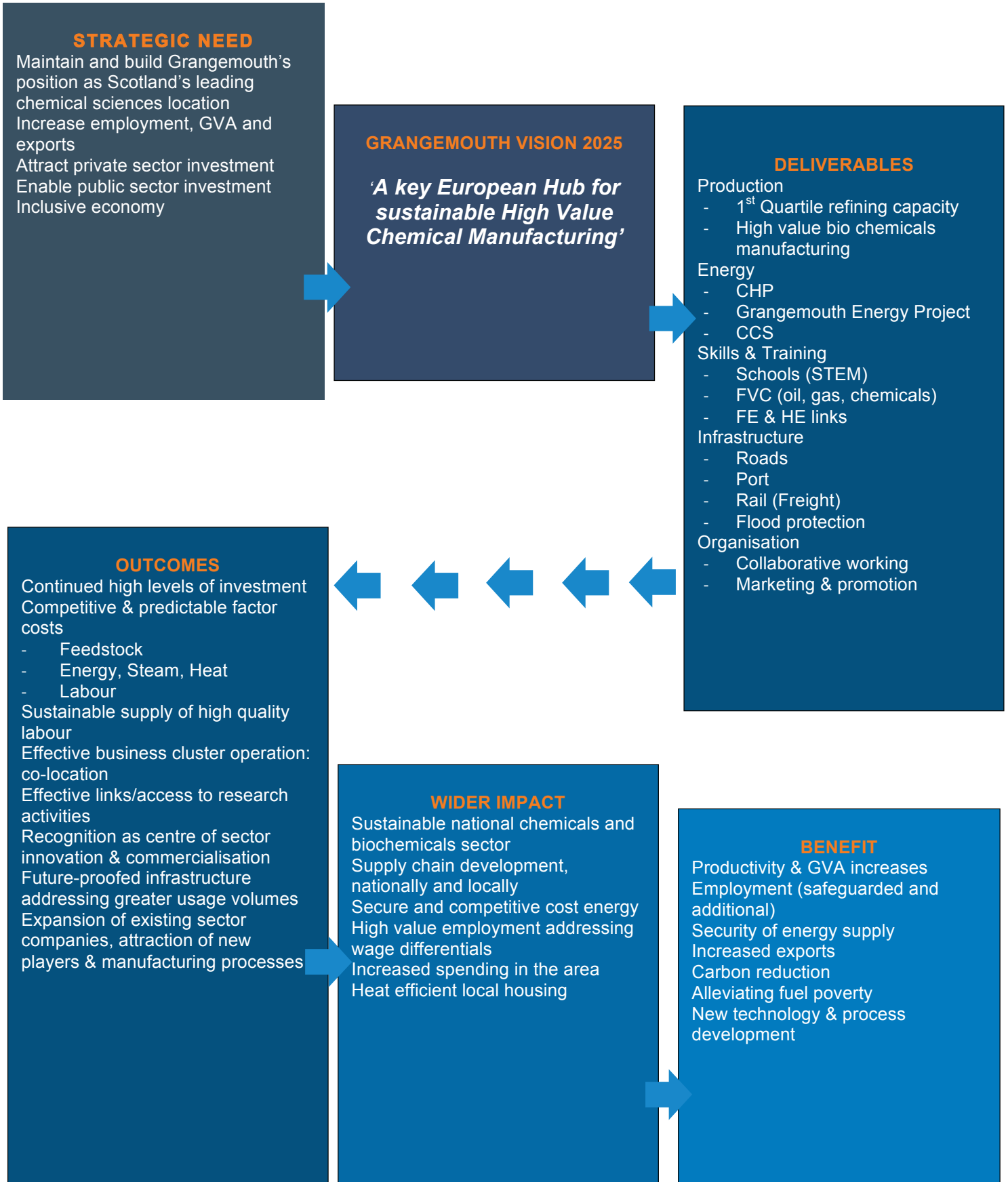
3.1.5 There was general support for the direction laid out in the Vision. While only limited detail of what it would involve or priorities from a business, infrastructure or skills development perspective emerged, there was general consensus in the following areas:

- Leadership – Clarity & partnership in delivery: to harness support from the business and wider community and exercise political influence;
- Consolidation around the area's strengths: promoting the concentration, diversity and innovation of Grangemouth's chemicals sector and its supporting skills infrastructure; and
- Repositioning Grangemouth as a world-class centre for innovation in chemicals & related manufacturing and energy.



