

BUROHAPPOLD  
ENGINEERING

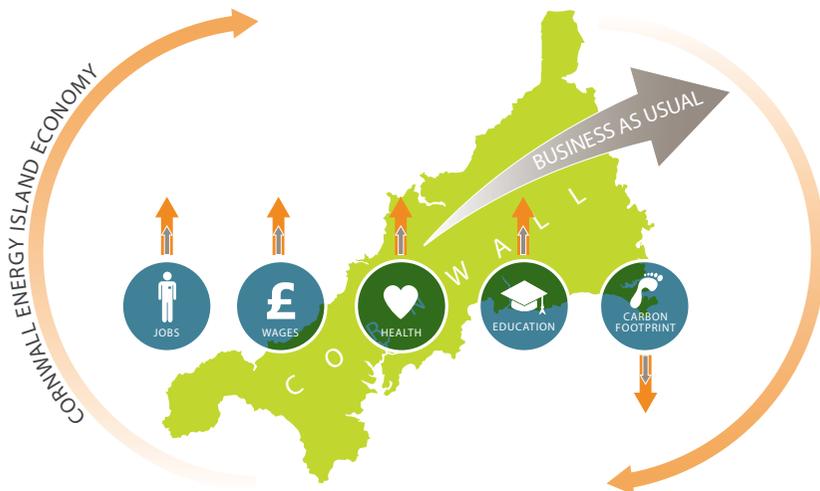
# 1. EXECUTIVE SUMMARY

# EXECUTIVE SUMMARY

This report defines the key actions required to deliver a Cornish Energy System that could lead to more jobs, higher wages, better health, more educational opportunities and a lighter carbon footprint for the region. We explored this through our 'Energy Island' approach, which involved conceptualising Cornwall as an island to explore potential solutions with stakeholders and define key drivers, barriers and actions required to achieve an Energy System that benefits the Cornish economy.

This process and its resulting strategy framework can be exported to other 'island' economies or regions struggling with a plan for their energy future.

**Cornwall is at a crossroads between a Business as Usual pathway and an Energy Island pathway. A Cornwall Energy Island economy can have improved outcomes for jobs, wages, health, education and carbon footprint.**



This report summarises the outcomes of the event held in March 2015. We hope that it can be of value for supporting the public discussion of Cornwall's energy future, in the context of the Devolution Deal and the ongoing momentum towards energy being part of strengthening Cornwall's economy.

Energy is essential to provide our daily needs and power economic activity. However, our current energy systems are primarily fossil fuel based, contributing to more than 50% of global GHG emissions. Making a transition to a low carbon energy system requires each locality to make the most of its renewable energy resources, reduce demand, and invest in infrastructure.

Fossil fuel energy could become more expensive, as we turn to inaccessible resources such as tar sands and shale gas. Many places are reliant on imported energy, often from far away. This leads to a flow of wealth out of the local economy, as well as reduced resilience.

These dynamics are particularly visible in islands, and the technical constraints that isolated land areas face are often met with ingenuity and innovation.

We wanted to explore how island thinking can promote creativity and support economic development in the peninsula of

Cornwall – a context which is not quite an island but can easily be conceptualised as one. By using the Energy Island metaphor, Cornwall can improve its economy by becoming self-sufficient in energy and exporting surplus to the 'mainland'.

We believe this approach can also be applied in many contexts: in a true remote island, in land-locked rural areas and even in some city-regions. Each will bring its own challenges and constraints, and reveal different interdependencies.

Starting at the local level allows the possibilities to be explored in the granular detail that enables action. It raises the level of understanding of local stakeholders and brings them together as a coalition of advocates. It also reveals the changes that are needed at a higher level:

- Regional trade and collaboration
- National policy and regulatory changes
- International electricity interconnectors
- Global climate change agreements
- Sharing of innovation taking place in different localities.

The Energy Island approach can be powerful in many contexts, considering both top-down and bottom-up approaches, focusing on the local without being parochial.

## The Vision

The seven actions below take us along the journey towards *harnessing Cornwall's renewable resources to halve energy costs and double new jobs by 2030*.

### 1. Create a powerful vision for a Cornwall Energy Island future:

Stories are powerful, and this story should be told consistently by Cornwall Council, the LEP, community energy groups, businesses investing in the region, and others, in the media and through publications and public speaking opportunities.

### 2. Build on the strength of coordinated leadership:

There are many people leading the creation of Cornwall's energy future. The involvement of a diversity of stakeholders, and the distributed nature of leadership is a strength, but greater data sharing and coordination would be valuable. Coordination activities should be valued and resourced.

### 3. Infrastructure planning:

Develop a detailed understanding of a future energy system in Cornwall to incorporate demand, generation and distribution. This study will inform a strategic plan alongside detailed research into the future management of these systems such as funding, legislation and ownership of electricity, gas and heat to address the issues of the status quo.

### 4. Train, attract and retain more skilled workers:

Through education, increased wages and increased connectivity and quality of life through improved public transport.

### 5. Just do it:

Develop a series of projects which support the actions and help to deliver project-based progress within Cornwall.

### 6. Provide funding and finance to projects:

Ensure availability of development funding, address the cost of capital, interest levels on loans, and support small projects to access larger pots of funding through aggregation.

### 7. Policy and regulation reform:

Identify the ways in which policy and regulation blocks the Energy Island vision and find solutions.

Since the Cornwall Energy Island event, the energy landscape has been changing.

- Cornwall has secured a Devolution Deal with a strong energy focus
- A number of Low Carbon projects have been funded by ESIF
- Cornwall Council has started the process of developing a Cornwall Energy Company.

It is time to decide how to interact with the direction of travel to capture the benefits for Cornwall.

## 2. INTRODUCTION

# INTRODUCTION

Adapting the existing energy system is key to Cornwall becoming richer: generating more energy locally, consuming less, and selling the excess. This leads to more jobs, higher wages, better health, more educational opportunities and a lighter carbon footprint. This could also make Cornwall a trailblazer for the rest of the UK.



**Gavin Thompson**  
Head of Energy Consulting  
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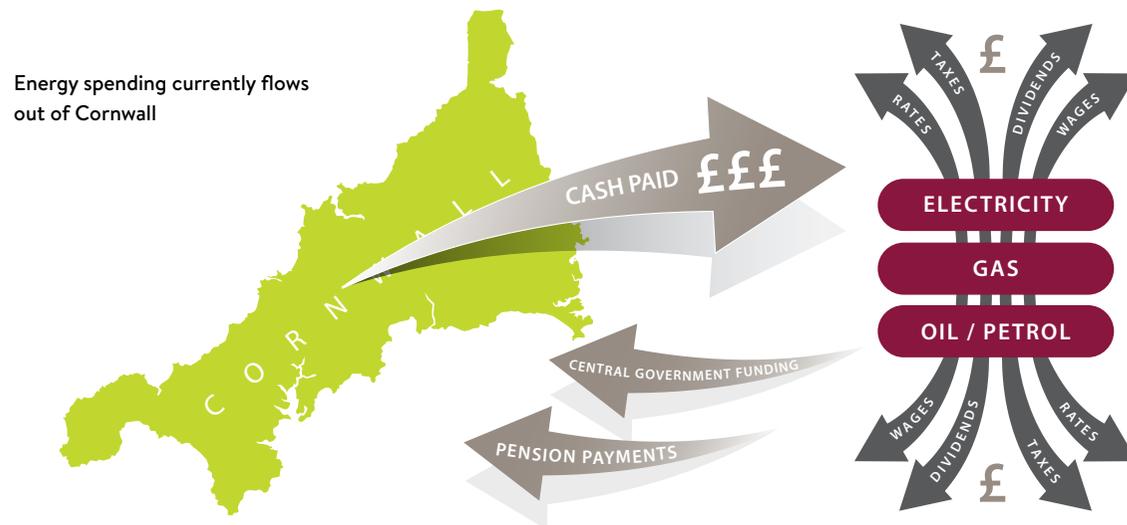
Annually, £1bn leaves Cornwall in energy payments<sup>1</sup>, which represents nearly 15% of the total Cornish economy. On the other hand, the resources, technology and finance exist to transition from a centralised system to a local, renewable, distributed and demand responsive system.

Cornwall has embraced renewable energy faster than elsewhere in the UK, with strong strategic frameworks in place from Cornwall Council and the LEP, and delivery by a wide range of partners.

