Energy efficiency is a no brainer – so why is it not happening?

Presenter's name: Andy Todd

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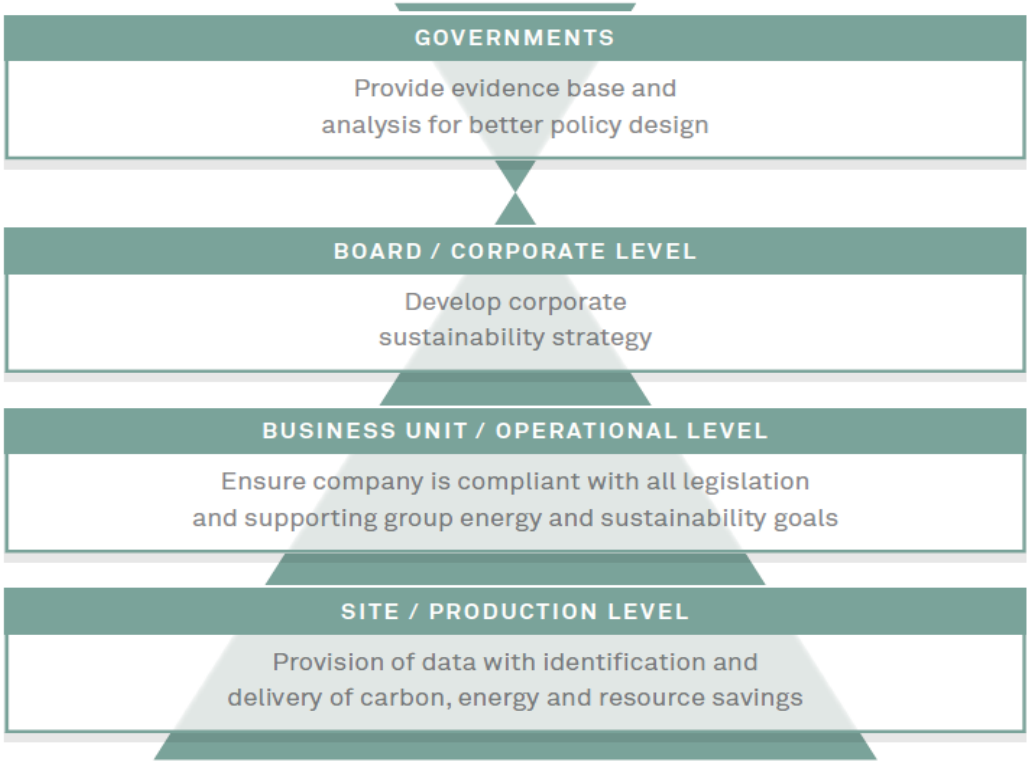
I•SEE
Institute for Sustainable Energy and the Environment

Introduction to Verco

- We are a specialist energy management and sustainability company
- Work with companies and governments on complex energy challenges.
- Have been around for 28 years in the low carbon space
- We have a blend of technical, policy, financial and software expertise



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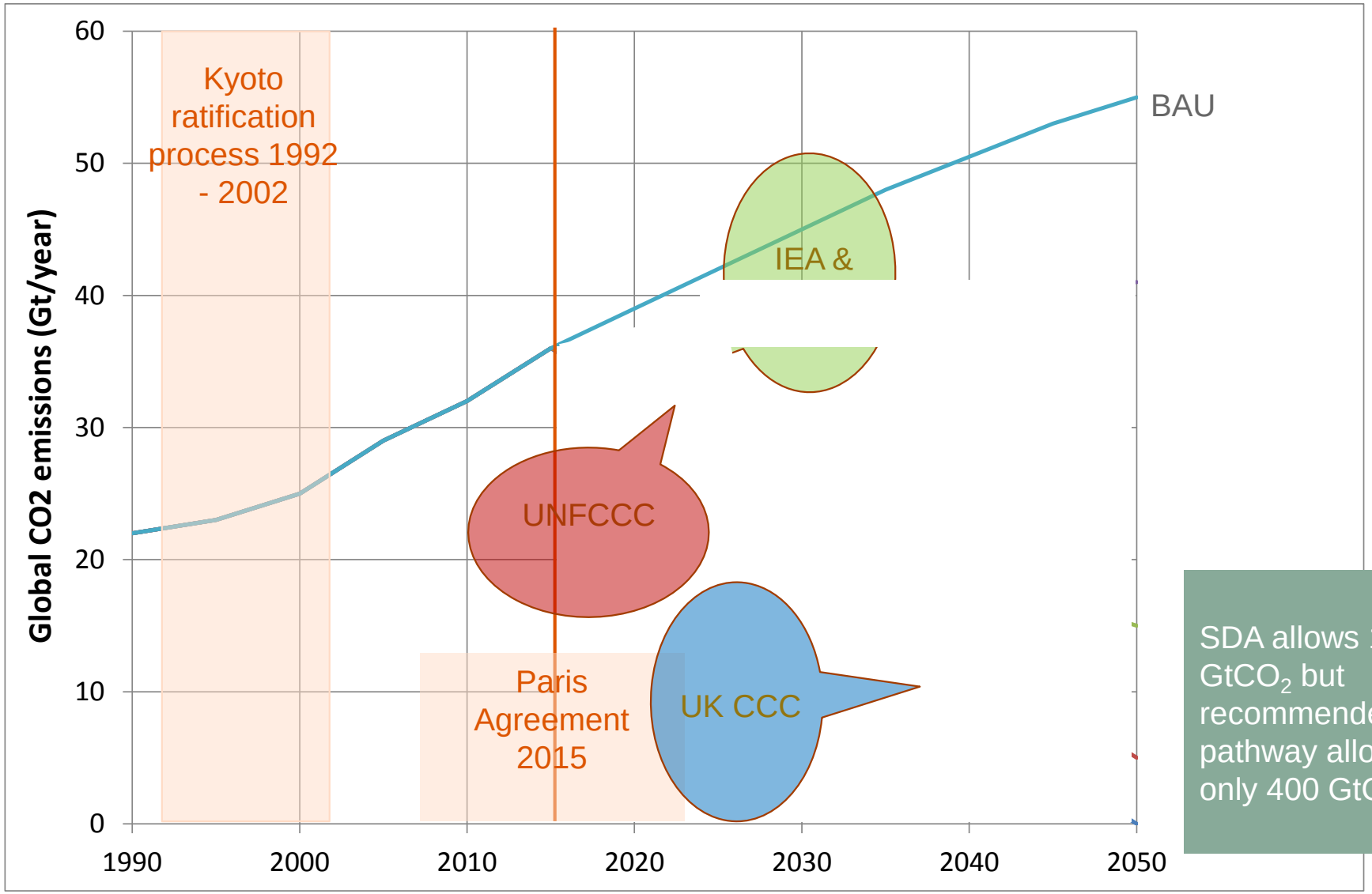
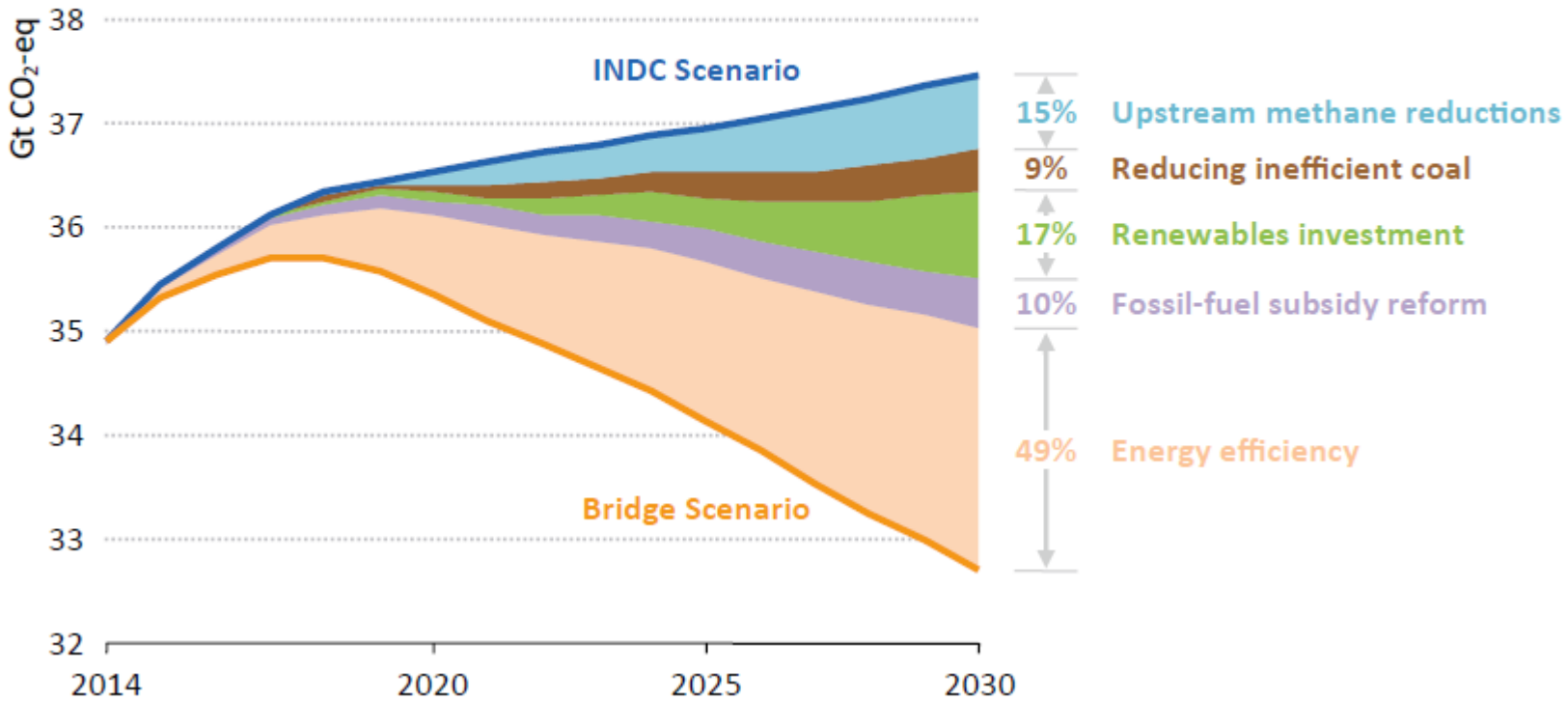
Global emission trajectories



