Re-energising Wales

Harnessing the potential: renewable energy in the Swansea Bay City Region

Institute of Welsh Affairs

30th April 2018 | National Waterfront Museum| Swansea

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Re-energising Wales

Harnessing the potential: renewable energy in the Swansea Bay City Region

Welcome and introduction to the IWA:
Auriol Miller, Director, IWA

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Introduction to the Re-energising Wales Project

Shea Buckland-Jones, Institute of Welsh Affairs

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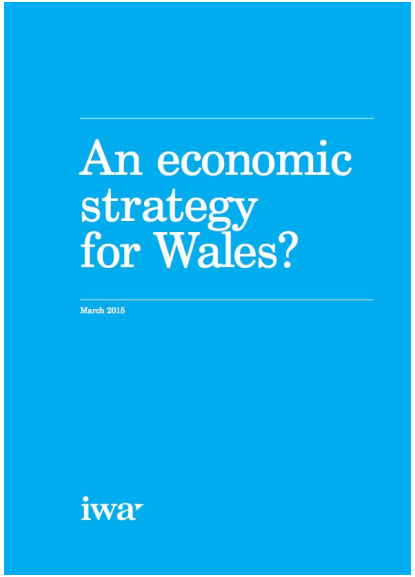
An economic strategy for Wales?



- March 2015
- Renewable energy has an important role to play in an ambitious economic strategy for Wales

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Re-energising Wales

- Vision: ‘Meeting energy demand in Wales through 100% renewable energy by 2035’
- 3 year project (2016-2019)
- Project steering group
- 6 work packages
- Short papers

Work Packages

1. Energy demand
2. Swansea Bay City Region ‘Future Energy Vision’ case study
3. Economic impacts
4. Social and community issues/ownership
5. Regulatory and political levers
6. Final report and action plan

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Swansea University
Prifysgol Abertawe

Introduction to the Swansea Bay City Region exemplar case study

Professor Stuart Irvine

Swansea University

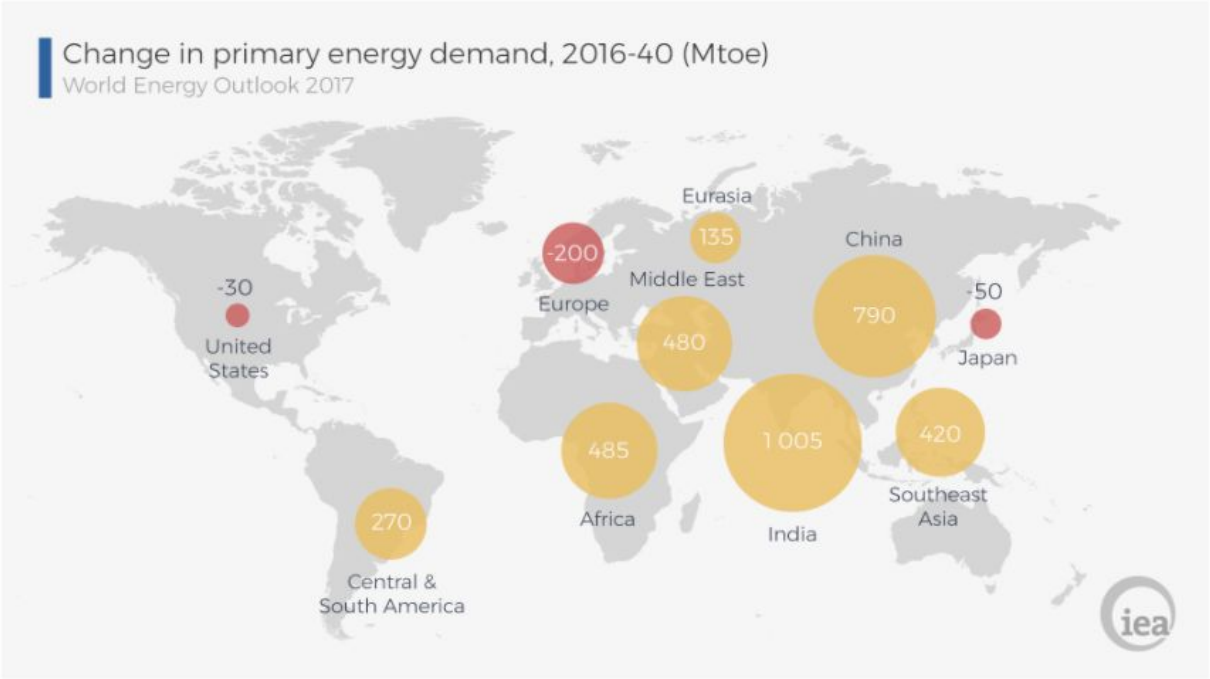
Re-energising Wales

iwa MAKING WALES BETTER

SPARC II
Building research capacity in solar photovoltaic technology

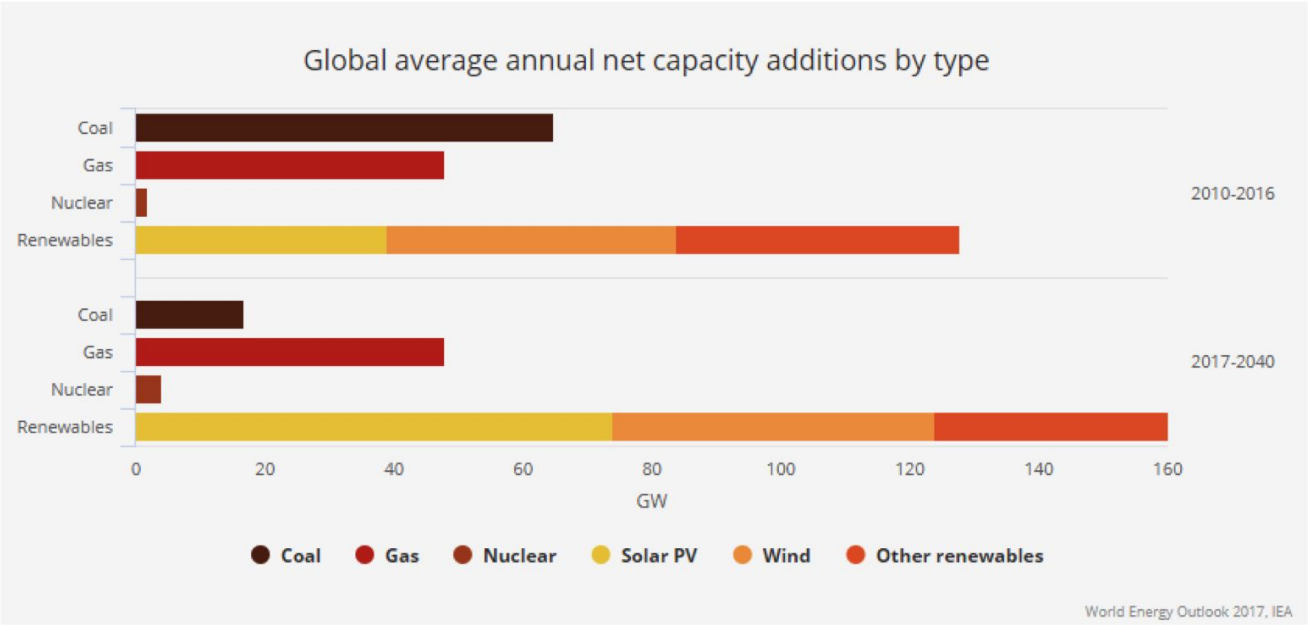
Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund

With increasing global demand for energy we have a tougher challenge to decarbonise



A global economy growing at an average rate of 3.4% per year, a population that expands from 7.4 billion today to more than 9 billion in 2040, and a process of urbanisation that adds a city the size of Shanghai to the world's urban population every four months are key forces that underpin our projections.

IEA World Energy Outlook 2017 – renewable energy predictions for 2040



"Rapid deployment of solar photovoltaics (PV), led by China and India, helps solar become the largest source of low-carbon capacity by 2040, by which time the share of all renewables in total power generation reaches 40%."

SBCR study – bottom up rather than top down!

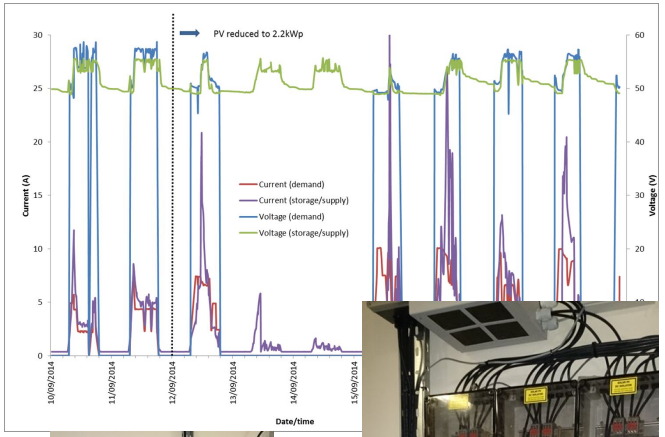
- The WP2 (RE generation) steering group focussed on one region in Wales to test methodology for total energy demand and supply scenario for 2035.
- Each region of Wales has a different energy mix and each should aspire to achieving <50 gCO_{2e}/kWh
- The scenario for the methodology was “ambitious but realistic”.
- Innovation will play an important part in achieving the 2035 goal and the solutions could help other regional plans.
- Will it be possible to generate the equivalent of 100% of SBCRs net electricity demand by 2035 by optimising the generation of RE?

