NPL National Physical Laboratory

National Measurement System

Measurement Network

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"Measurement and Standards to Enable Sustainable Cities"

With increasing migration from rural to city living, we cannot continue to manage and monitor cities in the way we do now and still meet targets for carbon emissions, water use, waste management, air quality etc. With the additional drive towards a low carbon economy, there is a move across multiple and varying groups to continuously assess and reduce emissions and operate and deliver their services and activities in a more sustainable way at local, community and city scale.

Measurement and standards are crucial to underpinning the science, technology, policy and regulation critical to delivering that sustainable model at scale.

So significant is the interest in Sustainable Cities, the Measurement Network Energy and Environment Special Interest Group supported by the AIRTO [Climate Change and Sustainability Interest Group], Carbon Disclosure Project, the British Standards Institution and the NPL Centre for Carbon Measurement, hosted a one day meeting in Central London concentrating discussions around

1. **Sustainable Infrastructure**
2. **Emissions Monitoring and Reporting at City Scale**
3. **Standardisation to underpin an Interoperable and Sustainable City**

The day focussed on understanding what the measurement challenges associated with each of the themes was from the perspective of the stakeholders representing those themes.

A senior level plenary debate, followed by high quality demonstrator presentations and subsequent breakout sessions structured around the three themes framed a hugely dynamic and lively discussion.

The purpose of this document is to provide you with a summary of the main outputs of the day, focussing particularly on the outputs of each of the meetings breakout sessions.

Please do let us know if you have any comments / questions regarding the meeting.

Dr Hilary Elliott
Chair: Energy and Environment Group, Measurement Network

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MEETING OUTPUTS

Context:

At the national and global level, the UK Climate Change Act of 2008 commits the UK to carbon reductions of 80% by 2050, compared to the 1990 baseline, and this will need to be verified both from accounting (supply-side) approaches , and from measurement approaches.

The deployment of 'smart' technologies will see key services such as housing, energy, health, waste and transport increasingly delivered in a more personalised, efficient, transparent, measurable, integrated, resilient and responsive way. The success of sustainable urban development is dependent on the ability of technologies and systems to communicate with each other through an interoperable system. Measurement and Standards play a central role in enabling such technological advances.

Within each of the workshops the measurement challenges were discussed.

SUSTAINABLE INFRASTRUCTURE

The afternoon session on sustainable infrastructure was built around small group discussions giving delegates access to a range of expertise in the room and encouraging a free-flowing exchange of ideas.

In exciting and wide-ranging conversations the following were identified by the delegates as the priority challenges in sustainable infrastructure:

- Patterns of movement of people and goods and associated with this, the role of national spatial planning in adopting a bigger picture perspective.
- How to incentivise policy makers, planners and those who implement change to deliver complex solutions.
- Achieving better use of existing urban infrastructure and resources to get the greatest value from what is already in place.
- City, region, country and international energy distribution
- Not just smart grids and energy distribution but smart utilities across the board.
- Creating transport infrastructure with the ability to change and evolve as demand changes.
- Maximising opportunities for low-cost mitigation in all built environment activities.
- Creating ownership of infrastructure with a culture of citizenship so it is not seen as someone else's problem.
- Public engagement and education
- The link between buildings and transport.
- The relationship between "smart" cities and civil liberties
- Integrating sustainable waste management into city design

Three over-arching priority areas were agreed for further exploration. Each was considered by a separate group to draw out measurement challenges and ideas.

Public Engagement and Education

It is vital to work out how to measure and communicate the right and wrong consumption patterns. A leading indicator of sustainability in infrastructure is public understanding of the underlying challenge, willingness to engage and ability to adopt the necessary behaviours. These should form part of a measurement approach to sustainable infrastructure.

Patterns of Movement and Spatial Planning

- Without national spatial planning, social and environmental aspects of sustainability will always be traded off against each other with the needs of neither being truly met. Measurement which enables effective spatial planning is key such as commuting distances and mapping usage and activity in different places in our urban environment.

Under-utilisation of Existing Infrastructure

- Key measurement challenges include how we define waste properly before we know what to measure for example where is the line between waste and resource and at which point should we think about it as being an input to the urban supply chain rather than an output. Other identified challenges include creating appropriate infrastructure assessment tools and developing accurate embodied emissions data. It should be recognised that different infrastructure in different places need different measurement tools making like for like comparisons hard.

