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Conference or Workshop Item

Title: Future perfect? "Bahrain: a zero waste place?"

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FUTURE PERFECT?

“Bahrain: A Zero Waste Place?”

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HH Shaikh Khalifa bin Salman Al Khalifa
Prime Minister of the Kingdom of Bahrain

His Majesty King Hamad bin Isa Al Khalifa
King of Bahrain

HH Shaikh Salman bin Hamad Al Khalifa
Crown Prince, Commander-in-Chief of the Bahrain Defence Force and Chairman of the Economic Development Board
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The journal publishes research papers and reviews on topics, which include:

Efficient management and use of all resources, including air and water, with regard to the qualitative as well as quantitative aspects of resource use.

Economic, societal and technological change for recovery and reuse of materials and energy from all waste streams.

Sustainable production and consumption patterns, including management, instruments and methods.

Innovation: tools and methods relating to resource productivity improvement.

Management systems involving resource status, use and material flows in society.

Policy aspects to improve the sustainability of resource use, including strategies for managing resource supply and demand, lowering energy intensities and increasing the serviceability of products.

Substitution of primary resources by renewable or regenerative alternatives.
ZERO WASTE England?

England should more than halve the amount of waste going to landfill in the next 10 years

Compostable items should be banned from landfill and how a ban will work.

In ten years time 75 per cent of household waste will either be recycled or used for energy, and over time this figure will increase even further.

A new Zero Waste Places Standard for Local Authorities will also recognise areas which are going above and beyond national waste targets.

The Government expects Local Authorities to offer a full collection service for all recyclable items by 2020.

Publication of aims and actions for Commercial and Industrial Waste. This will help businesses to use resources more efficiently.
ZERO WASTE Wales?

What are we aiming for?
1. By 2025 we want all sectors in Wales to be recycling at least 70% of their waste – this includes businesses, households and the public sector.

2. By 2050 we hope to have achieved zero waste. This will mean that products and services will be designed so they have eliminated waste entirely.

How are we going to do it?
• By reducing the amount of waste we all produce.

• By making sure we have the right facilities to collect and treat our waste – this is not only from our waste at home, but also commercial and industrial waste.

• By looking at all the materials that are thrown away and deal with the ones that will have the most benefit for the environment first.

• We will encourage businesses and retailers to take more responsibility for the waste they produce, or cause others to produce.
Zero Waste System
Zero Waste?

The US Zero Waste Alliance defines Zero Waste as “A visionary goal” that strives for:

- Zero waste of resources
- Zero solid waste
- Zero hazardous waste
- Zero emissions to air, water or soil
- Zero waste in production and administrative activities
- Zero waste in product life cycles
- Zero toxics”
What if we do not?
What are the tools to arrive at Zero Waste Bahrain?

“Waste Management” or “Resource Management”?
Objectives for Waste Policy (England) in Securing the Future

Protection of human health and the environment by producing less waste and by using it as a resource wherever possible.

Through more sustainable waste management – reduction, re-use, recycling, composting and using waste as a source of energy – the Government aims to break the link between economic growth and the environmental impact of waste.
Some Principles to Manage Waste

- The concept of ‘Sustainability’
- The Waste Hierarchy
- The Proximity Principle
- The Precautionary Principle
- The Polluter Pays Principle
- The Prevention Principle
- Zero Waste Philosophy
Vision and Policy Outcomes

Waste Prevention

Re-use

Recycle/Compost

Energy Recovery

Disposal
Environment Agency: Waste Minimisation Industrial

“The reduction of waste at source, by understanding and changing processes to reduce and prevent waste. This is also known as process or resource efficiency. Waste minimisation can include the substitution of less environmentally harmful materials in the production process”
Resource Management

The European Environment Agency defined resource management in 2006 as follows:

“Resource Management is taken to mean activities aimed at or effecting the efficient use of material resources throughout the economic system including resource extraction, product design, production systems, distribution, consumption, re-use, waste prevention, recycling and disposal”
Possible Resource Efficiency Savings across UK Economy

Table A1: Summary of the estimated resource efficiency savings opportunity across the UK economy

