

# Local Nexus Network Launch event and scoping workshop report - SUMMARY.

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The event was held on 23<sup>rd</sup> March 2015 at Oxford University Centre for the Environment, South Parks Road, Oxford, OX1 3QY, UK. Event report produced May 2015.

Local Nexus Network Website: [www.localnexus.org](http://www.localnexus.org)

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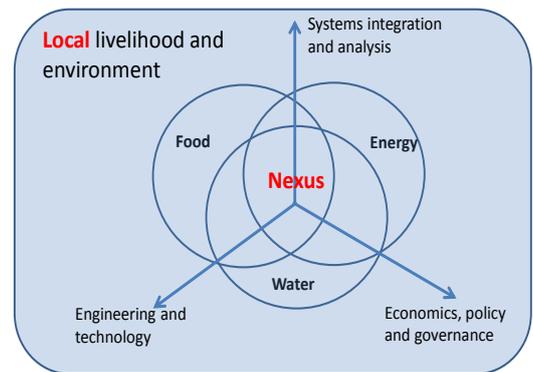
## 1. Local Nexus Network (LNN) context

### Building sustainable local nexuses of food, energy and water: from smart engineering to shared prosperity – network overview

The Local Nexus Network will investigate localised food manufacturing and the decentralised energy and water systems that interact with the food system.

#### What the network is about

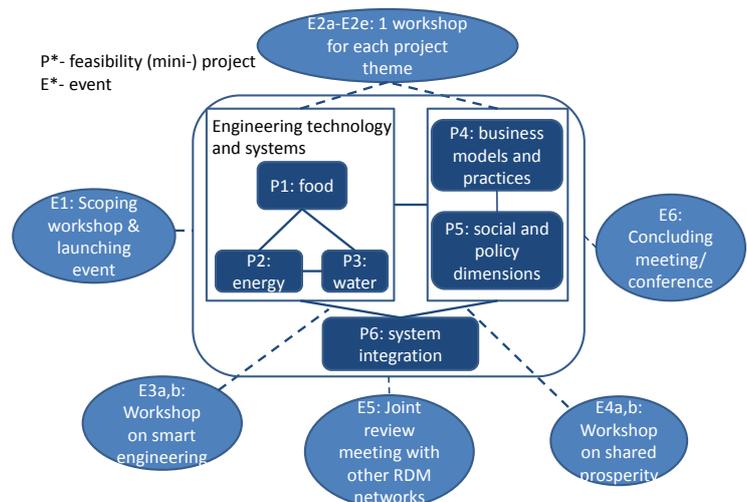
In this project, 'Local nexuses' refers to localised food systems interacting with decentralised energy and water supply. The sustainable development of local nexuses has the potential to contribute to the shared prosperity between business and community and between human society and natural ecosystems. This calls for a combination of "smart" engineering (smaller scale technologies, integrated processes) and driving forces from businesses, communities and policy makers. As one of the six 24-month research networks on re-distributed manufacturing (RDM) funded by the EPSRC and the ESRC to start in early 2015, the Local Nexus Network is aims to: 1) establish the state-of-the-art of local productions of food, energy and water; 2) generate initial insights to guide researchers, businesses, policy makers and communities who are enthusiastic about exploring the potential of local nexuses, and 3) develop an evidence-based agenda for future research. A key mission of this network is to form an inclusive research and stakeholder community around the theme of local nexuses. It will actively seek cross-fertilising interactions with other parallel EPSRC/ESRC RDM networks.

