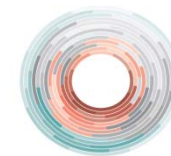




**SEREN UPDATE – 27<sup>th</sup> Sept 2012**

## ***GSHPA CONFERENCE***

**Dr R.W. Francis**



**Seren**

Sustainable Earth Energy

**Geoenvironmental Research Centre, Cardiff School of Engineering, Cardiff University**



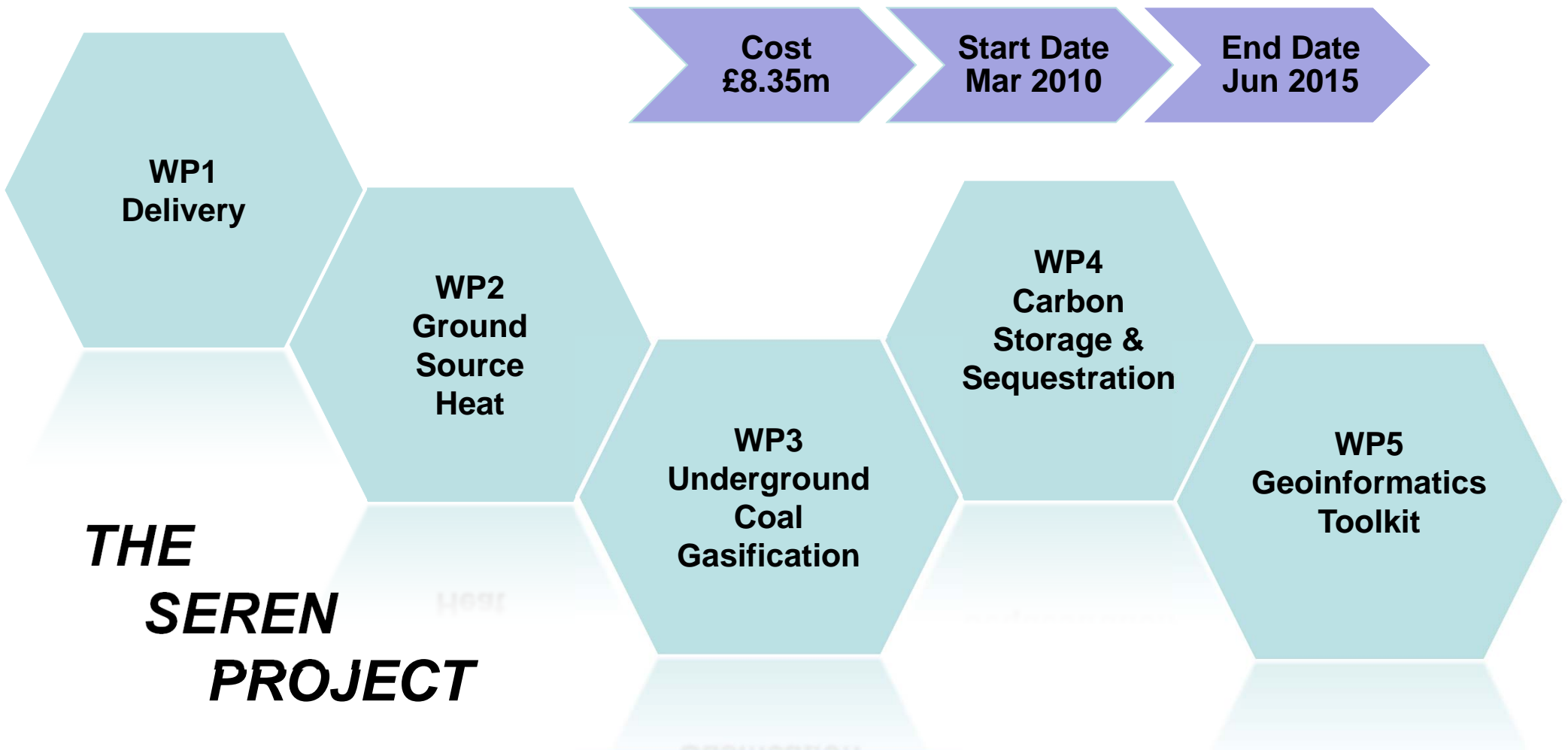
**Geoenvironmental Research Centre  
Canolfan Ymchwil ddaearymgalcheddol**

T: +44 (0) 2920 874004  
F: +44 (0) 2920 874004  
email: [grc@cf.ac.uk](mailto:grc@cf.ac.uk)  
web: [www.grc.cf.ac.uk](http://www.grc.cf.ac.uk)



