

# COVENTRY & WARWICKSHIRE GREEN BUSINESS PROGRAMME



**European Union**  
European Regional  
Development Fund

## Denise Osborne Marketing & Events Co-Ordinator Green Business Programme

024 7683 2040 [www.coventry.gov.uk/greenbusiness](http://www.coventry.gov.uk/greenbusiness)  
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European Union

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## What is it?

- A support funded programme for SMEs and organisations in Coventry and Warwickshire to help business become more energy/resource efficient and make the most low carbon opportunities

## Who?

- All small to medium size businesses (SMEs) in Coventry and Warwickshire
  - Employ fewer than 250 employees
  - Have an annual turnover of not exceeding €50 million and/or an annual balance sheet not exceeding €43million
  - Have at least 50% of sales through business to business

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## Highlights of Phase 1 Programme (2016-2018)

- £1.5m in grants were awarded to 73 small to medium sized enterprises (SMEs)
- There have been over 11,600 tonnes of CO2 savings
- 60 new jobs were created
- 88 SMEs received non financial support
- 300 local organisations joined the Green Business Network



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New Programme – launched in January (2019-2021)

- Energy and resource efficiency grants - £1k-£50k (with 40% intervention)
- Free energy and resource efficiency audits to help identify energy, water and waste savings
- Continued free membership to the Green Business Network with new benefits
- Access to other specialist support to enable growth and innovation
- Free events, workshops and 1:1 support



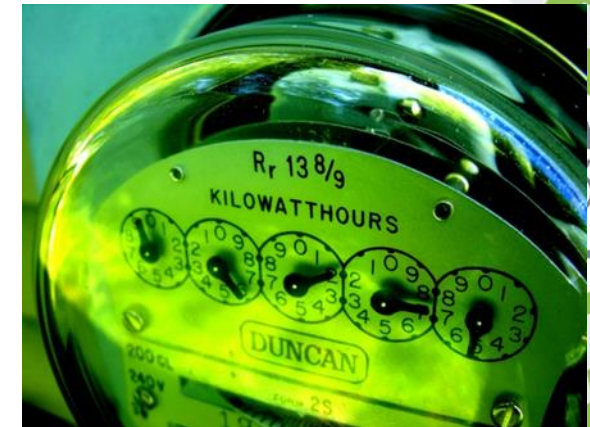
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## Energy/Resource Efficiency Audits

Identify potential energy/resource efficiency measures

- Audit looks at: Building fabric, energy bills, heating, lighting, equipment, process, water, waste, behavioural
- Includes estimated capital costs, energy savings & payback periods – used to provide a business case
- Energy/resource efficiency report



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- Energy/resource efficiency grants
  - Capital grants to improve energy/resource efficiency (Min £1K up to £50k)
  - Grants of 40%
  - Must save approx. 5 tonnes+ of CO<sub>2</sub> per year.
- What can be supported?
  - Measures that save carbon
  - Typical measures include lighting - LED, heating, energy efficient equipment, transformers, power factor correction, renewable technologies, ventilation, refrigeration, recycling and waste - compactors, balers and crushers
- Eligibility:
  - >50% B2B
  - Match funding can't be via another public sector grant etc.



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## Harris RCS

- CNC machined parts for the aviation and commercial industries
- £8,500 energy efficiency grant – business made investment of £28k
  - Sensor controlled LED lighting throughout
  - Insulated internal wall to minimise heat loss
  - Fast action roller shutter door & new insulated doors
- Electricity and gas consumption has dropped by 60%
- Saving 31 tonnes of CO2 emissions per year
- Payback from investment will take 2-3 years



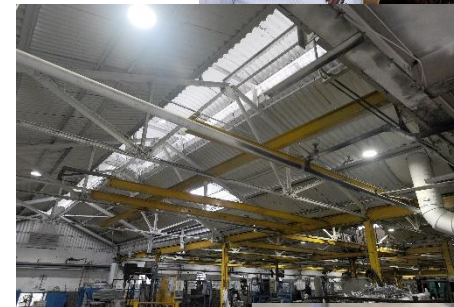
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## Sarginsons

### Aluminium Diecasting

- Were spending £370,000 per annum electricity and gas
- £26,000 energy efficiency grant
  - 2 recuperation gas furnaces
  - Variable speed air compressors and drying equipment
  - LED lighting throughout
  - Power Factor Correction
- Payback – 1.5 year
- 335 Tonnes CO2 saving/ annum
- Saving £50k per annum in energy bills



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## Green Business Network

Membership is free and offers a range of benefits:

- Events and workshops
- Monthly newsletter – news, events new legislation, case studies
- Membership certificate
- Expert advice
- Enhance green credentials to secure new business
- Networking and supply chain opportunities (Inclusion in Green Business Directory)
- Currently have 685 other organisations you can network with
- Signposting to other grants
  - ▶ Business Support
  - ▶ Innovation
  - ▶ Skills 4 Growth

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## Upcoming Events

### 29 October 2019

- The future of energy – Welcome Centre, Coventry (in partnership with Coventry University)

### 6 November 2019

- Electric Vehicles and Green Infrastructure for Business – Council House, Coventry City Council

### 14 November 2019

- Coventry & Warwickshire Business Festival Event (in partnership with CW Growth Hub)

**For more information visit <http://bit.ly/cwgreenevents>**

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# Strategic energy management

- Long-term approach to energy efficiency and energy security: goals, tracking progress, and reporting
- To manage continuous energy improvement, energy security and risks



# Strategic energy questions

- **How important is energy to successfully run your business?**
- **Do you know cost of energy on your bills (inc hidden costs taxes etc) and how this will change going forward?**
- **What is your strategy for addressing energy related threats? How will you run your business if:**
  - Energy supply outages on national grid
  - Severe weather flooding and storm damage
  - Energy become more expensive (e.g. carbon taxes)
- **Have you considered a back-up system?** E.g. Uninterruptable Power Supply (UPS) with generator and battery storage, renewable energy technologies (solar PV, biomass boilers, wind power etc)

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## ➤ Business Rates for Solar

- <https://www.solar-trade.org.uk/spv-toolkit-v2-8-for-the-website/>
- How they are calculated and minimising impact
- Higher rate if you mainly use the electricity yourself and a lower, fairer rate if you export most of the electricity back to the grid
- Planning a webinar with the Solar Trade Association in the future on this subject



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## ➤ Coventry's Climate Change Strategy

- UK Government announced its net-zero commitment by 2050
- Coventry's current strategy published in 2012 set a target to reduce carbon dioxide emissions by 27.5% by the year 2020. Coventry achieved this in 2014 (6 years early)
- Now working on our new Climate Change Strategy for Coventry



# Reducing our emissions across the City



39 rapid charge points have been installed with more planned.



Heatline – energy shipped from waste plant via 6.6km pipelines to major City Centre buildings.



**Energy efficient street lighting**

Existing Street Lighting



New Street Lighting



10 electric taxis operating in Coventry with more on the way.



# Coventry's Climate Change strategy

The strategy will cover the following themes

- **Domestic** - improving thermal efficiency of homes, reducing fuel poverty & encouraging innovation
- **Transport** - improvements to public transport and walking/cycling infrastructure
- **Industry** - improving the efficiency of buildings/processes
- **Environment** - sustainable procurement, enhanced biodiversity, sustainable food and driving behaviour change
- **Education & Skills** - upskilling
- **Energy** – increased use of renewables and feasibility studies for new solutions e.g. mine water for heating/cooling





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## Green Business Programme

### Contact us

Telephone: 024 7678 6901

Email: [GreenBusiness@coventry.gov.uk](mailto:GreenBusiness@coventry.gov.uk)

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Twitter: [@cwgreenbusiness](https://twitter.com/cwgreenbusiness)

