IHT Plug-in

sustainable energy

Purpose

- Introduce the team
- Introduce the idea of retrofit plug-in
- Explore the idea of a demonstrator

The Retrofit plug-in product team:

- ICAX: sustainable technology innovation company, design supply install and maintain Interseasonal Heat Transfer (IHT) systems
- Mitsubishi Electric UK: plant equipment partners for IHT products, in particular bringing their WR2 technology and manufacturing power to the IHT plug-in
- Rehau Limited: Specialist polymer manufacturer. Rehau supply high grade PEX pipework for IHT Thermalbanks

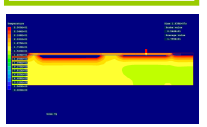
Brief History of ICAX IHT

1996: Mark Hewitt and Andy Ford begin working on IHT ideas

1999: Patent Filed

2000: ICAX Limited Formed. Edward Thompson joins

2000-2: Extensive CFD R&D of IHT



2003: Meet with Carbon Trust

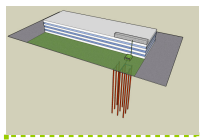
2004: Win Carbon Trust R and D Award for Howe Dell

2005: Begin HA IHT demonstration at Toddington. Private investment

2006: Garth Prison Delivered, Misawa License

2008: Howe Dell Complete. Rehau and Mitsubishi partnering

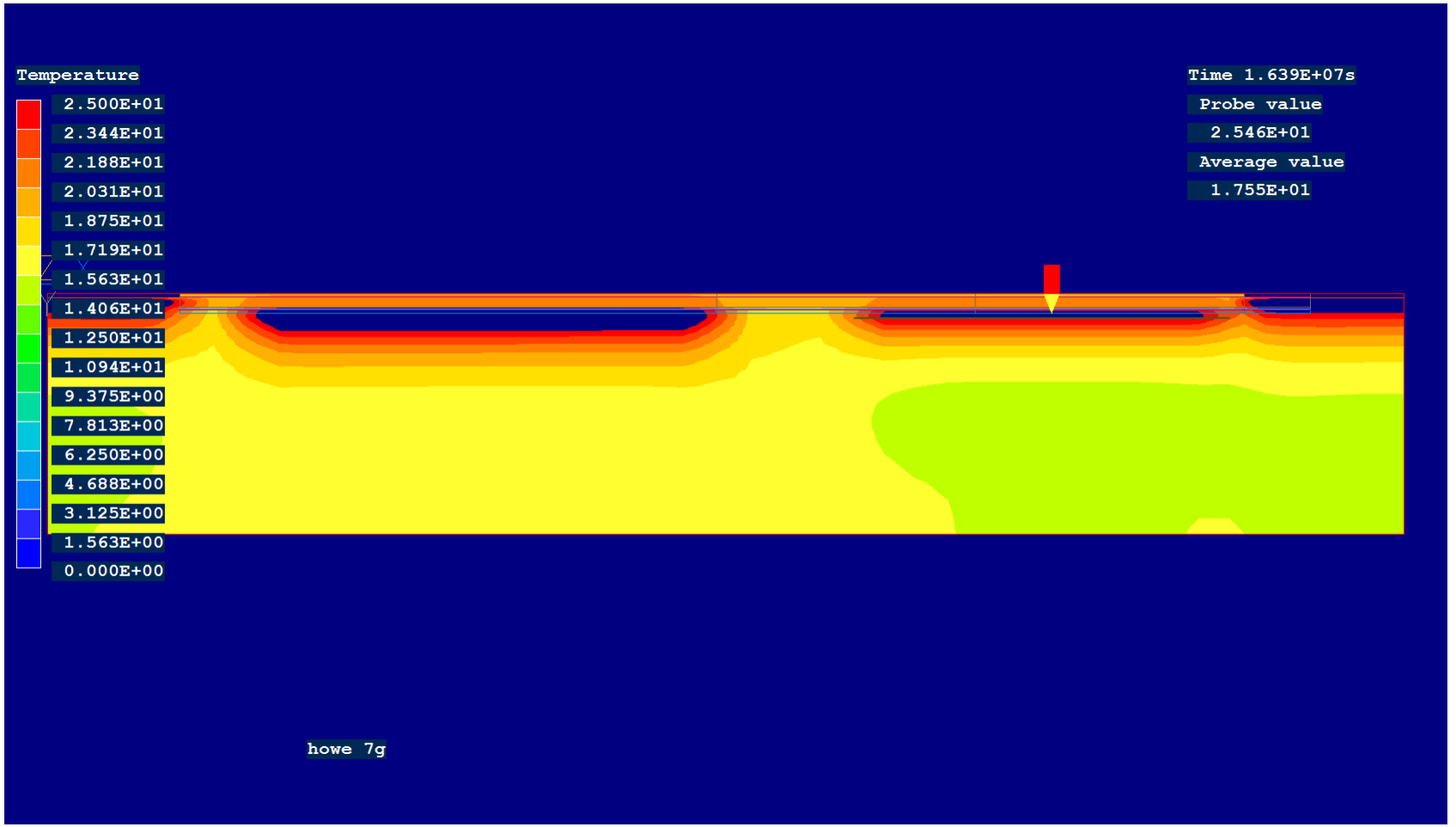
2009: Merton IGC Suffolk One Marshcroft Contracts Carl Lawson and Gary Page join