## JOINT SPONSORS

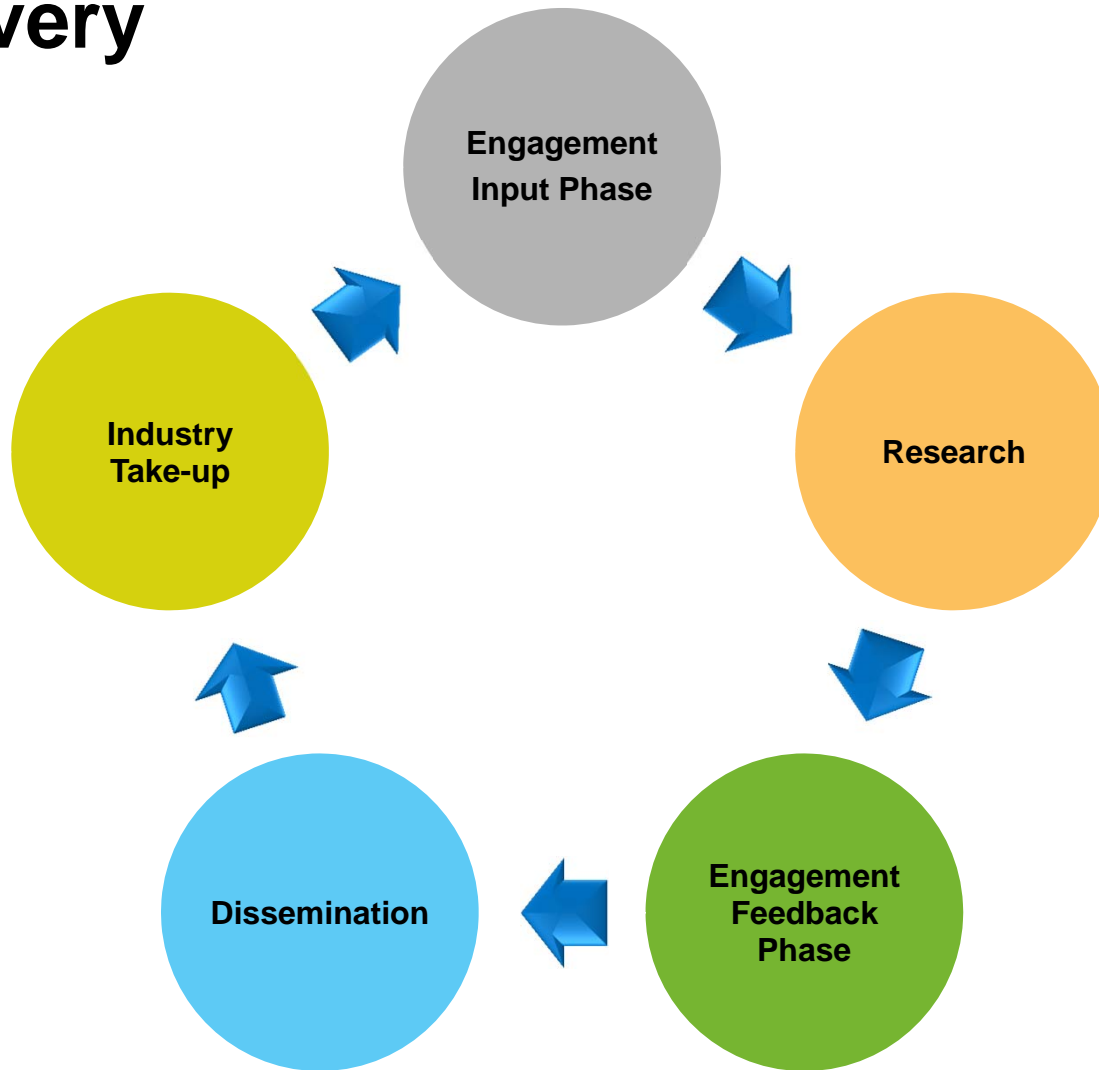






# Project Delivery

- ❖ Software
- ❖ Know How
- ❖ Products
- ❖ Processes



- ❖ Computational
- ❖ Experimental
- ❖ Demonstration

- ❖ Evening Lectures
- ❖ Day Seminars
- ❖ Conferences
- ❖ Web Site
- ❖ Case Studies

- ❖ Mail Shots
- ❖ Email shots
- ❖ Advertisements
- ❖ Phone calls



## WORK PACKAGE WP1 – DELIVERY

### Engagement

- Companies
- Stakeholders
  - *Carbon Trust*
  - *Environment Agency*
  - *Coal Authority*
  - *GSHP.*
- Local authorities and Business Clubs



## WORK PACKAGE WP1 – DELIVERY

### *Transnational*

- **Global community: UNIDO, UNESCO, EIT KIC InnoEnergy and Climate Change KIC**
- **Developing Research Centres in Ghana and Nigeria – UNIDO backed.**
- **Joint Projects with Central Mining Institute, Katowice, Poland**
- **Collaboration with IIT Roorkee, India**



## ***SEREN PROJECT TARGETS***

<b>Output</b>	<b>Target</b>
<b>Enterprises Assisted</b>	80
<b>Collaborative Projects</b>	25
<b>Companies Created</b>	8
<b>Jobs created</b>	153
<b>Enterprises Adopting or improving equality strategies and monitoring systems</b>	30
<b>Enterprises Adopting and implementing Environmental Action Plans</b>	30
<b>New or improved products, processes or Serviced launched</b>	25
<b>Investment Induced (£million)</b>	10



# WORK PACKAGE WP1 – DELIVERY

## Cross Cutting Themes

Welcome to the Seren ECODE

Env. Statement | Screening | Business Travel | Results | Action Plan

Utilities | Waste

Screening

- Have you appointed an environmental champion?
- Are all employees aware of your organisations key environmental impacts, and how they as individuals fit into the eco-code?
- Are all companies in your supply chain aware of your eco-policy?
- Have you carried out an environmental legislative compliance check with the NetRegs website?

