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# POWERING THE SOLENT

Solent Heat and Power Strategy and Action Plan to 2050

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Prepared by: Carbon Trust Advisory Ltd

Prepared for: Solent LEP





Carbon Trust prepared this report based on an impartial analysis of primary and secondary sources. Carbon Trust is an organisation of independent experts with the mission to accelerate the move to a sustainable, low carbon economy. We operate at a world-wide level and we have offices in London, Cardiff, Edinburgh, Belfast, Beijing, Pretoria, and Mexico City, as well as a presence in São Paulo and Washington DC

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## 1. EXECUTIVE SUMMARY

Local Enterprise Partnerships (LEPs) are responsible for ensuring opportunities for economic development in their local area are identified and maximised. The recent publication of Strengthening Local Enterprise Partnerships re-confirms this role with a clear focus improving productivity. This Solent Heat and Power Strategy demonstrates that the generation of energy, including low carbon and energy efficiency, are significant economic opportunities in the Solent. Optimising the Solent's energy system and energy use improves energy security, frees up funds that can be re-invested to improve local competitiveness, productivity and economic growth, and can be a catalyst for technology innovation.

The development of a robust, local Solent Heat and Power Strategy and Action Plan to 2050 is a complex but important challenge, which will support future Solent growth. Without it, there is a danger of a fragmented approach to delivery affecting the strength of regional growth and project cost-effectiveness. There is a national imperative to move to a lower carbon economy and the Solent has a role to play in achieving this transition in ways that considers the whole energy system and uses the evidence to identify lowest cost, highest impact local strategies aligned to local, national and international goals.

The Solent LEP has the convening power to bring public and private stakeholders together to create local solutions to a global issue.

The Department for Business, Energy, and Industrial Strategy (BEIS) have asked LEPs to show leadership in supporting and promoting the identification and implementation of local energy projects. Through the BEIS Local Energy Hubs, and the Solent LEPs membership of the South West (SW) Energy Hub, there is an opportunity to develop regional programmes and increase individual LEPs capacities through leveraging a wider resource and skills-base to deliver energy projects.

LEPs such as Solent are already key enablers of economic infrastructure, which supports local growth, such as housing and transportation, both key themes covered in this Solent Heat and Power Strategy and Action Plan.

The implications for local energy needs to be taken into account in the delivery of the LEPs core activities. The Solent LEP is well-placed to act as honest brokers. They can aggregate projects to attract finance; support the commercialisation and due diligence of a project pipeline. They can also, through their engagement in the SW Energy Hub, support in the provision of information and expertise to project developers and investors across public, private and community energy sectors.

Undoubtedly, a wealth of experience, expertise, dedication and enthusiasm already exists in the Solent. Leadership from the LEP can support enterprises and the economy to grow and existing capacity and expertise to flourish and grow.

### **The Solent energy landscape**

The Solent region consumed a total of 43.3 TWh of energy in 2015 (7,855 ktCO<sub>2</sub>). Greatest demand being from the commercial and industrial sectors (50%), followed by the domestic (26%) and transport (24%) sectors. Since 2005, energy consumption has continued to decrease in the Solent, despite increasing GVA and population levels, pointing to greater levels of efficiency in the use of energy within the region.

The UK is committed to transitioning to clean energy with a target to reduce its greenhouse gas emissions by at least 80% by 2050, relative to 1990 levels. If the Solent simply moves forward with business as usual then by 2050 it is forecast that energy consumption will be 50.6 TWh (9,137 ktCO<sub>2</sub>). But the Solent region has a role to play in the clean energy transition, with a significant level of natural resources for renewable energy and represented by sectors important to clean growth. This creates an economic opportunity to boost productivity, create jobs and retain wealth within the local area. If the Solent takes advantage of this opportunity then 2050 energy consumption could reduce to 34.3 TWh (6,193 ktCO<sub>2</sub>, a 21% reduction) and deliver economic growth.

The Solent region is already realising the economic opportunity from the deployment of renewable energy, which has seen strong growth in recent years. Of the current installed electrical capacity, 71% is gas and the remaining 29% is using renewable or low carbon sources such as solar (24%), waste-to-energy

(4%) and geothermal (1%). In 2015, 11% of the electrical energy generated within the region came from renewable sources. A significant evidence base identifies further potential for the cost-effective deployment of new, low carbon and renewable generation sources.

### Building on the Solent's strengths

The Solent is a gateway economy of international significance, providing connectivity to global markets, for the wider UK economy and characterised by its three international gateways: the Port of Southampton, the Port of Portsmouth and Southampton International Airport.

This gateway economy is fundamentally underpinned by the Solent's unique strengths within the marine, maritime and defence cluster. The Solent's coastal location, business base and research strengths present a unique advantage, which has resulted in a marine and maritime sector which accounts for almost 20% of Solent's GVA, provides 36,000 jobs and supports more than 3,000 businesses. The Solent's maritime sector has explicit links to the energy economy; being a significant user of energy, having the ability to support the development and deployment of marine-based energy technologies and most importantly offering a gateway for the import and export of energy-related goods and services as well as directly supplying (via pipeline) aviation fuel to the growing Heathrow Airport).

MHIVestas Offshore Wind (MHIVOW) are a local example of maritime-related investment drivers within the region. MHIVOW is a wind turbine manufacturer with an R&D facility on the Isle of Wight that supports 200 jobs. They recently announced plans for a new blade painting and logistics facility in Fawley, which will create a further 50 jobs. There is significant potential to build on this existing capability through the development of a supply chain associated with marine-based energy technologies. In addition, there is an active and burgeoning cleantech sector in the Solent. For example, Greentech South is a Technology and Innovation cluster comprising more than 100 members, and is the first Energy and Environment Sector Cluster in the UK to achieve Bronze accreditation under the EU Cluster Excellence Programme. There is potential to leverage this skills

base, linking with universities, to support further energy technology development within the region.

### Vision and priority areas

This Solent Heat and Power Strategy has defined a vision for the Solent *"to be the leading gateway for innovative and sustainable heat and power solutions"*. The vision aligns to the Solent LEP's broader economic ambitions and seeks to capture the potential for the region to apply its world-leading skills base and maritime strengths in order to become a leading gateway economy for innovation and sustainable heat and power, which achieves a greater level of productivity, attracts investment and delivers growth as part of the transition to a low carbon economy.

### The vision is guided by three core principles:

1. **A whole-systems view** – which broadens the focus to include heat and transport, alongside electricity and energy efficiency. An integrated approach that takes into account the interactions between all elements of the energy system and the opportunities brought about by new technologies
2. **A strengthened and productive economy** – which harnesses the opportunity to boost energy and resource productivity across businesses and unlocks clean tech growth and skilled job creation across the economy
3. **A smarter, local approach** – delivering local solutions that meet regional needs and build on energy and sectoral strengths and opportunities. Creating a prosperous, decentralised local energy economy that takes advantage of smart technologies and embraces the energy revolution.

Guided by this vision, six priority areas have been identified, setting out the role of energy in supporting economic growth:

1. Unlock growth in our marine, maritime and defence cluster
2. Embrace the energy system revolution
3. Deliver affordable, clean heat and power
4. Accelerate the shift to low carbon transport
5. Improve our homes
6. Boost productivity across business and industry

## 2. INTRODUCTION

### Project Scope and Methodology

The Carbon Trust was appointed to support the Solent LEP develop a Heat and Power Strategy and Action Plan for the Solent region. This work seeks to provide a strategic direction for the future of heat, power and transport through to 2050, within the context of raising productivity and supporting economic growth. The strategy is accompanied by an action plan that seeks to identify robust, cross-sector opportunities that can be implemented over the short, medium and long term to help realise the strategic vision.

#### Phase 1: Vision, research and baseline analysis

A baseline study provided a portrait of the Solent energy economy and landscape today, and looked forward to 2050. Concurrently, a literature review was undertaken combining key national and local policy and evidence documents with expert interviews and workshop consultation to build a more comprehensive picture of the challenges and opportunities. This included available levers, barriers to development, technologies that are key, and informed the development of a strategic vision and priority areas.

#### Phase 2: Development of Action Plan

Heat and power solutions and opportunities have been identified, evaluated and compiled into an action plan. Opportunities have been assessed against an agreed set of economic, commercial and deliverability criteria, before being mapped against appropriate delivery mechanisms, including consideration of stakeholder roles, business models, governance, procurement and finance. The opportunities identified aim to place the Solent in a strong place to compete for funding through the South West Energy Hub.

### The Role of Energy in Supporting Economic Growth in the Solent

The Solent LEP has an overarching role of economic growth leadership in the Solent. Energy is an essential ingredient for the success of a competitive modern economy. The impact of the energy sector on the economy is greater than the sum of its parts.

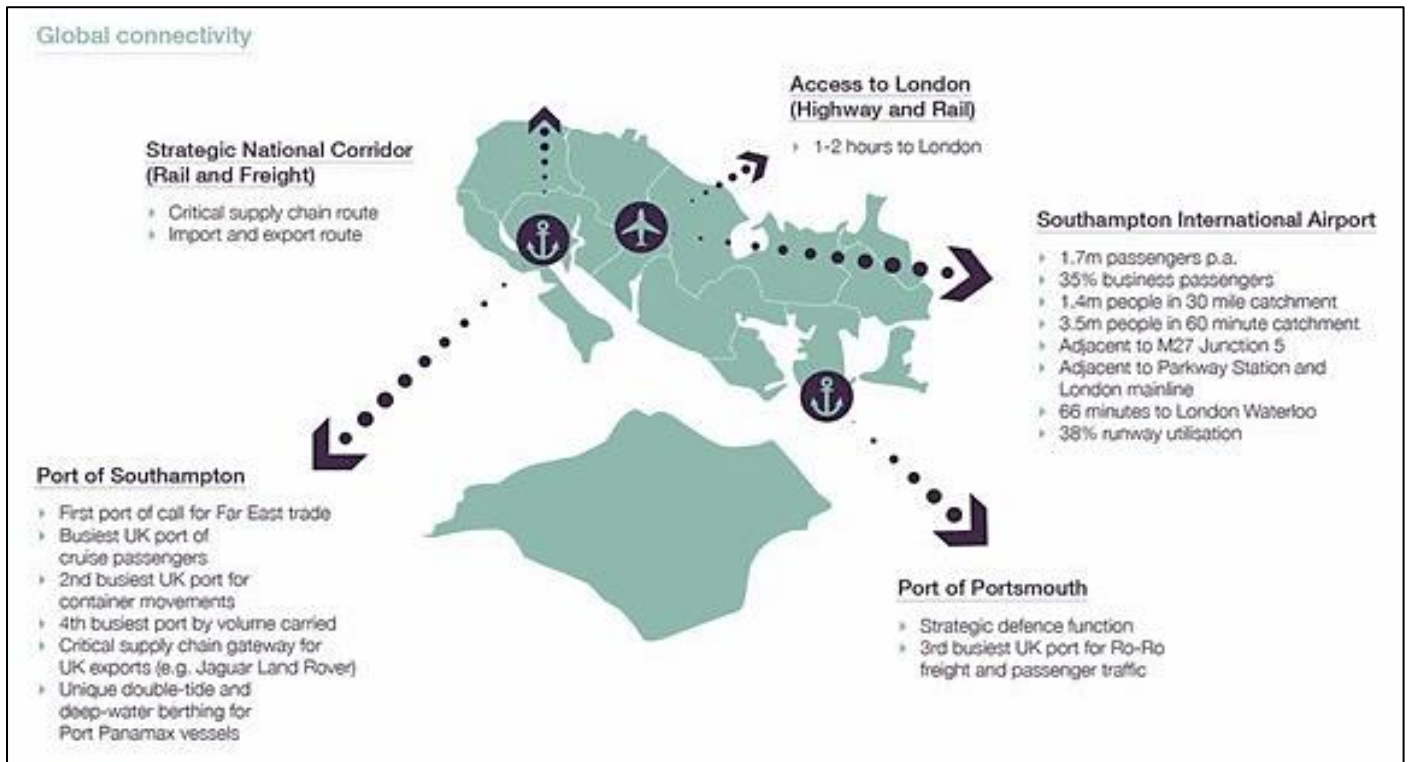
Whilst the sector constitutes a relatively modest share of Gross Value Added (GVA) within the Solent, its impact on the local economy is far greater than this direct contribution. Beyond the delivery of direct outputs such as heat, light and power, energy is deeply linked to all sectors and is an input into almost all goods and services. The cost of energy becomes increasingly significant for energy intensive industries that are reliant on affordable energy and security of supply to enhance their competitiveness. There are a range of energy intensive sectors, which form a significant part of the Solent economy, including oil refining, manufacturing, defence, construction and transportation. Rising energy costs impact the bottom line of business, affect household spending power, and influence public sector investment decisions. For this reason, stable and affordable energy prices are central to sustaining and expanding economic growth.

Investment in the energy sector can also lead to creation of economic value in several ways:

- Growth in local jobs in Research & Development, manufacturing, construction, installation, management and maintenance. The sector's well paid and highly skilled workforce have high capital spending power, with knock on effects for local business and industry.
- Deployment of smart energy systems and low carbon transport, can have a positive impact on the physical environment, including reduced carbon emissions, air quality improvements, better connectivity and socio-economic benefits such as improvements to living standards and productivity.
- Investment in local low carbon heat and power generation and energy efficiency can have a positive impact on local energy security, reduced energy costs and protection against fossil fuel price volatility, all of which are vital in attracting new industries to a particular region as well as retaining existing businesses, and helping them grow.

However, economic benefits can only be realised if energy projects are efficiently prioritised and investments are well planned. For example, over-investment can lead to energy projects that are inefficiently large with low marginal returns. Additionally, the ongoing shift to a low carbon economy will result in job losses from the fossil fuel energy industries and therefore any transition must factor in upskilling, retraining and redeployment.

### 3. VISION AND PRIORITY AREAS



### ***Vision: To be the leading gateway for innovative and sustainable heat and power solutions***

The Solent is a gateway economy of international significance, providing connectivity to global markets, for the wider UK economy. The Solent has three international gateways: the Port of Southampton, the Port of Portsmouth and Southampton International Airport. The region is positioned 120km to the south west of London with good transport links by road, rail, air and sea to the wider UK, but significantly constrained internal transport networks. The Port of Southampton is the nearest deep-water port in the UK to the key Shanghai to Rotterdam shipping lane, which allows the world’s largest ships efficient access.

This gateway economy is fundamentally underpinned by the Solent’s unique strengths within the marine, maritime and defence cluster. The Solent’s coastal location, business base and research strengths present a unique advantage, which has resulted in a sector which accounts for just under 20% of Solent’s GVA, provides 36,000 jobs and supports more than 3,000 businesses.

The Solent’s maritime sector has explicit links to the energy economy; being a significant user of energy, having the ability to support the development and deployment of marine-based energy technologies and most importantly offering a gateway for the import and export of energy-related goods and services.

The Vision for the Solent ***“to be the leading gateway for innovative and sustainable heat and power solutions”*** aligns to the Solent LEP’s broader economic ambitions. It seeks to capture the potential for the region to apply its world-leading skills base and maritime strengths in order to become a leading low carbon gateway economy, which achieves a greater level of productivity, attracts investment and delivers growth as part of the transition to a low carbon economy.

#### **A vision guided by three core principles:**

1. **A whole-systems view** – which broadens the focus to include heat and transport, alongside electricity and energy efficiency. An integrated approach that takes into account the interactions between all elements of the



energy system and the opportunities brought about by new technologies

2. **A strengthened and productive economy** – which harnesses the opportunity to boost energy and resource productivity across businesses and unlocks clean tech growth and skilled job creation across the economy
3. **A smarter, local approach** – delivering local solutions that meet regional needs and build on energy and sectoral strengths and opportunities. Creating a prosperous, decentralised local energy economy that takes advantage of smart technologies and embraces the energy revolution.

**A vision delivering key benefits to the local economy:**

- Support Solent businesses in improving their energy and resource productivity and competitiveness, particularly in key sectors
- Reduce the amount consumers and businesses spend on energy, and responding to Solent's productivity challenge
- Drive high skilled job creation, high growth and innovation in new energy sectors
- Protect the climate and environment upon which we and future generations depend

**A vision underpinned by six priority areas:** in response to the vision, priority areas have been identified setting out the role of energy in supporting economic growth

**1. Unlock growth in our marine, maritime and defence cluster**

- Take action to improve air quality and facilitate the shift to a lower carbon economy across Solent's three international gateways, through the availability of shore power, deployment of renewable energy technologies and energy recycling, without reducing the competitiveness of port operations
- Drive smart specialisation and energy innovation in the marine, maritime and defence sector
- Drive productivity and energy security through the deployment of energy efficiency measures across the cluster to enhance competitiveness

- Explore opportunities for energy provision to aviation and shipping, including the local sourcing of cleaner, more affordable fuels, working with Solent Universities and industry to capture innovation

**2. Embrace the energy system revolution**

- Accelerate the transition to a smarter, resilient energy economy, capitalising on the Solent's existing web science and digital sector strengths
- Drive sector growth through the deployment of smart grid technologies including demand side response, smart meters and energy storage
- Embrace emerging and disruptive technologies to advance the market, facilitating technology incubation through technology and innovation clusters
- Invest in big data and artificial intelligence to enable the energy transition and manage intermittent renewable generation, advancing the existing technological expertise across Solent Universities

**3. Deliver affordable, clean heat and power**

- Champion new business models to empower consumers, businesses and public sector bodies to invest in energy generation, transmission and supply
- Actively encourage local renewable electricity generation, with technologies including solar PV, wind, tidal and Combined Heat and Power (CHP) alongside energy storage, to accommodate the future electrification of heat and transport
- Drive investment in heat networks and tri-generation schemes<sup>1</sup>, building on the success in Southampton
- Implement renewable heating technologies, transitioning away from high carbon fuels in off gas-grid locations
- Develop opportunities for a self-sustaining or electricity exporting Isle of Wight

<sup>1</sup> Tri-generation is the production of electricity, heat and cooling combined

- Energy innovation and supply chain development (including in offshore wind, solar, anaerobic digestion and solid-state batteries)

#### 4. Accelerate the shift to low carbon transport

- Promote a clean and efficient modern transport network that tackles air quality and encourages a range of modal uses, including mass public transit systems to better connect the Solent
- Promote transport connectivity and the better integration of modes between ferries and other public transport, including improved transport interchanges
- Encourage the movement of freight to modes and systems that are cleaner and more efficient
- Harness smart technologies, such as bus rapid transit networks and smart data infrastructure
- Deploy ultra-low emission and autonomous transport technologies (building on local expertise in this arena), including electric and hydrogen fuel cell electric vehicles, and the supporting the rollout of charging/refuelling infrastructure

#### 5. Improve our homes

- Deliver significant levels of new, affordable housing, underpinned by robust sustainable development strategies and high levels of energy and water efficiency.
- Advocate better housing standards that go beyond the minimum requirements for energy efficiency, using sustainable and locally sourced building materials and incorporating connection to district energy networks, without unduly affecting housing viability.
- Deliver energy efficiency retrofit to homes across the region to reduce fuel poverty and improve health, establishing partnership models that access new sources of finance.
- Encourage the transition to a proactive consumer-led energy system, which deploys new business models including municipal and community-led energy supply.

#### 6. Boost productivity across business and industry

- Facilitate action across our industrial sectors to boost productivity and innovation; coordinate collaborative sector involvement in the sector deals and sectoral industrial decarbonisation and energy efficiency action plans.
- Unlock innovation through technology incubation and the Solent Growth Hub, supporting start-ups and young SMEs, research institutions and the expanding technology sector to access UK Govt. R&D funding and commercialise energy technologies.
- Support our strong marine and maritime, defence, aerospace and construction industries to increase their share of global markets as they shift to clean energy sources and efficient new materials
- Provide advice and financial support to SMEs leading to the implementation of resource efficiency measures
- Establish an energy brokerage service for local businesses using peer-to-peer networks to identify opportunities and unlock growth and export led activity.

## 4. CONTEXT

### National Context

Following the publication of the UK Industrial Strategy, all LEPs (or Combined Authority areas where they exist) have been asked to produce **Local Industrial Strategies** to translate the ambitions and activities of the national strategy into local economies and activities. Alongside the existing new Strategic Economic Plan (under development), this Heat and Power Strategy will provide the Solent LEP with a valuable local evidence base and action plan to feed into their local industrial strategy and inform future investment decision making.

Additionally, BEIS are delivering a **Local Energy** programme, which is intended to improve the ability of LEPs and local authorities to promote and deliver energy projects. Five **Energy Hubs** are being funded across England to provide capacity support from summer 2018.

The energy strategies currently being commissioned and developed across all England are intended to help inform the work of the regional energy hubs. Solent LEP is a member of the South West (SW) Energy Hub, covering seven LEPs.

The number and locations of staff are yet to be confirmed but the SW Energy Hub will be hosted by the West of England Combined Authority in Bristol, who will oversee the management of a £1.1m fund from BEIS on behalf of the SW area. Solent LEP will have the opportunity to influence the pipeline of projects to be considered under the SW Energy Hub, and secure support for those local opportunities highlighted in this Heat and Power Strategy.

It is also worth noting that the evidence resulting from this Heat and Power Strategy has the potential to influence future national policy-making. BEIS will be undertaking a review of all local LEP energy strategies, and using the findings and recommendations to influence the future of the local energy programme and shape future policy associated with the energy and industrial sector.

There are various national policy, strategy and study reports that provide important context for local energy planning. These reports indicate national priorities as well as analysis that may prove useful for local energy planning. Below we discuss four such reports and, where possible, highlight local links and implications.

#### THE CLEAN GROWTH STRATEGY

The Clean Growth Strategy provides an ambitious blueprint for Britain's low carbon future, outlining how investment in green energy goes hand-in-hand with economic growth and placing clean growth at the centre of the Industrial Strategy. Core to the strategy is the action that the UK will take to cut emissions, increase efficiency and lower the amount consumers and businesses spend on energy.

Key Policies and Proposals in the Strategy include:

- **Accelerating Clean Growth**, through the development of world leading Green Finance capabilities
- **Improving Business and Industry Efficiency**, through a package of measures to improve

energy productivity and commercial building standards, deliver industrial energy efficiency, invest in industrial innovation to drive down the costs of Carbon Capture Usage and Storage (CCUS) and supporting the recycling of industrial waste heat

- **Improving our Homes**, through energy efficiency upgrades across a million homes, strengthening building standards, rolling out heat networks, the phase out of high carbon heating in off gas grid homes and investment in low carbon heating
- **Accelerating the Shift to Low Carbon Transport**, supporting the take-up of ultra-low emission vehicles and low emission taxis and buses, developing a world-class electric vehicle charging network, investing in cycling and walking, shifting freight from road to rail and innovation in Connected and Autonomous Vehicles and electric batteries
- **Delivering Clean, Smart, Flexible Power**, through the phase-out of coal, a smart systems plan, development of new ways of balancing the grid through electricity storage and demand response, development of new nuclear power and offshore wind
- **Enhancing the Benefits and Value of Our Natural Resources**, through agricultural support, a new network of forests and increased amount of timber in construction, zero avoidable waste by 2050 and the management of emissions from landfill
- **Leading in the Public Sector**, through a voluntary 30% public sector carbon reduction target by 2020 and funding for energy efficiency improvements in England

The Clean Growth Strategy recognises LEPs as an important resource in driving future decarbonisation, stating that *“each region of the UK differs in its local energy resources, its industrial and domestic energy needs and its expertise”*. It commits to ensuring that *“local communities and LEPs are empowered to make the best use of their local skills and resource, so that through the clean energy economy they can drive productivity, job creation and growth”*. A number of ambitions particularly relevant to the Solent can be seen within the Clean Growth Strategy.

These include delivering clean smart flexible power; accelerating the shift to low carbon transport; improving housing; accelerating green growth through green finance; and improving business and industrial efficiency.

BEIS will be consulting with the public sector throughout 2018 to inform the development of a Future Action Plan for the Public Sector, due to be published in 2019 and to determine the future of the carbon target beyond 2020. It is recommended that Solent LEP and local councils take part in this consultation process to feedback local requirements that arise from this Heat and Power Strategy.

### INDUSTRIAL DECARBONISATION AND ENERGY EFFICIENCY ROADMAPS

The Industrial decarbonisation and energy efficiency roadmaps to 2050 are a national resource that is relevant to the development of energy strategies. The roadmaps focus on eight of the most carbon intensive sectors (Iron and Steel, Chemicals, Oil Refining, Food and Drink, Pulp and Paper, Cement, Glass and Ceramics) and highlight technological pathways that could be pursued to reach decarbonisation targets.

