Xerox (Europe) Ltd Dundalk Colour Toner Plant

Energy Efficiency

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Oct 2010

Xerox, Dundalk Colour Toner Plant

Key Info

Initial Investment ~ $85m

Headcount ~ 110

3 Shift , 5 Day operation

25% to US market

75% to Europe and Asia

MIC – 8MW

Large Digital Electrical Loads 4x1 MW compressors

€1.3m Annual Energy Spend

One of Our Products

High speed colour machine suitable for graphics arts sector , 60-80 copies per minute

Plants are supplying a wide range of SKUs for a variety of product families including the flagship product iGen3

Dundalk Toner Plant Status 2005

- Strategic Imperatives
  - Needed to position ourselves to be competitive in a more complex but declining conventional color toner market
  - Needed to develop a competitive offering for packaging new platform EA toners
  - Become the benchmark plant globally

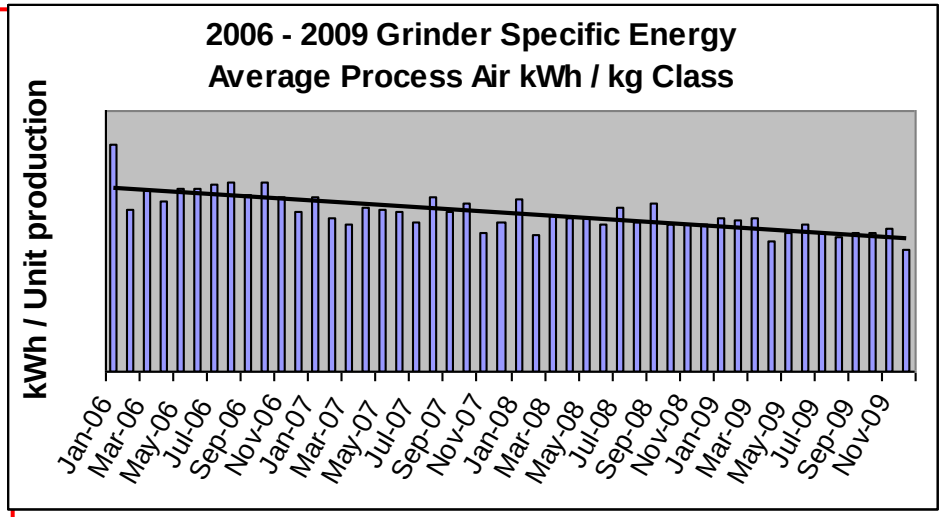
- Key Enablers
  - Strong internal Productivity Focus , **Energy,** Freight, Packaging, Automation, Reuse
  - SEI Energy Agreements program helped us start our Energy journey

Our Energy Story

Vital Few - Grind / Class

Key Projects

- **Particle Size Maximisation**
  - Improved particle size control (Cpk)
  - Changed internal product specification
- **First pass yield**
  - Reduced purge per start-up
  - Enable re-feed of start-up purge
  - Improved downstream first pass yield
- **Compressor control / efficiency**
  - Minimise idle time
  - Eliminated venting
  - Improved cooling water temperature
  - Chemical de-scaling & water softener
- **Special investigations**
  CFD analysis & Nozzle design,
  Additives to improve friability
  Effect of process parameters such as pressure, level, etc
  Benchmarked compressor efficiency…



Results

- Improved process compressor power per unit output (kWh/kg) by 20%.
- Improved first pass yield by 5%.
- Reduced impact of seasonal temperatures.
- Enabled load shifting
  Cost reduction through availing of WPDRS and moving production to suit STOD.

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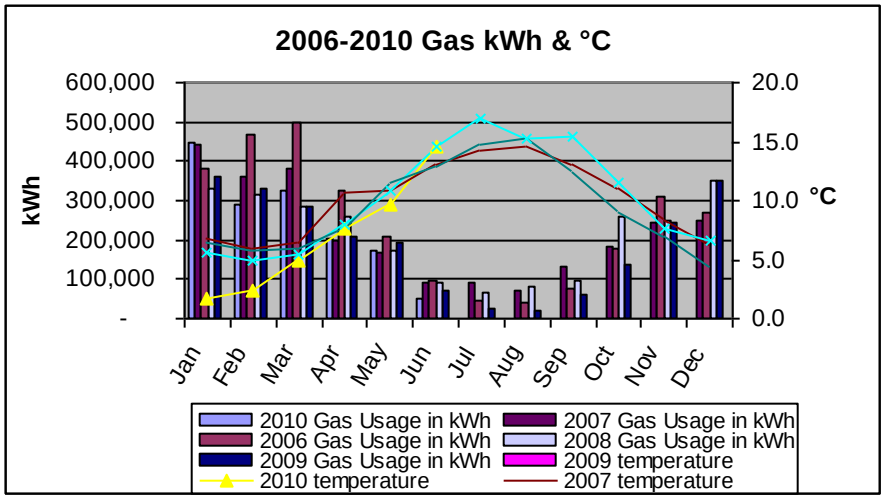
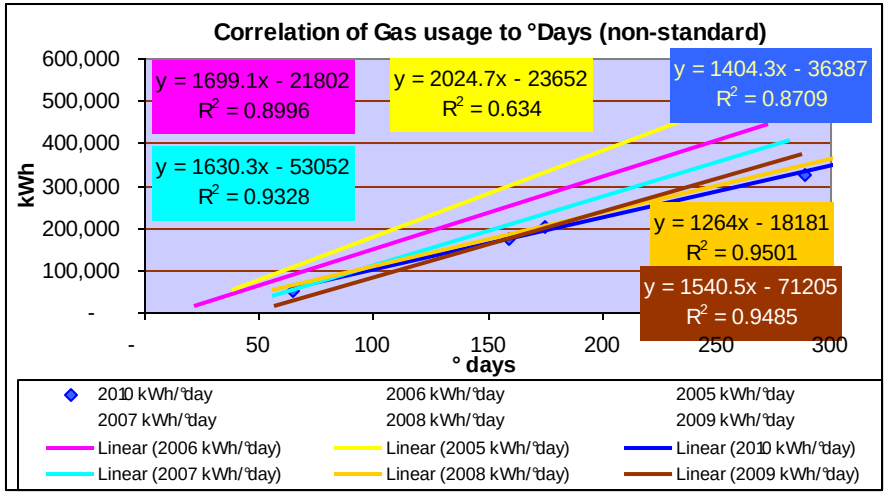
Vital Few - Heating