⁴³ A schedule of participants is attached at Appendix 1

Grangemouth Model



- 3.1.6 Further discussion with key businesses, staff from Scottish Enterprise and Falkirk Council and other organisations has assisted identification of the key enabling actions needed to develop the Grangemouth Future Vision 2025.
- 3.1.7 The main Vision aims (see Introduction) are considered in four thematic areas: **Industry/sector development; Infrastructure; People; and Partnership & Positioning** as follows:

Theme Area

Industry & sector development World Class refinery Unconventional gas Bio-based industries Carbon Utilisation	Infrastructure Smart City Competitive Port Combined Heat & Power	People Workforce	Partnership & Positioning Businesses Collaboration Inward Investment A high value manufacturing proposition
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- 3.1.8 This enables further refinement of Grangemouth’s future chemicals manufacturing proposition. Key strategy goals and actions are described in the remainder of this chapter using the four thematic areas as a framework.

3.2 Industry & Sector Development: Extending Sustainable & Innovative Advanced Manufacturing

- 3.2.1 While adaptation and augmentation is a permanent feature of oil refining and chemicals production, the large scale removal of outdated plant is now well in hand: Calachem’s landholding at Earls gate has been largely redeveloped, INEOS, Grangemouth’s main landowner, intends to have cleared up to 101 ha. of its 688ha. site⁴⁴ for redevelopment by 2025.
- 3.2.2 Grangemouth is witnessing a significant remodelling of its industrial areas. Along with further sites in or adjacent to the Port of Grangemouth, this provides an opportunity to expand existing technologies, adopt new processes and position Grangemouth at the forefront of Europe’s chemical sector for the next 50 years.

Site Development by Grangemouth Businesses

- 3.2.3 Since 2014, INEOS has invested over £400 million in developing new ethane facilities, radically improving the site’s competitiveness. This is underpinned by a long term 15-year supply contract for competitive feedstock. With US production costs for ethylene substantially lower than those in Europe, this will ensure the competitiveness of its Grangemouth’s operation in the long term⁴⁵. The first ethane shipments were received in September 2016. INEOS also opened its Olefins and Polymer division headquarters in Grangemouth in Autumn 2016.
- 3.2.4 Considerable momentum is building behind the expansion of chemicals- and related manufacturing across its estate and this will be the primary influence in strategy delivery.

⁴⁴ 250 acres of 1,700 acres

⁴⁵ 20% of those of European naphtha crackers in 2014

- 3.2.5 INEOS has produced a masterplan for the future development of its Grangemouth estate. Having stabilised its Grangemouth operations in a 'Survival' phase which has included the Ethane Supply project, the company envisages progressions through 'Sustain' and 'Growth' phases:
- Sustain: 2016-2021 – replacement of old power plant, refurbishment of storage tanks/pipe racks, removal of redundant buildings & plant; and
 - Growth: attract new business investment (INEOS and other parties). Co-location of inward investment is an important part of this.
- 3.2.6 Key elements include: a £450 million on site investment programme (which includes recent investment); development of a fully integrated chemical sciences, refinery and port complex comparable with the best in Europe; and new opportunities for co-locational investment. Development of competitive site infrastructure, including integrated high capacity energy, water, steam, waste treatment, natural and industrial gases, as well as emergency response facilities, is a critical component. A minimum of a further £100 million will be invested in a Multi-user Energy Network to ensure regulatory compliance and a competitive energy offer. The creation of sites ranging from 2 hectares to 30 hectares will support the co-location strategy - i.e. attracting additional chemicals production businesses and their activity to Grangemouth.
- 3.2.7 By 2020, the masterplan envisages INEOS Grangemouth *“as a global leading chemical manufacturing hub and Scotland’s chemical science sector centre of excellence and innovation embracing world class leadership and skills”*. By 2025, major colocation investment is anticipated, supported by a core of market ready sites extending to 50 hectares and integrated utilities and service provision. Following site clearance and utilities network development, the majority of the site is expected to be available by the end of 2018.
- 3.2.8 While of a different scale, Calachem is presently marketing serviced plots of up to 1.6 hectares, (4 acres), although few opportunities remain at its Earls Gate Park site.
- 3.2.9 While the chemical sciences and related sectors are the primary market for INEOS and Calachem, both retain the flexibility to attract general industrial and business users to parts of their landholdings further away from the core refining, chemicals production facilities and closer to the M9 and strategic road infrastructure.
- 3.2.10 While site development may build revenue and reduce operational costs, both companies continue to invest in their core production operations. At present, it is likely that prospective investment in emerging and developing technologies and processes, such as biorefining or decarbonisation will come from other sources, although it is highly likely, given the scale of the INEOS landholding that cooperation over the location of such facilities will be an important factor in their attraction to and development in Grangemouth.