This bottom-up “patchwork” approach is impressive but faces limitations. The Cornish electricity grid is now at capacity: there is no space for new renewable energy generation to connect. If new infrastructural capacity is to be released, top-down “clockwork” and end-to-end coordinated intervention is required to maximise the benefits to Cornwall’s economy. The political will exists but it needs a clear starting point and strong leadership.

In response to this context, we devised the Cornwall Energy Island project, as an exploration of what would happen if Cornwall were to become independent in energy, what the barriers and drivers for this are within Cornwall, and what actions could be taken to achieve this vision.

We see the concept of the ‘Energy Island’ as a key tool for shifting to a globally sustainable energy system. The thought experiment of energy independence or ‘islandness’, challenges us to design a system which can produce its basic needs internally, a constraint which prompts creative innovation, and frames the problem in a stimulating way.



<sup>1</sup> Communities for Renewables CIC and WREN (2013) Local Value Potential in Cornwall’s Electricity Economy, Penryn.

Energy is an essential resource in all of our lives, providing for our daily needs as well as powering economic activity. At the same time, our energy systems are deeply linked with climate change – around 50% of global Greenhouse Gas emissions are caused by energy production for heat, electricity and transport<sup>1</sup>.

As evident from the major downturn in Oil prices since June 2014<sup>2</sup>, the prices of fossil fuels are always changing, in response to a wide range of factors including geopolitical shifts. Increasing energy independence leads to greater local resilience to these fluctuations, and is therefore valuable as a long term strategy.

Many places are reliant on primary energy imported from other parts of the world. This is a major economic ‘leaky bucket’ as wealth flows out to purchase energy, and doesn’t come back. However, places that are currently importing fossil fuels often have a rich, local, sustainable energy resource. This could be harnessed to provide local energy needs, reduce dependency on imported energy, create local jobs, and contribute to global climate change mitigation. Islands have specific characteristics which help us to see these dynamics more clearly.

They often face technical constraints – electrical connections to the mainland are limited or non-existent, the cost of increasing their capacity can be prohibitive, and the cost of importing fuels is high and unpredictable. Economic flows in and out of an island can be more easily identified than those in mainland communities.

**‘Islandness’**

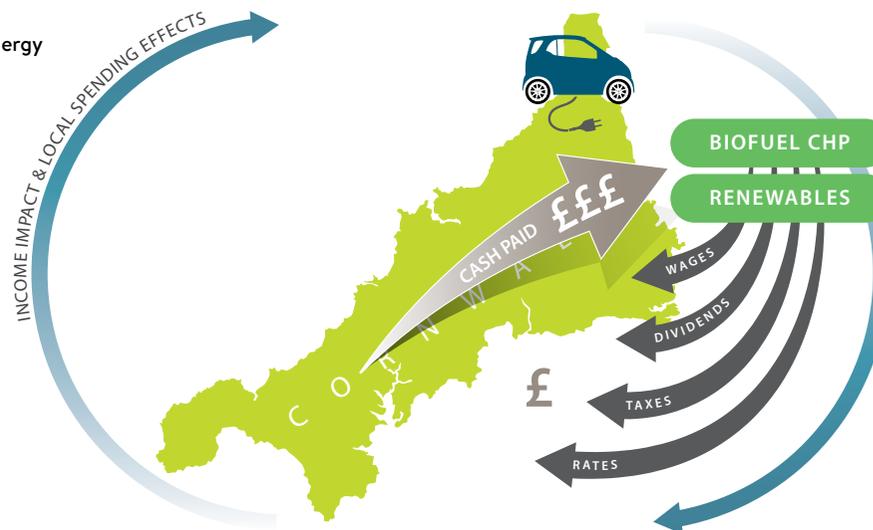
It is easier for an island to have a human scale sense of identity, to have a simpler governance structure that can get on with doing things without getting bogged down in political processes. Island communities often have a culture of local resilience and

self-sufficiency, born of necessity. There has been much energy innovation coming from ‘islands’ in recent years.

Examples include:

- Active network management and demand response experiments in Orkney, Shetland and Eigg where the mainland electricity grid connection is an important constraint
- Combined wind and solar PV generation on Pellworm off the North East coast of Germany
- A 100% renewable energy plan for El Hierro, part of Spain’s Canary Islands.

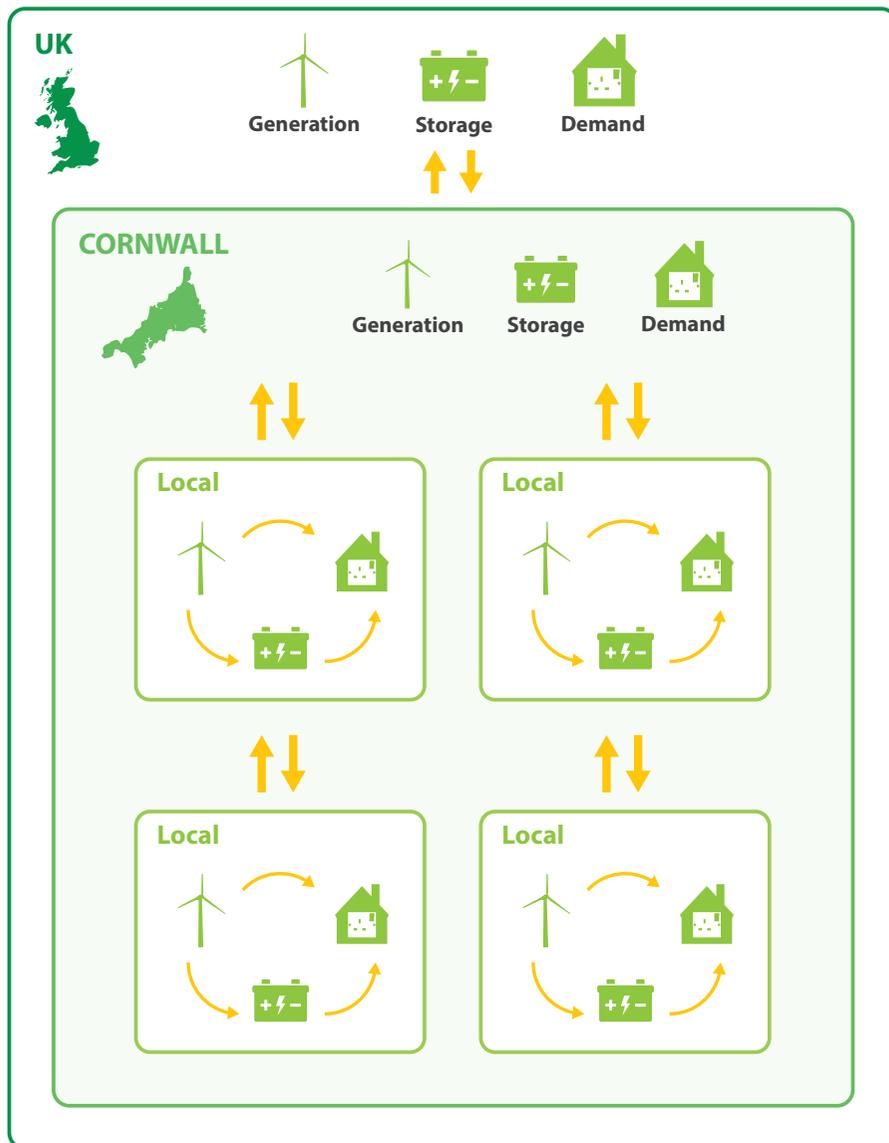
**An Energy Island can help retain energy spending in the local economy.**



1 Another 19% comes from industry, including energy and process emissions. Data from 2004, CO<sub>2</sub> equivalent, IPPC [www.ipcc.ch/publications\\_and\\_data/ar4/syr/en/figure-spm-3.html](http://www.ipcc.ch/publications_and_data/ar4/syr/en/figure-spm-3.html)

2 Oil prices have dropped approximately 70% between June 2014 and March 2016 – Source: Bloomberg.com, Brent Crude prices.

**Cornwall Energy Island as a permeable, nested system.**



The innovation taking place in these islands is often transferable to other locations where the need is less pressing, and the expertise developed in islands can provide a source of economic value for island nations.

The metaphor of an island gives us a boundary that stimulates creativity, but this boundary can also be permeable. An island can be connected to the mainland. In fact, a peninsula or a city can be treated as an island within an island. Electricity flows through interconnectors, and with island thinking we aim to minimise this flow, or to time it in such a way as to provide maximum economic value for the island itself. When we think of an Energy Island as a ‘nested’ system, with governance and infrastructure boundaries aligned with each other, the local, regional, national and global systems each play their role.