Join our LinkedIn group

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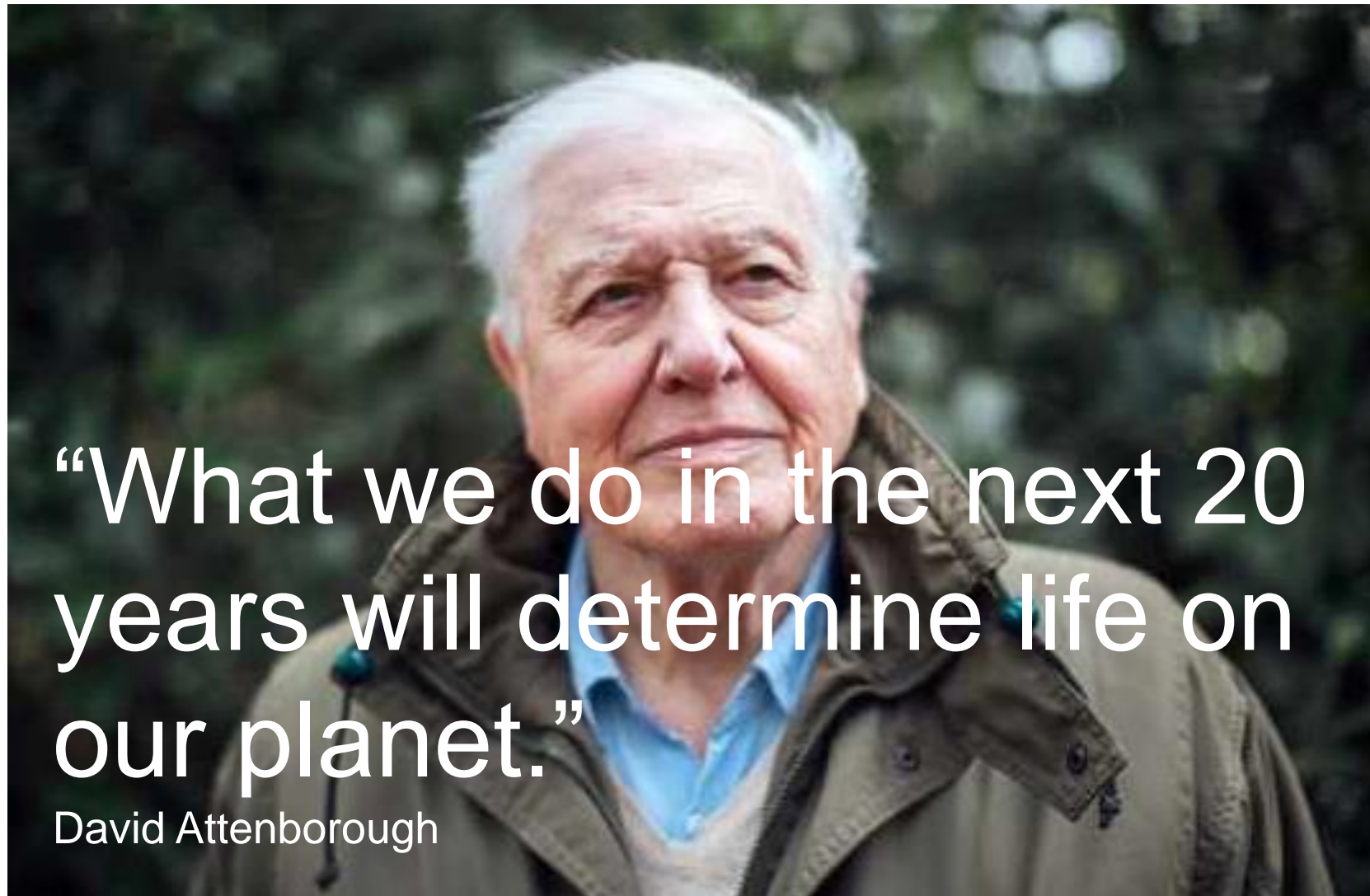


# CWLEP Breakfast Presentation on Solar PV

Angus Rose  
Director

07967 686650  
Angus.rose@inecoenergy.com

# Why am I here?



“What we do in the next 20 years will determine life on our planet.”

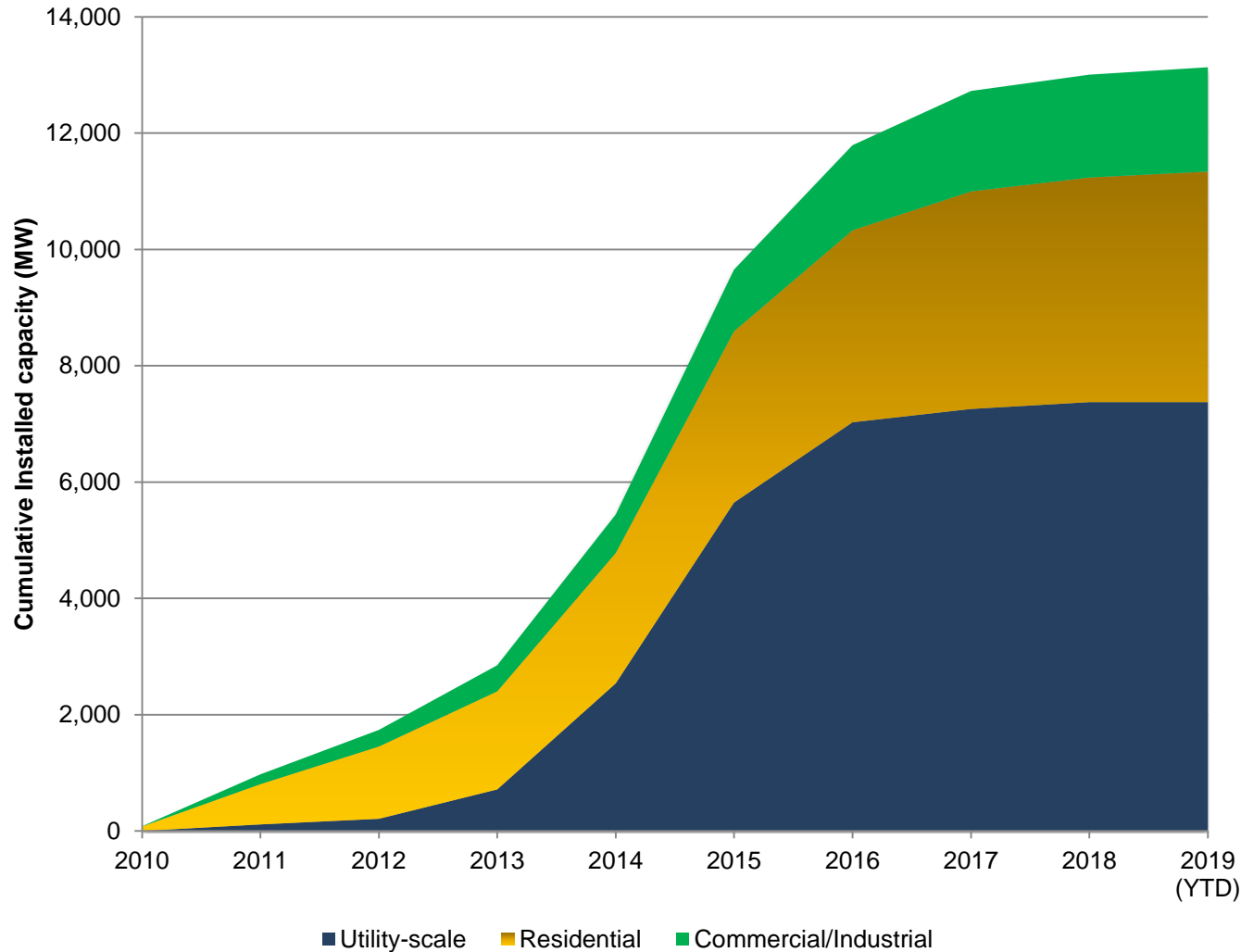
David Attenborough

# Why are you here?

- Who here has invested in renewable technology?
- Who here is interested in investing in renewable technology?



# UK Growth in Solar PV Generation



- Total installed capacity currently estimated to be 13.1 GW (7<sup>th</sup> highest worldwide)
- Market currently dominated by utility-scale solar farms (56% of total installed capacity)
- Domestic rooftops (approx. = 28%)
- Commercial and industrial installations (groundmount and rooftop) primarily for self-consumption together account for less than 20% of total installed capacity