Load NetRegs website

Energy & Water Usage

February	Cost/Unit	Show Monthly Data
Electricity Used	80 kWh 0.15	Show Graph
Gas Used	40 therms 0.45	
Water Used	44 m <sup>3</sup> 1.087	
Water Discharged	34 m <sup>3</sup> 0.7723	Update

Waste Produced

Go to waste

Seren GRC CARDIFF UNIVERSITY PRIFYSGOL CAERDYDD



Equality and Diversity Screening & Action Plan

Dr Isabella Santamaría (Equality & Diversity Manager)  
 Dr Alexandra Koj (Senior Research Associate)  
 Dr Jamie Lewis (Research Assistant)  
 Muhammad Irfan (PhD fellow)

START MODULE

AND DIVERSITY TOOLKIT

Project to assist Welsh SMEs (small and medium enterprises) in adopting the initiative of Equality and Diversity

CONTENTS

- STATEMENT
- SCREENING
- TRAINING
- QUIZ

Welcome to the Seren Equality and Diversity (E&D) Toolkit. The following software has been created specifically to assist Small and Medium enterprises to adopt, or improve their existing E&D systems by providing a simple way to evaluate current strategies and produce an action plan that will help guide and inform your enterprise as it develops.

The Seren E&D Toolkit provides the following features to help your organisation realise its equality/diversity goals:

- Statement of intent.** The software also includes a short, generic statement that can be personalised by your enterprise to form the core of an equality and diversity commitment. The text can then be displayed to inform clients, staff, supply chain and others of your commitment to equality and diversity.
- Organisational screening and action plan generation.** Using a simple series of questions, the Seren E&D toolkit will assess your enterprise's current E&D stance and automatically generate an action plan template that will identify core actions you can take to further improve your E&D systems.
- Hardy definitions of key terms.** The Seren E&D toolkit provides an indexed list of the key terms and concepts required for a better understanding of equality and diversity and existing legislation.
- Self assessment tool.** A short quiz is included to help reinforce the key principles outlined in the definitions and to identify which aspects of your understanding of equality and diversity are strongest and which can be improved further.

Seren GRC CARDIFF UNIVERSITY PRIFYSGOL CAERDYDD

### EcoCode Software

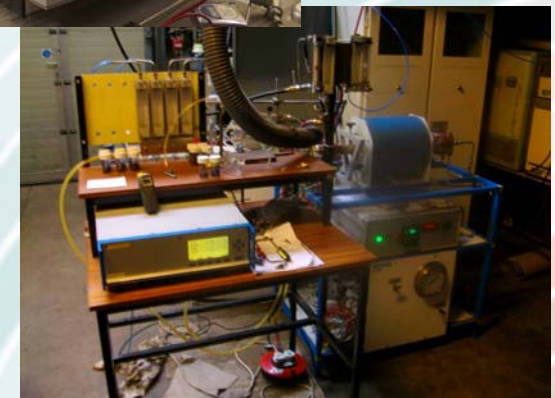
### E&D Software



## WORK PACKAGE WP3 – UCG

### High Pressure Rig

- High pressure high temperature rig
- Can produce data
  - product *gas composition*,
  - *product gas ultimate yield, etc.*
- Environmental issues being addressed
- Tools being developed include:
  - *Coal resource assessment tool*
  - *.Cgemical model*
  - *Energy model*