**Why Cornwall?**

The peninsula of Cornwall is rich in renewable resources, with the highest levels of sunshine of the UK, and good potential for marine energy from the Atlantic. The local governance structure is relatively simple, with only two Unitary Authorities, Cornwall and the Isles of Scilly, both covered by one Local Enterprise Partnership. Cornwall has a history of independence and a strong

cultural identity, with Cornish as a second official language. This independence was recognised in July 2015 with a Devolution Deal for Cornwall. The low population density and dispersed settlement pattern provides both challenges and opportunities: high levels of fuel poverty and off gas properties with substantial room for improvement, difficult public transport provision, and space for onshore renewables such as wind and solar farms.

The Cornish peninsula is in many ways remote from the rest of the UK, and although it is not a true island, it experiences many of the constraints of an island. The island metaphor works well in Cornwall, and its connectedness makes it a good case study for applying island thinking to mainland situations, and considering the island as part of a nested system, playing an important energy generation role in relation to the rest of the UK.

**Setting up the workshop**

To understand the potential for Cornwall to benefit from a greater level of energy independence, we set up a self-funded partnership with the Eden Project to invite a wide range of stakeholders to participate in defining the key constraints, drivers and actions to achieving a sustainable energy system in the region. This took the form of

a two day workshop at the Eden Project, held in March 2015, providing a platform for local people to explore the future of Cornwall's energy landscape.

### A place of energy innovation

This workshop is just one step in a rich heritage of energy innovation in Cornwall, which has been ongoing for many years. The Smart Cornwall Vision, Communities for Renewables, Community Power Cornwall, Community Energy Plus, the Cornwall Sustainable Energy Action Plan, the Green Cornwall Programme, the Cornwall Renewable Energy SPD, the LEP Strategic Economic Plan, and many more projects and events have built a strong community of action and fertile ground for taking things forward. Working closely with the LEP, Local Nature Partnership, Cornwall Council and others, we built on this foundation to boost momentum and create a plan of action for an Energy Island for Cornwall.

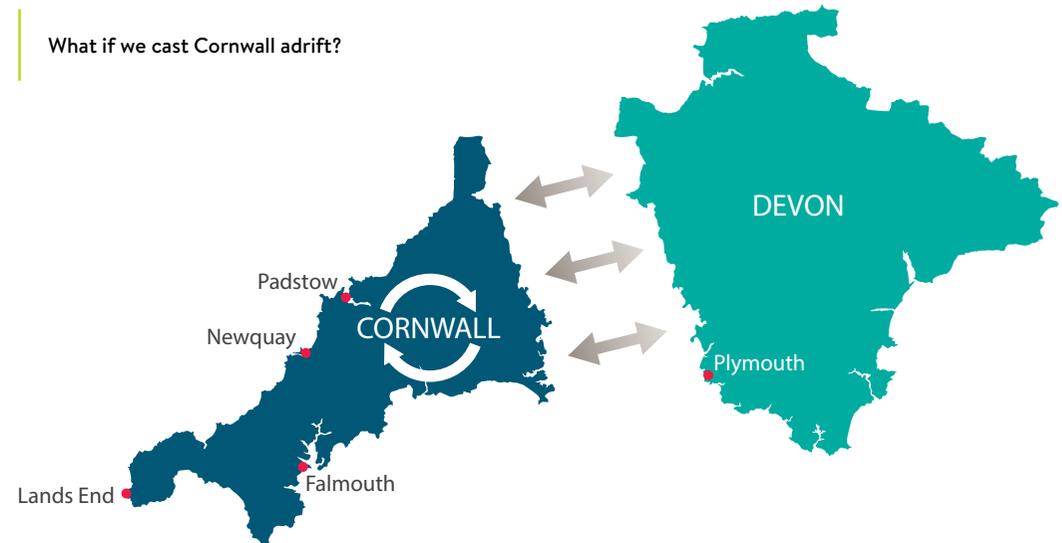
### An exciting engagement

The workshop was attended by approximately 130 participants, from a variety of backgrounds and perspectives, including local government, energy sector, community and church representatives, landowners, academics, think tanks and consultants, charity, mining and transport.

During the two days, participants listened to inspiring keynote speeches and shared knowledge through informational talks. They then worked in smaller groups, of similar or different stakeholders, to explore the **achievable level of supply and demand** through a 'power games' session. Next, was to identify Cornwall's specific barriers and strengths and barriers for achieving an Energy Island vision, and key actions that could move the agenda forward.

The content reported on here reflects the views and contributions of workshop participants. These views are of course subjective, as no perspective on how to create change in the future will be entirely accurate. The material coming out of this workshop was rich, with a wide variety of excellent ideas in many areas. The discussion was lively, and no doubt many more good ideas would come out if the exercise was repeated or given more time. Care was taken to invite a wide range of stakeholders to participate in the workshop, but to build further legitimacy for this work in Cornwall will need wider consultation and public discussion.

### What if we cast Cornwall adrift?



“

An understanding of what is achievable in terms of local supply and demand for energy.”

## 3. OUTCOMES

The aim of Power Games, the first interactive workshop session, was to find a way to supply enough energy through renewable technologies to meet Cornwall's demand in 2030. Participants had to develop scenarios that reduced demand and increased supply to do this. This provided a technical grounding for the discussion of social, economic, political and environmental factors that really matter.

These outcomes are summarised in this section.

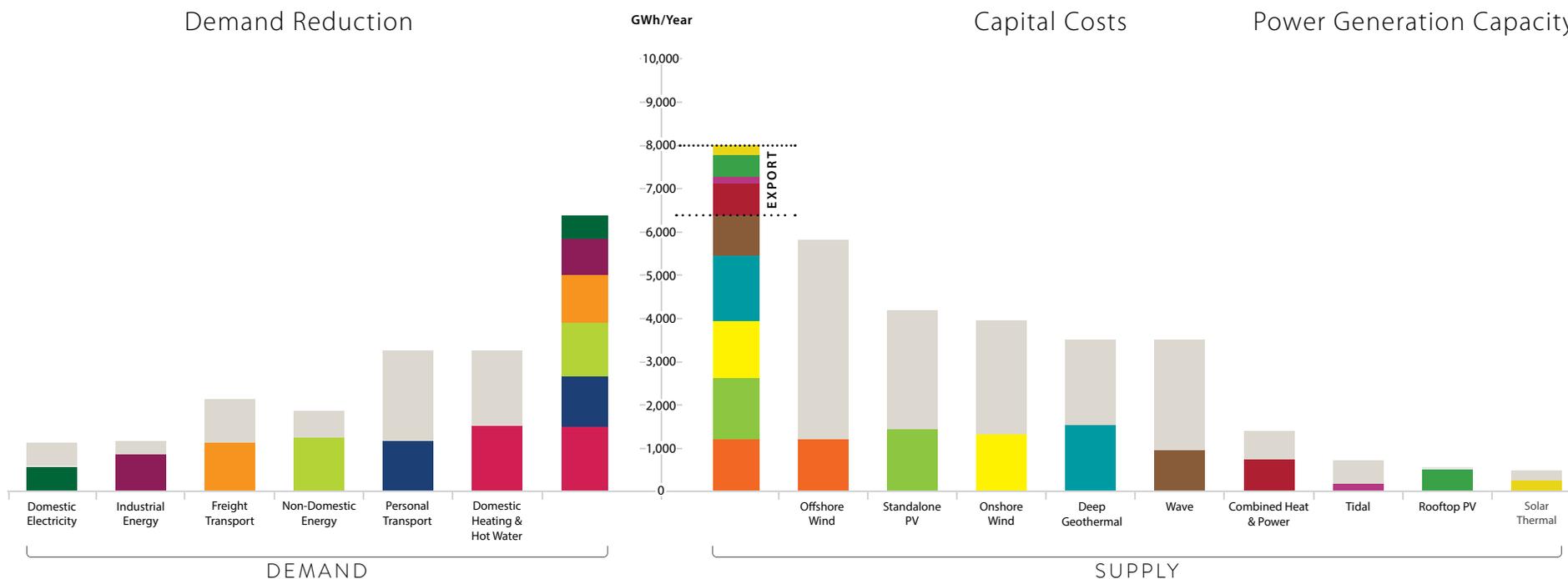
# OUTCOME: POWER GAMES

The graph below shows the average scenario developed by participants during the power games session of the workshop. The Power Games achieved general agreement to reduce demand by approximately 50% and increase supply to exceed the 2030 demand by 30%. This would lead to a net export opportunity. The consensus from the workshop was that this was a new and key finding, and an early indication of Cornwall's desire to control more of its energy infrastructure and to help the UK by exporting excess energy. For more detailed individual and group choices made and an in-depth statistical analysis please see the full [Energy Island white paper](#).