<table>
<thead>
<tr>
<th>Resource</th>
<th>Estimated Savings Opportunity (£M)</th>
<th>% of total estimated savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>3,349</td>
<td>52</td>
</tr>
<tr>
<td>Waste</td>
<td>2,659</td>
<td>41</td>
</tr>
<tr>
<td>Water</td>
<td>441</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>£6,449M</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 1.1: Estimated waste savings opportunity in the manufacturing sector in 2003.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total savings (£M)</th>
<th>% of total savings</th>
<th>Savings as % of GVA</th>
<th>Investment required (£M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, drink and tobacco</td>
<td>407.7</td>
<td>17.0</td>
<td>7.6</td>
<td>379.9</td>
</tr>
<tr>
<td>Textiles, leather and clothing</td>
<td>232.5</td>
<td>9.7</td>
<td>19.2</td>
<td>101.4</td>
</tr>
<tr>
<td>Coke, petrol and nuclear fuels</td>
<td>5.6</td>
<td>0.2</td>
<td>0.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Chemicals and man-made fibres</td>
<td>966.1</td>
<td>40.3</td>
<td>24.0</td>
<td>574.6</td>
</tr>
<tr>
<td>Basic metal and metal products</td>
<td>139.2</td>
<td>5.8</td>
<td>2.3</td>
<td>128.8</td>
</tr>
<tr>
<td>Engineering and allied industries</td>
<td>262.6</td>
<td>11.0</td>
<td>2.2</td>
<td>145.5</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>381.0</td>
<td>15.9</td>
<td>4.3</td>
<td>177.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£2,394.7m</strong></td>
<td><strong>100%</strong></td>
<td><strong>6.7%</strong></td>
<td><strong>£1,511.5m</strong></td>
</tr>
</tbody>
</table>
### Savings in one Resource Efficiency Club (20 companies) 1999 - 2000

<table>
<thead>
<tr>
<th>Category</th>
<th>Potential savings (£)</th>
<th>Actual as % of potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business rationalisation</td>
<td>212 520</td>
<td>81</td>
</tr>
<tr>
<td>Effluent</td>
<td>405 652</td>
<td>10</td>
</tr>
<tr>
<td>Electricity</td>
<td>611 256</td>
<td>65</td>
</tr>
<tr>
<td>Gas</td>
<td>75 322</td>
<td>61</td>
</tr>
<tr>
<td>Oil</td>
<td>14 880</td>
<td>15</td>
</tr>
<tr>
<td>Packaging</td>
<td>242 352</td>
<td>88</td>
</tr>
<tr>
<td>Process efficiency</td>
<td>643 410</td>
<td>93</td>
</tr>
<tr>
<td>Raw materials</td>
<td>639 742</td>
<td>52</td>
</tr>
<tr>
<td>Solid waste</td>
<td>509 990</td>
<td>68</td>
</tr>
<tr>
<td>Special waste</td>
<td>166 980</td>
<td>2</td>
</tr>
<tr>
<td>water</td>
<td>240 425</td>
<td>49</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3 762 529</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>
## Top RECs in England 2008

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of companies</th>
<th>Potential savings (£)</th>
<th>Cost (£)</th>
<th>Savings to cost ratio</th>
<th>% conversion after 1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Midlands Food</td>
<td>17</td>
<td>695,689</td>
<td>46,514</td>
<td>14.9</td>
<td>7.5</td>
</tr>
<tr>
<td>Plymouth</td>
<td>13</td>
<td>527,795</td>
<td>49,850</td>
<td>10.5</td>
<td>10.2</td>
</tr>
<tr>
<td>BFM</td>
<td>10</td>
<td>593,450</td>
<td>49,500</td>
<td>11.9</td>
<td>6.7</td>
</tr>
<tr>
<td>Oxfordshire</td>
<td>26</td>
<td>403,215</td>
<td>39,462</td>
<td>10.2</td>
<td>8.0</td>
</tr>
<tr>
<td>Hertfordshire</td>
<td>30</td>
<td>841,770</td>
<td>49,965</td>
<td>16.8</td>
<td>0.9</td>
</tr>
<tr>
<td>CWIC (Northants)</td>
<td>120</td>
<td>808,877</td>
<td>48,700</td>
<td>16.6</td>
<td>11.0</td>
</tr>
<tr>
<td>Bradford</td>
<td>14</td>
<td>148,058</td>
<td>49,991</td>
<td>2.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Cornwall</td>
<td>5</td>
<td>422,526</td>
<td>50,000</td>
<td>8.4</td>
<td>4.4</td>
</tr>
<tr>
<td>ENWORKS</td>
<td>136</td>
<td>1,779,842</td>
<td>200,000</td>
<td>8.8</td>
<td>2.4</td>
</tr>
<tr>
<td>GBN</td>
<td>28</td>
<td>354,900</td>
<td>43,000</td>
<td>8.2</td>
<td>2.6</td>
</tr>
</tbody>
</table>
The Goal: Route to Industrial Symbiosis