# Crossing the Chasm

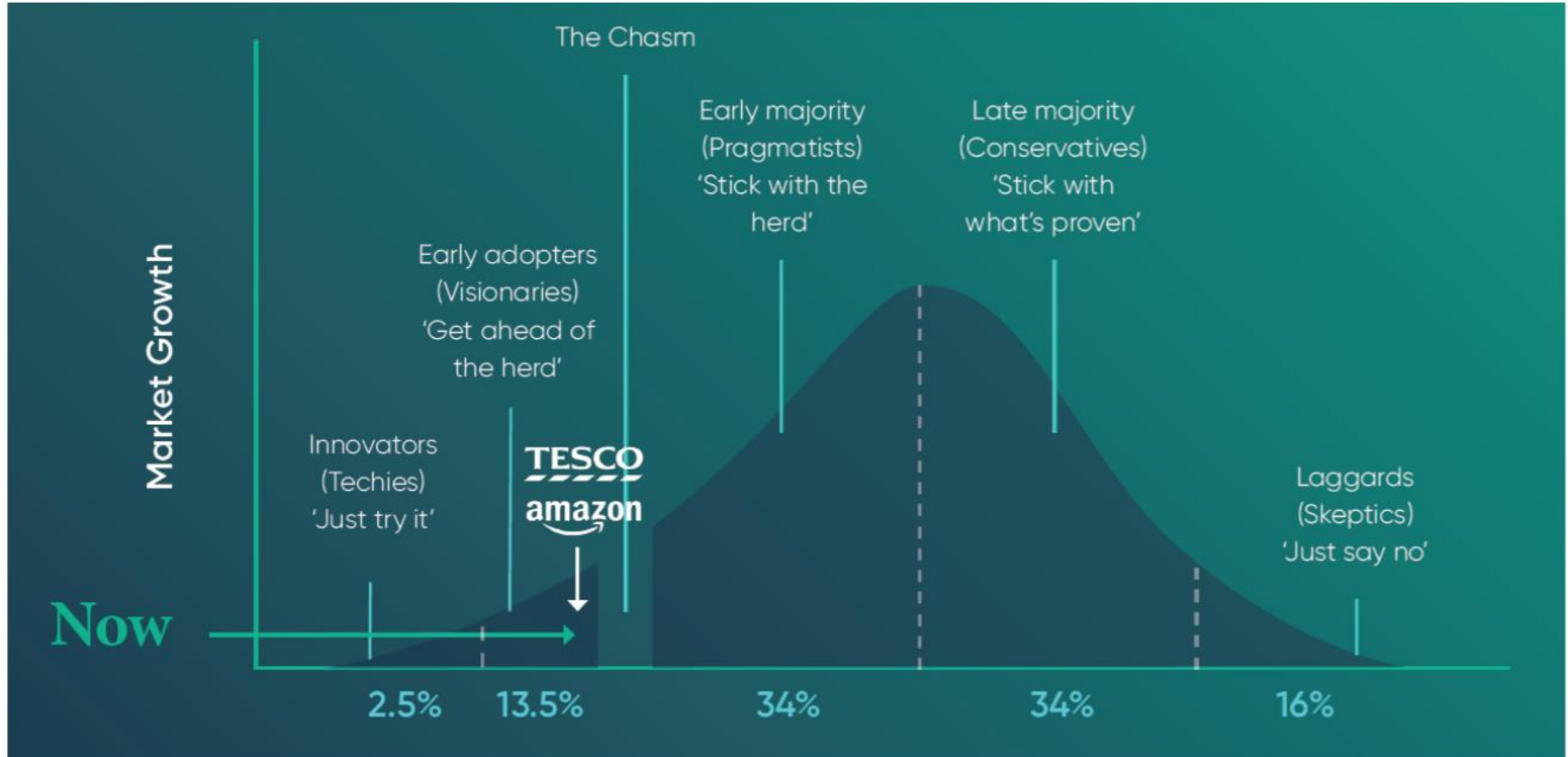
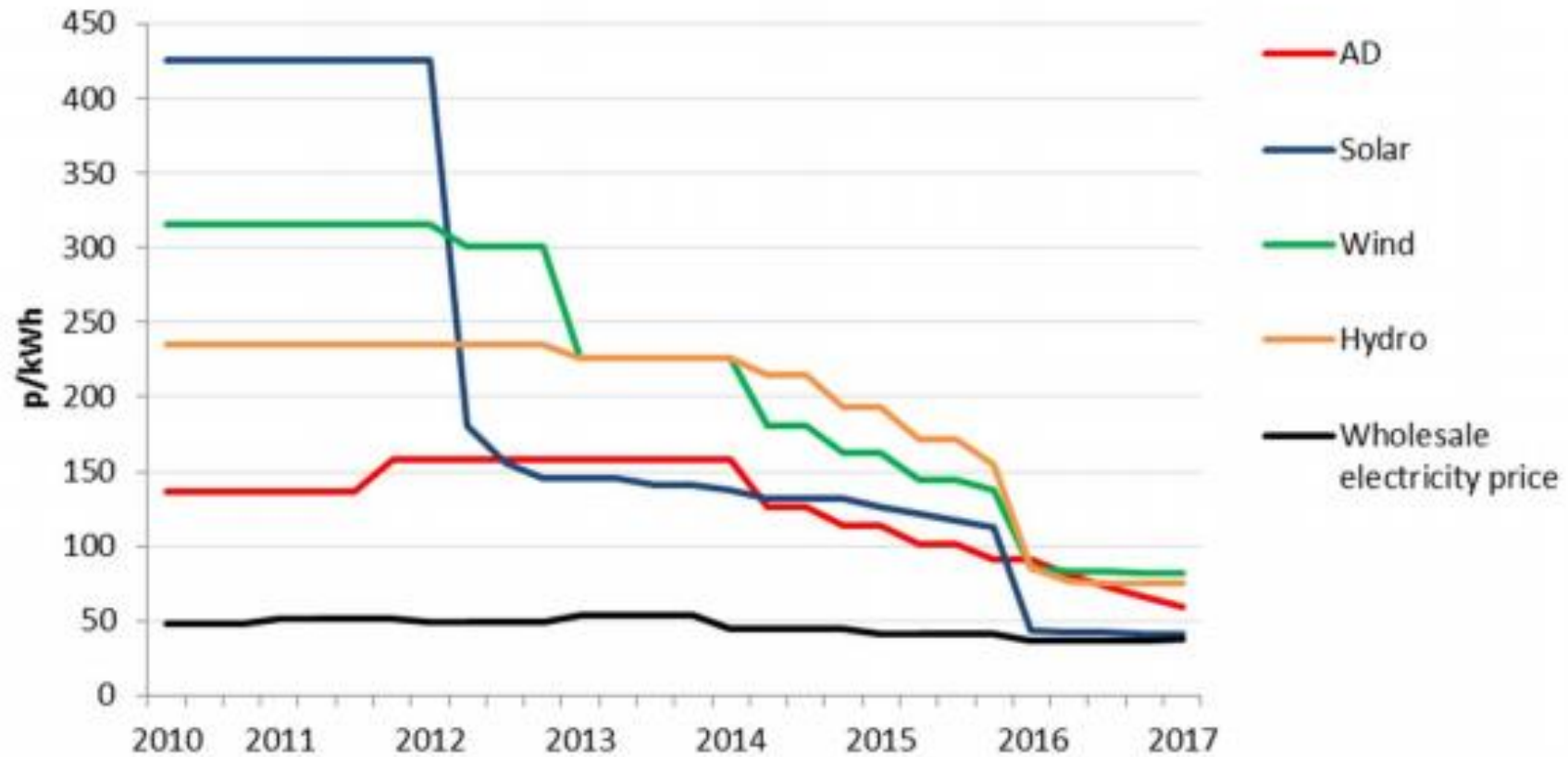


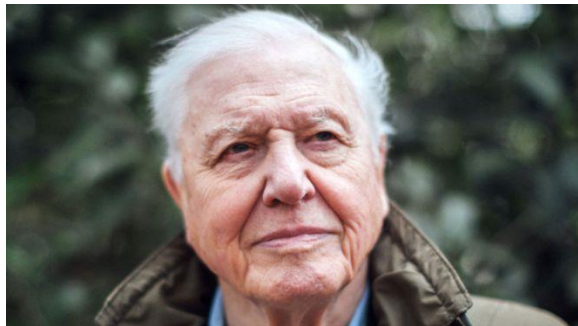
FIGURE 32: WHOLESALe PRICES VS SSFIT GENERATION TARIFFS



Sources: BEIS, from Ofgem tariff tables (2015/16 prices) and representative tariff bands; BEIS (2017), Energy and emissions projections 2016.

# Post FIT Business Case

- Solar system costs have decreased
- Energy costs have increased (on average 10% for business users)
- Electric Vehicle uptake will increase demand.
- Electrification of Heating
- Coal & Nuclear Decommissioning.
- Energy Storage improvements.
- Increase of taxes, levies, distribution & transmission charges.





# Business Applications – Thorlux Lighting

Thorlux manufactures over 400,000 luminaires per annum at its modern self-contained factory in Redditch, Worcestershire, UK. The factory contains energy intensive processes, such as sheet metal punching, laser cutting and forming, powder coating and LED PCB assembly lines. The company is continually measuring and improving its environmental credentials and for many years has had an energy monitoring programme in place which is independently certified to ISO 14001.

In 2009 Thorlux invested in its own carbon offsetting programme, planting trees on land in Monmouthshire to offset the CO<sub>2</sub> generated from its manufacturing and selling activities. The company has planted an incredible 150,000 trees over the last ten years. However, even with this responsible and proactive approach, it was felt that further improvements could be made to reduce the environmental impact and carbon footprint.

Thorlux has now installed solar photovoltaic units on the roof of its manufacturing facility. The system is estimated to produce 224,470kWh of electricity per annum, helping to power the plant and equipment as well as charging the company's fleet of hybrid vehicles. Over its operational lifetime, through reduced consumption from the National Grid, the installation will deliver a total CO<sub>2</sub> reduction of 1580 tonnes and **financial savings of over £1million.**



Every five to seven years the Valuation Office Agency (VOA) revises business rates, and the one in progress will come into effect from 1 April 2017 based on values in 2015. This will set 'rateable values' (RV) - used to calculate business rates - until 2022 and will apply to both existing and future assets.

1. PV Generation for Export or PPA is exempt.
2. PV Generation for Self-Consumption is not.

The STA has calculated that businesses that use their own onsite power will see a reduction of around 2.5% on their return on investment, damaging project economics as per the diagram to the right.

### How will diverse investors in solar be affected?



School	Small Business	Warehouse	Hospital Trust
50kW	40kW	250kW	1MW
Current Tax: £0	Current Tax: £0	Current Tax: £994	Current Tax: £3,976
New Tax: £807	New Tax: £1,093	New Tax: £6,014	New Tax: £14,214
<b>+£807 p.a.</b>	<b>+£1,093 pa.</b>	<b>+5,020 p.a.</b>	<b>+£10,238 p.a.</b>

# Residential Storage



# Utility Storage



A photograph of Mark Carney, Governor of the Bank of England, speaking at a podium. He is wearing a dark suit, a white shirt, and a blue and white striped tie. He is gesturing with his right hand while speaking. The background is a blue wall with the World Economic Forum logo visible.