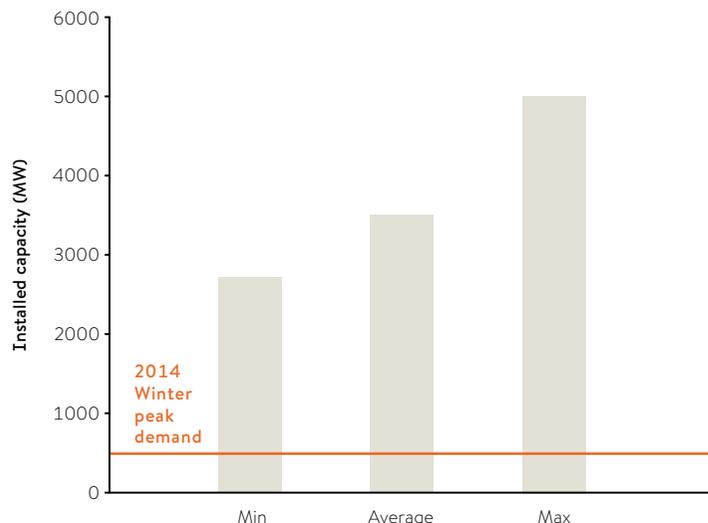
The following pages discuss the implications of this scenario for Cornwall, presenting the land and sea take, impact on grid capacity, approximate capital costs, 'islandness' and potential job creation and local economic impact.

The diagram below summarises the average scenario selected by the groups, for the whole of Cornwall. On the demand side, the grey bars show business as usual demand, and the coloured bars show the reduced demands selected by participants. On the supply side, the grey bars show the total technical potential for that technology and the coloured bars show the average level of generation selected by participants.

Scroll over the vertical bars along the bottom of the diagram to see the statistics relating to each supply and demand technology.

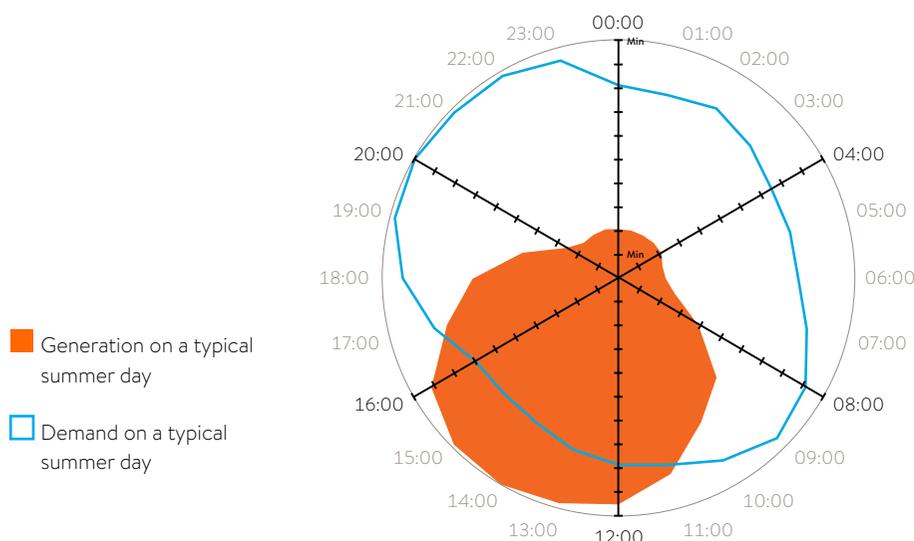


# GRID CAPACITY



Across the UK, constrained power distribution infrastructure is a major barrier to the large-scale deployment of renewable energy technology, with locally-specific effects. In March 2015, during the Cornwall Energy Island Event, Western Power Distribution announced that the electricity distribution grid in Cornwall was at capacity, and no new large-scale Solar projects would be granted connection agreements. This is primarily due to the high quantity of Solar PV generation that has been installed or has accepted connection agreement in Cornwall, and the divergence between demand and solar output in summer. *This limits the further development of the renewables sector in Cornwall.*

With grid infrastructure a key limiting factor today, it is vital to explore how the energy scenarios developed in the Power Games workshop would further exacerbate this issue. While it is unlikely that all of the installed renewable energy capacity will be operating at the same time, *the greater the difference between peak output and demand, the greater risk of excessive stress is placed on the grid.* As demonstrated above, even the minimum scenario represents an installed capacity over four times greater than the peak winter power demand.

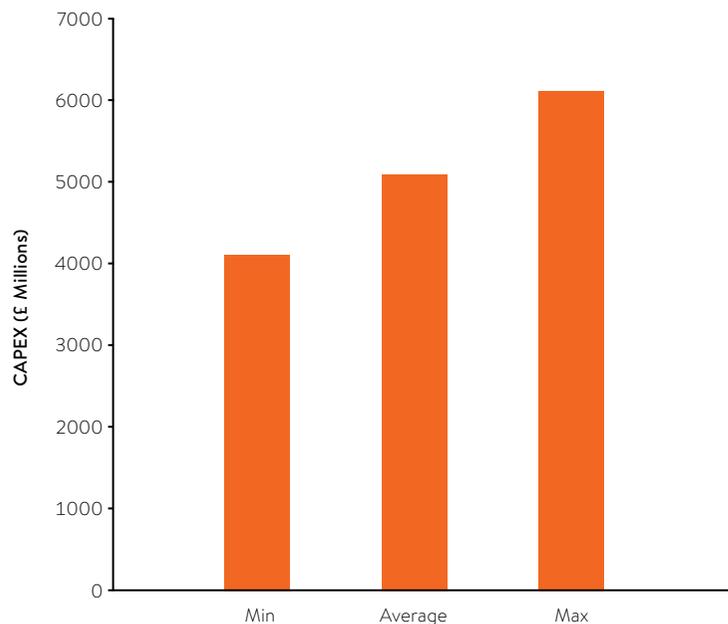


Solutions could include:

- Better matching of demand with supply, such as the Sunshine Tariff currently being trialed in Wadebridge
- Investment in batteries for storage of electricity
- Use of other energy vectors such as hydrogen or heat to store energy
- Investment in grid reinforcement to reduce local bottlenecks and increase the capacity for export of electricity from Cornwall to the rest of the UK.

This is vital for the continued development of the renewable energy sector, and requires strategic investment in infrastructure. *A clear vision and leadership is needed to enable this, due to the long procurement, consultation, funding and construction programmes often required for major infrastructure projects.*