Bio-refining

- 3.2.11 In the Future Grangemouth Vision 2025, biorefining sits alongside the use of oil and gas for feedstock as one of its core developmental elements. The National Plan for Industrial Biotechnology, launched in 2013, seeks to increase national turnover of manufactured goods using “at least one biological step” from £189 million to £900 million by 2020. Promoting investment in a new bio refinery/biochemical facility is part of this.
- 3.2.12 Grangemouth’s potential as a leading European research and production facility for bio-refining and industrial biotechnologies is clearly identified in the Falkirk Grangemouth Framework for Growth. It is important in further diversifying the Grangemouth offer and placing it centrally, reflecting the innovation, collaboration and skills needed to realise scalability and viability. With the investment of INEOS and others to improve efficiency and innovate in advanced oil and gas based processes, biorefining is a complementary function

repositioning Grangemouth at the forefront of the sector, while building potential long term resilience to changes in traditional feedstock availability and price fluctuations.

- 3.2.13 Presently, much interest in Scotland concentrates on units demonstrating the practicality and effectiveness of the technology before licensing to those with the funding available to take to scale. In the medium to long term, Grangemouth is well positioned to develop as a location for of choice for demonstrators and full process deployment building on the interest shown to date by Celtic Renewables and others. Its location relative to the strategic road network and within 30 miles of some 60% of Scotland's population places it well relative to potential feedstock sources. These include biomass, outputs from distilling and other activities as well as municipal waste streams, offering the potential for development of high value processes. The availability of sites, including those at INEOS as well as land potentially available near or in the Port, a suitable skills base and the availability of supporting network of utilities, further reinforces its suitability.
- 3.2.14 Actively supported by Chemical Sciences Scotland, the UK and Scottish Governments, and local industry, by 2025 the Vision anticipates Grangemouth's biorefining will include: 2-3 demonstrator units, 2 commercial facilities each occupying up to 4ha, and a larger operator with a requirement for up to 8ha.
- 3.2.15 With a combined potential requirement of 20 hectares, this scale of aspiration will demand collaboration and co-operation between potential operators, Scottish Enterprise (to enable a biorefining/manufacturing concentration in Grangemouth) and INEOS, Falkirk Council and other major landowners. Site availability will be an early consideration and include strategic agreement; formal leasehold or freehold options to secure locations well-related to the core manufacturing complex.
- 3.2.16 Its effective development, and location and promotion will also reflect the availability of accessible infrastructure including integrated utilities networks. Competitors such as Wilton are providing central power, water, high and low pressure steam and other gases, including nitrogen points. This should be part of the Grangemouth offer. While it is part of the approach of INEOS, Calachem and others to the development of their landholdings, such networks should extend broadly across the Grangemouth petrochemical complex. As potentially the main focus of future storage and distribution of biomass feedstocks, linkages to and from the Port of Grangemouth are likely to be critical to such network extension to other parts of Grangemouth.

Decarbonisation

- 3.2.17 With its focus on oil and gas refining and chemicals production, Grangemouth is one of the country's largest concentrations of Energy Intensive Industries (EII). The development of strategically located Carbon Capture Storage (CCS) infrastructure in Grangemouth's industrial cluster could help protect and ensure that important domestic industries are able to compete in the future low-carbon world. There are clear policy, environmental and process improvement imperatives to 'decarbonise' existing technologies and also explore opportunities for carbon capture and utilisation (CCU). The Industrial Decarbonisation and Energy Efficiency Roadmap Scottish Assessment produced earlier this year (the Scottish Assessment), recognises the need for policy and financial incentives to develop the sector.
- 3.2.18 Elsewhere in the UK, commercial scale carbon processing is now converting carbon into product for the construction and other industries. Experience to date indicates clustering of related operations is fundamental to process viability. Some of the locational advantages Grangemouth has for biorefining apply equally to decarbonisation and similar types of operation. As the Vision is implemented in the future, these will be further reinforced with the development by 2021 of a 120MW biomass plant at the Port of Grangemouth and the growing demand for biomass feedstock generated by Grangemouth's development as a biorefining focus.

3.2.19 Government will take a clear role in protecting Grangemouth's ability to take advantage of opportunities when they do arise. Grangemouth already has EU Model Demonstrator region status for CO₂ utilisation (CDU), Smart City and woody biomass biorefining. The scope of future potential will be influenced by examination of the potential for a carbon utilisation hub in Grangemouth, its key requirements (as outlined in the Scottish Assessment) and implementation of its recommendations.

Grangemouth: the Home of the National Manufacturing Institute for Scotland

3.2.20 The Scottish Government's Action Plan for the development of Scotland's manufacturing sector is contained in its February report, "A Manufacturing Future for Scotland", following closely on the Life and Chemical Sciences Manufacturing Strategy 2015-2020⁴⁶.