How to tell if heating is efficient?

Dublin Airport
average monthly temperature
minus 18°C
X
No of days in month
X
Empirical factor .
Expected heat requirement

Y=mX+C

R^2 =correlation or
how consistent is your control?

m=Slope or
how efficient is your heating system?

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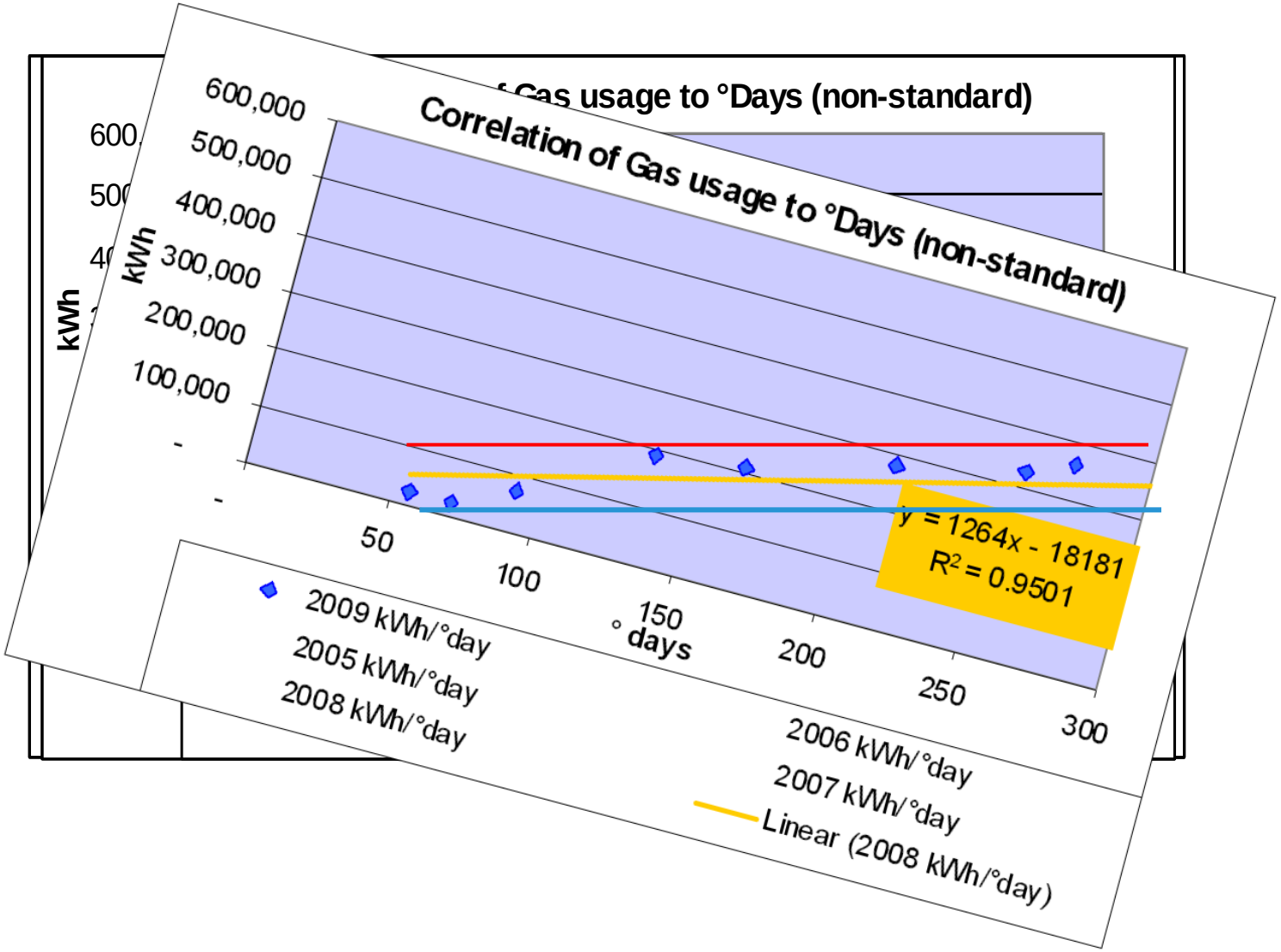
Vital Few - Heating