The roadmaps are relevant to the Solent LEP energy strategy planning, as each roadmap states current and future potential decarbonisation measures that may be undertaken by specific sectors.

For the Solent LEP region home to the Esso Fawley Oil Refinery (owned by ExxonMobil), one relevant sector is Oil Refining. This roadmap provides information on the enablers and barriers to decarbonisation within the sector as well as an assessment of the mechanisms or changes that will drive the greatest emissions reduction. Subsequently, the roadmap was translated to an industry action-plan supporting decarbonisation.

The greatest enablers of decarbonisation within the sector are:

- Cost savings from energy savings (threat of increasing energy costs)
- Government actions that encourage investments in decarbonisation
- Management focus, corporate targets, long-term energy strategies and high-level buy-in

- Regulatory compliance
- Increased energy efficiency through improved energy monitoring and process control systems
- Government recognition of the strategic importance of the oil refining sector
- Enhanced collaboration between industry, government, trade associations and academia

Meanwhile the largest barriers to decarbonisation in the Oil Refining sector are:

- Unfavourable market conditions (poor demand, cash flow and high uncertainty)
- Short-termism (and long payback periods)
- Regulatory compliance
- High and increasing energy costs
- High competition levels preventing collaboration
- Specific shortage of key skilled staff
- Carbon Capture and Storage (CCS) has a number of barriers
- Long lifespan of refineries
- Risk of production disruption
- Disruptive tested and reliable technologies not available

The modelling analysis that accompanied the roadmap indicated that the greatest emission reduction opportunities for the Oil Refining sector will come from: waste and energy recovery, pumps, compressors and fans, process heaters and furnaces, storage tanks, Combined Heat and Power (CHP) and utilities optimisation.

The second insight that the roadmap provides that is relevant to the Solent LEP energy planning strategy is that it highlights technologies that are likely to be important to future decarbonisation and also indicates their levels of market readiness.

This aligns with the economic direction of the Solent; not only are advanced engineering and manufacturing increasingly important sectors, but, the region has stated that encouraging growth in technology sectors is a priority. As such, the roadmap could be cross referenced with areas of local expertise to inform subsequently priority areas for energy planning. Furthermore, this report provides valuable national-

level information about how the UK will decarbonise and as such indicates areas that will be important for focus at the local and regional level. More specifically, the study found that the top eight most CO<sub>2</sub> intensive sectors will decarbonise through seven technology groups:

- Grid decarbonisation
- Electrification of heat
- Fuel and feedstock (including biomass)
- Energy efficiency and heat recovery
- Clustering
- Carbon Capture Usage and Storage
- Sector-specific technologies

### THE NATIONAL INFRASTRUCTURE COMMISSION REPORT

The National Infrastructure Commission (NIC) report “Congestion, Capacity, Carbon: Priorities for National Infrastructure” is an interim assessment in preparation for the 2018 National Infrastructure Strategy which identifies key infrastructure priorities<sup>2</sup>. Of the seven areas identified, two relate directly to energy.

They stress that technology plays a key role in eliminating carbon emissions from energy and waste. The report highlights the importance of smart meters, advances in batteries and storage, consideration of the case of tidal, CCUS, nuclear, and consideration of the barriers for different renewable technologies. Solent’s expertise in solid-state batteries and tidal generation technologies fits well with these priority area.

The necessity of a revolution in road transportation is also identified. This focuses around how technologies can be introduced, and how they can be funded through models that involve road users paying a fair price in the future. Digital connectivity, smart motorways, electric vehicles, smart charging networks, roadway sensors, and automated light management will play important roles in transportation. These will be important focus areas for the transport component of the Solent Heat and Power Strategy and Action Plan.

<sup>2</sup> Building a digital society; Connected, liveable city-regions; Infrastructure to support housing; Eliminating carbon emissions from energy and waste; A revolution in road transport; Reducing the risks of drought and flooding; and Financing and funding infrastructure in efficient ways.

The NIC report sets forth the common challenges that the country faces with respect to infrastructure and provided an early indication of how the government will seek to address these issues.

### THE INDUSTRIAL STRATEGY

The UK’s Industrial Strategy sets out the government’s plan to create an economy that boosts productivity and earning power throughout the UK. It positions five foundations for productivity; these are Ideas, People, Infrastructure, Business Environment and Places.

It sets Four Grand Challenges where Britain can lead the global technological revolution:

1. **AI & Data Economy:** putting the UK at the forefront of artificial intelligence and data revolution
2. **Clean Growth:** maximising the advantages for UK industry from the global shift to clean growth
3. **Future of Mobility:** being a world lead in shaping the future of mobility
4. **Ageing Society:** harnessing the power of innovation to help meet the needs of an ageing society

These challenges have strong links with the energy and low carbon sectors and with economic growth.

The Industrial Strategy highlights several ways in which the UK will need to consider energy in order to build an economy that works for everyone. These include:

- Upgrading energy infrastructure to enable growth and support new technologies;
- Delivering affordable energy and keeping energy costs down for businesses;
- Delivering clean growth and securing the economic benefits of the transition to a low carbon economy;
- Investing in science, research and innovation, including energy storage and grid technologies;

- Supporting businesses to start and grow.

It also highlights the role that LEPs will have moving forward and the expectation that *'local areas in England consider clean energy and the economy-wide shift to clean growth in the development and implementation of Local Industrial Strategies'*.

The strategy recognises that LEPs play an important part in supporting local growth. Throughout 2018, the government will work with LEPs to more clearly define activities and objectives, define a strategy for national and local partnership, and to agree appropriate accountability structures for LEPs.

The strategy emphasises the importance of collaboration between LEPs and recognises the need for policy flexibility at the regional level. In terms of funding, government recognises that LEPs require financial support in order to be effective. Additional financial resources will be made available to LEPs that demonstrate ambitious levels of reform. Key policies outlined in the industrial strategy, relative to the Solent Heat and Power strategy and action plan include:

- Raising total Research & Development (R&D) investment to 2.4% of Gross Domestic Product (GDP) by 2027
- Increase the rate of R&D tax credit to 12%
- £725 million investment in new Industrial Strategy Fund programmes to realise the value of innovation in the UK
- Additional £406 million investment in education for Science, Technology, Engineering and Mathematics (STEM) based subjects
- £20 billion worth of investment in innovative and high potential businesses

The government will also launch a UK Shared Prosperity Fund following the UK's departure from the EU. Government also confirmed its commitment to guarantee funding for any EU projects signed whilst the UK is still part of the EU. Support will continue even if a project continues after the UK's departure, if the project provides good value for money and aligns with domestic priorities.

#### Local Context

#### LOCAL AUTHORITIES

The Solent LEP is made up of 12 local authorities, seven of which fall completely within the LEP boundary (Southampton City Council, Eastleigh Borough Council, Fareham Borough Council, Gosport Borough Council, Havant Borough Council, Portsmouth City Council and Isle of Wight Council).

A further five fall partly within the LEP boundary, but also cross into the neighbouring Enterprise M3 LEP area (East Hampshire District Council, New Forest District Council, Hampshire County Council, Winchester City Council and Test Valley Borough Council).

Across the Solent, local authorities face common challenges. A focus for coastal areas is on offsetting the decline of tourism, in urban areas it's on maintaining sustainable growth and reinvigorating communities, and in rural areas it is on improving digital connectivity. Across all areas spans the challenge of housing and connectivity.

The Solent LEP aims to address these issues by consolidating regional strengths and using them as a springboard to create new industries, jobs and prosperity. Feedback loops between renewable and smart energy, technological innovation and advanced industry – where each is contributing to and reinforce the other – are at the core of this approach.



All local authorities across the Solent have made a commitment to reduce carbon emissions.

Commitments have been made through methods such as renewable and energy efficiency strategies, energy policies and planning policy. Most local authorities have baselined their own greenhouse gas (GHG) emissions. Some have baselined community GHG emissions by sector within their geographic boundary and others have considered what changes will be required to facilitate future decarbonisation.

There are a large number of existing local authority documents and studies, which give support for the low carbon energy transition and identify and appraise opportunities. For example, the Isle of Wight Council has conducted a heat mapping study, alongside a review of grid connections, and assessment of future energy initiatives.

Eastleigh Borough Council has published a Climate Change Strategy and Havant Borough Council an energy strategy, with both running up to 2020. Winchester has published a 'route map' to give directions for the shift to a low carbon economy, and East Hampshire developed an energy strategy alongside a further report on community energy in the borough. The New Forest District Council undertook a renewable energy potential assessment, focused around biomass. This has been supplemented by woodland resource assessments of the New Forest by the Forestry Commission.

The level of ambition amongst the Solent local authorities is strong, however it is clear that a strong regional coordination of these efforts would provide the Solent with significant cost and efficiency benefits. The introduction of additional funding and resource, through for example, the BEIS Local Energy Hubs, is likely to play a significant role in translating ambition to action. In fact, there is an opportunity to aggregate over an even wider area, such as the South West Energy Cluster.

## ECONOMIC LANDSCAPE

The Solent economy counts over 41,600 businesses, contributing to a local GVA of £29 billion. The private sector focuses around core sectors: Marine/maritime industries, petro-chemicals, advanced manufacturing, technological innovation and research, engineering, tourism and defence. The largest employment sectors are health, education and retail.

The Solent is a gateway economy of international significance, providing connectivity to global markets, for the wider UK economy. The Solent has three international gateways: the Port of Southampton, the Port of Portsmouth and Southampton International Airport. Currently, the Port of Southampton alone handles exports worth £40 billion, making it the number one port for exports, by value, in the UK.

This gateway economy is fundamentally underpinned by the Solent's unique strengths within the marine, maritime and defence cluster. The Solent's coastal location, business base and research strengths present a unique advantage, which has resulted in a marine and maritime sector which accounts for almost 20% of Solent's GVA, provides 36,000 jobs and supports more than 3,000 businesses.

The Solent region has strengths in marine manufacturing, with Portsmouth Naval Base sitting at the heart of a high-tech defence and advanced manufacturing cluster. This extends beyond marine into aerospace, including companies such as BAE Systems, GE Aviation Systems, Airbus and QinetiQ. In addition, the region is home to emerging and innovative technology sectors, such as composite manufacturing, marine autonomous systems, offshore wind and tidal energy. For example, the Isle of Wight is home to MHI Vestas Offshore Wind's wind turbine blade research and testing facility.

Research and development is world-leading within the Solent, including three universities with specialties in composites, fluid dynamics and marine autonomous systems. The University of Southampton's Marine and Maritime Institute for example, is an internationally-recognised centre of excellence in research and innovation as is their Web Science Institute. The University of Portsmouth's Institute of Marine Science is also internationally known for high quality marine research.

Additional leading blue-chip companies with sites in the region include Airbus, IBM, Land Rover, Rolls Royce, Pall Europe, City Technology and Magma Global.

## EXISTING AND EMERGING SOLENT LEP POLICIES

It is acknowledged that at the time of writing this Solent Heat and Power Strategy and Action Plan, the Solent Strategic Economic Plan (SEP) is being renewed.

The Solent LEP's vision, as outlined in the 2014 SEP, states, *"Our vision is to create an environment that will bring about sustainable economic growth and private sector investment in the Solent"*. This mission is bolstered by six strategic priorities:

- Supporting new businesses, particularly SMEs
- Enabling infrastructure improvement
- Establishing a single inward investment model
- Investing in local skills
- Developing strategic sectors and clusters, and their supply chains
- Supporting innovation

The SEP highlights opportunities in advanced engineering and manufacturing (particularly around renewables, composites and the marine/maritime industry), technological innovation and renewable energy, with the ultimate aim of the various spheres complimenting and progressing one another, dovetailing to achieve the stated mission.

In addition, BEIS produced a 'Marine and Maritime Supplement', in 2014, which sets the aim of positioning the Solent as a 'globally recognised marine and maritime centre of excellence'. It identifies leadership, developing ports, marine manufacturing, technology and innovation, skills and brand Solent as the key action areas to achieve this aim. Fully implemented, it will create 1,750 direct and 2,200 indirect jobs, whilst safeguarding up to 3,300 more.

This rolls into the targets of the SEP for 2020:

- Create an additional 15,500 new jobs in the Solent LEP area
- Achieve GVA growth of 3%, and increase GVA/capita by £3,000/head
- Increase employment rates from 78% to 80%, and economic activity rates from 80% to 81%
- Raise business birth rate from 3.6% to 4.1% and survival rate from 61.4% to 62.5%
- Increase inward investment into Solent, attracting at least 5% of FDI projects entering the UK

- Raise the proportion of population with Level 4 and above skills from 32% to 36% of the working age population

Most recently, the LEP has published the Productivity and Growth Supplement, which identifies a five point plan for growth and prosperity:

- Address deficits in infrastructure, most pronounced in transport, also in flood defence and superfast broadband, and the infrastructure required to unlock new development opportunities
- Address the serious and chronic shortage of housing in the Solent area.
- Develop the skills that our economy needs to succeed, with a continued focus on higher level skills, apprenticeships and STEM.
- Ensure that ideas and knowledge are at the forefront of our approach working with our world class universities to support our businesses to innovate and grow.
- Address the economic challenges across the Solent

Solent LEP have also responded to the Industrial Strategy Green Paper, highlighting that the Industrial Strategy needs to recognise the importance of:

- Investing in the area's economic infrastructure (digital and transport)
- Investing to support the development of skills and talent
- Supporting the growth of cities in the Solent and the coastal communities of the Isle of Wight and Gosport

The LEP has confirmed the key role played by Local Authorities and Universities in delivering an effective industrial strategy and will continue to work with these stakeholders to explore ways to build on existing expertise to support local growth.

Detail on the emerging Local Industrial Strategy for the Solent region is not yet available, although early engagement and resulting evidence is identifying a focus on the Solent maritime gateway economy and the opportunities brought about by these existing sector strengths as the core area of focus.



## FUTURE SOLENT AND THE PARTNERSHIP FOR URBAN SOUTH HAMPSHIRE (PUSH)

Low carbon opportunities are already recognised and being progressed in existing Solent strategies, and there is an opportunity to build on this existing activity.

Partnership for Urban South Hampshire (PUSH) and Future Solent, collaborated to develop a strategy for the development of a low carbon economy in the Solent area, publishing a strategy in 2015.

Future Solent have three stated priorities:

1. New low carbon and green technology
2. Resource efficiency in homes and businesses
3. Generation of secure, renewable and low carbon energy in the Solent area

The 2015 energy strategy included four objectives, each with a set of accompanying actions:

- Improving energy efficiency and conservation
  - o Review domestic energy efficiency programmes
  - o Review contribution to fuel poverty targets
  - o Scope projects that address non domestic energy efficiency
- Increasing the use of renewable energy resources
  - o Agree a renewable electricity generation target for 2020 (suggested 90MWe)
  - o Agree a renewable electricity generation target for 2030 (suggested 211MWe)
  - o Agree renewable electricity generation technology targets
  - o Bring forward a further 200MWe of capacity into investment readiness rating grades 2 or 3 by 2020
  - o Carry out detailed analysis of grid constraints and opportunities
  - o Support feasibility study development for district heating projects
  - o Improve information on feedstock supply for biomass and district heating
- Maximising the uptake of business opportunities locally

- o Review port infrastructure to establish suitability for offshore renewables
- o Develop a plan to support diversification and company development associated with support of offshore renewables
- o Develop a plan to support diversification and company development associated with support of smart energy sector opportunities
- o Develop a plan for port energy supply
- o Support the take up of local jobs in fossil fuel projects
- Ensuring focused, integrated delivery and implementation
  - o Strategy alignment within the Solent (e.g. across transport, economic development and other strategies)
  - o Establish a governance arrangement to provide a focus for implementation
  - o Pipeline management and development
  - o Learn from and promote good practice

Future Solent have faced some difficulties in bringing this strategy into action in recent years, stakeholders have commented that this was primarily due to a lack of coordinated effort between the parties and funding and financial constraints. The revived effort to facilitate greater stakeholder collaboration through the Solent LEP Heat and Power Strategy, should help overcome these barriers and lead to coordinated action across the Solent.

### Summary

There are good indications of political will, business commitment and growing momentum in the region. However, there is a risk that with a large number of documents and strategies coming from a range of regional actors, the overall picture and direction could become fragmented. Through this Strategy and Action Plan there is an opportunity to bring these plans and reports into one cohesive, regional vision and action plan that can feed into the regional and national frameworks.

## 5. SOLENT ANALYSIS

### Baseline Assessment

The baseline summary and analysis aims to give a brief oversight of the demographics, economy and energy landscape of the Solent region. Through assessing the historical trends in energy and carbon emissions data, projections through to 2050 have been developed.

### THE SOLENT REGION

The Solent has a population of 1.3m residents. The population of the region has increased year on year since 1982, and is expected to grow by an additional 110,000 up to 2036, i.e. 0.5% per annum.

The latest available GVA figures for the region stand at £29bn. The Local Authority areas of Southampton (20.3%) and Portsmouth (18.7%) contribute the greatest to the region's GVA. The portion of GVA generated by each sector aligns very closely with national averages.

The largest sectors by GVA are: distribution; transport; accommodation and food (12.8%) and, public administration; education; health (27%). Solent's productivity growth to 2036 is expected to be in line with that of the UK (2.1% growth per annum to 2036 for the UK as a whole, 2.0% for the Solent region).

### ENVIRONMENTAL SENSITIVITY

The environmental sensitivity of the Solent region has been considered throughout this strategy, taking into account how factors such as climate change and resource availability may influence future energy generation and consumption across the region.

Coastal regions such as the Solent are vulnerable to a wide range of impacts associated with climate change, including rising sea levels and enhanced storm activity. In addition to this, there are a number of Sites of Specific Scientific Interest (SSSI) and Special Protection Areas (SPAs) located across the region, which will determine the levels of infrastructure that can be developed in and around specific sites. The timing of delivering projects around both SSSI and SPAs will need to be taken into consideration and will require prior consent from local organisations such as the

Environment Agency. Consultations of this nature will help to improve the long-term feasibility of stated projects, avoiding any costly interventions in the future.

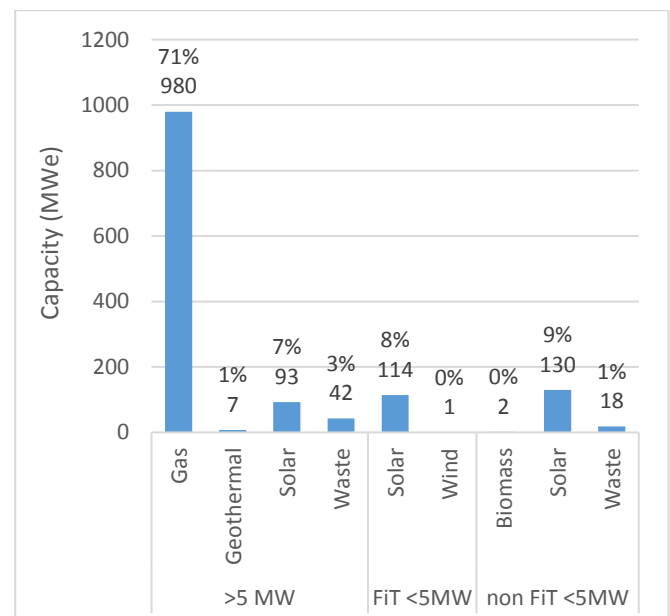
### ENERGY

#### Generation

In 2015, the Solent generated 5.2TWh of electrical energy, of which 11% came from renewable sources. There are 13 sites with electrical generation capacity greater than 5MW in the Solent. These are highlighted in Figure 1 with details of each power station provided in Table 1. Of the generation with capacity less than 5MW, there are 21,675 electricity generation sites registered on the Feed in Tariffs (FiTs) register (99.9% of which are solar PV sites), this shows a significant number of sites taking advantage of this scheme. There however, is still a significant amount of small scale electrical generation not benefitting from the feed in tariff scheme.

The total electrical capacity installed within the region broken down by source and general size bracket can be visualised graphically in Figure 1.

Figure 1 Breakdown of electrical capacity by source



Details regarding the generation of heat by renewable means can be found on the Renewable Heat Incentive (RHI) register. Across the region there are 1,216 sites generating heat (i.e. not electricity) from renewable

low carbon energy sources, with non-domestic installations generating 45.1MW of thermal energy.

Figure 2 Type and location of electricity generation sites of a greater than 5MW capacity.



Table 1 Details of electricity generation sites of a capacity greater than 5MW

Site	Name	Type	Capacity (MWe)	Location	Operator	Opened
A	Cowes	Gas OCGT <sup>3</sup>	140	Isle of Wight	RWE	1982
B	Marchwood B	Gas CCGT	840	New Forest	SSE	2009
C	Fawley	Waste to Energy	8.6	New Forest	Willacy Guinard Holdings Ltd	2001
D	The Heat Station	Geothermal CHP	7.1	Southampton	Engie	2004
E	Orta Field House	Solar PV	5.2	Winchester	Orta Solar	2015
F	Chalcroft	Solar PV	5.9	Southampton	Octopus Investments	2013
G	Raglington Farm	Solar PV	5.7	Southampton	Raglington Farm Solar Park Ltd	2013
H	Fairlee	Solar PV	6.5	Isle of Wight	IOW Sola rLtd	2015
I	Fareham	Solar PV	17.8	Fareham	Sunsave10	2014

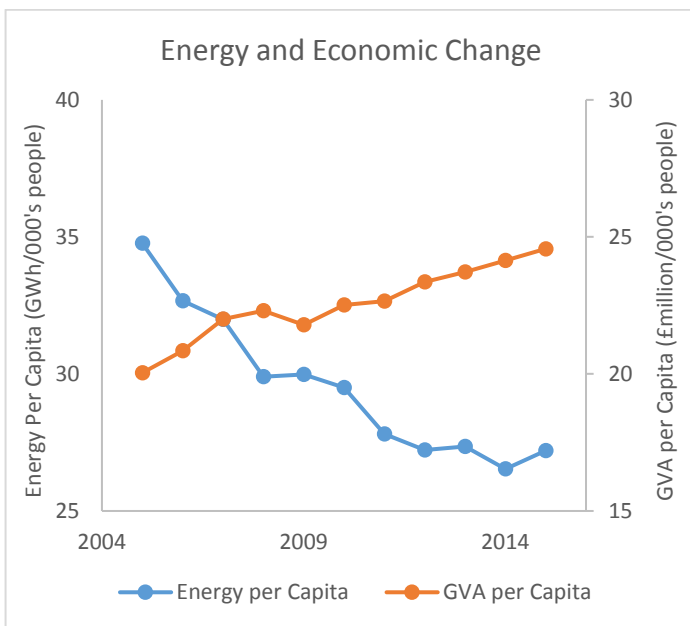
<sup>3</sup> Open-cycle gas turbine (OCGT) and combined-cycle gas turbine (CCGT)

J	Southwick	Solar PV	40.0	Fareham	Welbourne Energy LLP	2015
K	Marchwood PS	Waste to Energy	16.9	New Forest	Veolia	2004
L	Portsmouth Incinerator	Waste to Energy	16.9	Portsmouth	Veolia	2005
M	Netley Landfill	Solar PV	12	Eastleigh	REG Netley Solar Ltd	2016

### Consumption

The Solent region consumed a total of 43.3TWh of energy in 2015, a decrease of 8.5TWh since 2005. This change in trend points to greater levels of efficiency in energy management and consumption in the region. There is a substantial body of academic research that evidences the strong bi-directional causation between energy consumption and economic growth<sup>4</sup>, with consumption increasing as the economy grows and vice versa. In the Solent, energy consumption has continued to decrease despite increasing GVA and population, showing either greater efficiency in the use of energy or the presence of less energy intensive industries within the region (Figure 3). Once all energy efficiencies are captured, the long-term trend between energy consumption and economic growth is likely to re-establish at a new equilibrium point.

Figure 3 Decoupling of economic growth and energy consumption



A breakdown of energy consumption by fuel highlights the effect of the Esso Fawley Oil Refinery on the region, see Figure 5. The refinery consumes approximately 24% of the region's energy (10.5 TWh). The energy consumed by Fawley is categorised as Petroleum Products.

