

“LOW CARBON” ELECTRIC HEATING

FOR INTELLIGENT “SMART” HEATING SOLUTIONS

June 2019

CLIMATE CHANGE ACT 2008

THE WORLD IS STILL WAKING-UP TO GREENHOUSE GASES..... but

- **80% cut in World emissions agreed**

(Paris Accord)

- **20% energy from renewable sources**

(EU Directive)

UK Govt ACTIONS:

- **Ban on gas boilers in new homes by 2025**
- **Crack-down on wood-burning stoves**

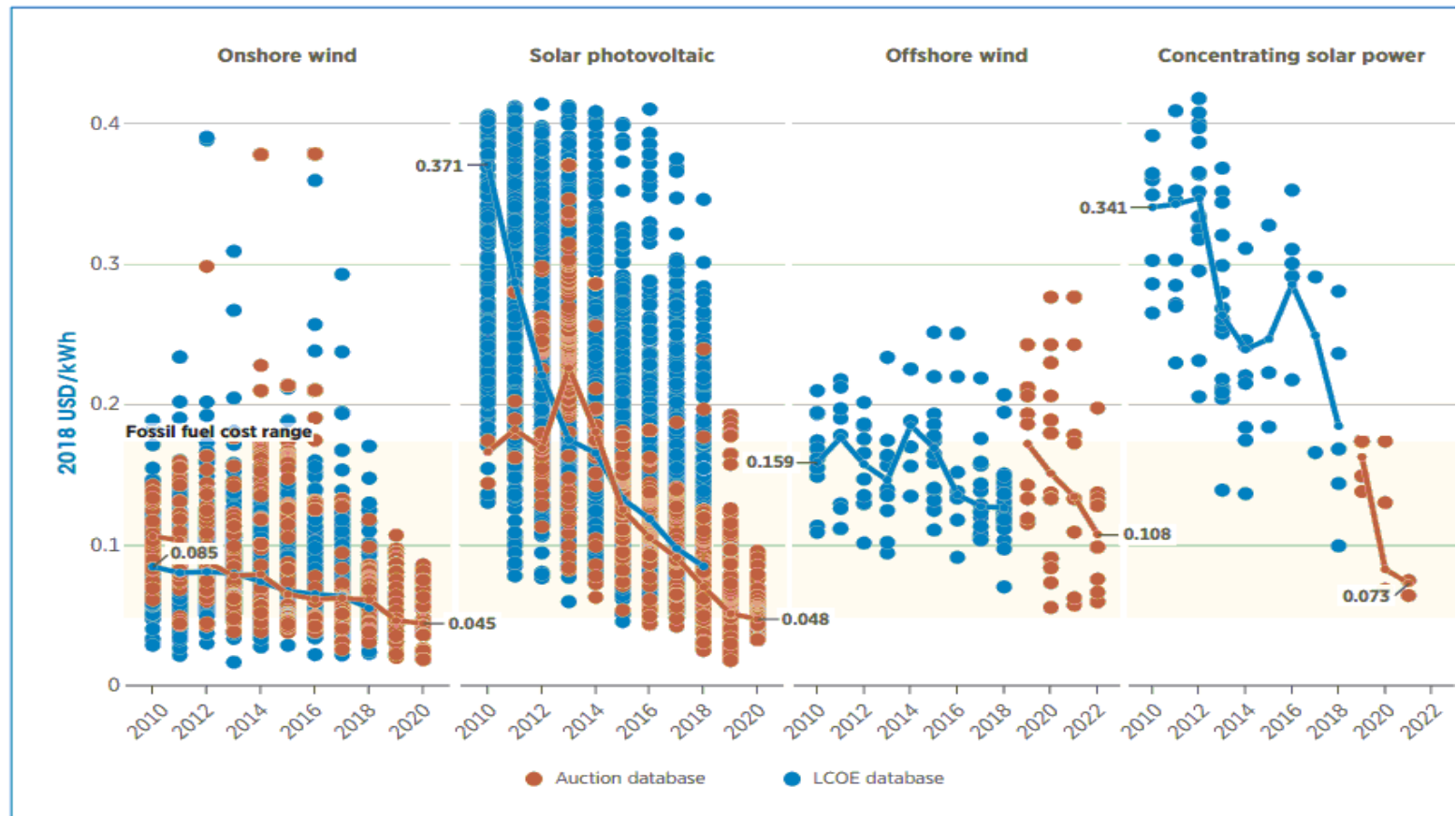
= 89% of UK HEATING MARKET “UP FOR GRABS”!!

REPLACEMENT TECHNOLOGIES?