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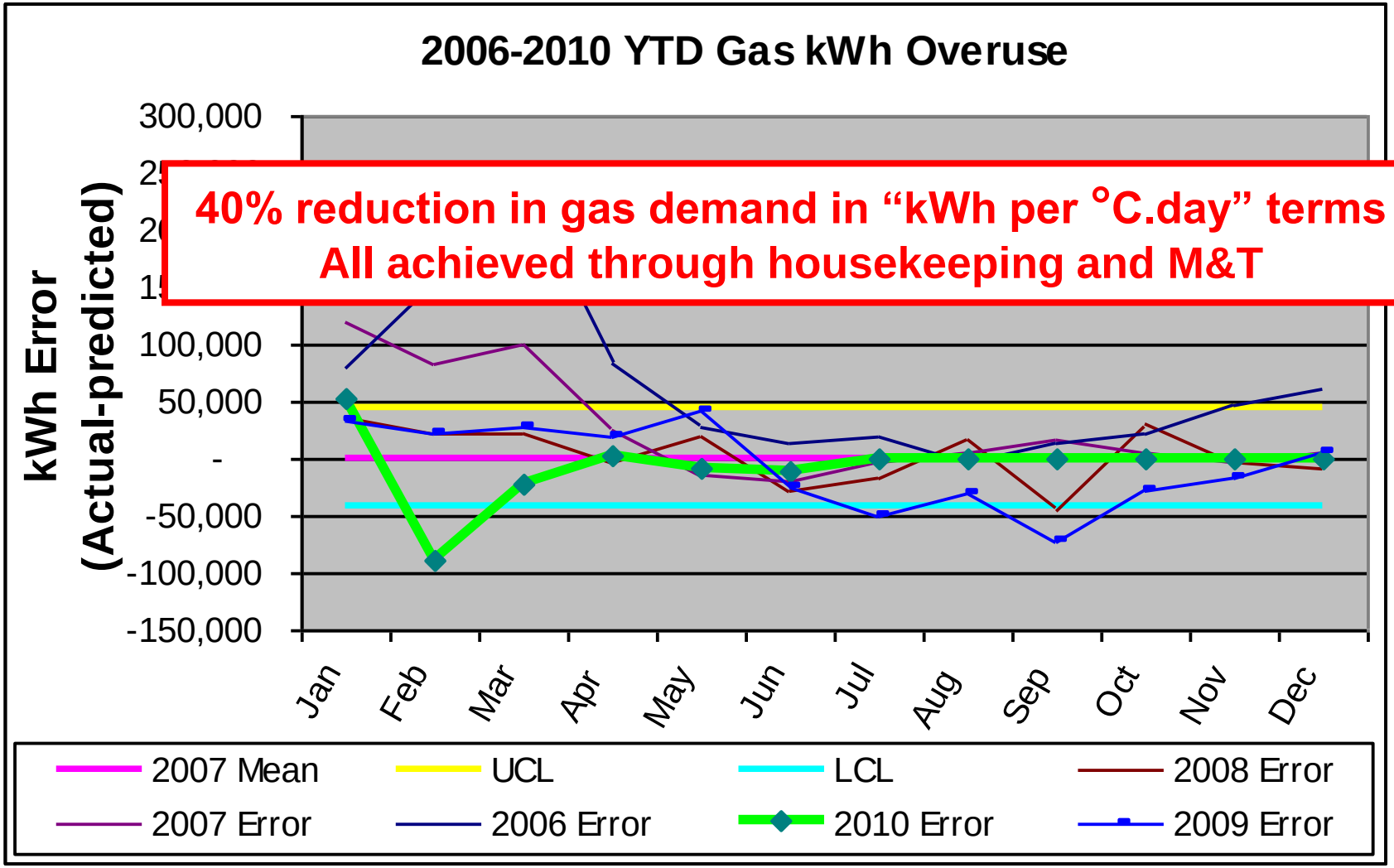
Vital Few - Heating



40% reduction in gas demand in "kWh per °C.day" terms
All achieved through housekeeping and M&T

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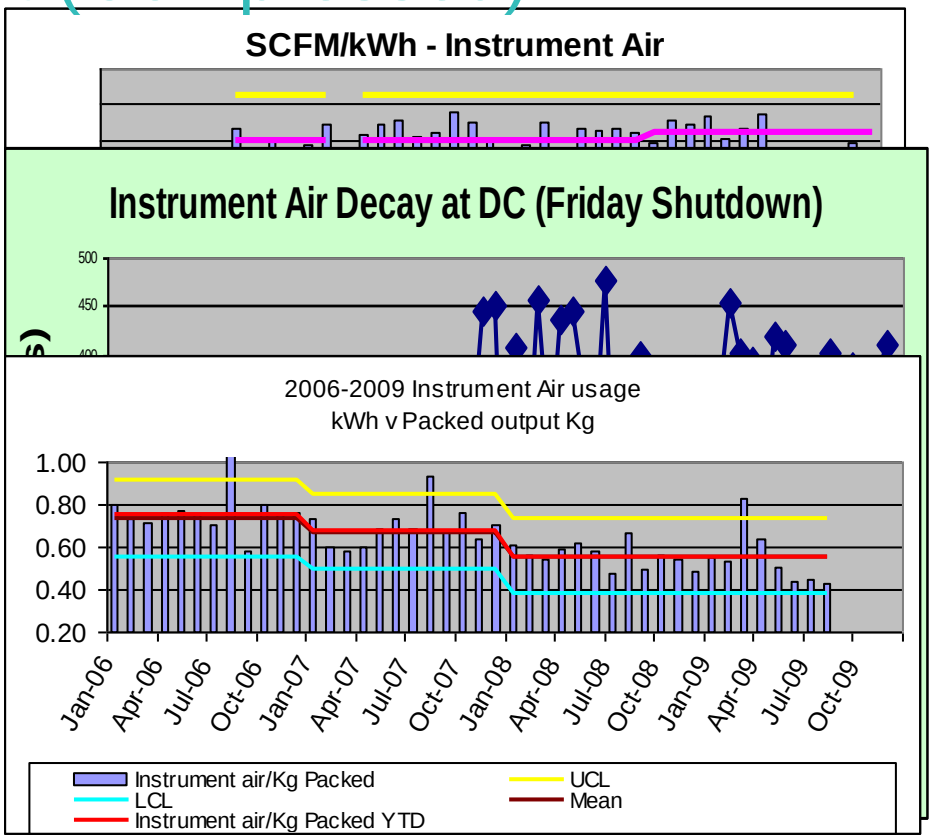
Vital Few - Instrument (Compressed) Air