2010: Plug-in Retrofit for Commercial buildings programme starts

2020: 10% Carbon Target achieved

ICAX - Specialists in the modelling, design installation and maintenance of Interseasonal Heat Transfer

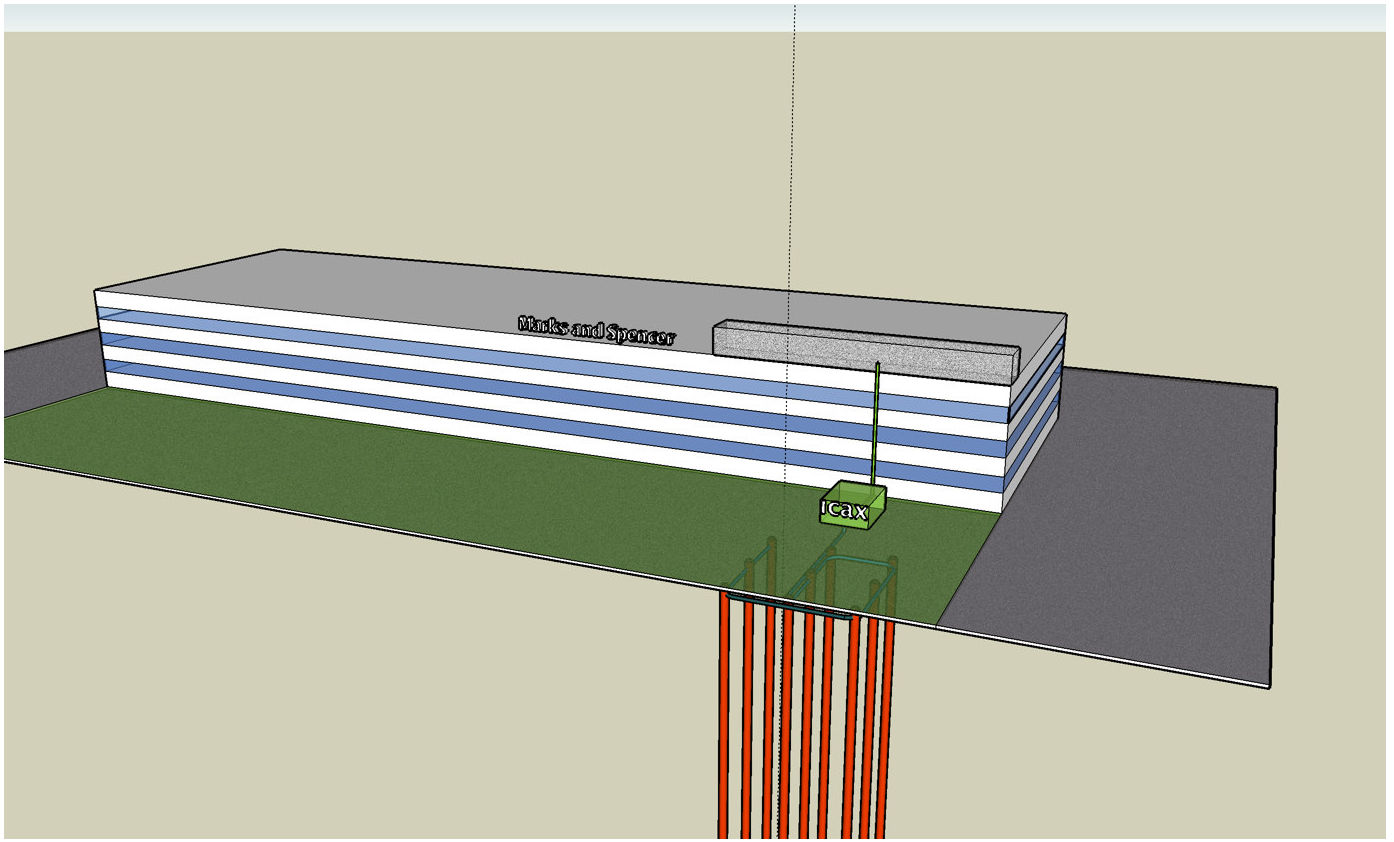


Why retrofit commercial buildings?