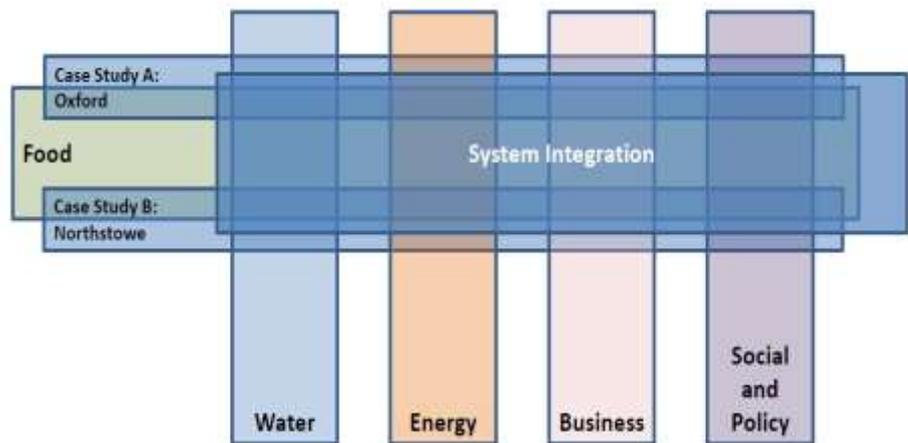


#### Founding members of the network

This network was founded by a multidisciplinary academic team involving six UK universities. The members include Dr Aidong Yang (PI, systems integration), Dr John Ingram (Co-I, food systems) and Jo Hamilton (network co-ordinator) of University of Oxford, and theme leaders including Prof Matthew Leach (Surrey, energy), Prof David Butler and Dr Raziye Farmani (Exeter, water), Dr Lisa De Propris (Birmingham, business clusters and models), Dr Laura Purvis (Cardiff, supply chains) and Prof Andy Pike (Newcastle, policy and society). This academic team is supported by representative stakeholders, currently including Nestlé, Innocent, Association for Decentralised Energy, Thames Water, Oxford City Council, Good Food Oxford, and Flooding on the Levels Action Group (FLAG).

The launch event and scoping workshop was held on the 23<sup>rd</sup> of March 2015. This report gives an overview of the event. Throughout the project, a number of feasibility projects will be carried out and research events organised along the key themes of the network.





## 2. Aims of the launch event

1. Formally launch the Local Nexus Network project
2. Introduce the network to key stakeholders
3. Initiate discussions on the key aspects/issues the network should look at
  - a. Identify areas of synergy, overlap and concerns
  - b. Generate contacts
4. Define our network in terms of key boundaries and ways to work around the case studies
5. Exchange with other parallel initiatives

Aims 1, 2 and 5 were achieved through the presentations at the beginning of the day, and the networking throughout the day. See section 4.

Aims 3 and 4 were achieved through the scoping workshops, which took place during the day. See section 5.

## 3. Participants:

The event brought together over 40 participants from the academic partners, key stakeholders, academics in related projects, such as those focusing on re-distributed manufacturing and nexus projects, local stakeholders involved in food systems in Oxford, and representatives from South Cambridgeshire council responsible for the development of Northstowe.

## 4. Presentations.

Presentations were given which covered the following areas of the Local Nexus Network. Below are short summaries of the presentations. All the slides can be found online on the Launch event report page:

<http://localnexus.ouce.ox.ac.uk/events/launch-event-and-scoping-workshop/> .

### 4.1 Intro and overview of LNN: Dr Aidong Yang, University of Oxford.

What is 'local'?

- Referring to a geographical scope, within which beneficial alignment of resource, production and consumption can be effectively established.
- The size of such a locale may vary, depending on its physical and social-economic situation and the types of products considered.

What do we hope to achieve by the LNN?



Why interest in 'local'?

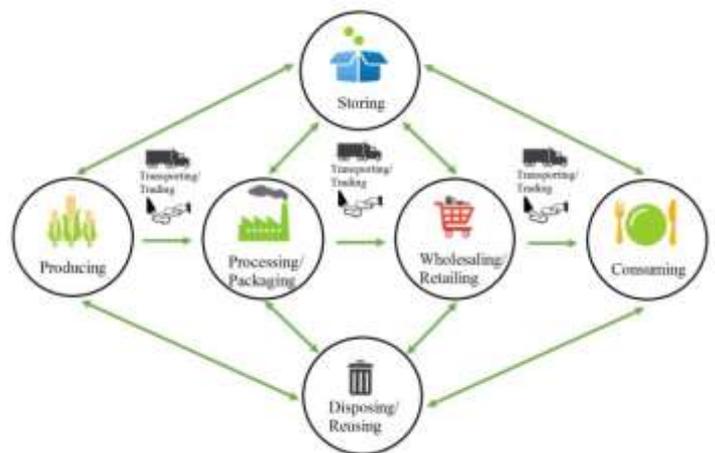
- Exploring opportunities of integrated systems at the local scale due to geographical proximity between various activities.
- As an effective way into researching the multi-scalar structure of the nexus
- Understanding how activities at the lower end of the scale spectrum can trigger bottom-up changes in the system.