An ambitious and inclusive study

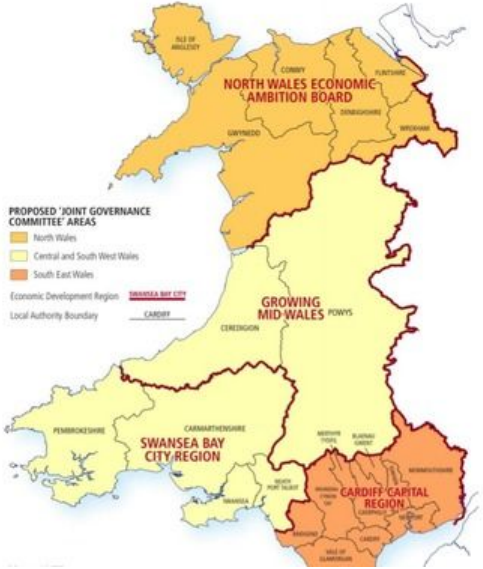
- Electricity
  - Solar PV
  - Onshore and offshore wind
  - Tidal Lagoon
  - Marine energy – wave and tidal
  - Energy from Waste
  - Hydropower
- Heat
  - Domestic consumers
  - Commercial buildings and processes (including public sector)
  - Industrial buildings and process
- Transport
  - Private vehicle transport – cars
  - Commercial vehicles and light goods vehicles
  - Public road transport including buses

How will the system be balanced?

- Smart demand
- Local energy storage
- Utility scale storage
- Import/ export of energy from region – stress to the connectors?
- Consider different diurnal scenarios considering maximum demand and maximum supply



The IWA WP2 study by Regen takes a fresh look at a fully integrated, low-carbon energy system



Re-energising Wales

Findings from the Swansea Bay City Region case study

Johnny Gowdy, Director, Regen

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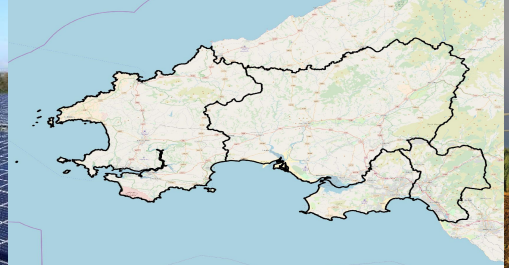



Re-energising Wales Project

Swansea Bay City Region : A renewable energy future

Energy system vision for 2035

regen transforming energy

iwar Re-energising Wales

Re-energising Wales
A future energy vision for the Swansea Bay City Region

….whole energy system vision and strategy looking out to 2035 for the Swansea Bay City Region

Phase 1 – Scoping and vision report (November 2017)

- Current energy system analysis
- Regional energy resource and opportunity assessment
- Future growth, generation and demand assumptions
- Future energy vision goals and objectives

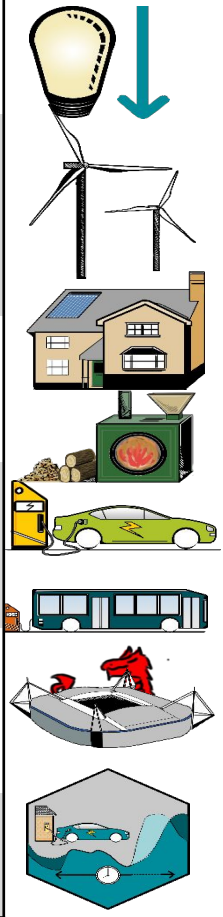
Phase 2 – SBCR : A renewable energy future (Today's launch)

- Energy system modelling and scenario analysis
- Base case to achieve vision decarbonisation targets and objectives
- Electricity, heat and transport, and energy efficiency
- [illegible]ty -
- Policy steps and recommendations

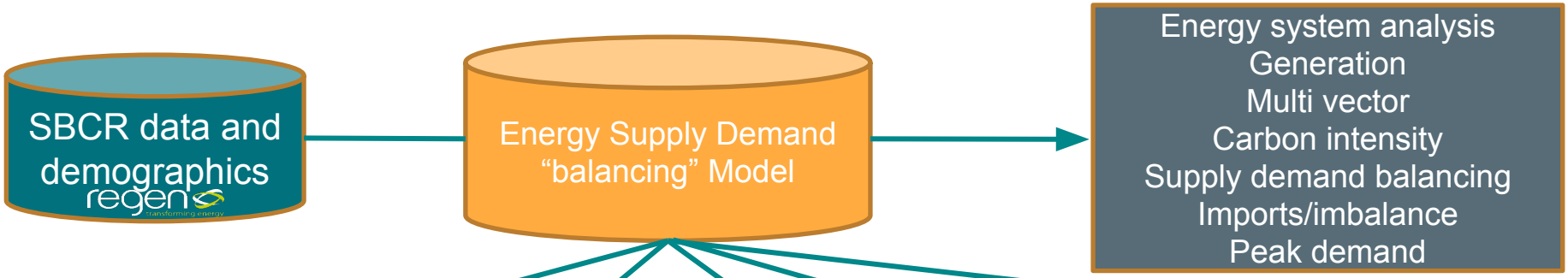
SBCR Future Energy Vision 2035

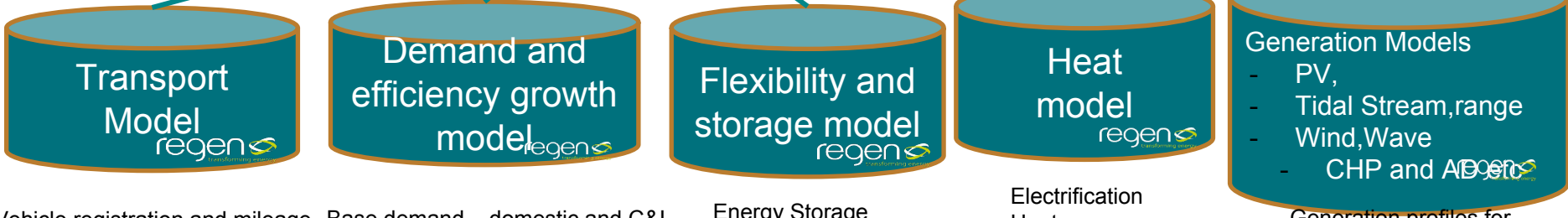
regen transforming energy

Step change Energy efficiency	Step change in domestic and commercial energy efficiency to deliver at least a **20% reduction** in heat and electricity demand,
Renewable energy generation	Maximise use of regional energy resources Achieve a target of renewable electricity generation **equivalent to 100%** of electricity consumption on an annual basis. Reduce carbon intensity for electricity (inc. imports) **< 50g CO_2e/kWh**
Decarbonisation of heat	**40% of heat supply from decarbonised heat supply sources** – through electrification, gas decarbonisation and renewable energy sources. Reduce the CO_2 emissions from heat by **at least 40%** compared to 2017.
A transport revolution	Become a leading region for the reduction of vehicle emissions through: • **80% of new cars,** and over **30% of all cars** electric by 2035 • public transport with **100% Ultra Low Emission Vehicles**.
Local energy generation and ownership	Maximise use of local energy resources –with a target of less than **15% electricity** imports over the year. Accelerate Wales' ambition to increase local ownership of energy generation
Flexibility and smart energy	Use flexibility through energy storage, time of use tariffs, smart charging and appliances, and demand side response, to minimise energy system imbalance, grid impacts and imports.



Integrated energy system model





Vehicle registration and mileage data
ULEV and EV growth model
Cars, LGV, HGV and buses,
Charging Profiles

Base demand – domestic and C&I
Underlying growth
EPC bandings
Energy efficiency assumptions
Domestic, Commercial and industrial demand breakdown

Energy Storage
Demand Side Response
- Domestic
- Industrial
- EV Smart charging

Smart demand shift

Electrification
Heat pumps
Hybrid Heat pumps
Decarbonisation of mains
Biomethane
Hydrogen
District heat network
RE heat
Temperature

Generation profiles for renewable energy technologies
- Variable e.g. Wind
- Controllable e.g. AD CHP

Swansea Bay City Region

An energy system for 2035

Case study highlights

SBCR Future Energy Vision - Efficiency

EPC Rating Band	A-C rating	D-G rating
Current SBCR bandings based on EPCs lodged 2008-17	28%	72%
Example of step change needed in EPC bandings to achieve 20% energy efficiency savings targets	Step Change	
Energy saving programme A "Across the board"	62%	38%
Energy saving programme B "more focus on the worst"	58%	42%
Energy saving programme C "more focus on the best"	59%	41%

Challenge

EPC ratings between 2008 and 2017 suggests that circa 72% of SBCR properties are banded D-G

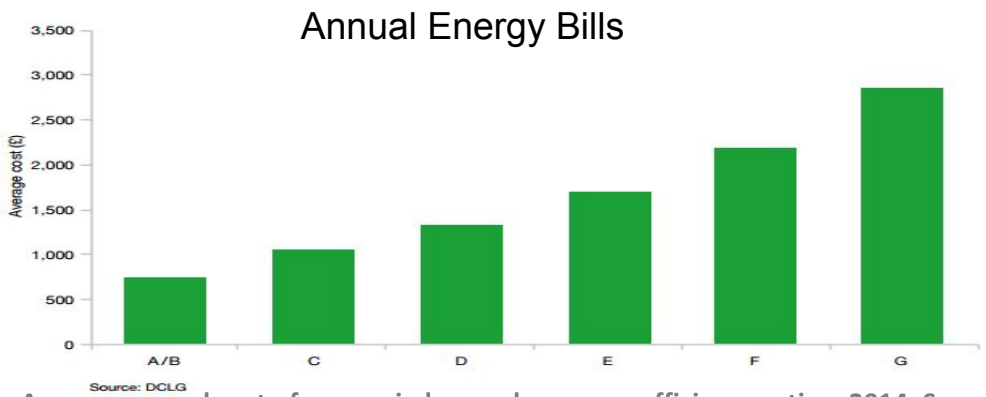
To achieve a 20% saving would require this to flipped such that circa 60% of properties are banded A-C

Depending on the approach this would mean significant efficiency improvements to around 200,000 properties or 60% of households.