- 50% of the energy used in Britain is consumed within buildings – largely for heating and cooling
- UK is committed to a series of ramped carbon targets including binding EU carbon emissions reduction by 2020
- New building regulations affect new buildings
- Carbon emissions from existing commercial buildings need to be addressed
- ICAX has designed a retrofit plug-in solution for commercial buildings

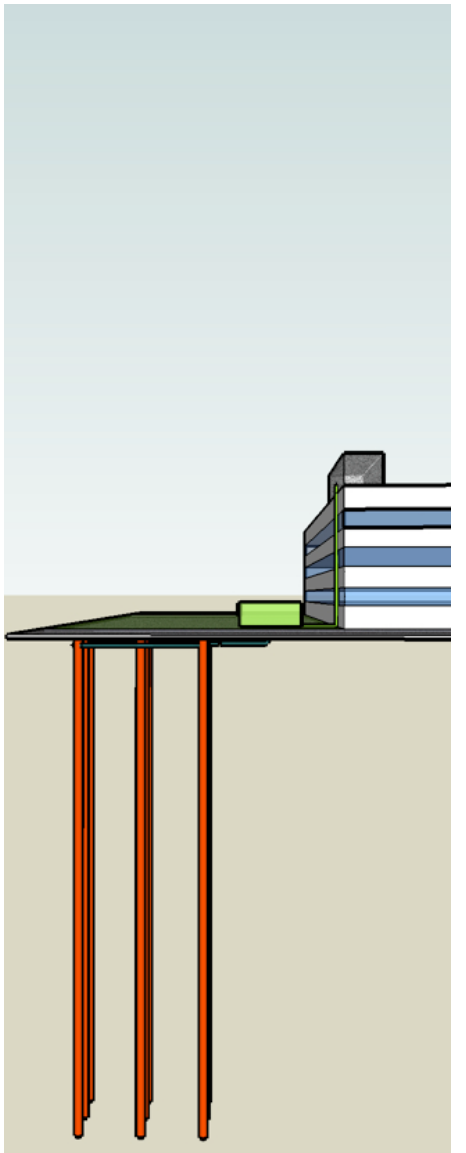
Retrofit Concept

Roll-out retrofit IHT plug-in for commercial buildings



Plug-in package

- Modular plug in of 150 kW (nominal), approximately 270,000 kW hours of heating and 270,000 kW hours of cooling
- The plug-in consists of a prefabricated plant unit and a vertical borehole Thermalbank.
- The plug-in provides high efficiency, low cost heating to existing commercial buildings.

