

How to make a financially sound investment in energy efficient equipment

– understanding the cost of energy and impact on the bottom line

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www.em3.ie

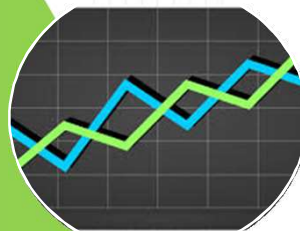
WHAT DO WE DO?

Total Energy Management

Identify Projects,
Design, identify
financial support,
Construct,
commission, Verify
Savings,



Energy Audits –
**SEAI Registered
EAS Scheme**



Energy Metrics,
Reporting & Analysis
Meets requirements of
ISO50001



Grants & Other
Financial Support –
Environmental
Scheme Grants, SEAI
Grants & **Energy
Efficiency
Obligation Scheme
support**



Energy Projects
(Concept through
commissioning and
savings verification)

Q.

What is a successful energy efficiency project?

A project that delivers a financial return which meets or exceeds the project estimates at approval stage.

Ancillary Benefits may include:

- Replacement of old or obsolete equipment
- Reduce maintenance costs
- Increase reliability or redundancy of a system
- Increase production output or debottleneck a process
- Free up internal staff time
- Raise the profile of energy awareness
- Positive PR or meet CSR goals



Q.

What is the opposite to a successful energy efficiency project?

- A project that doesn't deliver a financial return in line with the project goals**
- A good energy efficiency project which never got approved for Investment**
- A good energy saving opportunity which was never identified**

All of the above.....

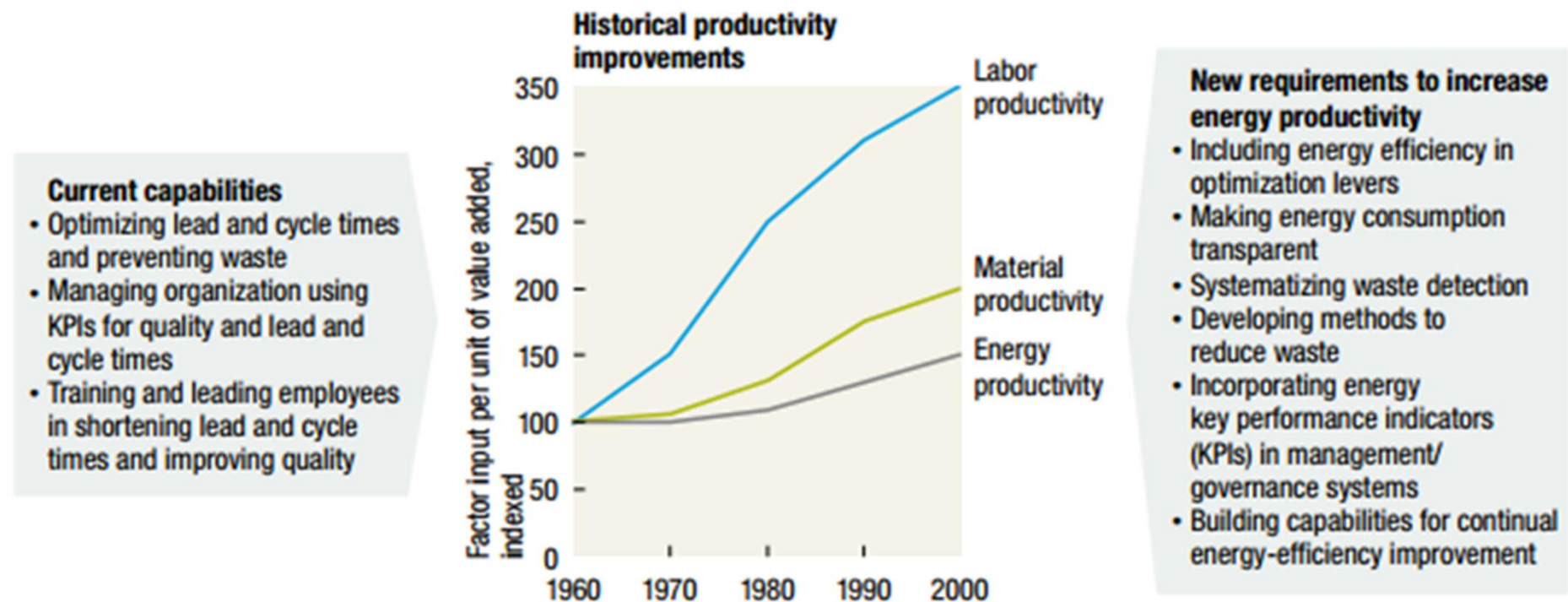


Why do some companies invest in energy efficiency and some don't?

