SusTem
Sustainable Thermal Energy management Network

Report: SusTEM 2015 Industrial Forum

1 Introduction 2

2 Agenda and format 2

2.1 Format 2

2.2 Agenda 3

2.3 Attendance 4

3 Keynote talks 5

3.1 "Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050" - Dr Arjan Geveke 5

3.1.1 Speaker Profile 5

3.1.2 Content 5

3.2 "The Energy Transition and Your Business" - Dr Garry Felgate 5

3.2.1 Speaker Profile 5

3.2.2 Content 5

3.3 "The Future of Industrial Parks" - Dr Stan Higgins 6

3.3.1 Speaker Profile 6

3.3.2 Content 6

4 Discussion sessions 6

4.1 Theme 1: barriers to application of new technology in industry. 6

4.2 Theme 2: industry "wish list" - views on research for a 5 year agenda 7

5 Questionnaire results 9

6 Discussion 15

1 Introduction

Increased efficiency in our use of thermal energy is a governmental priority and a focus for researchers. The importance of private sector involvement in any solution to climate change was stressed by Jim Yong Kim, the President of the World Bank at WEF last year. In 2014 he urged companies to seize the opportunity: "*there is a lot of money to be made in building the technologies and bending the arc of climate change*". There is a strong business case for investing in efficiency; the Carbon Trust's business guide in 2013 stated "*A 20% cut in energy costs represents the same bottom line benefit as a 5% increase in sales in many businesses*". This year, at the World Economic Forum (WEF), shaping a global sustainable development agenda was a core part of the climate change sessions. This agenda requires collaboration between all stakeholders.

Several efficiency improvement possibilities now exist but there are many issues that prevent businesses from exploiting them. Such issues maybe associated directly with acquiring and installing technology or indirectly with the feasibility of implementation, affected by criteria such as availability of consumers and security of demand for any recovered heat.

With support from the UK Research Councils, the Sustainable Thermal Energy Management network held a one day industrial forum, focussing on thermal energy and the industrial environment. The forum was attended by a varied range of organisations interested in implementing leading-edge technology & practices and planning the route to an economically and environmentally sustainable industrial environment towards 2020 and beyond.

The SusTEM forum intended to provide industry with the opportunity to affect research agenda in the medium term in order to align research outputs with industry needs and to voice opinions about the factors affecting the business environment, including government policy.

The forum was held on the 9 of July 2015, at the Marriott Hotel in Newcastle upon Tyne immediately following the 2-day SusTEM2015 International Academic Conference in the same location. Documents associated with both events are available on the network's website at http://research.ncl.ac.uk/sustem/events/sustem2015industrialforum/ & http://research.ncl.ac.uk/sustem/sustem2015conference/.

2 Agenda and format

2.1 Format

The forum was facilitated by Flint Consulting and "Poll Everywhere", an online polling software accessible through https://pollev.com/ was used to capture input from the delegates. All delegates had access to an electronic device (smart phone, tablet, or laptop) which connected to the polling software and allowed them to provide feedback.

Two main discussion sessions took place during the day with specified themes, described later in this report. Attendees formed groups of about eight and held discussions on individual tables. This was followed by full group discussions and feedback session. There was also two questionnaire sessions during the day and keynote lectures. The keynote talks also generated active discussions following Q&A. A networking session supported by posters from researchers and industrial organisations finished the day.

2.2 Agenda

Time	Event
09:30 – 10:00	Arrival & Registration
10:00 – 10:10	Welcome Address by Professor Tony Roskilly, Director of the Sir Joseph Swan Centre for Energy Research, Newcastle University.
10:10 – 10:30	Keynote "Heat integration across industrial parks" by Dr Stan Higgins, CEO, North East Process Industries Cluster
10:30 – 10:45	Q&A and follow on discussion
Coffee break	
11:00-11:30	Introduction to technology
11:30-12:15	Cancelled - Keynote "The Energy Transition and Your Business" by Dr Garry Felgate, Communications Director, Association for the Conservation of Energy New agenda item - Discussion session: Theme 1
Lunch	
1:30- 2:00	Keynote "Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050" by Dr Arjan Geveke, Assistant Director of Energy Policy, BIS.
2:00-2:15	Q&A and follow on discussion
Coffee break	
2:30-3:00	Questionnaire session
3:05-3:20	Closing by Professor Tony Roskilly
3:20-4:00	*Networking & posters*