**“Companies that don’t adjust to the reality of global warming will simply cease to exist.”**

Mark Carney, Bank of England

# Any Questions?

Angus Rose  
Director

07967 686650

Angus.rose@inecoenergy.com



# Using Solar and Battery Storage

# Building 2-6 Harnall Row

- Office Built by Harrabin in 2016 (4k sqft)
- Structured Insulated Panels
- Air source heating from Daikin AC
- LED lightening
- Auto switch off lights
- EPC of A

Simple installations done:

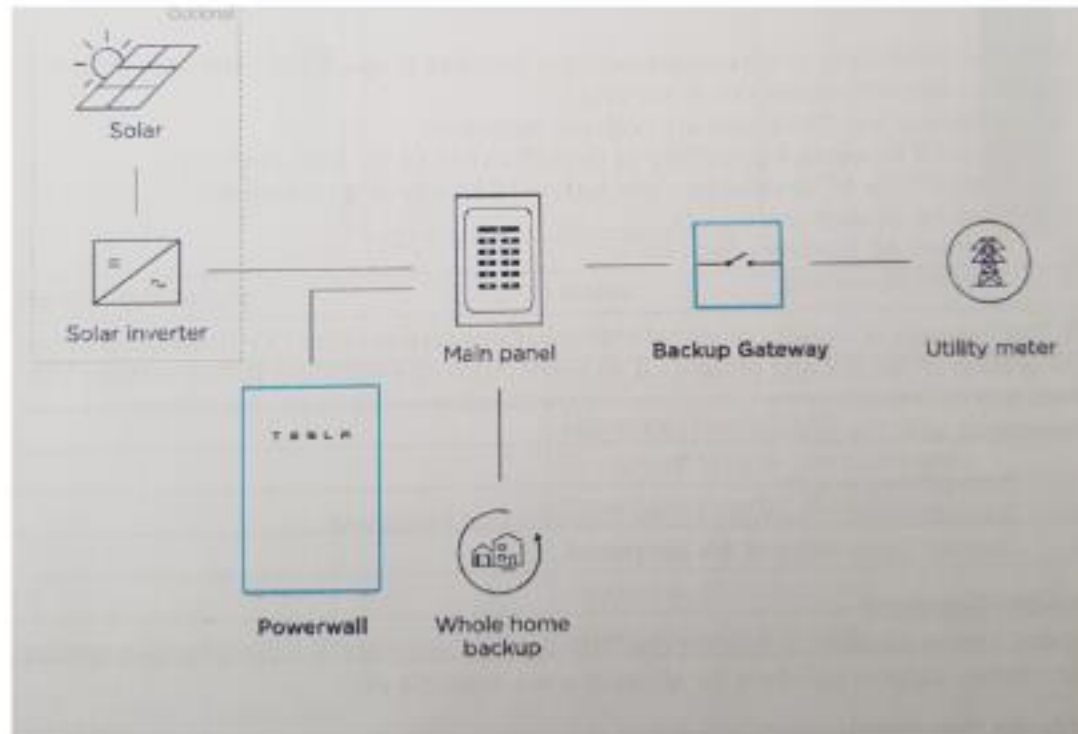
- 3 EV sockets EPC rating of A
- Installed smart plugs





# Solar and Battery System

## Proposed

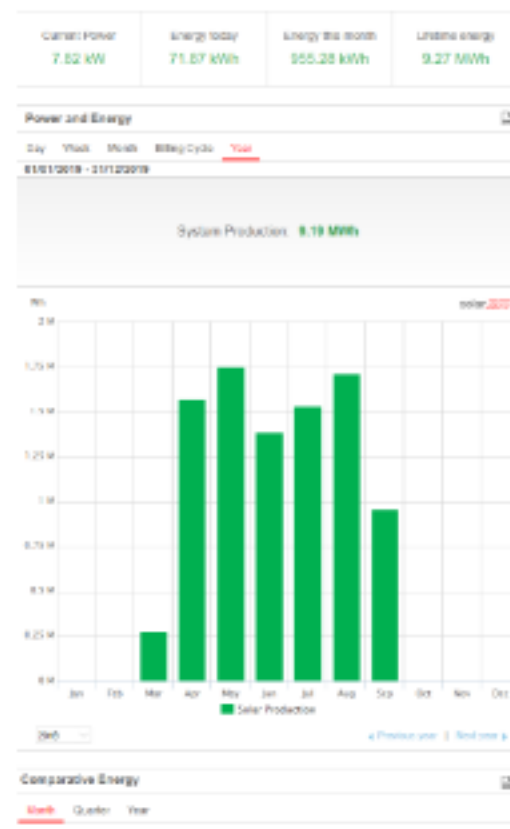


## Actual



# Solar Energy

- Solar Panels installed March 2019
  - Solar Edge Invertor
  - JA Solar 300w panels
- 44 Panels for 13.2 Kwp system
- Installation company: Empower Ltd
- Total Generated 9.27MWh
- 3,633kg CO2 saved (estimated yearly CO2 6,952kg)
- Personal Investment of £12k



Month	Solar Production (MWh)
Mar-19	0.28
Apr-19	1.57
May-19	1.75
Jun-19	1.39
Jul-19	1.53
Aug-19	1.71
Sep-19	0.96
<b>Total Energy</b>	<b>9.19</b>

# Comparison Payback

## Proposed

Year	Generation	Generation	Electricity Savings	Export Payment	Gross	Balance
1	13,395	£550.53	£1,875.30	£0.00	£2,425.83	[-£9,398.2]
2	13,289	£559.78	£1,044.01	£0.00	£2,509.79	[-£6,894.4]
3	13,182	£569.19	£2,015.24	£0.00	£2,584.43	[-£4,308.9]
4	13,075	£578.75	£2,080.08	£0.00	£2,667.83	[-£1,642.1]
5	12,971	£588.47	£2,165.62	£0.00	£2,754.09	£1,112.0
6	12,869	£598.36	£2,244.97	£0.00	£2,843.33	£3,955.3
7	12,765	£608.41	£2,327.23	£0.00	£2,935.64	£6,890.9
8	12,663	£618.63	£2,412.50	£0.00	£3,031.13	£9,922.1
9	12,561	£629.03	£2,500.89	£0.00	£3,129.92	£13,052.0
10	12,461	£639.59	£2,592.52	£0.00	£3,232.12	£16,284.1
11	12,361	£650.34	£2,687.51	£0.00	£3,337.85	£19,622.0
12	12,262	£661.26	£2,785.98	£0.00	£3,447.25	£23,059.2
13	12,164	£672.37	£2,888.06	£0.00	£3,560.43	£26,629.6
14	12,067	£683.67	£2,994.80	£0.00	£3,677.55	£30,307.2
15	11,970	£695.16	£3,108.57	£0.00	£3,798.73	£34,105.9
16	11,875	£706.83	£3,217.29	£0.00	£3,924.12	£38,030.0
17	11,780	£718.71	£3,335.17	£0.00	£4,053.88	£42,083.9
18	11,685	£730.78	£3,457.37	£0.00	£4,188.16	£46,272.1
19	11,592	£743.06	£3,584.05	£0.00	£4,327.11	£50,599.2
20	11,499	£755.54	£3,715.37	£0.00	£4,470.91	£55,070.1

## Actual

Month	Solar Production (MWh)	KWh	Charges	Savings*	Generation
Apr-19	1.57	1571.85	0.14	£ 220.06	£ 64.60
May-19	1.75	1751.77	0.14	£ 245.25	£ 72.00
Jun-19	1.39	1389.89	0.14	£ 194.58	£ 57.12
Jul-19	1.53	1531.50	0.14	£ 214.41	£ 62.94
Aug-19	1.71	1714.55	0.14	£ 240.04	£ 70.47
<b>5 Whole Mths Energy</b>	<b>7.96</b>	<b>7959.56</b>	<b>0.14</b>	<b>£ 1,193.93</b>	<b>£ 327.14</b>
5 month average	1.59	2653.19		£ 397.98	£ 109.05
Proposed Average (13395/12)		1116		£156.27	£45.87
Difference		1537.19		£ 241.71	£ 63.18
Pay					
*To verify					

# CCC Green Grant

## Aims

1. To reduce CO2 levels further
2. Self sustaining building
3. To reduce payback period



# Grant Intervention: Battery Technology

## Battery Investment Uncertainty

- Slight risk-no comparison in Coventry
- Unsure of CO2 savings
- Increase in Payback period for whole system

## Grants

- Would not have purchased without grant
- Helps reduce risk
- Reduction in CO2
- Towards making the building self sustainable