What are the Barriers to investment in Energy Efficiency?

1. Energy is still relatively cheap.

An analysis of the development of energy productivity over time reveals substantial improvement potential



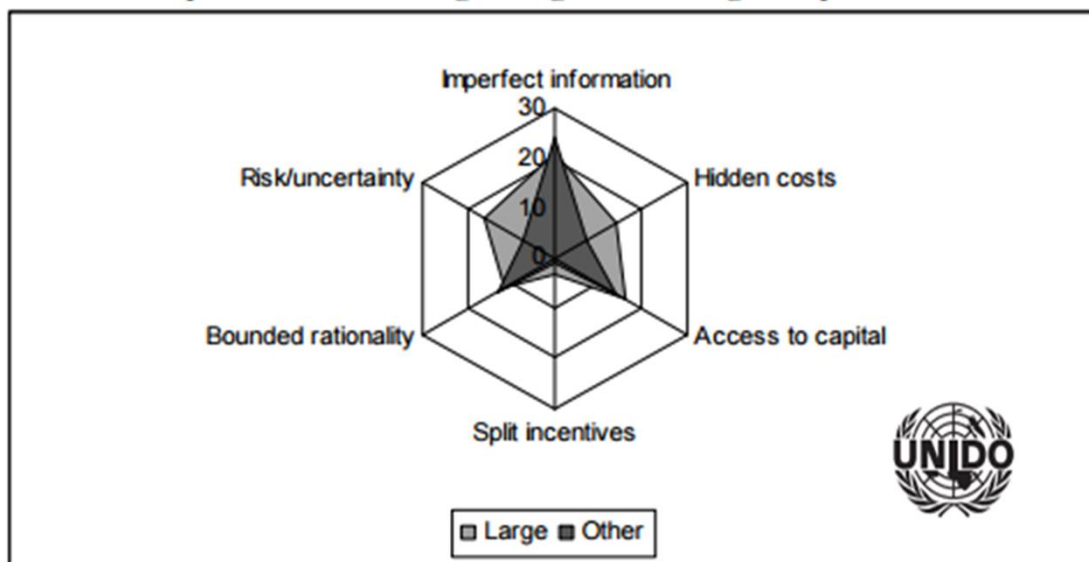
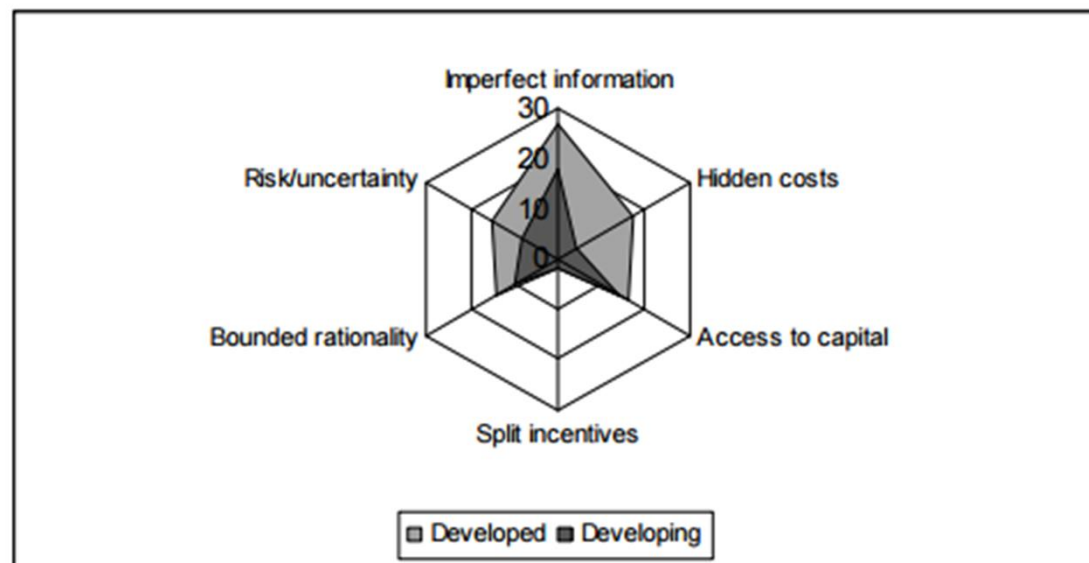
Source: BMU 2007a, McKinsey