Step change in energy efficiency to achieve a 20% energy demand reduction

EPC Rating Band	A	B	C	D	E	F	G
Current SBCR bandings based on EPCs lodged 2008-17	0.2%	7.1%	21.2%	37.1%	22.5%	8.7%	3.3%
Example of step change needed in EPC bandings to achieve 20% energy efficiency savings targets							
Energy saving programme A "Across the board"	5%	21%	36%	21%	13%	4%	1%
Energy saving programme B "more focus on the worst"	4%	15%	39%	31%	11%	0%	0%
Energy saving programme C "more focus on the best"	8%	24%	26%	22%	13%	5%	2%

SBCR Future Energy Vision - Efficiency



Average annual cost of energy in homes by energy efficiency rating, 2014. Source: BEIS, Clean Growth Strategy (2017)

Opportunity

Comprehensive measures to shift properties to bands A-C could save over 780k MWh of energy and energy costs of £70-85 million per annum.

Potential household energy bill savings of £350-420* per year

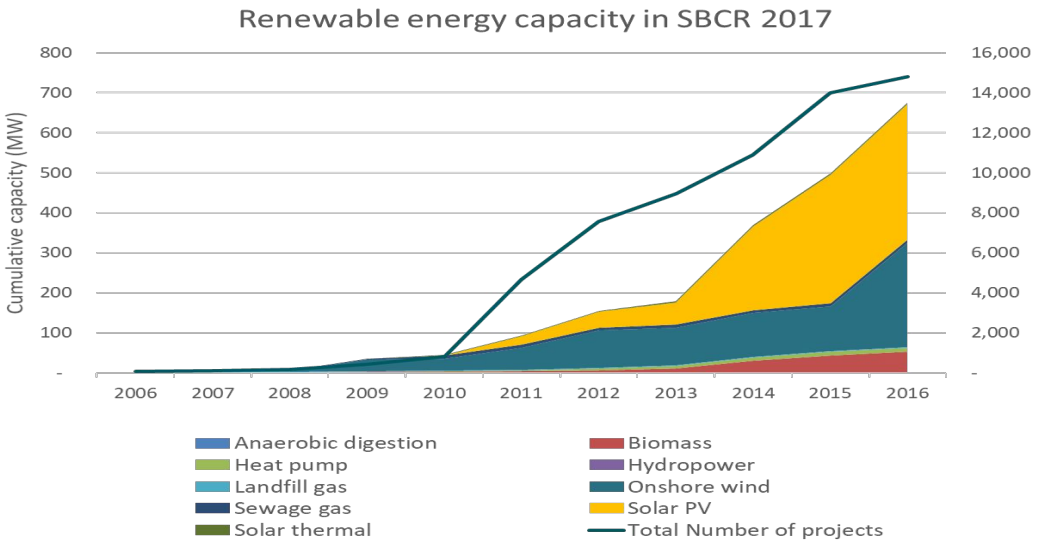
Energy saving EPC profile	SBCR Energy Saving MWh 20%	SBCR total consumed energy cost saving per year £millions	Avg saving per household improved	households improved (approx)
20% energy saving profile A "Across the board"	788,597	£76	£378	202,175
20% energy saving profile B "more focus on the worst"	788,597	£84	£420	200,641
20% energy saving profile C "more focus on the best"	788,597	£72	£354	204,808

Carbon Saving 100k mT CO_2e

*cost saving calculations based on estimated costs per EPC banding taken from BEIS Clean Growth Plan 2017