Figure 5 Breakdown of energy consumption by fuel

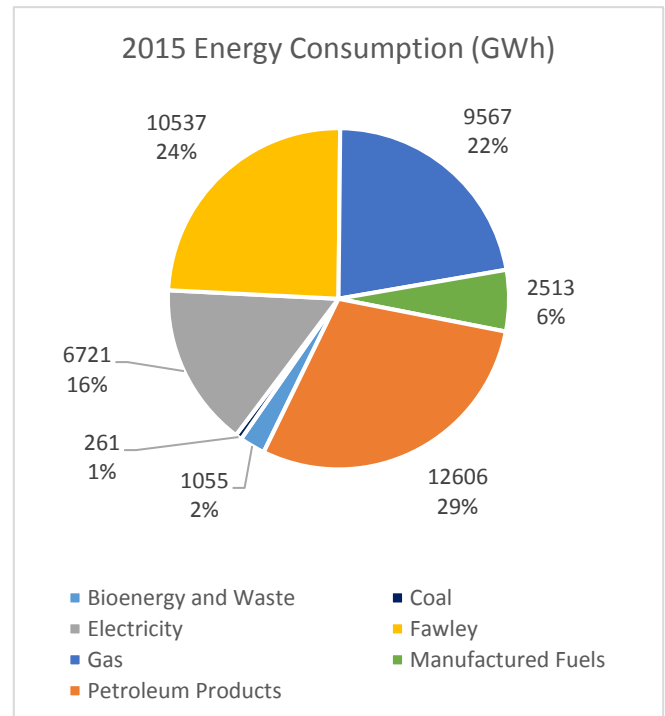
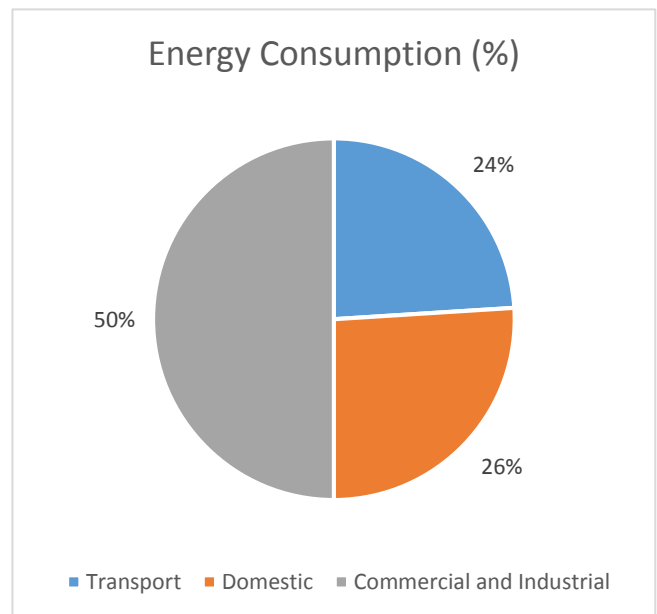


Figure 4 Breakdown of energy consumption by sector



Approximately 24% of energy is consumed by the transport sector, 26% by the domestic sector and the rest by commercial and industry sector (Figure 4).

<sup>4</sup> See for example Yang, H-Y (2000) 'A note on the causal relationship between energy and GDP in Taiwan' Energy Economics 22 309-317

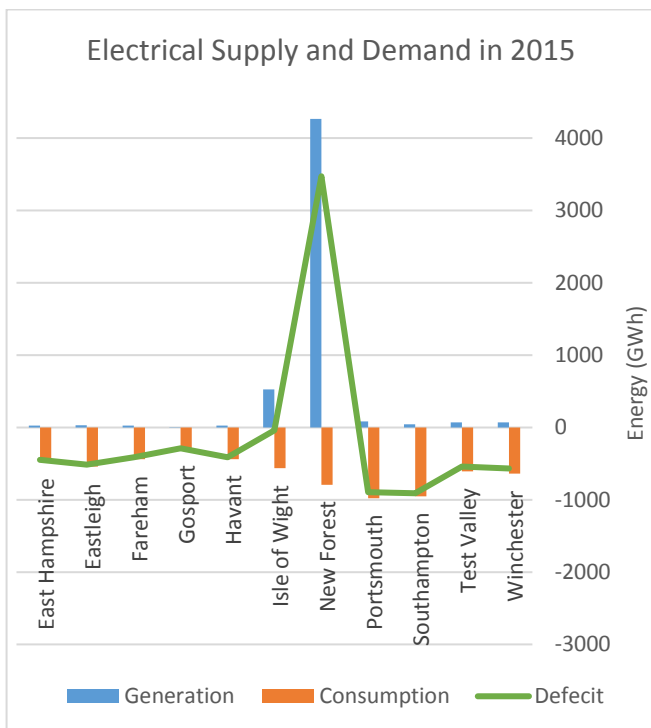
### Electrical Supply and Demand

There is an energy deficit between the amount of electrical energy generated and consumed within the region. The total electrical energy deficit was 1.3TWh in 2015 (Figure 6).

The New Forest local authority has a large energy surplus due to the presence of Marchwood B CCGT<sup>5</sup>. Due to its current levels of electricity generation, the Isle of Wight is near to a net zero deficit<sup>6</sup>. Any surplus or deficit can be exported/imported through HVDC<sup>7</sup> interconnectors to the mainland. However, these interconnectors are reaching maximum capacity.

The region as a whole, however, is reliant on imported electricity from elsewhere. With a limited number of new energy generation installations forecast and increasingly challenges of grid constraints, the Solent region could face issues of security of supply in future.

Figure 6 Electrical energy deficit/ surplus by local authority

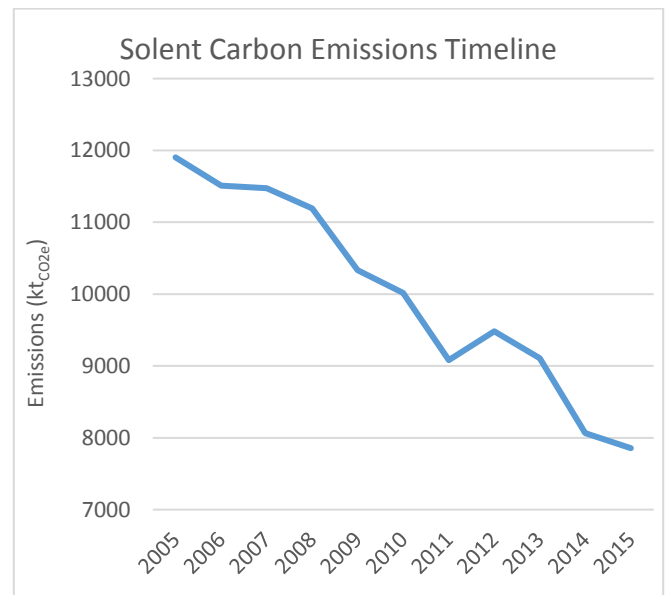


### EMISSIONS

Carbon emissions within the region decreased by 34% from 2005 to a 2015 value of 7,855 ktCO<sub>2</sub>. This decrease has been demonstrated across all local authorities and industrial sectors (Figure 7). Emissions from the industrial and commercial sector fell by 51.5%, by 32% in the domestic sector, and 9% in the transport sector.

The Solent grid has become 'greener', resulting in a shrinking carbon footprint from sectors relating to electricity consumption. Emissions from electricity use have almost halved in the 10 years to 2015. The closure of the Fawley power station had the greatest impact on emissions with a sustained drop of 700ktCO<sub>2</sub> seen after closure<sup>8</sup>. More data about the refinery can be found in the appendices.

Figure 7 Timeline of carbon emissions emitted in the Solent region excluding Fawley Power Station



There is an even split between the carbon emissions produced by each energy user category. At 39%, transport has the largest emissions contribution (see Figure 8). Due to the availability/attribution of emissions data, Fawley Refinery's emissions are not covered in this analysis.

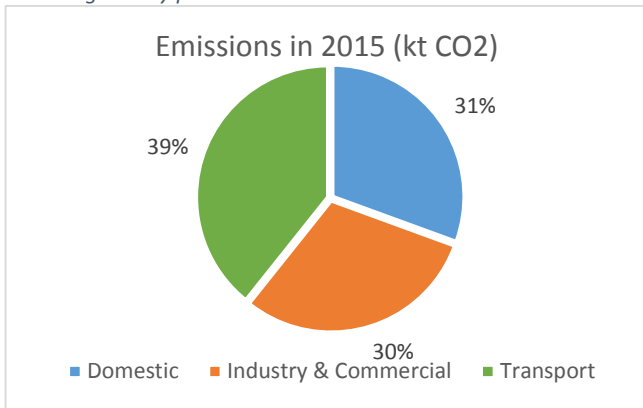
<sup>5</sup> Combined-cycle gas turbine (CCGT)

<sup>6</sup> An 8% difference between energy consumption and generation

<sup>7</sup> High voltage direct current

<sup>8</sup> Although technically out of the study area, Fawley power station is included in the data due to its impact on the Solent area

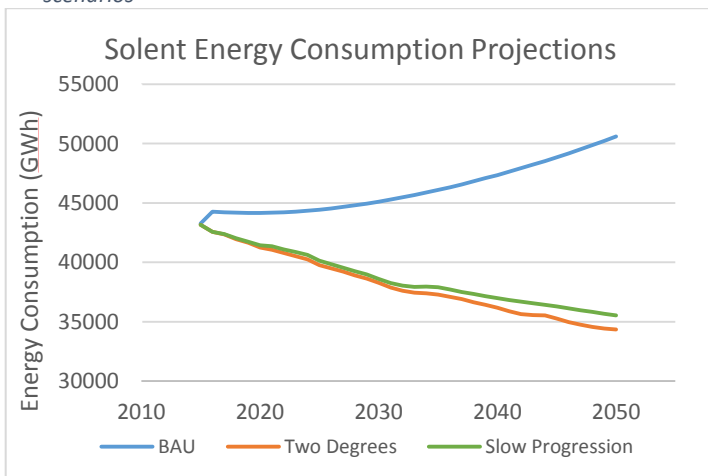
Figure 8 Sectoral emissions data for 2015 for the Solent region, excluding Fawley power station



## PROJECTIONS

Energy consumption projections up to 2050 has been developed based on National Grid's future energy scenarios, as well as a simple business as usual case. Details of each scenario and modelling assumptions may be found in the appendices. The business as usual scenario predicts 17% growth in energy consumption fuelled mainly by commercial and industry growth. Domestic energy use decreases. The 'slow progression' and 'two degrees' scenarios result in 17% and 20% decreases respectively. These two scenarios assume decreases in consumption across all sectors. However, a greater shift towards electrification is predicted within the 'two degrees' forecast with the resultant efficiency benefits seen as decreased consumption.

Figure 9 Energy consumption forecast to 2050 based on different scenarios



## Summary of Research Findings

This summary provides a picture of the Solent energy economy from today through to 2050, aligned to the six priority areas identified for the strategic vision.

The evidence upon which this summary is based is varied and includes:

- interactive consultation workshops attended by a large, cross-sector group of regional stakeholders
- 10 stakeholder interviews
- An in-depth literature review of local plans and strategies.

### *Unlock growth in our marine, maritime and defence cluster*

The Solent's marine, maritime and defence cluster is internationally renowned. It contains the largest car exporting port in the UK, as well as the Royal Navy's strategic base. The LEP has already directed existing funding streams to support innovation projects, opening up opportunities to position the cluster as a leader in new cutting-edge fields and technologies, such as composite materials, alternative fuels and satellite communications.

One point which came out clearly during workshop roundtable discussion, was the need to ensure clean and green energy supplies to Solent's ports. If done well this could reduce port operating costs and make its ports more attractive as business location.

The redevelopment of waterfront brownfield sites such as Marchwood Military Port and Itchen Riverside Area is a particular opportunity for the Solent, providing the potential to introduce new, innovative energy efficiency and energy supply measures at these sites. Further opportunities have been identified across the region at Trafalgar Wharf, Portsdown Hill and Hythe Marine Park. Sites in Southampton including Meridian Wharf, Drivers/Princes Wharf, Northam, Aggregate Wharves, American Wharf, Chapel Riverside, Willmets Marine and Business Park and Centenary Quay offer approximately 97,000 sq metres of new and expanded industrial and warehousing space. The Solent Waterfront Sites (2015) publication lists and categorises all waterfront employment sites in the Solent.

These waterfront sites could be developed into modern, efficient economic sites, utilising integrated renewables or heat networks, which provide the energy infrastructure to power economic growth and job creation in a key sector, whilst simultaneously locking in clean energy generation.

The redevelopment of Gosport waterfront (including MoD / MoJ sites divestment) and potential expansion of Southampton Port at Dibden Bay also presents opportunities for energy demands to be considered during planning, delivering secure, affordable energy to support economic activity.

Another option could be to develop a Marine Enterprise Hub at one or more of the sites. These could be used to connect existing university expertise and technology companies to incubate innovative technologies and support the growth of start-ups. Such hubs could also provide an opportunity for shared infrastructure such as hoist docks. In addition, there is potential to encourage the inclusion of high levels of energy efficiency, on-site generation or connection to a heat network at the design stage.

To maximise these opportunities Solent LEP may be able to play a leadership role – maximising the cluster's visibility (including to international investors), giving it overarching strategic direction, supply chain collaboration, lobbying to make its voice heard in central government and undertaking or supporting innovative projects.

Solent LEP should play to its competitive advantages. The deep water of the Solent allows the world's largest ships to dock providing significant opportunity for trade and attracting world-leading maritime businesses and expertise to the region. The existing supply chain could provide products and services to support the development and deployment of marine-based energy technologies. This is particularly relevant for wind and tidal energy development in the Channel, such as the Rampion wind farm, as there is a considerable need for local bases to house access/service vessels, provision of port facilities, marine engineering services, shipping, storage and manufacturing.

The Solent also has a competitive advantage through its cutting-edge expertise in improving maritime fuel efficiency, and there is an increased focus on associated areas such as fluid dynamics, hull and propeller design, and alternative fuels, such as LNG.

The Southampton Marine and Maritime Institute has been selected to conduct five projects per year to examine vessel efficiency, novel lightweight design, marine autonomous systems and improved manufacturing efficiency. With marine diesel costs spiralling, this efficiency-led expertise is key to improving the energy efficiency and reducing costs for shipping, and thus likely to capture a considerable market. As such, there was a recognition from workshop participants that dual gas ships (oil and LNG) and autonomous vessels/cargo unloading are key opportunities, on the cusp of entering the mainstream, which the Solent should grasp. Smart port technology is beginning to take hold and more is on the horizon.

Whilst there are already examples of shore power capabilities within the region at the Portsmouth Naval Base, there remain some challenges. In particular, it was identified that a majority of vessels entering Southampton lack shore plug-in capability, also the cost of grid connection is prohibitive. Opportunities exist to explore the potential for CHP technology, which can benefit from a range of incentives. There has been a recent trend toward LNG propulsion and roof-mounted solar PV on ships, which could offer an alternative.

The ABP Southampton Air Quality Strategy identifies key action points in relation to exploring the installation of an LNG filling station for heavy vehicles, as well as the opportunity to provide shore power to cruise vessels in the 2020s. This will be conditional on understanding the benefits of shore power for cruise vessels.

The arrival of the first of two new aircraft carriers in Portsmouth has also been identified as key to the interplay between maritime and energy developments. Portsmouth Naval Base has an existing shore power system, and are installing new CHP capacity to meet the additional demand of the carriers (10MW each).



*“Our overall priorities are to reduce consumption. We would also like to increase collaboration – there are many people in a similar position that as a single entity struggle to justify investment. If we work together there will be benefits to investment.” Maritime business*

Workshop discussions highlighted that direct grid shore power would have been challenging for the Naval Base, as grid reinforcement would have been required to support the additional load and avoid potential intermittency. Waste heat from the naval base itself also has potential utility as a resource, and BAE Systems are currently investigating whether this waste heat could be exported into a heat network, or recovered for use on site. This potential is also being explored at the Esso Fawley Oil Refinery, where waste heat from the refining process could be captured and utilised for local waterfront developments.

*“There is a big opportunity for heat recovery, using heat to pre-heat other processes on site, we’re also exploring opportunities for heat export into local heat networks” Oil refinery*

**Case study 1 - Green Port Hull:** The £25.7m Green Port Hull initiative is currently funded by the RGF Round 2 funded Green Port Growth Programme, and acts as a key enabler to establishing Hull and the Humber Energy Estuary as a world class centre for renewable energy. The initiative supports the local renewables sector supply chain, encourages investment in renewables, and provides local residents with the skills and training needed to access the opportunities on offer. Significant private sector investment has been captured, particularly £310m by Siemens to develop the Siemens Gamesa wind turbine blade manufacturing plant in the region. Regional supply chain participants including Towne, MMS, Layton Marine, Jenkins & Davies have all won contracts from Siemens Gamesa. This Investment has recently be complemented in additional investments by £12m to fund the Project Aura Innovation Centre that seeks to be a world leading, multi-disciplinary offshore wind innovation hub.

**Case study 2 – Port of Rotterdam:** With ~90,000 people employed by the industries operating within the Port of Rotterdam, it is Europe’s largest seaport. The port has ambitious emissions reduction target of 50% by 2025 and 60% by 2030, compared to a 1990 baseline. The Port of Rotterdam uses industrial ecology to increase its attractiveness in comparison to competitors. To encourage green shipping & logistics, the Port offers a Green Award incentive. This provides a discount of 6-30% on seaport dues for vessels that have made efforts to improve environmental performance, safety and quality on-board. The Green Award scheme is international and accreditations are carried out by an independent body. No other UK ports operate this incentive, so this represents an opportunity for the Solent Ports to set themselves apart in terms of UK competition.

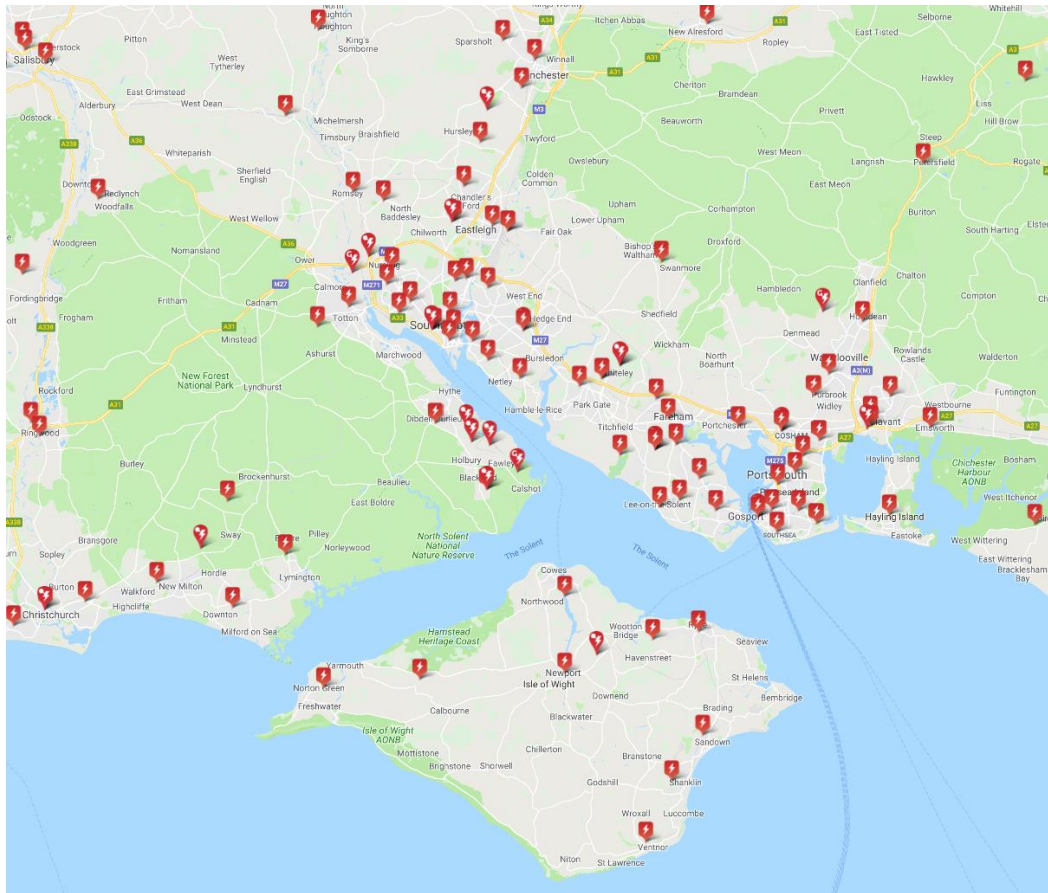
Further potential opportunities to decarbonise currently being investigated by the Port include: renewable energy, CCS, connecting steam reforming facilities to CCS, water electrolysis in hydrogen generation, energy storage, biomass- and waste-fired thermal power stations, geothermal and heat grids.

**Case study 3 – Port of Antwerp:** The Port has a forward-looking approach to integrating sustainability into its ongoing strategy. At present, it is implementing three key projects to promote environmental sustainability in the region:

- the launch of a Sustainability Award to recognise sustainable initiatives implemented by private companies located at the Port;
- a feasibility study for a power-to-methanol plant to be produced from captured CO<sub>2</sub> and hydrogen; and
- the creation of the Alternative Energy Hub, a joint initiative led by the Port of Antwerp and ENGIE, to include a shore-to-ship bunkering station, a LNG and CNG filling station and a fast charging system for electric vehicles.

Embrace the energy system revolution

Figure 10 Grid constraints map for Solent sub-region



Available from: [www.ssepd.co.uk/GenerationAvailabilityMap](http://www.ssepd.co.uk/GenerationAvailabilityMap)

The Solent suffers from grid constraints, which can be particularly strained in urban areas. Grid constraints can result in prohibitive grid connection costs for large energy consumers and producers of electricity: less capacity results in higher competition for the remaining connections ‘spots’, and Distribution Network Operators (DNOs) may start charging consumers for grid reinforcement works through higher connection costs.

However, there may be potential in the Solent to turn this barrier into an opportunity. Grid constraints may make smart technology a viable, cost-effective option, when compared to the alternative cost of grid reinforcement.

The economic impact of smart technology extends significantly further than simply alleviating grid constraints with associated cost benefit, or cost-saving through more efficient energy use. In deploying smart technology, jobs will be created in research, installation, operation, and maintenance - developing a specialised workforce and positioning the Solent at the centre of a cutting-edge emerging sector.

The Isle of Wight has already been earmarked by the Isle of Wight Council and developers including Silver Spring Networks and Vodafone as a potential testing ground for rolling out smart technology such as energy storage, active network management, demand side response, and smart meters.<sup>9</sup>

<sup>9</sup> Solar Power Portal (2017), ‘Isle of Wight generators slam years of under investment as curtailment nears’. Available from: [https://www.solarpowerportal.co.uk/news/isle\\_of\\_wight\\_generators\\_slam\\_years\\_of\\_under\\_investment\\_as\\_curtailment\\_loom](https://www.solarpowerportal.co.uk/news/isle_of_wight_generators_slam_years_of_under_investment_as_curtailment_loom)  
Isle of Wight Council (2008), Eco Island – The Isle of Wight’s sustainable community strategy 2008-2020. Available from:

<https://www.iwight.com/azservices/documents/2782-D1-Eco-Island-Sustainable-Community-Strategy-2008-20.pdf>

Andrew Turner MP (2011), Eco-Island Strategy. Available from: [https://hansard.parliament.uk/Commons/2011-03-08/debates/1103085200003/Eco-IslandStrategy\(IsleOfWight\)](https://hansard.parliament.uk/Commons/2011-03-08/debates/1103085200003/Eco-IslandStrategy(IsleOfWight))

**Case study 4 – Isles of Scilly:** The ‘Smart Energy Islands’ project is a multi-million pound EU funded project led by Hitachi Europe. It will use the Isles of Scilly as a test-bed, providing it with a new smart energy system, using new software platforms to manage supply and demand through renewables, energy storage, and electric vehicles. Around £8.6m has been secured from the EU’s Regional Development Fund, which will be added to over £1.4m from Hitachi and £754k from the local council and project partners, Moixa and PassivSystems. The project feeds into the Isle of Scilly council’s plans to change rapidly its energy system, currently served by one undersea cable from the mainland and an ageing power station.

**Case study 5 – Orkney Islands:** Once almost completely powered by a centralised, expensive, and polluting diesel power station, the island now boasts over 700 interconnected energy generators. In 2014, Orkney produced 104% of its electricity needs. It now has more grid connected ocean energy devices than anywhere in the world, and more domestic wind turbines (500) than any other county in the UK. Due to capacity constraints on both Orkney’s grid and the connection to the mainland, the island employs an Active Network Management approach to control supply-vs-demand. Since 2013 Orkney has been home to a 2MW battery, however, more recently the island has been looking at new ways to use excess power, rather than store or export it. This has included encouraging EV use, water-source heat pumps using seawater and heating greenhouses.