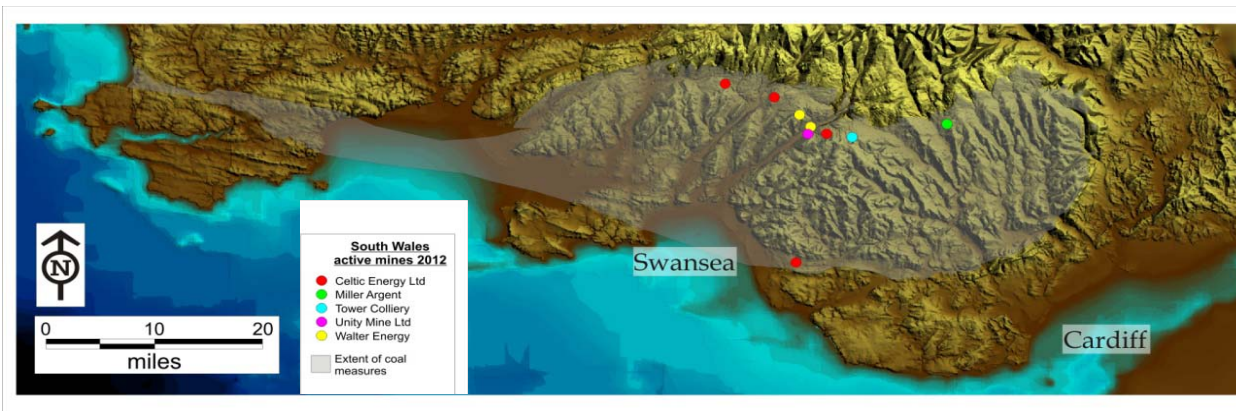


# WORK PACKAGE WP4 – CSS

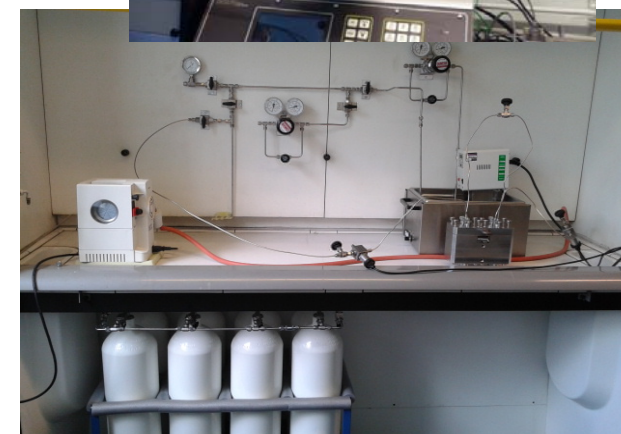
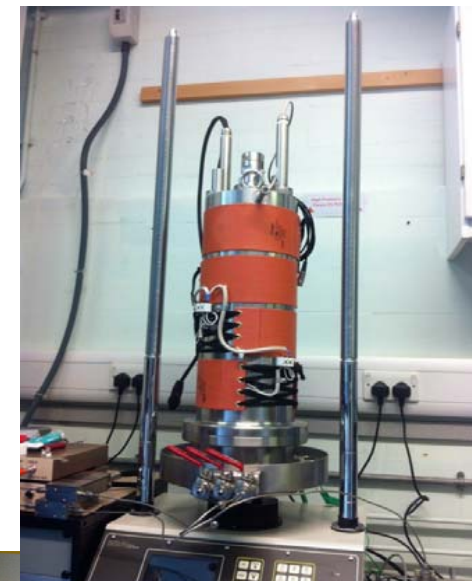


## Experimental Work

- **Apparatus development.**
  - Adsorption/desorption unit.
  - Permeability/gas flooding unit.
- **Coal sampling.**



- **Resource Assessment.**
- **Site Selection.**





# WORK PACKAGE WP5 – Geoinformatics Toolkit

## Google Based Geoportal

The screenshot shows the Seren Web Portal homepage. At the top, there is a navigation bar with links for Home, Contact, Legal / Tech, Site Map, and GRC Intranet. Below this is a banner for the Geoenvironmental Research Centre (Canolfan Ymchwil Ddaearyngalcheddol) with UNESCO Chair and IAEA Centre of Excellence logos. The main heading reads "Welcome to Seren Web Portal!!". Below the heading are several small images representing different aspects of the project. A navigation menu includes Welcome, Resources, Networking, Training, and Seren Toolkit. The main content area is divided into several sections: "Seren and Sustainable Energy" (describing the project's aim to deliver new technologies), "Seren in pictures" (with a group photo), "Search" (with a search bar and Google logo), "Seren News" (announcing new products like Seren Eco Code and Seren H-GOLD), "Featured application" (highlighting the Seren H-GOLD software), and "Seren video". A sidebar on the left contains links to Home, News, About Us, Research, Events, People, Opportunities, Resources, and Business Support, along with logos for other Cardiff University sites like ENGIN and the Institute of Environment and Sustainability.

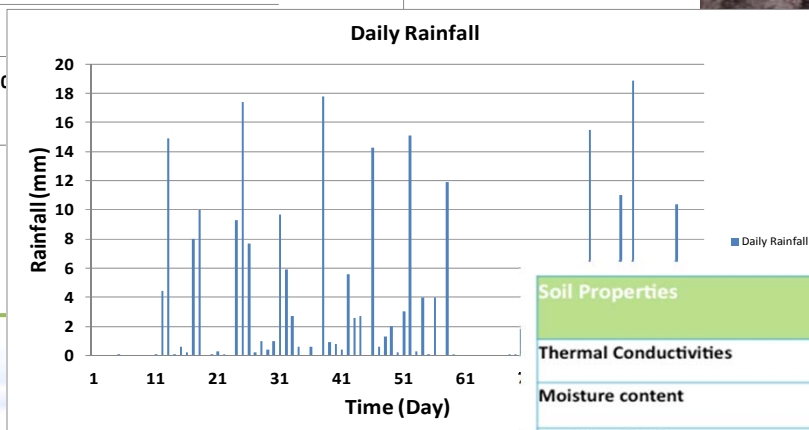
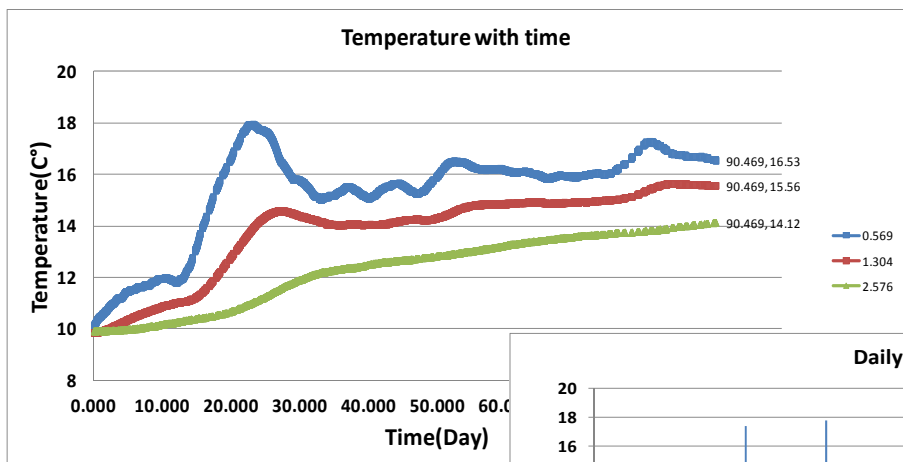
The screenshot shows the "GSHP tool for initial analysis" interface. It is a web-based form for calculating heating demand and comparing GSHP with existing heating systems. The form includes fields for "Existing heating system", "Please, fill in the form below regarding the existing heating system in your property:", "Current heating demand (kW)", "Type of fuel used", and a list of fuel types: "Gas boiler (condensing)", "Oil boiler", "Gas boiler (condensing)", "Peak electricity", "Ground source heat pump", and "Air source heat pump". Below the form, there is a section titled "Efficiency, carbon and cost savings using GSHP instead of existing heating system". This section contains text explaining the benefits of GSHP, such as improved efficiency, reduced carbon footprint, and cost savings. It also includes three bar charts comparing the efficiency of existing systems with GSHP. The charts show that GSHP significantly outperforms traditional systems in terms of efficiency and cost savings.