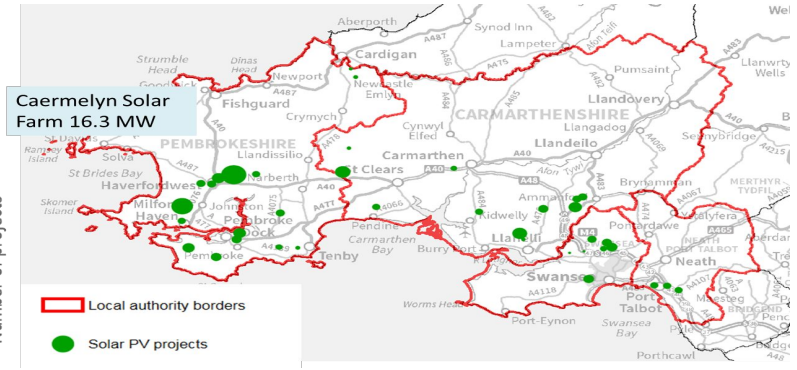
SBCR Future Energy Vision - Electricity

Current renewable energy mix in the SBCR

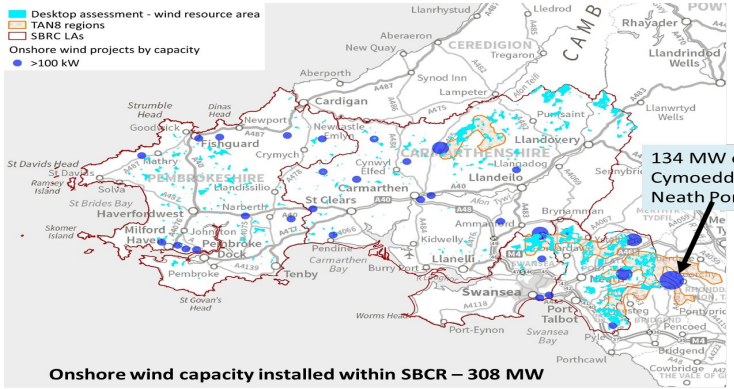


Source Regen : Energy Generation in Wales data from 1st Jan 2017

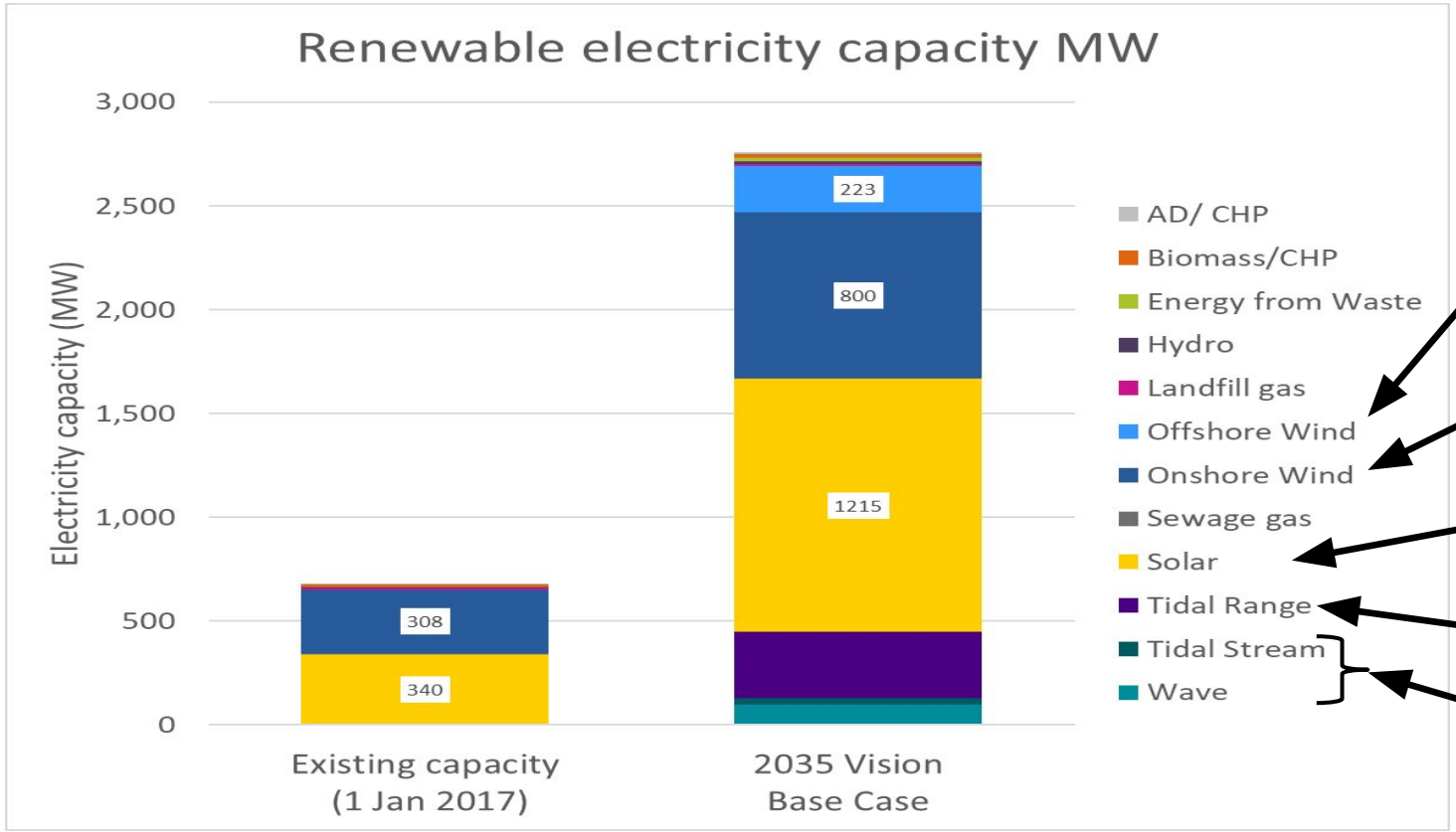
Current solar PV 340 MW



Current wind farms 360 MW



SBCR Future Energy Vision - Electricity



A new offshore wind farm in the Bristol Channel /Celtic sea*

Onshore wind double existing capacity to 800 MW

Over 1.2 GW of solar

Swansea Bay Tidal Lagoon

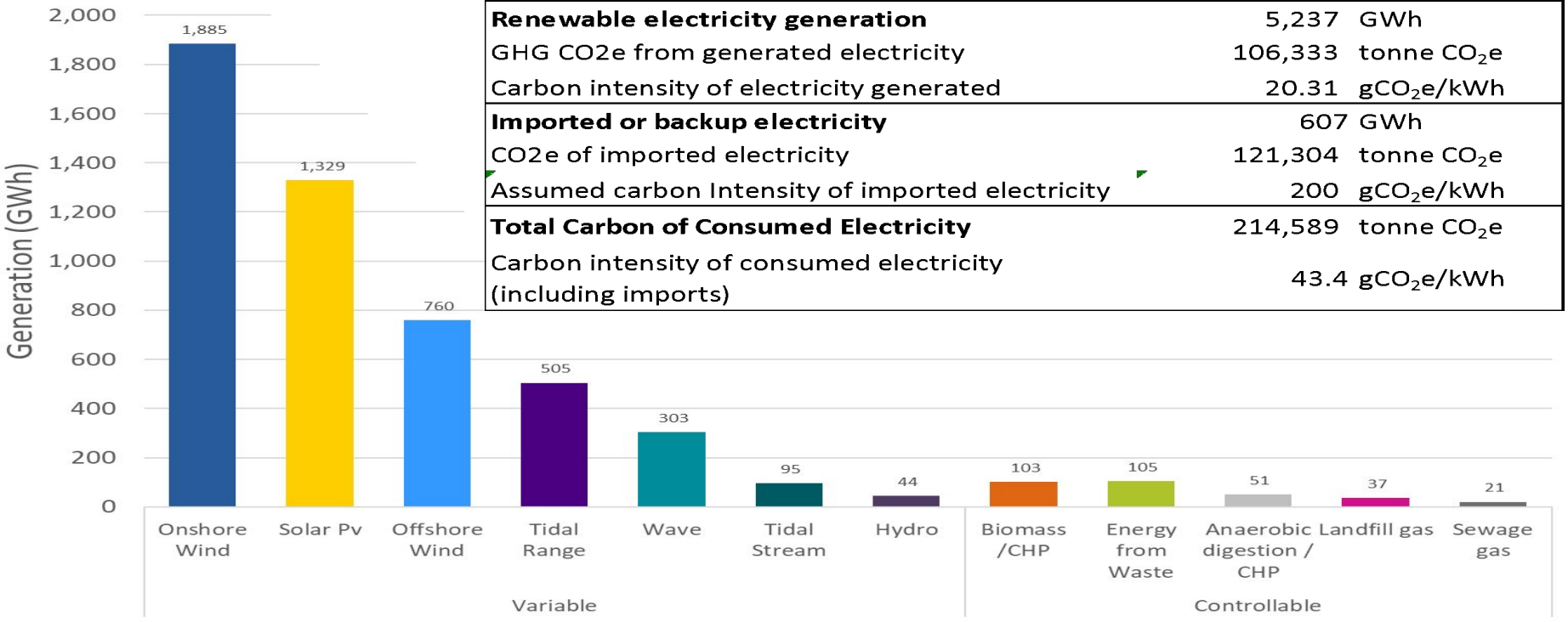
First commercial projects

*Offshore wind capacity would be shared with other Welsh and South West regions

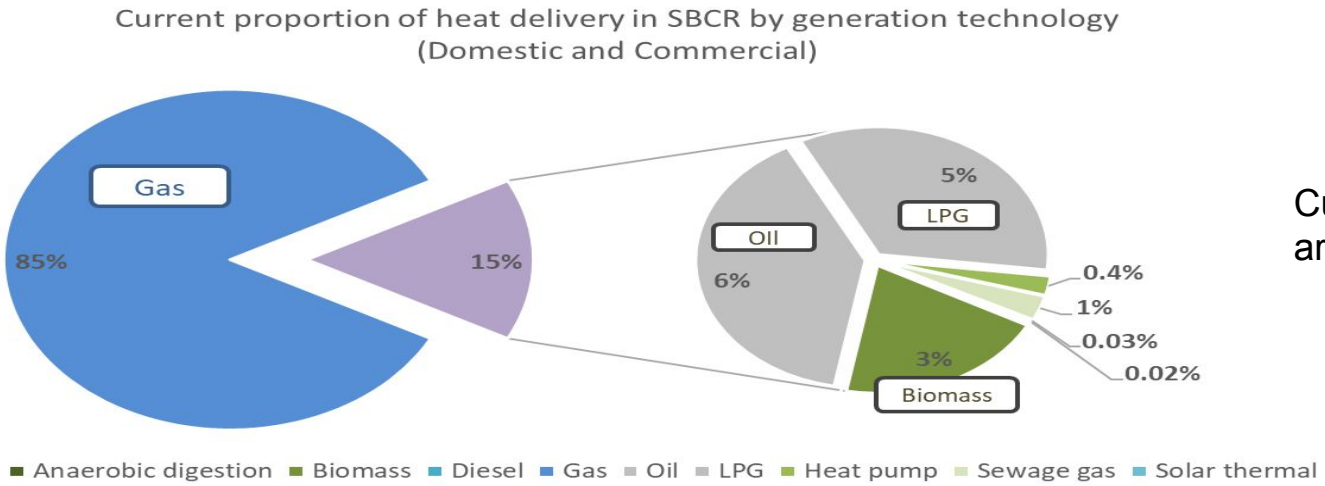
SBCR Future Energy Vision - Electricity
RE 100% equivalent of annual consumption

5.2 TWh annual renewable electricity generation in SBCR – equivalent to **4.9 TWh** annual consumption (after losses)

Electricity generation and carbon	Base Case scenario	
Renewable electricity generation	5,237	GWh
GHG CO2e from generated electricity	106,333	tonne CO_2e
Carbon intensity of electricity generated	20.31	gCO_2e/kWh
Imported or backup electricity	607	GWh
CO2e of imported electricity	121,304	tonne CO_2e
Assumed carbon Intensity of imported electricity	200	gCO_2e/kWh
Total Carbon of Consumed Electricity	214,589	tonne CO_2e
Carbon intensity of consumed electricity (including imports)	43.4	gCO_2e/kWh



SBCR Future Energy Vision - Heat



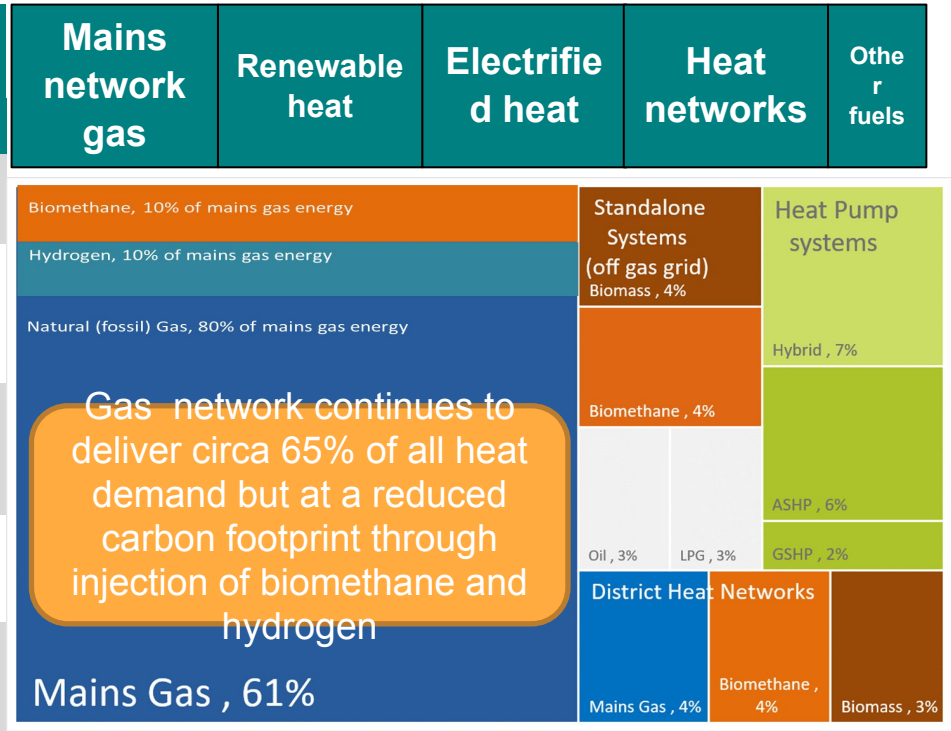
Current carbon intensity around 178g CO_2e/kWh

Current and projected demand for heat GWh	Domestic	Commercial and Industrial	Total heat demand
Demand from Mains Gas	2,999	1,245	4,244
Non mains gas heat demand	548	117	666
Total Current Demand	**3,547**	**1,362**	**4,909**
New Domestic Build	256		256
Demand Growth - economic and change of use	190	-122	68
Energy efficiency savings	-761	-272	-1,033
Efficiency saving %	-20%	-20%	
Projected heat demand in 2035	**3,233**	**968**	**4,201**