#### 4.2 Food: Dr John Ingram, University of Oxford

**Food systems include a set of activities (shown right).**

**How will localising the food sector affect water and energy use?**

1. Assess re-engineering food system activities at county- and city-levels, including adaptation of food engineering technologies with smaller processing capacity.
2. Investigate how the above activities affect food system outcomes for
  - I. the major components of food security
  - II. energy and water use across all food system activities
  - III. sustainability of the multiple food system enterprises, businesses and livelihoods and their contribution to creating circular economies with enhanced resource efficiency and stewardship.



#### 4.3 Energy: Professor Matthew Leach, University of Surrey

Using two case studies as background for empirical data collection and for developing new thinking...

1. Assess requirements for energy supply (electricity and heat of different qualities) to localised food systems (eg production, storage), including typical temporal (diurnal and seasonal) variations
2. Assess potential for energy recovery from waste food arisings across the local supply chain, plus arisings from local wastewater treatment
3. Develop local energy system scenarios, incl other potential users
4. Evaluate energy generation and storage technologies suitable for implementing the scenarios: efficiency, cost effectiveness, safety, and environmental impact

#### 4.4 Water: Dr Raziye Farmani, University of Exeter

The water feasibility project will:

- Assess the changing landscape of **water demands** in the context of localised production and related community initiatives
- Develop application scenarios that address these demands to inform **technology** portfolio analysis for water processing, including those for **optimising water-use efficiency**

- Investigate **graded water reuse and recycling** opportunities among processes involved in food production chain (e.g. water reuse within food facilities; collected/grey water for agriculture), energy generation and other domestic and industrial activities within the same locality
- **Exploit synergies** among localised/small scale **water and energy technologies and systems** (with P2) for improved resource recovery.

#### 4.5 Business and Value Chain: Dr Lisa de Propris, University of Birmingham, and Dr Laura Purvis, University of Cardiff

The feasibility project on business will be split between Birmingham, investigating individual enterprises and local clusters; and Cardiff, investigating supply chains. The feasibility project will:

- examine the opportunities and implications of the growing demand for re-localising food processing (food security along supply chain, greengrocers and farmer’s market)
- identify new/alternative business models required to reconcile various environmental, social and economic objectives within a localised value chain, including service-oriented approaches
- explore potential strategies and important trade-offs faced by value chain players with respect to resilience, efficiency, and sustainability
- develop an understanding of the interactions between local value chains and value chains that present a mix of local and more centralised business activities.

#### 4.6 Policies and Society: Professor Andy Pike, University of Newcastle

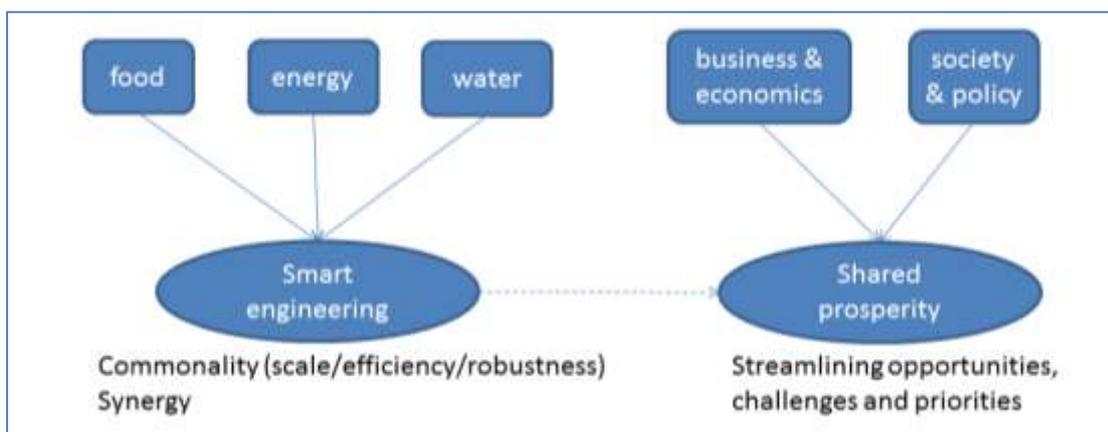
The aims and objectives of the Policies and Society Feasibility Project are to:

- To identify the barriers and potentials of public procurement localisation for sustainable local development
- To examine the awareness and skills of public procurement managers at the local level for local and sustainable purchasing
- To explore how public service institutions are shaping local food demand and supply and its further localisation
- To examine measures to connect localised public purchasing with the stimulation and expansion of local food supply chains
- To investigate international lessons from localised public food procurement for energy and water systems.