Why is energy efficiency important?

- Energy efficiency is seen as the major play in helping us achieve these targets

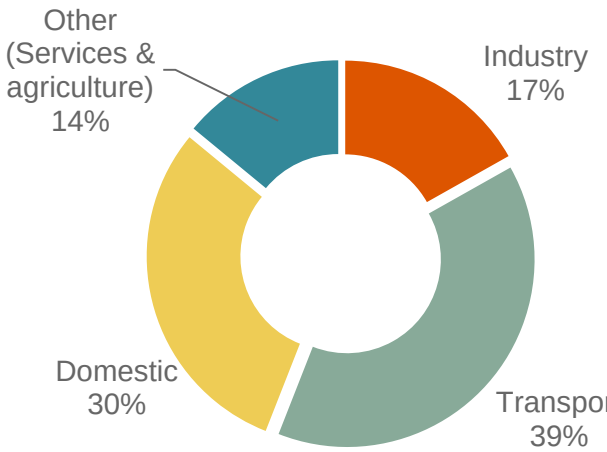
Global energy-related GHG emissions reduction by policy measure in the Bridge Scenario relative to the INDC Scenario



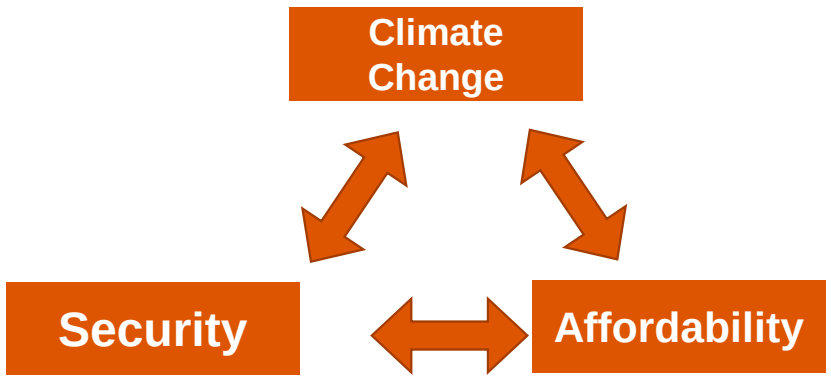
Source: IEA world energy outlook 2015

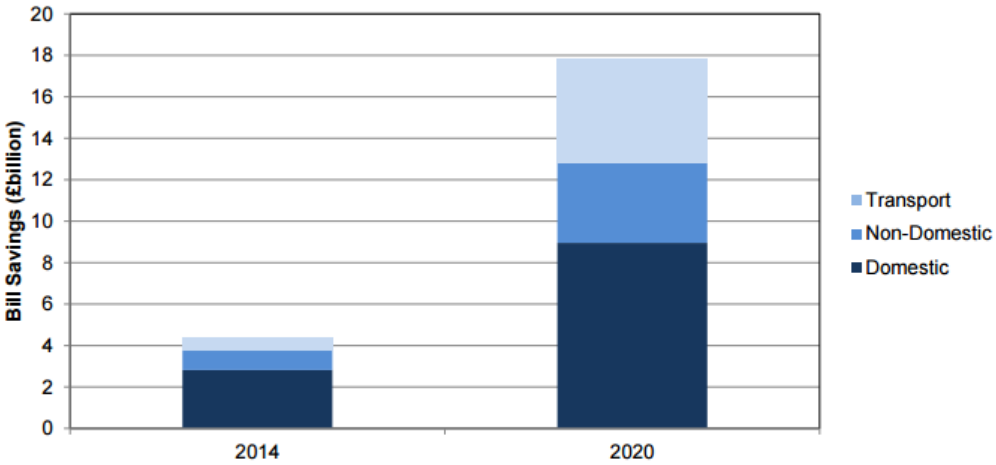
Important for the UK

- Supports all three elements of the “energy trilemma”
- Supports the current demand side management agenda
- Expected to save £18bn on energy and transport bills in 2020



2015 Temperature corrected final energy consumption by sector
Source: DBEIS Energy Consumption in UK Nov 2016





Source: DECC Analysis of DECC Energy & Emissions Projections and Price Assumptions.

How are we doing?

- The EU has a 20% energy efficiency improvement target by 2020, this is currently being extended to 30% by 2030