3.2.21 Measures to boost productivity and stimulate innovation and investment to improve Scottish manufacturing's international competitiveness are prioritised in the Action Plan. There is support for company, skills and business development throughout but the establishment of a new joint Centre for Manufacturing Excellence and Skills Academy is one its most prominent features. This will be "established as a hub for continuous innovation in manufacturing that can sustain globally competitive businesses in Scotland. Manufacturers and suppliers will have access to a range of expert services, advanced demonstrator facilities and training programmes all focused on innovative manufacturing." In its December 2016 Draft Budget, the Scottish Government has committed to developing the business case for the National Manufacturing Institute in 2017-18.

3.2.22 While originally conceived as a hub and spoke approach centred on the Advanced Forming Research Centre at Inchinnan, it is understood that thinking has subsequently evolved. Grangemouth is perfectly positioned to be the location for Scotland's National Manufacturing Institute:

- It is the location of Scotland's largest manufacturing cluster, including companies at the forefront of the chemicals sector internationally – the NMI's location in Grangemouth will cement existing relationships, encourage further innovation locally, and attract new businesses to the area;
- It has established relationships with HEIs including Heriot Watt and Strathclyde Universities. NMI location in Grangemouth will continue and extend these, bringing opportunities for academic and company R&D to partner further in developing innovative manufacturing processes;
- Proposals for the development of new and emerging technologies, including decarbonisation/CCU and biorefining have centred on Grangemouth, recognising the critical mass of sector facilities already established here – NMI location will enable proof of concept and product development testing in a practical environment;
- The heritage and continuing importance of manufacturing in the local economy underpins the availability of a skilled workforce and the presence of Forth Valley College, the country's leading provider of training to the oil & gas and chemicals sectors ensures availability of skilled operational staff to support new business ventures – NMI location will be a channel to ensure Grangemouth's training provision continues to reflect the requirements of industry as it positions itself in the vanguard of chemicals sector innovation; and
- Its strategic location relative to road, rail and airport infrastructure, and related ongoing investment delivered through Falkirk's Tax Increment Finance Initiative (TFI).

⁴⁶ September 2015

- 3.2.23 The location of Scotland’s National Manufacturing Institute will work with these factors to firmly position Grangemouth as the lead centre for innovation in the UK, and an internationally compelling destination for process and manufacturing investment.
- 3.2.24 While sites in Grangemouth are understood to be among those shortlisted as potential locations for the UK’s Medicine’s Manufacturing and Innovation Centre⁴⁷ or Scotland’s National Manufacturing Institute should be located in Grangemouth to make the best use of existing business, skills, and hard and soft infrastructure to develop Scotland’s manufacturing sector’s competitiveness. Its location will further reinforce Grangemouth’s developing position as a leading European centre of refining and chemicals manufacture.

KEY ACTIONS:	
Industry & Sector Development	
2017-2019	
<ul style="list-style-type: none"> ▪ Resolve Bo’ness Road alignment ▪ Development of delivery vehicle for Grangemouth ▪ Review of assisted areas status e.g. EZ ▪ Core site clearance & rationalisation of redundant infrastructure ▪ Secure serviced site availability of 35 hectares ▪ Secure core location for biorefining and related processes 	<p>INEOS, Falkirk Council</p> <p>INEOS, Calachem, other landowners</p> <p>Scottish Enterprise, INEOS, Calachem, other landowners</p>
<ul style="list-style-type: none"> ▪ Secure functional operation of first Grangemouth biochemical process demonstrator(s) ▪ Build case and secure location of Scotland’s National Manufacturing institute & MMIC 	<p>Scottish Enterprise, Industry, IBIOIC</p> <p>Scottish Enterprise, Scottish Government</p>
<ul style="list-style-type: none"> ▪ Establish commercial carbon utilisation potential of bio and non-bio feedstocks 	<p>Falkirk Council, Industry</p> <p>BEIS, Scottish Enterprise, Industry, Scottish Government</p>
2020-2025	
<ul style="list-style-type: none"> ▪ Secure serviced site availability of 60ha ▪ Secure 4 new company locations and investment of £125m 	<p>INEOS, Calachem, other landowners</p>
<ul style="list-style-type: none"> ▪ Attract additional biochemical demonstrators and 2 commercial operators ▪ Delivery & full occupation of Scotland’s Centre for Manufacturing Excellence 	<p>Scottish Enterprise, Industry</p> <p>Scottish Enterprise, Scottish Government</p> <p>HEIs, Forth Valley College, Industry</p>
<ul style="list-style-type: none"> ▪ Attraction of carbon utilisation demonstrator linked to port expansion, biomass and other developments 	<p>BEIS, Scottish Enterprise, Industry</p>

3.3 Sustainable Infrastructure to Enable Growth & Attract Investment

- 3.3.1 Vision delivery requires supporting infrastructure to enable business expansion, site development and the development of a chemicals sciences sector proposition which optimises Grangemouth’s assets. This is needed: to ensure efficient distribution of supplies inwards and

⁴⁷ promoted by Innovate UK, Scottish Enterprise

of products to market destinations; to ensure high capacity and integrated provision of utilities and services to businesses; to ensure rapid and high capacity communication between Grangemouth businesses and their customers, and with related research facilities in Scotland, the UK and overseas; and to ensure local communities benefit from Grangemouth's utilities.