Key Projects

- **Compressor Efficiency**
  - Routed intake to external air
  - Measured flow profile / de-rated compressor to match (**Right-sizing)**
- **Compressed air demand**
  - Weekend shut-off
  - Eliminate / substitute / reduce CA use
    - Dust Collector Pulsing
    - Changeover
    - Purge Panels
  - Leak detection & repair program
    - monitor Pressure Decay Time (Idle Leak Rate)
- **Special investigations**
  I2E2 & Trinity College
  SEI workgroup
  Benchmarked compressor efficiency…



Result

- Reduced CA kWh/ unit production by 45%.
- Saving ~ 100,000 kWh per annum

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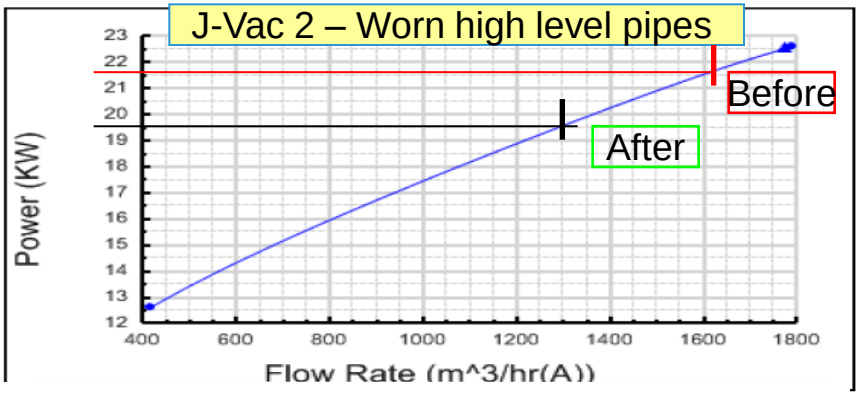
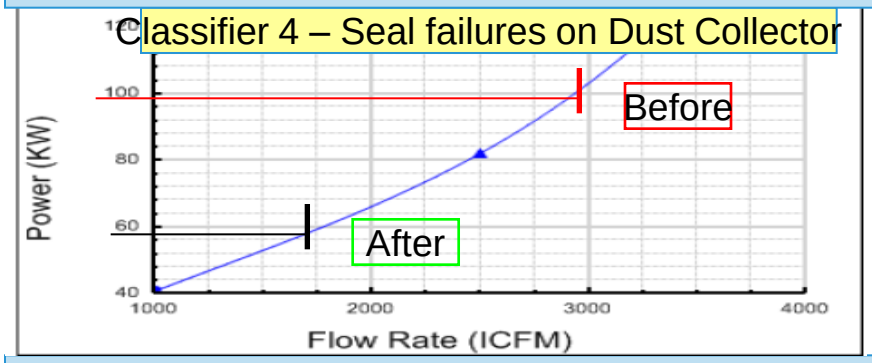
Vital Few - Fan Energy Demand Reduction



- J Vac 2 -Leaks causing high flow

  2kW saving approx $1.5K per annum

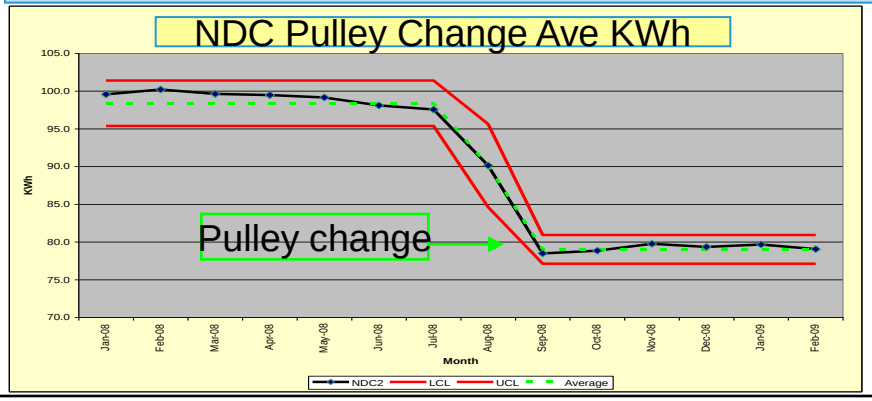
Analysis of flow rate and fan curves indicated fans were operating at flowrates higher than design. Further investigation discovered high level worn pipe elbows. Repaired and strengthened same reducing flow and thus energy demand.



- Classifier Blower Flow Reduction

  Saving $10k per annum on Class 4

Monitored flow at Class inlet v's blower across 4 classifiers. Motor control chasing airflow setting due to seal leaks in Dust collector - 34% loss in process vacuum. Leak repaired repair resulting in energy savings.



- NDC Fan Speed reduction (2 units)

  20kW saving approx $25K per annum

Trials conducted to see if system functionality could be delivered at reduced flow.
Pulleys changed: still maintaining sufficient dust pick-up velocity of 40mph

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DCTP Energy Newsletter: Energy tips for Work & Home

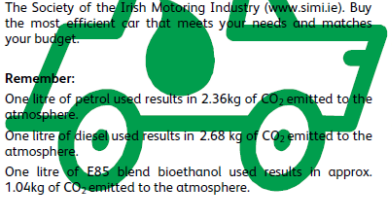
DCTP Energy Update

June 2008 Page 2

MOTORING TIPS

What Car?