Progress indicator 2015 - Comparison 2012

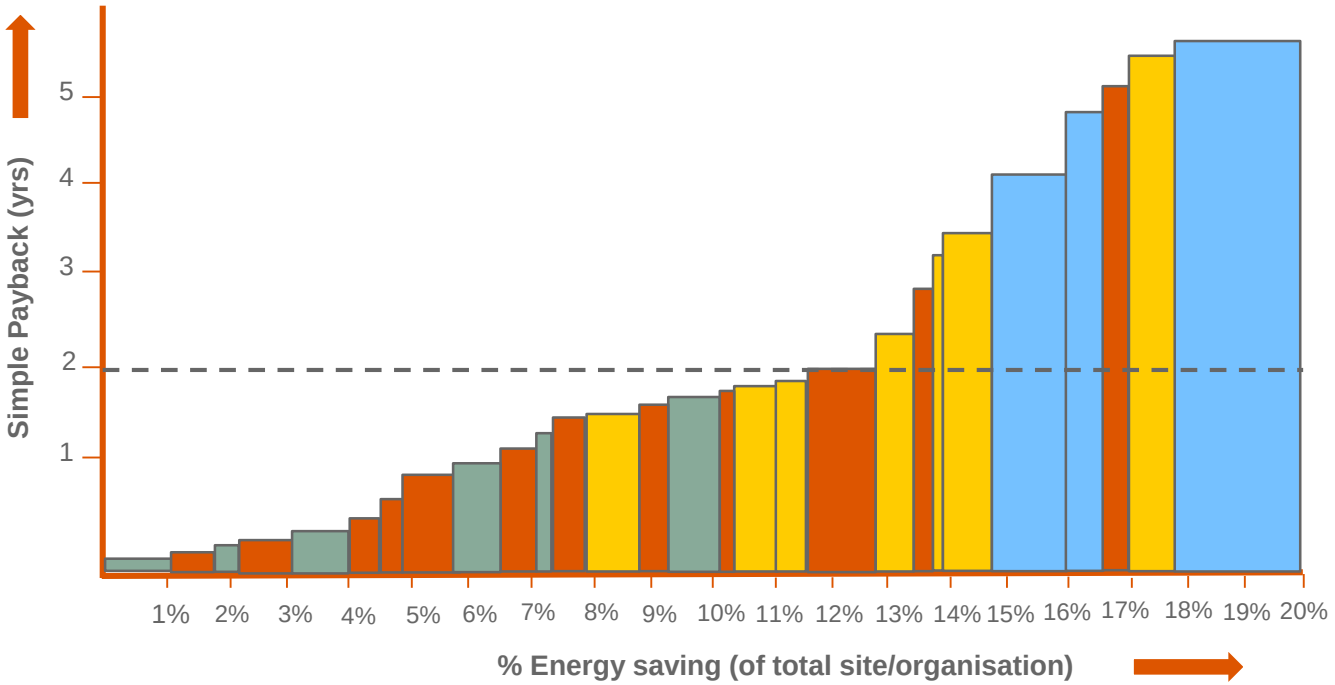
Austria	5	13	↗	Italy	13	27	↑
Belgium	13	18	↗	Latvia	15	12	
Bulgaria	23	16	↘	Lithuania	9	18	↗
Croatia	10			Lux	10	3	↘
Cyprus	5	22	↑	Malta	25	3	↓
Czech Rep.	15	25	↑	NL	19	24	↗
Denmark	**1**	**2**		Poland	22	21	
Estonia	**3**	**3**		Portugal	21	6	↓
Finland	**2**	**1**		Romania	20	23	
France	12	10		Slovak Rep.	15	26	↑
Germany	5	8		Slovenia	5	7	
Greece	24	16	↘	Spain	28	15	↓
Hungary	26	20	↘	Sweden	4	9	↗
Ireland	15	11	↘	UK	27	13	↓

Source : Energy efficiency watch 2015

- Traditionally the UK has been at the forefront of efficiency progress, this has seemingly slowed in recent years
- The UK ranked very low in a recent survey of industry experts assessing progress made towards this target.

The potential

What level of opportunity exists?



- We completed circa 90 energy audits for ESOS across a range of industries
- In total we found an average of 26% saving potential
- We found an average of 11.4% efficiency improvement within a 2 year payback

- The recently published Building Energy Efficiency Survey found a total 39% efficiency reduction opportunity across the non domestic building stock.
- 14% was found to be within a 3 year payback.

So what's stopping us?

Technical

- Availability of data or ability to effectively analyse data
- Unclear information provided by suppliers
- Opportunities lay undiscovered
- Diverse nature of opportunities
- Lack of skills

Economic

- Misaligned Incentives
- Unfamiliar investment type – low confidence in savings
- Competition for finance
- Interventions not sufficiently profitable
- Long investment cycles
- Often difficult to aggregate measures to a scale interesting to investors

Cultural

- Inertia
- Poor energy management structures
- Complex decision chain
- Not seen as core business
- Lack of awareness
- Poor processes making small investments difficult to sign off