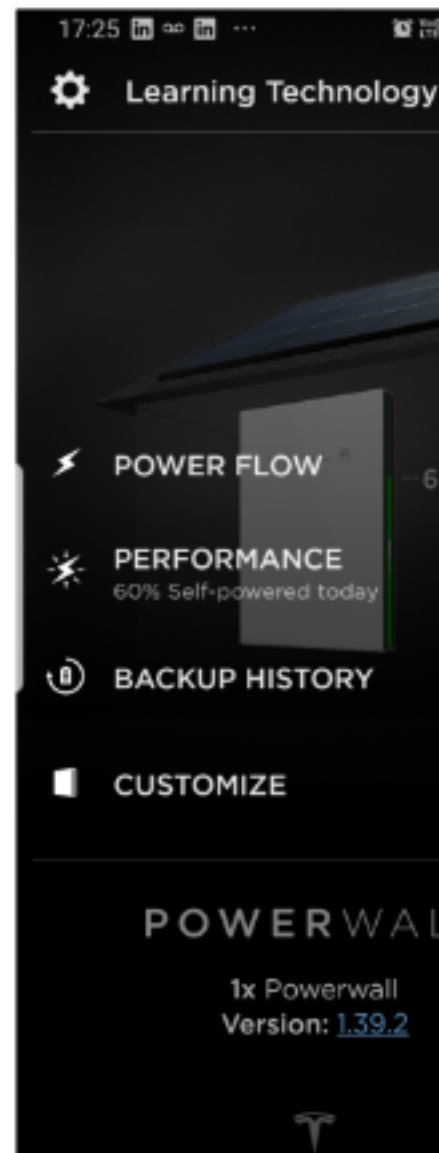
# Grant Investment

- Tesla Powerwall 2 with Gateway to keep office running without power
- £13k with installation and meter change
- Intervention of 40% around £5k grant
- Installed July 2019



# Powerwall 2

July to September 2019	Total	Monthly	Daily
Office Usage (kWh)	3668	1223	41
Solar Energy (kWh)	3007	1002	33
From Powerwall (kWh)	648	216	7
From Grid (kWh)	2195	732	24
To Grid (kWh)	1855	618	21
Average self sufficiency			42%
Good day (yesterday)			60%



# CCC Green Business Programme Process

- Fantastic support and encouragement from Sara Wilkes during application to final claim
- Simple forms
- Quick approval
- Easy Claim (1 form with supplier invoices and payment proof)
- Payment within 3 weeks



# Future

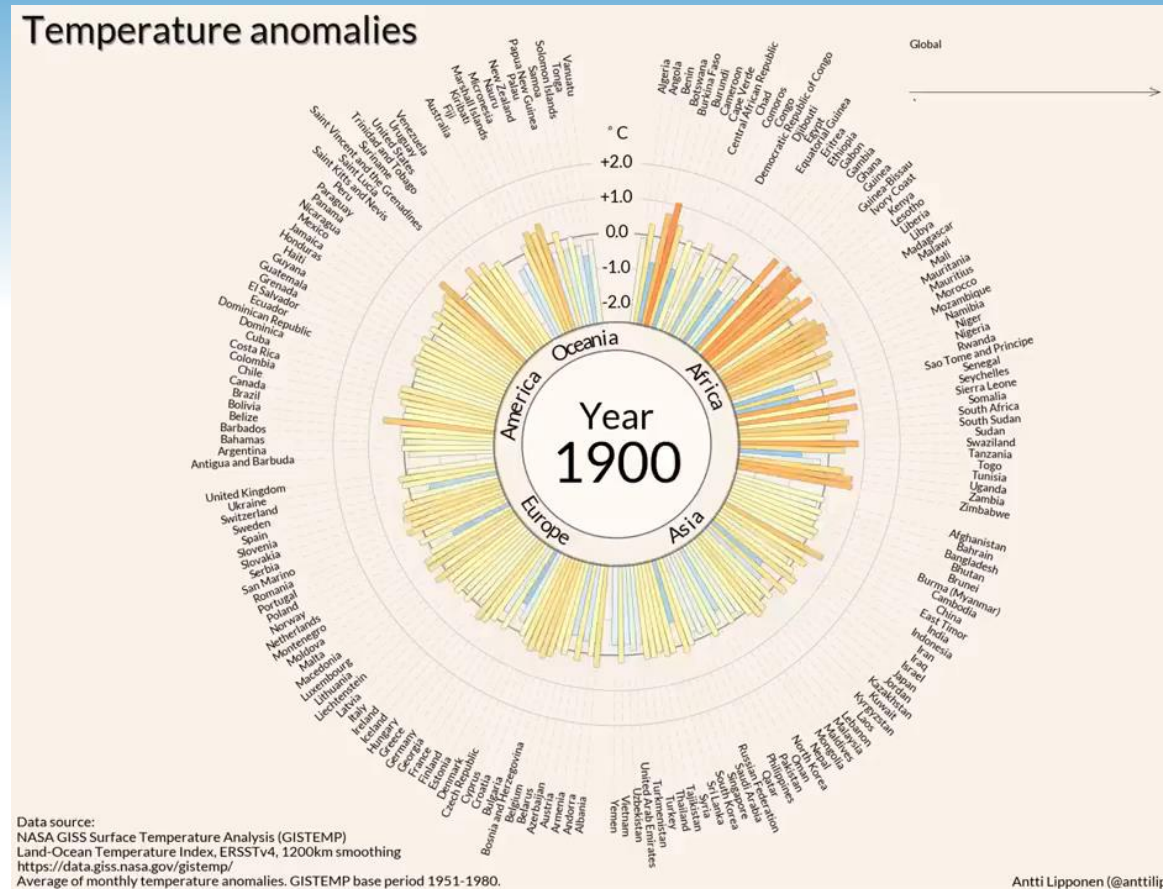
- Encouraging employees to change to electric cars: Carrot and Stick
  - Lease schemes
  - Free Charging
  - CCC Congestion charging
- Considering 2<sup>nd</sup> Powerwall for total self-sufficiency
- Switching to DC Power (technology not there yet)

# Turning up the Heat – the Technology of NOW

The UK Heat Pump Associations  
Thursday 19<sup>th</sup> September 2019

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# Why are we worried - Global Temperature Anomalies since 1900



# The Ultimate Renewable Energy Source



# 2019 - a year of publications

- Committee on Climate Change – Net Zero
- Committee on Climate Change – Reducing UK Emissions
- IPCC – Global Warming of 1.5°C
- Commons Science & Technology Committee – Clean Growth



House of Commons  
Science and Technology  
Committee

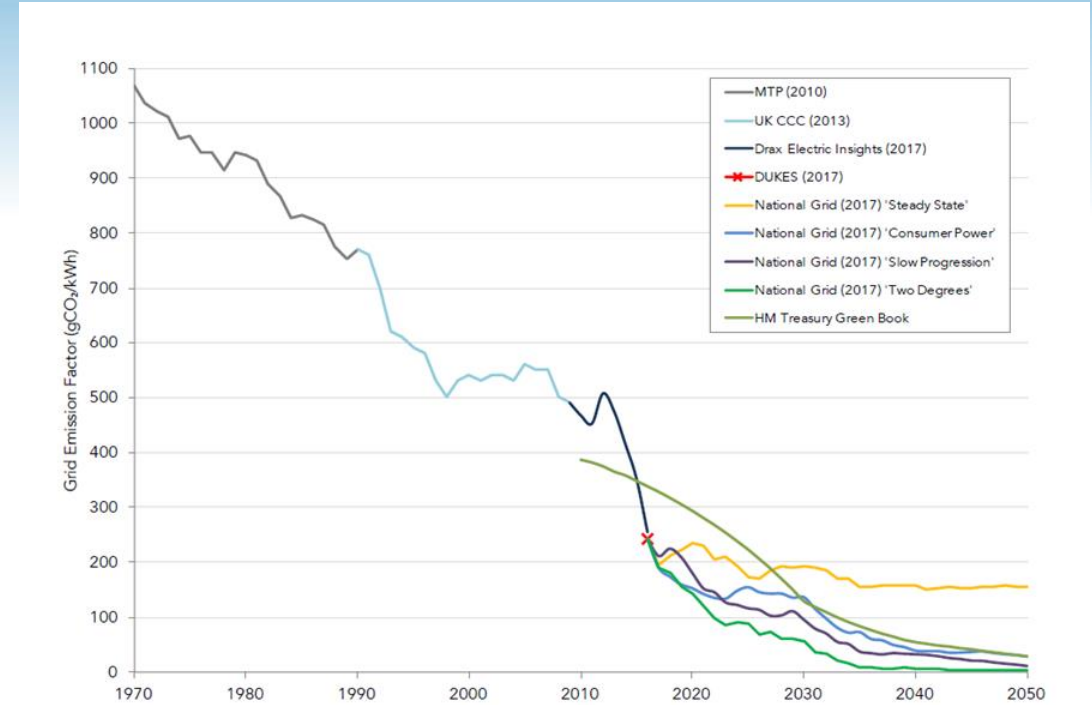
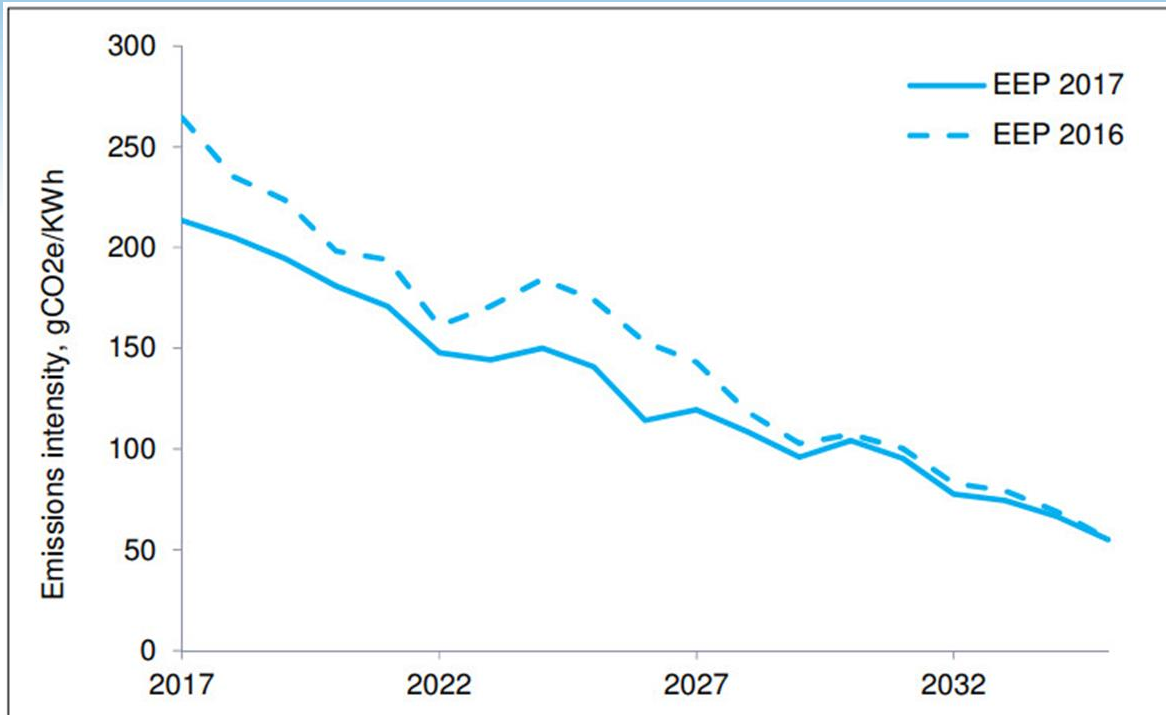
**Clean Growth:  
Technologies for meeting  
the UK's emissions  
reduction targets**

