



**UK US Collaborative Applied Research Discovery Workshop
Sustainable Environments and Biofuels
October 30 and 31, 2007**

Welcome to our Workshop and to UC San Diego.

I hope you find that we have collectively developed a stimulating and enjoyable program. The principle objectives of the workshop are:

- To link researchers with complementary, synergistic, and relevant expertise and research interests, especially UK and US-based researchers;
- to identify tangible collaborative applied research opportunities and potential projects where the associated researchers are motivated to work together (many of the projects are likely to be multidisciplinary);
- to begin to explore how the SETsquared initiative can assist the development of some of these projects and help secure them research funding.

Together with our session champions, we have developed four relatively structured sessions to stimulate discussion and encourage discovery. Hopefully we have also provided enough networking and breakout time to enable ad hoc interactions and a little time to enjoy San Diego.

The workshop will involve 45 academics from our six Universities, and a small number of additional invited participants.

The agenda is pretty full and we have a number of facilitators and administrators to enable its smooth running. If at anytime you would like clarity on any part of the program or help with logistics or administration please do not hesitate to contact either myself or one of my colleagues.

I would like to thank the session champions for all the work they have already put into developing the program. I look forward to meeting you all and hope that together we deliver some exciting outcomes.

Kind regards,

Paul Linden
Director, Environment and Sustainability Initiative
UC San Diego

Workshop Format

Introduction

As I am sure you are aware, the key objectives for our October workshop include:

- **Linking up researchers with complementary, synergistic and relevant expertise and research interests, especially UK and US based researchers;**
- **Identifying tangible collaborative applied research opportunities and potential projects where the associated researchers are motivated to work together, (many of the projects are likely to be multi- disciplinary);**
- **Beginning to explore how the SETsquared initiative can assist the development of some of these projects and help secure them research funding.**

This inevitably means that we will be in discovery mode for much of the workshop. In order to accelerate discovery and maximise our chances of reaching our objectives we have been working with a number of the attendees (workshop champions) to prepare the agenda and workshop structure. We are very grateful to the workshop champions who have together identified four key relevant themes within which we will develop our discussions when we meet in San Diego. Within each theme they have identified key challenges and topics for discussion

Session Format

The aim of the sessions is to promote discussion with the ultimate goal of generating applied industrially relevant research collaborations. To assist this process, a number of questions/topics have been identified for us to discuss at each session. They are set out below. The format of each session will generally follow the format below, although this may be modified on the day depending on how each session is working. We have a professional facilitator to help us with the process.

- 30 minutes introduction from the session champions (and external speakers in certain cases) (each champion speaking for no longer than 5 minutes)
- 1 hour 15 minutes of structured breakout sessions to discuss the session questions. During the breakout sessions we will split into smaller groups each at a table chaired by a session champion. During the discussions attendees will have the opportunity to move and join other tables if they wish.

Sum up: up to 45 minutes will be spent at the end of each session with session champions from each table reporting back on the discussions at their respective tables. Any emerging collaborative projects will be identified and recorded during the sum-up.

Workshop Agenda

- 29th Oct
Monday** Arrival and check in at leisure for those staying at the La Jolla Shores Hotel
- 4:10pm** **Transport from Hotel to UCSD**
- 4.30pm** Pre-event informal reception at the UCSD Faculty Club. [Directions](#)
- 5.30pm** Walk (10 minutes) from Sun God to Ed Mazria Lecture. Ed is the founder of Architecture 2030
http://www.architecture2030.org/2030_challenge/index.html
- 6.00pm** Ed Mazria Lecture
- 7.00pm** Transport from lecture to Hotel
- 7.30pm** Informal optional dinner Piatti (walking distance from hotel)
- 30th Oct
Tuesday** **Day 1 Sustainable Environment Workshop**
- 7.00am** Transport from Hotel to Weaver Centre, UCSD
- 7.30am** Breakfast at Weaver Centre
- 8.00am** **Welcome and Introductions**
- Opening welcome by Art Ellis, Vice Chancellor for Research, UC San Diego**
- Introduction to the Workshop and Introducing Each Other**
Nick Smailes and Mike Rawlins
- Why Sustainability is Important – Lisa Shaffer, Executive Director, Environment and Sustainability Initiative, UC San Diego**
- 9.00am** **Coffee**
- 9.30am** **Topic 1: Built Environment**
- US Academic Champion – Paul Linden (UCSD)**
UK Academic Champion – Bakr Bahaj (Southampton)
Invited Guest Speaker – TBC
- The Built Environment theme of the workshop will consider the development of the future generation of buildings including the development of carbon neutral or negative construction, energy efficient

systems and the design tools required to simulate and plan future construction. The theme will also consider the existing housing stock which will require significant investment and retrofitting to improve energy efficiency. This section will consider real time data requirements for effective modeling, integration of microgeneration, energy efficiency as well as the influence of urban planning on transport and society.