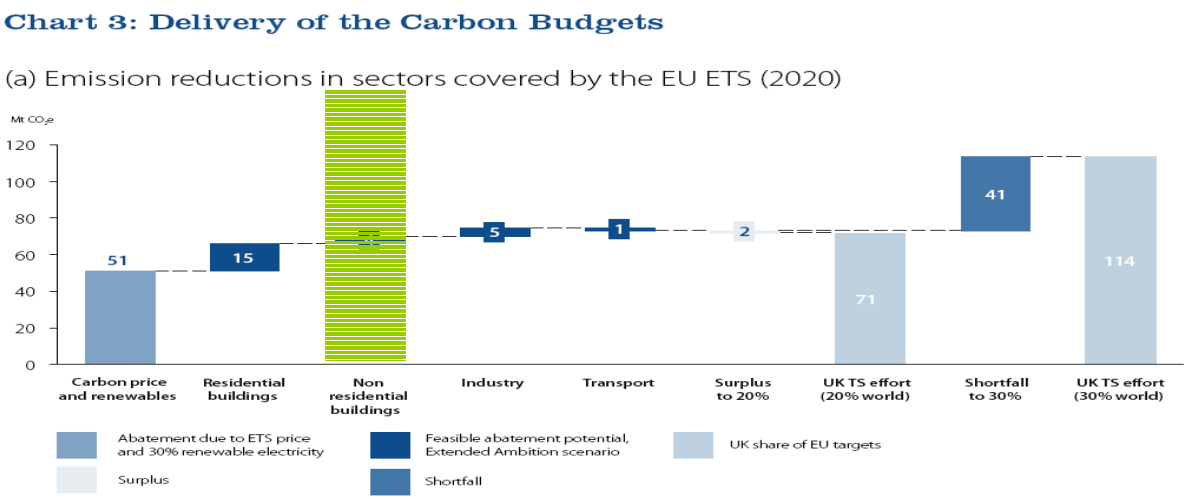


Concept

Roll-out retrofit IHT plug-in for commercial buildings

Rollout for commercial buildings: part of the UK carbon target

- The target is a significant share of the carbon savings required in the non-residential building sector (4MtCo_2): 10% or approximately 400,000 tCo_2 of this component



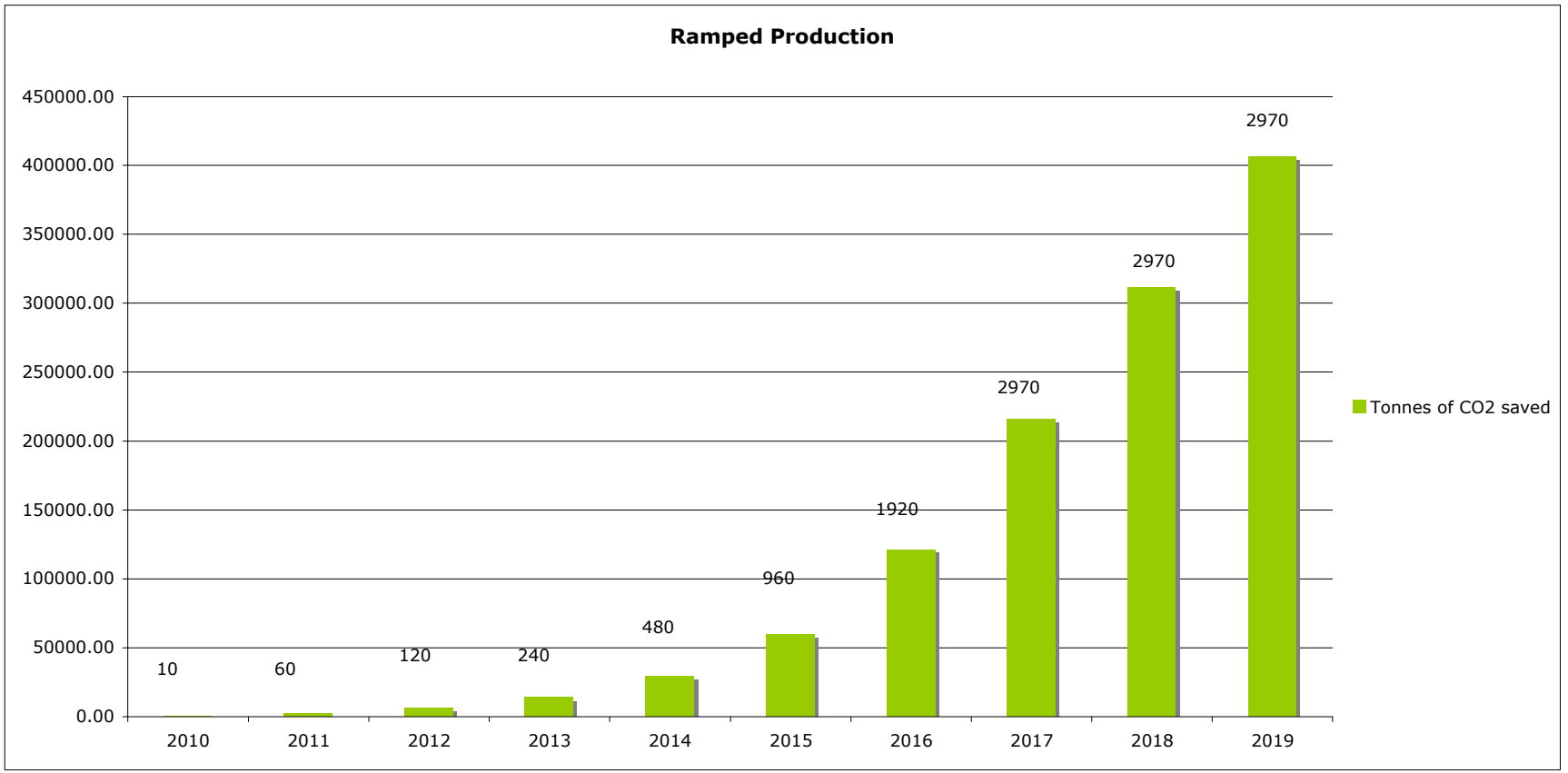
Source: Building a low carbon future: the politics of climate change. S. Faulkenhauser, D. Kennedy and J. Skea