Twentieth Report of Session 2017–19

# Why act now?

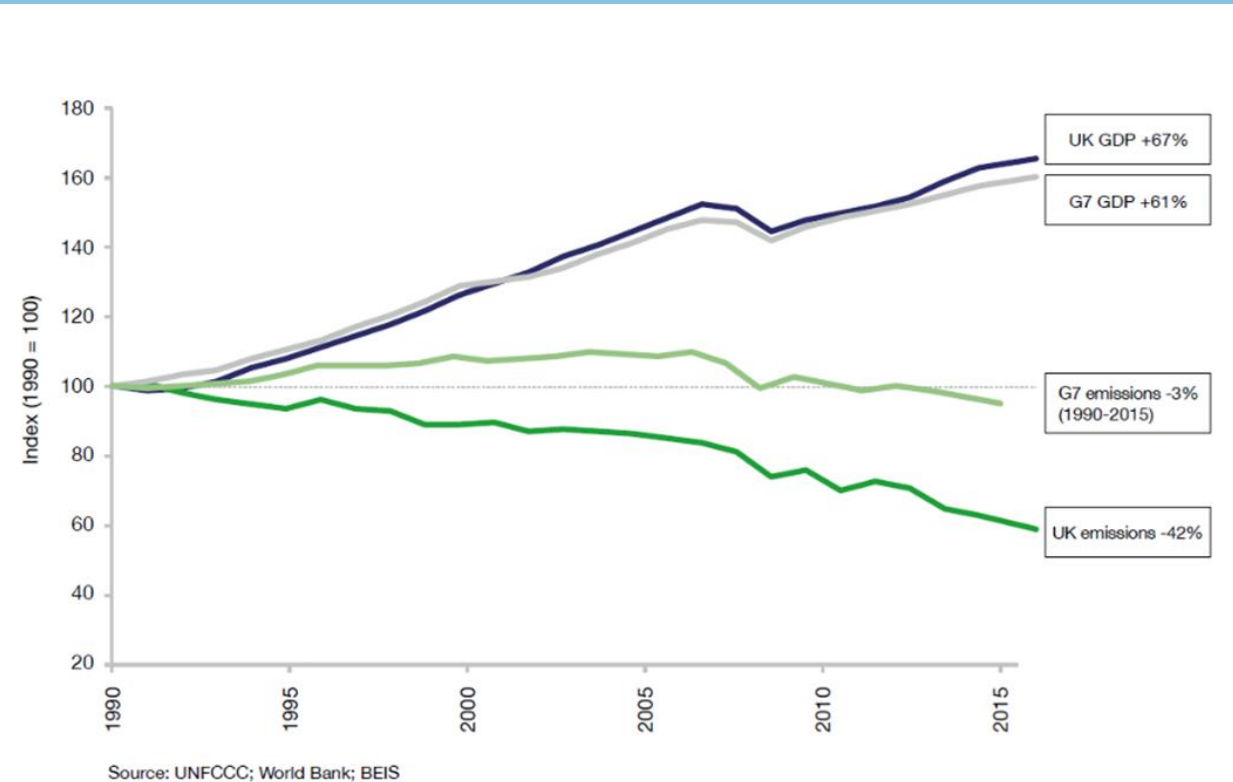
- The IPCC report gives us limited time to stop irreversible damage
- Current Building Regulations permit development that is adding to the problem by embedding yet more fossil fuel dependency
- Public awareness is shifting rapidly
- Generational pressure
- The Greta and Attenborough effect (public licence to operate)
- We have technologies available now that are tried and tested
- All industry watchers anticipate a much more regional and distributed energy (CCC and National Grid, etc.)
- The very rapid development of the electric vehicle market is transforming the power generation and distribution sector and plays to growth in the electrification of heat

# What drives electrification?



# Will decarbonisation harm the economy?

- 1990 – 2015, UK GDP growth outstripped the G7 average whilst emissions reduction was significantly greater.
- The UK started the industrial revolution and so has a moral duty to lead on emissions
- Decarbonisation technologies tend to upskill the workforce
- The UK is now a net importer of energy





# What is the impact on heat emissions?

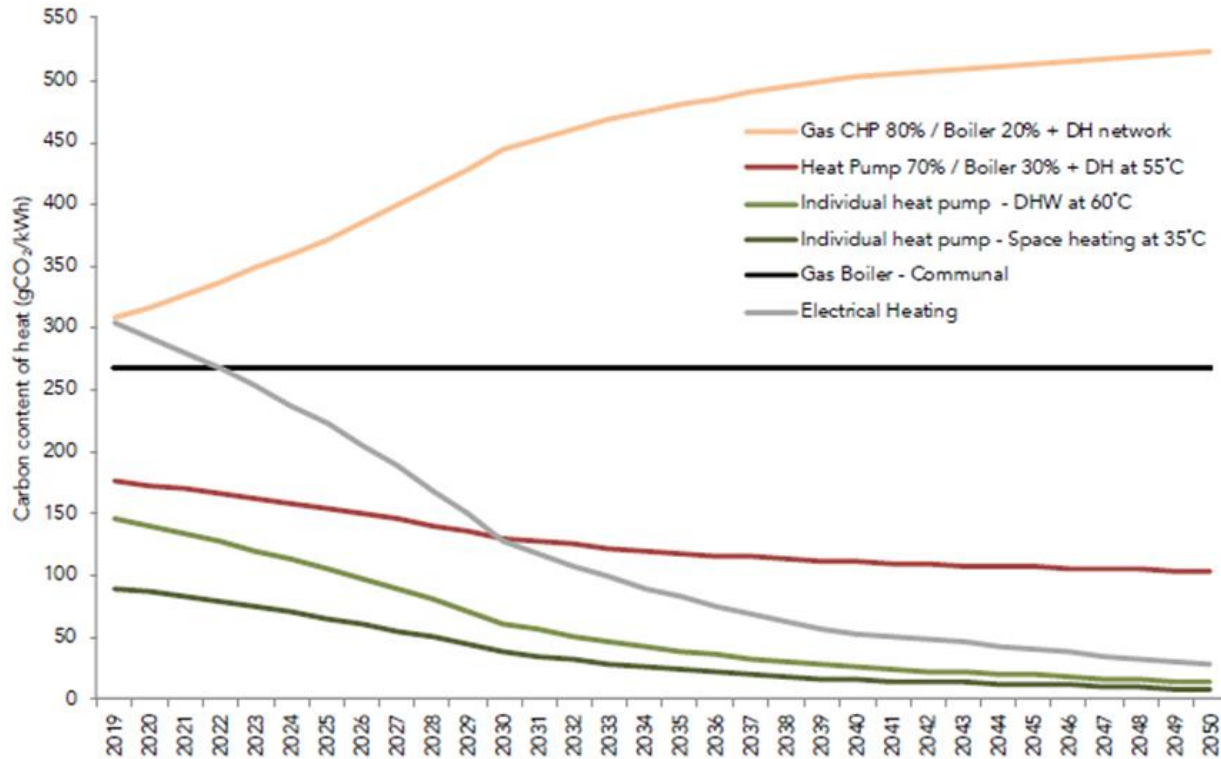


Figure 4.05 – Projected carbon factor of heat based on HM Treasury Green Book marginal emission factors

## CO<sub>2</sub> from Heating systems

UK grid at : 2019-09-11 08:30

is emitting : 128 grams CO<sub>2</sub> /kWh

Ground Source Heat Pump (400%):	32	grams CO <sub>2</sub> per kWh delivered heat
Ground Source Heat Pump (320%):	40	
Direct Electric heating (100%):	128	
Gas boiler (85%):	215	
Oil boiler (85%):	320	
Cool (50%):	630	

**GSHP**  
association

[www.gshp.org.uk](http://www.gshp.org.uk)

Displaying the CO<sub>2</sub> released from different heating technologies. GSHP values are for 2 typical levels of efficiency; 320% (COP=3.2) & 400% (COP=4). Grid carbon intensity uses real-time data. The value reflects the decline in generation from coal & the growing contribution from renewable power technologies.

