



PAPER TECHNOLOGY

VOLUME 56
NUMBER 5
NOVEMBER/DECEMBER 2014

THE OFFICIAL JOURNAL OF THE PAPER INDUSTRY TECHNICAL ASSOCIATION



Arjan Geveke of BIS introducing the 2050 Roadmap Project

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PITA Energy Event

Daven Chamberlain
PITA Publications Editor



PITA Energy Event

At the first Senior Managers' meeting held at SAICA Partington Mill in July, Energy was universally stated to be the number one priority by all participants. With that in mind, and with the impending publication of the BIS/DECC Roadmap 2050 Project, PITA organised an event to cover this hot topic. Held at the premises of Fuchs Lubricants, in Stoke-on-Trent, on November 6th, over 40 people packed the small auditorium to hear ten presentations on the Roadmap; Energy Market; and a 'Toolbox' of ideas to reduce energy consumption. Thanks go to all the speakers; to the audience; and to Tim Klemz (**Compact Engineering**) who acted as compere throughout the proceedings. What follows is a series of short summaries, most produced by the speakers themselves, to highlight the essential messages. Next year we hope to cover some of them in slightly greater depth.

SESSION ONE – The 2050 Roadmap Project

Introduction to the Roadmap 2050 Project (Arjan Geveke – BIS)

The Roadmap Project has been developed to combine work already ongoing in the fields of Energy Intensive Industries and on Heat and Decarbonisation into a single set of projects aimed at eight specific industry sectors: cement; ceramics; chemicals; food and drink; glass; iron and steel; oil refining; and pulp and paper. It is funded mainly by DECC, but most manpower has been provided by BIS.



The objectives include: development of a database that can be used to improve modelling of energy use and carbon emissions for a '2050 calculator'; to provide a shared evidence base between Government and industry; to understand the decision-making context used by industry for investment; and ultimately to agree upon policy measures needed both to reduce emissions and to allow industry to remain competitive.

The specific outputs include: development of several modelled pathways for decarbonising each sector (by Parsons Brinkerhoff and DNVGL); an overview of the business environment; and to build policy action plans for industry, Government and others.

Work on Paper & Pulp started in December 2013 – this was one of the first sectors to be analysed. After the full report is finalised early next year, the analysis and policy conclusions will be made ready for the post-election Spending Review. It is felt that if both departments make the same case, the report will have a stronger chance of making headway with the newly appointed Government.

Outputs & Feedback

(Paul Noble – Parsons Brinkerhoff & Ulrika Wising – DNVGL)

The Climate Change Act established a legally binding target to reduce the UK's greenhouse gas (GHG) emissions by at least 80% by 2050 relative to 1990 levels. The Department of Energy and Climate Change (DECC) 2011 Carbon Plan outlined how the UK would achieve decarbonisation to make the transition to a low-carbon economy. A key challenge is to achieve decarbonisation while maintaining energy security and minimising negative economic impacts and costs to business and consumers.



As part of a project consortium DNV GL and Parsons Brinkerhoff have carried out a series of investigative workshops across eight industry sectors, including Pulp and Paper, as part of a UK Government project to develop Industrial Decarbonisation Roadmaps to support the UK's 2050 emissions decarbonisation goals.

These workshops have explored the technical options and breakthrough technologies needed for this transition, as well as the social and business barriers and enablers to achieving the reduction targets. The workshops, attended by CPI, senior executives and sector experts, have included discussions on future scenarios for the sector, drawing conclusions and helping inform a set of high level potential actions to be undertaken by industry, Government and other stakeholders.

The project is nearing completion and the final reports will be published by end of March 2015.

The Industry Point of View (David Morgan – CPI)

From the start of the project, CPI welcomed the chance to become involved in a detailed



Government-backed, consultant-led study into how our industry might realistically reduce its carbon emissions out to 2050. The political environment – both in the UK and the EU – is such that successfully reducing carbon emissions will be a major requirement for all manufacturing industries if they are to survive and prosper into the next few decades. The preliminary results of the Roadmap project for our sector are very interesting – details of the pathways constructed under each economic scenario are fascinating and many offer a chance of significantly reducing sector carbon emissions. However, the key outputs for CPI are related not to the detail of the report, but to the identification of barriers to remove and new policies to be put in place to enable the sector to remain competitive and also to deliver carbon reductions in the medium to long term. Key questions have already been identified – one being about biomass – will it always be treated as carbon-neutral, what is its availability, how sustainable are different types of biomass? We also see that while Government believes a pay-

back of 5-6 years is acceptable for a carbon-reduction project, industry requires much shorter payback periods for non-strategic investments – how do we close this gap? Most importantly, Government needs to set a realistic framework to deliver internationally competitive energy prices within which the paper industry can operate. Once we have a final draft copy of the Roadmap we will share with the sector for comments so our views will be fully represented in the final report.