Rollout for commercial buildings

- Our prime target is existing commercial buildings, particularly the relatively low performing examples which have relatively high emissions
- In order to achieve the full 10% target (of the non-residential sector) we would need to install approximately 4,705 150kW (nominal heating and cooling output) plug-ins, which is 470 installations per year between 2010 and 2020
- We are looking for the first one…

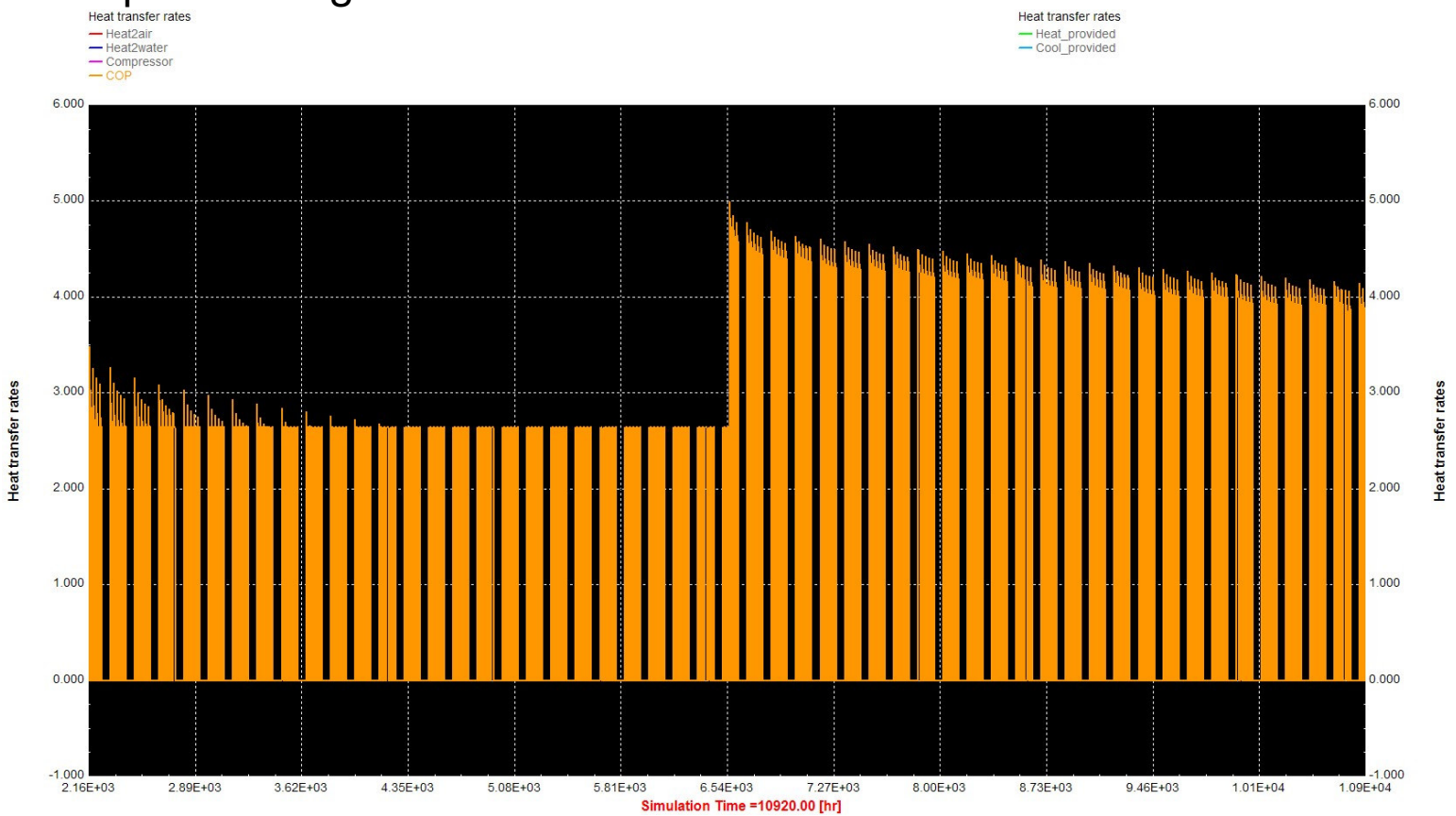
Carbon Target

10% of non-residential building carbon reduction



Plug-in technical performance

Cop modelling



Plug-in technical specification

- The technical specification is based on the results from the monitored performances at Toddington and Howe Dell IHT installations
- The technical evolution is being demonstrated at the Merton Community Centre, Suffolk One Sixth Form College and Marshcroft projects in construction 2009
- The delivery supply chain is backed by ICAX's strategic partnership with construction industry giants, Rehau and Mitsubishi