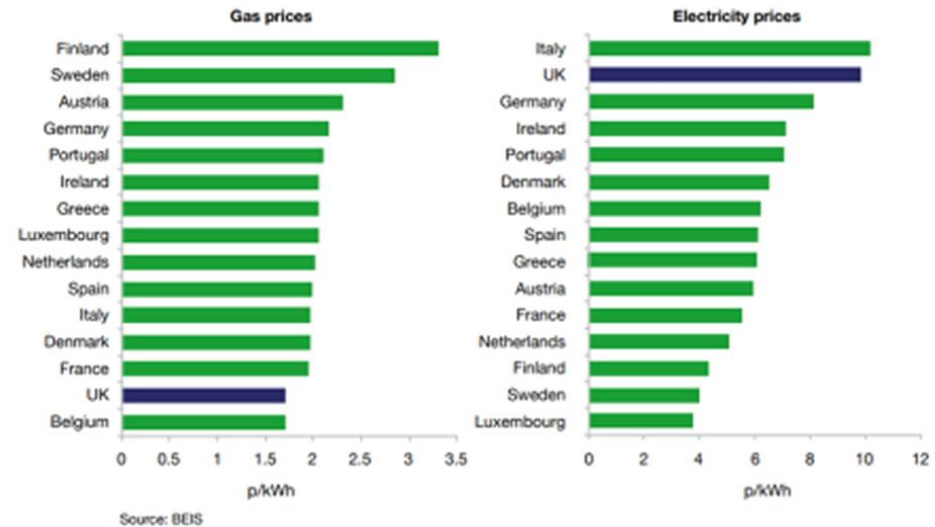
Data courtesy National Grid - CO<sub>2</sub> Intensity API Original thinking JCW Parker  
Developed & sponsored by GeoScience Ltd. Running on pythonanywhere

[View live UK generation status](#)

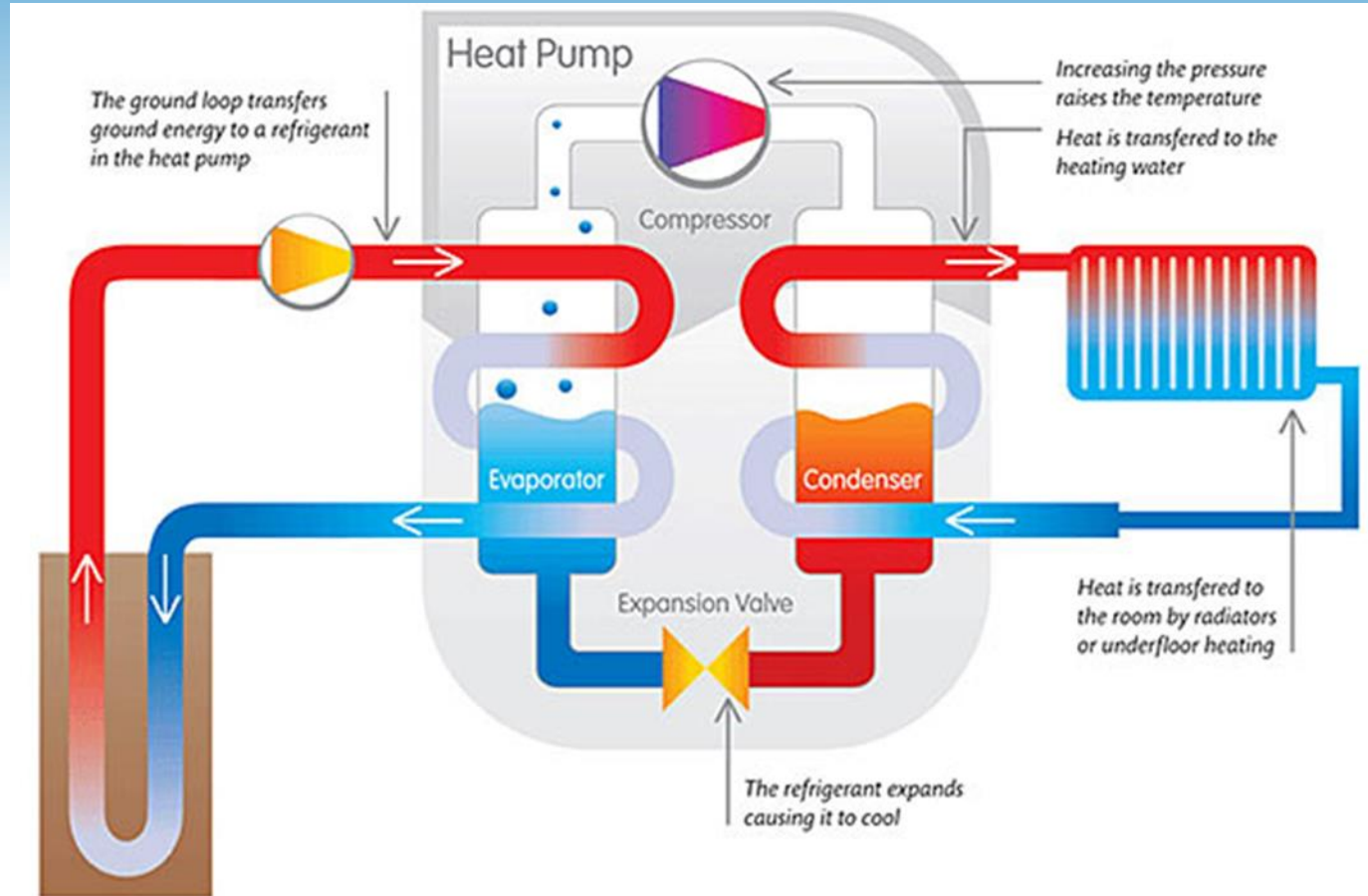
# What has held heat pump deployment back?

- Resistance to recognising grid carbon factors in Building Regulations
- UK raw fuel spark gas favours gas
- All “green” levies are applied to electricity only – 18% or so inflationary result
- Hidden subsidies to the fossil fuel sector
- Lack of robust standards environment
- Poor renewables subsidy strategy
- The interests of the incumbents
- Consumer awareness
- Heating industry skills and knowledge

Figure 12: Industrial electricity and gas prices for large consumers in the EU15 in 2016, including taxes<sup>135</sup>



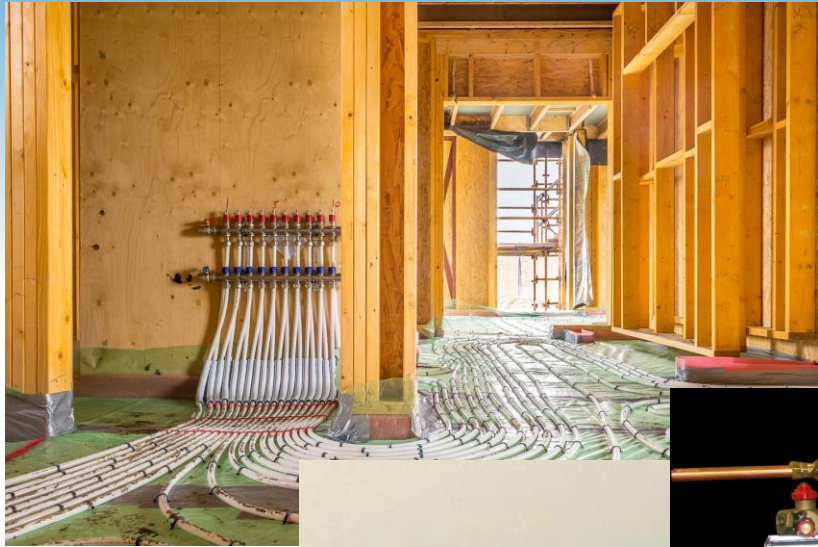
# Heat pumps 101



# Heat pumps 101



# Heat pumps 101



# Heat pumps 101



# What is changing to make heat pumps the technology of NOW?

- Part L consultation on grid carbon factor and maximum emitter flow temperatures
- Adoption of innovative district heat solutions
- Co-location of a-seasonal heating and cooling loads
- New thermal storage technologies – can be as effective as battery storage
- The value of demand side management, demand side response and load shifting
- Smart integration between local electrical generation, electrical demand and heat (or coolth) demand
- Progressive development of design and deployment standards
- Knowledge, skills and training for consultants, designers and deployment engineers
- Heat as a service and other innovative funding models
- Public attitudes to emissions