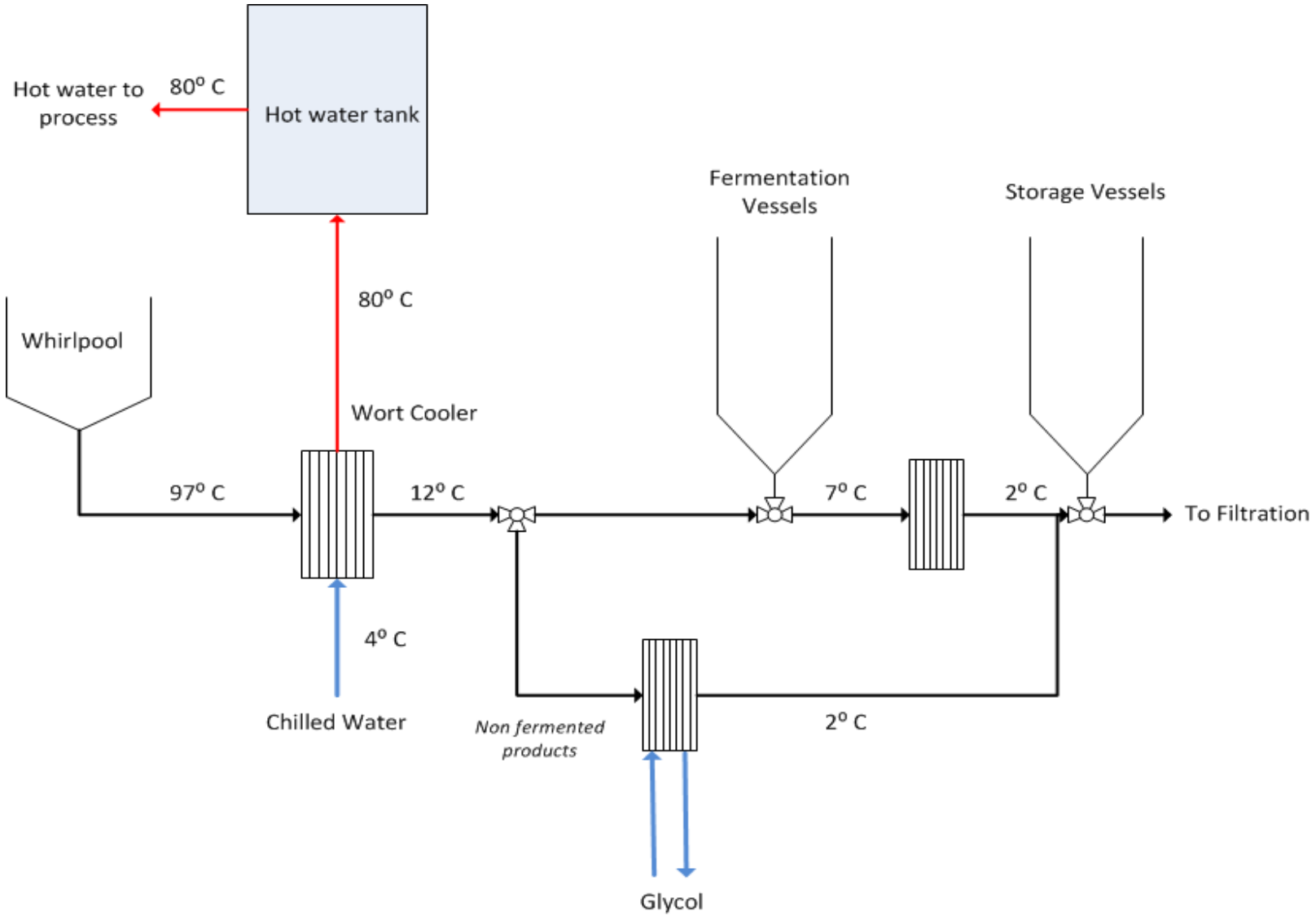
These are just the internal barriers…

Diverse nature of opportunities

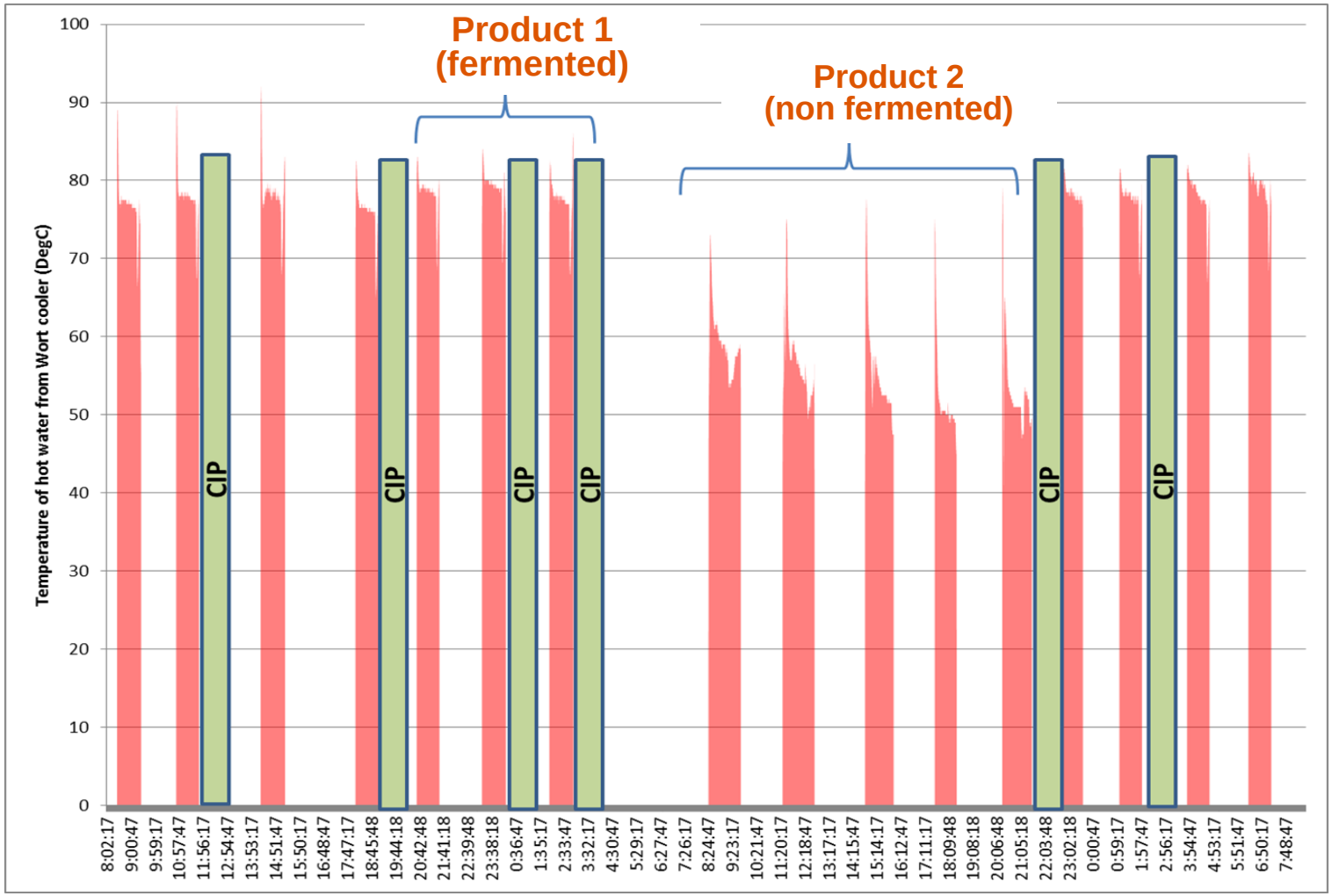
The reality of our building stock?

Lack of skills

Doing the wrong thing for the right reason

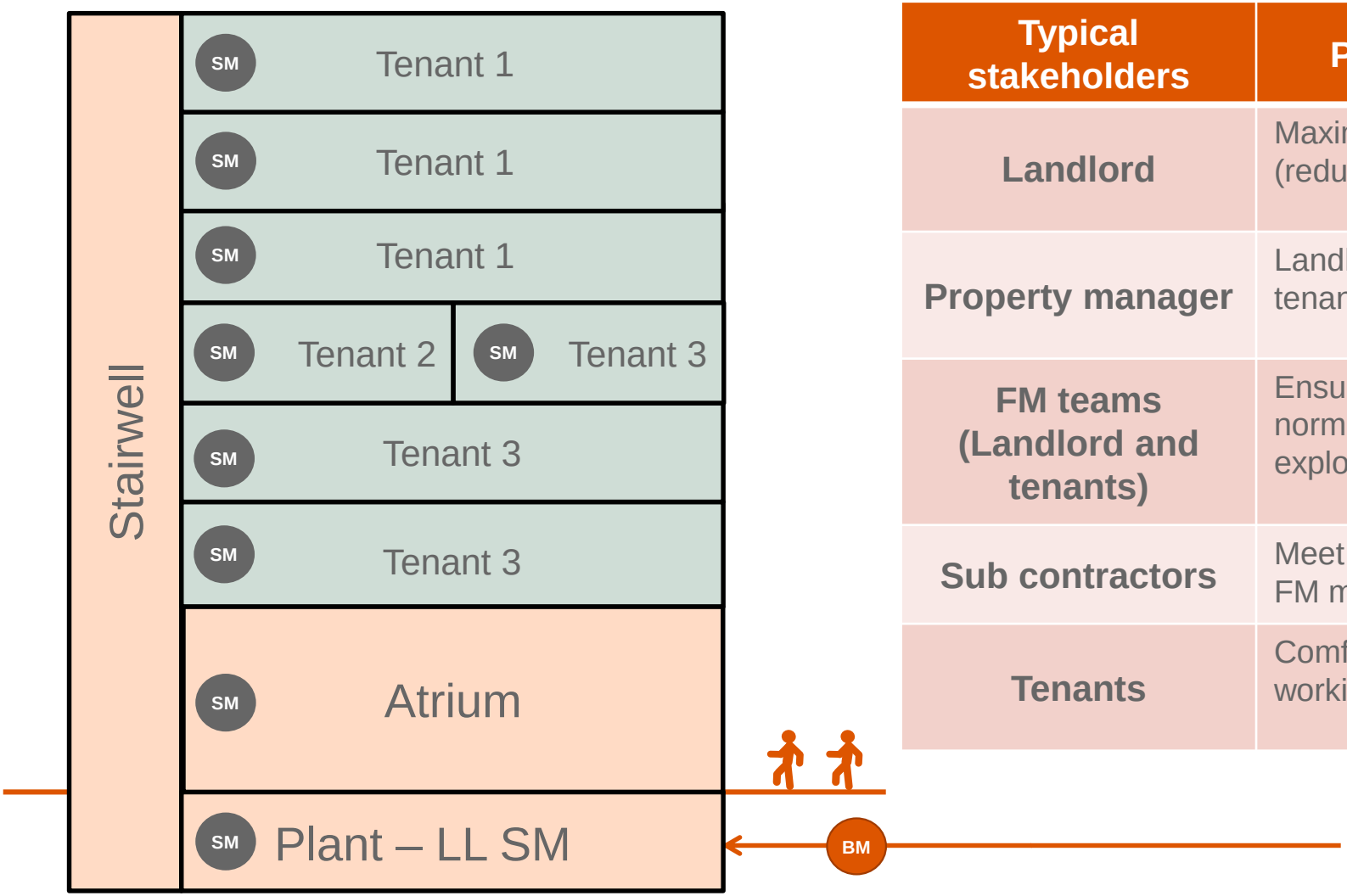


Resulted in 75% more hot water at a lower temperature being generated which ultimately went to drain