Other barriers... according to UNIDO

- **Imperfect Information**
- **Access to Capital**
- **Hidden Costs**

Single biggest barrier to investment in energy efficiency is imperfect information:

- No or few meters in place
- Poor knowledge on process or utility systems and their efficiencies
- Unable to recognise poor performance even with meter data.
- Unable to evaluate credible alternatives to the current systems



Imperfect Information

- **Lack of Resources** within a facility or business – don't have the time to understand where and how energy is being consumed...
- **Lack of meters** or measurement of energy or production output
- **Lack of expertise** – even with resources in place and good data on energy usage – correct analysis or metrics are not being generated

As a result of imperfect information, opportunities remain hidden or an over-conservative approach on savings can lead to projects being unattractive

If imperfect **verification** data exists on a complete project, finance personnel may be unconvinced on energy performance improvement – no traction for subsequent projects



Access to Capital

– Varies hugely from one business to the next

- Indigenous F&D – 1.5 to 2 years

(Competing with business critical & production projects)

- Some Multinationals – up to 5 to 7 years

(Ring-fenced fund for energy efficiency or carbon reduction)



Hidden costs

Hidden Costs – a function of the project delivery process

- **Cost of uncovering projects**
- **Cost of routing projects internally for financing**
- **Cost of disruption, hassle, shut-downs, production outages**
- **Cost of Additional Maintenance**
- **Costs of internal resources**
- **Depreciation**
- **Capital Write-off**