Meeting the heat challenge - Heat

2035 heat energy system to deliver 4.2 TWh heat per annum

Heat decarbonisation strategies	
Strategy	**Approach**
1. Energy efficiency	20% demand reduction
2. Electrification of heat	Deployment of heat pump and hybrid heat pump system technology and other technologies
3. Gas decarbonisation	Through injection into the mains network of "green gases" such as biomethane and hydrogen
4. Renewable heat	Direct delivery of renewable heat energy from sources such as biogas and biomass
5. District heat networks (DHNs)	Delivery of heat through district heat networks which could then be decarbonised

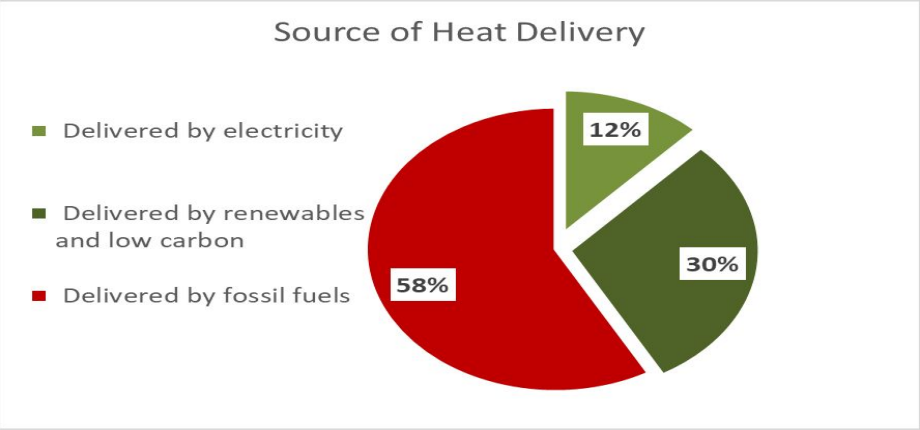


Carbon intensity reduced to 133 gCO_2e kWh

SBCR Future Energy Vision - Heat
Over 40% heat supply sources decarbonised

Meeting the 2035 energy system vision for heat

Over 40% of heat delivered from decarbonised sources



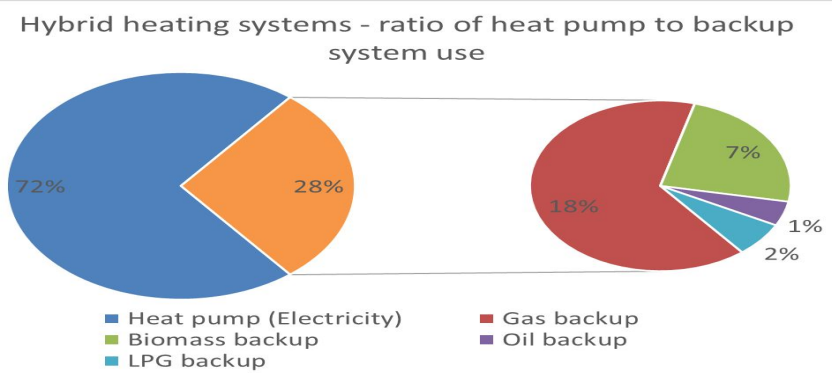
Over 40% of carbon saving compared to current emissions

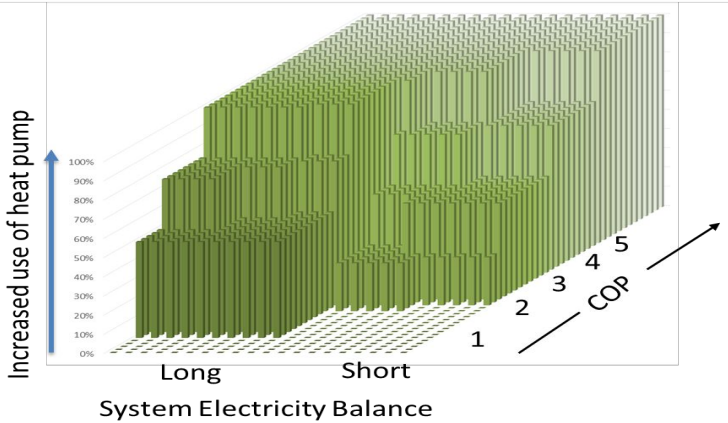
Heat Carbon Savings		
Carbon	**CO2e tonne**	**Carbon Intensity**
	Tonne	**gCO2e/kWh**
Current emissions	940,768	178
2035 Energy System	557,341	133
Carbon saving	383,427	45
Percentage saving	41%	

Reduced carbon intensity plus energy efficiency → 41% carbon emission reduction

SBCR Future Energy Vision - Heat
Heat pumps to deliver 12% of heat demand

Heat Supply Heat pumps	Percentage of properties with a heat pump	Of Which ASHP	GSHP	Hybrid	No Properties
On Gas grid	8%	20%	5%	75%	19,771
Off Gas Grid	25%	60%	15%	25%	19,426
New development homes	40%	55%	25%	20%	9,384
Commercial and Industrial	10%	20%	5%	75%	2,241
Total properties		21,219	6,361	23,242	50,822





With a well sized hybrid heat pump system, simulation shows circa 70% of annual heat demand is met by the heat pump

Challenge and opportunity

50,000 of properties with a heat pump represents around 14% of properties in the SBCR, to deliver 12% of total heat demand.

Currently heat pumps are installed in less than 0.4% of properties.

SBCR Future Energy Vision - Transport
Switch to electric and Ultra Low Emission Vehicles

Vehicle Data from DfT	Car	LGV	HGV	Buses
Total vehicles (SBCR 2016)	356,958	52,172	54,56	2,265
Historic growth rate (Wales 1990-2016)	1.02	1.02	1.05	0.99
Electric vehicles (SBCR 2016)	594	123	0	0

Local Authority	Road transport petroleum demand (GWh)
Carmarthenshire	1,502
Neath Port Talbot	1,013
Pembrokeshire	794
Swansea	1,306

Cars

80% of new cars ULEV by 2035
Majority of these are electric
34% of all cars electric by 2035

Light goods vehicles LGV

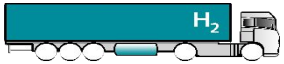
72% of new LGV are ULEV by 2035

Buses /public transport

100% of new buses are ULEV by 2021
100% of all buses are ULEV by 2035

HGV's

30% of new HGV's are ULEV by 2035

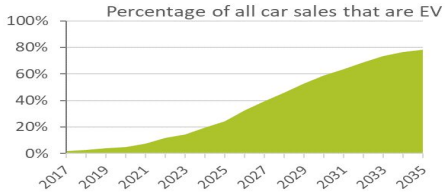


Vision based on a 2040 ban on sales of all diesel and petrol vehicles. Is this ambitious enough given calls to bring this forward to 2035 or 2030?

Transport EV Growth Scenarios
The big unknown

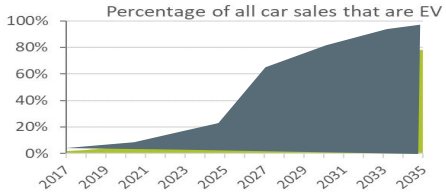
New report published : Harnessing the electric vehicle revolution

Exponential growth



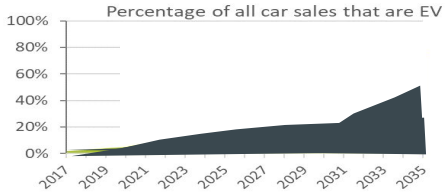
The most common growth model. From a slow start the EV market grows exponentially throughout the next decade reaching a point where 80% of new car sales are EV's in the 2030's.

Explosive growth



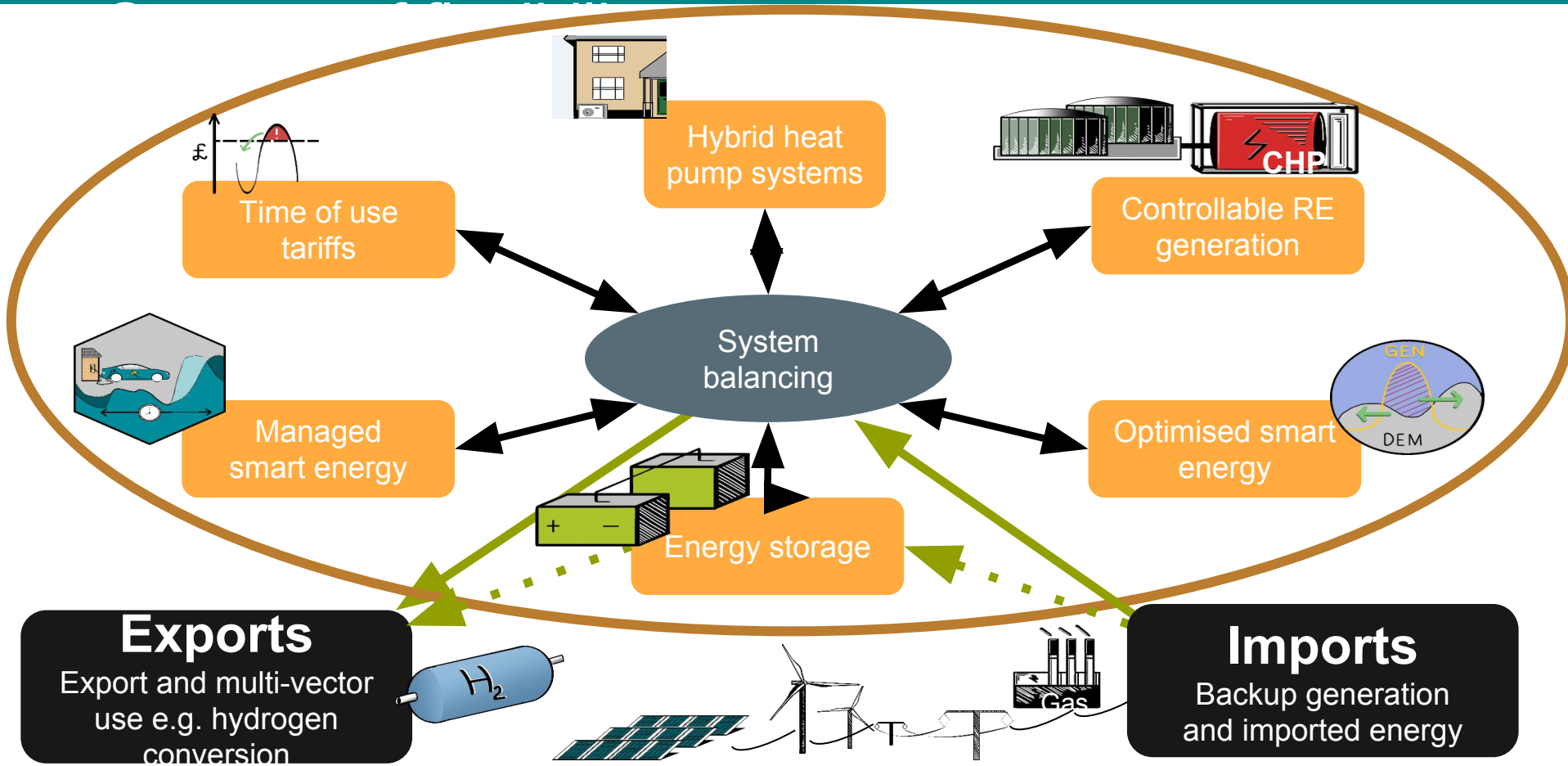
The EV market reaches a tipping point where an overwhelming consumer demand for EV's (and a shift from diesel/petrol) leads to a rapid and disruptive market expansion.