Transport

- 3.3.2 The area already benefits from good strategic transport connections and the Falkirk TIF will further enhance this. Vision delivery will focus on improving local access to the M9, Junctions 5 and 6 ensuring high quality approaches and high capacity access to the Port of Grangemouth and development site opportunities in the Grangemouth Investment Zone.

Utilities Infrastructure

- 3.3.3 Investment in energy generation capacity is already planned by INEOS, Calachem and BP to replace outdated plant and meet the needs of existing and future users. With Silva's delivery of the 120 MW biomass plant at the Port of Grangemouth anticipated by 2021⁴⁸, local energy generation capacity is unlikely to be a constraint to business expansion or inward investment.
- 3.3.4 While availability of supply and the capacity of existing infrastructure are important considerations, the presence of a likely surplus of both in Grangemouth indicates a potential opportunity to develop a 'low cost energy' proposition to attract investment and encourage expansion across Grangemouth and in specific sites. Provision may stimulate development of supply chain clusters locally and encourage new businesses to the area (attracted by security of supply). Development of private integrated networks, as proposed by Silva and INEOS, may also encourage low cost provision further differentiating the area as an investment location.
- 3.3.5 The presence of a ready market for surplus in National Grid indicates this proposition will need to be subsidised if it is to be applied Grangemouth-wide (particularly where extension to domestic networks is proposed). There should be early discussion of the practicalities of implementation and how potential constraints might be overcome.
- 3.3.6 INEOS has indicated it intends to provide integrated steam, water, gas and emergency response services across its site. This will be a major improvement in efforts to further promote the area as a sector hub. The potential for smaller scale networks elsewhere in Grangemouth should be explored.
- 3.3.7 Ideally, a proposition combining integrated provision of utilities with a Grangemouth Investment Zone energy and utilities pricing differential should be in place by 2022.

District Heat Network

- 3.3.8 Falkirk Council's Energy Project will be a collaborative approach between INEOS, BP, Calachem and other major industrial interests and the public sector, acknowledging the availability of surplus heat locally and addressing affordability issues experienced by local institutional, business and residential users.
- 3.3.9 Following initial feasibility work, a more detailed Business Case is being prepared to underpin the Council's Energy Project. This will see major users including public sector buildings, schools and health care facilities and residential areas in Grangemouth, some of which are among those in Scotland most affected by fuel poverty, connected to a district heat network providing affordable heat. Heat will be supplied from a combination of: industrial heat recovery from existing businesses; supply from CHP facilities in the area and innovative renewable energy sources including energy from waste, geothermal opportunities in the

⁴⁸ Subject to a successful CfD application

Grangemouth basin, and other sources. The Vision anticipates completion of the district heat network by 2025.

Strategic Approach to Flood Alleviation

- 3.3.10 While existing businesses with experience of operating long term in Grangemouth may have factored the potential for flooding when assessing their investment risk, a strategic approach will further support Grangemouth’s competitive proposition in targeting operators internationally. Its provision will therefore assist delivery of key development sites in the Zone.
- 3.3.11 Flood defences for the Grangemouth have been assessed and emerge from the National Flood Risk Management Plan as a top priority: Its delivery would raise the profile of the Grangemouth Investment Zone, improve sector resilience in it, and also generate a significant and constant stream of construction and investment over a 10-year period. Work is now moving to the design stage and the Grangemouth scheme is identified in prioritised work to be delivered through the first flood risk management strategies
- 3.3.12 The Vision anticipates completion of a comprehensive Grangemouth Flood Protection Scheme by 2030.