Questions to be discussed

Question area 1 – Sustainable Buildings: Commissioning and Technology

Question Champion: Paul Linden (UCSD)

1. **Commissioning.** Do buildings perform as designed? How will we know if they are sustainable?
 - i. What information is required to assess the energy performance of existing buildings in real time? How would we access these data and display them?
 - ii. What information is required to assess the energy performance of existing buildings in real time? How would we access these data and display them?
 - iii. Role of facilities management?
2. **Technology.** What existing and new technologies are needed to achieve sustainability?
 - i. How can we use new, quickly evolving technologies in a slowly changing environment?
 - ii. What new devices are needed?
 - iii. Effects of intelligent control?

Question area 2 – Energy Supply and Demand

Question Champion: TBC

3. **Supply.** How can we use buildings to generate energy, store water?
 - i. What is the potential for solar/wind energy
 - ii. How can we produce an energy-generating building?
4. **Demand.** How can we reduce energy and water consumption?
 - i. What low-energy systems need to be developed?
 - ii. What is the role of new materials?

Question area 3 – Modeling Sustainable cities and integration at the urban scale

Question Champion: Bakr Bahaj(Southampton)

5. **Scale.** How do we integrate the individual building into the urban scale?
 - i. What aspects of urban form play a role in sustainable design?

- ii. What is the link between different building types?
 - iii. What is the link with transportation?
 - iv. Building density/green space?
6. **Modeling.** What models/tools are needed to create sustainable cities?
- i. Models for individual buildings
 - ii. Models for urban scales
 - iii. Models incorporating human and physical factors

Question area 4 – Climate change and human interaction with the built environment

Question Champion: Marialena Nikolopoulou(Bath)

7. **Climate change.** What are the implications of climate change?
- i. Which answers to the above questions are global and which are regional?
 - ii. What are the relevant time scales?
 - iii. How do buildings contribute to GHG emissions/pollution?
8. **Human behavior.** How can societal behavior be modified to achieve sustainability?
- i. What is the role of individual-building user behavior
 - ii. What is the role of work-home relationships?

12:00pm **Lunch**

1.00pm **Topic 2: Biofuels**

US Academic Champion – Scott Samuelsen (UC Irvine)

UK Academic Champion – Gary Hawley (Bath)

Invited Guest Speaker – Bryan Jenkins (UC Davis)

The Biofuels workshop theme will consider the requirement for current and future alternative fuels, their applications as well as raising issues surrounding their socio-economic impact. With regard to bio-fuels, delegates will discuss feedstock production issues, the requirements for an effective supply chain and quality definitions of the final product as well as the associated technical issues for implementation into the transportation and electric power generation sectors.

Questions to be discussed

The questions and themes are intended to provide representation of the 'value chain' in a 'Crops to Combustion' approach which reflects the expertise of the principal researchers attending this Workshop.

Question area 1 – Plant Science

Session Champions: Diane Pataki (UCI) – Rod Scott (Bath)

1. How do we match geographic locality to bio-energy production to encapsulate and optimize the entire value chain?

Question area 2 - Biochemistry

Session Champions: Wesley Hatfield (UCI) - Matt Davidson (Bath)

2. What choice and mix of pathways are required to promote desirable reactions including opportunities for multistage low energy reactions?

Question area 3 - Reactor Engineering

Session Champions: Richard Herz (UCSD) – Stan Kolaczowski (Bath)

3. What design concepts should be considered to enable the realization of compact biofuel reactors?

Question area 4 - Mechanical Engineering

Session Champions: Bob Cattolica (UCSD) – Gary Hawley (Bath)

4. What type of research will be required to assure future bio-diesel 'fuel quality,' and how does 'quality' harmonize with fuel 'standards' and environmental quality? What chemical or molecular modifications of biofuels are (i) desirable and (ii) feasible to enhance biofuel 'quality'?

Reflection & Wrap up

4pm	Close
4:15pm	Transport to hotel - optional
4 – 5pm	Workshop focus groups - optional An opportunity for collaborative project teams that are beginning to emerge to spend time further defining their project and working on initial drafts for pump priming bids.
5.30pm	Hotel : Meet in reception for transport to evening reception and dinner UCSD Campus : Meet at Weaver Centre for transport to evening reception and dinner
6.00pm	Reception and dinner Munk Lab, Scripps Institution of Oceanography, UCSD Directions
8 – 8.30pm	Transport back to Hotel
8.30pm	Reception/dinner finishes

31st Oct **Day 2 Sustainable Environment Workshop**
Wednesday

7.00am Transport from Hotel to Weaver Centre, UCSD

7.30am Breakfast at Weaver Centre

8 – 8.10 **Welcome**

Welcome back: Mike Rawlins

Set scene for Day 2

8.10am

Topic 3: Water, Climate and Air Quality

US Academic Champions: Daniel Tartakovsky (UCSD), Jay Famiglietti (UCI)

UK Champions: Steve Pedley (Surrey)

Invited Guest Speaker – Timothy Brick, Chair, Metropolitan Water District of Southern California

The Water, Climate and Air Quality theme of the workshop will consider the long term impact of climate change on water resources, current and future impact of GHG emissions on the biosphere and address how potential societal changes will impact future air quality, atmospheric chemistry and related health effects. This will include discussing the approaches to collection of data for monitoring surface and groundwater resources for their long-term protection, and the integration of in situ and remote sensor data into hydrological models for the enhanced prediction of water availability. The workshop will also investigate the potential regional impacts of extreme hydrologic events and their mitigation. Relationships between air quality and regional weather patterns will be considered in relation to possible effects of diminishing air quality on temperature and precipitation. Delegates will also consider potential impacts of greenhouse gas mitigation strategies on the global chemistry and composition of the atmosphere as well as the potential for development of mitigation strategies that go beyond the definitions within the Kyoto protocol.