The Isle of Wight has at least ten points of acute grid constraint, and has seen unprecedented curtailments during grid improvement work. Grid constraints on the island could be partially relieved by a new subsea interconnector cable, however more work needs to be done on the island itself concerning flexibility to reduce constraints. The deployment of storage facilities could help manage available resources more flexibility, and so would getting people to shift patterns of demand from day to night times for instance.

The Isle of Wight could be used as a standalone, living demonstrator of the benefits and drawbacks of smart grid technology. Learnings could then be transferred to the wider Solent region.

*“The DNO is historically the quiet partner in the energy industry but this is liable to change. We’re facing challenges associated with the growth of distributed generation. We need to manage the transition from a network operator to a system operator, becoming a neutral market facilitator which allows the growth of local electricity production markets” DNO*

The Solent is already well-placed to develop smart technology through its web science and digital research pedigree. Southampton University currently has a strong research offering, focusing on the applications of big data and the Semantic Web. Its Web Science Institute brings together world-leading experts and has helped feed a digital cluster, which now contains sub-groups such as GreenTech South, and high-profile companies such as IBM. The considerable skills and research base in the Solent could assist in effectively and rapidly scaling-up and deploying smart measures, and if captured, this could represent a significant economic opportunity.

Poor regional broadband infrastructure is a key barrier and limitation to the Solent’s economic and societal growth. Smart technologies rely on an internet connection to transmit and receive data. Improvements to broadband infrastructure are an essential pre-cursor to deploying smart technology across the region. Broadband rollout is already a key priority for the LEP.

Effective broadband infrastructure improvements, if combined with smart energy technologies, enable real-time adjustments in grid usage. In the US, demand-side management has been shown capable of delivering a 90% reduction in peak time electricity price.

Increased broadband speed and bandwidth boost business productivity and efficient use of resources. Broadband improvements enable employees to hold videoconferences rather than travel to client sites, or work from home, both of which have the potential to reduce business operating costs whilst also reducing peak time road congestion.

*Deliver affordable, clean heat and power*

The majority of the opportunities in the Solent to deliver affordable, clean heat and power are for smaller-scale, decentralised generation. More work needs to be done to identify a pipeline of large, multi-megawatt heat and power generation opportunities.

*“We need to assess what sort of local generation base might be established across our local area and equip the city with a number of good generation projects”  
Local MP*

The Solent region has increasing strain on its electricity grid. Levels of regional electricity demand currently exceed regional generation within the Solent. The region predominantly relies on imported energy and some of the region's power stations are old such as Cowes on the Isle of Wight, which is 35 years old.

New housing and new port activity (e.g. new carriers as high-load customers joining the grid) will place additional strain on the grid. To benefit from the economic growth that new housing and port activity could deliver new sources of energy generation are required.

Increased energy efficiency is likely partially to reduce grid strains. The Solent should look to deploy new, low carbon and decentralised generation to support the region's economic growth whilst taking more control of its electricity supply.

A number of opportunities are presented below.

Local planning is a key lever to drive clean heat and power resilient to the rising costs of fossil fuels. Through planning, local authorities can encourage the uptake of integrated EV charging, on-site renewables or district heat network connection at the planning stage of developments. Several councils across the Solent have already introduced policies stipulating developers look at on-site renewables for sites over a certain size. However, the LEP could go further in utilising its brokering role to bring together the relevant parties from the private and public sector to assess these options at the earliest stage possible.

Workshop discussions on this subject raised a consensus that developers should be required to incorporate measures such as connection to a heat network, as implementation doesn't otherwise occur.

The potential for further solar PV generation in the Solent sub-region is significant. The area has among the highest solar gain of anywhere in the UK, and has already seen a significant number of projects delivered<sup>10</sup>. These have included several community project schemes, such as West Solent Solar, as well as local authority-led projects, which have become increasingly frequent as councils have found a model of financing and delivery that works.

Alongside Community Energy Companies, there has been a recent trend towards Purchase Power Agreements (PPAs). These have proven highly effective for solar projects. Testament to the growth of skills and confidence in this area are the decisions of Portsmouth and Southampton City Councils to create energy companies dedicated to offering affordable energy to consumers.

The use of brownfield or 'poor' land unfit for agriculture offers potential for Solar PV installations. A Renewable Energy Potential Assessment in the New Forest District shows that across the region, if just 2% of all 'poor' land is used, 19MW could be installed, supplying electricity for 4100 homes.

The Solent also has a considerable biomass resource as well as a well-developed supply chain. Several biomass plants have been proposed along the Fawley corridor between the New Forest National Park and Southampton water, although the air quality impacts of this technology in urban areas should be considered. The proximity to the old Fawley power plant and existing Esso Fawley refinery will reduce grid connection costs and other planning restrictions, easing the development process.

Onshore wind generation is currently constrained in the region, largely due to current government policy not supporting new onshore wind generation outside of Scotland.

<sup>10</sup> Data available from: <https://solargis.com/maps-and-gis-data/download/united-kingdom/>, <https://blog.theecoexperts.co.uk/solar-installations-map>

*Accelerate the shift to low carbon transport*

The proposed Navitus Bay offshore wind farm, which was to be located approximately 10km south of Dorset and the Isle of Wight and had the potential to generate 970 MW of wind power, was refused planning permission in September 2015, due to the perceived visual impact. Despite this, the region holds significant expertise in wind energy, through the presence of MHI Vestas Offshore Wind. This represents an economic opportunity, particularly for offshore wind. Yet this is likely to be limited by the amount of local deployment of offshore wind that can be expected, as the offshore wind manufacturing and construction industry need to locate themselves close to where deployment is happening as this is more cost-effective.

The Isle of Wight is a location of particular opportunity, reflected in the Council's aim to deliver 100% self-sufficiency through renewable energy at affordable prices for consumers. The current target is 100MW of installed renewable capacity on-shore, through a combination of wind, waste, PV and biomass, with added potential for deep geothermal energy supplying a district heat scheme similar to that which already exists in Southampton.

Tidal energy around the island has huge potential, with tidal flows in the Solent and around the island that can exceed 2m/s. Consequently, planning permission has been granted to install up to 60 sea bed turbines off St Catherine's Point, generating an initial 30MW, with a potential scope of up to 200-300MW. As a pioneering project, it is hoped that this demonstration of the generation at commercial scale could reduce the strike-price from £300/MWh to £100/MWh or lower, and have international applicability in terms of export. With sustained high strike prices tidal does not become competitive with other technologies such as wind for instance. Additionally, with high CAPEX costs that are mainly reliant on private investment, there is a need for government and policy support to anchor projects and give assurance/confidence to investors, enabling the tidal opportunity.

Poor infrastructure is a key challenge to developing low carbon transport networks in the Solent. This includes East-West rail connections, as well as the connectivity from the North of the Solent region into London.

Without a strong foundation to improve and build on, low carbon transport development can become extremely expensive. Rather than becoming 'bolt-on' improvements, these represent a total redevelopment from ground-up to ensure the infrastructure can handle modern technology.

Emblematic of this new-build expense is the cost of the proposed Solent Metro, which stakeholders felt faces a significant barrier in cost-effectiveness. Improving existing infrastructure should therefore be very high up on the agenda. However, minor improvements can have their limitations. Stakeholders noted that although smart motorways are part of the solution, they will not solve the problem. Instead, action needs to be taken on a number of fronts.

Poor air quality in Southampton, as well as other urban pockets throughout the region, is a key enabler for the rational for using low carbon transport. Addressing commuter, commercial and freight traffic is crucial to improving air quality.

Delivery vehicles are ubiquitous in cities worldwide, particularly with the advent of online delivery services. This is a crucial area of transport that needs to decarbonise, alongside the more traditional delivery vans for shops and works vehicles that are almost exclusively diesel engines and often guilty of extended periods of 'idling'.

The large amount of freight that passes through the Solent is also important to transport decarbonisation, and the transferral of an increasing amount of freight onto cleaner modes, such as rail, will help in the effort. Southampton Port for instance aspires by 2030 to move 40% of container traffic by rail, and have been planning the expansion of the port-rail links to push forward this shift to rail freight.

Better integration between the different existing forms of transport within the region should maximise their effectiveness. There is also a need for continued modal shift, reducing the number of car journeys by transferring drivers onto efficient bus routes, bikes and new programmes such as the Bus Rapid Transit (BRT) route. The Department for Transport and Solent Transport have invested into mode shift (particularly walking and cycling) through the Local Sustainability Transport Fund and Better Bus Area Fund, totalling over £50m. However, the impact of this significant investment is unclear and, likely, marginal.

Further potential lies in voluntary partnerships between businesses, which have been used to great effect in creating efficiencies through optimising bus networks. In Oxford for example, regular complaints from residents regarding a perceived excess of buses in the city centre led to operators running a coordinated service to minimise overlap and prevent reputational damages. This is emblematic of businesses' increasingly sophisticated understanding of sustainability as crucial to future economic success.

The proposed BRT in the Solent is set to build on the success of the Gosport-Fareham BRT corridor, which has an estimated sixteen times more users than the regular bus route it replaced. Reducing A27 congestion whilst also improving sustainability. The new route has been assessed as cost-effective and is set to receive further funding to begin further development. Moreover, in Southampton, there has long been aspiration for the development of a Park and Ride scheme.

However, undoubtedly a national issue, the rolling out of standardised EV charging infrastructure is essential for the Solent. The LEP could add their voice to calls for central government to create a standardised framework for the country, creating a joined-up network with as little overlap as possible. Additionally, with car clubs already set up for Winchester, Southampton and Isle of Wight, there is the foundation (and demand) for the creation of EV car clubs.

One particularly challenging area of EV infrastructure is in addressing capacity for big energy users, for example, bin lorries, which need a significant charging infrastructure to support them. Alternative low carbon fuels or hydrogen fuel cells provide a possible alternative for the larger vehicle fleet. Densely populated areas such as Portsmouth face challenges associated with EV charging. As much of the housing is terraced with no driveways, this presents a difficulty for domestic EV charging. In a modest, but positive attempt to address this, Portsmouth City Council is rolling out a number of street charging points. Careful management of disruption during construction periods should be considered to retain public support.

*“Technology is moving so fast, we should focus on the transition to electric vehicles, because the market is very close to being at the point it can be pushed to accelerate. Electric vehicles enable people to think about energy differently” Local business*

#### *Improve our homes*

The South East and Solent are predicted to have amongst the highest rising prices in the UK and high demand for housing.<sup>11</sup> The challenge facing local authorities is how to deliver part of this housing growth sustainably whilst simultaneously improving the efficiency of the existing housing stock, which is amongst the least efficient in Europe.

A large number of the Solent's buildings date from the 20th and late 19th centuries, making it is harder to install efficiency measures due, in particular, to the need for more expensive solid wall insulation compared to insulating modern cavity wall houses. However, given the densely populated nature of some parts of the region (e.g. Portsmouth), economies of scale can be captured by retrofitting urban areas street-by-street which can help reduce the cost of external wall insulation and reduce issues associated with thermal bridging from poor installations.

<sup>11</sup> Partnership for Urban South Hampshire (2016), PUSH Spatial Position Statement. Available from: <https://www.push.gov.uk/wp-content/uploads/2018/05/PUSH-Spatial-Position-Statement-2016.pdf>

IPPR (2014), UK spending on housing benefit: problems, causes, solutions. Available from: <https://www.slideshare.net/ippr/142016-b2-bslideshare>

Some retrofit programmes have been rolled-out across the region. For example, the East Hampshire District Council scheme identified and installed retrofit measure in over 600 homes, and had to close the scheme due to overwhelming demand and a lack of funding. The Cosy Havant programme aims to have improved efficiency through over 300 measures by 2020, working towards a 10% reduction in fuel poor homes. Additional funding is now needed to deploy the observed learnings from these schemes to extend further impact.

A radical retrofit method ‘Energiesprong’ is being trialled in Nottingham and has shown to be very effective and cheaper than conventional techniques. Another potentially simple measure could be to install LED lighting in housing stock on a mass scale. Lighting accounts for approximately 12% of a household’s electricity use, however LEDs consume 20% of the energy of compact fluorescent lamp. Lastly, not to overlook rural areas of the region where there are a number of ‘off gas grid properties’, particularly the Isle of Wight (40%) and Hayling (13%) where, for example, these could be converted from electric or oil heating to heat pumps or biomass boilers.

Many local authorities in the Solent have already put in place ambitious planning requirements for new build, embedding Passivhaus principles, and measuring against the former Code for Sustainable Homes – going beyond the UK government’s current Part L Building Regulations. Across all local authorities, the minimum stipulation was that residential development proposals larger than 100 homes will be judged against the Home Quality Mark or BREEAM Communities scheme. For example, developments over 250 units or 18,000m<sup>2</sup> will be required to install a community district heating system using low carbon heat sources. Local Planning Authorities (LPAs) are also introducing sustainability checklists into planning documentation, including: utilising decentralised, renewable or low carbon energy, re-using/recycling building materials, and addressing waste during construction. In order to maximise the impact of these measures, developers should potentially be made to install broadband/wireless remote sensors facilitating the council or approved organisation to monitor the

energy performance of the development through a Building Management System.

As an area of ‘water stress’ there is also a particular emphasis on water efficiency across the Solent region. This is strengthened by the European nature conservation status of the River Itchen for instance. Consequently, developments must include a sustainable drainage system to mitigate against flood risk and maximise efficiency.

Beyond retrofitting, new council stock also represents a huge potential resource, offering thousands of roofs for Solar PV generation. The East Hampshire District Council has already begun capitalising on this through their ‘urban solar farm’ scheme, which focuses on installing roof-mounted solar PV during construction to save on scaffolding costs, utilising a scalable model that caters for all building types.

The housing retrofit market faces an unstable policy environment, with programmes such as the previous CERT/CESP and more recent ECO programme influencing a ‘boom and bust’ sector which cannot easily retain skills and knowledge. Stakeholders have labelled the Energy Company Obligation 1 (ECO 1) scheme as poor and inconsistent. With the introduction of ECO 2, there was a broad consensus that schemes are needed for domestic refurbishment, with grants for energy efficiency extended to all residents (not only those in fuel poverty). Furthermore, challenges were identified in engaging the population to stimulate action on insulation, and local authorities being able to assess post-construction quality. The history of poor installations of energy efficiency measures has created a lack of trust.

Additional national policy barriers revolve around the removal of the Code for Sustainable Homes and the amendments to the Planning and Energy Act (2008) brought about by the Deregulation Act (2015), which removed the ability of LPAs to set energy efficiency standards for dwellings that exceed building regulations. However, given that this strategy has an outlook to 2050, it is reasonable to expect that additional powers will be introduced in future.

Establishing effective partnerships between local councils, housing providers, utility companies and

local energy advice charities offers an opportunity to overcome this challenge and introduce stability by taking an area-wide aggregated approach to housing retrofit, accessing new sources of finance (e.g. match funding, lottery funding), providing behavioural advice alongside the measure, and ultimately taking a more long term view.

*Boost productivity across business and industry*

Though the Solent is a centre of excellence for certain industries within the UK, there are still opportunities to grow these skills and improve upon a productivity that lags behind the rest of the country. Forecasts for the Solent LEP suggest the area will experience average employment growth of 0.72% per annum, creating an additional 31,000 jobs by 2020. With many sectors – particularly maritime – becoming increasingly skills hungry, the region faces a challenge of producing skilled local residents who can take advantage of these new opportunities.

Despite having a highly skilled workforce with considerable engineering and technical skills, the Solent area suffers from a widespread difficulty in filling roles such as ‘electrical and electronic fitters’. In the early market stages, it is likely that existing trade people (e.g. electricians) will take on additional skills before there is a large influx of new installers.<sup>12</sup> There are concerns that higher regional pockets of lack of work coupled with low skills will drive business investment elsewhere. There is also concern regarding the wider ageing of the engineering workforce and a lack of young people coming in to fill these roles. This is within a wider context of the overall general reduction in the economically active population, relative to the population over all.

One particular challenge identified is the difficulty to promote local businesses as the main suppliers due to complex procurement processes, within which for example the locality of a company does not affect the scoring. A lot of work is underway to secure local supply chains, and procurement processes are

another opportunity to boost productivity across business and industry in the Solent region.

PUSH has been particularly focused on the need for skills. They have developed and adopted a policy framework on the ‘use of developer contributions to provide workforce training’. This includes training, apprenticeships, employment advice, interview guarantees, work placements, transport arrangements and childcare. At present, 11 out of the 12 local authorities have signed up to this framework.

The Solent LEP has also already been strong on improving local skills. For example, through their £183m Solent Growth Deal capital programme they have invested in a range of projects to secure better skills and training outcomes. These include over £43m of investment including the following skills and training projects:

- Portsmouth Naval Base Marine Engineering Skills Centre and newly refurbished *Thunder* Building
- Eastleigh College Estates Renewal and Advanced Technology Block
- Isle of Wight College Centre of Excellence for Composites, Advanced Manufacturing and Marine
- Fareham College - Civil Engineering Training Centre
- Solent University Warsash School of Maritime Science and Engineering
- Centre of Excellence for Manufacturing (CEMAST)
- Solent Employer Ownership of Skills Programme - £1.5m investment in a range of employer-led projects to help marine and maritime, advanced manufacturing, defence and other key employers plug skills gaps and grow their businesses.
- Through a range of European funding opportunities businesses in the Solent are able to access support to train staff and grow their businesses. There is clear evidence that such investment in skills development benefits wider productivity and pays returns. Local Authorities across the Solent have also invested in business support and skills development; for example, Test Valley Borough Council has assisted several hundred SMEs through the £500,000 Skills Training Fund. A survey in 2015 estimated the training

<sup>12</sup> New Forest National Park Authority & New Forest District Council (2010), Renewable Energy Potential Assessment in the New Forest District. Available from: <http://www.newforest.gov.uk/CHttpHandler.ashx?id=15944&p=0>



generated £600,000 in additional revenue and enabled the creation of 100 new jobs.

Rethinking inefficient industrial practices in energy intensive sectors was a strong theme that emerged from participant workshops. Specifically, there was a desire to look more closely into ways of reducing energy wastage in major sectors such as the water industry. Creating a heat recovery and exchange marketplace for large producers of waste-heat has also been suggested.

Demand Side Response (DSR) is another opportunity to boost productivity as it shifts large loads of electricity off peak demand times, reducing grid strain, whilst also reducing costs due to lower off-peak prices. There is also great, untapped potential for introducing efficiency measures to SMEs and even start-ups.

*“Efficiency is low on the agenda, with many SMEs not realising the potential economic benefits. From a purely economic side of generating growth, this is a great opportunity and we should set aspirations such as: ‘Cut energy use from all our businesses in Solent by X% by 2030’. Council*

There was a very strong desire amongst workshop participants to make clients and stakeholders ‘invest’ in the strategy and understand the opportunities of futureproofing. To achieve this the strategy should be high profile and communicated to everyone. In addition to ‘hard’ interventions it is recommended to also focus on ‘soft’ public engagement and more schemes such as ‘Save’ with ‘smart nudges’.

## 6. STRATEGIC ANALYSIS

### Key strengths of the Solent region

The Solent is a substantial and leading contributor to the UKs civil and military maritime and marine capabilities. The economic benefits of these capabilities to the region are significant, accounting for 19% of the GVA, more than 36,000 local jobs, and supporting more than 3,000 businesses. Over the

period to 2025, the marine and maritime sector in the Solent region is forecast to grow by at least 5%.

The ports in the region are important to the local and national economies. Southampton is the UK's leading vehicle export port, Europe's leading turnaround cruise port and the UK's most productive container port. HMNB Portsmouth is one of the three operating bases in the UK for the British Royal Navy, Portsmouth Commercial Port is growing and provides an important cross-channel ro-ro function, and the Portsmouth Historic Dockyard is a major visitor attraction to the region.

The Solent’s maritime coastal location, navigable waters, strong industrial and academic research base (see later in this section) provide a substantial regional platform encouraging innovation and investment in marine and maritime technologies. Examples of investment in the region include MHI Vestas Offshore Wind, a wind turbine manufacturer with a major R&D facility on the Isle of Wight, which supports 200 jobs. MHI Vestas Offshore Wind recently announced plans for a new blade painting and logistics facility in Fawley, which will create 50 jobs.

The Solent also has, across its three universities, substantial academic strengths in maritime, logistics and operational research.

The University of Portsmouth hosts:

- Centre for Operational Research and Logistics, a cross-faculty centre with the view to impact on economic growth. The Centre brings together multidisciplinary expertise on the sciences of data and decision making.

The University of Southampton has a number of research groups or centres focused on maritime or wider transport research:

- Transportation, Planning and Supply Chain Group
- Transportation Research Group
- Energy & Climate Change Division
- Marine and Maritime Institute<sup>13</sup>
- Maritime Law Institute
- National Oceanography Centre Southampton

<sup>13</sup> A UK Centre of Excellence located at the University of Southampton

Solent University is home to the:

- Warsash Maritime Academy, one of the world's leading providers of marine industry education, training courses, research, and consultancy,
- China Centre (Maritime), the centre promotes teaching, research, consultancy and other activities concerning the role of China as a major maritime nation in the 21st century

The Solent region is not only a marine and maritime region. It also has, as examples, substantial high tech manufacturing (e.g. aeronautical and aerospace) and a growing creative, cultural and digital industry which delivered ~£1.bn GVA, and 40,000 local jobs.

There is an active Cleantech sector, for example, Greentech South is a Technology and Innovation cluster comprising more than 100 members, and is the first Energy and Environment Sector Cluster in the UK to achieve Bronze accreditation under the EU Cluster Excellence Programme. The collaboration, involving local government, the region's universities and the private sector provides an excellent demonstration for further initiatives of this nature.

### Swot/Tows Analysis and Recommendations

A detailed analysis of strengths, weaknesses, opportunities and threats (SWOT) has been undertaken for the Solent region.

The SWOT analysis focused on the overarching question: *How can Solent become the UK's leading gateway for innovative and sustainable heat and power solutions by 2050?* To broaden and deepen understanding, an individual SWOT analysis was undertaken for each of the six priority areas.

A Threats, Opportunities, Weaknesses and Strengths (TOWS) strategic options analysis was then created for each individual SWOT, to identify a series of options to intensify the strengths and opportunities and limit the weaknesses and threats. Resulting options were prioritised and themed, and fed through to the recommendations in the strategy section.

A summary of each SWOT and TOWS analysis is provided in the following sub-sections.

Summary of SWOT analysis key findings

**How can Solent become the UK's leading gateway for innovative and sustainable heat and power solutions by 2050?**

**How can Solent unlock growth in the marine, maritime and defence cluster?**

Drive smart technology deployment and innovation with universities (e.g. marine-based renewables, fuel efficiency, and hull & propeller design)

**How can Solent embrace the energy system revolution?**

Capitalise on existing digital sector strengths, facilitate technology incubation, pilot and roll out smart grid technologies

**How can the Solent deliver affordable, clean heat and power?**

Utilise innovative business models and financing structures, deploy generation alongside storage capacity, and build on existing strengths (e.g. solar, heat networks)

**How can the Solent accelerate the shift to low carbon transport?**

Better modal integration, mass transit (e.g. Solent Metro) movement of freight to cleaner modes so long as it does not compromise competitiveness, deploy ultra-low emission and autonomous transport technologies, charging infrastructure

**How can the Solent improve its homes?**

Deploy energy efficiency retrofit programmes, enhance building standards, connect homes to heat networks, and promote community and municipal-led business models

**How can the Solent boost productivity across business and industry?**

Deploy energy efficiency in industrial and SME sectors, facilitate collaboration, support key industries and develop an energy brokerage service

### STRENGTHS

- Gateway economy of international significance, providing connectivity to global markets - Ports of Southampton and Portsmouth, and their respective clusters
- Strong links exist between key local research institutions and the clean tech and digital sectors – this has driven significant market growth
- Advanced manufacturing – composites, defence, renewables, maritime/marine, technology are highly developed sectors
- Strengths of logistics and operational research activity
- Web science history and expertise at universities
- Active and burgeoning Cleantech sector in the region
- Battery and fuel cell expertise at Southampton University
- Southampton is the home of the UK's only geothermal District Heating scheme
- Solent region has high amount of installed solar PV
- Centre of marine energy research
- Home to off-shore wind turbine expertise – MHI Vestas

### WEAKNESSES

- Air Quality issues – noted in Southampton, and challenges to comply with air quality regulations
- Poor transportation and communication connectivity – putting off investments
- Poor digital infrastructure – need to secure widespread superfast broadband coverage, 4G and 5G network
- The most densely-populated urbanised areas in the South East – pressure on existing energy and transport infrastructure
- Acute grid constraints
- Lack of skilled workforce for installation and maintenance of smart technologies
- Planning refusal of wind farm - lack of local/neighbouring support
- Geographic constraint to improving congestion issues in Southampton
- Old housing stock – hard to treat and more expensive
- Most councils don't have knowledge, skills or finance to take radical actions
- Low take-up of renewables
- Other regions may have more coordinated voice and influence in Government

### OPPORTUNITIES

- Using Rotterdam and Antwerp as a model to follow e.g. Shore Power, Heat Roundabout
- Using the port as a gateway for the trade of electric vehicles
- Redevelop brownfield sites – particularly along the waterfront
- Smart grid tech such as energy storage and DSR to flatten peaks and reduce costs / need for reinforcement
- Solar PV rooftop, commercial and community projects identified
- Small biomass plant by Fawley using under-utilised wood stocks of region
- Mass rapid transport e.g. Solent Metro or rapid bus transit network
- Big support for Energy Efficiency – retrofit and new development / ECO funding
- Rising energy prices drives feasibility for alternative energy schemes
- Expand regional strengths associated with circular economy
- Significant potential for more diversity of energy supply in the region, plus smart energy solutions including storage. Growing UK trend for green energy purchase
- UK and global renewable technology markets are growing
- Further collaboration between universities, Growth Hubs, Innovate UK, Catapults etc.

