



Technical Seminar

“Ground Source Seminar” Future Research Needs – Debate

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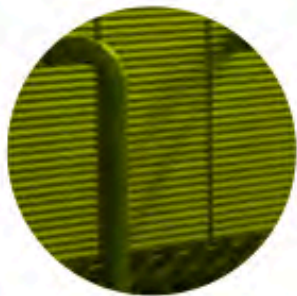
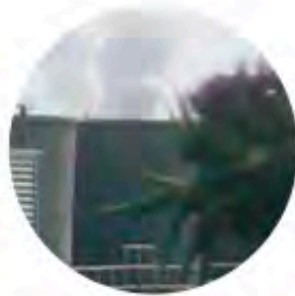
Cardiff University – Trevithick Building – 27 September 2012

From today.....

- Beware “over – complexity”
- GSHP systems depend on many variables –
- We need to discover the sensitivities....
- In the midst of dealing with designers / installers /users

www.geothermalcongress2013.eu

EUROPEAN GEOTHERMAL CONGRESS, PISA, 3-7 JUNE 2013



<http://rhc-platform.org>



European
Technology
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RHC Renewable
Heating & Cooling
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Upcoming events



Steering Committee
meeting of the Solar
Thermal Technology Panel
01 Oct 2012
Brussels (BE) [more](#)



European Technology Platform on Renewable Heating and Cooling

Combating climate change and ensuring the security of energy supply represent profound challenges for Europe. Adapting the current energy scenario into a truly sustainable one will require realising the full potential of renewable energy sources to satisfy the heating and cooling demand- which accounts for around half of the EU's final energy consumption.

www.rhc-platform.org/fileadmin/Publications/Geothermal_SRA.pdf

Strategic Research Priorities for Geothermal Technology

European Technology Platform on Renewable Heating and Cooling



DECC funding calls

- Thermal storage
- Support for Innovation > heat pumps etc. (SMEs)

Developments since last year

- Roll out of revised MCS design/installation standard
- Roll out of hydraulics design guide
- EST Phase II monitoring – ongoing
- RHPP monitoring



MCS 022: GROUND HEAT EXCHANGER LOOK-UP TABLES

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SUPPLEMENTARY MATERIAL TO MIS 3005

DRAFT Issue 1.0

Responses??????

Related issues – GSHP Sizing software

- EED / GLHEPRO / GLD / CLGS
- Heat pump models
- SPF / COP computation
- Validation / verification
- Treatment of peak loads



Hydraulics ?!