KEY ACTIONS:	
Infrastructure	
2017-2019	
▪ Deliver Bo’ness Road alignment	INEOS, Falkirk Council
▪ Establish networked utilities infrastructure (site specific)	INEOS, Calachem, other landowners
▪ Investigate potential for linked GIZ network	Scottish Enterprise, Falkirk Council, Industry
▪ Commence design of Grangemouth Flood Protection Scheme	Scottish Government Falkirk Council
▪ Design & secure funding for Grangemouth District Heat Network	Falkirk Council, operator(s)
▪ Consideration of new routes development for Grangemouth Port	Forth Ports, Scottish Government

2020-2025	
▪ Development of linked GIZ utilities network, and regulatory infrastructure	Scottish Enterprise, Falkirk Council, Industry
▪ Completion of Grangemouth District Heat Network	Falkirk Council, operator(s) Forth Ports
▪ Expansion of Port of Grangemouth (harbour infrastructure & specialist storage)	
▪ Improvement to Port approach roads	Falkirk Council, Scottish Government
▪ Completion of M9, J5 & J6 improvements	Falkirk Council, Scottish Government
▪ Construction of initial stages of Grangemouth Flood Protection Scheme	Scottish Government Falkirk Council
2025-2030	
▪ Completion of Grangemouth Flood Protection Scheme	Scottish Government Falkirk Council

3.4 People: Skills & Capacity to Support the Grangemouth Investment Zone

- 3.4.1 Forth Valley College (FVC) is a leading institution in provision of the advanced operational skills needed to support Grangemouth’s manufacturing industry. It has adapted well to the changing demands of the chemicals, energy and refining sectors and now provides not just a local facility but also a regional and national resource for these sectors.
- 3.4.2 Developing a ‘vertical’ skills proposition, involving expansion and broadening of FVC relationships with the chemicals sciences sector (and communication of its achievements in UK and external markets) is a short term priority for the Vision, increasing awareness of its services and the quality of them across the sector at UK level and further afield.
- 3.4.3 It is preparing for the next stage in its development – a move to a £83m state-of-the-art campus – in 2019. In implementing the Vision, its collaboration with local employers and HEIs on programmes such as its Engineers for the Future programme (developed with INEOS and Heriot Watt) will be further extended
- 3.4.4 Existing collaborations with Heriot Watt and Strathclyde Universities on associate degree programmes in chemical engineering will be further expanded to other institutions with a view to developing effective research and operational collaborations. Already recognised for the excellence of its training provision, close further collaboration with the business and research base will develop opportunities to develop and promote local training expertise internationally.
- 3.4.5 As part of Vision implementation, business outreach activity will be expanded from current levels to ensure comprehensive understanding among all sector and manufacturing businesses in the Grangemouth Investment Zone of its capabilities and capacity.
- 3.4.6 Forth Valley College will be an intrinsic element of the National Manufacturing Institute.

KEY ACTIONS:	
People	
2017-2019	
▪ Construction & opening of Forth Valley College campus	Forth Valley College
▪ Expansion of sector Modern Apprenticeships programmes to 100 places	Industry, Forth Valley College
▪ Expansion of industry/HEI research collaborations	Industry, Universities of Strathclyde (CMAC), Heriot Watt
▪ Assessment of potential FE/HE satellite space at National Manufacturing Institute	Industry, Forth Valley College, HEIs
2020-2025	
▪ Establishment of research and training capacity at National Manufacturing Institute	Scottish Enterprise,
▪ Expansion of sector Modern Apprenticeships programmes to 300 places	Scottish Enterprise, Industry

3.5 Partnership & Positioning: A Structure to Support Vision Delivery

- 3.5.1 Arguably, the Strategy is at the core of Grangemouth Investment Zone. With national priority, its delivery clearly needs to be enabled by appropriate resource. While this will require commitment to investment to fund infrastructure, company expansion and skills development, it also needs to be supported by dedicated staff resource and clear leadership.

- 3.5.2 Leadership will be reflected in the establishment and composition of a focussed, delivery-oriented partnership.
- 3.5.3 The Falkirk Economic Partnership is an umbrella for developing the economy across the Council area and includes many of the businesses and public sector organisations whose co-operation and focus is needed to deliver the Grangemouth Vision. However, its implementation is of national significance, in terms of the chemicals and related sectors and for manufacturing across Scotland. It is therefore proposed delivery be overseen by a focussed partnership group with representation from Scottish Government, Scottish Enterprise, the Department for Business, Energy & Industrial Strategy, Chemical Sciences Scotland, Falkirk Council, INEOS, Forth Valley College, Forth Ports, and an additional representative for Grangemouth's chemicals and other businesses.
- 3.5.4 It will be further politically promoted through the appointment or identification of a champion figurehead for Grangemouth's future development. This figurehead will lobby, promote and articulate the case for Grangemouth investment at a national level to Government and industry bodies and internationally.
- 3.5.5 At operational level, and recognising that Vision implementation will generate additional challenges over and above the existing programmes of the key partners, delivery will be supported by a small secretariat of dedicated staff. Funded by the partnership, Vision co-ordination would be the responsibility of a full time officer based in the area and seconded from or appointed by Scottish Government. It would also co-ordinate inward investment, marketing and promotional activity to accompany the site preparation and development ambitions of Grangemouth's companies. They would be supported by senior staff seconded on a full or part-time basis from Falkirk Council and INEOS.
- 3.5.6 This secretariat will be responsible for driving delivery, co-ordinating the actions of partners and other organisations securing and maintaining levels of investment, and reporting progress regularly at Cabinet or Board level to the Partnership, to Government and to their employer organisations. A degree of decision-making autonomy is also necessary to build and maintain project momentum and to build credibility. This and the level of accountability indicated, suggests Officers should be demonstrably effective, combining a track record in delivery with the ability to influence at senior level.