# ***WORK PACKAGE WP2 GROUND SOURCE HEAT***



# Site Monitoring – Lower Pentre

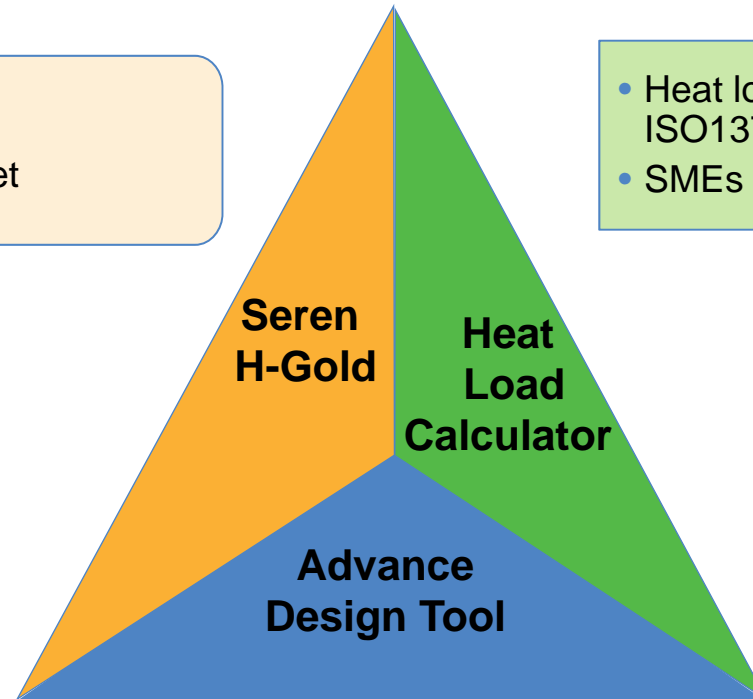


Soil Properties	Min.	Max.	Avg.	Test Type
Thermal Conductivities	2.06	2.87	2.44	In-site
Moisture content	8	15	12	Lab
Bulk Unit Weight	13	19	16	Lab
Mineral Content	Quartz			Lab
Soil classification				Lab
Sample 1:	Fine Grained soil (Inorganic silt, ML) >70% passing 75 µm			
Sample 2:	Coarse Grained soil (Gravel) <36% passing 4.5 mm			