# CAPITAL COSTS



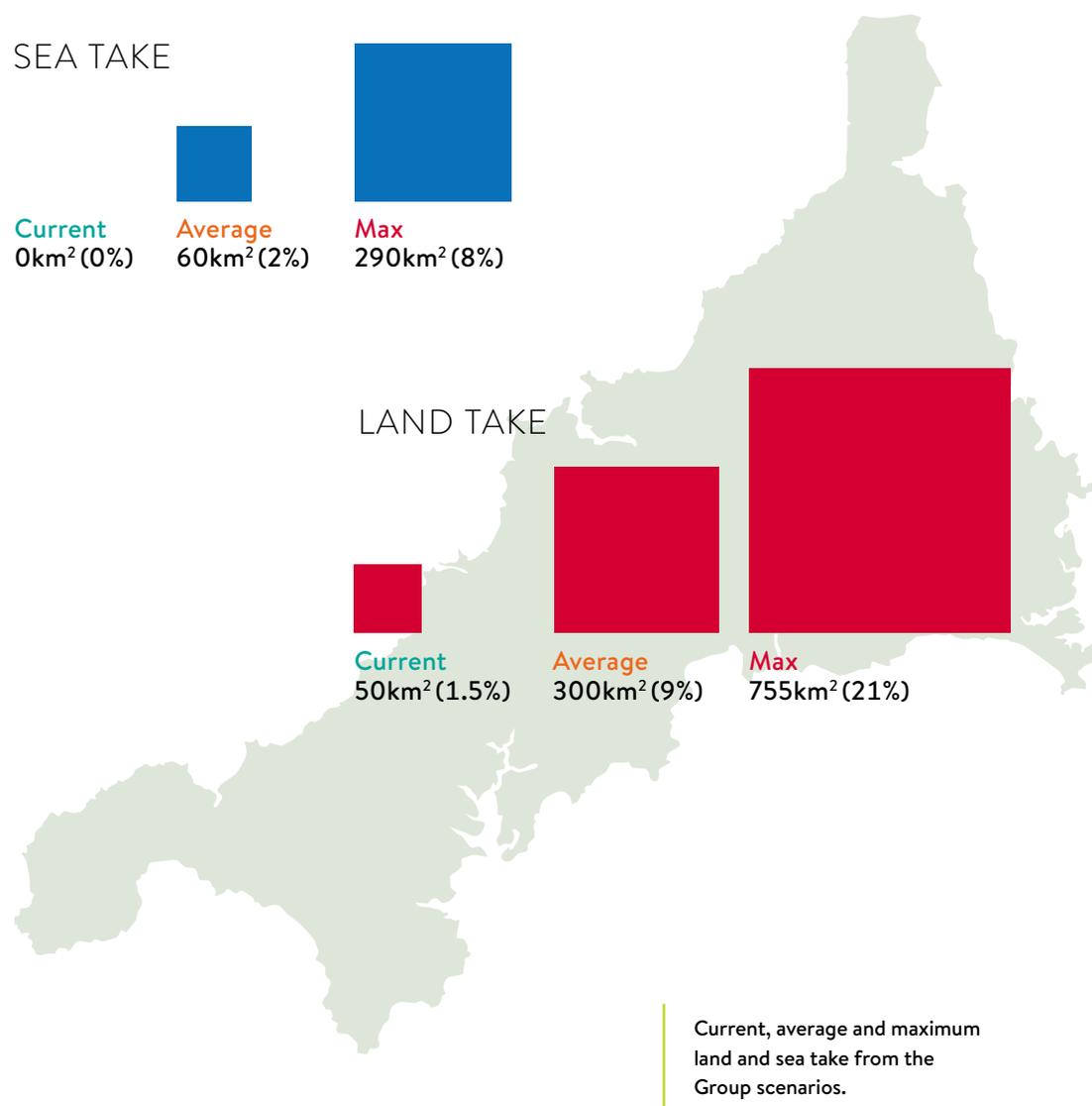
In the Power Games workshop, capital cost was not included as a metric as it was felt that comparing capital costs across renewable energy technologies of different scales and demand interventions was complex and potentially misleading. A cost-efficiency metric of £/kWh saved was used in the game, to highlight which measures delivered the best results for the least upfront investment.

The capital cost estimates for supply technologies only are presented, based on DECC Projected Costs studies<sup>1</sup>, to highlight the magnitude of capital investment required to achieve the developed energy scenarios. As a comparative reference, the entire Dept. for Energy and Climate Change 2014-15 budget was £6 billion, which is just below the maximum capital investment of all the proposed scenarios.

It is important to note that these costs include no investment associated with demand reduction, and importantly no associated costs of infrastructure investment.

<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/66176/Renewables\\_Obligation\\_consultation\\_-\\_review\\_of\\_generation\\_costs\\_and\\_deployment\\_potential.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66176/Renewables_Obligation_consultation_-_review_of_generation_costs_and_deployment_potential.pdf)

# IMPLICATIONS FOR CORNWALL LAND AND SEA TAKE



Landscape impact, from a visual and land use perspective, is one of the most controversial issues for the development of renewable energy in Cornwall. The estimated land take of currently installed capacity is 50km<sup>2</sup>, 1.5% of the area of Cornwall. It is important to understand how little area is actually taken up when discussing this sensitive issue, although this metric does not consider the impact of sight lines and the precise location of these installations.

In order to include this issue within our analysis, land and sea requirements associated with the chosen energy scenarios were estimated. While the overall objective of balancing supply and demand was achieved in all groups, the varying results in land take reflected the differing group opinions. Strong supporters of Solar PV and Onshore Wind chose scenarios which resulted in large landscape impacts, while groups aiming for an 'out of sight, out of mind' approach tended to prioritise offshore technologies with less of a visual impact.

'Sea take' is an interesting concept which raised much discussion during the session. While onshore landscape impact is often discussed, certain groups felt that the visual impact of offshore technology had not been given adequate consideration. Onshore AONB designations are a major tourist attraction for the region, but the coastline areas arguably offer even greater tourism value and it is views out to sea which would potentially be most affected by offshore technologies. Additionally, the impact on coastal areas and ports of the construction process and associated material deliveries is often overlooked.

## ‘ISLANDNESS’

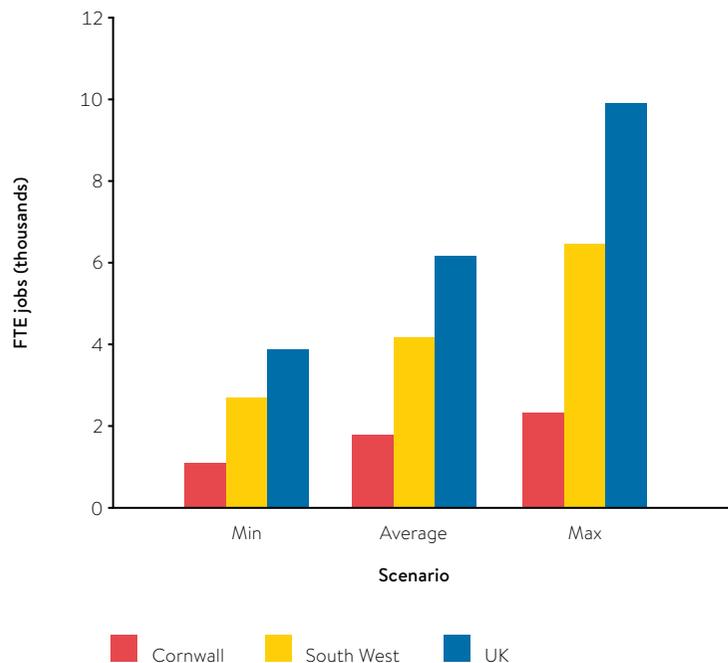
The metric of ‘Islandness’ concerns how Cornwall would interact with the UK energy system if it was set-up to generate 100% of its energy demands. This looks at how much energy is being exported or imported and at what time it occurs.

A low level of interaction between Cornwall and the UK indicates that the supply and demand profiles of the proposed energy system are well matched, i.e. a high level of ‘Islandness’. The majority of the renewable energy technologies considered in the scenarios are non-dispatchable, meaning it cannot be controlled when they generate. *For this reason a perfect supply/demand balance is not possible.* Reducing this interaction has technical benefits due to energy security, management of the grid and infrastructure reinforcement requirements.

Perhaps the more important metric regarding ‘Islandness’ is the cost/revenue impacts. Whenever there is a supply/demand imbalance, this results in an export and sale of electricity to the UK, or an import and purchase. The timings of these exchanges are important as they will affect the price of electricity whether it is being sold or purchased. Time-dependent tariffs are used to some extent within the electricity market at present, but rarely at a consumer level. With the roll-out of smart meters, this is likely to change and so the time at which energy is sold and purchased is likely to have a greater impact. By assessing at what time the various renewable energy technologies generate power (often based on weather conditions) and how this aligns with estimated demand, we were able to estimate whether it would be a profit-making or loss-making interaction with the UK energy system.

The performance of all scenarios varied greatly, driven by the selection of renewable energy technologies. For example although output from Solar PV varies significantly between winter and summer, *it only generates during daylight hours and is never generating at night when prices are lowest.* This is similar for Combined Heat and Power, as its operation is heating demand-led, which is aligned with when people are awake and using buildings and limited during the night. Wind energy however has a more constant generation profile on average over the year. This is beneficial from a technical point of view, as energy is constantly being generated, but at night when demand is low, the excess power is being exported when prices are very low and therefore revenues are poor.

# JOBS AND LOCAL ECONOMY



Job creation and local economic benefit are an important part of the Cornwall Energy Island. There is a huge opportunity for jobs: in construction and installation of renewable energy technologies, in ongoing operation and maintenance, in deployment of energy efficiency measures, particularly home fabric upgrades. The extent to which these jobs are created in Cornwall, and the level of skill and quality of work that is available, depends on many factors: skills and training within Cornwall; the extent to which the supply chain is localised and manufacturing takes place within Cornwall, and more. The impact on the local economy is also affected by the extent to which spending is recirculated within it, and the extent to which capital investment is internal or external. A local energy market and local ownership and investment would retain more of the total energy spend within Cornwall.