### THREATS

- Uncertainty around national policy and incentives limits long-term planning and project implementation. Changes in Government renewables policy restricts long-term investment. Claimed uneven playing field on subsidies – cuts in solar PV and RHI
- Brexit and associated market uncertainty, esp. regarding joining up UK and EU regulations. Regulation changes post-Brexit
- Regulatory structure around energy storage and uncertainty around support for technologies (e.g. onshore wind)
- More stringent policies on air quality
- Uncertainty of planning consent for future developments
- Uncertainty of energy and raw material price fluctuations: “High energy prices” limit EII propensity to invest
- Competition from other UK regions for skilled workers
- Competition with other UK ports – e.g. Port of London, Humber affecting trade as well as European ports e.g. Rotterdam, Antwerp
- The rising cost of electricity and dominance of the ‘Big 6’
- Misalignment of transport policies with neighbouring regions (e.g. charging infrastructure)
- Pressure to build more housing cheaply – viability challenge

## How can Solent unlock growth in the marine, maritime and defence cluster?

### STRENGTHS

- UK's largest naval port and marine cluster in the UK: £5.5bn GVA
- Ports of Southampton and Portsmouth with good transport links but with key pinch-points
- Contains two deep water ports providing access to world's largest ships
- In immediate proximity to the route between Rotterdam and Singapore - the most busy trade route in the world
- Recognised strengths and skills in maritime services and technology including advanced manufacturing, including drones
- Local universities with strong maritime capabilities (e.g. Southampton Marine and Maritime Institute)
- Home to Team GB sailing team- leader in modern and efficient yacht building
- Moving in the direction of EVs and shore power e.g. Portsmouth BAE
- Warsash Maritime Academy China Centre

### WEAKNESSES

- Air quality issues in region including Southampton
- Poor transport connections between Portsmouth and Southampton (cars, trains)
- Poor broadband impacting productivity and not attractive to businesses, including those developing smart grid technologies
- Increasing demand for fuel and electricity for the carriers presents a security of supply challenge
- A majority of vessels entering Southampton Port lack low emissions technologies, restricting the short term potential for emissions management
- Grid constraints preventing opportunities for new RE or facilities
- Marine diesel costs are spiralling – need for alternative fuels

### OPPORTUNITIES

- To take leadership role in global maritime transport emission reductions including new maritime energy vector (e.g. LNG, dual fuel, shore power)
- To take leadership role in smart ports, autonomous vessels, cargo unloading
- To take leadership role in new energy vectors for transporting renewable energy
- To take leadership role in the transport of EV to or from the UK
- Re-development of areas surrounding to support port expansion using low carbon and sustainable practices
- Providing high quality, affordable space for manufacturers, businesses and R&D (e.g. Marchwood Military Port and Itchen Riverside Area)
- BREXIT – new or increased exports and imports opportunities

### THREATS

- Losing world leading maritime cluster through not keeping pace with emerging shipping challenges (e.g. LNG refuelling, smart ports, EV infrastructure)
- Brexit and the threat to the ports and export trade
- The rising cost of electricity
- More stringent policies on air quality
- Competition with other UK and European ports – e.g. Port of London, Humber – as well as European ports – e.g. Antwerp, Rotterdam
- Southampton Port not expanding to accommodate future growth forecasts
- Lack of Investment funding

	Opportunities	Threats
Strengths	<p><b>Strength-Opportunity strategies:</b> which of the Solent’s strengths can be used to maximise the identified opportunities?</p> <ul style="list-style-type: none"> <li>- There are multiple opportunities for the Solent to take (or sustain) leadership position in a wide range of emerging global maritime challenges. These will each have economic, environmental and energy co-benefits</li> <li>- Strengths in skill base for marine, maritime and composites can be used to grow advanced manufacturing, and port activity</li> <li>- These skills are also highly applicable for smart grids, expertise and engineering abilities are transferrable</li> <li>- Strategic position on the Rotterdam-Singapore trade route, presents a huge opportunity to capitalise on the growing EV market and opportunities for international trade. This is particularly relevant considering China’s preeminent EV market position e.g. in battery production</li> </ul>	<p><b>Strength-Threats strategies:</b> how can the Solent use its strengths to minimise the identified threats?</p> <ul style="list-style-type: none"> <li>- Strength of ‘global port’ brand could leave Southampton in strong position to grow in the international trade market, despite growing competition</li> <li>- Advanced manufacturing skill base could be turned to create a renewables production hub, driving uptake across the region, and reducing the reliance on increasingly expensive grid electricity</li> <li>- Ability to lead competition from UK ports thanks to strong history of marine/maritime industry, higher learning linkages, and position on key trade route</li> </ul>
Weaknesses	<p><b>Weakness-Opportunity strategies:</b> what actions can be taken to minimise the Solent’s weaknesses, using the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Encourage technology that reduces emissions (e.g. CO2, NOx, PM)</li> <li>- Ambition of ports in region to grow, offers potential of a waterlink between the two, which would ease on-land congestion</li> <li>- Smart grid and DSR technologies will reduce impact of grid constraints on local businesses, developments and industry</li> <li>- Utilise brownfield sites to attract new businesses to the area, and to site energy storage infrastructure that can meet peak demand of the aircraft carriers</li> </ul>	<p><b>Weakness-Threats strategies:</b> how can Solent minimise its weaknesses to avoid the identified threats?</p> <ul style="list-style-type: none"> <li>- The transition to new shipping technologies has begun (e.g. LNG, Solar Sail) and leading ports are moving and rebuilding their infrastructure (e.g. Rotterdam). No clear similar strategic vision exist for a UK port</li> <li>- Spill-over effects from land and air autonomous vehicles harm investment in maritime vehicle research and development</li> </ul>

## How can Solent embrace the energy system revolution?

### STRENGTHS

- Smart grid trials on IOW as part of Eco-Islands project using automated active management – using IoW digital connectivity
- Limited regional fossil fuel based generation reduces incumbency barriers to energy systems transformation
- Grid constraints provide a testing ground for smart grid technologies
- Good levels of renewables generation, particularly PV
- Advanced research on batteries, web science and digitisation at universities
- Spill over effects from advanced technology capabilities in developed in maritime & defence into energy systems
- Future South innovation cluster
- Southampton port has LNG capabilities – links to thermal and electricity storage and trading
- Smart meter roll out in domestic sector driving costs down/ innovation potential – link with universities

### WEAKNESSES

- Broadband strength and coverage a break on smart systems roll out
- Lack of delivery, installation and maintenance skills for smart tech
- Lack of transport interconnectivity affecting rollout of charging infrastructure
- Grid reinforcement required for electrification of heat and transport – huge costs
- Energy security issue because of lack of grid capacity
- Lack of standardisation of smart meters
- Lack of joined-up thinking, which is key to formulating a smart vision

### OPPORTUNITIES

- To take leadership role in new energy vectors for transporting renewable energy across the UK; or exporting oversea
- Technologies including smart appliances, HEMS, advanced metering have potential to reduce energy use
- Opportunity to build EV charging infrastructure – current points in Portsmouth/Southampton/MOD
- Isle of Wight earmarked as a potential testing ground for rolling out smart technology
- Deployment of smart grid techs in maritime cluster
- Development of satellite communications – driver of efficiency as secure and reliable connection for logistics and ship routing
- Energy storage alongside France interconnector?
- Air quality issues enhancing the business case for EVs
- Strategy alignment within the Solent (e.g. across transport, digital, economic development and other strategies)

### THREATS

- Uncertainty around national policy and incentives limits long-term energy planning and project implementation
- Changes in Government renewables policy restricts long-term investment
- Claimed uneven playing field on subsidies – cuts in solar PV and RHI
- Regulatory structure around energy storage preventing value stacking and limiting investment
- A need for innovation to drive down the cost of smart grid technologies

	Opportunities	Threats
Strengths	<p><b>Strength-Opportunity strategies:</b> which of the Solent’s strengths can be used to maximise the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Smart grid technology is already being tested on the IoW and can inform its wider roll out across the Solent</li> <li>- Expertise in battery technology and smart grids can be used to roll out an advanced EV charging network with V2G technology</li> <li>- Battery expertise can be leveraged to pilot storage on the IoW</li> <li>- LEP can play a facilitating role using leadership position to bring together capital and university expertise</li> </ul>	<p><b>Strength-Threats strategies:</b> how can the Solent use its strengths to minimise the identified threats?</p> <ul style="list-style-type: none"> <li>- Advanced battery and storage R&amp;D capabilities in Southampton can be used alongside pilots run by regional actors (e.g. Future South, Southampton University) uncover new innovative technologies and increase commercial feasibility</li> <li>- New thermal energy vectors are starting to emerge that could be used to ‘transport’ renewable energy which could supplant or dampen the market for current chemical battery technologies</li> </ul>
Weaknesses	<p><b>Weakness-Opportunity strategies:</b> what actions can be taken to minimise the Solent’s weaknesses, using the identified opportunities?</p> <ul style="list-style-type: none"> <li>- In deploying smart technologies within/alongside the marine industry, existing marine skills will be leveraged, and a new skilled workforce developed</li> <li>- Need for grid reinforcement nullified/minimised by deploying smart grid technologies, development of commercially viable storage will also lessen grid load</li> <li>- A great amount of data will need to be collected to plan, optimise and monitor measures</li> </ul>	<p><b>Weakness-Threats strategies:</b> how can Solent minimise its weaknesses to avoid the identified threats?</p> <ul style="list-style-type: none"> <li>- Work with BEIS and other stakeholders to establish a viable strategy for a regional energy system (including storage) that is consistent with the strategies of the UK government, energy actors (e.g. electricity providers, DNO, National Grid) and major energy consumers in the region</li> <li>- In the medium term rolling out energy storage is likely to address some of the regions peak load energy supply challenges, ameliorate some grid capacity constraints, improve consumption of renewable energy, and help reduce technology</li> </ul>



## How can the Solent deliver affordable, clean heat and power?

### STRENGTHS

- All local authorities across the Solent have made a commitment to reduce carbon emissions – RES and EE strategies, energy and planning policies
- Installed base of high quality **district heating scheme**
  - only **geothermal** DH scheme in the UK – and extendable
  - Significant waste heat sources that provide potential for heat networks (e.g. Southampton EfW plant, Fawley oil refinery)
- Significant installed **solar PV** capacity, large solar farms installed (10MW+)
- Growing base of **Waste to Energy** plants
- **Tidal** potential in IOW and Southampton
- Significant local expertise IOW interconnector existing infrastructure
- Strength of activities suggest good engagement with the DNO

### WEAKNESSES

- Grid capacity limiting export of renewable power
- Over-reliance on traditional energy generation and transmission
- Large energy deficit between the amount electricity generated and consumed
- Lack of space in highly densely populated areas (e.g. Portsmouth) for larger scale renewables
- Planning refusal of wind farm discourage future renewables investment in region, lack of local or neighbouring support
- Substantial component of the housing stock is old and not easy to retrofit with new heating technologies
- Skills deficit (e.g. electrical and electronic fitters )

### OPPORTUNITIES

- Continue to encourage growth in renewable or sustainable energy vectors
  - Encourage off gas grid decarbonisation through Fits and RHI
  - Encourage Solar PV commercial and community projects identified
  - Encourage sustainable biomass plant
- Work with fossil based power suppliers to encourage cost-effective decarbonisation measures to be taken
- Worked with energy intensive industries to identify DSR and decarbonisation opportunities
- Examine how expensive energy sources (e.g. tidal) could be made cost-effective for the region (e.g. multi-site small opportunities?)
- Agree renewable electricity generation technology targets
- Strong regional coordination of efforts – cost and efficiency benefits – aggregation of projects

### THREATS

- Increased pressure on energy supply due to population and housing increases and growth of the economy
- Cuts in subsidy for solar PV may slow further penetration
- Longer term future of RHI – beyond 2021
- Uncertainty around and lack of policy support for some other renewable technologies – e.g. onshore wind, tidal
- Current constraints related to full capacity of IoW interconnector – reinforcement works needed to accommodate further generation

	Opportunities	Threats
Strengths	<p><b>Strength-Opportunity strategies:</b> which of the Solent’s strengths can be used to maximise the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Take a leadership position as a leading UK example of renewable energy generation from multiple sources with a wide renewable portfolio</li> <li>- Building on the good adoption of Solar PV, Waste to Energy, and Biomass plant, possibly through setting regional energy generation targets</li> <li>- Take a leadership position encouraging cost-effective solar PV deployment and thus build on the value of being home to the UK’s largest solar farm</li> <li>- Examine to current opportunity for tidal energy innovation on the Isle of Wight and Southampton</li> <li>- Look to develop a Solent wide approach to decentralised heat networks by building on, for example, Southampton’s success</li> </ul>	<p><b>Strength-Threats strategies:</b> how can the Solent use its strengths to minimise the identified threats?</p> <ul style="list-style-type: none"> <li>- Solar PV is becoming increasingly cost effective against other forms of energy generation, will offer good payback times even without FiT</li> <li>- Political will of councils in district heating, expertise in district heating schemes can ensure longevity of technology beyond end of RHI</li> <li>- Limited innovation in some technologies in the region (wave, tidal, fuel cell technologies)</li> </ul>
Weaknesses	<p><b>Weakness-Opportunity strategies:</b> what actions can be taken to minimise the Solent’s weaknesses, using the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Despite lack of support for large offshore wind, still plenty of opportunity for other forms of renewable generation</li> <li>- New, bigger offshore wind turbines can be placed further out to sea and are almost invisible from the shore</li> </ul>	<p><b>Weakness-Threats strategies:</b> how can Solent minimise its weaknesses to avoid the identified threats?</p> <ul style="list-style-type: none"> <li>- Change in public perception, especially around offshore wind farms</li> <li>- Further investment in the national grid by DNOs, to bolster infrastructure for increased renewable supply</li> </ul>

## How can the Solent accelerate the shift to low carbon transport?

### STRENGTHS

- Wide stakeholder acceptance of transport challenges and need for action
- Regional focus on modal transport shift
- Existing smart motorway e.g. M3 to be upgraded, M27 to commence shortly
- The Gosport – Fareham BRT (Eclipse) is one of the most successful BRT projects in the country
- University of Southampton world leading research in autonomous vehicles
- vehicles: land and sea
- Planning policies in Havant require futureproofing for EV charging
- Growing uptake of Hybrids, uptake of EVs accelerating
- Existing EV infrastructure in key locations
- Port of Southampton market leading position in vehicle exports

### WEAKNESSES

- Intense peak time commuter demand on key routes leading to heavy congestion
- Geographic constraint to relieving congestion in region due to existing urban development, the existence of waterways and difficult terrain
- No direct connection between Southampton West Dock and the motorway
- Poor transport infrastructure e.g. slow East-West rail link
- Transport contributing to significant air quality issues in the region
- No standardised charging infrastructure
- Difficult to charge at home given housing density in urban areas
- Grid capacity constraints

### OPPORTUNITIES

- Provide an integrated *Ship to Solent edge Transport Mesh* to move goods and people across and through the region
- Integration, modal shift, clean-smart-green network, and the logic – ‘first decrease the need for transport, then deal with the rest’
- Deploy efficient mass transits systems (e.g. Solent Metro, EV rapid bus transit network) to debottleneck commuter traffic
- Expand on existing base of EV charging infrastructure as key building blocks to a Solent wide EV area. With investment potentially available through Green Growth Strategy
- Grow home-grown autonomous vehicles capabilities to meet regional, UK and international need
- Inductive charging for transport

### THREATS

- Active, vocal regions crowd out funding for Solent transport solutions
- Government funding objectives could change
- Less current funding for hydrogen fuel cells
- Misalignment of transport policies with neighbouring regions (e.g. on charging infrastructure)
- Growing power demands due to uptake of EVs would lead to additional capacity constraints, if left unmanaged
- Addressing capacity for big energy users, e.g. electric bin Lorries
- Infrastructure cost could hinder project development e.g. Solent Metro
- Solent is a North – East – West road transport gateway so passing through vehicles influence energy systems demands. If unmanaged could lead to distorted grid demands

	Opportunities	Threats
Strengths	<p><b>Strength-Opportunity strategies:</b> which of the Solent’s strengths can be used to maximise the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Take a holistic, strategic <i>all modes</i> view of transport within the Solent (e.g. ship, plan, bus, train, car, truck). Examine the benefits of an efficient, low carbon transport Sea to Solent Edge integrated transport mesh</li> <li>- Regional autonomous vehicle design and manufacturing together with world leading university research, and likely location of large scale EV exports or importers through the region lend support to growth of EV market and infrastructure in the region</li> <li>- Advanced battery technology within Solent research institutes can be applied for testing inductive charging</li> </ul>	<p><b>Strength-Threats strategies:</b> how can the Solent use its strengths to minimise the identified threats?</p> <ul style="list-style-type: none"> <li>- Research and manufacturing can create new EV industry, driven by commercial investors less influenced by government funding</li> <li>- Seek to ensure the Solent has a strong voice on maritime, autonomous vehicle, and electrical vehicle policy that affects the region and the UK</li> <li>- Continue fuel cell research at universities to maintain support for hydrogen economy funding</li> </ul>
Weaknesses	<p><b>Weakness-Opportunity strategies:</b> what actions can be taken to minimise the Solent’s weaknesses, using the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Encourage expansion or improvement public transport and rapid mass transit, hybrid and EVs, and work with industry to reduce transport related energy use. All will contribute to a reduction in pollution</li> <li>- Integrated transport system, seamless transfer between vectors to minimise geographic constraints of the region</li> <li>- Standardisation of charging infrastructure can be could include inductive charging</li> </ul>	<p><b>Weakness-Threats strategies:</b> how can Solent minimise its weaknesses to avoid the identified threats?</p> <ul style="list-style-type: none"> <li>- Ensure the transport strategy clearly, and coherently outlines a regional path to lower carbon transport modes or technology solutions</li> <li>- Improving infrastructure to minimise capacity constraints for big energy users</li> </ul>

## How can the Solent improve its homes?

### STRENGTHS

- Portsmouth most densely populated outside London – makes retrofit schemes more efficient to roll out given economies of scale (particularly external wall insulation)
- Existing planning policies have requirements for exploring heat networks and on-site renewables
- East Hampshire council part owns energy company ‘Energy Centre’
- SCC part owns energy company – Citizen Energy
- Portsmouth city council developing an energy company
- Lots of domestic solar in the region taking advantage of FiTs
- Retrofit programmes in the region have proven successful so far e.g. East Hampshire District Council scheme and Cosy Havant programme

### WEAKNESSES

- Old housing stock and amongst most inefficient stock in Europe – hard to treat and more expensive
- Coastal location leads to exposure to wind driven rain which can affect the suitability of properties for cavity wall insulation
- Great water stress in the region
- Boom and bust nature of housing retrofit programmes (ECO) leads to lack of a sustained market and uncertainty
- Fuel poverty, due to inefficient housing stock, and low income levels or unemployment in certain areas, and high and increasing energy prices
- Skills shortage in the region - delivery, installation and maintenance skills

### OPPORTUNITIES

- Wider South Hampshire region predicted to have amongst highest demand for housing in the UK – opportunity to build new housing sustainably
- Big support for EE in CGS – retrofit and new development / ECO funding
- Rising energy prices, drive feasibility and enthusiasm for behaviour change and community energy schemes
- Review domestic energy efficiency programmes
- Taking advantage of new radical retrofit methods e.g. Energiesprong
- Review contribution to fuel poverty targets
- Review planning policy and include sustainability checklists

### THREATS

- Policy and financial uncertainties – funding for retrofit schemes
- Pressure to build more housing cheaply – viability challenge
- Regulatory limitations – protections granted to buildings through listing, and to Areas of Outstanding National Beauty (AONB)
- Deregulation Act – removal of Code for Sustainable Homes
- Dominance of the ‘Big 6’ limits potential for municipal energy companies

	Opportunities	Threats
Strengths	<p><b>Strength-Opportunity strategies:</b> which of the Solent’s strengths can be used to maximise the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Stringent planning policy and building regulations are in force across the region (utilising CfSH and BREEAM) driving uptake of sustainable measures, providing a strong foundation to be built on</li> <li>- Dense urban areas of the region make EE installation more cost-effective and less labour/time intensive</li> <li>- Both EHCC and SCC part own energy companies, which are popular and addressing a demand for cheaper energy. These developments show the appetite in the region for alternative energy schemes</li> </ul>	<p><b>Strength-Threats strategies:</b> how can the Solent use its strengths to minimise the identified threats?</p> <ul style="list-style-type: none"> <li>- Southampton is strong in advanced manufacturing techniques, such as pre-fabrication, modular systems and composites, this will lower the cost to build large numbers of houses (which with EE will be cheaper to run), delivering large scale, affordable and sustainable housing</li> <li>- Strengths in Community energy companies are a disruptor and challenge to ‘Big 6’, their growing maturity offers a viable alternative</li> </ul>
Weaknesses	<p><b>Weakness-Opportunity strategies:</b> what actions can be taken to minimise the Solent’s weaknesses, using the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Greater emphasis on building new homes sustainably will ensure future residents use less energy</li> <li>- Support for energy efficiency in Clean Growth Strategy and through ECO scheme allows existing housing stock to be retrofitted with EE measures</li> <li>- Councils can engage with other local authorities to gain and share knowledge about local energy schemes, e.g. Collaboration between SCC and Nottingham City Council to transfer learnings from Robin Hood energy to CitizEn Energy</li> </ul>	<p><b>Weakness-Threats strategies:</b> how can Solent minimise its weaknesses to avoid the identified threats?</p> <ul style="list-style-type: none"> <li>- Improve old housing stock through retrofit making properties EE and cheaper to run</li> <li>- Councils need to bring in expertise, and there needs to be more collaboration and knowledge sharing between councils to spread learnings</li> </ul>

## How can the Solent boost productivity across business and industry?

### STRENGTHS

- Strong, growing leadership positions / ecosystems in key markets including: maritime and defence, materials, vehicle automation, life sciences, digital, big data, cybersecurity, satellites, aerospace, portage, tourism, energy systems, renewables
- Attracted direct investment in new industries (e.g. offshore wind, ports)
- Regional universities have entrepreneurial development platforms
- Business enthusiasm to take action and existing growth momentum
- Cross-regional projects connecting up sectors and people, e.g. PUSH
- > 90 business support organisations in the region providing start-ups and size-ups with support

### WEAKNESSES

- Transport infrastructure (e.g. IoW, Portsmouth-Southampton) is a drag on productivity and a contributor to unnecessary energy use and emissions
- Poor regional connectivity (e.g. broadband) is a drag on productivity, growth in digital use, and regional innovation. Also a contributor to unnecessary energy use and emissions
- Skills shortages in some specialist skills needed in key markets
- Housing constraints impact labour supply
- Stronger economies in close proximity in key markets (e.g. digital) attracting talent away
- Not harnessing the combined power of the regions universities
- Undirected incubation, innovation and enterprise growth