Stagnated growth



Initial growth is curtailed as the market fails to develop. EV's remain a relatively small part of the overall car market until the mid 2030's.

Energy System Electricity Balancing

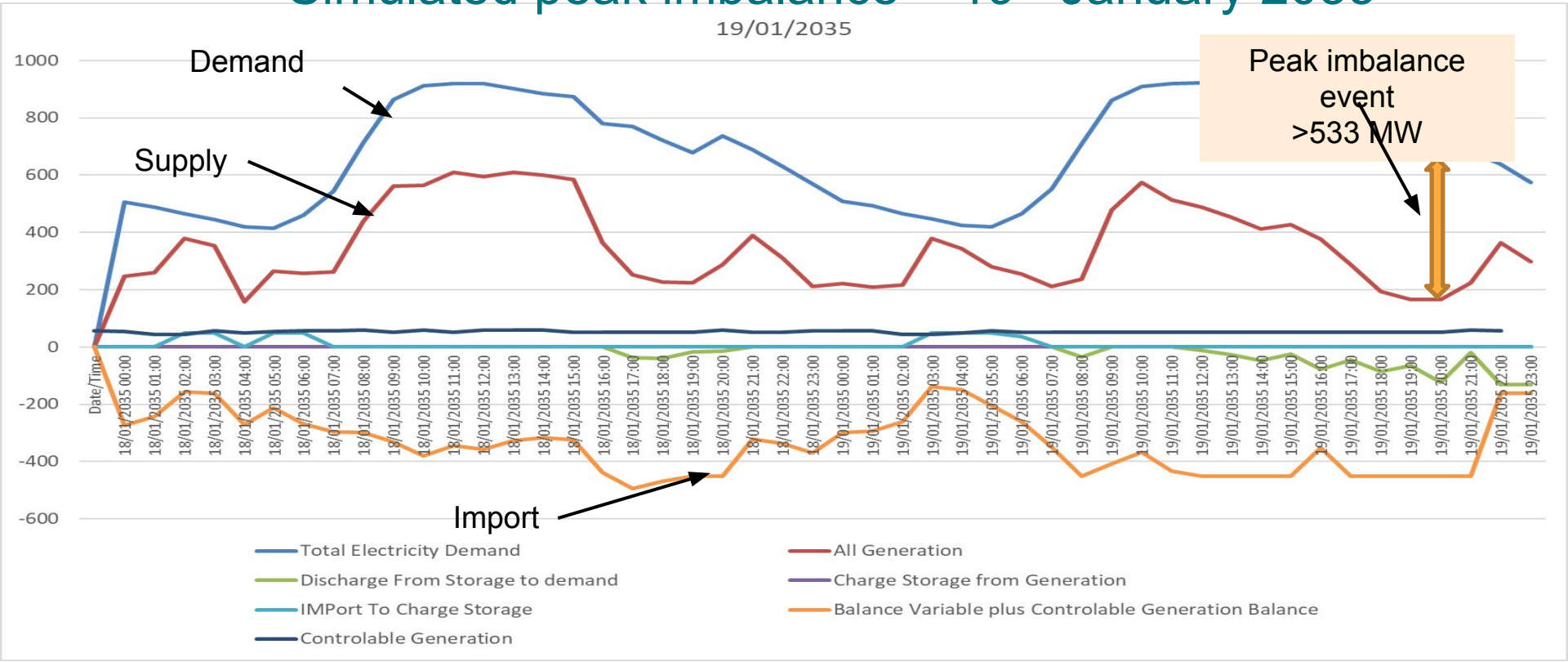


Energy System Electricity Balancing

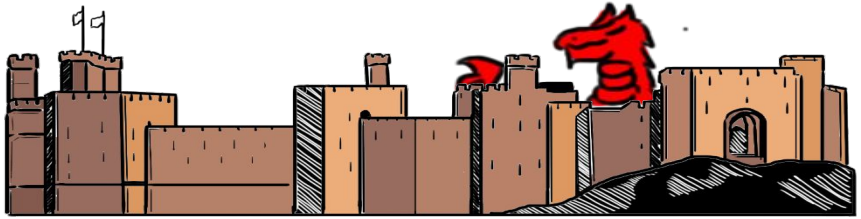
Energy System Balancing Scorecard		
Electricity import and export required - MWh	**606,521**	MWh
Imports as % of Demand Consumption	**12.3%**	
Export as % of generation (inc losses)	**11.6%**	
Peak import or backup electricity		MW
Max import/backup power required MW	**450**	
Max power as % peak demand	**48%**	
Number import/backup peaks >350 MW occurrences (1 hour periods) in one year	**183**	Hours p.a.

19th January 2035 – simulated stress event

Simulated peak imbalance – 19th January 2035



Big challenges and big opportunities: for Wales and SBCR



SBCR Future Energy Vision 2035
Big challenges and opportunities

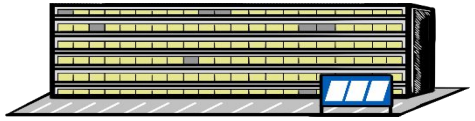
SBCR Energy Vision 2035
Big challenges and big opportunities

		Energy prize (MWh)	Carbon Saving p.a. mT CO_2e	Prime opprtunity for Wales
Energy efficiency	Shift circa 30% of properties from EPC bands D-G to bands A-C, and deploy energy efficiency measures across circa 200k (60%) SBCR properties	788,597	102,863	
		Electricity		
Electricity generation	Is it possible to more than double on-shore wind capacity to 800 MW?	1,159,681	218,020	
	Will the Swansea Bay Tidal Lagoon be built?	504,854	94,913	
	Will a new offshore wind farm be built off the south Wales coast?	759,548	142,795	
	Can tidal stream and wave energy reach maturity?	398,275	74,876	
		Heat		
Heat	Is it realistic to deploy over 50,000 heat pumps (circa 14% of properties)	508,007	84,642	
	Could 10% of buildings be served by a district heat network	468,299	83,518	
	Will sufficient biomethane and/or hydrogen be available - do we have the resources and will they be commercially viable?	623,940	111,320	
		Electricity		
Transport	Will drivers embrace the EV revolution, will we see exponential growth such that a third cars in the SBCR are EV's by 2035?	398,674	324,282	
Flexibility	Is there a business model that would justify investment in over 350 MW and 1500 MWh of energy storage capacity?			
	Will business and domestic consumers embrace smart systems and flexibility - Time of Use Tariffs, optimised and managed smart appliances including heating and EV charging, demand side response -to enable 10-15% of demand to be deferred during peak imbalance periods?			