KEY ACTIONS:

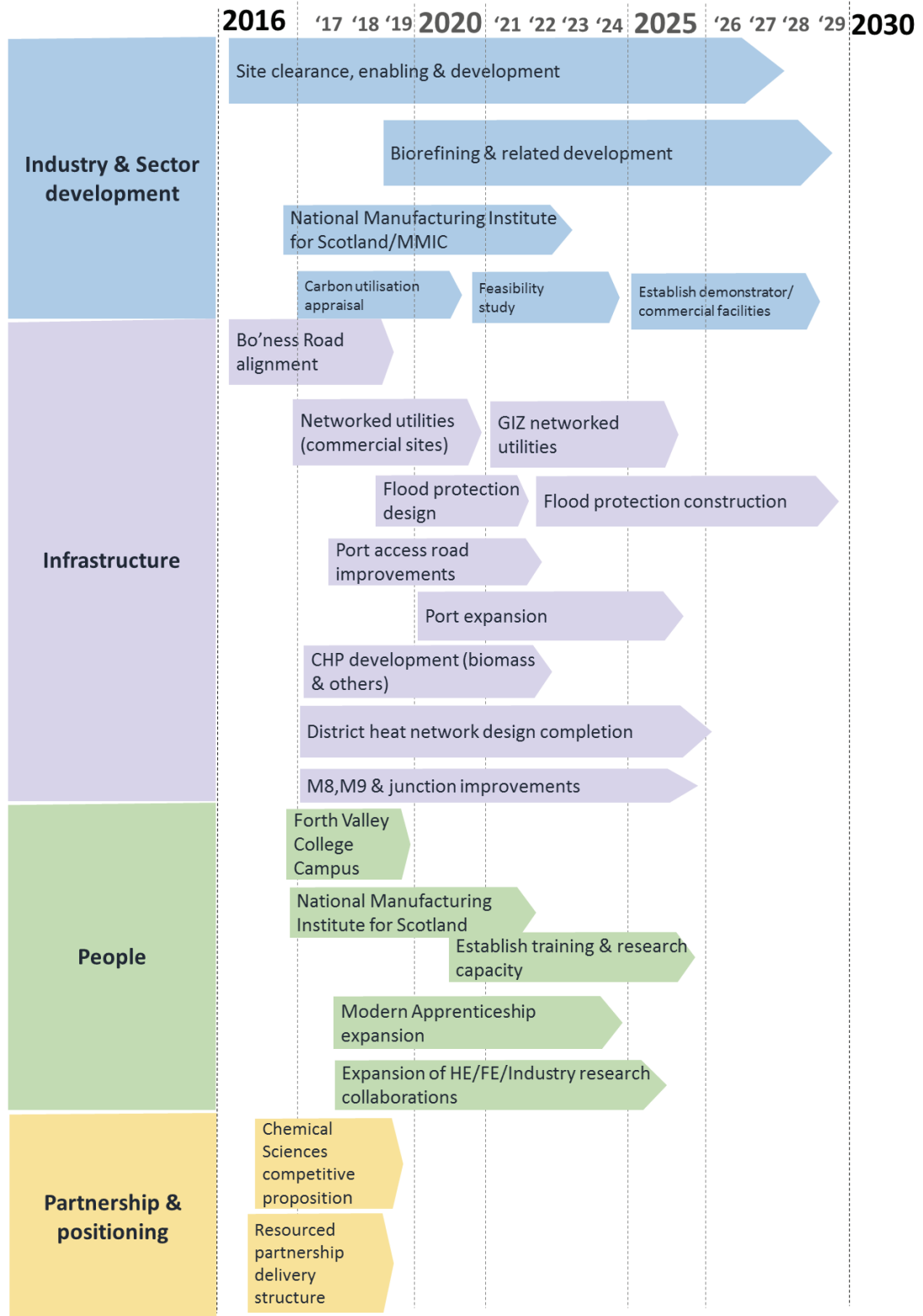
Partnership & Positioning

2017-2019

- | | |
|---|---|
| ▪ Early establishment of a coordinated, competitive proposition for Grangemouth's chemical sciences sector | Scottish Enterprise, Industry, CSS, Falkirk Council |
| ▪ Early establishment of a dedicated partnership structure resourced to deliver the Future Grangemouth Vision | Scottish Government, Scottish Enterprise, Industry, Falkirk Council |