### OPPORTUNITIES

- Set aspirational economic goals (e.g. growth, GVA, productivity) in key market segments selling world class capabilities
- Create the infrastructure to attract new investment (e.g. UK government, foreign direct, from businesses external outside the Solent)
- Development of regional entrepreneurial leadership platform
- Commercialise spin-outs technology from the regions universities
- Grow key specialist industries, capturing workers and investment from around the UK whilst developing a core (college-linked) skills base
- Making potential sources of investment and finance clearly visible
- Better use of renewable energy, energy efficiency, and the resource economy

### THREATS

- Competition for skilled resources with other regions (e.g. M3 corridor, London)
- Brain drain from the region as EU national head home after BREXIT
- BREXIT impacts for key market segments (e.g. maritime, defence, digital) due to trade obstacles or enablers
- More impactful growth opportunities in other LEP local industrial strategy
- Competition from other UK ports for international trade (e.g. Hull, London)
- Growing strength and innovation of the Rotterdam complex.
- Foreign direct investment in key segments goes elsewhere
- Competition with other regions for constrained funding

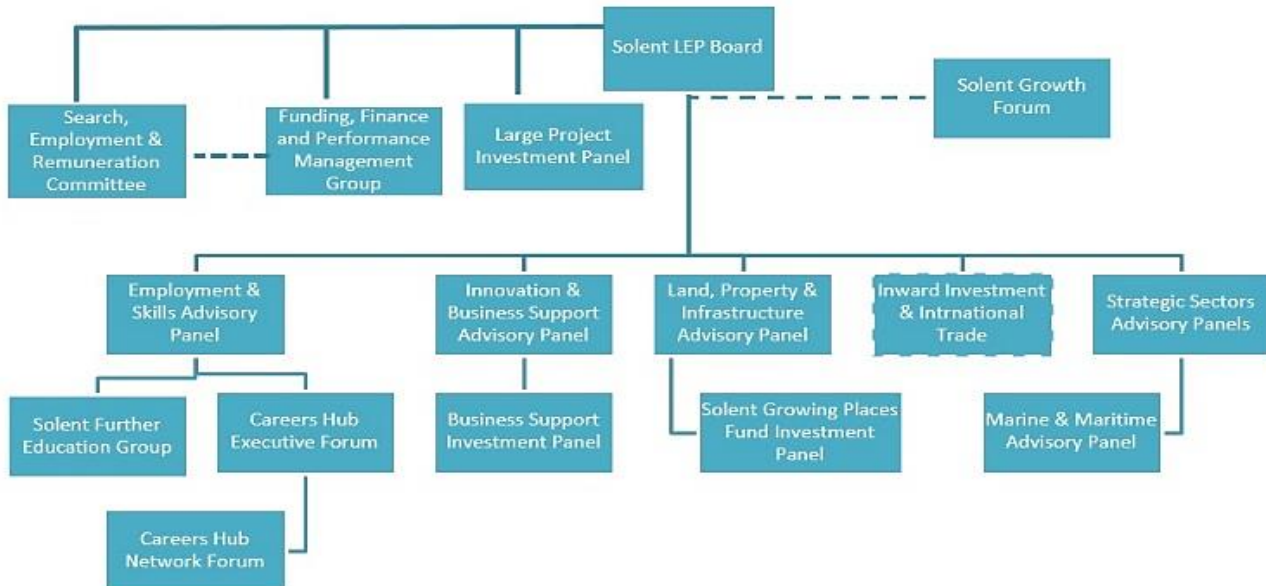
	Opportunities	Threats
Strengths	<p><b>Strength-Opportunity strategies:</b> which of the Solent’s strengths can be used to maximise the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Support the widespread rollout of digital connectivity. Seek to use industrial strategy funding, particular in key business and domestic zones</li> <li>- Encourage development of common entrepreneurial growth platform across the regions universities, local authorities and industries</li> <li>- Targeted GVA growth expectations for key and emerging markets</li> <li>- Encourage spin-out opportunities from the regions universities or industry, i.e. create a growth pipeline</li> <li>- Target direct investment that reinforce key market growth (e.g. automation, digital, wind) and deepens supply chains</li> <li>- Strengthen energy storage technology, smart grid and digital technology. Encourage regional universities to co-operate with other leading universities</li> </ul>	<p><b>Strength-Threats strategies:</b> how can the Solent use its strengths to minimise the identified threats?</p> <ul style="list-style-type: none"> <li>- Ensure key markets have or maintain Centre for Excellence (e.g. life sciences, smart ports, automation, digital) delivering world class research</li> <li>- Message the Solent’s attractiveness to new employees and new businesses. Formulate a GDP/GVA growth and resource efficiency targets in key markets to bring focus to the region’s circle of influence, its innovation capacity, skills development, entrepreneurial and industrial growth.</li> <li>- Encourage university and industry to support a response to the BREXIT resource challenge in the local industrial strategy</li> </ul>
	Weaknesses	<p><b>Weakness-Opportunity strategies:</b> what actions can be taken to minimise the Solent’s weaknesses, using the identified opportunities?</p> <ul style="list-style-type: none"> <li>- Implement an entrepreneurial leadership platform highlighting regional strengths (e.g. life style, training, growth markets, infrastructure, entrepreneurial support, cross-fertilisation, financing) as a tech hub - in the same way that the American “West Coast” is considered the “go to” innovation market. Might this be part of the industrial strategy?</li> <li>- Encourage rethinking of higher education training to include taught (academic) and applied (business start-up) modules. For example core skills courses then 6-12 months grant-funded incubation support. Possibly linked to university spin-outs?</li> <li>- Leverage cross-regional partnerships, such as PUSH and the LEP to delivery joined-up strategic improvements to transportation and broadband</li> </ul>



## 7. STRATEGY

### Governance

Figure 11 Relationships and roles within the Solent LEP



An enabling factor to deliver against the objectives in this strategy is to have suitable governance structures and processes. The existing LEP governance structure provides the leadership and oversight required to execute this strategy and action plan.

#### Principles

The key characteristics of governance of an energy strategy to be considered include:

- Provide vision and leadership
- Monitor progress and give visibility to success
- Be accountable for progress against objectives
- Ensure adequate resourcing is available
- Provide an effective link to national bodies

#### Current governance landscape

Solent LEP already has a governance structure in place, presented in the [Articles of Association of the LEP](#). For example, the Land, Property, and Infrastructure Advisory Panel provides advice on infrastructure priorities. This Panel in addition with the other relevant ones could provide oversight, and disseminate local area energy planning information and advice.

#### Governance structures in development

Solent LEP is a member of the **SW Energy Hub**, which will be hosted by the West of England Combined Authority in Bristol, who will oversee the management of a £1.1m fund from BEIS.

The proposed key objectives of the SW Local Energy Hub are:

1. Increase the number, quality and scale of local energy projects being delivered;
2. Raise local awareness of the opportunity for and benefits of local energy investment;
3. Enable local areas to attract private and/or public finance for energy projects;
4. Identify a working model for teams to be financially self-sustaining after the first two years.

The SW Energy Hub are considering a 'hub and spoke model' for the allocation of funding, allowing for the targeted use of funds where expertise already exists. In addition, the hub will likely work closely with other funding programmes, such as a potential local authority support programme for the South West, which Bristol City Council area leading and seeking to secure ELENA funding to enable delivery.

The SW Energy Hub initiative and its governance arrangement should provide some resource to deliver the aims of this strategy.

### *Governance recommendations*

- Continued stakeholder engagement to facilitate joined-up thinking between IoW and mainland, between energy strategy and DNO plans and between Solent and the UK;
- Use this Strategy and Action Plan as a basis for a strong policy approach, emulating best practice demonstrated by the likes of the Greater London Authority;
- Communicate and collaborate with the South East energy hub, to ensure joined up thinking on matters which transcend borders, e.g. shared electricity and gas network operator.

### Role of the LEP

The Solent LEP has an overarching role of economic growth leadership in the Solent, and energy infrastructure is part of the broader economic infrastructure that is important to help unlock growth potential.

To achieve its vision of becoming the *UK's leading gateway for innovative and sustainable heat and power solutions*, the LEP will need to secure the commitment of a wide range of stakeholders, from inside and outside the Solent region, who can drive deployment and bring the necessary expertise, resource and finance to help turn this vision into a reality.

Given this is a LEP-led strategy, we have considered the range of potential roles that LEPs usually play to support the delivery of their strategies and visions. These roles have a common thread, which is for the LEP to act as the nexus between key stakeholders. In the case of Solent, these functions could be facilitated at a regional level using the South West Energy Hub as a delivery vehicle.

The roles that LEP usually play are:

- **Aggregate:** As a public-private partnership, LEPs have a unique potential to bring all stakeholders together and act as an impartial aggregator. Aggregating resources can help to achieve economies of scale and maximise the bargaining

power. This role could be valuable in helping the Solent LEP achieve its vision of a whole-systems approach. As we move towards more distributed generation and smarter energy use in buildings and industrial facilities, local communities and businesses will increasingly have the opportunity to play an active role, shifting from consumers to prosumers. The LEP acting as an aggregator could help them in this transition. Given the resources required to play this aggregator role the LEP might need to strengthen further its facilitation skills and legal expertise.

- **Broker:** LEPs have the benefit of being considered impartial bodies. This enables them to be an 'honest broker': be impartial, provide advice, and negotiate agreements between stakeholders. Key to the brokerage role is the clear signposting and sharing of information as well as general networking among relevant stakeholders. This will help progress new projects or business models, as well as identifying specific, targeted match-making for particular projects or technologies.
- **Lead and influence:** LEPs have the potential to leverage their unique position of link between the public and private sector. They can provide the essential regional leadership required to turn national strategies, such as the Industrial Strategy and Clean Growth Plan, into reality. The Government has already requested that LEPs develop local industrial strategies that support delivery against the national industrial strategy.
- **Share knowledge and advice:** Underpinning all other roles is LEPs' prime role to facilitate knowledge, and advice sharing. This can be achieved through clear signposting to existing resources, such as the Solent Growth Hub. This role also links into the LEP's engagement in the South West Energy Hub.
- **Programme manage:** The LEP, through its involvement in the SW Energy Hub, will be in a position to play a programme management role across the projects and initiatives launched from this strategy to drive timely delivery to budget and high quality standards.
- **Manage investment pipeline:** The LEP, independently and through its involvement in the SW Energy Hub, could play a role in coordinating the regional investment pipeline in energy projects. This would include promoting regional investment opportunities; reaching out to stakeholders looking for investment; understanding barriers to progress; and providing support as outlined above.

## Priority Areas

Below we present each priority area in turn and outline the critical success factors that are necessary to achieve these goals:

### 1. Unlock growth in our marine, maritime and defence cluster

The marine, maritime and defence cluster represents a significant proportion of the Solent economy, being home to world-leading skills and expertise that could provide the supply chain necessary to enable the development and deployment of marine-based renewables, low carbon shipping, and smart ports.

The strategic UK maritime assets of Southampton and Portsmouth ports, world leading research (e.g. maritime, marine, onshore and offshore automation, vessel efficiency, IoT) and substantial supply chain, give the Solent Region a platform upon which to make a substantial contribution to the UK's offshore energy growth, the global decarbonisation of shipping, and the emergence of smart ports. Each of these opportunities could deliver additional wealth and economic growth.

This cluster is also characterised by a number of energy intensive businesses, which could deploy energy efficiency solutions to enhance productivity and reduce costs. In addition, taking action across this cluster will help to deliver important co-benefits, such as improving air quality, developing a highly skilled workforce and unlocking technology innovation. The ultimate opportunity is to boost the economy and create growth through the transition to a low carbon economy.

#### Critical success factors:

- Strategic review of the economic benefits that low carbon shipping and smart ports could present for the Solent region
- An understanding of the supply chain of the maritime sector and exploitation of the links to the energy economy
- Support for the development and deployment of marine-based renewables (e.g. wind, tidal)
- Sufficient land availability, finance and policy support to deploy clean energy solutions

### 2. Embrace the energy system revolution

The Solent region has a solid foundation of web science and digital strengths, through its research

excellence and emerging digital cluster. Coupled with challenges associated with grid constraints and the need to facilitate the growth of distributed and intermittent generation, this represents a valuable testing ground for smart grid technologies and an opportunity for the region to enhance its resilience and drive economic growth.

#### Critical success factors:

- Technology innovation to drive down the costs of smart grid technologies
- Participate in the hydrogen economy
- Understand the role that energy storage can play in the Solent's energy system
- Understand the contribution the region can make to the development of smart ports
- Sharing and management of data

### 3. Deliver affordable, clean heat and power

The Solent region relies on imported electricity to meet its demand, creating a potential security of supply threat and representing a missed economic opportunity. Despite this, there is significant potential for the deployment of new, affordable heat and power technologies and existing expertise in technology areas including solar, wind, heat networks, geothermal and tidal. Investing in the deployment of affordable, clean heat and power will enable the region to deliver economic growth and reduce energy costs.

#### Critical success factors:

- Renewable energy is >35% of generating capacity by 2025
- Expand the use of district heating across urban centres
- Participate in UK trials proving the value of energy storage at different scales (e.g. intelligent hot water tanks, liquid air energy storage, battery storage)
- Stakeholder and planning support for clean technologies to allow deployment
- Cost effective grid connection

### 4. Accelerate the shift to low carbon transport

Transport connectivity is a key challenge in the Solent, having a significant impact on the region's air quality and leading to productivity issues associated with congestion and a lack of integration between modes. There is a need to improve the connectivity of existing transport infrastructure, in order to shift people away from

cars and towards public transport, cycling and walking. This need can be met through integrated Mass Public Transport (MPT) solutions and a better joining up of settlements. A mass transit system should be a priority for the Solent, to better connect communities, and proving a faster city to city connection.

**Critical success factors:**

- Solent plays a leading role in maritime decarbonisation and smart ports
- The availability of cost effective alternative fuels for heavy vehicles
- Deployment of mass transit systems
- Availability of electric vehicle charging
- Significant grid capacity to accommodate the electrification of transport

**5. Improve our homes**

Much of the existing housing stock within the Solent is old and inefficient. Residents would benefit from reduced energy bills and improved health through the rollout of retrofitted energy efficiency measures. There is an opportunity to take advantage of economies of scale in the densely populated areas of the region, which creates cost-effective conditions for the roll out of measures such as external wall insulation. Energy efficiency represents the least cost route to decarbonisation, hence why housing retrofit is so central to the government’s strategy. Key actors within the Solent such as local authorities and housing associations could create partnerships which take advantage of the funding available and delivers housing retrofit programmes. In addition, the Solent has a substantial need for housing growth, and there is a need to ensure new housing is delivered sustainably, to avoid the need for costly retrofit in future.

**Critical success factors:**

- Understanding the domestic energy efficiency opportunity in the region
- By 2025 reduce domestic energy by 20% (>2 TWh or 228MW generating capacity) through the deployment of co-ordinated energy efficiency programmes
- Deliver break-through cost-effectiveness in housing energy efficiency measures without compromising viability
- Sufficient industry skills to enable the development of sustainable housing practices

**6. Boost productivity across business and industry**

Productivity is a crucial challenge for the Solent economy, which can, in part, be addressed through the deployment of energy efficiency measures that have a real impact on the bottom line of businesses. This is particularly relevant for energy intensive sectors which make up an important part of the Solent economy, including oil refining, manufacturing, defence, construction and transportation. In addition, local investment in the energy sector represents an opportunity to develop a highly skilled and productive workforce.

**Critical success factors:**

- Solent plays a leading role in maritime decarbonisation and smart ports generating new wealth and economic growth
- Adequate development and retention of skills
- Understanding of energy efficiency opportunities

**Finance**

Different funding sources and financing options are available to energy projects in the LEP area, including domestic and European (though uncertain post-Brexit), public and private, grant and loan. It is important to bear in mind that these public sources are subject to frequent change, and therefore the suitability of individual sources will be analysed in more detail in the action plan section of the strategy. This will reflect the fact that different types of energy projects may need different types of financing as well as different investment structures.

The LEP will also have to consider key investment developments such as the uncertainties related to a transition from EU funding, the trend for public funding to move away from grants to loans, and the need for innovative financing solutions.

The UK Government has committed to establishing a UK Shared Prosperity Fund (SPF) after the UK has left the EU to replace EU financing. The details of this fund and its administration are still under discussion, offering the LEP the opportunity to influence a major future source of funding. This strategy and its action plan could form one part of the evidence base on which priorities for the fund are set.

The Industrial Strategy and the Clean Growth Strategy both announced funding which will provide an opportunity for the Solent to enhance delivery against the Heat and Power Strategy and Action Plan, including:

- £275m Industrial Strategy Challenge Fund for innovation;
- £31bn National Productivity Infrastructure Fund for investments in transport, housing and digital infrastructure;
- £1bn public investments, including £176m for 5G and £200m for local full-fibre networks;
- £400m for electric vehicle charging and £100m extra for plug-in car grants;
- £1.7bn Transforming Cities fund for intra-city transport within regions;
- £2.5bn Investment Fund within the British Business Bank;

- £3.6bn of investment to through the Energy Company Obligation;
- £320m Heat Network Investment Project capital grant programme;
- £557m for Pot 2 Contract for Difference auctions to enable renewable technologies;
- £265m innovation funding in smart systems;
- £255m funding for energy efficiency improvements in the public sector in England;
- £4.5bn to invest in low carbon heating through the Renewable Heat Incentive;
- £14m further investment through the Energy Entrepreneurs Fund to support innovative energy technologies and processes; and
- A new £9.2m Industrial Energy Efficiency Accelerator.

Key Sources for Funding & Investment	Technologies & Priority Opportunities
UK Shared Prosperity Fund	Introduced to replace European Structural Investment Funds, with an emphasis on reducing inequalities between the four nations. Money is to be directed at sustainable growth, SMEs and the low-carbon economy.
Energy Entrepreneurs Fund	From the Clean Growth Strategy, this competitive funding scheme supports the development and demonstration of innovative and state of the art technologies, products and processes through both public and private funding.
Strategic Priorities Fund	This is a new fund, announced in the recent Industrial Strategy White Paper. It will support high quality R&D priorities, identified by researchers and businesses at the cutting edge of innovation.
Industrial Strategy Challenge Fund (Wave 2)	£725m available over the next 4 years to develop technologies, that will transform existing industries and create entirely new ones. The 6 ‘Challenge Areas’, include ‘Transforming construction’ and ‘Prospering from the energy revolution’, explicitly mentioning electrification, EVs, efficiency and renewable energies.
Innovation Loans pilot	This new £50m White Paper programme operating over the next 2 years will target the most promising projects on the cusp of commercialisation. This could address the funding difficulties experienced with the transitioning from technically to commercially viable in marine energy.
National Productivity Investment Fund	The Clean Growth Strategy states that this will increase to over £5 billion in 2020/21, focusing on upgrading infrastructure of all kinds and forcing market demand of innovative new clean energy technologies.

<b>BEIS Industrial Heat Recovery Support Programme</b>	<p>Includes proposed feasibility and capital funding for waste heat recovery projects. The proposed programme under consultation includes feasibility study funding for up to 6 months, with 50%, 60% or 70% funding provided (depending on the whether the company classifies as large, medium or small) and follow-on capital grant funding for implementation of projects.</p>
<b>Enterprise Investment Scheme</b>	<p>This scheme has been around since 2004 but was recently highlighted as source of funding specifically for energy generation schemes, with a potential to be expanded to more innovative energy business models (including network investment). This scheme offers up to £5 million in investment, provided by private investors who receive a tax break in return, supporting projects which earn lower than full commercial rates of return.</p>
<b>Department for Digital, Culture, Media and Sport</b>	<p>The DCMS has a pool of grant funding to allocate in amounts of up to £75k in support of exploring or including crowdfunding to raise funds for public infrastructure projects. Abundance Investment have helped find interest and the LEP could be added to the initial list of interest for the launch of the scheme.</p>
<b>Salix</b>	<p>Salix provides interest-free Government funding to the public sector to improve energy efficiency, reduce carbon emissions and lower energy bills. Funding is currently available for England, Scotland and Wales.</p>
<b>Leapfrog Finance Bridge Finance</b>	<p>Pure Leapfrog is one of the leading providers of social investment to community energy projects in the UK. It provides affordable finance to community-led projects across the UK to help fund the installation of renewable energy technologies and energy efficiency measures.</p>
<b>Department for Transport On-street Residential Charge point Scheme</b>	<p>This scheme offers up to 75% of the cost of procuring and installing electric vehicle charge points. Local authorities can fund the remaining costs through public and private sources. Take-up has been very low and ministers were encouraging applications as of January 2018.</p>
<b>Enterprise Europe Network – South West England Offering</b>	<p>A combination of expert advice and grant funding, the EEN supports businesses looking to commercialise new ideas and succeed in international markets. It will find research partners, new product markets, funding, finance, and help with planning internal resources.</p>
<b>Heat Network Investment Programme (HNIP) for capital support</b>	<p>The Heat Networks Investment Project (HNIP), funded by the Department for Business, Energy and Industrial Strategy, will provide capital support to for heat network investment projects from autumn 2018.</p>
<b>Green Bonds</b>	<p>Green bonds are a financial instrument where proceeds from the issue of bonds are used exclusively to support green projects. Green bonds are the most useful when there is an assured and sufficient pipeline of projects identified or where the initial projects have already been undertaken.</p>
<b>Public Sector ESCO</b>	<p>An Energy Service Company (ESCO) provides energy and related services, usually in conjunction with performance and operating guarantees. Most ESCOs are private sector led, but there is a rationale for public sector ESCOs where the projects are aligned with key public sector objectives. Scale is critical in justifying the set-up of a public sector ESCO, particularly given its reliance on debt as the main source of financing energy efficiency improvements. Suitable sources of debt include community energy financing, Public Works Loan Board loans, crowdfunding and Green Bonds.</p>

<p>Whole Energy Systems Approach, and the Whole Systems Networking Fund</p>	<p>A Whole Energy Systems (WES) approach could be appropriate for aggregating investment across transport, generation, transmission and storage for large scale whole system development. Larger developments are well suited for a WES approach for two reasons; first, investment fund size is more easily achievable due to the combination of investments needed to deliver an end-to-end energy infrastructure. Scale is critical to attract the interest of long-term, low-cost third party investment, with most infrastructure investors seeking opportunities above the £50 million fund value, with minimum thresholds of around £20-30 million. Second, a certain scale of development is needed to integrate multiple energy vectors and unlock efficiency gains. As a WES approach to energy infrastructure funding has not yet been deployed in the UK, additional feasibility work will need to be undertaken to provide proof of concept. The LEP is well-placed to help deliver this work, using funding currently available through the UK Energy Research Council (UKERC). Reviews of applications to their Whole Systems Networking Fund are currently accepted on a rolling basis. Funding for up to £60,000 is available to support stakeholder engagement for those interested in a whole energy systems approach.</p>
<p>Green Business Fund</p>	<p>The Carbon Trust <b>Green Business Fund</b> is the energy efficiency support service for small and medium-sized companies in England, Wales and Scotland. It provides direct funded support through energy assessments, training workshops, equipment procurement support and up to £5,000 capital contribution per company towards energy saving equipment purchase.</p>
<p>Industrial Energy Efficiency Accelerator</p>	<p>The Carbon Trust has launched a new £9.2 million Industrial Energy Efficiency Accelerator (IEEA) to help strengthen the global competitiveness of British industry. Funded by the Department for Business, Energy and Industrial Strategy (BEIS), the IEEA aims to lower the cost of near-market energy efficient technologies for a range of industrial sectors, through demonstration projects.</p> <p>Successful applications should expect to receive between 40-60% of total project cost, with IEEA contributions typically between £150,000 and £750,000 per project. The competition will be open from October 2017 to September 2018.</p>
<p>The Solent Growth Fund: Capital Investment Fund</p>	<p>The Solent Growth Fund: Capital Investment Fund is a Solent LEP competitive funding programme, supported by the Solent Growth Deal, tailored to support the Solent SME base to grow quickly (high-growth) through delivering new processes / products / services, and / or developing new markets.</p> <p>A total amount of £3.2m funding is available up to March 2019 to support new and existing businesses to deliver new processes / products / services, develop new markets, or directly create and / or safeguard jobs in the Solent. Funding from £80,000 to £500,000 is being made available subject to state aid compliance.</p>
<p>The Solent Growth Fund: Small Business Programme</p>	<p>The Solent Growth Fund: Small Business Programme is a Solent LEP competitive funding programme, supported by the European Regional Development Fund (ERDF), tailored to support the Solent SME base to grow quickly (high-growth) through delivering new processes / products / services, and / or developing new markets.</p> <p>A total amount of £1.8m funding is available up to March 2019 to support new and existing businesses to deliver new processes / products / services, develop new markets, or directly create and / or safeguard jobs in the Solent. Grants from £10,000 to £75,000 are being made available, subject to state aid compliance.</p>

## 8. ACTION PLAN

This section highlights how the Solent can start to implement the ambitions and objectives set out in the strategy. The action plan proposes a set of projects/ action areas that Solent can further explore going forward. For each thematic area, we present project specifics, potential routes to delivery and timeframes, and a risk register. Each thematic area will also be supported by a justification of its high strategic fit within the wider Solent LEP Heat and Power Strategy, as well as an overview of the evaluation criteria used.