#### 4.7 System integration: Dr Aidong Yang, University of Oxford

The system integration feasibility project will:

- Integrate findings from other feasibility projects
- Assess whole-system potentials
- Identify principles/concepts sharable with other RDM areas



#### 4.8 Case studies of Oxford and Cambridge:

Two geographic case study areas have been chosen for the project. These are:

**Oxford (Oxfordshire):** 150,000, ca. 1% food from county  
=> retrofitting existing systems

**Northstowe (Cambridgeshire):** 40,000 people, ?% food from county  
=> designing de novo

The case studies will be used to consider up to four types of food, e.g. bread, chicken / eggs, green veg and milk / cheese.

#### 4.9 The EPSRC/ESRC Re-Distributed Manufacturing (RDM) initiative: Dr Mark Claydon-Smith Theme lead for Manufacturing the Future. EPSRC.

The LNN context is one of 6 multidisciplinary agenda forming networks awarded funding as part of the EPSRC Re-Distributed Manufacturing call. The RDM focuses on technology, systems and strategies that change the economics and organisation of manufacturing, particularly with regard to location and scale.

#### 4.10 The Nexus network: Dr Rose Cairns, Network Coordinator

The nexus network was launched in June 2014, with ESRC funding for 3 years. It is open to researchers, business, policy, practitioners and civil society with an interest in Nexus issues.

Aspirations of the Nexus network are to:

- Catalyse novel inter-disciplinary and cross-sectorial research collaborations
- Support the social science research community and others to develop and share new data, conceptual frameworks, methodologies, skills and practices
- Provide a UK interface for international initiatives with nexus dimensions
- Support the move from rhetoric to reality in confronting nexus challenges

**Nexus Network:** [www.thenexusnetwork.org](http://www.thenexusnetwork.org) **twitter:** @uk\_nexus

**Dr Rose Cairns, Network Coordinator** [r.cairns@sussex.ac.uk](mailto:r.cairns@sussex.ac.uk) or 01273 678350

#### 4.11 Centre for Sustainable Energy Use in Food Chain (CSEF): Prof. Maria Kolokotroni, University of Brunel

The mission of CSEF is to carry out:

- i) research that will have demonstrable impacts on energy demand reduction in the food chain in the short term and
- ii) fundamental research into innovative technologies and approaches that will have significant impacts and contribute to the Government's long term greenhouse gas emissions reduction targets, while taking into consideration socio-economic and behavioural aspects.

#### 4.12 WEFWEBS: Dr Ariella Helfgott, University of Oxford

The WEFWEBS project aims to systematically map the WEF nexus in the UK, to identify system boundaries, interdependencies, feedbacks, bottlenecks and disconnects in the nexus across scales (national, regional, local and individual) and over multiple dimensions (including social, civic, economic, physical, ecological, political and digital).

### 5. Scoping workshop write up

The scoping workshops were carried out in parallel small groups through the course of the day, and addressed the questions listed below. Thematic reflections were reported back in plenary at the end of the day. Below are summaries of the material recorded onto the flipcharts and worksheets.

1. What are potential benefits and problems of a localised food system, and for whom?
2. What socio-economic and biophysical conditions are needed to achieve a more localised food system?
3. What are the opportunities and/or requirements for local energy and water to support a localised food system?
4. What are the key technical, social, economic, policy research areas and questions relating to the local food-energy-water nexus ?

#### 1. What are potential benefits and problems of a localised food system, and for whom?

##### Summary of benefits

The range of benefits identified covered:

- **Economy and policy aspects** (generating jobs and skills training; ability to respond to local market trends, and innovation);
- **Water** (reusing local non potable water in local food production);
- **Energy** (reduced energy costs from transportation / food miles);
- **Educational** (greater awareness and connection to methods of production, seasonality);
- **Symbiosis and resource-looping** (opportunities for industrial symbiosis and local nutrient recycling);
- **Food systems:** (more resilient system, reduction in food waste, and increased traceability); and
- **Health, food quality and wellbeing** (fresher food, social benefits).

##### Summary of Problems

Problems identified included:

- **Economy, policy and business aspects** (higher prices and reduced flexibility, incumbents and resistance to change, land use conflicts);
- **Water** (potential for increased water pollution);
- **Education and consumption** (consumer preferences and trends);
- **Food systems** (limited variety of produce. Options and choice, limitations on quantities of food produced); and
- **Health, food quality and wellbeing** (decreased quality and lack of nutrition).
- Other (such as 'local food' can be fetishized idea, which is inaccessible to many).