2.3 Attendance

Tony Alderson, PBWorld.	Paul Laidler, Natural Technology Developments Limited.
Chris Bayliss, Econotherm.	Nick Lee , ConocoPhilips.
John Cloughley, E4 Structures Ltd.	Arthur Leroux, Enogia.
Shirley Coleman, ISRU Newcastle University.	Roger Mallinson, DRD Power Ltd.
Lucy Davies, Pera Management Services.	Marc Ottolini, International Innovation Technologies Ltd.
Garry Felgate, UKACE.	Benoit Paillette, Enogia.
Mike Fielden, TTI Group Ltd .	Keerthi Rajendran, Swan Centre.
Steve Freeman, Conderation of Paper Industries.	Tony Roskilly, Swan Centre.
Arjan Geveke, BIS.	Tim Scott, SR Technology Innovations Ltd.
Philip Geyer, KU Leuven.	Richard Simmons, Purdue University.
Dave Gorringe, Corporate Risk Associates.	Andrew Smallbone, Swan Centre.
Andrew Griffiths, Nestle.	David Somervell, University of Edinburgh.
Andrea Gysin, Enzen Global Limited.	Danielle Turton, Siemens PLC.
Stuart Hallett , Arup.	Murthy Vallishree, British Glass Manufacturers' Confederation.
Terry Hawksby , NetThings Ltd.	Javier Vera Sorroche, Smithers Rapra.
Stan Higgins, NEPIC.	Geoff Wallman, Swan Centre.
Sean Jobling, Newcastle University.	Robin Wardle, Swan Centre.
Suzanne Johnston, Smithers Rapra.	Peter Wilkinson, Energy Data Management Ltd.
Jayshree Johnstone, Newcastle University.	Warren Yabsley, Enzen Global Limited.
Adil Kuzhi Kandathil , Heatcatcher Ltd.	
Dirk Kok, University of Sunderland .	
Krishna Kokkonda, Enzen Global Limited.	

3 Keynote talks

The keynote talks stimulated active and valuable discussion during the Q & A sessions and a decision was made to extend the time allocated to support this. The time allocated for the event and break times was initially affected, however as one of the keynote sessions was cancelled the event ran along the same schedule. The slides from all planned keynotes are available at http://research.ncl.ac.uk/sustem/events/sustem2015industrialforum/.

3.1 "Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050" - Dr Arjan Geveke

3.1.1 Speaker Profile

Dr Arjan Geveke is Assistant Director of Energy Policy, Department of Business, Innovation & Skills (BIS). Arjan analyses and influences policy to ensure effectiveness and minimise cost on business. He leads on BIS input to Whitehall policy-making on topics such a electricity market reform, energy market competition, security of supply and policy impact on large energy intensive industries.

Previously Arjan has worked as a Senior Policy Analyst for government, with Compliance Management Consultancies and the European Institute of Public Administration.

He also works on promoting business opportunities provided by the transition to a low carbon economy.

3.1.2 Content

Description of joint BIS-DECC project to assess how the eight most heat-intensive UK industries could reduce their greenhouse gas emissions and increase their energy efficiency while remaining competitive up to 2050 and the latest Government thinking on how to follow up the conclusions of the project.

3.2 "The Energy Transition and Your Business" - Dr Garry Felgate

3.2.1 Speaker Profile

Dr Garry Felgate is Communications Director, Association for the Conservation of Energy (UKACE).

Garry leads on all stakeholder engagement and external communications for the ACE. He is a highly respected figure with extensive experience in the energy, energy efficiency and low carbon sectors and has been widely quoted in UK media.

Garry was a Director of the Carbon Trust where he led the Action Energy and Carbon Management programmes focusing on energy efficiency solutions and he was Chief Executive of the Energy Retail Association, which represented the big six energy supply companies in Britain where he participated in the development work of the supplier obligation for smart meters, the development of the Green Deal and the Energy Company Obligation. He is a building engineer by background with his PhD being passive heating for homes. Garry is a Fellow of the Energy Institute and the RSA.

3.2.2 Content

The keynote talk did not take place but the intended presentation is available at the link provided above. The planned presentation introduced the infrastructure needs associated with demand

reduction. Forecasts under a number of different scenarios are presented including the National Grid and the Gone Green scenario.

3.3 "The Future of Industrial Parks" - Dr Stan Higgins

3.3.1 Speaker Profile

Dr Stan Higgins is CEO of the North East Process Industries Cluster (NEPIC). As well as leading the Cluster team Stan has had wide technical and management experience in commodity, specialty and fine chemicals, as well as pharmaceutical primary manufacture. He has international business experience having managed sites and businesses around the world and has held national positions that support the sector's collaborative R&D and Innovation activities. Stan regularly represents the sector to regional, national and international politicians and other stakeholders.