Inter Company

• Development for regional Industrial Ecology site
• Company development via Industrial Symbiosis

Intra company

• New, clean technology adopted after economic analysis
• Wide array of tools used such as eco-design and teams trained for Continuing Professional Development. Company Certificated to show progress
• Teams addressing issues and under-going training
• Waste prevention plan developed/ workforce engaged
• Waste quantified and linked with legislation
• Waste seen as disposal issue only
• No perception of waste problem
Figure 3: Indicative Intermodal Transport Nodes for Waste Management and Reprocessing in the UK
What about imported, embedded CO₂?

Embedded carbon dioxide emissions (tonnes) by UK import categories from different geographical regions (2000) [Ref 20]
Government support

Investment in appropriate support structures in journey to Zero Waste Place
## UK / England Support Programmes

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action Sustainability</td>
<td>Sustainable procurement</td>
</tr>
<tr>
<td>Business Resource Efficiency and Waste (BREW)</td>
<td>In 3 years it had £200 m</td>
</tr>
<tr>
<td>The Carbon Trust</td>
<td>Low carbon technologies</td>
</tr>
<tr>
<td>Environment Agency</td>
<td>Regulator</td>
</tr>
<tr>
<td>Market Transformation Programme</td>
<td>Develops policy strategies for resource efficiency</td>
</tr>
<tr>
<td>National Industrial Symbiosis Programme (NISP)</td>
<td>Links companies to work together on resources</td>
</tr>
<tr>
<td>Envirowise</td>
<td>Best Practice programme that offer free advice on waste prevention and clean technology</td>
</tr>
<tr>
<td>Regional Development Agencies</td>
<td>Address market failure</td>
</tr>
<tr>
<td>Waste and Resource Action Programme (WRAP)</td>
<td>Creates markets for recyclates &gt;£50 m per annum</td>
</tr>
</tbody>
</table>
One component of way ahead:

Pro-Environmental Behaviour by Citizens
But what does the public want?
The proportion of people recycling different materials, 1993-2007

Percentage of people

Material

Paper, Glass, Tins and cans, Plastic, Food waste, Cardboard, Garden waste, Clothes

The seven population segments

Segment willingness and ability

- **Ability to act**
  - Low
  - High

- **High potential and willing**
  - 1: Positive greens
    - I think it’s important that I do as much as I can to limit my impact on the environment.
    - 18%
  - 2: Waste watchers
    - ‘Waste not, want not’ that’s important, you should live life thinking about what you are doing and using.
    - 12%
  - 3: Concerned consumers
    - I think I do more than a lot of people. Still, going away is important, I’d find that hard to give up...well I wouldn’t, so carbon offsetting would make me feel better.
    - 14%
  - 4: Sideline supporters
    - I think climate change is a big problem for us. I know I don’t think much about how much water or electricity I use, and I forget to turn things off...I’d like to do a bit more.
    - 14%
  - 5: Cautious participants
    - I do a couple of things to help the environment. I’d really like to do more, well as long as I saw others were.
    - 14%
  - 6: Stalled starters
    - I don’t know much about climate change. I can’t afford a car so I use public transport...I’d like a car though.
    - 10%
  - 7: Honestly disengaged
    - Maybe there’ll be an environmental disaster, maybe not. Makes no difference to me, I’m just living life the way I want to.
    - 18%

**Low potential and unwilling**

- Low
- High
Impacts and current take up of behaviours

Inclusion of impacts other than carbon (e.g. on air quality, water demand, landfill, biodiversity) would affect the ranking. We are commissioning
Policy Framework

Approach evolves as attitudes & behaviours change over time

Enable
- Remove barriers
- Give information
- Provide facilities
- Provide viable alternatives
- Educate/ train/ provide skills
- Provide capacity

Catalyse
- is the package enough to break a habit and kick start change?