If you are buying a new car, check the Energy and Emissions label which by law must be displayed on the windscreen. And ask the dealer for a copy of the **Guide to Passenger Vehicles Fuel Economy & CO_2 Emissions** which is also available from The Society of the Irish Motoring Industry (www.simi.ie). Buy the most efficient car that meets your needs and matches your budget.



Remember:

One litre of petrol used results in 2.36kg of CO_2 emitted to the atmosphere.

One litre of diesel used results in 2.68 kg of CO_2 emitted to the atmosphere.

One litre of E85 blend bioethanol used results in approx. 1.04kg of CO_2 emitted to the atmosphere.

When (Not) to Use the Car

- Avoid using your car for short or unnecessary journeys. You should try walking or cycling short journeys, which is great for your health.
- Check if public transport can get you there.
- Plan your journey, try phoning ahead to make sure the journey is worthwhile / essential.
- Try combining trips (such as shopping and the school run) to avoid taking the car out several times.
- Or see if you can share the car journey with someone else, at least taking one car off the road.
- Try to use less congested routes and avoid rush hours if possible.

Get into the habit of asking yourself these questions

When Driving Your Car

Driving at high speed (over 80 km and especially over 100 km) uses more fuel and causes more pollution. Try to keep to lower speeds.

An aggressive driving style can lead to an increase in fuel consumption of 10-12% above average. In contrast, an **energy aware driving style** can save up to 13% on fuel consumption and is better for the environment and for your wallet.

There are some simple steps you can take when driving to reduce fuel consumption and improve efficiency:

- **Starting the Car**
  Turn the engine on then drive off gently and without delay. This will reduce excessive fuel consumption and pollution.
- **What affects fuel consumption most?**
  Driving style, unnecessary short trips, cold engine, poor car maintenance, rapid acceleration and incorrect tyre pressure all affect fuel consumption adversely.
- **Maintain your car regularly**
  A properly maintained car will have good engine lubrication, wheel alignment and well adjusted brakes reducing your fuel consumption.
- **Reading the road**
  By watching the roads ahead and anticipating any likely problems, your driving style will become smoother, better controlled and be safer for you and other road users.
- **Maintaining your distance**
  Safe and economical driving requires you to maintain a sufficient distance behind the car in front - a minimum of 10m for every 15km/h speed. This way you can brake and accelerate more smoothly.
- **Saving fuel in town**
  Avoid over-revving the engine and drive in as high a gear as is suitable to road conditions.
- **Reduce unnecessary drag**
  Take off unused bike racks or roof boxes and save 15-40%. Use the car's vents rather than leaving the windows or sun roof open, saving you a further 3-5%.

Did You Know?

- Even if you only have to wait 30 seconds, it is more economical to switch the engine off and start it again when necessary.
- A less aggressive, energy conscious driving style could reduce your fuel consumption by 10% and reduce harmful emissions by 30-40%.
- Tyres 0.5 bar below manufacturers recommended pressure increase wear and fuel consumption by 2-3%.
- At bends, reducing speed gently and in time and accelerating smoothly when you are halfway through will reduce excessive fuel consumption.
- Lower speeds are safer, but driving at high speed (over 80km/h and especially over 100km/h) also uses more fuel and causes more pollution.
- A cold engine uses significantly more fuel than a warm engine – try avoiding your car for very short journeys.
- The rear window demister being on uses 3-5% more fuel. Remember to switch it off when the window is clear.

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power of one at work energy efficiency for Ireland

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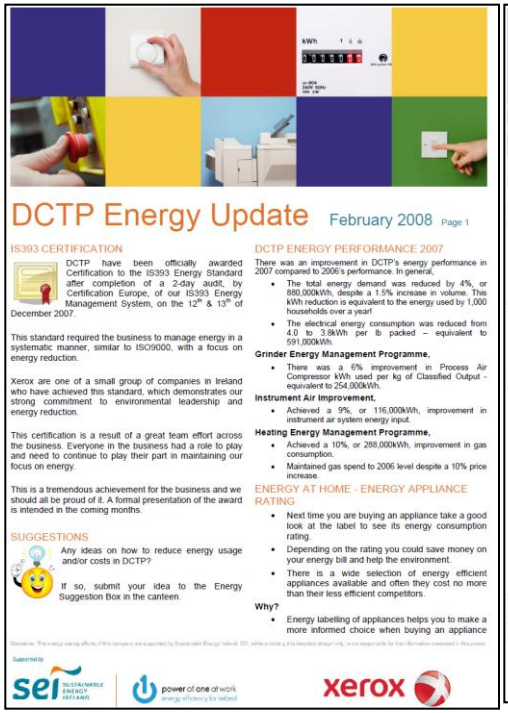
Energy Aware Employees !

What better way to stimulate interest in energy awareness in work than show employees how the can save energy both at work and at home with our energy awareness newsletter.

Each issue leads with a new topic – in June it was transport while February featured domestic appliances



DCTP Energy Update

February 2008 Page 1

IS393 CERTIFICATION

DCTP have been officially awarded Certification to the IS393 Energy Standard after completion of a 2-day audit, by Certification Europe, of our IS393 Energy Management System, on the 12th & 13th of December 2007.

This standard required the business to manage energy in a systematic manner, similar to ISO9000, with a focus on energy reduction.

Xerox are one of a small group of companies in Ireland who have achieved this standard, which demonstrates our strong commitment to environmental leadership and energy reduction.

This certification is a result of a great team effort across the business. Everyone in the business had a role to play and need to continue to play their part in maintaining our focus on energy.