SESSION TWO – The Energy Market

**Current Overview & Future Drivers
(William Oliver – EIC)**

There are many challenges facing the UK energy market. As a result, energy intensive users are facing new and more complex challenges. Ageing generating assets, diminishing indigenous resources and ever changing legislation, to help achieve targets for decarbonisation and renewable energy use, have driven demand for greater investment, more engagement with energy users and increased exposure to global market drivers. For major energy users headaches include growing costs and more complicated legislation with which to comply.



The breakdown of costs, particularly for electricity, is changing, with a greater proportion of non-commodity elements making up the total bill. This shift is being driven by both low and stable commodity costs and increasing non-commodity costs relating to new taxes and charges. These have been implemented to subsidise the changing energy mix and recover costs for investment in the transmission and distribution networks.

The commodity element is not becoming any less significant either. This means end users who will benefit the most will have to adopt a strategy to get the best procurement and non-commodity cost strategy.

Utilitywise plc has grown organically, through strategic acquisition of specialist companies since establishing in 2006. It is now in a position to offer a Strategic Utility Management approach to its client base with a host of holistic and turnkey solutions. To survive in a competitive marketplace energy intensive users need to be seeking the best solutions available to minimise costs and take advantage of the opportunities afforded them. At Utilitywise we support clients to better Procure, Monitor, Manage and Reduce their energy and water usage. The effective application of this approach changes energy from being a potential risk into a strategic asset.

**Utilities and Energy Management
(Mick Hamilton / Matt Dracup – Cofely Ltd)**

[Part of this presentation covered similar ground to the previous one – Cofely cover some of the same services offered by EIC. This material is not summarised below.]

Cofely offer ‘energy efficiency’ services for both Energy Users and Generators. They can cover a whole gamut of operations, including: compressed air; electricity optimisation; steam/(hot water); lighting; HVAC;



VSDs; Production Processes; CHP; Biomass; Effluent; Wind; Solar; and Hydro.

As regards paper mill opportunities, Figure 1 shows some typical carbon emissions from paper production processes. The drier section is shown to be a major lever upon which to focus; typically this could involve maintenance of a ‘tight’ system by minimising air infiltration, heat recovery and close hood moisture control. For compressed air systems, leak detection and repair, system pressure optimisation and multiple compressor controls and VSDs to match demand might be specified.

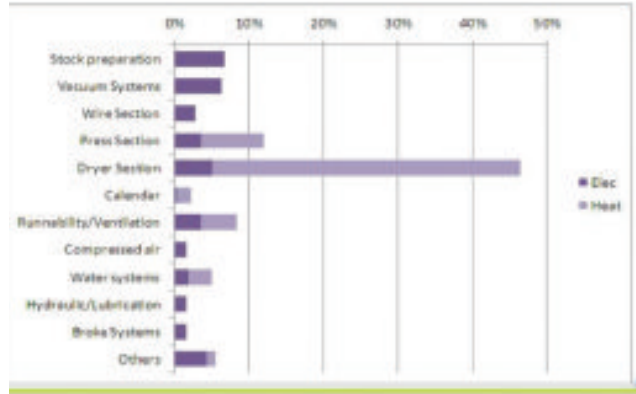


Figure 1: Carbon emissions from various processes in a typical paper mill

Among the variety of case studies presented were two relating to the Paper Industry. In the first, steam injection from one boiler to a stand-by unit was used to displace gas use and to maintain temperature and pressure for back-up heating capacity – the annual reduction of 1.7GWh of energy resulted in a saving of £29k per annum, with a payback of 1.7 years. In the second, an aged fixed speed compressor was replaced with a new high efficiency 75kWVSD compressor to match air demand – the annual energy saving of 186MWh resulted in a saving of £12.5k with a payback of 3.6 years.

**The Role of Biomass
(Steve Freeman – CPI)**

The UK government is tied to the 2008 Climate Change Act which commits the country to an 80% energy reduction (relative to a 1990 baseline) by 2050. As part of this, the renewable energy target is 20% by 2020, moving to 27% by 2030. Biomass is seen as one of the main levers as regards large-scale renewable energy production.



Biomass encompasses a wide variety of materials, from so-called ‘energy crops’ to agricultural waste; process waste; recovered paper and board; waste wood; forest residues; and specially derived materials such as wood pellets, and Refuse Derived Fuels (RDF) and Solid Recovered Fuels (SRF), the last two of which contain significant biomass but may or may not be classed as true ‘biomass’ by some authorities. In addition, some of these materials are currently already directed elsewhere – for example to animal feed, soil conditioning, or in the case of paper and board, about 80% of the UK industry already uses it as a raw material feedstock. Similarly, waste wood is a common feedstock for wood panel manufacture.