Removing Barriers to Investment in Energy Efficiency



REMOVING BARRIERS

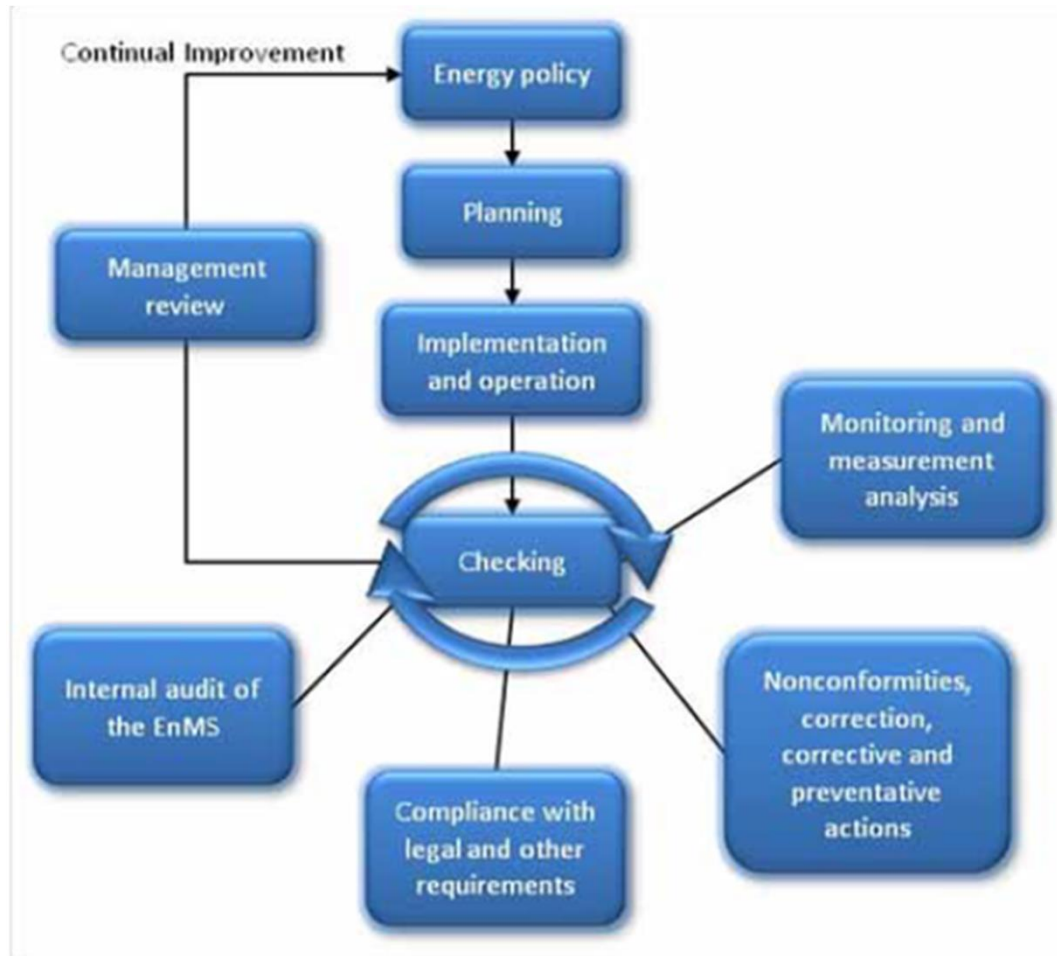
Imperfect Information

- **A formal energy management system or methodology**
 - ISO 50001 – SEAI Agreements Program
 - SEAI Energy MAP
 - Energy Bureau Services
- **Focused Metering with relevant metrics or EnPI's**



MANAGEMENT SYSTEMS

ISO 50001 – Energy Management System



Allows systematic implementation of energy efficiency

Reduces the dependence on key individuals

Allows savings to be continually achieved and ensures that new equipment/systems are designed and procured with energy efficiency in mind



MANAGEMENT SYSTEMS



Energy MAP

Energy MAP (Energy Management Action programme) is a web-based tool to help you decrease energy use and therefore costs, thus increasing your competitive edge in local and global markets. Energy MAP explains the best practice process in **20 easy to follow steps**.

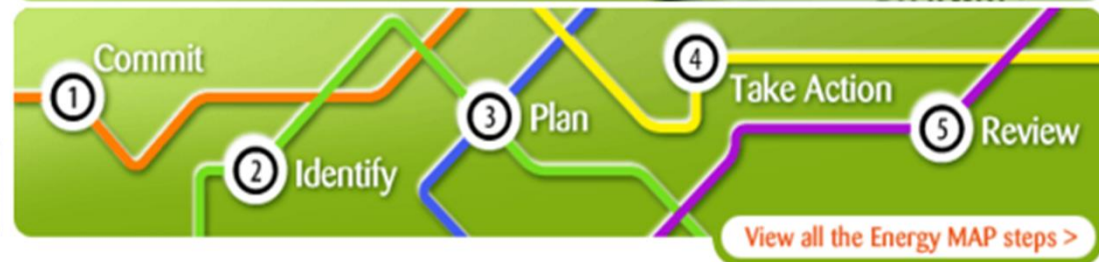
[Learn more about Energy MAP >](#)



Energy MAP

Resources and tools

You are here > Home > Resources & tools



[View all the Energy MAP steps >](#)

Resources and Tools for Energy Management

This section provides you with the tools and resources to support you in your energy management efforts whether it is part of the 20 Step Energy MAP, or you are just looking for a tool to help you with a specific project.