This is a tremendous achievement for the business and we should all be proud of it. A formal presentation of the award is intended in the coming months.

SUGGESTIONS

Any ideas on how to reduce energy usage and/or costs in DCTP?

If so, submit your idea to the Energy Suggestion Box in the canteen.

DCTP ENERGY PERFORMANCE 2007

There was an improvement in DCTP's energy performance in 2007 compared to 2006's performance. In general,

- The total energy demand was reduced by 4%, or 880,000kWh, despite a 1.5% increase in volume. This kWh reduction is equivalent to the energy used by 1,000 households over a year!
- The electrical energy consumption was reduced from 4.0 to 3.8kWh per lb packed – equivalent to 591,000kWh.

Grinder Energy Management Programme,

- There was a 6% improvement in Process Air Compressor kWh used per kg of Classified Output - equivalent to 254,000kWh.

Instrument Air Improvement,

- Achieved a 9%, or 116,000kWh, improvement in instrument air system energy input.

Heating Energy Management Programme,

- Achieved a 10%, or 288,000kWh, improvement in gas consumption.
- Maintained gas spend to 2006 level despite a 10% price increase.

ENERGY AT HOME - ENERGY APPLIANCE RATING

- Next time you are buying an appliance take a good look at the label to see its energy consumption rating.
- Depending on the rating you could save money on your energy bill and help the environment.
- There is a wide selection of energy efficient appliances available and often they cost no more than their less efficient competitors.

Why?

- Energy labelling of appliances helps you to make a more informed choice when buying an appliance

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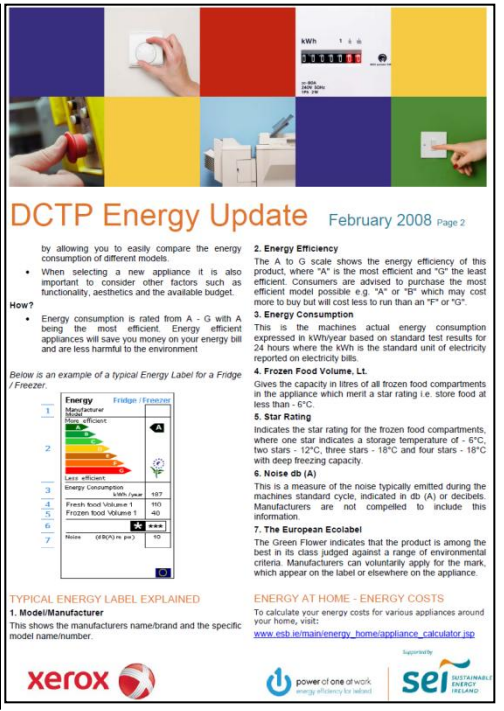

DCTP Energy Update

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by allowing you to easily compare the energy consumption of different models.

- When selecting a new appliance it is also important to consider other factors such as functionality, aesthetics and the available budget.

How?

- Energy consumption is rated from A - G with A being the most efficient. Energy efficient appliances will save you money on your energy bill and are less harmful to the environment

Below is an example of a typical Energy Label for a Fridge / Freezer.

TYPICAL ENERGY LABEL EXPLAINED

1. Model/Manufacturer

This shows the manufacturers name/brand and the specific model name/number.

2. Energy Efficiency

The A to G scale shows the energy efficiency of this product, where "A" is the most efficient and "G" the least efficient. Consumers are advised to purchase the most efficient model possible e.g. "A" or "B" which may cost more to buy but will cost less to run than an "F" or "G".

3. Energy Consumption

This is the machines actual energy consumption expressed in kWh/year based on standard test results for 24 hours where the kWh is the standard unit of electricity reported on electricity bills.

4. Frozen Food Volume, Lt.

Gives the capacity in litres of all frozen food compartments in the appliance which merit a star rating i.e. store food at less than - 6°C.

5. Star Rating

Indicates the star rating for the frozen food compartments, where one star indicates a storage temperature of - 6°C, two stars - 12°C, three stars - 18°C and four stars - 18°C with deep freezing capacity.

6. Noise db (A)

This is a measure of the noise typically emitted during the machines standard cycle, indicated in db (A) or decibels. Manufacturers are not compelled to include this information.

7. The European Ecolabel

The Green Flower indicates that the product is among the best in its class judged against a range of environmental criteria. Manufacturers can voluntarily apply for the mark, which appear on the label or elsewhere on the appliance.

ENERGY AT HOME - ENERGY COSTS

To calculate your energy costs for various appliances around your home, visit:

www.esb.ie/main/energy_home/appliance_calculator.jsp

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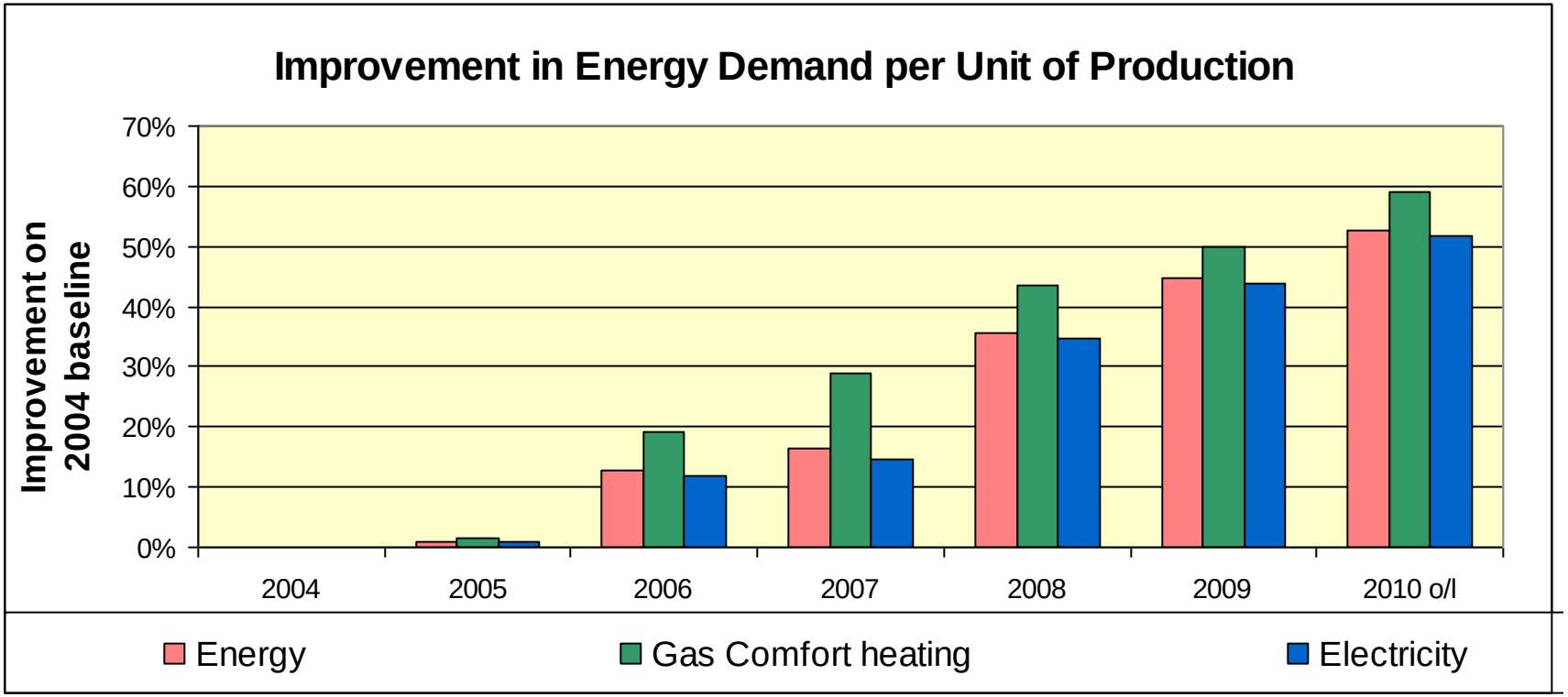
DCTP Energy demand reductions 04–10



- Reduction of 50% energy demand per unit from 2004 to 2010
  25% efficiency improvement / 25% more energy efficient product mix

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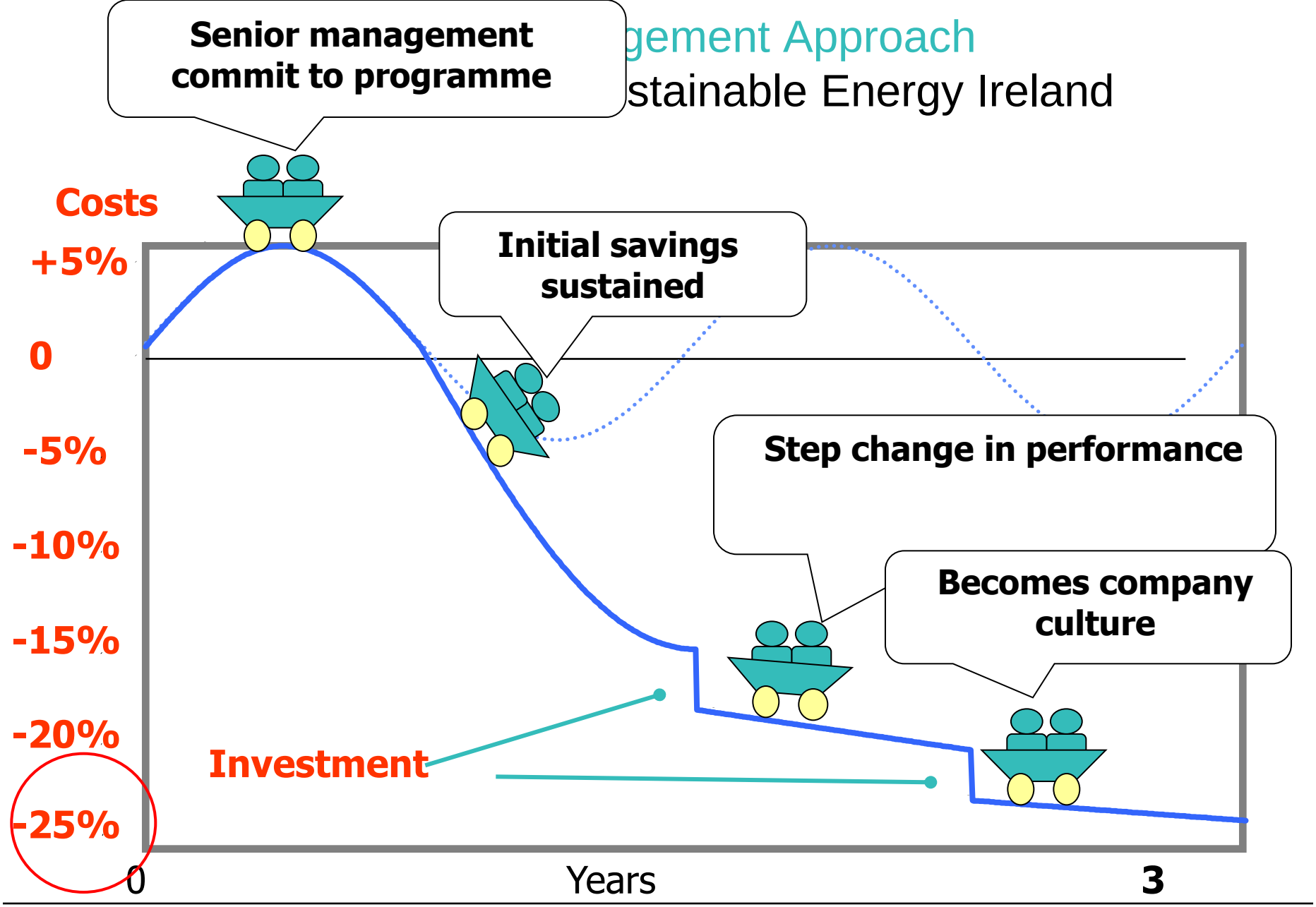
gement Approach
stainable Energy Ireland