- **Air Source Heat Pumps – viable but expensive (CT)**
- **Solar panels – viable but long payback (CT)**
- **CHP – major ‘down-grade’ in efficiency (BRE)**
.....and NOT suited for most homes!

ELECTRIC HEATING?

Figure S.3 The LCOE for projects and global weighted average values for CSP, solar PV, onshore and offshore wind, 2010–2022



Source – International Renewable Energy Agency – IRENA – 2018 Report

THE FUTURE IS ELECTRIC!!

**•ALREADY 2-FOLD “UPLIFT” IN
ELECTRIC ENERGY EFFICIENCY FROM
“RE-NEWABLES”
(BRE)**

**•IR HEATING 16%-32% BETTER
ENERGY EFFICIENCY THAN GAS
BOILERS / ELECTRIC CONVECTION
(EIHAP)**

IR HEATING OVERVIEW

- IR ONLY HEATS OBJECTS IN A ROOM**
- ~2⁰-3⁰C IMPROVED 'COMFORT FACTOR'**
- MINIMAL 'DUST' CIRCULATION**
→ HEALTH!

2DHEAT IN THIS MARKET

NOVEL TECHNOLOGY DEVELOPED

- **ULTRA SLIM PANELS** (2MM)
- **SMALLER/ LIGHTER** (< HALF WEIGHT)
- **HIGHER POWER** (700W VS 300W)

- **5X FASTER HEAT-UP** (< 5 MINS VS 20 MINS)
- **RUN AT 120°C** (VS 85°C)
- **BETTER UNIFORMITY** (90% VS 67%)

→ **LOW DC VOLTAGE OPTION**

INTELLECTUAL PROPERTY

- GB PATENT FILED (product & process)**
- STRONG “KNOW-HOW”**
- PRODUCTION SCALE PROTOTYPES**

MARKET CHANNELS

- **MANUFACTURING CONSORTIUM FORMED**
- **DIALOGUE WITH FTSE 250 DISTRIBUTOR**
- **'POSITIVE INTEREST' FROM NW BUILDER**
- **DIALOGUE WITH HOUSING ASSOCIATION**

THE TEAM



Chris Redfearn
BSc Chem Eng
Non-exec Chairman



John Lewis
BSc Chem
Managing Director



Tony Knowles
ACA/FCA/BA/MA
Part-time Finance
Director



Dr Marcus Rutherford
PhD Chem Eng, MSc Surface
Sciences, BSc Chem
Technical Manager



Steve Keating
Instrumentation,
systems, quality
engineer.



Professor Gordon Tatlock
University of Liverpool.
Strategic partner. Global expert in
metal oxide behaviours.

TARGET INDUSTRIES

NEW BUILD HOMES



178,000 new UK homes
pa

- Need 8-16 panels each
- Theoretical £1.25bn pa
- Accessible £250m pa

OFFICE/ COMMERCIAL/



135m pa UK ceiling
tiles (AMA Reseach)

Theoretical 15m ceiling
heater 'tiles' pa
Accessible 150,000
ceiling heaters
(~£60m p.a.)

SOCIAL HOUSING (ENGLAND ONLY)



6.7m rented houses of
which 3.2m social rent

Av 5 panels each
Theoretical £640m pa
Accessible £128m p.a.

NEXT STEPS

- **ESTABLISH PRODUCTION IN St. HELENS**
- **P.O.C IN 50-100 HOMES BY 2021/22**
- **FORMALISE DISTRIBUTION CHANNEL**
- **INSTALL BULK SCALE MANUFACTURE**
- **SIGNIFICANT SUPPLIER BY 2026**

- St Helens 'pilot' line develops next generation products & exploits technology in new sectors (automotive/ aerospace)
- IR panel sales of ~300,000pa/ NSI £45-50m/ £11m NPV/ IRR 53% (indic. market share 2.5% of UK market by 2029)

IN CONCLUSION....

- **STRONG USP** → unique technology / patent filed.
- **ENERGY & CARBON EFFICIENT** → end-user needs
- **LOW COST PRODUCTION POTENTIAL** → cost competitive

- **ADDRESSES MAINSTREAM INDUSTRY SECTOR NEEDS**
- **DELIVERS AGAINST REGULATORY DRIVERS**
- **EXPERIENCED TEAM** → need to fill building industry 'gap'
- **TECHNOLOGY DEVELOPED VIA INNOVATE UK GRANT**

- **£0.9m funding being sought to set-up manufacture**
 - 60% EU grant being sought (£0.4m net)
 - Match funding (EIS qualifying)
- **Projected 55% IRR** → ~2 year payback



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