Energy use and cost savings templates

[Energy bill tracking tool](#)

[Significant energy users](#)

[ESB Tariff analysis tool](#)

[More..](#)

Guidance on management and procurement

[Analysing your bills](#)

[List of energy measurement equipment](#)

[Guide on elevator pitch](#)

[More..](#)

Planning and management templates

[Register of Opportunities](#)

[Action Plan](#)

[Energy Opportunity Tracker](#)

[More..](#)

Sample documents

[Sample Energy Policies](#)

[More..](#)



REMOVING BARRIERS

Hidden Costs

- **Scale up the design effort in stages (Decision Gates) –**
 - **Idea Generation – EAS Audit, ISO50001 Opps List, Energy Team 0%**
 - **Concept Development – low cost – SEAI Special Investigations (0.5 to 1%)**
 - **Basis of Design Documents (3% to 5%)**
 - **Detailed Design – Construction – Commissioning – Verification following Capital Approval**
- **Use project delivery specialists (internal or external) to organisation to ensure hidden costs are flushed out early in the Delivery process**
- **Contingency – Sensitivity Analysis**



REMOVING BARRIERS

Access to Capital

- **Build the financial case**
 - Life Cycle Cost, IRR
 - Funding/Support – EEOs
 - Funding/Support – Environmental Fund
 - Esco/Energy Performance Contracting transfers element of risk and spreads cost (at a premium)
 - SEAI support for Esco/EPC