Questions to be discussed

Question area 1 – Sensor technology and the Water Environment
Question Champion – Daniel Tartakovsky (UCSD)

1- Multi-sensor approaches for monitoring surface and groundwater resources:

2- Integrating in situ and remote sensor data into hydrological models for enhanced prediction of water availability

3 – Analysis of the risks and benefits of “nanotechnology” for the management of water resources

Question area 2 – Impacts of extreme hydrological events
Question Champion – Jay Famiglietti (UCI)

4- Regional impacts of global change on hydrologic extremes, including flooding and drought.

Question area 3 – Risk Communication and education – Steve Pedley (Surrey)

5 – Development of technologies for effective risk communication and education relating to water and climate change

Question area 4 – Air quality and atmospheric chemistry
Question Champion – TBC

6- What are the impacts of greenhouse gas mitigation strategies on the global chemistry and composition of the atmosphere?

7- What is the level of scientific understanding of the causes and impacts of air quality? Is it sufficient to justify more stringent policies? If not, what level of uncertainty is required for more action?

8 – What are the causes and predictability of extreme exposure levels to point and distributed sources of pollutants, individual exposure levels, their relation to monitored levels and the consequences of the differences?

11.00am

Topic 4: Transport – with a working lunch
US Academic champion – Stephen Ritchie (UCI)
UK Academic champions – Nick Lieven (Bristol), Mike McDonald (Southampton)

The Transportation theme of the workshop will consider the future development of this sector, overall environmental impact and strategies for mitigation. Within this, participants will discuss a range of interrelated topics including future vehicle development, alternative fuels, traffic management strategies, sensors, models and technologies. Other topics within the transport theme include how economic instruments (taxes, transferable permits, cordon pricing, or peak pricing schemes for example) could be used to improve air quality, and develop cost effective transportation solutions.

Questions to be discussed

Question area 1 – Intelligent Transport Strategies and their environmental impact
Question Champion – Steve Ritchie (UCI)

1. What are the strengths and limitations of integrated solutions e.g. alternative traffic detection and surveillance technologies (including vehicle, infrastructure and driver (e.g., mobile phone and e911 system in US) technologies) that are the foundation of traffic management and control strategies for improving energy consumption, emissions and reducing carbon output? Are there new sensor designs and networking approaches that offer significant benefits?
2. For evaluating the environmental impacts of alternative Intelligent Transportation Systems (ITS), telematics and traffic management strategies, what are the strengths and limitations of:
 - i. current vehicular fuel consumption and emissions models
 - ii. microscopic, mesoscopic and macroscopic traffic simulation models and their ability to incorporate the models in a) and state-of-the-art traffic control schemes?
3. What are the relative fuel, energy consumption and air quality impacts of ITS strategies e.g., improved incident detection, local vs integrated freeway ramp control, dynamic speed limits, surface street adaptive (e.g., SCOOT) vs conventional coordinated vs isolated actuated control, advanced public transportation systems, advanced commercial vehicle operations? What is the cost effectiveness of these measures?

Question area 2 – Environmental impact of major ports

Question Champion – TBC

4. What data and studies are required to adequately understand the environmental impacts (air quality) of sea-side and land-side operations of major ports (e.g., Los Angeles, Long Beach, Southampton)? What are cost-effective transportation solutions?

Question area 3 – The impact of new vehicle technologies

Question Champion – Nick Lieven (Bristol)

5. What are the current and future impacts of alternative fuel and hybrid vehicle technologies
 - i. Energy and integration in the electrical utility grid,
 - ii. economics, emissions, environmental impact, consumer demand and usage
 - iii. impact of different strategies for transitioning to the refueling infrastructure for alternative fuelled vehicles?

Question area 4 – Transportation demand and future influences

Question Champion – Mike McDonald (Southampton)

6. What determines user choice of transportation and its demand and how can we influence future transportation choices?

2pm

Coffee Break

- 2.30pm** **Priorities and next actions – Nick Smailes**
Reviewing the projects that have emerged and the opportunity to express which projects you are interested in.
- 3.45pm** **Closing Comments**
- 3.45 – 5.00** **Development of first drafts of the bids**
If people want to take the opportunity
- 6.30pm** Optional dinner, [Ocean Terrace](#) at George's, for those still in San Diego