MIS 3005

Hydraulics Design

The hydraulic balancing act

Maximise heat extraction

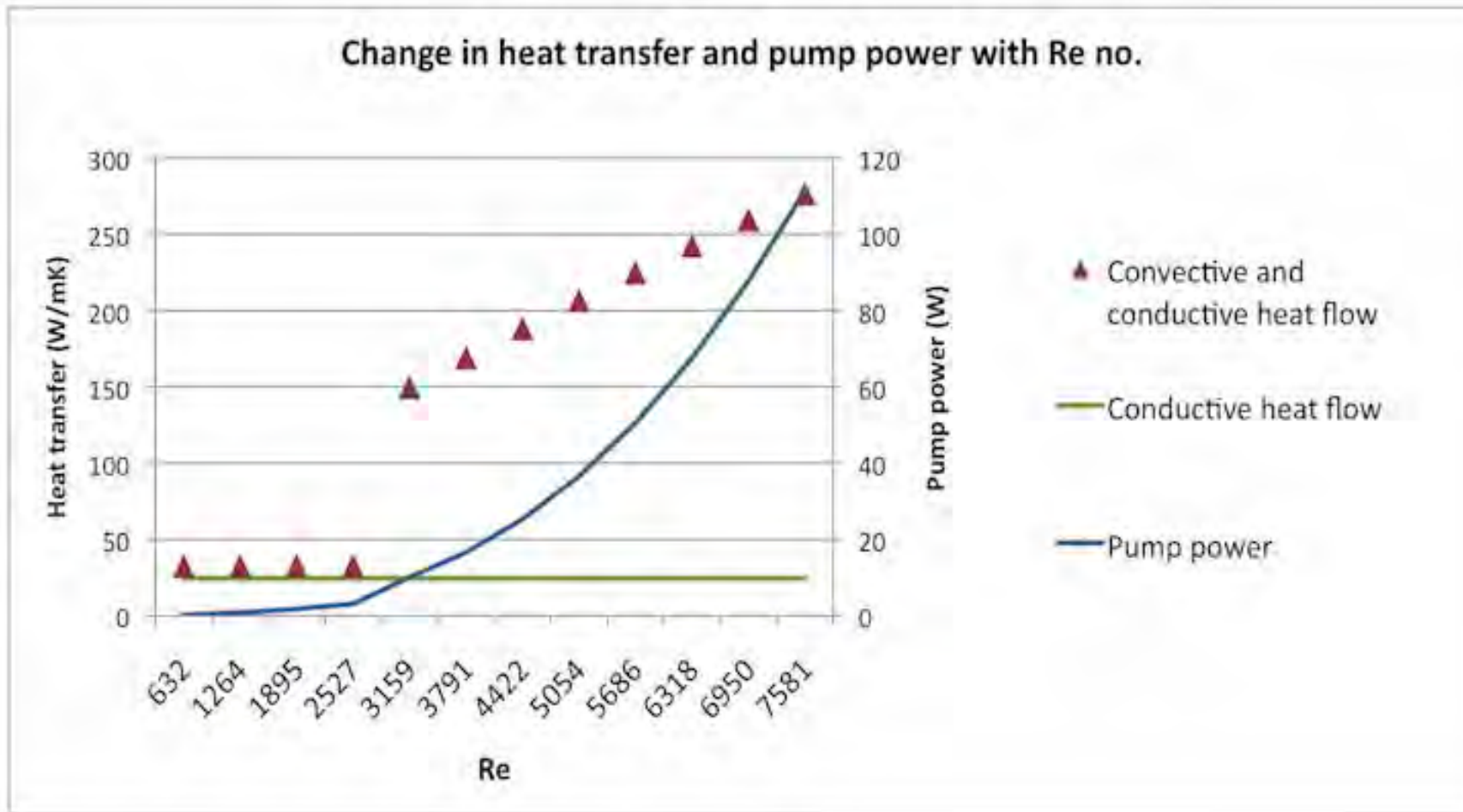
Minimise (circulation) pump
power

Increase Reynolds No

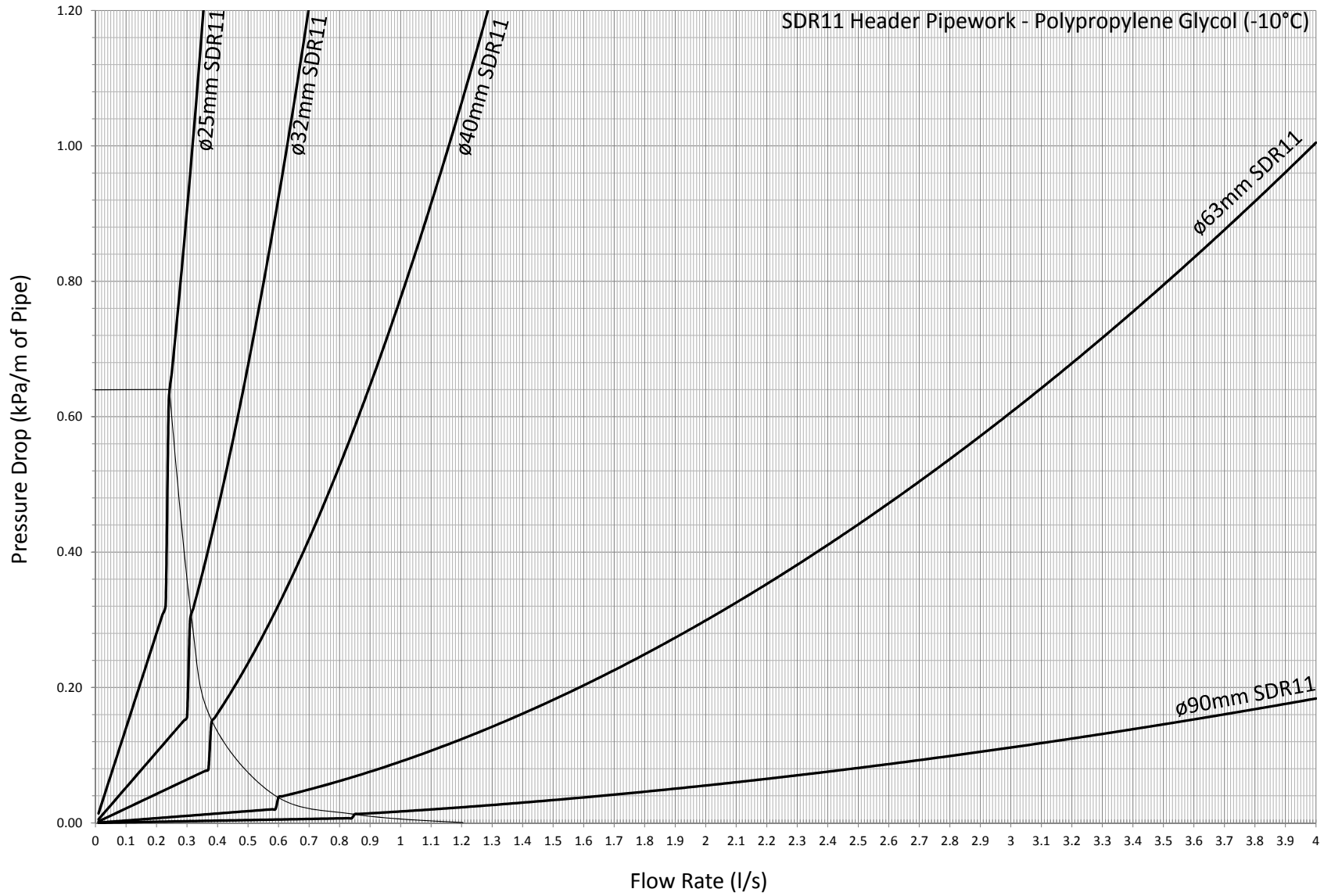
Heat transfer improves

but

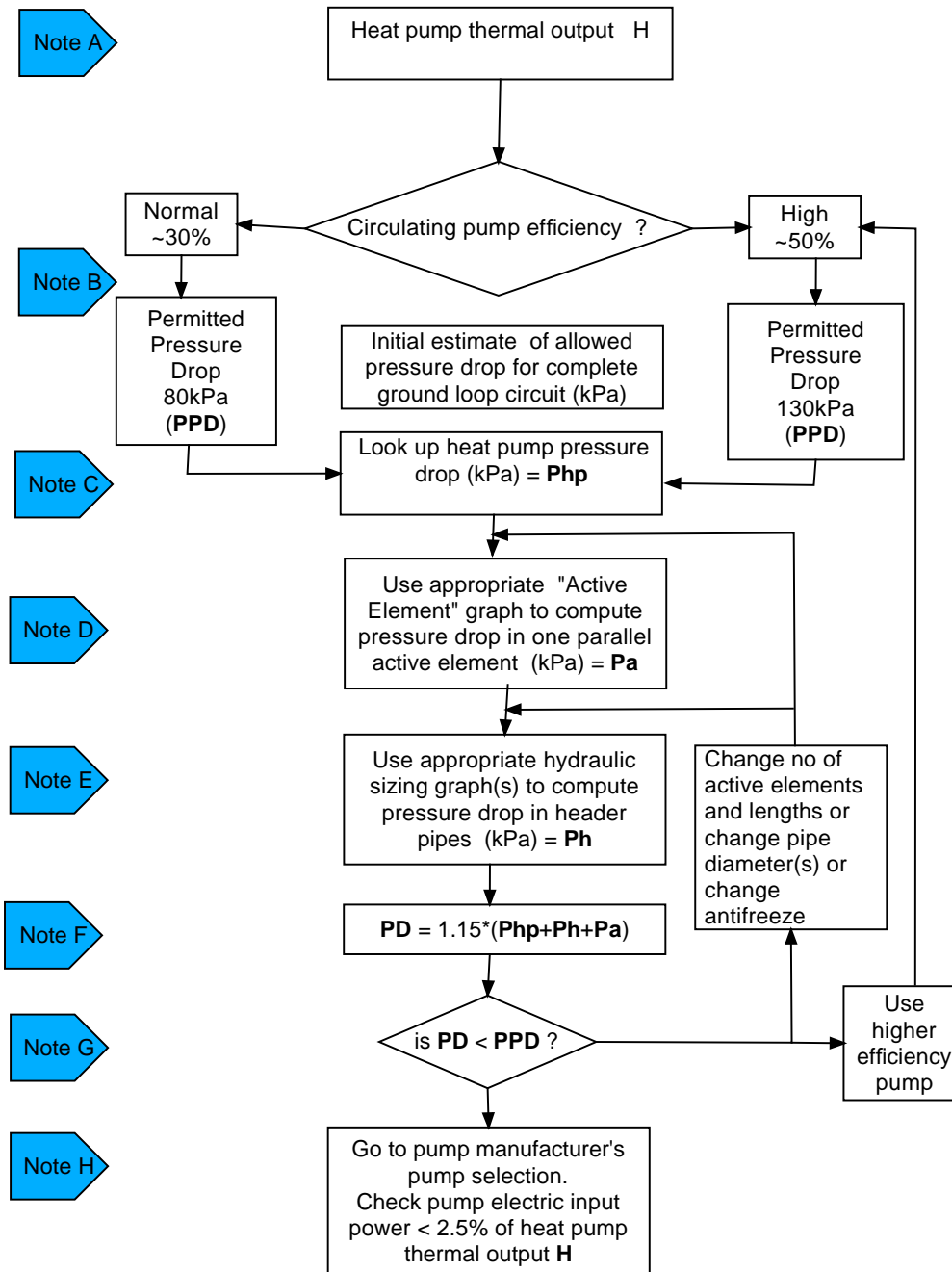
Pump power also goes up



(illustrative only – do not use !)



Closed loop GSHP Hydraulic Sizing Flow Chart



Heat Pump Cycling study



Heat pump cycling study for DECC / EA Technology

- Watch out for release by DECC in the not too distant future.

R&D areas ?

- Drilling ?
 - Eg Geo-Mole
 - Installation of Co-axial – sealing /grouting ?
 - Pipe material / pipe jointing methods - technology
 - Grouts
-
- Thermal piles / in-structure elements –
 - Thermal properties
 - TRTs
 - Life time cycling – stress/strain performance issues

Drilling / installation ?

GEO-MOLE®.....The Benefits are self explanatory

With GEO-MOLE®