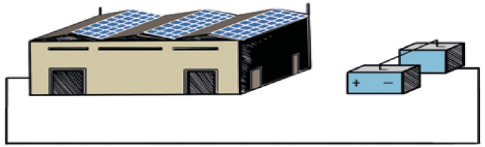
SBCR Future Energy Vision 2035
Opportunities for SBCR and Wales

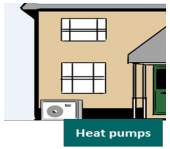
1) Net zero carbon buildings as power stations

200,000 properties with improved energy efficiency
60% of households

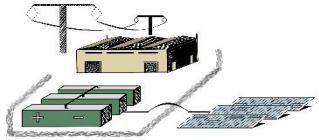


50,000 properties with a heat pump (14% of properties)

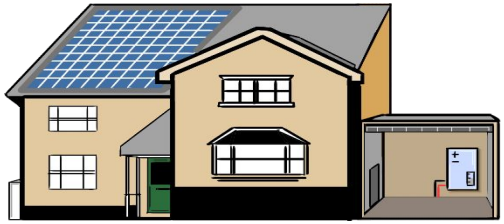




75,000 properties with a rooftop and building integrated PV
Totalling 375 MW capacity



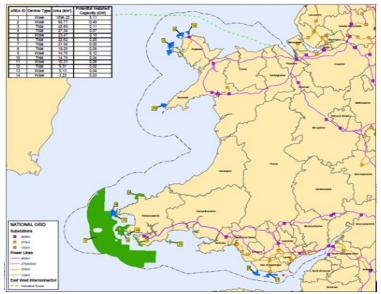
350 MW of storage many located alongside sources of demand



Homes (and commercial buildings become power stations with energy storage)

2) Harnessing offshore wind and marine energy

UK needs at least a further 20 GW of offshore energy by 2035



Welsh marine energy and offshore wind resource

Port and supply chain capability

Technology innovation

MARINE ENERGY WALES
YNNI MOROL CYMRU

Wales and SBCR become a centre for offshore energy technology development and deployment

SBCR Future Energy Vision 2035
Opportunities for SBCR and Wales

SBCR energy vision requires 1.6 TWh of biomethane (or bio SNG from biomass)

Potential sources of biomethane and bioSNG energy	
Waste feedstocks	Residual waste Wood waste Food waste Sewage sludge
Non-waste feedstocks	Decidcated energy crops Dry agricultural residues Forestry residues Small round wood Arboricultural arisings Sawmill co-products Short rotation forestry Wet manure Macro-algae

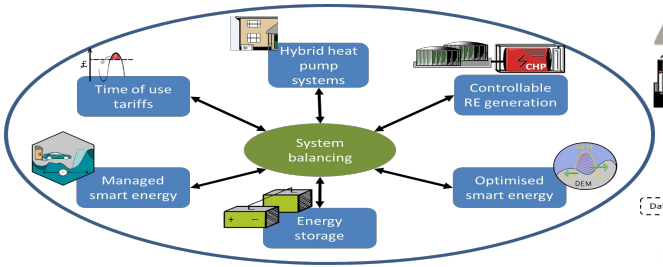
Technology innovation

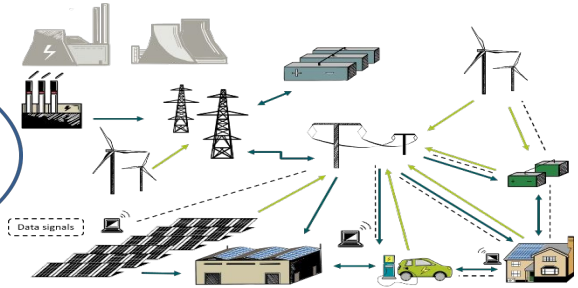
3o
b

Commercialisation of bioenergy feedstocks will create opportunities for Welsh farmers and forestry.

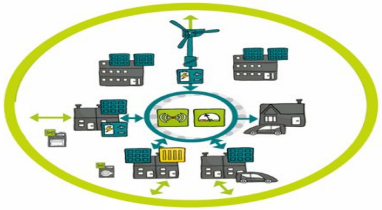
4) Smart and flexible local energy

Maximising the use of local energy will support new business models

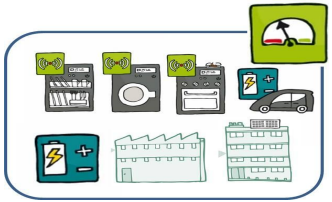




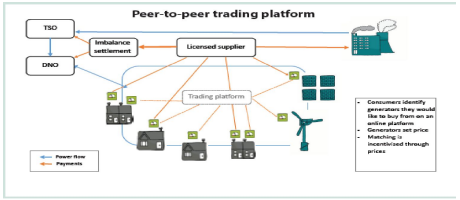
Welsh ambition to increase local ownership….



Local supply balancing



Demand side response



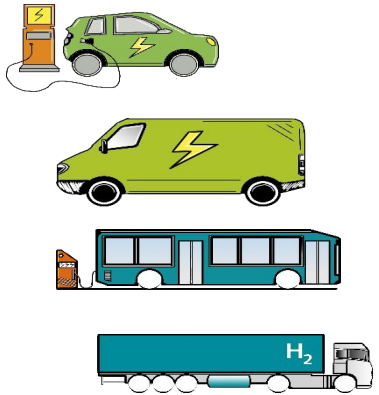
Peer-to-peer, energy clubs and local generation tariffs

Decarbonised, decentralised and democratised…

- Community energy
- Energy clubs
- Local generation tariffs
- ….
- Peer-to-peer trading
- Microgrids
- Local energy markets
- Local ESCO

5) Leading the transport revolution

Cars
80% of new cars ULEV by 2035
34% of all cars electric by 2035
Light goods vehicles LGV
72% of new LGV are ULEV by 2035
Buses /public transport
100% of new buses are ULEV by 2021
100% of all buses are ULEV by 2035
HGV's
30% of new HGV's are ULEV by 2035



Plus

Public transport

Cycling and walking

Clean air zones

Integrated transport and clean air strategy putting SBCR and Wales at the forefront of the transport revolution:

- Innovation
- New jobs
- Clean air
- Healthy people




Regen, Innovation Centre, Rennes Drive, Exeter, EX4 4RN
T: 01392 494 399

regen
transforming energy

THE ECONOMIC IMPACT OF ENERGY TRANSITION IN WALES

A RENEWABLE ENERGY SYSTEM FOR SWANSEA BAY CITY REGION

EMERGING FINDINGS

Calvin Jones
Welsh Economy Research Unit

IWA SBCR 30-4-02018

Objective

To assess the indicative cost and economic impact of the Regen SBCR Energy System Vision.

What's actually doable… or at least been done so far?

- Outline estimate of gross cost & Welsh spend for electricity & refurb
- Economic impact 2021-35 on Wales & SBCR (Jobs, GVA)
- Discussion of wider issues – local ownership, skills & supply chain…

What's not doable… or at least not been done so far?

- Cost other Vision elements – grid upgrades, storage, vehicles…
- Any 'systematic' analysis – crowding out, viability/investability etc

Method

Lever extensive prior Wales-level studies on energy generation & domestic refurb to estimate cost & economic impact of Energy System

Estimate cost/economic impact per MW by relevant technology

Rebase to 2018(ish) using UKGOV & other sources (e.g. CfD Auctions; press reports)

Assess Swansea Bay-level 'economic capture' based on indirect data (employment demand by sector, local employment etc.)

Synthesise prior reports to open discussion on wider issues driving impact.

Key Sources

- Bere, J, Jones, C. and Jones, S. (2015) The Economic and Social Impact of Small and Community Hydro in Wales – Report for Hydropower Stakeholder Group http://www.regenwales.org/upload/pdf/071015091201Impact%20of%20Small%20and%20Community%20Hydro%20in%20Wales.pdf
- Bryan, J., Evans, N., Jones, C., & Munday, M. (2017). Regional electricity generation and employment in UK regions. Regional Studies, 51(3), 414-425.
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- Tidal Lagoon Swansea Bay (2013) Turning Tide: the economic significance of the Tidal Lagoon Swansea Bay Report for Tidal Lagoon Swansea Bay http://tidallagoon.opendebate.co.uk/files/TidalLagoon/Cardiff_Business_School_Report.pdf

Scenario

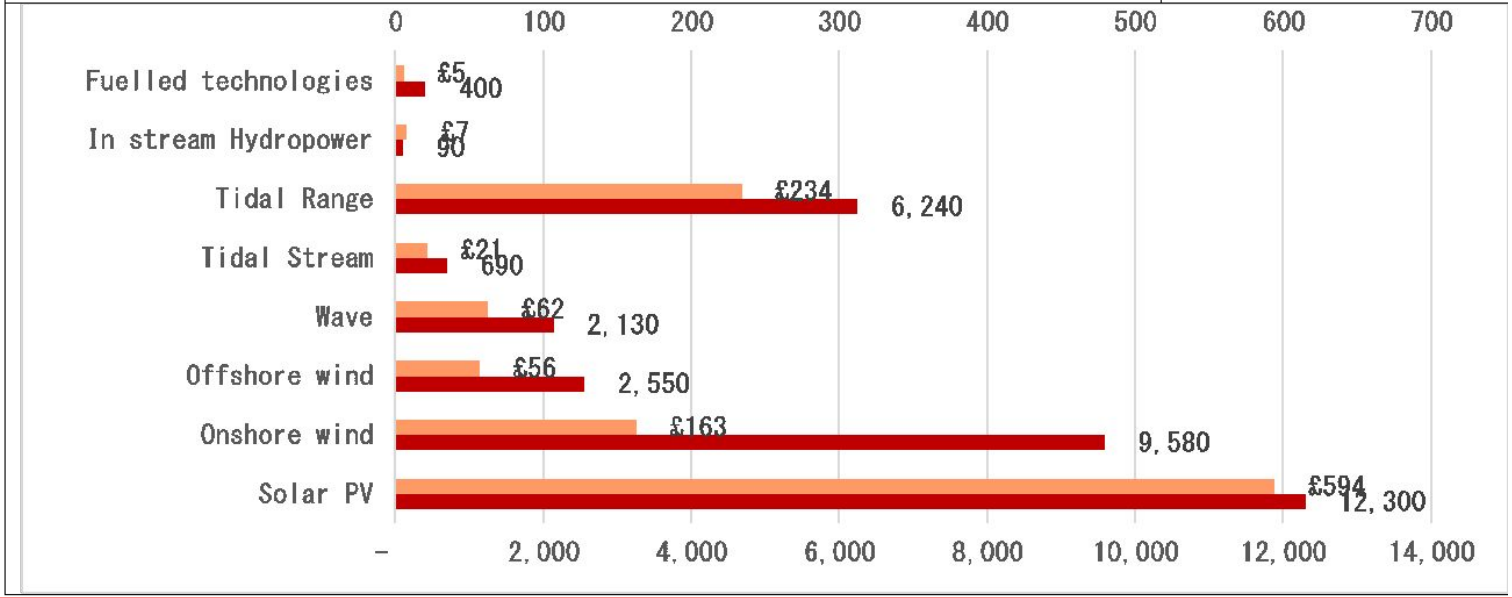
Figure 3-1 Electricity Generation Investment: MW and Investment Cost				
	MW	Cost per MW (£m)	Investment cost (£m)	Estimated Wales Spend (£m)
Solar PV	1,215	1.5	1,800.6	821.3
Onshore wind	800	0.7	584.9	207.1
Offshore wind	223	2.1	470.7	102.0
Wave	100	2.0	200.2	68.8
Tidal Stream	30	2.4	72.6	20.8
Tidal Range	320	4.1	1,299.2	515.2
In stream Hydropower	13	4.8	62.1	42.5
Fuelled technologies (Biomass, AD, Energy recovery)	30	5.0	150.5	23.6
All Technologies	2,731	1.7	4,641.0	1801.2