4 Economic Impact

Figure 4-1 A Resilience Roadmap for the Grangemouth Chemical Sciences Sector



- 4.1.1 As the Roadmap above and the schedule of actions in the previous chapter indicates, Vision delivery has clear milestones. This reflects:
- Investment by INEOS and other major landowners in their own estates (site clearance, integrated utilities, creation of market ready plots);
 - An increasingly coordinated competitive investment proposition, supported as appropriate by Scottish and UK Government;
 - Investment in transport, energy and flood protection infrastructure to secure ongoing competitiveness;
 - A Grangemouth-distributed network of heat, steam and other utilities bringing benefit to local business and local residents network;
 - Investment in expanded facilities by existing businesses and attraction of new operators to Grangemouth;
 - Grangemouth’s establishment as a Centre of Excellence in the sector; and
 - Increased diversification & in Grangemouth’s chemicals sector.
- 4.1.2 The potential economic impacts of have been estimated employing the most recent Scottish Government and other data on: local and national GVA in relevant sectors; sector multipliers; employment densities (other than for the chemicals sector where densities are assumed at between 100 sq.m and 150 sq.m per employee and assumptions; and assumptions made for deadweight, leakage and other additionality factors consistent with those adopted in the Falkirk TIF analysis (a summary is attached at Appendix 1). Values are discounted by 3.5% per annum consistent with Treasury guidance
- 4.1.3 Estimates are presented for the Grangemouth labour market area (Falkirk, Stirling, parts of Clackmannan, West Lothian & Fife) and for Scotland.
- 4.1.4 Implementation of the Grangemouth Future Vision is estimated to generate an additional 3,591 jobs (FTEs) locally and over 3,350 across Scotland. Additional GVA from Vision delivery is estimated at £206m locally and £182 million across the country

Table 4-1 Grangemouth Vison Economic Impacts (total)

ALL	2020	2025	2030
Local			
Net additional jobs	1,103	3,187	3,591
Annual GVA impact, £m	£69.35	£194.46	£205.94
Scotland			
Net additional jobs	1,060	3,029	3,358
Annual GVA impact, £m	£68.55	£176.61	£182.34

Table 4-2 Grangemouth Vision Economic Impacts (sector)

CHEMICALS	2020	2025	2030
Local			
Net additional jobs	430	1,867	2,271
GVA per employee £	90,349	98,778	107,994
GVA impact £m	£33.87	£135.34	£151.51
Scotland			
Net additional jobs	374	1,625	1,977
GVA per employee £	80,124	87,600	95,773
GVA impact £m	£26.14	£104.46	£116.95
INDUSTRY	2020	2025	2030
Local			
Net additional jobs	247	693	693
GVA per employee £	71,853	78,557	85,886
GVA impact £m	£15.45	£31.95	£29.41
Scotland			
Net additional jobs	289	797	797
GVA per employee £	75,323	82,351	90,034
GVA impact £m	£18.98	£39.25	£36.13
OFFICE	2020	2025	2030
Local			
Net additional jobs	354	519	519
GVA per employee £	52,810	57,737	63,124
GVA impact £m	£16.28	£21.98	£20.24
Scotland			
Net additional jobs	311	456	456
GVA per employee £	69,963	76,491	83,628
GVA impact £m	£18.95	£25.60	£23.57
DISTRIBUTION	2020	2025	2030
Local			
Net additional jobs	72	108	108
GVA per employee £	59,698	65,267	71,357
GVA impact £m	£3.76	£5.19	£4.78
Scotland			
Net additional jobs	86	151	128
GVA per employee £	60,068	65,673	71,800
GVA impact £m	£4.48	£7.29	£5.69

Appendix A Additionality Assumptions

A.1 Additionality Assumptions

	Chemicals	Industrial	Office	Distribution
Leakage %	10%	20%	20%	20%
Displacement %	10%	25%	25%	25%
Deadweight %	15%	25%	25%	25%
Multiplier	2.18	1.40	1.43	1.33
GVA per employee	£84,126	£66,904	£49,173	£55,586

SCOTLAND	Chemicals	Industrial	Office	Distribution
Leakage %	5%	0%	0%	0%
Displacement %	25%	35%	50%	35%
Deadweight %	25%	35%	35%	35%
Multiplier	2.44	1.75	1.75	1.67
GVA per employee	£74,606	£70,135	£65,145	£55,931