# Planning – where London leads....

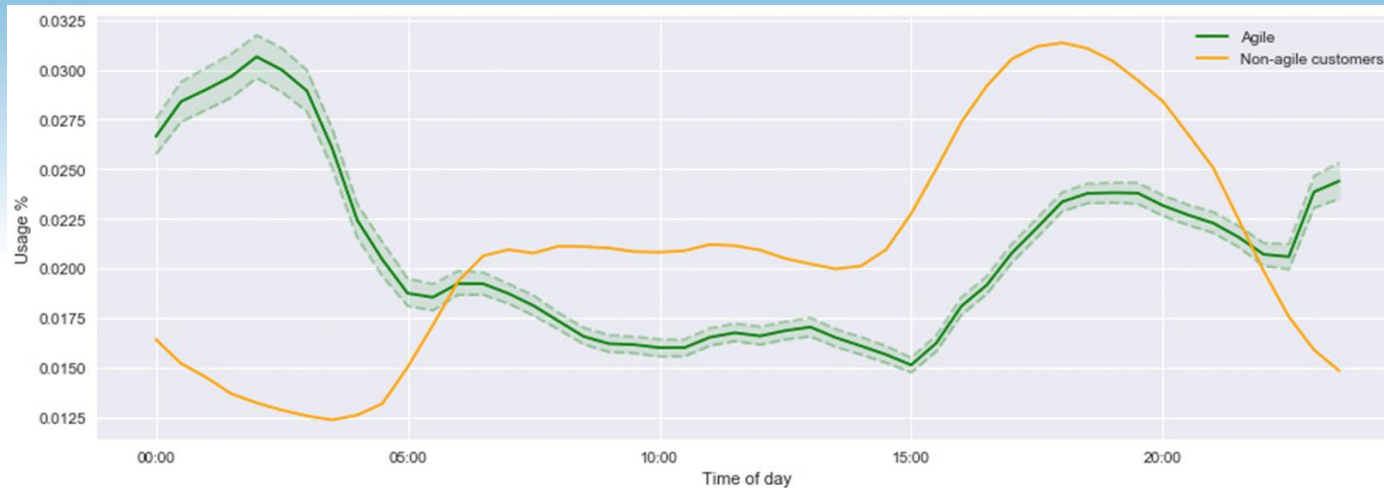
## New 2019 GLA Guidance Air Quality Gets Equal Billing

Fuel type	Fuel Carbon Factor (kWh/kgCO <sub>2</sub> )	
	SAP 2012	SAP10
Natural Gas	0.216	0.210
Grid Electricity	0.519	0.233

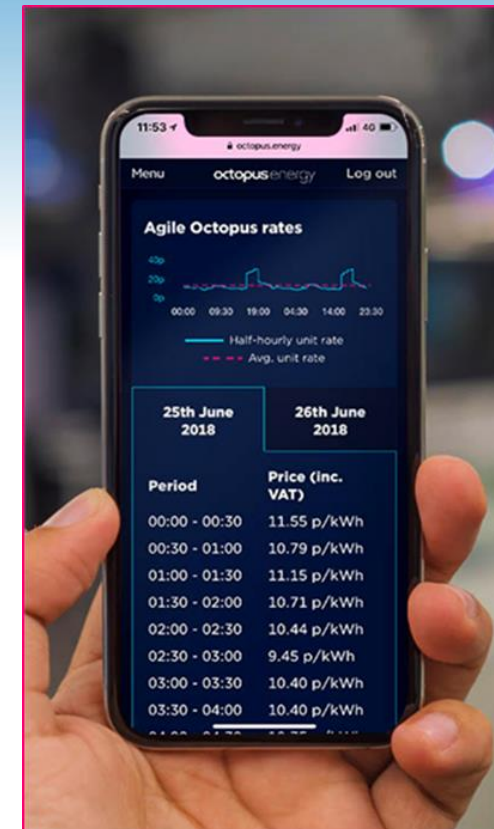




# Nudge Theory Billing for Load Shifting



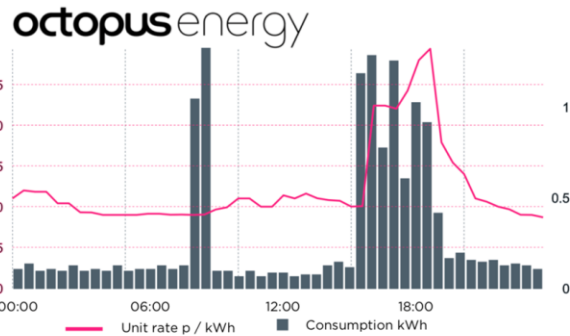
Octopus Energy Agile Tariff consumers demonstrate significantly different consumption profiles compared to average non-agile consumers. Low cost electricity is a proxy for low carbon intensity. Initial benefits for EV charging but progressing to heat pump deployment with thermal storage.



# Tariff gains from load shifting

Sunday  
18th March 2018

For electricity meter 17P3001648



Total cost

£ 2.26

Total consumption

13.82 kWh

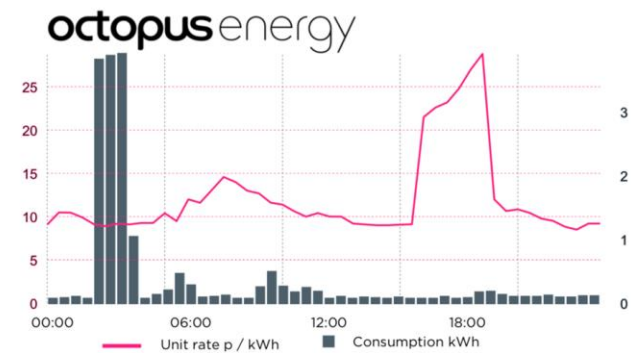
Weighted average unit rate

16.36 p / kWh

Period	Rate p / kWh	Consumption kWh	Cost p
00:00 - 00:30	11.00	0.10	1.100
00:30 - 01:00	11.98	0.13	1.557
01:00 - 01:30	11.82	0.09	1.064
01:30 - 02:00	11.82	0.10	1.182
02:00 - 02:30	10.40	0.09	0.936
02:30 - 03:00	10.40	0.12	1.248
03:00 - 03:30	9.30	0.09	0.837
03:30 - 04:00	9.28	0.10	0.928
04:00 - 04:30	8.98	0.09	0.808
04:30 - 05:00	8.98	0.12	1.078
05:00 - 05:30	8.98	0.09	0.808
05:30 - 06:00	8.98	0.10	0.898
06:00 - 06:30	9.12	0.10	0.912
06:30 - 07:00	9.12	0.12	1.094
07:00 - 07:30	9.00	0.10	0.900
07:30 - 08:00	9.02	0.12	1.082
08:00 - 08:30	8.98	1.04	9.339
08:30 - 09:00	9.02	1.32	11.906
09:00 - 09:30	9.64	0.09	0.868
09:30 - 10:00	9.91	0.09	0.892
10:00 - 10:30	11.00	0.06	0.660
10:30 - 11:00	11.00	0.09	0.990

Thursday  
22nd March 2018

For electricity meter 17P3001648



Total cost

£ 1.85

Total consumption

18.48 kWh

Weighted average unit rate

10.01 p / kWh

Period	Rate p / kWh	Consumption kWh	Cost p
00:00 - 00:30	9.07	0.07	0.635
00:30 - 01:00	10.49	0.08	0.839
01:00 - 01:30	10.46	0.10	1.046
01:30 - 02:00	9.90	0.07	0.693
02:00 - 02:30	9.10	3.82	34.762
02:30 - 03:00	8.90	3.88	34.532
03:00 - 03:30	9.20	3.91	35.972
03:30 - 04:00	9.10	1.04	9.464
04:00 - 04:30	9.27	0.07	0.649
04:30 - 05:00	9.27	0.13	1.205
05:00 - 05:30	10.40	0.20	2.080
05:30 - 06:00	9.48	0.46	4.361
06:00 - 06:30	12.00	0.28	3.360
06:30 - 07:00	11.60	0.09	1.044
07:00 - 07:30	13.09	0.10	1.309
07:30 - 08:00	14.58	0.12	1.750
08:00 - 08:30	14.00	0.07	0.980
08:30 - 09:00	13.00	0.07	0.910
09:00 - 09:30	12.68	0.25	3.170
09:30 - 10:00	11.61	0.49	5.689

Source: Octopus Energy

# The resulting numbers

Heat demand 20,000kWh/ annum	Carbon emissions/ Annum Kg	Operational cost : Gas at 4.5p/kWh	Operational cost : Ground source electricity at 16p/kWh	Operational cost : Ground source electricity at 10p/kWh
Gas at 85% efficient	4,300	£900		
Ground source at SPF 3.5:1	1,120  Reduction of 74%		£914	£572  Reduction of 36%

# The resulting benefits

- Lower operational cost for heating and cooling
- Lower carbon intensity for heating and cooling
- The value of demand side management, demand side response and load shifting
- Smart integration between local electrical generation, local electrical demand, EV battery charging (and discharge to grid) and heat (or coolth) demand
- Reduced grid reinforcement investment required
- Reduced investment in generation capacity
- Can be combined with innovative retail models for heat as a service
- Potential for lower lifetime costs due to the long term value of in-ground ground source infrastructure
- Potential reduced decommissioning / recycling costs for thermal storage vs electrical battery storage

# Developments in thermal storage



# Thank you

[www.gshp.org.uk](http://www.gshp.org.uk)

[www.heatpumps.org.uk](http://www.heatpumps.org.uk)

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