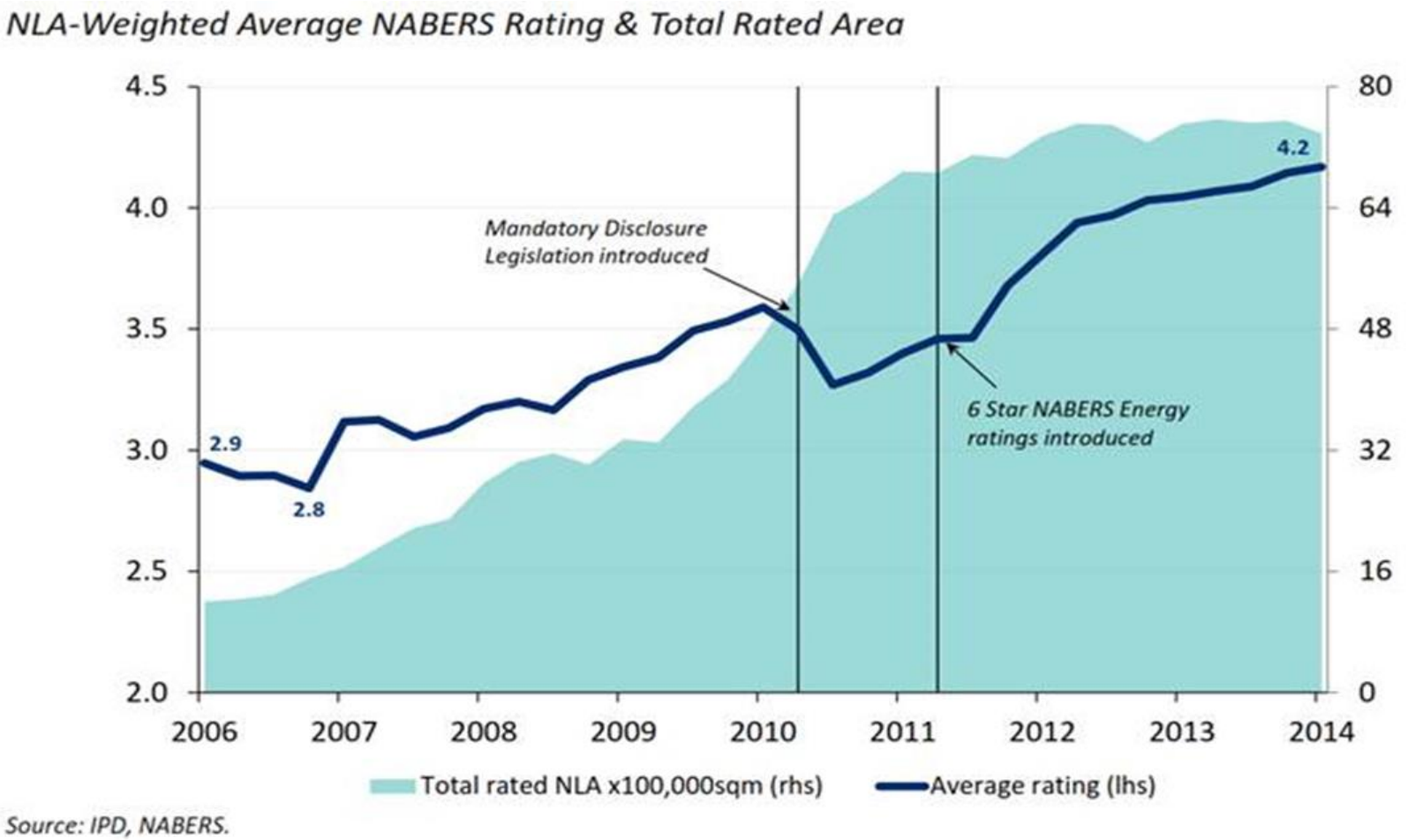
Misaligned incentives

Barriers: Misaligned incentives



Typical stakeholders	Primarily incentive
Landlord	Maximise asset value – (reducing service charge)
Property manager	Landlord agent ensuring tenants are satisfied
FM teams (Landlord and tenants)	Ensure systems work not normally incentivised to explore lowest TCO options
Sub contractors	Meet the requirements of the FM minimise complaints
Tenants	Comfortable and productive working environment

Australia has managed to align these incentives



Source: IPD, NABERS.

Competition for finance

When capital is limited companies may see investing in energy efficiency as an opportunity cost

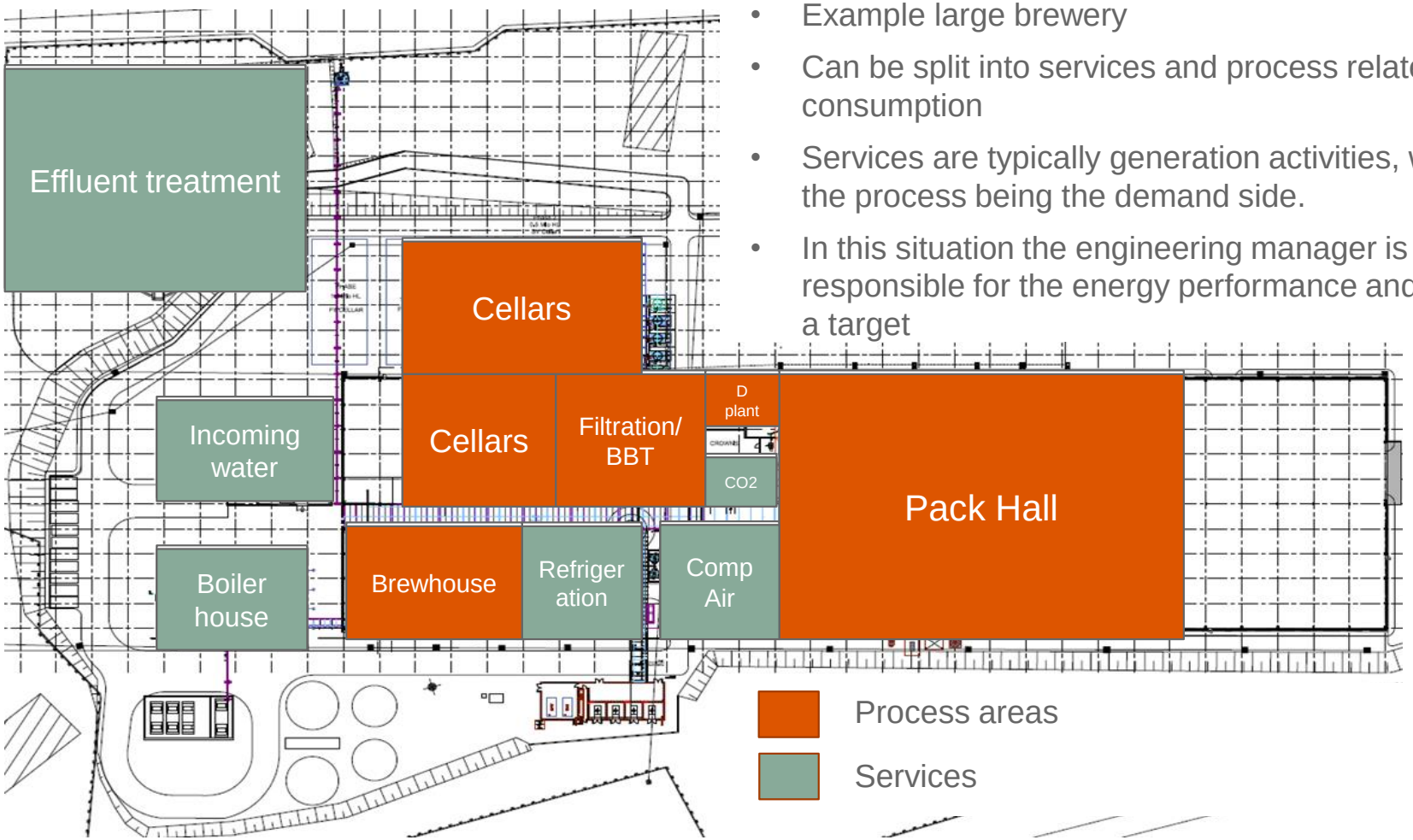
Gas turbine GHP?

or

New production capacity?