EMISSIONS MONITORING AND REPORTING AT CITY SCALE
CHAIR: Kyra Appleby, Carbon Disclosure Project, Cities Programme

Emissions Monitoring and reporting at City Scale is a clear and definitive metric for how sustainable a city is. The key challenge associated with emissions monitoring and reporting at City scale is around consistency and accuracy. Measurement and traceability provides a key contribution to improving that consistency.

A panel discussion was held within this breakout session looking in detail at the Measurement Challenges associated with Emissions Monitoring and Emissions Reporting at the City Scale. Panellists included:

- Dave Levin, AECOM
- Michael Doust, Greater London Authority
- Conor Riffle, Head CDP Cities Programme
- Jen Hawes-Hewitt, Accenture

From the discussion the following key measurement challenges were identified:

- It is clear that there is no widely-used standard for city-wide emissions accounting.
- There is a clear need for standardisation so that cities can share best practices and compare themselves with other cities. Cities are using different methodologies, including different emissions sources and activity types in their inventories.
- Close alignment with the role of measurement in understanding Scope 3 emissions i.e. those emissions most closely linked to actions and consumption.

- Clear issue with collecting city-wide activity data (electricity used, fuel use etc.) is time consuming and very difficult to compile. Can accurate measurement play a role in ensuring that data that is compiled is "representative" of the full activity being measured.

The following solutions and recommendations were identified:

- Development of new protocols for city-wide emissions: The Global Protocol for Community-scale Greenhouse Gas Emissions (GPC) developed by WRI in conjunction with ICLEI and C40 and other organizations has potential to be a globally accepted emissions accounting standard.
- The CDP Cities program provides a standardized way for cities to report their climate change information in a public, transparent way that enables comparisons between cities.
- Greater London is piloting PAS 2070 "Specification for the assessment of consumption-based greenhouse gas emissions in cities," a consumption-based accounting methodology that allows cities to account for their Scope 3 emissions.
- There was a great optimism about the solutions that will come from innovative technology. Examples of game-changing technology included the mobile-phone, CO_2 remote sensing, geo-location data and crowd-sourcing.

STANDARDISATION TO UNDERPIN AN INTEROPERABLE AND SUSTAINABLE CITY
CHAIR: Dan Palmer, British Standards Institution

The deployment of 'smart' technologies will see key services such as housing, energy, health, waste and transport increasingly delivered in a more personalised, efficient, integrated and responsive way. Sustainable urban development offers huge potential for growth but this may be stifled if innovators cannot communicate with each other along supply chains and across sectors, where system interoperability is vital. Standards - be they agreed codes of good practice or technical specifications - play a central role in enabling such technological advances to flourish in a way that can also assure city authorities and citizens that risks such as resilience and information security are being managed appropriately. The British Standards Institution presented its evolving standards strategy for Smart Cities - a project sponsored by the Department for Business, Innovation and Skills. *http://drafts.bsigroup.com/Home/Details/46000*

The breakout breakout session for this theme focussed discussion around a series of questions. Questions and Answers relating to this session are set out below

1. **What is a Sustainable City - what would it be like and what are the challenges?**

- Whilst a Sustainable City could be described as one which enjoys a level of autonomy in its decision-making, no city can ever be self-sufficient.
- Cities need resources (including human), some of which will have to come from the periphery / rural communities
- The degree of autonomy (self-sufficiency) is a key metric (and thus key challenge)… see below

2. **What is a Smart City - how does that relate to sustainability?**

- If a City is 'smart', it can be more sustainable (whether or not it chooses to be)
- 'Smart' is thus an enabler to allow a city to behave in a more sustainable way

- ‘Smart’ can be seen as a pillar of sustainability (so a help, but not an end it itself)
- It mustn’t be overlooked that there is a revenue cost associated with maintaining those smart technologies that can deliver future efficiencies (this includes training in the use of smart technology)

3. What are the challenges for Cities where standards can help?

- Cities need to avoid partnerships with vendors that have too much IP in the smart solution
- The procurement culture needs to change
- Intelligent purchasing is needed to avoid ‘spec creep’
- Open data can release private sector innovation. This suggests a crucial area for standards intervention.
- Data validation / Quality Assurance

Key to underpinning how some of these challenges are met are:

  - Measurement
  - Quality Management (just as with Kitemarks on white goods)
  - Interoperability
  - Resilience
  - Risk Management (addressing governance / security)

- Different standards are needed (technical specifications, codes of practice, management systems and governance frameworks) to meet cities various needs.

THANK YOU

The Measurement Network would like to take this opportunity to thanks all of the participants of the event from Panel members to presenters to delegates to Events Partners for their contributions to making this event so valuable.

Particular thanks go to Arup for allowing us to hold the event at Arup Offices, Central London.