##### Other:

Summary: Other issues and questions were identified, which included questioning the local=good concept; asking at what scale we should be operating at; issues of power; connection between global food production.

**2. What socio-economic and biophysical conditions are needed to achieve a more localised food system?**

<b>Biophysical / technical</b>	<p><b>Biophysical conditions</b></p> <ul style="list-style-type: none"> <li>• availability of suitable land and water supply;</li> <li>• changes in systems of production.</li> </ul> <p><b>Technical conditions</b></p> <ul style="list-style-type: none"> <li>• the scale - appropriate technology development from production through to distribution;</li> <li>• the importance of national and local logistics and infrastructure;</li> <li>• and Big data of food processing and demand.</li> </ul>
<b>Economic</b>	<p><b>Economic conditions</b></p> <ul style="list-style-type: none"> <li>• the need for new business models and organisational structures;</li> <li>• local procurement and supply chain for processing;</li> <li>• socio-economic changes such as new farmer development.</li> </ul>
<b>Social / behavioural</b>	<p><b>Social and behavioural issues</b></p> <ul style="list-style-type: none"> <li>• consumer acceptance of local food;</li> <li>• changes in land and planning policy;</li> <li>• changes in food behaviour;</li> <li>• skilling up farmers.</li> </ul>
<b>Policy / governance</b>	<p><b>Policy and governance issues</b></p> <ul style="list-style-type: none"> <li>• Policies to support local / small scale to allow economic competition with large scale industrial agriculture;</li> <li>• Quality control;</li> <li>• Legislation, regulation and laws;</li> <li>• a supportive / radical planning framework prepared to discriminate between localised and non-localised production systems;</li> <li>• Statutory commitment to provision of growing space.</li> </ul>

**3. What are the opportunities and/or requirements for local energy and water to support a localised food system?**

<b>Technical (e.g. technology, farming practices, design of technical systems)</b>	<p><b>Technical opportunities and requirements</b></p> <p><b>Energy:</b> Use of local heat arisings for food process, and capture food process waste for district heat</p> <p><b>Water:</b> improved water management, water recycling, utilisation of grey water</p> <p><b>Food:</b> how to localise logistical systems, identifying farming / production practices for lower water and energy use</p> <p><b>Cross-cutting,</b> such as integration – food / water / waste connections, building a circular economy)</p>
<b>Business / economics</b>	<p><b>Business opportunities and requirements</b></p> <p><b>Energy:</b> Energy and water needs to be affordable; funds for community energy</p> <p><b>Cross-cutting:</b> need for New business models for Food, energy, water – market / co-op/ farm shop, covering production, distribution, retailing, consumption.</p>
<b>Social</b>	<b>Social opportunities and requirements</b>

	<p><b>Water:</b> Need buy-in from consumers / residents to use lower quality water, and energy recycling etc</p> <p><b>Cross-cutting:</b> Looking at Systems of provision' for Food-Energy –Water, market and non-market systems Change perceptions/ acceptance via cultural trigger points</p>
<b>Policy</b>	<p>Policy opportunities and requirements included promotion of anaerobic digestion, change in government restrictions about grid export, smart packaging, Policy and regulation need to avoid perverse outcomes (e.g. dedicated crops for AD); and the current lack of lack of knowledge exchange platforms.</p>
<b>Other</b>	<p>Other issues included the need to map the overall food system, whether diversity in food production matches local conditions, and questions of affordability.</p>