Due to this complexity, jobs were not represented within the Power Games. The graph on the left shows an estimate of the number of full time equivalent jobs that could be created in Cornwall, in the South West, and in the UK, based on the group scenarios from the Power Games workshop.

# 4. BARRIERS STRENGTHS AND KEY ACTIONS

In collaboration with workshop participants we developed key actions around 5 themes.

# LEADERSHIP AND GOVERNANCE

What is needed to achieve the best leadership and management?

## Key barriers and strengths

### Barriers:

- Need for more resource for Cornwall Council to play a stronger coordinating and facilitative leadership role
- Need for increased communication between leaders to enhance coordinated action
- Insufficient understanding of the different roles needed from different organisations
- Uncertainty and instability in national energy policy and regulation.

### Strengths:

- Strong strategy from Cornwall and IoS LEP and Cornwall Council, with ESIF capital to support this
- Cornwall's identity, cohesiveness and independent spirit
- Relatively simple decision making due to only two Unitary Authorities
- Widespread leadership and motivation for change in communities, businesses and other sectors.

## Key actions

Successful leadership and governance towards a Cornwall Energy Island will involve building on the existing strengths of Cornwall. This includes **strengthening the existing distributed leadership**, where each person and organisation makes the most of their capacities, and makes public statements of commitment. It also involves celebrating what is already happening, e.g. through the Cornwall Sustainability Awards.

There is also a need for **greater coordination**, as identified in the barriers. This could be achieved through increased support for the facilitative leadership role of Cornwall Council and the LEP, more sharing of knowledge with all stakeholders, and greater clarity on the roles of different organisations. The Devolution Deal for Cornwall published since the workshop, can support greater agency in Cornwall Council, which workshop participants noted was limited by central government.

Finally, committing to **a big project that everyone unites to deliver** can support the collaboration that is needed to make more ambitious change.

# INFRASTRUCTURE

How can we deliver the infrastructure we need?

## Key barriers and strengths

### Barriers:

- Difficulty for DNOs to invest ahead of demand, structure of who pays for infrastructure and how this is approached
- Grid designed to deliver energy from outside Cornwall, rather than distributed within Cornwall
- The high cost of the needed energy storage
- Issues coordinating with other infrastructure
- Lack of sufficient leadership and coordination
- Local opposition to renewable development
- Rapid changes and uncertainty in national regulatory context.

### Strengths:

- Cornish identity, independence, ambition and ownership of renewable energy
- Cornwall Council relationship with DECC, Ofgem, National Grid and Western Power Distribution to discuss long term solutions
- Technology development and innovation projects taking place, including Active Network Management, leading to new entrants and disruptive business models and availability of superfast broadband to support this
- Ofgem consultation on Quicker and More Efficient Connections, with 'next steps' published September 2015.

## Key actions

A number of themes emerged from the many actions proposed in the infrastructure session:

- The need for greater **communication** of current grid constraints and possible solutions, and sharing information with a wide range of stakeholders
- The need to **increase electricity grid capacity**, which requires a shift in regulation to allow investment ahead of demand – one suggestion was for Cornwall to be a pilot for alternative regulatory arrangements
- The need to support **electricity balancing**, through investment in storage and smart metering and data management
- The need for funding to enable studies and pilot projects
- The need for **greater local autonomy** such as a local version of DECC, prioritisation of community ownership in policy, an independent DNO, or private investment in grid infrastructure.

Some of these actions are supported by the Ofgem paper on quicker and more efficient connections published in September 2015. Cornwall stakeholders could propose to trial one of the proposed models.

All of these actions are underpinned by the need for **vision and leadership**, which was also a strong theme in this session. The Devolution Deal for Cornwall, and the ESIF funding calls under low carbon energy themes put Cornwall and IoS in a strong position to take this forward.

# DEMAND REDUCTION

What are the main challenges for significantly reducing demand?

## Key barriers and strengths

### Barriers:

- Need for collective and social approach to change, rather than an individual one
- Difficulty of changing habits, lack of understanding of the need for change, and resistance to change
- High cost of energy efficiency and lack of funding, an insufficient business case for investment in energy efficiency
- High cost of finance for energy efficiency and lack of awareness of mortgage options for funding home improvements.

### Strengths:

- Economic benefits of energy efficiency: cost competitive technology such as LED bulbs, low wage growth driving desire to save on energy, some availability of grant funding
- Council guidance on energy efficiency of historic properties, and energy efficiency advice given when buying and renting properties
- Increasing development and understanding of technology e.g. insulation and thermostats.

## Key actions

Achieving demand reduction will require **practical schemes** such as collective buying of LED bulbs, vision and leadership from the bottom up and from Cornwall Council and the LEP, and **awareness raising** on fuel poverty, the benefits of energy efficiency and climate change, through a variety of channels: media such as Western Morning News Radio Cornwall, a campaign, recruitment of credible champions, and through exemplars and practical projects.

**Enterprise** is also important: participants mentioned action on developing and celebrating local, community and social energy enterprises, the development of local energy markets, and potentially a Cornwall Energy Company.

# FUNDING AND FINANCE

How can we identify the best funding and finance mechanisms?

## Key barriers and strengths

### Barriers:

- Uncertainty in policy, regulation, future energy price and planning risk and lack of clarity on state aid and EU funding requirements
- Low political interest in the topic at local and national levels
- Lack of understanding of renewable energy by some financial institutions, of business risk by some investors, and need for viable commercial models and opportunities to invest at scale
- High cost of loans for energy efficiency and lack of awareness of potential to use mortgages to fund energy efficiency and renewables
- Competition for limited funding.

### Strengths:

- Natural resources and higher return on renewable energy with Feed in Tariffs, Renewable Obligation Certificates and Contracts for Difference in Cornwall than elsewhere
- Leadership and motivation in businesses, community, council and LEP, social capital, community spirit
- Cornwall Council's revolving fund, and planning prioritisation of community ownership
- Finance is available e.g. pension funds seeking long term returns.

## Key actions

Participants proposed actions relating to:

- **How to get funding**, such as developing a costed plan with a clear business case, developing a cross-party campaign, and a prospectus for Cornwall
- Ideas about **sources of funding and finance**, including private sector, community and crown funding, LEP, Green Investment Bank, ESIF, central government, and potentially setting up a Cornwall Bank or Cornish Infrastructure Fund
- Ideas of **what to fund**, such as energy efficient refurbishment of housing, deep geothermal energy, alternative vehicle fuel development, research and modelling to develop a plan for Cornwall's energy system, and seed funding a Cornwall Energy Company or ESCO
- Actions for **the funding process**, including at risk development funding, generate funding practice over time, aggregation of funding, media, press and champions, loud independent business voice.

# SKILLS, TECHNOLOGY AND EXPERTISE

How can Cornwall attract and retain the right skills, technologies and expertise?

## Key barriers and strengths

### Barriers:

- Low salaries and pay levels
- Lack of opportunities for skilled work
- Cornwall's 'end of the line' location, with lack of infrastructure, connectivity and transport
- These result in a 'brain drain' from Cornwall.

### Strengths:

- Entrepreneurial, skilled and motivated workforce, particularly among the young
- Location near to natural resources for energy, particularly marine
- Strong research and teaching sector, with universities, further education colleges, apprenticeships
- Motivated community with 'just do it' spirit as shown by number of community groups
- Quality of life in Cornwall, with beauty of natural environment.