3.3.2 Content

The talk introduced the North East area and its geographical importance. The objectives of the LOCIMAP study (www.locimap.com), a European wide FP& funded study led by NEPIC were introduced in detail and findings were presented. The consortia led by NEPIC identified 10 principles for a Lower Carbon Industrial Future, identified barriers and also developed tools to enable the benchmarking of industrial park performance.

4 Discussion sessions

The sessions started with a brief introduction followed by separate discussion in groups of about eight. A full-group discussion to consolidate and share contributions from the smaller group discussions followed this. As mentioned previously, all attendees had access to a device which connected to the online system, and during the full-group session, points could be submitted by attendees using the online system.

4.1 Theme 1: barriers to application of new technology in industry.

Opinions collected from the PRO-TEM 2010 industrial forum and the SusTEM visit to The Energy Event in 2014, on barriers to improving energy efficiency using new technologies were varied but revolved round some key issues:

- lack of time for considering efficiency enhancement activities / lack of R&D facilities within the organisation/ lack of information about possibilities and case studies
- uncertainty in a regulatory framework/ lack of communication between different organisations and disciplines
- costs, return on investment & payback periods which are not in line with company financial strategy/ lack of confidence in new technology & the risks associated with investment into unproven technology
- business interruption (resulting from change of practice or technology)/ lack of clear solution to production and process constraints (which may need to be individualised)/ need to implement without compromising operating practices

Relevant links:

PRO-TEM 2010 forum: http://research.ncl.ac.uk/sustem/library/pro-temindustrialforum2010/

The Energy event: http://www.theenergyevent.com/

This session followed up these points and invited new issues to be raised. This was followed by discussion session around what is currently being done to overcome problems and what future possibilities there are. The comments submitted by attendees are shown in the table below and consisted of current problems faced and needs to enable better energy management. Apart from minor grammatical corrections, the text in the table is taken verbatim from the recorded text and have been re-ordered below such that comments on similar issues have been grouped.

The resulting points put forward by each of the tables
Managing technological and economic risk is the most important; most other issues are secondary or subordinate to these
Conservative attitude
Reluctance to spend time money and take risk on new non core business projects
Short-termism in business payback time decisions
Access to funding
Lack of link between pension funds and environmental investments
Poor marketing of new technologies
Visibility and credibility and creating awareness in the market place
Lack of demand for low carbon products
Need for faster better technical developments
Education on the use new technologies
Improvement of new technology
Implement new technologies where you gain most symbiosis
Lack of focus/ lack of agencies delivering application of new technologies rather than pure research
Consistency of government policy
Lack of technically able politicians
Industry needs carrots as well as sticks
Need to incentivise technology adoption
Need for greater collaboration between groups
Collaboration without IP protection
Alignment of industry, academic and government

4.2 Theme 2: industry "wish list" - views on research for a 5 year agenda

The objective of this session is to reveal industry needs and views on what research outputs and government policy would be beneficial to facilitate improved energy efficiency and sustainable use

of energy in industry. These results can be useful for academic institutions to guide future research direction and for policy makers to understand root causes of problems and possible solutions.

Discussion points suggested:

- How is energy use being managed currently? i.e. monitoring, enhancements, problems
- What future energy related trends are anticipated? What is expected in the future in terms of energy management?
- What solutions and opportunities may exist to improve current situation in an ideal world?

As before, separate group discussions were followed by a full-group feedback session. The comments submitted by attendees are shown in the table below. Again, apart from minor grammatical corrections, the text in the table is taken verbatim from the recorded text and have been re-ordered to reflect the different themes.

The resulting points put forward by each table
Increasing the energy density of hydrocarbons
Reuse of lower value waste products
Quick wins which advance toward long term objectives
Develop potential of energy capture technologies from human activity
Energy storage potential using bio mimicry
Energy storage and distribution/integration
Micro generation and integration
Practical industrial symbiosis solutions
R&D on heating technologies
Demand side management
Re-use of wasted low grade as well as high grade heat across different sectors
Industrial CCS feed studies, demo, networks
Demo of lower TRL technologies
Small single targeted projects - aimed at solving SME solution introduction : technology validation
Question whether this is a technical or engineering challenge or if it's more of a cultural, organisational and financial issue. A way of better communicating between businesses, industry and research institutes to help develop and Implement and feed ideas. So that research reflects business needs.
Integration of broader base industrial partners in KTNs and smaller scale projects
Make it easier to collaborate and innovate
Tackle fragmentation of ideas and networks making them easier to access and contribute to
Consider regional/ smaller geographical area collaboration especially for heat sharing and district

energy networks
Industrial clustering for heat/energy - better symbiosis
Working with government and industry to develop and deliver Stable policy framework
Better symbiosis + sectoral knowledge exchange
Industry / consumer integration for renewable energy schemes
Include management techniques as well as engineering technologies
Training for engineers to enter leadership positions
Funding for large scale demonstration of technology
Sharing the profits across the supply chain
All renewables supported - financial investment and incentives
More capital investment for demonstrator projects for new energy efficiency technologies