# Producing Software to Aid Design

- Pre-feasibility Study
- SMEs new to the GSHP market

- Heat load calculation as per BS EN ISO13790
- SMEs involved in energy market

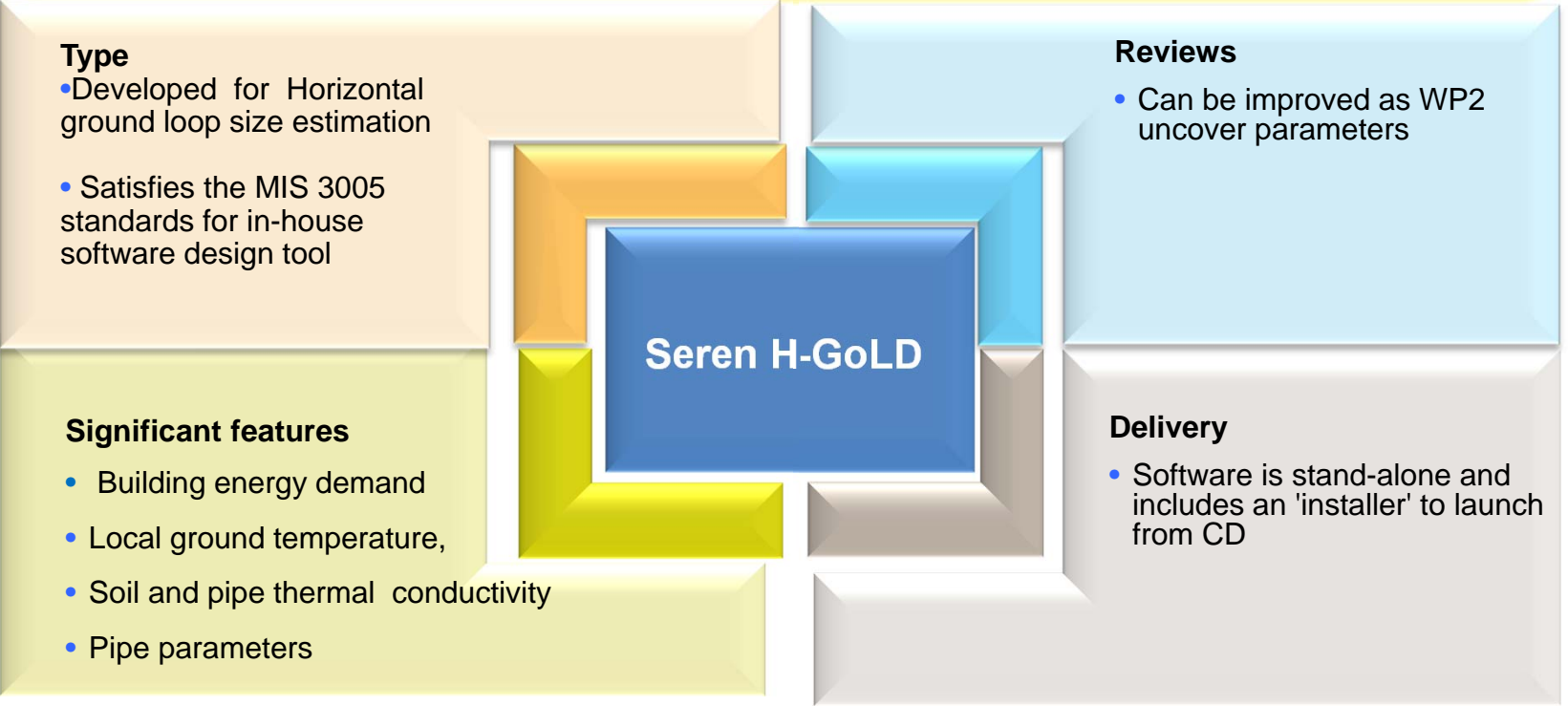


- Long term behaviour
- Companies in Consultancy, Designing and installation



# Seren H-GoLD

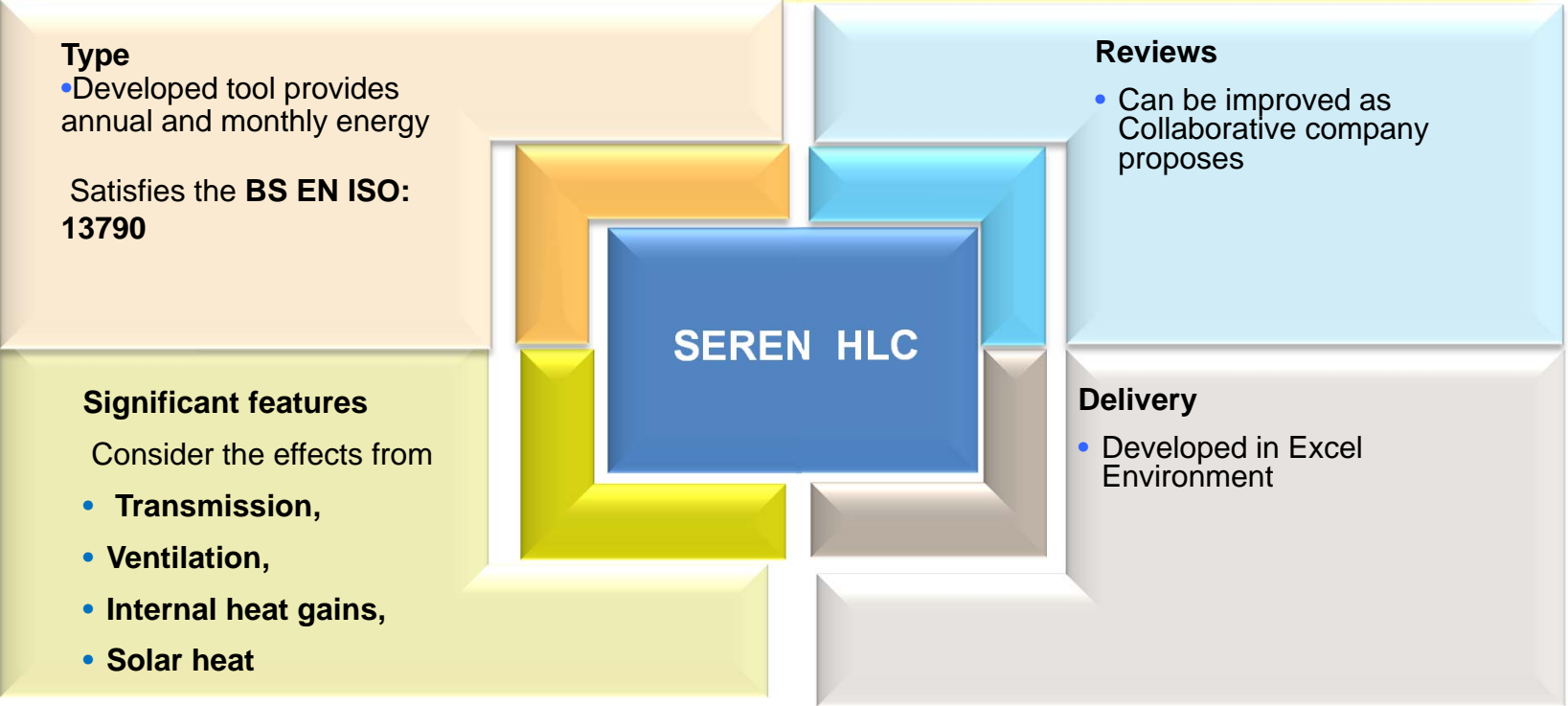
- Software as a tool for Welsh companies new to GSHP Market
- Software adequately provides the assessment for pre-feasibility of GSHP system