## Key actions

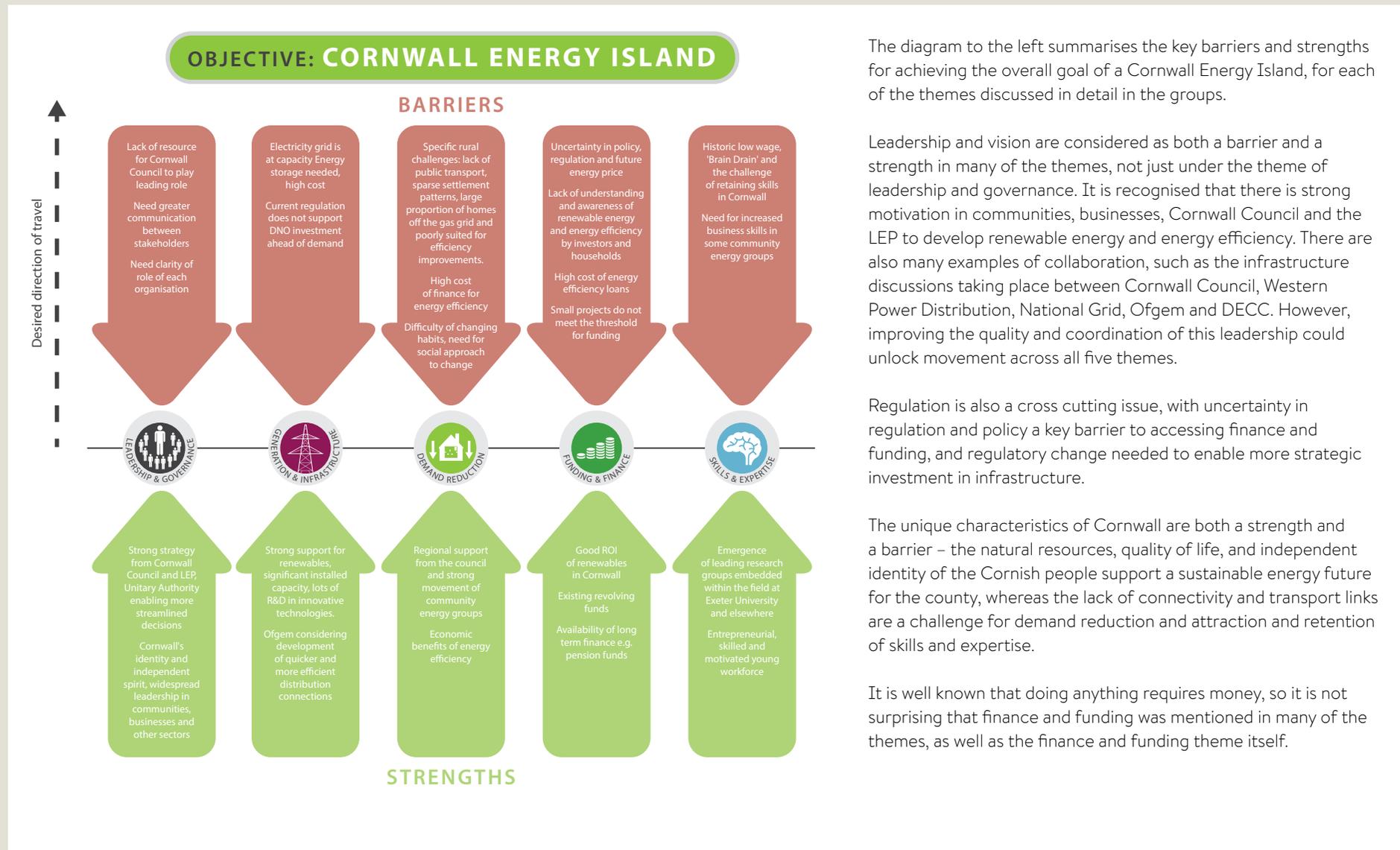
Key actions can be grouped into three themes:

**Attracting and retaining talent:** including increasing salaries and wages; reducing cost of living through investing in public transport and energy efficient housing; celebrating the quality of life in Cornwall; attracting industry and manufacturing to Cornwall.

**Training and education:** including colleges developing practical skills training in the renewables industry, and universities increasing their focus on energy related skills, and encouraging masters and PhD level research on energy.

**Vision, branding and leadership:** promoting Cornwall as a centre of green economic development, innovation and renewable energy, and promoting a Cornwall Energy Island vision with targets for green jobs, renewable energy deployment etc.

# SUMMARY OF BARRIERS AND STRENGTHS



The diagram to the left summarises the key barriers and strengths for achieving the overall goal of a Cornwall Energy Island, for each of the themes discussed in detail in the groups.

Leadership and vision are considered as both a barrier and a strength in many of the themes, not just under the theme of leadership and governance. It is recognised that there is strong motivation in communities, businesses, Cornwall Council and the LEP to develop renewable energy and energy efficiency. There are also many examples of collaboration, such as the infrastructure discussions taking place between Cornwall Council, Western Power Distribution, National Grid, Ofgem and DECC. However, improving the quality and coordination of this leadership could unlock movement across all five themes.

Regulation is also a cross cutting issue, with uncertainty in regulation and policy a key barrier to accessing finance and funding, and regulatory change needed to enable more strategic investment in infrastructure.

The unique characteristics of Cornwall are both a strength and a barrier – the natural resources, quality of life, and independent identity of the Cornish people support a sustainable energy future for the county, whereas the lack of connectivity and transport links are a challenge for demand reduction and attraction and retention of skills and expertise.

It is well known that doing anything requires money, so it is not surprising that finance and funding was mentioned in many of the themes, as well as the finance and funding theme itself.

## A CORNWALL ENERGY ISLAND VISION

Through the Energy Island process we defined the following vision:

To harness Cornwall's renewable resources, to halve energy costs and double new jobs by 2030.

**Of those who responded to the survey, 90% endorsed this vision.**

**We are now working with Cornwall Council on specific parts of this plan.**

# RECOMMENDATIONS

1

## CREATE A POWERFUL VISION FOR A CORNWALL ENERGY ISLAND FUTURE

Stories are powerful, and the workshop participants had many suggestions for ways that we can tell the story of Cornwall's energy future.

- **Change is happening** – people are recognising the importance of climate change, and the need for a shift in how the energy system is operated
- The Cornish landscape has seen many **phases of industry** – it is time to embrace the next one
- A renewable based energy future for Cornwall can lead to **affordable energy and happy people**
- We need to **celebrate achievements**, and build on existing strengths – the Cornish sense of independence and 'just do it' spirit
- Wide support is needed – telling the story through a variety of media, and through Western Morning News Radio Cornwall, creating an inspiring '**prospectus for Cornwall**', an inspiring green brand of Cornish innovation
- The change needed is at a social, not an individual level, and **collective action** can be much more powerful than the sum of its parts.

2

## INCREASE THE ELECTRICITY GRID CAPACITY FOR CORNWALL

We know that the electricity grid in Cornwall is full for further connection of renewable energy. We can be smart about how we deal with this.

- Develop **smart grids, storage and demand response** to make the most of the existing infrastructure and renewable resources
- Communicate grid constraints more clearly and in more geographic detail, and make a **technical plan**
- Build on existing conversations between Cornwall Council, WPD, Ofgem and DECC to test models for **investment ahead of demand**
- Support energy **storage** as part of grid reinforcement policy.

3

## CREATE MORE COORDINATED LEADERSHIP

There are many people leading the creation of Cornwall's energy future. The involvement of a diversity of stakeholders, and the distributed nature of leadership is a strength, but can also be fragmented and lack coordination.

- Strengthen **bottom up leadership**, supporting community ownership and action
- Increase **trust, build relationships**, and create opportunities for **collaboration** through a Cornwall Energy Island forum
- Recognise the **key role of Cornwall Council** in providing leadership and facilitation
- Develop greater **clarity about the roles** of different stakeholders.

4

## TRAIN, ATTRACT AND RETAIN MORE SKILLED WORKERS THROUGH EDUCATION, INCREASED WAGES AND BETTER PUBLIC TRANSPORT

Colleges and universities play an important role in developing the next generation of skills. There is also a 'demand side' challenge to overcome: the low wages, lack of public transport, distance from the rest of the UK, and cost of living make it difficult to attract and retain skilled people in the county.

- **Increase wages** to attract and retain skilled workers
- Engage with **graduates of universities and colleges** in Cornwall to attract them to stay
- Recognise that energy efficiency of housing **could reduce the cost of living**
- **Invest in public transport**, to reduce the sense of isolation and cost of commuting
- Celebrate the **high quality of life** in Cornwall, including the natural beauty and green space.

5

## JUST DO IT: MAKE THE ENERGY ISLAND HAPPEN THROUGH PILOT PROJECTS, INNOVATION AND EXEMPLARS.

An energy island means balancing supply and demand. Learning by doing is powerful, with pilot projects led by local community groups and Cornwall Council, in collaboration with WPD, Wales and West Utilities and local, national and global businesses.

- **Bottom up activity** is already happening, testament to Cornwall's 'just do it' spirit. This could be further enabled and supported through funding, endorsement and national government support
- Choosing a **big project to unite** around could bring different stakeholders together in collaboration
- Cornwall could be a test bed for **innovative electricity grid reinforcement** approaches
- **Global businesses and investors** could be attracted to invest in Cornwall and enable projects to get off the ground
- Local policy, funding and incentives for **energy efficient refurbishment and smart meter deployment** can build momentum to make this happen fast in Cornwall
- A new organisation such as a **Cornwall Energy Company** could provide a vehicle for getting things done.