GEO-MOLE all the Kit that is required



GEO-MOLE® is simple



GEO-MOLE®

Millions of homeowners globally are enjoying a high level of comfort and significantly reducing their energy use today with GeoExchange (geothermal) heating and cooling systems. With our new system the current market place has just been opened up, there are now no residential or commercial restrictions due to access/area.

No need for large machinery, the pneumatic Geo-mole® can access all areas from mid terrace houses, cellars, small frontage properties and small back gardens.

The process is as simple as ABC but effective. The Geo-mole® can be used vertically or angled.

All large and cumbersome machinery has been eliminated. CO2 emissions reduced immediately compared with the mobilization and set up of large rigs and excavators etc.

Eliminates any mess and disruption in prestige gardens and can be used alongside a footing eliminating horizontal installation back to the property. Sites with Archaeological interest uninterrupted - Health & Safety friendly, no external moving parts. This operation gives a much broader market place to all.

Related topics

- Antifreezes

Related issues – Thermal Response Testing

- Faster TRT's – pulse testing?
- Good practice -

- Horizontal ? – Conductivity values ?

Related issues – simulations / hybrids

- Trnsys / EnergyPlus / HVACSIM+
- Associated ground models/modules – short time steps
- GSHP array optimisation – sensitivity analyses
- Relevant heat pump models

Monitoring / metering

Heat metering ?

Electrical metering !?

Emitters.

Whole house control

Underfloor

Radiators

Convectors

Buffer tanks

Thermal storage – Phase change

Compressors -

variable speed - multi-speed ?

alternative approaches

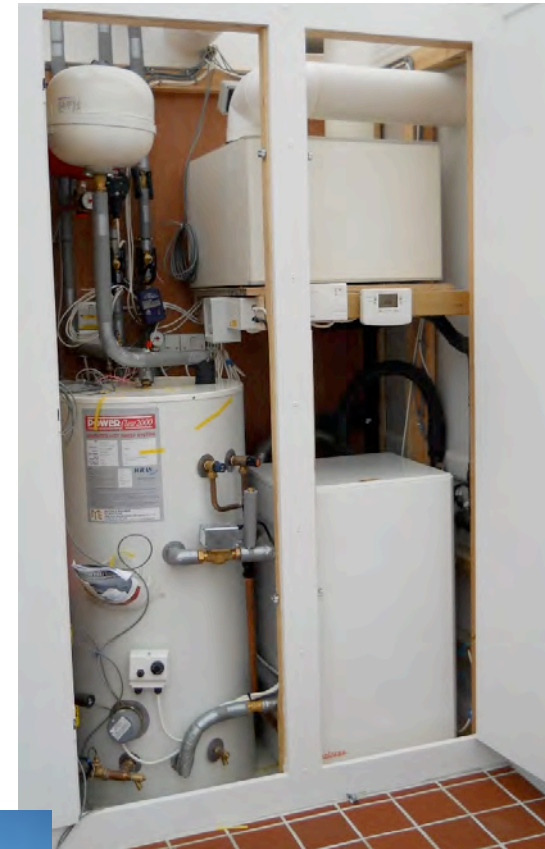
Refrigerants

CO₂ /

Hydrocarbons (!)