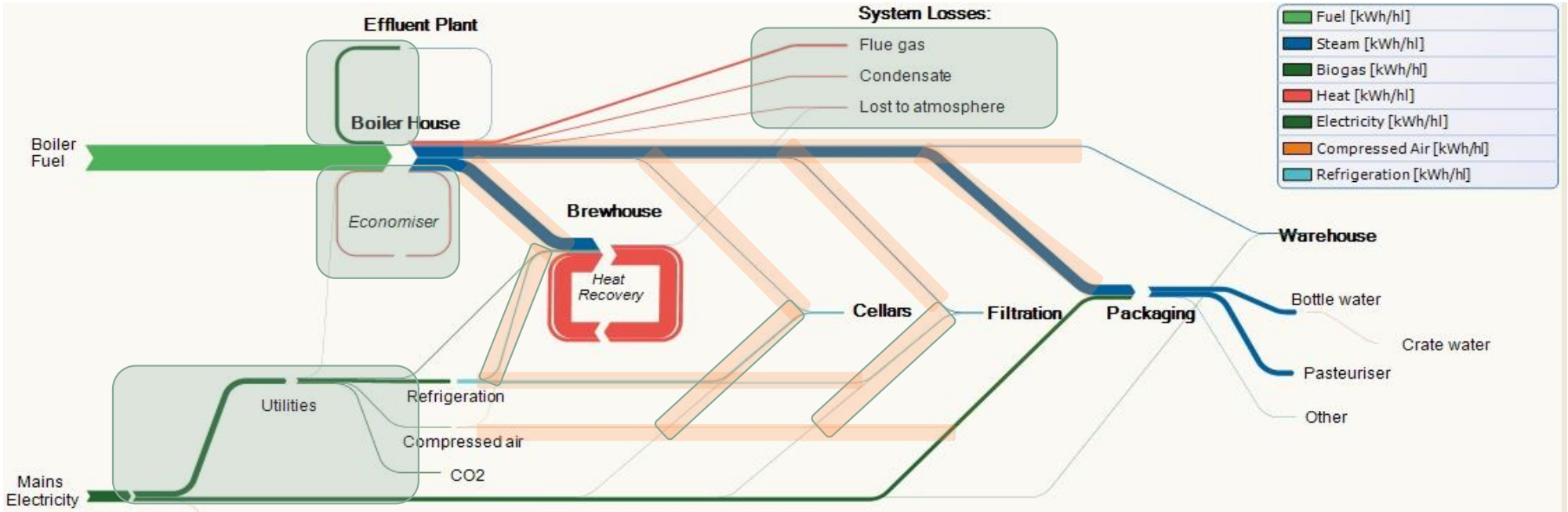
Poor energy management structures

Barriers: Inadequate accountability example



- Example large brewery
- Can be split into services and process related consumption
- Services are typically generation activities, with the process being the demand side.
- In this situation the engineering manager is responsible for the energy performance and has a target

Sankey chart showing energy flow



- <15% of the energy is used by the person responsible for energy performance
- The majority is consumed by parts of the process whose primary focus is unlikely to be energy consumption

This happens when there is insufficient accountability for energy

Often a combination of lack of awareness, poor management and “site blindness”

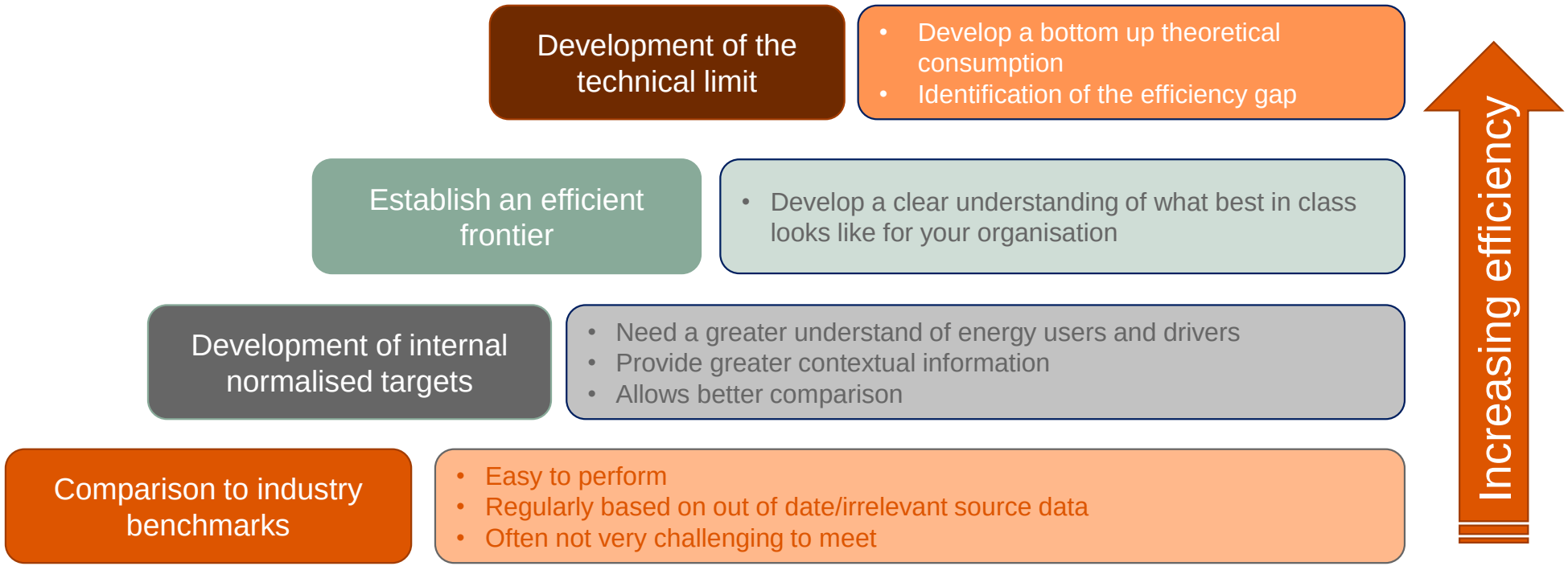
Lack of awareness

There are different types of issues that fall under “lack of awareness”

Organisational - The *“We have already done everything*” mind-set….