Plug-in technical performance

- Extensive performance modelling of the plug-in has been undertaken
- The inputs are based on hard, third party monitored data of ICAX systems
- Significant performance enhancements in ICAX technology have not been factored in, to ensure that performance results are conservative
- Variables such as geology are ‘worst case’ to ensure that performance results are conservative

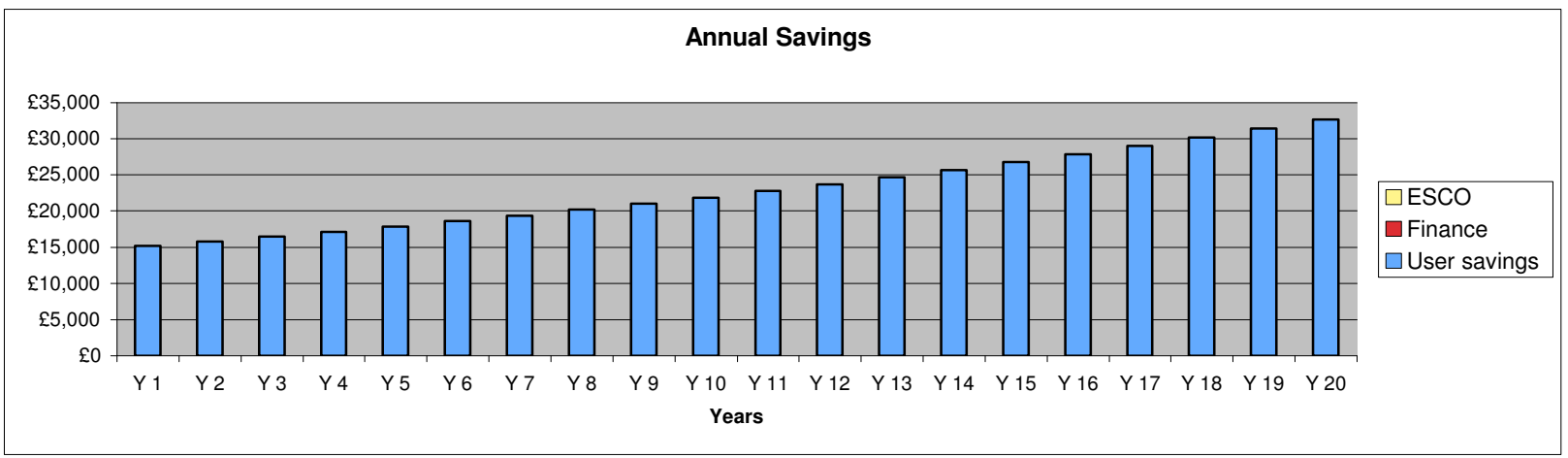
Plug-in technical performance

Assumptions:

- 15 no 150 metre kW borehole Thermalbank in clay
- 4 pipe fan coil building with CoP of .75 for heating (gas) and 1.5 for cooling
- Plug-in CoP of 4.37 for heating and 2.93 for cooling
- 270,00 kWh of heating and cooling
- 0.422 kgC/kWh for primary electricity
- O.206 kgC/kWh for gas
- A 150 kW nominal plug-in saves 85 tonnes of CO2 a year

Client benefits

- Fast payback, thereafter customer makes savings
- CSR (Corporate Social Responsibility) benefit
- ECA (Enhanced Capital Allowance) benefit
- Seen to be green
- RHI (Renewable Heat Incentive) benefit from 2011
- Carbon Reduction Commitment



We are looking for:

- A Client willing to be a demonstrator champion for IHT plug-in
- A building with a heating and cooling load of in excess of 270,000 kwh of heating, and 270,000 kwh of cooling per year.
- Enough space to place a Thermalbank borehole field outside but close to the building
- The borehole field installation will take a month
- The team will provide the plug-in at cost (approx £148k)

Feasibility:

- We would like to do a feasibility for an initial site.

INTERSEASONAL HEAT TRANSFER

Thermalbanks

www.icax.co.uk