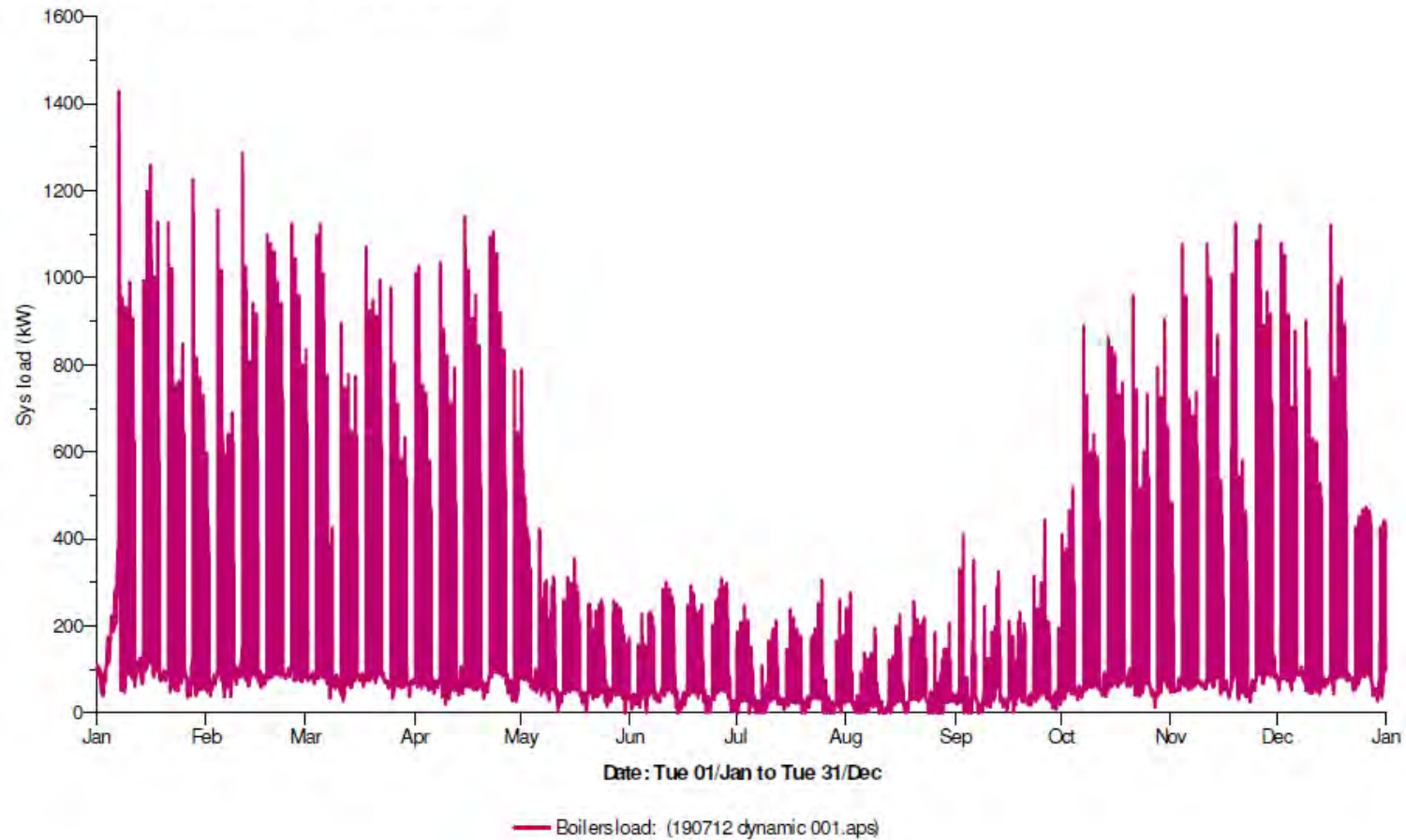
Water

Integrated approaches (domestic) Retrofit for the Future – Sennen – Cornwall



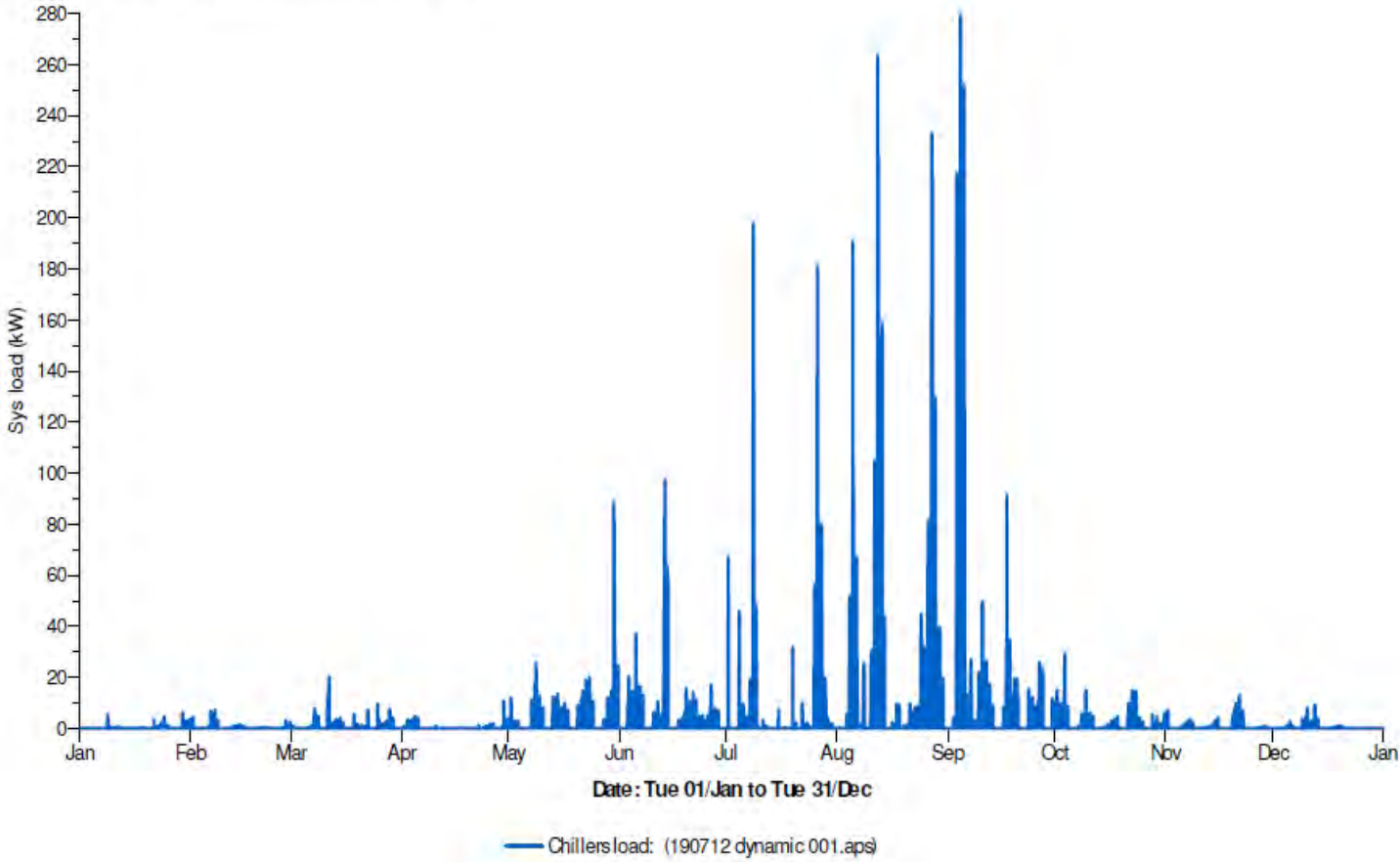
Building loads ? Progress – approaches ? Reality ?

Graph 2: Yearly Generator Output Profile



Building loads – cooling – real ?

Graph 3: Yearly Generator Output Profile



Lots to look at / play with

- What do we want / need to focus on ?
- Standards ? Best practice ? Training ? R & D ?
- GSHP bibliography - UK / EU / Worldwide ?
- DEBATE !
- Bear two things in mind:
- Cost – enormous challenge to the GSHP industry
- More “efficient” GSHPs – require larger ground loops.....