SAMPLE PROJECT DAIRY PROCESS

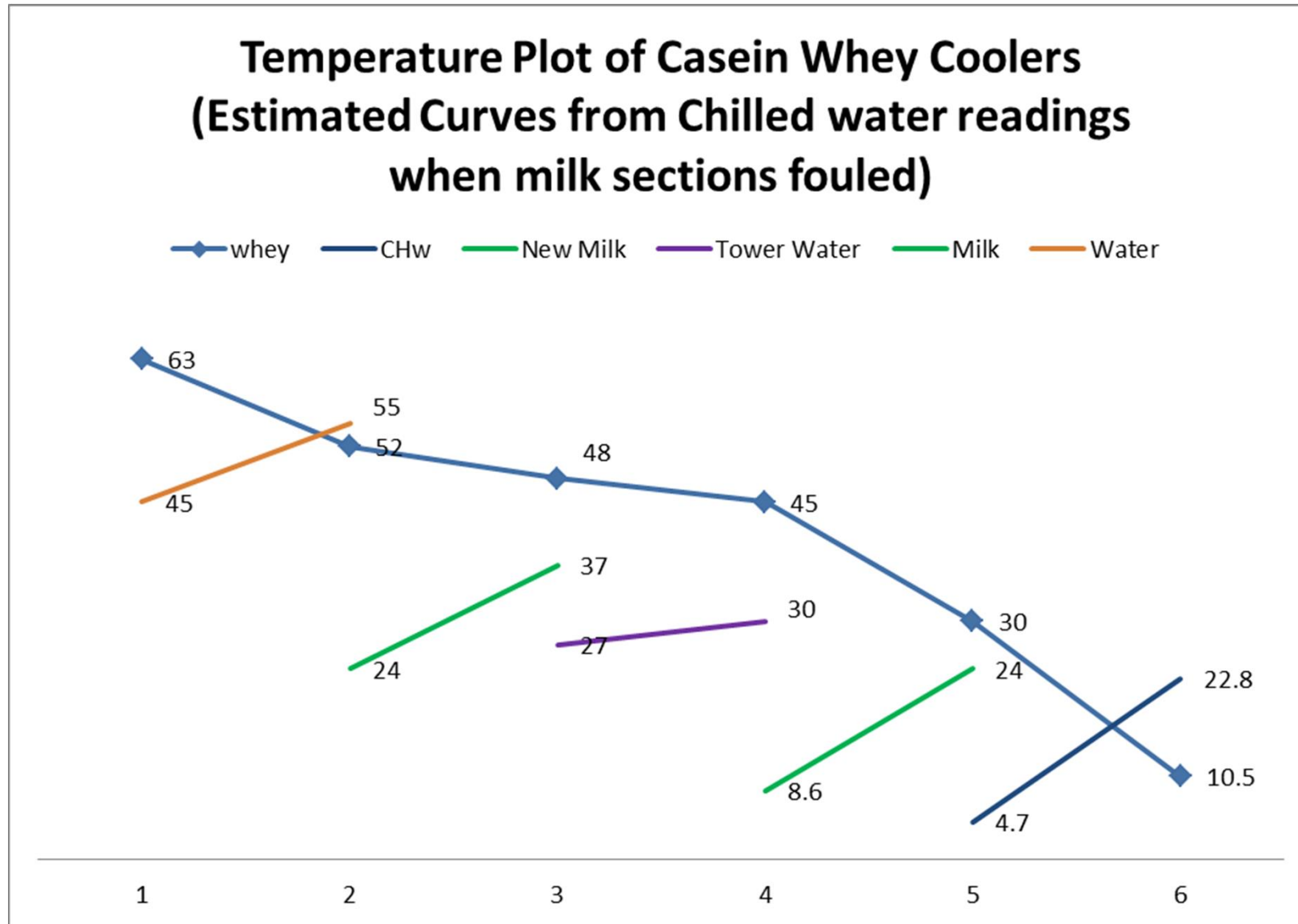


Process integration at dairy facility

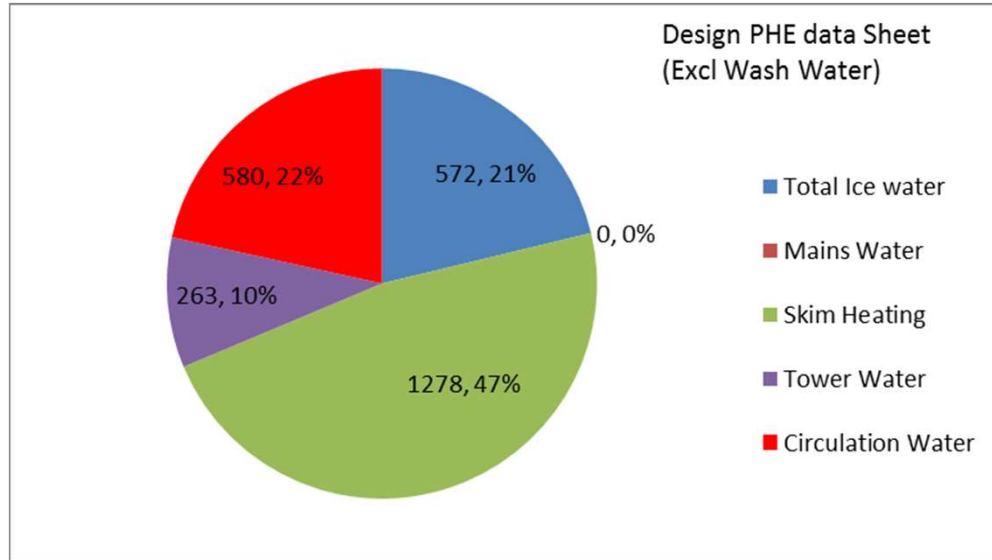
- **Major Dairy Facility with ISO50001 initiated special investigation to look for opportunities to reduce chilling loads (Biggest Energy User)**
- **Drivers – cost reduction, avoid need for capital investment in utility equipment in face of increasing processing loads**
- **Developed a schedule of all chilled water users on the site. Modelled the requirements for Chilling as milk volumes increased.**
- **Focused on largest users of Chilled Water for savings**
- **Gathered detailed load data on Chilled water users in Casein Area**
- **During the Deep dive on Casein, it became evident that fouling of process heat exchangers between washes was having a major impact on chilled water consumption.**