6

## PROVIDE FUNDING AND FINANCE TO PROJECTS

Ensure availability of development funding, address the cost of capital, interest levels on loans, and perceptions of risk and viability by banks and other lenders.

- Create a **funding aggregation body** to support multiple small projects to access larger pots of funding
- Make available **low interest finance** for home energy efficiency improvements
- Encourage **mortgage lenders to recognise** that energy efficiency and renewable energy add value to a home and reduce borrowers' outgoings
- Raise awareness among households that increased **mortgages are an option** for energy efficiency financing
- Develop a **strategic plan for Cornwall's energy system** with a model of the system in 2030 to develop the business case for investment
- **Grow existing community and crowd funding initiatives** e.g. The Low Carbon Society
- Make the most of the ESIF funding, with **greater clarity on how this is to be used** and how to access it
- Set up a **Cornwall Bank** or Cornish Infrastructure Fund.

## 7

## ENGAGE AT A NATIONAL LEVEL IN DEVELOPMENT OF POLICY AND REGULATION

Much can be done in Cornwall, but there is also a need to look beyond, to the national policy and regulatory context which both enables and limits what can be achieved locally. This is also the opportunity for lessons from Cornwall to catalyse action more widely across the UK and beyond.

- Identify the ways in which **policy and regulation** blocks the Cornwall vision and find solutions to this
- Increase the agency of the Unitary **Authority** to allow greater local control, through the devolution deal
- **Look beyond the UK** to learn from other countries e.g. Germany, Japan, California
- Find ways to navigate national policy and regulatory instability and uncertainty.

## MOMENTUM IS BUILDING

The energy landscape is changing, and this is the time for Cornwall to decide how to interact with this change to capture the benefits. We are at a crossroads in terms of how we move towards the concept of an energy island. Since the Energy Island event in March 2015, there have been a number of positive developments in Cornwall, as well as a changing policy context nationally:

- Cornwall has secured a Devolution Deal with a strong energy theme, including further support for community energy, grid reinforcement, geothermally heated Enterprise Zones, and locally delivered energy efficiency
- Low Carbon projects in Cornwall and IoS are now being funded through ESIF, developing projects on marine renewables, deep geothermal, low carbon heat and local energy markets
- Cornwall Council is assessing the feasibility of district heating in Cornwall, funded by the Heat Networks Delivery Unit
- A number of innovative pilot projects have been developed, for example the Sunshine Tariff trial in Wadebridge, with WPD, RegenSW, WREN, Tempus Energy
- Cornwall Council has started the process of setting up a Cornwall Energy Company
- Ofgem has consulted on Non-Traditional Business Models, and there is a national appetite for removing barriers to entry for the energy market.

# CONCLUSION

The Energy Island workshop in Cornwall took participants through a four step process, an Energy Island approach which we believe can be applied to structure dialogue and define future energy scenarios and actions for regions around the world.

The challenge of achieving a transition to a more sustainable energy future, and realising the social and economic benefits, is at least as much of a social challenge as a technical challenge. Experts, policy makers, decision makers, engineers, community groups, and politicians all need to be engaged in the debate to design, fund and advocate the solutions that will enable this. This requires exploring scenarios and developing action plans collaboratively.

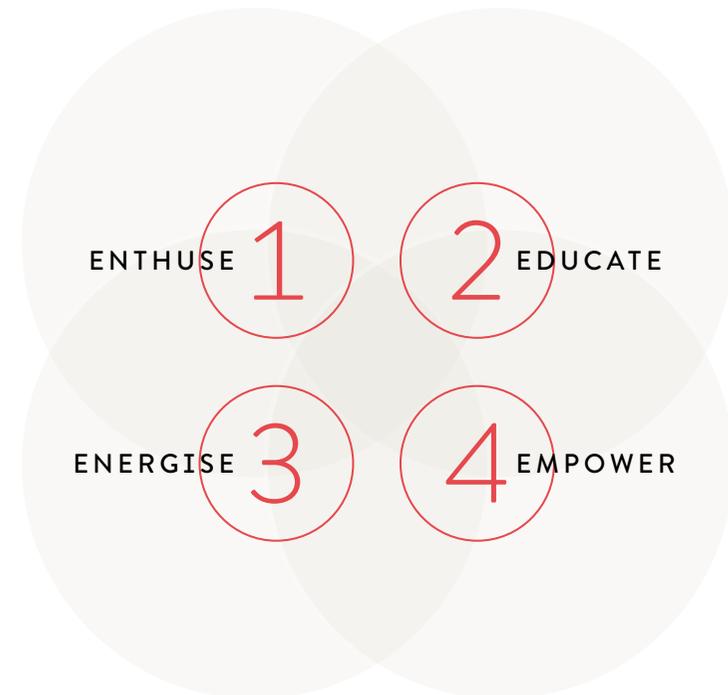
In order to do this we developed and tested a robust four stage process that allowed the conversation to be progressive, informed and action orientated.

We started by **enthusing** participants, with a series of inspiring keynote speeches. The workshop brought together a wide range of expert and non-expert stakeholders, and the next step was to **educate** each other by sharing knowledge between different specialists and raising the general level of understanding of non-experts. During the **energise** session, the Power Games provided an engaging arena for gaining a clear picture of the areas of consensus, and the areas of unresolved debate about how best to reduce demand and increase local energy supply.

The outcomes were a clear vision for Cornwall that exports renewable energy and makes a contribution to the rest of the UK, importantly a vision that was created together by many stakeholders. The 'call to action' session explored both the barriers and the drivers for achieving this vision, and showed how powerful it can be to focus on removing barriers. The actions identified **empower** participants to take forward a plan for a Cornwall Energy Island. This plan, if taken forward, can lead to jobs, recycle money in the region, and provide local energy resilience.

This approach was developed over several months and iterations, with feedback from local stakeholders and bringing in well researched information to inform the debate. The robustness of the Energy Island approach to deal with the messiness of reality has been tested in Cornwall but we believe that some of the learning can be applied broadly and the approach is globally applicable.

If you would like to know more about the Energy Island approach, please see the full [Energy Island White Paper](#).



# ACKNOWLEDGEMENTS

This project would not have been possible without the hard work and commitment of many people.



**Anthony Davies**  
Group Director, Sustainability  
BuroHappold Engineering

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## IN PARTNERSHIP WITH

### eden project

The Eden Project, an educational charity, connects us with each other and the living world, exploring how we can work towards a better future.

Our visitor destination in Cornwall, UK, was built in an ex-china clay pit to demonstrate that devastated landscapes can be restored. Here, geodesic Biomes housing the largest rainforest in captivity, exhibitions and stories serve as a backdrop to contemporary gardens, concerts and year-round family events. Registered charity number 1093070 (The Eden Trust). Money raised supports our transformational projects and learning programmes.

## EVENT SPONSORSHIP FROM



REHAU is an innovative polymer company who specialise in low energy solutions, manufacturing products that are used to reduce energy demands from buildings, as well as energy creating solutions. From the Passivhaus approved REHAU GENE0 window system to earth tubes and collector pipes for ground source heating, we also offer a UK manufactured district heating pipe. The Cornwall Energy Island event was an ideal opportunity to showcase our exciting range of products, with Cornwall & the South West being at the forefront of the adoptions of these systems for many years. We were able to strengthen our connections within the region and the event also gave us an opportunity to meet a number of new and interesting delegates. REHAU have also developed a strong relationship with BuroHappold and felt it helped us cement relationships by supporting them in this exciting project.



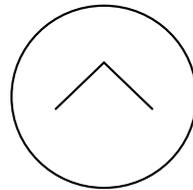
Solarcentury is one of the world's long-standing solar companies, with a reputation for innovation and quality. Solarcentury recognised that its own mission of making a meaningful difference in the fight against climate change by promoting the widespread adoption of solar, was well aligned with the goals of the Cornwall Energy Island conference. We were keen to support the conference in identifying solutions to issues such as grid infrastructure, energy storage, community engagement, investment and in influencing energy policy.

Solarcentury has long standing links with Cornwall; from designing and installing the aesthetic solar roof of the Core Building at the Eden Project in 2006, to the first UK large-scale ground mounted system in 2011 at the site of a disused tin mine at Wheal Jane. Solarcentury has also undertaken two large rounds of work with Cornwall Council, installing roof top solar systems across the Council's building portfolio.

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