Notes:
All £2018 or closest equivalent.
Does not include operational costs.
Note fuelled technologies (AD, energy recovery) have multiple value streams of which electricity is only one

Results - Generation Wales

Employment and GVA Impacts – Wales

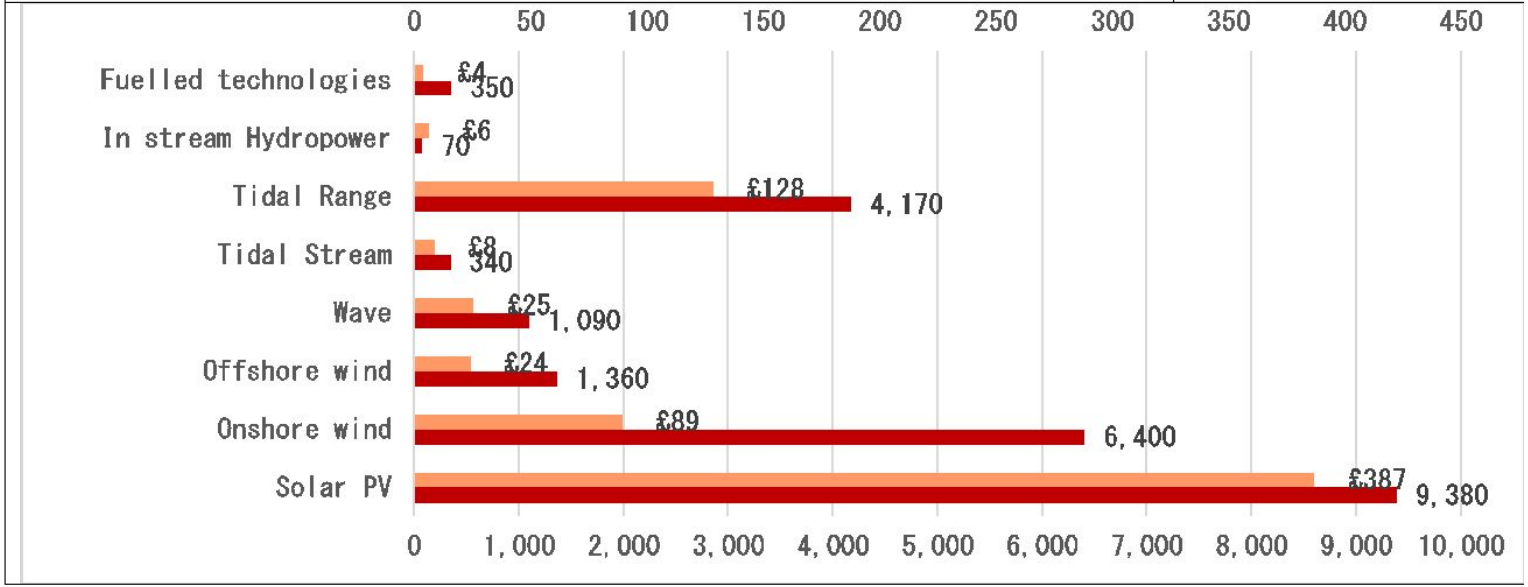
Employment (Person-years)	34,690
Gross Value Added (£m)	1,140



Results – Generation SBCR

Employment and GVA Impacts - Swansea Bay City Region

Employment (Person-years)	23,160
Gross Value Added (£m)	670



The Domestic Refurb

Figure 4-1 Domestic Refurbishment Investment Cost

Number of Households Covered	202,175
Average Cost per Household	£5,750
Total Investment Cost (£m)	1,160
Total Welsh Spend (Direct) (£m)	850

Figure 4-2 The Economic Impact of Domestic Refurbishment- Wales

	Total	Per Annum
Employment (Person years)	33,000	2,200
GVA(£m)	517.7	34.5

Figure 4-3 The Economic Impact of Domestic Refurbishment (SBCR)

	Total	Per Annum
Employment (Person Years)	24,990	1,670
GVA(£m)	340.2	22.7

The Domestic Refurb

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Employment (Person Years)	24,990	1,670
GVA(£m)	340.2	22.7

Capturing the Opportunity

"Sitting as it does within a highly regulated UK market for electricity and a UK national supply grid, Wales will see few price or energy security benefits flowing from local generation that might then have positive impacts on fuel poverty, competitiveness or inward investment. It would seem, for the UK regions at least, that a preponderance of natural resource, which is increasing in value, is no guarantee of increased prosperity."

Bryan et al(2017) Regional electricity generation and employment in UK regions *Regional Studies*, 51:3, 414-425,

Scheme	Type	Organisation	Location	kW Installed	Date
Cwm Clydach	Hydro	Cwmclydach Comm. Dev	Rhondda-Cynon-Taff	60	2011
Hafod-y-Porth	Hydro	National Trust	Gwynedd	100	2015
Hafod-y-Llan	Hydro	National Trust	Gwynedd	640	2013
Plas Newydd	Marine heat pump	National Trust	Anglesey	300	2014
Anafon Hydro	Hydro	Abergwyngregyn RegeneCo.	Gwynedd	270	2015
Llangattock	Hydro	Llangattock Green Valleys	Various	~60-100	2015
Taff Bargoed	Hydro	Friends of Taff Bargoed	Merthyr	100	2016
Gwrhyd Mountain Wind Farm	Wind	Aman Awel Tawe (via coop)	Neath Port Talbot	4700	2016
Rhydygwydd Salem	Wind	Carmarthenshire Energy	Carmarthen	500	2016
Abergwaun	Wind	Transition Bro Gwaun	Pembs	225	2015
Egni	Solar PV	Aman Awel Tawe (via coop)	Neat Port Talbot	120	2015
Gwent Energy	Solar PV	Gwent Energy CIC	Gwent	105	2013-2015
Gower Regeneration	Solar PV	Gower Power Coop	Swansea	1000	2018*
Narberth Swim. Pool	Biomass Heat	Narberth Energy	Pembs	200	2015

Operational Employment Supported by Community Energy Projects in Wales 2016-2035

Technology	Estimated kW	FTE/MW	FTE Jobs/yr
Onshore Wind	6000	1.6	10
Solar PV	1200	3.3	4
In Stream Hydropower	1250	10	12.5
Biomass,			3
All technologies	9000+	-	30

Figure 5-1 Notable (>50kW) Community & Charity Energy Installations in Wales since 2010

Figure 6-1 The Economic Opportunity of the Swansea Bay City Region Energy System Vision

	Renewable Electricity		Domestic Refurbishment		Total	
	Wales	*SBCR*	*Wales*	*SBCR*	*Wales*	*SBCR*
Gross Investment (£m)	4,640	-	1,160	-	5,800	-
Spending in Wales (£m)	1,800	-	850	-	2,650	-
Economic Impact (Employment Person-Years)	34,690	23,160	33,000	24,990	67,690	48,150
Economic Impact (Gross Value Added £m)	1,140	670	520	340	1,660	1,010
Annual Employment (FTEs)	*2,310*	*1,545*	*2,200*	*1,670*	*4,510*	*3,215*

Conclusions

Potential for significant employment/GVA gains at Wales & City region level - here from electricity and refurbishment.

Other elements - storage, grid, vehicles etc. - more expensive but lower economic impact?

Wales has only managed to capture a small proportion of econ benefits from previous energy booms. Nothing has changed.

Scale of investment daunting - 3 x M4 just for these elements - but we **must** find ways to enable such investment.

THE ECONOMIC IMPACT OF ENERGY TRANSITION IN WALES

A RENEWABLE ENERGY SYSTEM FOR SWANSEA BAY CITY REGION

EMERGING FINDINGS

THANKS FOR LISTENING

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IWA SBCR 30-4-02018

Re-energising Wales

Panel discussion:

- Chair: Emma Pinchbeck, Executive Director, Renewable UK
- Professor Stuart Irvine, Director of Centre for Solar Energy Research, Swansea University
- Johnny Gowdy, Director, Regen
- Professor Calvin Jones, Professor of Economics, Cardiff University
- Shea Buckland-Jones, Re-energising Wales Project Coordinator, IWA

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Lunch

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Breakout groups

What are the short or medium term opportunities towards 100% renewable energy in SBCR?

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Feedback from breakout groups

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Re-energising Wales

A response from Swansea Bay City Region representatives

- Chair: Dr Jane Davidson, Pro Vice-Chancellor for External Engagement and Sustainability, University of Wales Trinity Saint David
- Gill Kelleher, Policy & Engagement Manager, SPECIFIC
- David Jones, Project Director, Marine Energy Wales
- Councillor Rob Stewart, Leader of Swansea Council
- Ioan Jenkins, Development Director, Tidal Lagoon Power

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Summary

Auriol Miller, Director, IWA

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Harnessing the potential: renewable energy in the Swansea Bay City Region

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