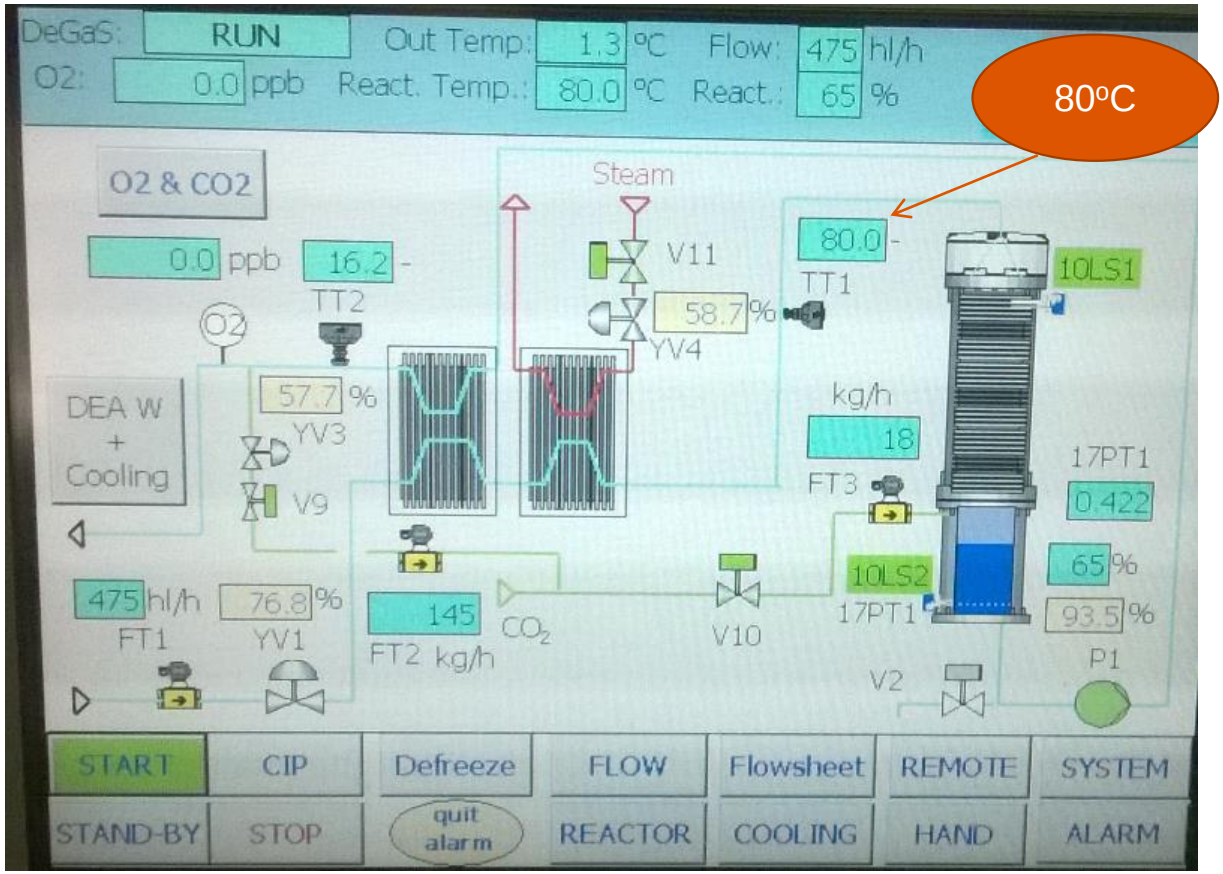
Behavioural – Lack of basic understanding of how one’s actions can impact on energy use

It can be easy to convince yourself that you are “efficient”



Operators can often be unaware of the impact they have

Deaerated water column:

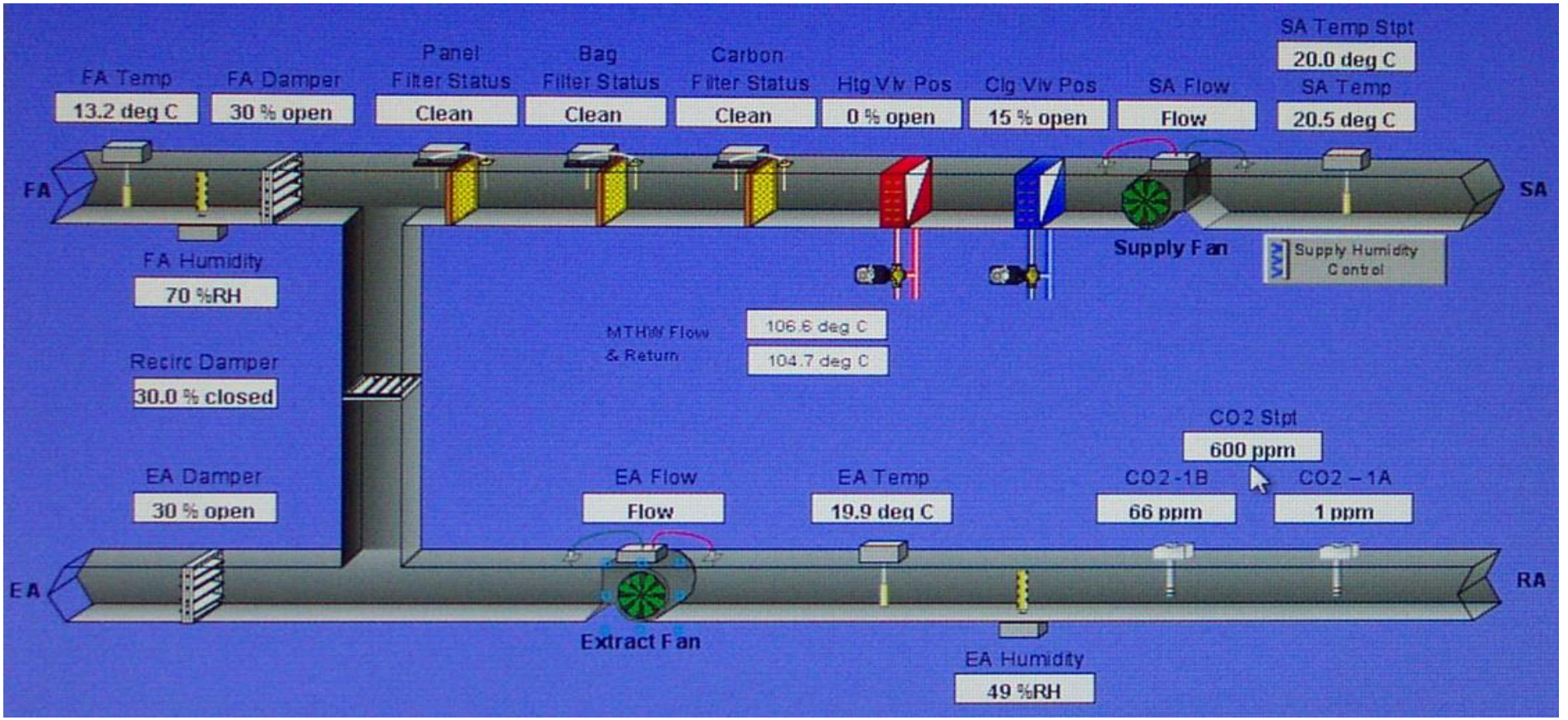


Metric	Current	Design
Inlet Temp	10°C	30°C
Column Temp	80°C	70°C
Efficiency	87%	95%

By increasing the temperature above design by only a relatively small amount resulted in:

- 300% increase in heating
- 20% increase in cooling

A keen eye is often needed to spot issues



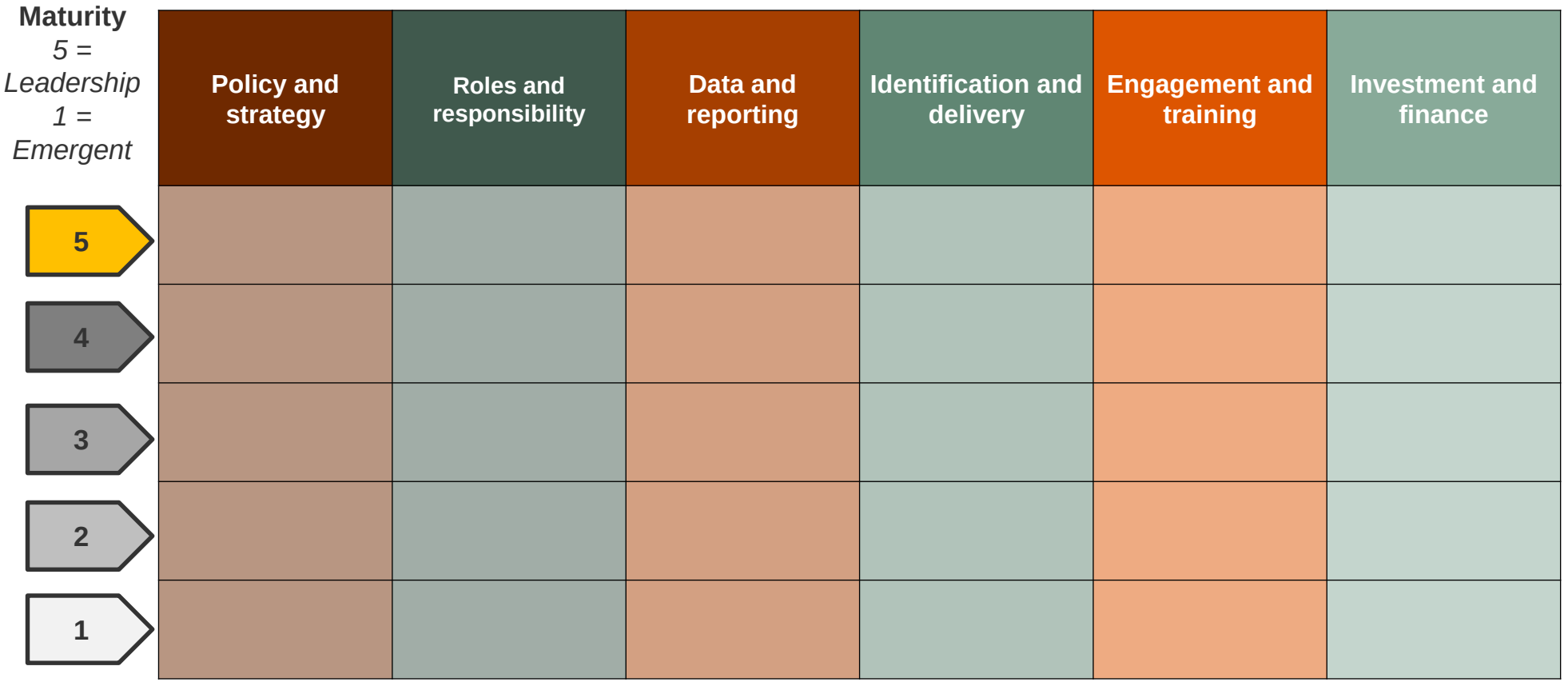
Supply air temperature warmer than extract and fresh air temperature despite heating valve apparently being closed?