# SEREN HLC

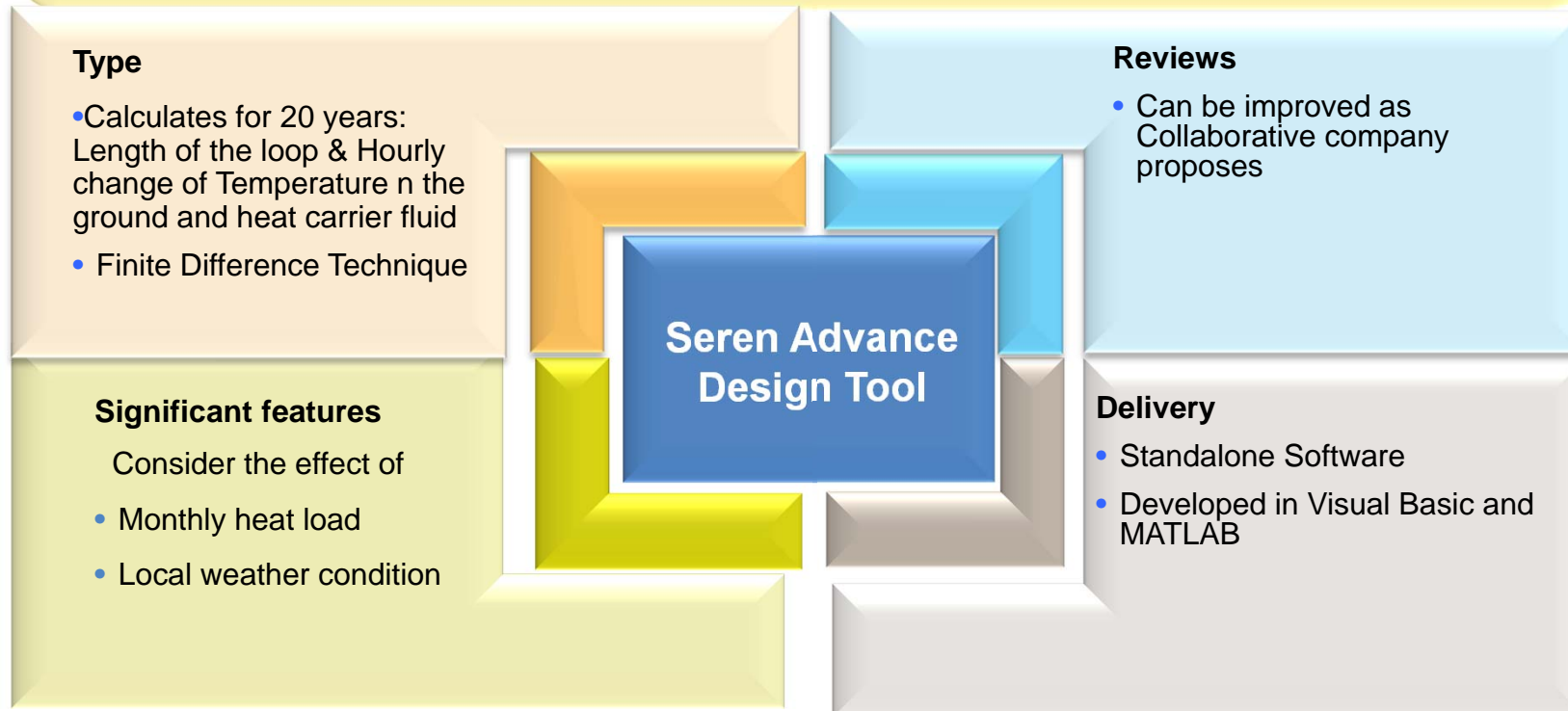
- Software as a tool for companies in Energy Market
- Software adequately provides the energy demand for space heating & cooling of the buildings.