5 Questionnaire results

The questionnaire consisted of 6 key questions influenced by the study which lead to the European Climate Foundation (ECF)'s 2050 roadmap, adapted for the UK context. Each question has a number of answer options and the questions are presented in a multiple choice format. During the questionnaire session, the questions and answer choices were displayed, one after the other on the main screen. Each user is then able to enter an "upvote" or a "downvote" for each of the options for each question. Voting was not mandatory and answers could be left "unvoted". The results of these order the answers in order of vote points. The result of each entry is updated in real time on the main screen as a live re-ordering of the answer list. This in many cases stimulated questions and discussion.

The tables below show each question, presented answers, and the votes received. The chart for each table shows the ranking of each of the answers based on the difference between upvotes and downvotes.

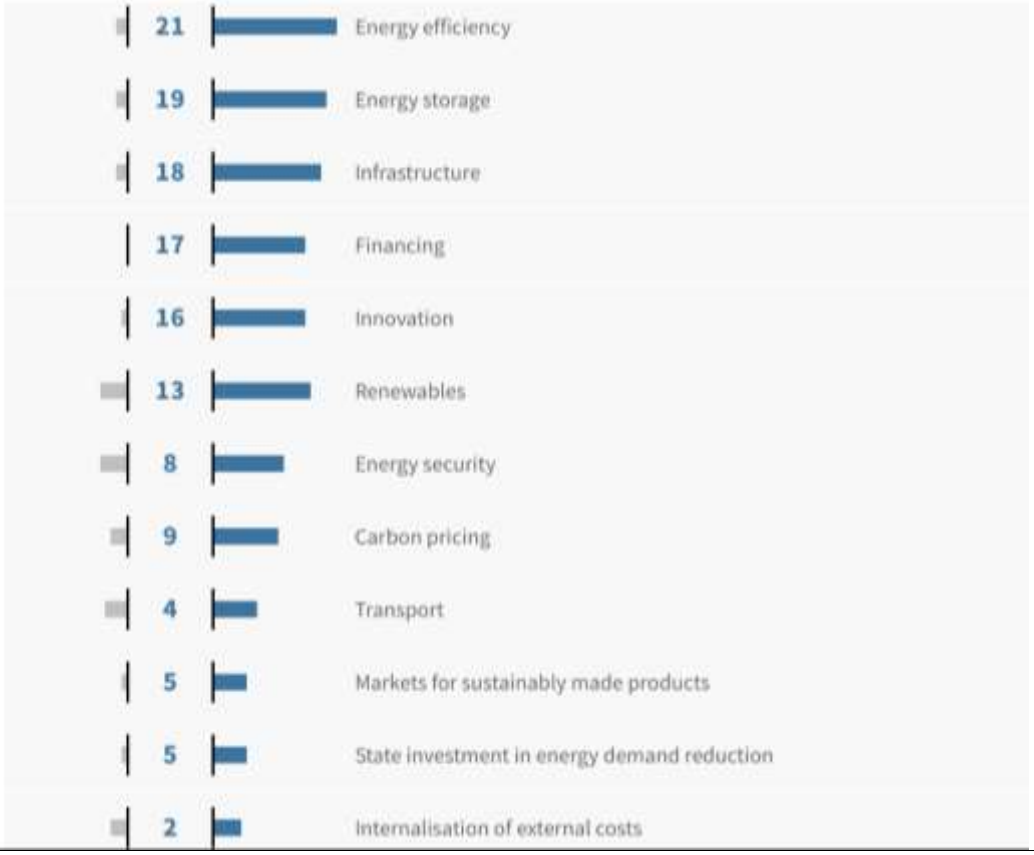
Which developments do you think are necessary for the UK as a strategic move towards decarbonised energy sector?

Answers	*Upvotes*	*Downvotes*
Energy efficiency and demand reduction	24	0
Global action on climate change	20	1
Energy storage	19	2
Renewable energy	21	4
Infrastructure development	18	2
State investment in the practical measures needed	19	3
Price of fossil fuel	13	4
Carbon capture and storage (CSS)	8	7
Nuclear energy	9	9
International standards, trade and investment frameworks	6	8

What societal challenges and opportunities are likely to occur over the next decades?