### Summary of Actions

#### Overview of considered projects

This action plan will help to identify feasible project opportunities across the Solent region that will contribute towards heat and power solutions across short, medium and long term timeframes. The opportunities assessed will contribute towards raising productivity and economic growth, alongside improving the scope of the Solent region to access regionalised funding streams through the South West Energy Hub. A whole systems approach has been adopted for this action plan, with technologies focusing on heat and transport, electricity and energy efficiency solutions.

Figure 13 Overview of pipeline projects by generation source

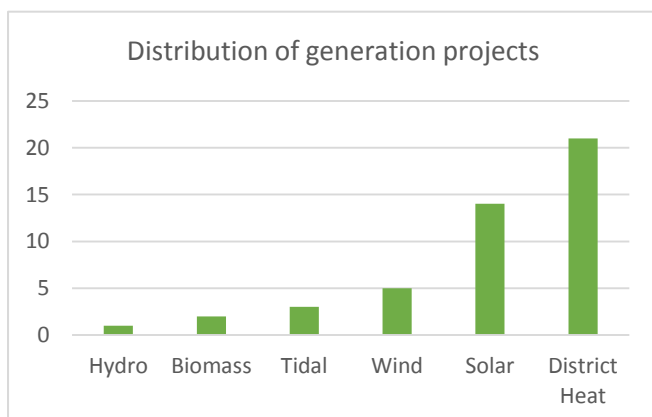
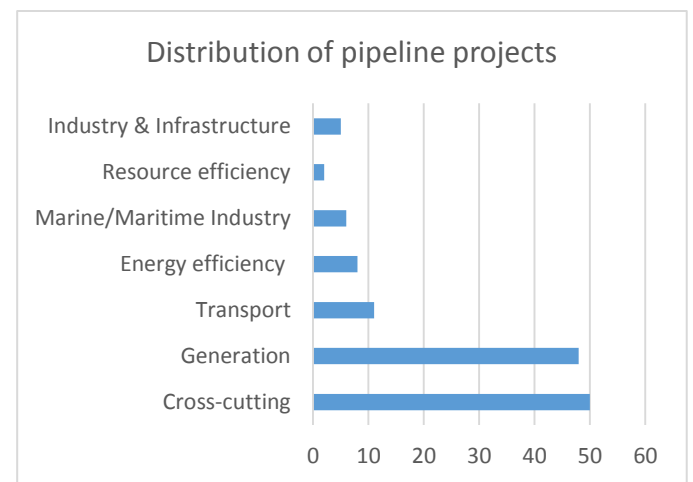
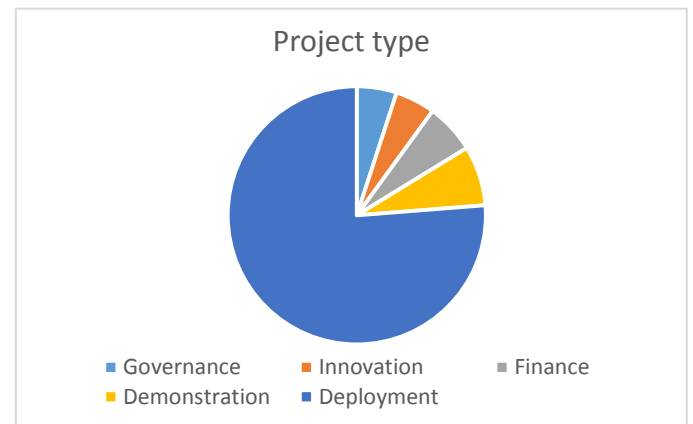


Figure 12 Overview of pipeline projects by type



#### Evaluation process

Figure 14 Evaluation framework





Alignment to the Solent LEP strategic narrative formed a crucial part of the assessment methodology used to evaluate prospective projects. Qualitative frameworks were formulated to provide a scoring system through which a variety of projects could be ranked and scored against the 6 key priority areas of the LEP that are presented within. Projects were subsequently given a ranking of ‘Low’, ‘Medium’ or ‘High’ according to their suitability against priority visions.

The Solent’s involvement in the South West Energy Hub has also been considered when assessing the feasibility of projects, and opportunities will work towards enhancing the competitiveness of the region to compete for funding.

**Project Implementation**

**DISTRICT HEATING**

*Summary*

There is the potential for the deployment of 20 or more district heating networks across the Solent region that could generate in excess of 120MWth.

The majority of these opportunities are in Southampton, Portsmouth, Eastleigh, Fareham, and Gosport. They range from the extension or interconnection of existing networks to the deployment of entirely new ones.

Key opportunities include the extension of the Southampton City Centre network, and the creation of a heat network at Portsmouth Dockyard with possible extension to the city centre.

<p><b>Southampton - City Centre expansion</b></p>	<p>This is one of the UK’s oldest and largest commercially developed city centre schemes. It started with a single customer, the Civic Centre, and now has thousands of customers supplied via five energy centres. Over the last 10 years energy supply has grown by more than 50%. Building on the successes of this scheme there is a significant potential for further expansion, notably to the East and to the North East of the existing network.</p>
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<p><b>Portsmouth - Dockyard and city centre expansion</b></p>	<p>Portsmouth Naval Base currently has a contract with Edina to install a natural gas fuelled 13.5MWe CHP plant. The plant supports the site’s growing energy requirements ahead of the arrival of HMS Prince of Wales at the naval base in 2019. As well as reducing carbon emissions, it should save the MOD up to £4m p.a. in energy costs. Previous studies have assessed the potential to create a heat network at the Dockyards. The commissioning of the CHP plant represents a good opportunity for further investigations. The heat network could utilise the additional heat off the CHP engine jackets (as well as the flue heat). Potential exist to expand the scheme could be expanded towards the city centre to connect to university buildings, museums and tourist attractions, and shopping centres and retail units.</p>
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*Route to delivery and timeframes*

Heat network development in the UK usually follow well-defined project steps to delivery from mapping and masterplanning, techno-economic feasibility and detailed project development, to commercialisation, construction, and operation. Illustrative timeframes for project development are:

- 2-6 months for mapping and masterplanning
- 6-12 months for feasibility and detailed project development
- 18 months for commercialisation
- 1-2 years for construction
- 40+ years for operation

The initial route to delivery of these projects is to secure funding and commission studies in the development stage i.e. mapping and masterplanning and feasibility studies. Once project viability is confirmed, further funding will be required to finance CAPEX expenditure. Funding might be secured from the BEIS Heat Network Delivery Unit (HNDU) and BEIS Heat Network Investment Project (HNIP).

It is feasible to assume that an extension to the Southampton City Centre scheme could be delivered in shorter timeframe than the Portsmouth opportunity. Preliminary studies would be required to assess the feasibility of a heat network scheme at Portsmouth Dockyard and possible extension to the town centre.

Another key step in the route to delivery is to establish a steering group for each of these two proposed schemes. Stakeholders that would be involved are varied, from the LEP, the councils, BAE systems and the Naval Base, to other potential domestic consumers.

### *Evaluation criteria and justification*

Heat networks have the potential to save carbon, save money, generate revenue, reduce fuel poverty, and support economic development. They therefore align with the goals of the LEP priority visions of delivering affordable, clean heat and power whilst providing economic benefits to the region.

Below we provide an assessment of the fit of these opportunities with the evaluation tool:

	<b>Southampton - City Centre expansion</b>	<b>Portsmouth - Dockyard and Town Centre</b>
<b>Strategic fit</b>	High	High
<b>Deliverability</b>	High	Medium
<b>Economic outcomes</b>	High	High
<b>Project development timeframes</b>	Medium	Low
<b>Value for money</b>	High	Medium

### *Risk register*

	<b>Southampton - City Centre expansion</b>	<b>Portsmouth - Dockyard and Town Centre</b>
<b>Financial</b>	Securing finance e.g. HNIP	Securing finance e.g. HNDU
<b>Stakeholder</b>	Securing stakeholder buy-in	Secure internal and external project buy-in
<b>Technical</b>	Crossing railway line and/ or the city wall	Compatibility with existing CHP and other systems
<b>Commercial</b>	Securing long term revenue streams	Ensure sufficient heat demands
<b>Other</b>	Influencing planning policy	Influencing planning policy

## SOLAR PV

### *Summary*

The Solent region contains 10 or more small or medium sized solar PV opportunities (0.1 to 12MW), championed by either local communities, the private sector, or councils that can deliver in excess of 116MW of additional generating capacity – a 34% increase on installed solar generation capacity of 337MW. This would take the solar share of total generating capacity from 24% to 30%.

Opportunities exist in Winchester, Fareham, East Hampshire, Southampton, and Portsmouth and utilise unused vacant land of low quality or brownfield land or the roofs council housing, educational buildings or supermarkets.

With the reduction of solar subsidies, larger PV projects (e.g. 12MW) appear the most feasible. Feasibility studies are required to firm up these opportunities.

<b>Bishops Waltham Solar Farm (Phase 2)</b>	This site is approximately 64 acres and there is a planning application for a 12MW array, enough to power 3,636 average households, and save 5,160 tonnes of CO2 annually. The developer Solafields has collaborated with Hampshire Renewable Energy Cooperative to promote community investment in the project (up to 10%).
<b>Rooftop Solar Programme</b>	For authorities such as Southampton, East Hampshire and Portsmouth, projects are ready for deployment. <ul style="list-style-type: none"> <li>• Southampton City Council has installed more than 700 panels on its buildings, and has developed a business case to deploy on a further 10 buildings.</li> <li>• East Hampshire District Council plans to make use of thousands of roofs through its Urban Solar Farm,</li> <li>• Portsmouth 10MW of solar roof potential in the harbour has been identified.</li> </ul> <p>Alongside ready to deploy projects, there is potential for Solar PV to be widely rolled across the region. The Solent's natural solar resource and numerous potential Solar PV site (e.g. community buildings, leisure centres, council housing stock, schools, other public buildings) make this a useful electricity generation option.</p>

### *Route to delivery and timeframes*

The 337MW of existing solar generating capacity installed in the Solent region together with an additional 116MW generation capacity ready to deploy suggests that a well-established Solar PV supply chain is operating effectively in the region.

For the next wave of Solar PV projects a delivery routes have been mapped out by several local authorities (e.g. Southampton already has 5MW new capacity). This forward planning combined with the existing regional experience in solar deployment, this will minimise timeframes.

Local authorities are key stakeholders, particularly if they are the landowner of a project site, alongside private investors, local community groups (who may also be investors in the project), and the District Network Operator (DNO).

Financing options include grant funding, private investment and community investment, with two main stages – initial feasibility and construction costs.

For companies, the Green Business Fund provides grants of up to £10,000 for low carbon equipment, including roof mounted solar PV.

### *Evaluation criteria and justification*

On average, solar projects score highly for strategic fit and value for money, with medium scores for economic outcomes, deliverability and project development timeframes due to specific considerations.

Projects scored well because of existence of similar schemes across the Solent, in Cornwall, and across the UK.

There are existing funding and delivery mechanisms, as well as experience and skills in managing such projects in the region, and many transferrable approaches and learnings.

Rooftop solar projects increase renewable generation capacity whilst avoiding the loss of green space or farmland, one of the foremost criticisms of solar PV arrays. Deliverability is high due to existing schemes, experience in delivering them, and a number of projects identified and ready for deployment across several local authorities.

	<b>Bishops Waltham Solar Farm (Phase 2)</b>	<b>Rooftop Solar Farms</b>
<b>Strategic fit</b>	High	High
<b>Deliverability</b>	High	High
<b>Economic outcomes</b>	Medium	Medium
<b>Project development timeframes</b>	Medium	High
<b>Value for money</b>	High	High

### *Risk register*

	<b>Bishops Waltham Solar Farm (Phase 2)</b>	<b>Rooftop Solar Farms</b>
<b>Financial</b>	Securing finance	Securing finance
<b>Stakeholder</b>	Community buy-in	Need multi-stakeholder buy-in for various sites
<b>Technical</b>	Grid constraints (increased connection costs and delays) & environmental sensitivity	Grid constraints (increased connection costs and delays) & environmental sensitivity
<b>Commercial</b>	25 year limit to array / constraints cap export	Lack of subsidy, e.g. FiT
<b>Economic</b>	No local economic benefit or skills development	Insufficient links with local training

## SMART GRID ISLE OF WIGHT

### *Summary*

Because of acute grid constraints, and the high costs associated with traditional grid reinforcement, the Isle of Wight Council has supported the deployment smart grid technology as a viable alternative to building additional generating capacity. There is scope to extend smart grid technology on the Isle of Wight.

A smart grid system is a combination of several complimentary technologies, such as energy storage, active network management, demand side response and smart meters.

The Isle of Wight has an active network management system in place. It monitors the state of the network in real time, identifying points of constraint and responding through managing generation, allowing more connections, however, this could be extended.

The Hydrogen Island project has the potential to dovetail with current and future smart grid activity, creating a diversified network in line with the council's aim of self-sufficiency.

<b>Island Hydrogen Smart Grid Project</b>	<p>Plans are for a 500kW solar PV system powering a hydrogen electrolyser. The solar array will also be connected to a neighbouring industrial building through a private wire to provide power when not required for H2 production. The primary output of the electrolyser will be transport fuel for the local bus fleet and private car owners. Any surplus gas will be fed into the private gas grid at the neighbouring industrial site.</p> <p>The project costs were £3,185,629 (CAPEX), with funding support required due to the innovative nature of the demonstration. It is intended that the system will then operate on a commercial basis, there is confidence that, once the demand for H2 transport fuel is established, this will be the case.</p> <p>The Island Hydrogen scheme is seen as an essential component of the Island's expanding smart grid, and Newcastle University (partners with Isle of Wight Council in the H2020 'inteGRIDy' smart grid project) are quantifying the impact of hydrogen production and storage on the network. Ultimately producing a smart grid architecture for a self-sufficient Isle of Wight.</p>
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### *Route to delivery and timeframes*

Due to the existence of smart grid technology and renewable generation on the island, the route to delivery is, in part, well laid out. Solar PV and grid-focused technologies have been proposed, assessed, funded and deployed successfully. Complexity exists in the delivery of innovative hydrogen infrastructure, which, though deployed elsewhere in the UK, will be a first for the Isle of Wight.

The project developer is likely to be a SME, however the stakeholders will be many and varied, including the council, the industrial building, the local bus company, and residents (particularly those with cars). Local political will on the island currently supports this project and the wider smart grid direction that aims for a wholly self-sufficient Isle of Wight.

The UK government offers funding to hydrogen projects:

- The Hydrogen for Transport Programme (launched 2017) provides funding via an open competition for both Hydrogen Refuelling Stations (HRS) and hydrogen fuel cell vehicles, providing up to £23m of new grant funding until 2020.
- Stage one has closed for application. Stage two will commit up to £14m to fund up to ten HRSs plus captive fleets and will begin in December 2018, subject to market developments over stage one.

### *Evaluation criteria and justification*

This project aligns well to the strategic priorities of the LEP – it will directly help to green the Isle of Wight, whilst placing the island at the forefront of action on energy systems and hydrogen.

Development timeframes for this project are split between the core solar-hydrogen element (which requires additional detailed project development planning, techno-economic feasibility and funding), and the linkage with the Isle of Wight's smart grid.

Although the capital requirements for this type of project are high the economic outcomes could be very significant. Hydrogen is a sector with significant growth potential. On the Isle of Wight it could facilitate the creation of a new industry, with a highly skilled workforce, and expertise that can be deployed elsewhere in the UK and to the global marketplace.

	<b>Island Hydrogen Smart Grid Project</b>
<b>Strategic fit</b>	High
<b>Deliverability</b>	High
<b>Economic outcomes</b>	High
<b>Project development timeframes</b>	Medium
<b>Value for money</b>	High

The active smart grid network management system on the Isle of White has helped to control energy demand and eased generation capacity issues, releasing 45MW of generation capacity.

The Orkney Islands had great success with a similar programme called the SMILE scheme suggesting execution risks can be effectively managed. SMILE scheme as well as provide insights into potential delivery models that could fit the Isle of Wight project.

### Risk register

	<b>Island Hydrogen Smart Grid Project</b>
<b>Financial</b>	Innovative, therefore needs funding support
<b>Stakeholder</b>	Multi-stakeholder complexity
<b>Technical</b>	Hydrogen is still an emerging technology
<b>Commercial</b>	Rests on the development of a local transport fuel market
<b>Economic</b>	Lack of local island-based skills already established so limited potential for driving new growth

A key risk is the lack of local island-based skills to deliver the installation and maintenance, thereby failing to capture the potential economic benefits for the local area. This can be mitigated through a complimentary apprentice training scheme that upskills the local workforce, providing labour for maintenance as well as future network extension, and thereby developing a new local sector. Currently, the key viability issues are ‘access to cables’ (for which SSE needs to give permission) and ‘energy flows’, the monitoring of which must be publically shared.

## MARITIME, MARINE & PORTS ACROSS THE SOLENT REGION

### Summary

The Ports of Southampton and Portsmouth are important international gateways for the Solent and the UK. Together with the Solent’s substantial marine, marine and defence cluster these collective assets present a significant strategic energy sector opportunity.

The Port of Southampton is leading the way in deploying clean energy across its sites.

Through installing 2,000 roof-mounted solar panels on the Ocean Terminal, the port has become the UK’s first carbon neutral cruise terminal. The panels will provide an average of 584KW per hour of clean energy that can be utilised in a variety of different ways throughout the port. HMNB Portsmouth has developed EV charging and is improving the delivery of heating services. ABP Southampton Air Quality Strategy also sets out a number of ambitions such as installing shore power technology for cruise vessels and work with local companies to develop hybrid technology marine craft. The port has also committed to a green ship tariff in place for 2019, following the footsteps of Portsmouth Naval Base.

Looking to the future, there is an emerging vision for the future of maritime and marine technology and of port infrastructure that will have direct impacts on regional economic success, energy demand and environmental impact. It is clear that there is growing need to consider how innovative maritime technologies can reduce emissions from vessels whilst at sea and or in port. At the same time, ports themselves are transforming with the emerging deployment of industrial automation (e.g. automated cranes, automated port transport) and alternative energy sources.

Innovative maritime and marine technologies will be required to deliver significant reductions in vessel energy consumption and carbon emissions (among other environmental emissions). Equally, innovative smart port technologies present a significant economic opportunity for the Solent region with its strong marine and maritime industrial and research capabilities.

Two broad strategic opportunities exist for the region:

- For Solent ports to remain strategic National Assets, they should embrace the concept of a “smart port”. For example, the port of Rotterdam has already deployed automated guided vehicles at its deep sea terminal and the Portbase Port Community System, the backbone of the Dutch smart ports activities. These steps have been done to remain relevant and competitive in a global market that is shifting eastward. Innovative smart port technologies present a significant economic opportunity for the Solent region with its strong industrial and research capabilities including marine and maritime, autonomous vehicles and IoT.

- Innovative maritime and marine technologies will be required to deliver significant reductions in vessel energy consumption and carbon emissions (among other environmental emissions).

With its strong marine and maritime industrial and research capabilities, the Solent has an opportunity to capture a share of this substantial market opportunity.

These strategic opportunities will have impacts on the regional energy system. This has proven to be the case at Hamburg Port, where smartPORT technologies have been deployed to improve logistic, energy and infrastructure efficiency across the port. The launch of newer, more efficient vessels over the next 10 to 20 years is also likely to alter the ship energy mix, a shift that could affect shore based energy systems. Vessels such as the ‘Creole Spirit’, which is the world’s most efficient Liquefied Natural Gas (LNG) ship, uses only 100 tonnes of fuel consumption, highlighting the scale of efficiency improvements that can be achieved. ‘Green cruising’ designs are also being adopted by Carnival Corporation, who have ordered four LNG-powered cruise ships that will be the first ships of their kind to power on dual-hybrid engines. In addition, the regional manufacture of new marine technologies will also place additional demands on the energy grid.

During this study no capital projects have been identified that have local support to be taken forward, and strategic review is considered to examine in more detail the anticipated strategic value and combined impact of the Solent’s regional assets.

#### *Route to delivery and timeframes*

The Port of Southampton is planning to work with local companies and universities to understand the benefits of shore power and develop new technologies. It is recommended that the Port considers establishing a working group to assess the significant economic growth and wealth creation opportunities that may be provided by the future need to develop new energy or energy related technologies that:

- improve vessel energy efficiency and reduce vessel related emissions
- boost port productivity and port throughput (i.e. smart port technology)

Once significant economic growth opportunities are identified, the working group – facilitated by Solent LEP

– could seek funding from the SW Energy Hub to look at feasibility and deployment options further.

Suggested key phases:

- Establish a working group comprised of key regional actors who can add strategic value and direction. These are likely include representations from Associated British Ports, HMNB Portsmouth, multiple Southampton University institutions (e.g. Maritime and Maritime Institute, Autonomous Research Group), Solent University (e.g. Warsash Maritime Academy), Portsmouth University, National Oceanography Centre and industrial representatives.
- Commission a strategic review of the regional economic and wealth creation opportunities presented new energy or energy related technologies delivering low carbon maritime and marine transport, and through smart ports. As part of the Government’s Industrial Strategy, the National Infrastructure Commission will complete a study on the future of freight infrastructure, focusing on identifying routes towards decarbonisation and deployment of new technologies. This report is due to be completed in 2019 and could be used to support development of the strategic review.
- On completion of this strategic review, it is anticipated that separate follow-up activities might include: (i) the development of a technology roadmap for academic and industry to co-ordinated action on the future research, innovation and technology development needed to establish the regional expertise necessary to help the global transition to a low carbon shipping and smart ports. (ii) The execution of a multi-year implementation plan to embed more energy efficient technologies in port instructor and related supply chains. (iii) The delivery of regional demonstrators to display the benefits of new low carbon marine, maritime and port technologies. And (iv) the expansion of the regional supply chain.

Work of this nature will subsequently inform the direction of smart port initiatives, including the extent and capacity at which new technologies and systems could be deployed.

Key sources of funding for this initiative will stem from two key sources.

- Round 3 of the Government’s Local Growth Fund, of which the Solent LEP will receive £57.7 million up until 2021 could be an appropriate funding source. Specifically, the LEP’s Growth Deal 3 funding will deliver investment on projects that invest in local skills and infrastructure projects that will facilitate enhanced productivity across the region. It is expected that central government funds will also bring forward up to £360 million of additional finance from local partners and the private sector.
- Securing additional finance from local partners and the private sectors will be needed. There are clear opportunities to assist with the capture of appropriate finance, through the development of effective stakeholder engagement strategies which communicate clearly the benefits of investing in renewable technologies, and the effect such actions will have on port operations and economics.

#### *Evaluation criteria and justification*

This mechanism aligns strongly to the visions of the LEP, and directly takes into the consideration the need to *deliver affordable, clean heat and power*, and recognises the importance of *unlocking further growth across the marine and maritime cluster*, both of which can be achieved through the deployment of smart, renewable technologies. If a local renewable supply chain is also developed as part of this strategy, LEP visions to *boost productivity across businesses and industries* will also be met.

The above strategy will address the visions of the LEP across a variety of timeframes, where developing an initial evidence base can be seen as an immediate action to inform longer-term deployment measures. This mechanism will also have the additional benefit of increasing the operational capacity of the regions ports generating economic growth, whilst also supporting further investment in renewable technologies. The potential to develop regional skills and job opportunities through harnessing local research and innovation could great new wealth alongside new economic growth.

	<b>Smart port initiatives</b>
<b>Strategic fit</b>	High
<b>Deliverability</b>	Medium
<b>Economic outcomes</b>	High

<b>Project development timeframes</b>	High
<b>Value for money</b>	Medium

#### *Risk register*

The main risks associated with the deployment of smart port initiatives and maritime technologies stem from the need to identify appropriate sources of finance. The degree to which appropriate streams of finance can be identified is largely dependent upon the successful creation of a multi-year implementation plan, which will help to highlight the benefits associated with clean maritime technologies through the creation of regional demonstrators.