Potential areas for load reduction - Casein

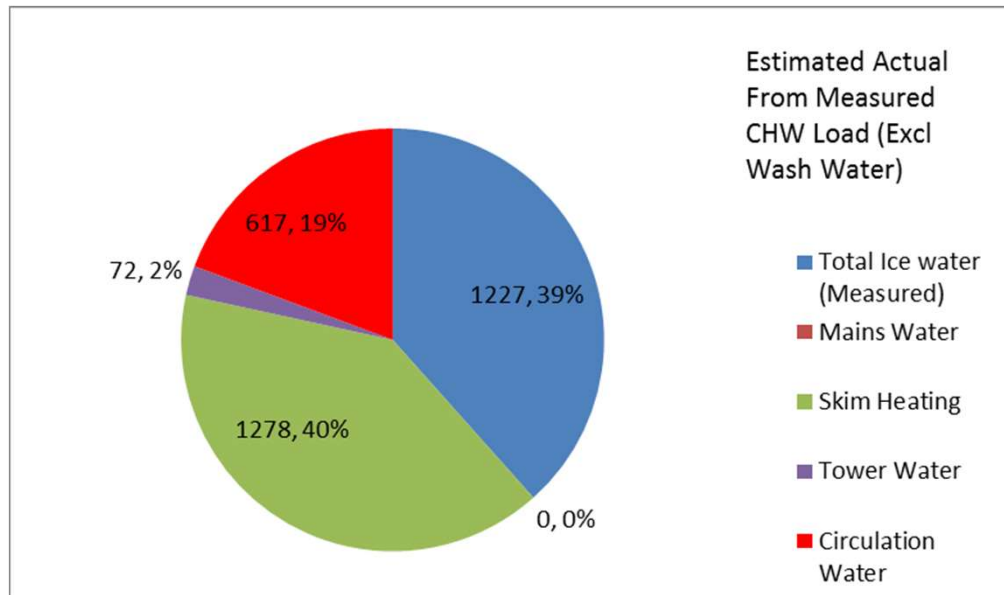


Potential areas for load reduction - Casein



Design breakdown of Whey cooling from 63 to 6.5

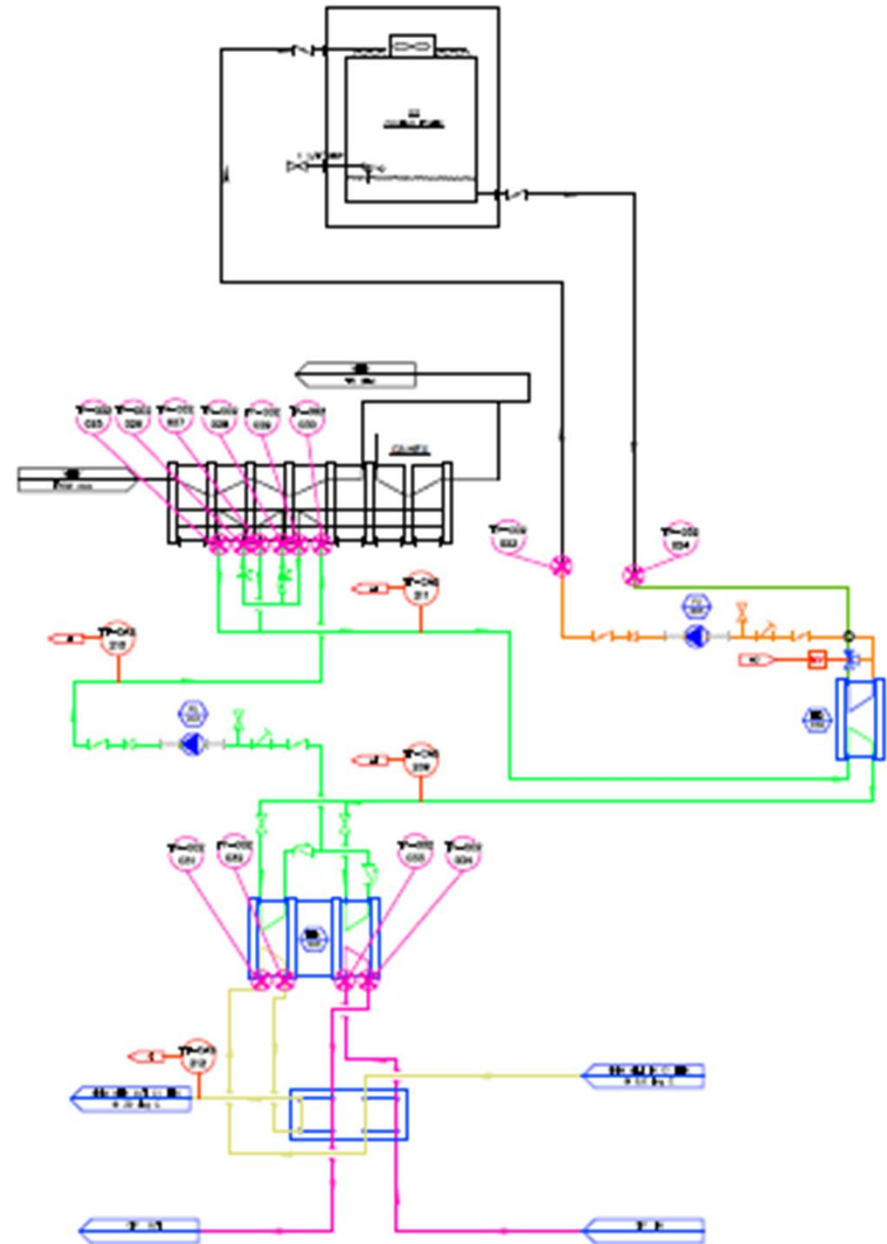
CHW responsible for 21% of cooling in design actually went to 39% when process heat exchangers were fouled



Concept Solution

Install additional heat exchangers to allow an intermediate loop to heat the milk and allow the cooling tower absorb maximum quantity of heat all the time

Allowance for external heaters to allow milk heating to be done without increasing CHW load when plates fouled.