As long as biomass contains ‘biogenic carbon’, it is classed as ‘zero carbon’ for EUTS purposes, but for how long will this definition remain? Also, how is the biomass to be utilised: in an

old, low efficiency coal-fired power station, or a new, high efficiency specially designed biomass units. (All paper mills in the UK that are utilising biomass have installed new equipment.)

Finally, it is estimated there is a large amount of potential biomass in forests that is underutilised. However, should an unmanaged forest be converted to a managed forest, the changing carbon balance needs to be accounted for. For instance, in an ‘unmanaged’ forest, residues are classed as ‘zero carbon’ on the basis that material cut down regrows, over a long timescale. However, in managed forest the timescale is different, as, potentially, are the species harvested, and the ‘zero carbon’ assumption becomes more questionable.

Overall, the ‘biomass’ question is much more complicated than is often considered.

Energy Savings Opportunities Scheme (ESOS)
(Andy Hannah – NIFES)

Large UK Enterprises will by now have received notification of the legal requirement to comply with a new piece of legislation from next year...ESOS (The



Energy Savings Opportunity Scheme). This introduces mandatory energy audits to the UK for the first time, and has been launched as the UK’s vehicle to satisfy The EU Energy Efficiency Directive (Article 8).

Large enterprises, and groups containing one, must satisfy the requirement or pay fines much larger than the cost of compliance. The main routes to compliance are to conduct an ESOS Audit or hold ISO 50001 certification. The compliance deadline is 5 December 2015, and almost 10,000 organisations must gain compliance by then. Furthermore, a qualified and registered Lead Assessor must sign-off the Audit, which should cover buildings, industrial processes and transport.

NIFES is helping organisations understand what the new legislation will mean for them by offering a free ESOS Scoping Review, and also guidance on the potential implications of the alternative routes to compliance. NIFES believes that an ESOS audit conducted with care and diligence by a Lead Assessor with the appropriate skills can deliver real benefits for organisations in planning their energy and cost reduction trajectory. So rather than being viewed as an additional burden, participants should focus on how to get the best out of the scheme and stimulate the maximum savings. Acting quickly to ensure the availability of the best auditors for your business is a key element of realising a positive result from ESOS.

More information can be obtained from the ESOS information hub (www.esos.uk.com), or www.nifes.co.uk, or directly from Andy Hannah on andy.hannah@nifes.co.uk.



SESSION THREE – Toolbox to Reduce Consumption

Electricity from Steam Pressure Reduction
(Edward Kennedy-George – Heliex Power Ltd)

[The technology behind the Heliex Screw Steam Expander was described in Paper Technology, June 2013, pp.14-16. This background will be taken as read; only new applications and installations are discussed below.]

The Heliex system is designed to work primarily in parallel with pressure reduction stations, but it can also work with biomass boiler



systems, potentially putting them in the region of CHP RHI tariffs, and also with waste heat recovery boilers in industrial flue stacks etc, to raise steam from waste heat sources.

A direct example of how the machinery could operate in the Paper Industry is shown in Figure 2. The unit would take around 90% of the steam flow, allowing the remaining 10% to pass through the pressure reduction valve, so exercising the PRV. (The Heliex equipment involves moving parts that, periodically, need to be maintained. Failure to maintain the PRV in this way will almost certainly result in a stuck valve.) The estimated revenue increase shown is around £50k per annum; the payback in this instance was just under 3 years.

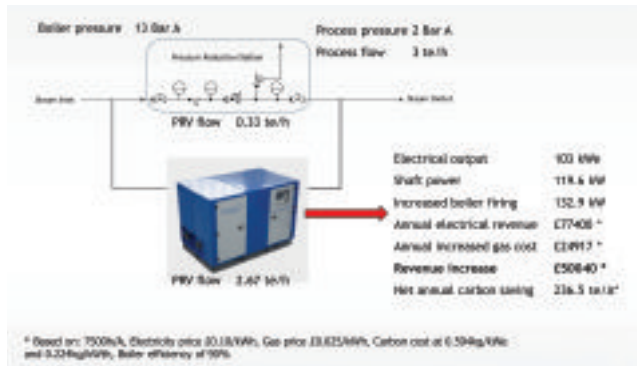


Figure 2: Example of using the Heliex Steam Screw Expander in the Paper Industry

The proposition from Heliex Power is increased site efficiency using robust technology which any maintenance staff operating in a paper mill will be able to understand and work. The technology is not subject to subsidy, but is proven to work in markets driven by increasing energy cost, mandatory efficiency improvements and carbon reduction.

The Role of Lubrication Technology in Improving Energy Efficiency

(Dr Chris Bibby – Fuchs Lubricants Ltd)

With a great deal of emphasis on reducing emissions and energy use in the paper industry, the importance of informed lubricant selection has never been greater. New lubricant developments using both novel additive



systems and non-conventional base oil types can both play a part in reduction of energy use, because synthetic base fluids show a considerable reduction in friction coefficients compared to mineral oil.