Engage
- Community action
- Co-production
- Deliberative fora
- Personal contacts/ enthusiasts
- Media campaigns/ opinion formers
- Use Networks

Encourage
- Through tax system
- Expenditure - grants
- Reward schemes
- Recognition/ social pressure – league tables
- Penalties/ fines & enforcement action

Exemplify
- Leading by example
- Achieving consistencies in policies
How to ensure Citizen Participation?

1. Regulatory Instruments
e.g. targets, bans on, take back, segregated collections

2. Economic Instruments
e.g. Landfill taxes, producer responsibility, pay as you throw

3. Voluntary Agreements
e.g. adoption of eco-design, environmental information
Impulsive action or considered action?

What do we know? What do we not know?

Requirement for Research
So what do we need to Drive the waste agenda?

Evidence for policy makers to design long term waste / resource strategy!
For England Waste evidence strategy questions from 2007

- What does current research on household waste prevention tell us and where are the evidence gaps in this work?

- What do we know about the drivers for personal acquisition, consumption and disposal behaviours and how do we improve our forecasting of the impacts of technology and lifestyle trends on waste arisings and composition?

- Is there a sense of how much householders can do to prevent waste, and how much influence they have on retailers and manufacturers?

- How do we ensure an integrated policy and delivery approach to enhancing community-based behavioural change?

- Is there a need to know more about the barriers to waste prevention, reduction and recovery?
Evidence-based Policy-Making

• Process marrying experiences, expertise and judgment

• Interconnecting policy goals and evidence through robust analysis

• Evidence needs to be used

• Evidence-based or evidence backed?
Balancing Supply and Demand

Supply (from the research community)
- provider-focused
- robustness and quality
- presentation in a policy-relevant format
- accessibility

Demand (from policy specialists)
- user-focused
- pro-active
- cost-effective
- working with policy-makers to identify needs
- linking evidence to policy goals and their achievability
Time Horizon

- Supply and demand
- Balancing short-term research and evidence needs

Source: Louise Shaxson, 2005: figure attributed to Tony Taig.
Key issue: Training

Does Bahrain have the Capability to Exploit Innovation in Waste / Resource Management?
Some Year 1 Activities

**Formation of steering group:** with representatives from Bahrain including Universities, Government, Business and from UK TUoN and Business (e.g. Veolia). The group will guide upon key questions such as buildings for location etc and contractual issues and the mix of activities required.

**Teaching:** At least 40 students studying at least 1 module from UK Distance Learning Degrees at Foundation, First and Masters Degree levels. A virtual learning environment (VLE) set up to support learning.

**Consultancy:** Key Bahrain professionals (10) cluster around a UK / European consultancy to determine what model is best suited to Bahrain. Initial market and gap analysis for Region started.

**Research:** Launch Journal

Bahrain students - 5 - are supported to apply for scholarships to enable them to come to UK to a University that is the most suited to the specialism that they have chosen.

**Funding:** The steering group will seek to lever in external funding from Government, British Council, International Business e.g. Veolia. Rolls Royce. In excess of £100 000 sought
**Some Year 3 Activities**

**Steering group:** Enlarged from year 1 and 2 to be more inclusive to represent Bahrain as capability and capacity increases.

**Teaching:** At least 20 students studying for full Distance Learning Foundation (12 Modules) and First degree. 10 studying for full Masters Degree (8 Modules).

In addition, 100 students enrolled from Region onto Modules. Modules delivered by Bahrain staff. New degrees that are based primarily on conditions in Region and will be produced in native language/languages. **These will be owned by Universities from Bahrain who will provide QA.**

**Consultancy:** A national best practice programme set up to support commercial/industrial waste minimisation. Some 30 companies in Bahrain audited and trained and case studies produced. Savings of over £500 000 identified.

**Research:** Some 10 PhD students from Region coming to Bahrain to study PhD by papers developed and validates to support professionals in the work place. They can continue to work, produce papers and obtain PhD. Some 5 enrolled.

A large international research conference to showcase developments in Journal and in Bahrain.

**Funding:** in excess of £300 000 sought.
Questions?