What are the key technical, social, economic, policy research areas and questions relating to the local food-energy-water nexus?					
	Technical	Business / economics	Social	Policy	Other (across all topics)
Energy	<p>Look at energy recovery potential from different crops            → optimise mix of nutritional value and energy recovery            Dealing with grid capacity            Local cost AD</p>	<p>Decentralised energy systems – consistent or not?</p>	<p>What is holding back producers of new entrants from energy with the local market?</p>	<p>Power-purchase regulation</p>	<ul style="list-style-type: none"> <li>• Are different perspectives / currencies captured?</li> <li>• Geographies / mapping</li> <li>• Cultural –dietary evolution / transitions</li> <li>• Tension – individual / bespoke versus collective / societal</li> <li>• Balance of ‘controversial technology’ vs public perceptions</li> <li>• Acceptance for primary food processing</li> <li>• Look at existing local food production outside Oxford / Cambs</li> <li>• ‘Local as value’ – business model</li> </ul>
Food	<ul style="list-style-type: none"> <li>• Energy and water footprinting of the food chain</li> <li>• Mapping economy and water demands against food production and promotion</li> <li>• Small scale / building scale vertical horticulture</li> <li>• Technologies in the home-based food processing (cooking?) e.g. 3D printing</li> <li>• Near real time testing for food safety (=&gt; export)</li> <li>• Localisation – Increase individual / energy use?</li> <li>• Scale effects on fertilizer use</li> <li>• Energy and water flow mapping (e./g. Sankey diagram)</li> </ul> <p>- implications of each of the food supply stages and crops?            - Explore choices and trade-offs</p>	<ul style="list-style-type: none"> <li>• Explore trade-offs related to food processing re-localisation and energy</li> <li>• Which products would make best use of local?</li> <li>• What level of local production is needed to make as cheap as supermarkets?</li> <li>• Assessments of environmental / social externalities of high-input production systems</li> <li>• What are best products to produce locally?</li> <li>• Specialisations or diversification for each producer?</li> <li>• What is efficiency? – KPIs / metrics – highly context dependent</li> <li>• Resource / material</li> <li>• Energy / CO2</li> <li>• Economic / cost</li> <li>• Labour</li> </ul>	<ul style="list-style-type: none"> <li>• What motivates a change towards improved WEF efficiency in farming?</li> <li>• Communal consumption – e.g. German canteen culture</li> <li>• Local consumption models - e.g. casserole clubs, aggregating individual suppliers as local sources</li> <li>• Resilience – individual/ collective</li> <li>• Education – knowledge, confidence</li> <li>• Anti-poverty and increased wellbeing</li> <li>• Collective/ social solutions, e.g. community freezers</li> <li>• Risks of ‘Local food rebound effect’?</li> </ul>	<ul style="list-style-type: none"> <li>• EU law – CAP etc</li> <li>• What would planning framework look like for local food?</li> </ul>	

		<ul style="list-style-type: none"> <li>• Nutrition</li> <li>• Cultural values</li> <li>• Multi-dimensional metrics for the concept of 'efficiency' – decoupling vs proportional trends</li> <li>• New models between mass of artisanal – part processed food?</li> <li>• New models of exchange</li> <li>• Local sourcing models – e.g. recipes and local sources via apps</li> <li>• Role of big supermarkets?</li> <li>• Business seasonality, as well as products?</li> </ul>	<ul style="list-style-type: none"> <li>• Triggers for change in purchasing behaviour?</li> </ul>		
<b>Water</b>	<ul style="list-style-type: none"> <li>• Water shortage and re-use in the context of growing demand</li> <li>• Re-engineering for smaller scale with lower energy costs per unit (i.e. reduce carbon footprint of water (blue(rain) green (surface) grey (washing) black (sewage?) )</li> </ul>		<ul style="list-style-type: none"> <li>• Would consumers value 'local'?</li> <li>• What are different framings of 'local' – social /' political</li> </ul>	<ul style="list-style-type: none"> <li>• New mechanisms to incentivise change (e.g. pay farmers per pasture to help alleviate flood risk)</li> </ul>	
<b>Cross cutting</b>	<ul style="list-style-type: none"> <li>• How does 'local' change resilience?</li> <li>• What units do we use to discuss 'efficiency'?</li> <li>• How does FEW nexus interact with other nexus (policy technical social nexus)?</li> </ul>	<ul style="list-style-type: none"> <li>• New business model – shared workshop - how you get there</li> <li>• Opportunities for incentivising low environmental impact behaviour – e.g. via regulations</li> </ul>		<ul style="list-style-type: none"> <li>• International policy learning</li> <li>• Systems of inter-dependencies across WEF</li> <li>• What policy environment required to</li> </ul>	

	<ul style="list-style-type: none"> <li>• Circular economy – e.g. waste fed to fuel – heat water systems – saline / near coast solutions</li> <li>• Balance of centralised / decentralised</li> <li>• Supply – demand</li> <li>• Challenges for delivery?</li> </ul>	<ul style="list-style-type: none"> <li>• Funding models used or possible for nexus</li> <li>• Triggers for motivating local investors</li> <li>• Skills needs and availability</li> </ul>		<p>capture benefits and prevent perverse outcomes?</p>	
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