Use of special synthetics such as Polyalphaolefin (PAO) / Synthetic Hydrocarbons (SHC), Polyglycol (PAG) and Ester – including esters from renewable plant sources – can add further efficiencies and energy reduction. For example, the following levels of saving have been reported with synthetic base fluids:

• Gearboxes		
▪ Worm Drives	12-30%	
▪ Spur Drives	1-5%	
• Hydraulics	1-3%	
• Compressors	2-7%	
• Bearings	1-5%	

With energy costs at over 96% of the total running cost of an item of machinery compared to 3.9% for maintenance and only 0.08% for lubrication, the incremental increase in lubricant cost incurred by changing to an energy efficient lubricant is more than compensated for by the reduction in energy costs. (See *Paper Technology*, February 2014, pp.13-14)

It should also be emphasised that the benefits of these types of fluid are not confined to reduced energy use. We also see:

- Lower wear rates – extended unit life.
- Synthetics have higher thermal and oxidation resistance - extended oil drain periods
- Lower sump temperatures – particularly in stressed gear applications, typically 5 – 7°C lower gear lubricant temperatures, leading to further extension of lubricant life
- Reduced lubricant volumes

- Reduced waste disposal
- Reduced labour
- Environmental savings

As stated at the beginning, the importance of informed lubricant selection has never been greater.

A Common Sense Approach to Reducing Pulping Energy (Frank Doornaert – Adesko Pulp & Paper NV)

Part of the Adesko business, started in 2001, involves refurbishing of pulper rotors, sorters and dewatering and transport screws. In each case this involves cleaning them, removing the old hard facing and resurfacing with a new wear resistant layer. For optimum results this requires the use of top grade of hard-facing – Tungsten Carbide – which is married to the underlying metal using a three-powder system which incorporates a ductile interface layer. Prior to this, the whole of the previous hard-facing must be removed – applying a new hard-facing layer directly to the old is the cheaper way of doing the refurbishment job, but leads to a very poor, unstable result that is liable to break down sooner.



Focussing just on rotors, the firm has seen a multitude of different designs by a host of major manufacturers, all of which have one thing in common – they are all different – there does not appear to be a consistent rotor design. Having seen so many different designs, and in particular the wear characteristics, Adesko has developed a series of pulper rotors which they claim simultaneously reduce energy usage and wear more slowly. Called *EKO-Geometry*®, the design creates a stronger vortex, which increases fibre-fibre attrition and breaks down pulp sooner, while withstanding wear better. This range is due to be released in early 2015.

Exhibition & Conference Reports

RICOH OPEN DAY October

Ricoh, the giant Japanese hi-tech conglomerate, opened the doors of their European headquarters in Telford, Shropshire, to a group of interested paper specialists - just ahead of the official launch of their ‘Customer Experience Centre’ in November. The site employs close on 700 people, and is the only European HQ for a top digital press manufacturer to be sited in the UK. Furthermore, the new Experience Centre will allow customers to trial larger quantities of paper, on all the new presses, than has hitherto been possible - before the ‘limit’ was around 2500 sheets per test run.

Ricoh have also been working with a large number of paper providers to verify performance of products on their presses. Samples on display, for the opening of the centre, came from **Arjowiggins**, **Celloglas**, **Favini**, **Gmund** and **Iggesund** to name but a few. Interestingly, they claim packaging board is of particular interest to them.

As regards presses, Ricoh were fairly late in reaching the market - they only entered the office sector in 2009, and now claim to be the number one in the market, having overtaken **Xerox**, **Konica Minolta** and all the other competition. Now they are looking to enter the high volume digital production print market, which currently is dominated by **Konica Minolta**, **HP (Indigo)**, **Xerox (IGen)** and **Kodak (Nexpress)**. We saw the *C9100* being set up in the ‘Experience’ hall - this model is what Ricoh hope will be their ‘IGen Killer’. It is a web-fed inkjet system that can print on any standard ‘offset’ substrate thanks to a ‘conditioning’ unit that is used to flood the surface of the web with a water-based primer prior to it meeting the inkjet heads. The primer is dried, then the first side is printed and dried by hot air, before the process is repeated on the second surface. Currently it can duplex at 130ppm A4, with a registration front-to-back of 300µm, and accepts substrates up to 400gsm (nominal - since it is actually caliper that is the limiting factor). They are aiming in particular at the book-on-demand print sector.

Also on show was the *C7100* toner-based system, a veritable tortoise at only 80-90ppm, capable of handling substrates up to 360gsm, and printing either with 5 colours (the fifth being white), or 4 colours and a pigment-free toner to give a ‘spot gloss’ effect.