Answers	*Upvotes*	*Downvotes*
Acceptance of the need for increased energy efficiency	23	0
Increase in energy prices and energy poverty	22	1
Increased scope for decentralised power generation	21	2
Changed patterns of disruption in energy supplies	17	1
Economic and employment gains in some energy sectors and losses in others	17	3
Increased importance of high performance energy infrastructure (e.g. smart meters and grids)	17	4
Acceptance of the need for new infrastructure	14	4
Sustainable and publicly acceptable energy sources	12	5
Increased reliance on electricity	11	10

Which areas of development are mainly needed?		
Answers	*Upvotes*	*Downvotes*
Energy efficiency	23	2
Energy storage	21	2
Infrastructure	20	2
Financing	17	0
Innovation	17	1
Renewables	18	5
Carbon pricing	12	3
Energy security	13	5
State investment in energy demand reduction	6	1
Markets for sustainably made products	6	1
Transport	8	4
Internalisation of external costs	5	3



What are the most likely key drivers for the future energy mix?

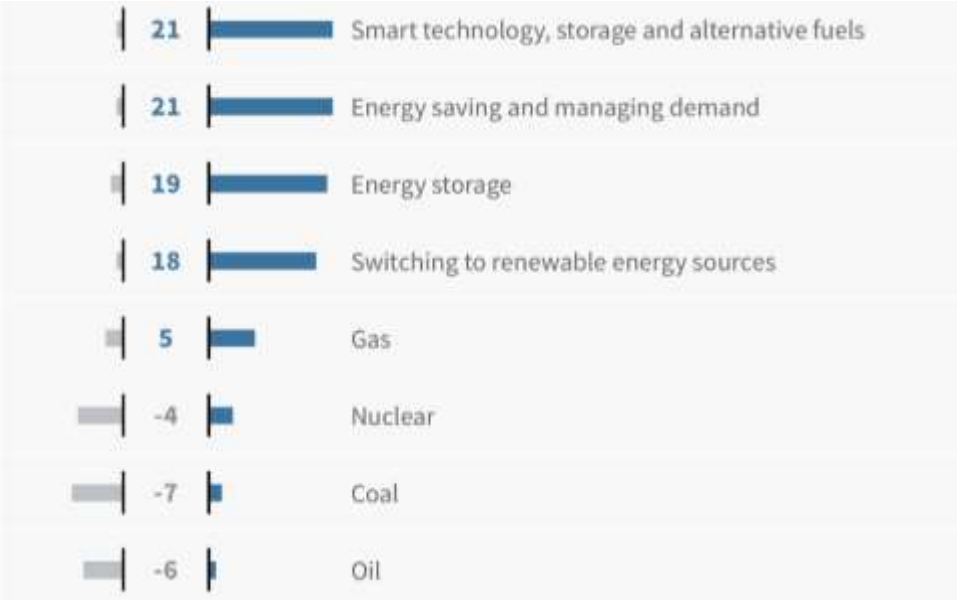
Answers	*Upvotes*	*Downvotes*
political decisions	19	0
fossil fuel prices	19	1
climate policy	18	1
long-term security of supply	13	1
public subsidy	13	2
public acceptance of new energy technologies & infrastructures	13	6
expectations about short-term security of supply	8	3
A few short sharp blackouts might do wonders	0	0
gradual integration of internal energy market	4	6

Five key factors have been identified in EU Energy Roadmap 2050 for a secure, competitive and decarbonised energy system. Which are most important to you?

Answers	*Upvotes*	*Downvotes*
Energy efficiency	23	0
Diversified supply technologies	19	0
Renewable energy sources	19	1
Nuclear energy	11	5
CCS	8	4

A few elements have been recognised as important factors in transforming the energy system. Which are most important to you?

Answers	*Upvotes*	*Downvotes*
Energy saving and managing demand	22	1
Smart technology, storage and alternative fuels	22	1
Energy storage	21	2
Switching to renewable energy sources	19	1
Gas	8	3
Nuclear	4	8
Oil	1	7
Coal	2	9



6 Discussion/ Conclusion

The discussions from the forum revealed numerous and various barriers to better energy management from technological, business and policy contexts. The discussion session on elements of a positive future view were much more unified. The comments from the discussion session and the questionnaire suggest that even though the perceived barriers are varied, there is consensus in future industrial need. Within the industrial sector, the need for support in managing business and financial risk. In a wider context the requirement for collaboration between industry, academia and government in general was raised across all discussion sessions.