UCL - London’s research and teaching powerhouse

- Established over 180 years ago
- First university in England to admit students of any race, class or religion, and the first to welcome women on equal terms with men
- The first in England to teach experimental science, modern European languages, Laws…
- Today - still providing excellent and relevant research and teaching to the World
So...What is UCL made of?

• 54 academic departments grouped into 8 faculties
  – Multi-disciplinary - from *Fine Art* to *Medicine*
  – Ongoing establishment of interdisciplinary centres spanning a range of subjects, e.g.
    • *London Centre for Nanotechnology*
  – Internationally-renowned centres of excellence, e.g.
    • *UCL Bartlett*
    • *UCL Institute of Child Health*
    • *UCL Institute of Ophthalmology*
World Leading ....

- UCL is ranked in joint 5th place in the QS World University Rankings 2014/15.
- UCL is the top-rated university in the UK for research strength in the new 2014 Research Excellence Framework (REF).
- Nobel Prizes have been awarded to 21 former academics and graduates. The most recent addition in October 2014 was Professor John O’Keefe in Physiology or Medicine for the discovery of cells that constitute a positioning system in the brain.
UCL Institute for Sustainable Resources
Vision: a world of globally sustainable resource use.
Mission: generate knowledge in the globally sustainable use of natural resources and train the future leaders in the field when faced with a growing global population and increased demand and competition for natural resources.

UCL Institute for Sustainable Heritage
At our community-focussed Institute, our vision is a world that engages with heritage, appreciates its value and participates fully in its protection. The communities we wish to impact through our research and teaching are heritage groups, companies and decision-makers.

UCL Energy Institute
Mission: Faced with the challenge of energy equity, security and climate change, the UCL Energy Institute aims to accelerate the transition to a globally sustainable energy system through world-class energy research, education and policy support.

UCL Institute for Environmental Design and Engineering
Vision: a world in which development is sustainable, affording social, economic, technological, cultural and aesthetic innovation, and enhancing diverse ecologies, cultures and heritage.
Impact

• **Commercialisation of research**: models being used by industry under license

• **Special projects** (Lead author for IPCC WGIII chapter, Lancet Commission, Deep Decarbonisation Pathways, COP 21)

• **Working with governments** (UCL models used by UK government (DECC), Advisory posts)
Our Global presence is significant and expanding

• **Global Impact projects** (HELIX a clear view of “future worlds” under higher levels of global warming, Met Office, Postdam, India, 9M Euro)

• **Strong International Partnerships** (BHP, EDF France, LBNL, Cisco, KOGAS)

• **Research projects** to support individual countries (Africa, Mekong Delta, Oman)

• **Visitors and visiting**
“This is the real significance of Obama’s Keystone XL veto,

• “In particular, if there’s one scientific paper that you need to consult to understand his thinking — and that of many other environmental leaders — it may be a study that just came out in Nature last month that calculates what the world must do to have “at least a 50 percent chance” of staying below a temperature rise of 2 degrees Celsius, globally averaged. That’s widely considered the threshold beyond which truly dangerous global warming kicks in.

• The paper, by Christophe McGlade and Paul Ekins of University College London, calculates that to stay under 2 degrees we can emit only about 1,100 gigatonnes of carbon dioxide (a gigatonne is 1 billion metric tons) between now and 2050. But current fossil fuel reserves, they say, imply emissions equaling three times that amount, were they all to be burned.”

These activities resulted in exceptional UK and international coverage; the story was the subject of more than 600 articles and has been one of the biggest stories of the year so far. The story also had impact beyond media coverage: a number of governing bodies got in touch, including US senators and those from the Canadian Parliament; it was discussed by UK parliamentary select committees;
The Energy Institute has since its launch in June 2009

- Bought together a highly motivated multi-disciplinary team, 53 research staff and 85 Mres/MSc.
- A current portfolio of £20m of funding.
- Established a vibrant Doctoral Training Programme currently 59 PhD students
- Made important findings which it has presented to government, other academics and stakeholders
Our Vision: A globally sustainable energy system

Strategic Focus: Systems and Demand

Aim: understand the world and help to change it.

Partnership: – long term strategic – EDF, Arup, Cisco, Hitachi, Lawrence Berkley National Laboratory,

Methods: Multi-disciplinary, observation, data collection, analysis, energy epidemiology, model development and scenarios our laboratory is the “real world”
The RCUK Centre for ENERGY EPIDEMIOLOGY: The study of energy use in the population
‘epidemiology’

$epi = upon$

$demos = people$

$ology = logic, study$

Term hijacked by the medics!

John Snow founding father of epidemiology discovered that Cholera spread via a water pump in Soho (1849 to 1854). Worked at University College

Published in The Builder, 1855:


Now titled: *Building* (building.co.uk)
Energy & Building Research

Energy Epidemiology (population)

Energy & Building Science (buildings)

Behavioural Science (people)
Energy Epidemiology: the study of energy demand in a population

the systematic study of the distributions and patterns of energy use and their causes or influences in populations. It uses statistical association to impose top-down, constraints on bottom-up thermodynamics. It deals with the whole energy system rather than its sub-systems, focuses on outcomes such as reduced delivered energy or carbon emissions rather than intermediate performance indicators. It is interdisciplinary, facilitating and illuminating enquiry from the perspectives of economics and social science as well as thermodynamics. It will support the developments of technologies, changes in behaviour and policies and is action-oriented.
The Challenge: By 2050 the UK is legally committed to an 80% GHG emission reduction by which time all buildings will need to have an emissions footprint “close to zero”, and that transport must “substantially reduce its emissions”.

The Vision: The Centre for Energy Epidemiology's (CEE) vision is to precipitate a paradigm shift in the way we understand energy demand through the development of new research methods and tools - specifically, application of epidemiological methods to large, linked data sets on energy demand across sectors, people, energy systems and infrastructure
Aims

– Undertake world leading research into energy use in buildings and transport through the analysis of novel combinations of empirical data.

– Improve the collection of empirical energy demand and related data.

– Help combine and curate relevant data sets

– Help researchers, industry and policy makers use energy data and the results of data analysis via securing open access to data, and providing a bureau service.
Highlights: Established 15 Projects

Metrology

Data

Analysis methods

Model
Highlights

- **Energy Epidemiology**: new approach to energy demand research
- **Novel algorithms** linking individual building, energy and use data in non-residential, 90% success in Camden.
- Green light for a **Longitudinal UK Energy Survey (LUKES)**
- **Smart analysis of smart meters**: Can smart meter data generate occupant independent empirical energy labels?
- Empirical relationship between internal temperature and efficiency, integrating into the National Household Model as part of a DECC project costing **health benefits of energy efficiency**.
- Publication of a **Bayesian analytic method for heat-flux data** helped established that uninsulated solid walls (¼ of the English stock) lose 40% less heat than we thought
- **Ships are slowing**: decline in CO2 emissions from shipping in part due to ships choosing to travel more slowly.