Inadequate stakeholder engagement will also affect the regional deployment of smart initiatives and technologies. Development of a clear technology roadmap will therefore work to mitigate this risk, allowing regional supply chains to be created to facilitate such regional transitions.

	<b>Maritime and maritime technology</b>	<b>Smart port initiatives</b>
<b>Financial</b>	Securing finance	Securing finance
<b>Stakeholder</b>	Inadequate engagement strategies will prevent uptake and willingness to install renewable technologies.	Unfamiliarity of smart port initiatives and their application may prevent regional deployment.
<b>Technical</b>	The availability and maturity of renewable technologies to support marine activities may hinder deployment rates.	The cloud-based technology required to deploy smart port initiatives may act as a technical barrier.
<b>Economic and Commercial</b>	Strength of the local renewable supply chain will determine ability to drive regional skills	Due to the cloud-based nature of smart port initiatives, questions remain over the potential to

	and job creation.	upskill regional work forces.
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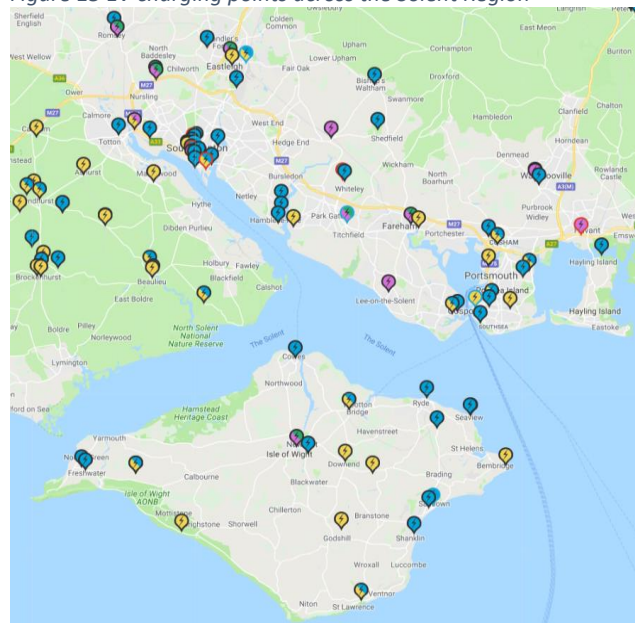
TRANSPORT

Summary

A number of identified opportunities in the Solent region relate to transport. These include new infrastructure, new public transport solutions, and new transport policies. The principal opportunities for Solent are the deployment of an EV charging strategy and mass transit systems.

<b>EV charging strategy</b>	Facilitate the regulation of EV charging infrastructure together with a strategy for rollout across the Solent. This includes identifying existing infrastructure and future smart expansion opportunities across the South West, including EV charging points on motorways. This project would touch on different key themes such as deployment, policy and regulation, leadership, knowledge-sharing and best practice.
<b>Mass transit systems</b>	The development of an integrated mass transit system that shortens journey times, removes commuter traffic from the regions roads, and creates a platform for closer economic integration.

Figure 15 EV charging points across the Solent Region<sup>14</sup>



Source: <https://www.zap-map.com/live/>

Route to delivery and timeframes

The delivery of the EV charging strategy could be done in different steps:

- Initial mapping/assessment of existing charging points across the study area to identify gaps in provision
- Feasibility study to assess different deployment scenarios across the Solent region, and opportunities to link up with shared SW Energy Hub strategy
- Communication strategy to inform and engage consumers about current and future EV charging opportunities within their district

The above strategy could be deployed as a shared strategy in collaboration with the SW Energy Hub and therefore draw on the expertise and resources that will be available through the hub.

The government is providing substantial funds for EV charging infrastructure:

- Government has been offering funding for local authorities to buy and install EV charge points under the On-Street Residential Charge point Scheme since 2016
- £400m Charging Investment Infrastructure Fund to finance improved electric car infrastructure. The fund is set to be made up of £200m from the government together with £200m in private investment
- £100 million for consumers purchasing EVs

<sup>14</sup> Isle of White (19), Portsmouth (10), Southampton (19), Gosport (2), other locations in Solent Region (29). Total 79. Some charging points provide multiple chargers



- £95m of Clean Growth Strategy funding to support charging infrastructure deployment.
- Electric Vehicle Homecharge Scheme, and Plug-in Car Grant, which provides up to £4,500 to help motorists make the switch to electric.

### *Evaluation criteria and justification*

This programme has a good strategic fit with the LEP’s priority vision area of accelerating the shift to low carbon transport. Transport projects contributions towards large carbon mitigation across the area, and significantly improving air quality. It will also respond to another LEP strategic priority of embracing the energy system revolution.

Further feasibility studies will be needed to assess specific project opportunities and sources of funding streams. Some aspects of this strategy such as the initial mapping of existing charging points have shorter development timeframes as they can rely on existing resources such as zap map. Establishing a collaborative cross-LEP strategy to EV charging point’s deployment would require resources that are more substantial.

	<b>EV charging strategy</b>
<b>Strategic fit</b>	High
<b>Deliverability</b>	Medium
<b>Economic outcomes</b>	Medium
<b>Project development timeframes</b>	Medium
<b>Value for money</b>	High

### *Risk register*

	<b>EV charging strategy</b>
<b>Financial</b>	Securing finance
<b>Stakeholder</b>	Coordination issues: achieving a collaborative relationship with neighbouring LEPs e.g. SW Energy Hub
<b>Technical</b>	Grid constraints

## ENERGY EFFICIENCY FOR HOMES & RETROFIT

### *Summary*

Domestic energy consumption across the region was, in 2015, 11.25TWh or 26% of the regions total consumption of 43.3TWh. Domestic energy efficiency can therefore play a substantial role in reducing the Solent’s energy use and carbon emissions, and help reduce fuel poverty whilst also generating jobs and economic growth.

<b>Domestic Energy Efficiency Mapping</b>	Map areas across the Solent where properties are suitable for energy efficiency retrofit. Carbon Saving Communities Obligation (CSCO) mapping from The Environment Centre in Southampton, have already taken place across the region, and should be used to support future mapping.
<b>Whole-House Retrofit &amp; Energy Efficiency</b>	Deployment of measures to improve domestic energy efficiency across the region. Focused on those areas identified in prior mapping studies.

Local authorities in the Solent can play a facilitating role in encouraging and supporting domestic energy efficiency retrofit programmes. Such programmes can deliver material reductions in regional domestic energy consumption.

Initial activity should focus on the development of an energy efficiency retrofit mapping tool to identify those houses that require EE improvement and by doing this the retrofit potential in the region. Opportunities should be grouped together in to cost-effective programmes of work.

The Environment Centre in Southampton has started to map Southampton housing stock to identify the stock which is most in need of domestic energy efficiency improvement.

There is scope to expand the ECS tool to cover the whole of the Solent region. To gain access to the datasets used to develop such mapping studies, the LEP will have to work closely with local authorities to ensure the correct information is obtained. Annual energy efficiency data can also be accessed through government publications.

Output from this mapping exercise should inform the delivery of one programme, or an aligned group or programmes focused on, whole-house retrofit across the Solent region. During procurement, consideration should be given to the provision of ‘bundled energy efficiency measures’ that will be deployed at the same time to the whole-house. This is expected to deliver better cost-efficiency than would be achieved through procurement of individual technology contracts.

Such approaches will reduce delivery costs and improve supply chain efficiencies. Roll out should be prioritised based on an assessment of multiple benefits: cost-effectiveness, reduction in fuel poverty, total energy reduction.

### Route to delivery and timeframes

Assuming the initial mapping exercises can build upon the previous work completed by the Environment Centre, with a view to expanding current mapping extents to cover varying local authorities across the whole Solent region. Initial activity could be focused on collaborative working with local authorities, to identify the required data-sets to conduct mapping studies.

The delivery of measures to increase domestic energy efficiency can be financed by central government initiatives:

- Up to £3.6 billion has been set aside through the Energy Company Obligation (ECO).
- Additional expected funds of £184 million out to 2021 will contribute towards research and development into innovative heat and energy technologies. Possibly an opportunity for the Sustainable Energy Research Group at Southampton.

Central government funding of this nature also has the potential to stimulate additional investments from local partners and the private sector. The creation of a localised partnership with developers, local authorities and energy providers to obtain funding should be considered an option.

The LEP should communicate the increased levels of employment, economic growth and skills development that will be created to draw in additional funding streams and develop a sustainable funding proposal.

### Evaluation criteria and justification

Improving domestic energy efficiency delivers on a number of LEP priority visions, including: to *deliver affordable, clean heat and power, alongside boosting productivity across business and industry*. It directly serves to:

- Reduce carbon emissions
- Tackle fuel poverty
- Reduce energy and water demands
- Reduce energy costs and increase levels of disposable income
- Increase job opportunities and skills development through installation processes

	Whole-house retrofit & energy efficiency	Domestic energy efficiency mapping
<b>Strategic fit</b>	High	High
<b>Deliverability</b>	High	High
<b>Economic outcomes</b>	High	Medium
<b>Project development timeframes</b>	Medium	High
<b>Value for money</b>	High	Medium

### Risk register

The key risks that need to be considered as part of this initiative are associated with obtaining appropriate sources of finance. Effective and open stakeholder engagement between partners to highlight the benefits of such a scheme will therefore be vital. Risks can begin to be reduced through the effective mapping of priority and suitable areas across the Solent region, to provide a stern business case behind retrofit interventions.

	Whole-house retrofit & energy efficiency	Domestic energy efficiency mapping
<b>Financial</b>	Securing sufficient finance	
<b>Stakeholder</b>	Inadequate stakeholder engagement	Sourcing appropriate data
<b>Technical</b>	Suitability of regional housing stock	

<b>Economic</b>	Lack of emerging sectors/businesses	
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	It is estimated the water around the island has the capacity to generate over 200MW of energy with current technology. There is potential for a pilot scheme to ascertain what technologies are commercially viable, and whether the resource can suitably contribute to The islands energy mix.
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## MARINE RENEWABLES

### Tidal

#### Summary

In the UK tidal energy is less developed than other renewable sources. The Solent has large potential tidal resources and keenly interested stakeholder groups in Southampton and the Isle of White.

A cost-effective deployment case for tidal is likely to remain challenging, particularly when considered in the context of consistently improving economics for other forms of renewable energy (e.g. offshore wind) and a clear prioritisation of wind in the National Infrastructure Assessment.

That said, the business case for Solent tidal should be examined, particularly as some project costs might be shared with other infrastructure development opportunities (e.g. a mass transit system), and also because of the Solent substantial maritime and marine engineering capabilities.

If a favourable economic case is proven then this could be a future new growth opportunity for the region.

<b>River Itchin Barrage</b>	This project would use an existing railway bridge as the location for turbines in a stream or impoundment barrage. Although the idea has support from high-levels of local government in the Solent, there is a need for a feasibility study to identify and appraise the suitable options in detail.
<b>Isle of Wight</b>	Feasibility studies have identified the coastal waters to the south of the island as the most promising area for tidal development in the Solent, with a peak flow of between 2-2.25m/s.

#### Route to delivery and timeframes

The route to delivery for tidal generation is similar to other renewable projects. A feasibility study needs to be followed by techno-economic and commercial feasibility studies alongside an environmental impact assessment, feeding into a detailed project development plan. This is then followed by a planning application, which can include a lengthy period of amendments before approval and construction.

Stakeholders include: local authorities, the DNO, the Environment Agency, environmental/biodiversity groups, local residents, and maritime companies that might operate boats in the area.

There are no government funding streams specifically for tidal energy projects. However, as part of the Clean Growth Strategy up to £557m is available for less established renewable electricity projects. Developers will compete for the funding in Contracts for Difference auctions, the next of which is scheduled for spring 2019.

#### Evaluation criteria and justification

Tidal energy generation fits closely with the LEP strategic aims of boosting the region's economy through developing advanced industries and new skilled workforces, whilst simultaneously providing clean energy.

As a technology, tidal has been commercially proven elsewhere in the UK (e.g. Wave Hub in Cornwall, Stangford Lough in Northern Ireland, Pentland First in Orkney). Deployment learnings from technology overlaps with the offshore wind sector such as electrical systems and undersea cabling, could speed

up the delivery process, reduce infrastructure costs and provide engineering expertise.

	River Itchin Barrage	Isle of Wight
<b>Strategic fit</b>	High	High
<b>Deliverability</b>	High	Medium
<b>Economic outcomes</b>	Medium	High
<b>Project development timeframes</b>	High	Medium
<b>Value for money</b>	Medium	Low

### Risk register

	River Itchin Barrage	Isle of Wight
<b>Financial</b>	CAPEX requirements	CAPEX requirements
<b>Stakeholder</b>	Community benefit uncertain	Multi-stakeholder complexity
<b>Technical</b>	Environmental sensitivity	Environmental sensitivity
<b>Commercial</b>	Grid constraints delay connection	Difficulty in competing with cheaper wind

## Offshore Wind

### Summary

Offshore wind is a rapidly growing sector in the Solent (e.g. Southampton, Fawley) and the wider South Eastern region. The closest channel development is Rampion Wind Farm, which has a nameplate capacity of 400MW.

A new round of Crown Estate allocations for offshore wind leasing of seabed rights are expected to be released in late 2018 or early 2019. It is anticipated that new offshore wind sites will be created, driving considerable sector growth, including in the Solent.

The Solent needs to ensure that its infrastructure, skills and supply chain are ready to capitalise on this economic opportunity.

<b>Offshore Wind Skills Hub</b>	<p>Building on existing skills development infrastructure will capture future business and sectoral growth.</p> <p>The Solent LEP has already funded The Centre of Excellence for Composites, Advanced Manufacturing and Marine on the Isle of Wight, which is an industry-led skills centre for 600 students. The National Composites Centre has also seen collaboration between MHI Vestas and Bristol University. With the new MHI Vestas Fawley site, there is potential to extend this collaboration and create linkages with MHI Vestas and Southampton and Portsmouth universities. This could occur through the creation of a new Centre for Excellence focused directly on future workforce development for offshore wind.</p>
<b>Supply Chain Development</b>	<p>Offshore wind represents a large, untapped source of business for many SMEs in the Solent. These businesses are often unaware that they could supply components and materials necessary for wind farm construction, and consequently are missing out on being part of the supply chain.</p> <p>The proposal is to create a network of businesses, and to map out the market opportunities for offshore manufacturing in the sector, matching them with businesses in the Solent.</p>

### Route to delivery and timeframes

The Solent has had recent successes in establishing itself as a centre for wind turbine production. These

### Evaluation criteria and justification

initial steps provide an anchor point for wider offshore energy **Supply Chain Development**. Local supply chains reduce offshore development, delivery, maintenance & servicing timeframes; and retain wealth in the region.

Foremost is MHI Vestas Offshore Wind's new painting and logistics facility at the former Fawley Power station, which aims to provide 50 new jobs. This has been accompanied by GE Renewable Energy submitting an application to Southampton City Council for a wind turbine research and development hub at the former Vosper's shipyard site in Woolston. However, this can be extended, and there should be an encouragement to SMEs in the region to work with and support these new larger developments.

It is likely that by strengthening the supply chain, deployment projects may well follow.

For the delivery of a new **Solent Offshore Wind Skills Hub**, a key initial step will be to identify skill gaps, what transferable learning could be maximised from other sectors or regions, and then produce a forward plan to develop needed skills, expertise and capabilities. Consideration should also be given to working with other local enterprise partnerships to strengthen the UK's offshore wind capabilities (e.g. Humber LEP).

There will also need to be a funding assessment, feeding into a detailed project development plan that outlines expected uptake and demand.

In order to take forward these opportunities to completion, strong stakeholder engagement will be needed:

- For the Solent Offshore Wind Skills Hub, key stakeholders could include: local authorities, universities (including those outside Solent, such as Bristol), MHI Vestas, GE Renewable Energy, offshore wind developers and supply chain businesses involved in deployment, SMEs, local schools and colleges, the Solent Universities, and the Advanced Composite Centre.
- For the supply chain development project, these include: local authorities, offshore wind developers and turbine manufacturers, local SMEs and potential component manufacturers, and brownfield site landowners.

These two projects align well with the LEP's strategic aim of developing new, clean and affordable energy, whilst also boosting regional productivity and growing economic activity through developing a new sector.

Recent big wins for the offshore wind industry in the Solent, alongside the existence of Solent skills projects, have strengthened the deliverability and reduced the development timeframes for a supply chain and accompanying skilled workforce. In addition, given the expected growth of the sector on the back of newly demarcated waters for development by the Crown Estate, there are positive economic benefits that this investment in the sector can provide.

	Skills Excellence Hub	Supply Chain Development
<b>Strategic fit</b>	High	High
<b>Deliverability</b>	High	High
<b>Economic outcomes</b>	Medium	High
<b>Project development timeframes</b>	High	High
<b>Value for money</b>	Medium	High

### Risk register

	Skills Excellence Hub	Supply Chain Development
<b>Financial</b>	Funding requirements	Funding requirements
<b>Stakeholder</b>	Connections with industry	Planning permissions for new farms constrained
<b>Technical</b>		Lack of workforce
<b>Commercial</b>	UK and European competition (Northern Ireland and Denmark)	UK and European competition (Northern Ireland and Denmark)
<b>Economic</b>	Sector weakens	Sector weakens

## 9. CONCLUSION

This work seeks to provide a strategic direction for the future of heat, power and transport through to 2050, within the context of raising productivity and supporting economic growth.

There is a substantial opportunities within the Solent to accelerate regional transformation of the energy system. Solar generating capacity stands at 337 MWs and there is a pipeline of 116MW in additional generating capacity. So the Solent could easily add 30%, and maybe as much as 50%, to its solar generating capacity in the next 5 to 10 years. There are also more than 20 district heat network opportunities across the Solent that could generate in excess of 120MWth.

Some 29% of the Solent's existing generating capacity is renewable or low carbon, and in 2015 produced 11% of the regions energy. With a strong identified pipeline of clean energy projects and ambitious execution possibly 35% to 40% of the regions 2025 generating capacity could be from such sources.

Great opportunities exists to improve productivity through reduced energy use. By 2050 the Solent could reduce its energy use to 34.3 TWh p.a., a 21% reduction on today's 43.5 TWh p.a. And a much higher proportion of energy will be from clean sources. Adoption of Science Based Targets could be used to set phased reduction targets that stimulate decarbonisation and signal renewables expansion to 2050.

Given the Solent's existing renewable energy generation capacity (e.g. solar, waste heat) and recent foreign direct investments in wind energy manufacture, it should look to encourage local growth in clean technology industries.

Alongside energy system improvements there are needed infrastructure improvements to transport (e.g. rail links, smart roads, electric vehicle charging) and digital connectivity. These infrastructure improvements play key roles to enable technology transformation, improve economic growth and productivity, reduce energy use and carbon emissions,

and also enhance quality of life (e.g. improved air quality, home working, reduce work related stress).

The Solent has many strategic capabilities of UK importance. Often these capabilities are supported by the UK Centre of Excellence, making the Solent home to world class academic or industrial capabilities.

These capabilities present to Solent with an outstanding platform for future economic growth, particularly in markets for:

- Maritime and marine
- Smart ports
- Vehicle automation
- Aerospace and satellites
- Digital including cybersecurity and Blockchain
- Composition materials
- Life sciences

In such markets the Solent can seek to take economic advantage and set market ambitions to reduce energy and resource use (e.g. Southampton University's work on low carbon vessels).

The Solent's universities, the LEP and local authorities each have their own services focused on attracting or supporting new enterprise. These building blocks of enterprise support and the Solent's strategic capabilities could be brought together as a common entrepreneurial platform to support innovation, incubation and enterprise growth. This accords with the approach taken by central government to foster UK strategic technology innovation in key markets (e.g. offshore wind). The Solent could use this platform to identify and stimulate medium term sources of GDP and GVP growth, skills development and job creation.

Finally the Solent should examine how it can co-operation with neighbouring LEPS, central government and industry and UK wide challenges such as electric vehicle charging infrastructure or building standards.

## 10. APPENDICES

### Appendix A – Baseline Forecasts

The following scenarios have been used as a template for the forecasted energy consumption, these are in line with National Grid's Future Energy Scenarios.

Business as Usual	<ul style="list-style-type: none"> <li>No improvement in efficiency or further grid decarbonisation</li> <li>Energy consumption continues to rise in line with growth in GVA, population, and home and vehicle numbers</li> </ul>
Slow Progression	<ul style="list-style-type: none"> <li>Long-term environmental strategy</li> <li>Reduced prosperity to deliver green ambition</li> </ul>
Two Degrees	<ul style="list-style-type: none"> <li>Environmental sustainability is a top priority</li> <li>Strong economy and prosperity to deliver green ambition</li> </ul>

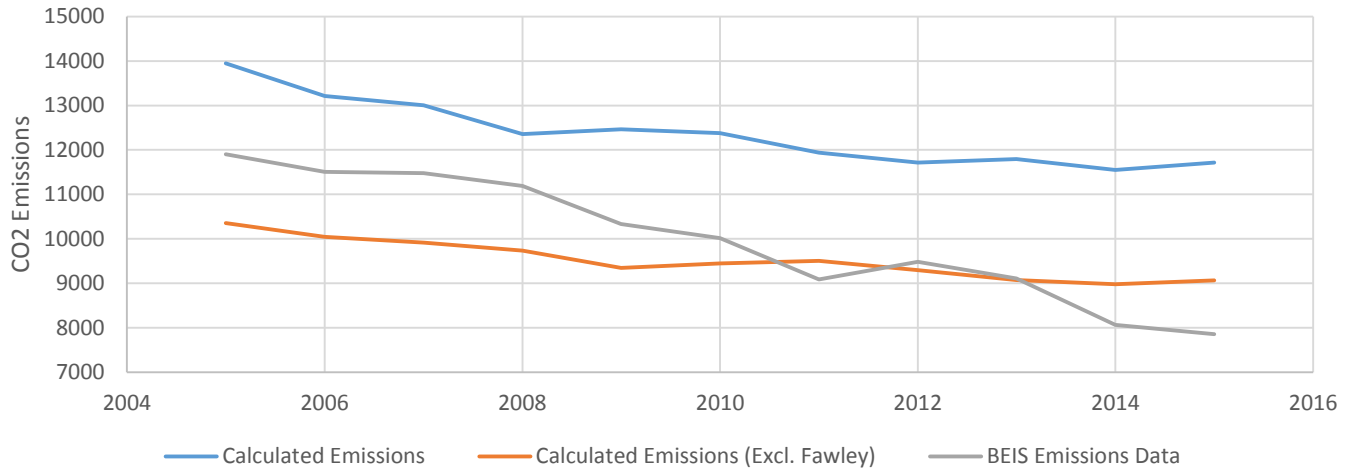
Several assumptions were built in to the business as usual model in order to predict energy consumption up to 2050, it should be noted firstly that where possible each energy user had their consumption normalised, and then these trends were projected forward. This was done to ensure that energy consumption follows regional demographic trends. These normalisation factors are summarised below:

Energy User	Normalisation Factor
Domestic electricity and gas	Number of households
Commercial and industry consumption	GVA
Road transport	Vehicle numbers
Coal consumption	No normalisation factor
Rail transport	Static – no change in consumption

It is assumed that fuel consumption will increase/decrease in relation to their normalisation factor. However, it is assumed that coal usage will continue its gradual phasing out, it is also assumed that no new rail will be built and train stocks will remain the same and hence no change in rail fuel consumption.

### Appendix B – Esso Fawley Refinery

The Esso Fawley refinery is a major player within the Solent region in terms of energy consumption, emissions and contribution to regional GVA. However, data sources vary in their inclusion of the refinery. Final total energy consumption by local authority data as produced by BEIS include the refinery; this vastly skews the data for both petroleum and manufactured fuels consumption. BEIS data on UK local and regional CO2 emissions data does not seem to include emissions relating to the refinery. This then filters through to the results presented within this report. A brief analysis of the emission data produced by BEIS and derived emissions using simple emission factors and BEIS energy data confirm that the BEIS emission data is unlikely to include the Fawley refinery.



It is clear from the above graph that BEIS Emissions data more closely matches energy consumption derived emission data that excludes Fawley (commercial and industrial petroleum products and manufactured fuels consumption within the New Forest local authority).



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