Poor management can lead to bad decisions to be made

Whilst engineers will always come up with solutions, they are not always right…

How can companies get this right?

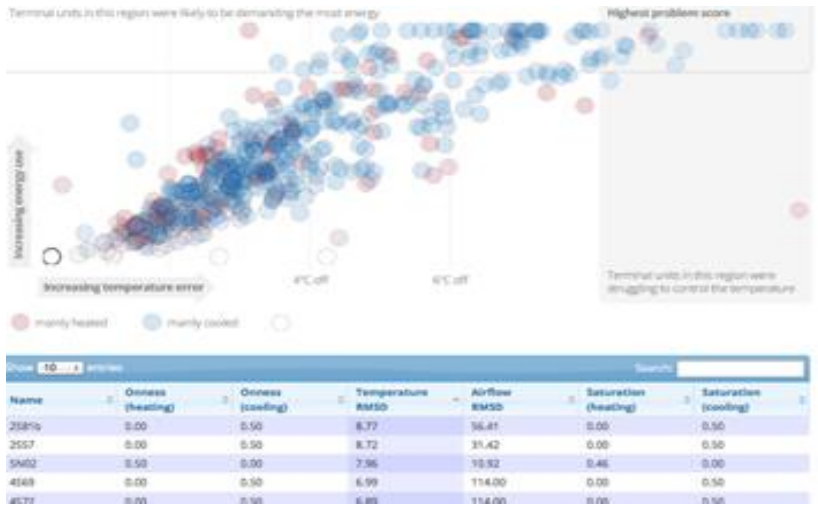
Taking a holistic view to energy management will help maximise an organisation's energy efficiency potential.



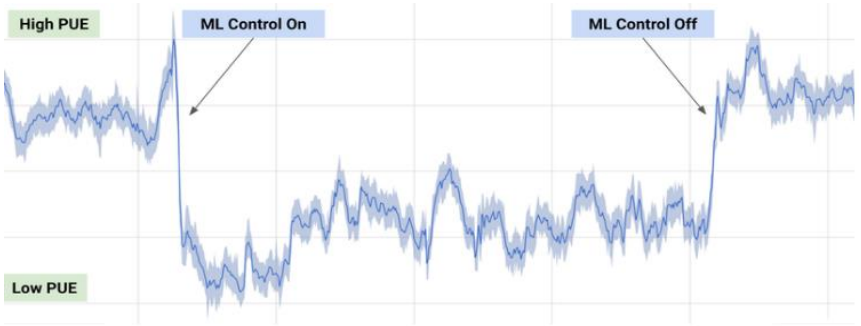
Future trends

Advanced data analytics

- Increasing connectivity, ability to handle large sets of data and apply machine learning techniques is likely to unlock further optimisation potential
- Relatively low barrier to entry has resulted in a healthy mix of large companies (IBM/Google) and start-ups looking to provide solutions



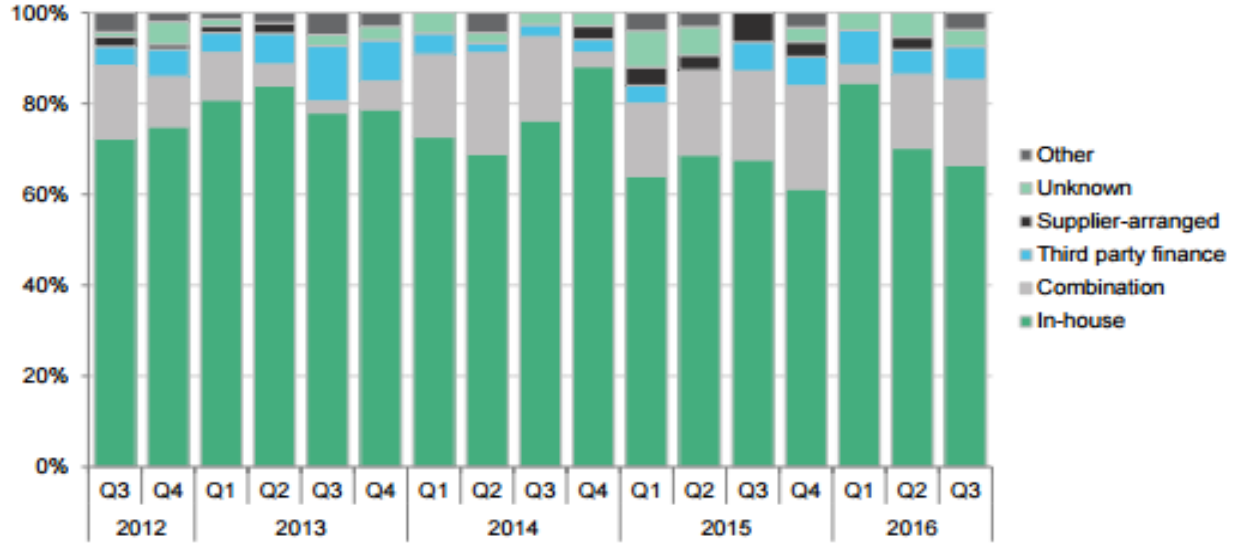
Bespoke analytical packages are being used to identify unexpected behaviours e.g Demand Logic



Google data centre and impact of applying Deepmind control

Greater role of third party finance in energy efficiency

Figure 16: Trends in finance models, Q3 2012 – Q3 2016



Source: EEVS, BNEF

INVESTOR READY ENERGY EFFICIENCY SM
Energy Performance Protocol
LARGE MULTIFAMILY v1.0a
INVESTOR CONFIDENCE PROJECT

INVESTOR CONFIDENCE PROJECT

- There is a trend that sees more projects being financed by a third party
- Plenty of availability capital but shortage of good projects.
- New standardised protocols for developing projects are likely to further de-risk projects and we expect this trend to continue

Conclusions

- Energy efficiency is already the foundation of much of the current carbon reduction policies
  - The ask is likely to get greater as we try to target a 2^{o}C scenario
- There is still a great deal of commercially viable opportunities within buildings and industry
- Energy efficiency is not always straightforward.
- Transformative impact is achievable when incentives are carefully aligned
- Exciting developments both in terms of new technology and the ways projects are financed have potential to make an impact

Andrew Todd

Head of Energy and Resource Management

m: +44 (0)7980 505 585

e: andrew.todd@vercoglobal.com