Design & PM process

- Basis of Design (+/- 10% Accuracy) developed for investment decision

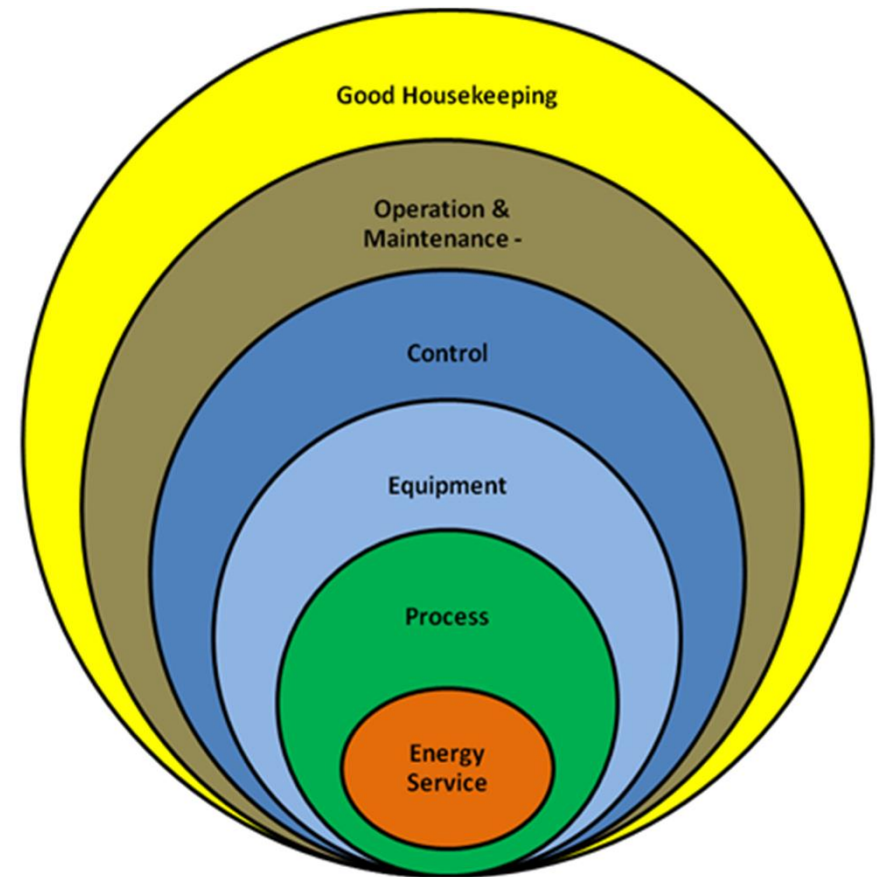
Discount Rate		10%										
Depreciation period		7 years										
Corporation Tax rate		12.60%										
Grant		€20,000										
Energy Inflation		6.00%										
Service Inflation		3.00%										
		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capex	Project cost	-€225,970										
	Energy Credits	€49,459.13										
Savings	Capital Write-off	€0										
	Energy Savings	€102,578	€107,707	€113,092	€118,747	€124,684	€130,919	€137,465	€144,338	€151,555	€159,132	€167,089
	Maintenance & Ops cost		-€650	-€670	-€690	-€710	-€732	-€754	-€776	-€799	-€823	-€848
	Carbon credits	€3,429	€3,600	€3,780	€3,969	€4,168	€4,376	€4,595	€4,825	€5,066	€5,319	€5,585
Sub-total		-€70,604	€110,868	€118,203	€122,027	€128,142	€134,683	€141,308	€148,387	€156,821	€163,828	€171,828
	Depreciation on Investment		-€25,216	-€25,216	-€25,216	-€25,216	-€25,216	-€25,216	-€25,216			
	Net contribution to profit		€85,442	€90,988	€96,811	€102,926	€109,348	€116,090	€123,171	€155,821	€163,629	€171,826
	Tax		€10,680	€11,373	€12,101	€12,866	€13,668	€14,511	€15,396	€19,478	€20,454	€21,478
Tax sub-total			€10,680	€11,373	€12,101	€12,866	€13,668	€14,511	€15,396	€19,478	€20,454	€21,478
Total		-€70,604	€99,877	€104,830	€109,828	€116,278	€120,895	€128,795	€132,890	€138,344	€143,176	€160,348
NPV		€605,018										
IRR		148.83%										
Payback (yrs)		1.77										

- Project Approved and Design, Construction, Commissioning & Verification in 2015



Results

- **Project implemented on-time, on-budget**
- **Savings were achieved and verified**
- **EEOS contribution from obligated party were assigned**
- **Product Quality was improved**
- **Chilled water demand on the site reduced by 5% despite 10% increase in volumes of milk processed**
- **Refrigeration plant became more efficient as a result of reduced loading**
- **Amount of washing was reduced substantially**
- **Most importantly – by reducing the load investment in additional refrigeration equipment was avoided**



Summary – dairy process improvement

- **ISO50001 Process pushed for focus on SEU's (CHW)**
- **Gathering the crucial information and metrics unlocked the project**
- **The project delivery process ensured that risk associated with cost and design were addressed at basis of design stage – all stakeholders were brought on board**
- **A good baseline data set was available for analysis and subsequently for verification of savings**
- **Investment was justified due to good IRR based on:**
 - **Detailed energy calculations and cost estimates**
 - **EEOS and other financial supports being included in the IRR calc**
- **Project was successful on a number of levels, cost reduction, process improvement, CO2 reduction, capital offset**

Win – Win –Win!