Slide courtesy of Sustainable Energy Ireland

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The Broader Picture

Sustainability in our Community

- Among the first of 10 organisations to be certified to IS393/EN16001
- Participated in SEI Agreements workshops
  - development of technical guides
  - technical workshops
- Actively support local SEI sustainability initiative, Dundalk 2020
  - Workshops & info sharing
  - Employee training (Domestic)
  - Community Projects – Phone app
  - Logistics pooling (Warehouse & Transport)
- Founder members of I2E2 and project champion for research into compressed air efficiency

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Dundalk

The I2E2 Centre

Innovation for Ireland's Energy Efficiency

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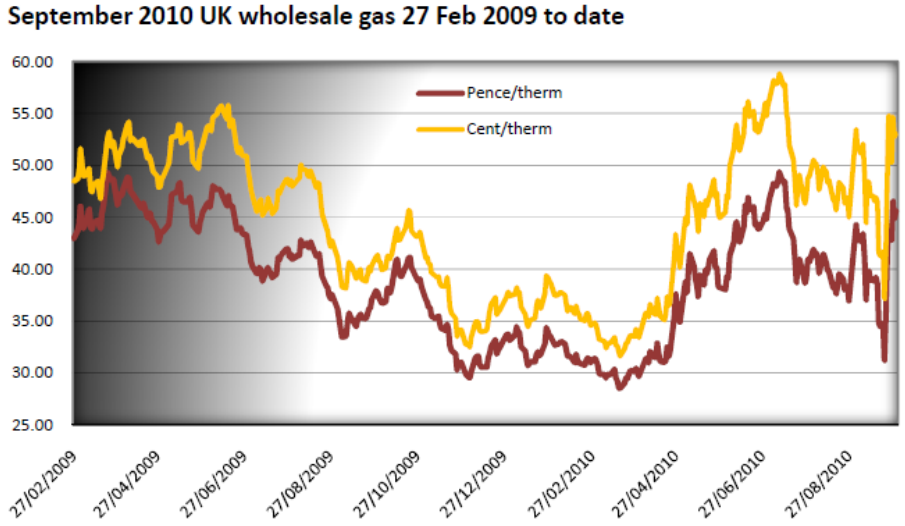
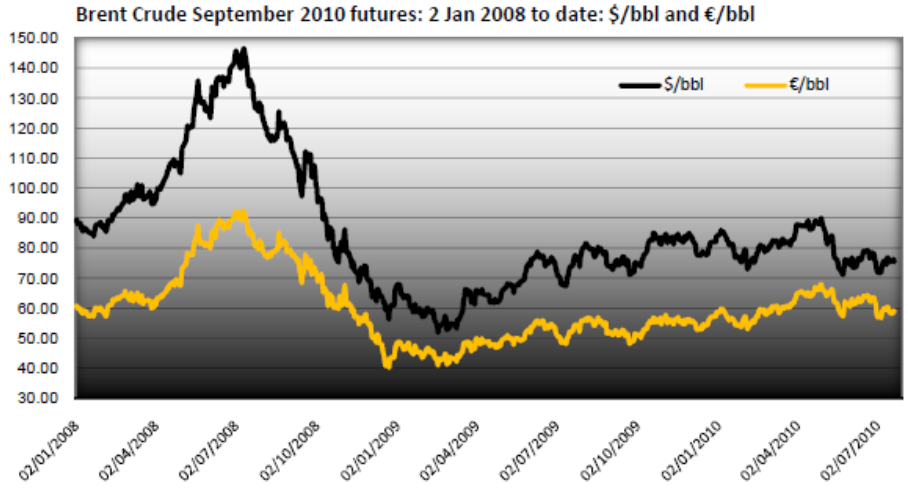
The Broader Picture - Price





- Price management
  - Early adopters of Pool-Pass-Through
  - Enabled load-shifting to utilise night rates.
  - Flex pricing- hedging fuel component of power generation
  - Active participation in WPDRS scheme
- Price concerns
  - Within corporation energy price comparisons are not favourable. Disadvantaged to US / EU sister plants.
  - Irelands dependence on Natural gas, price can be very volatile
  - Spark Spreads, PSO and other issues highlighted by earlier speakers

Current Market Conditions

- Weak Global Economy
- Volatile Currencies
- Volatile energy market
- Ireland perceived as high cost location
  - Freight costs
  - Labour costs
  - Energy Costs
  - High regulatory burden

- Essential that this plant be benchmark to maintain competitiveness

Summary of our Energy story

- 5 year journey
- Sustained effort by Engineering team
- High degree of collaboration with SEI and industry peers
- Delivered 25% energy efficiency
- Improved control on price
- Recognised as benchmark

- Rewarded with additional new products this year

- A Great team effort

Questions