# Seren Advance Design Tool

- Software as a tool for companies in Consultancy, Designing and Installations
- Software will adequately provide long term behaviour for GSHP System



## Ground Loop Boundary

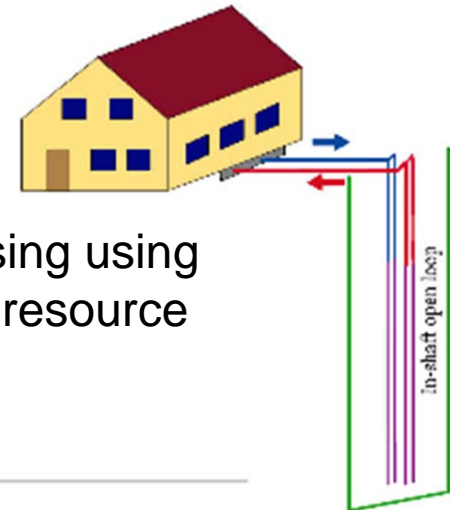
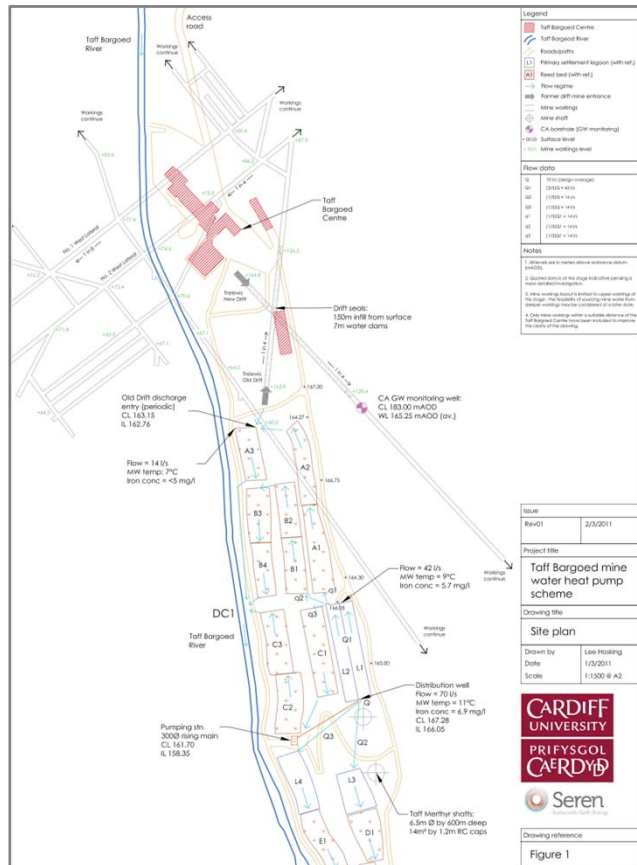
- Range of simulations were undertaken considering both horizontal and vertical systems.
- A subsequent investigation showed that both horizontal and vertical ground loop boundaries could be successfully represented with **relatively simple boundary conditions** (e.g. an average W/m length)
- This was especially the case for **horizontal systems** due to the relatively low heat fluxes induced and the dominance of the surface boundary.

## Surface Boundary

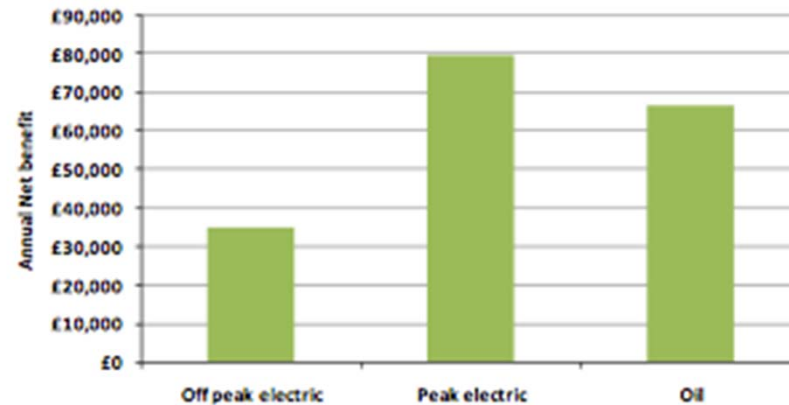
- A boundary has been developed within **COMPASS** which is capable of representing the ground surface.
- The boundary breaks down the surface components to the shortwave, longwave, sensible and latent heat fluxes.



# Taff Bargoed Minewater Project



Open loop system using using mine shaft as a heat resource



Net benefit of mine water heat pump system over other heating systems

## TARGETS – UP TO AUGUST 2012

Output	Target	Achieved
Enterprises Assisted	25	25
Collaborative Projects	8	8
Companies Created	1	2
Jobs created	13	10
Enterprises Adopting or improving equality strategies and monitoring systems	4	7
Enterprises Adopting and implementing Environmental Action Plans	4	20
New or improved products, processes or Serviced launched	4	23
Investment Induced (£million)	0.5	0*



# DIOLCH YN FAWR AM WRANDO THANK YOU FOR LISTENING

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