

## Resource Depletion and Unmanaged Waste

**Demand for the non-renewable natural resources that are integral to modern societies is creating enormous environmental pressures and will ultimately outstrip availability, while vast quantities of waste is left unsustainably managed.**

Modern society is economically, socially and culturally reliant on finite, non-renewable resources, such as minerals, metals and fossil fuels. Economic growth to date has been reliant on continued access to these commodities as part of linear cradle to grave systems. Increased extraction and ultimate disposal of finite resources cannot continue indefinitely.

Reserves of key resources are concentrated in certain countries and regions, which can be subject to conflict, political instability and corruption. Commodity prices across all indexes rose sharply after 2000, driven by booming emerging market economies. Subsequent falls, particularly for energy since 2014, have led to significantly less investment in developing new resources<sup>9</sup>. Prices and resource availability over the coming decade are likely to become more volatile and could lead to geopolitical instability. However, 2015 marked the first year that global clean energy investment outpaced investment by oil and gas companies, and in the power sector renewables out-invested fossil generation by a factor of about 2:1<sup>10</sup>. The implications of these trends on resource demand will be significant, with potentially much lower fossil fuel demand but great need for metals and rare earth metals.

People in rich nations consume up to 10 times more resources than those in the poorest nations. Demand for resources in both developed and developing regions is growing, driven by population growth and increasing affluence. Resource efficiency is improving to some extent, with the world economy now using 30% fewer natural resources to produce \$1 of GDP than it did 30 years ago<sup>1</sup>.

### Challenges

- ★ Can 'closed loop' approaches to resource management sufficiently mitigate limited supplies and improve resource security?
- ★ Can we address economic development goals without demanding more from limited global resources, and what measures are available?
- ★ How can social behaviour be influenced to reduce waste and overconsumption and will this be achievable before resources deplete?
- ★ Could cities and their governance structures lead in tackling resource scarcity and how can they be supported in achieving these ambitions?



### Key Facts:

- 1. Humans extract 50% more natural resources than 30 years ago, some 60 billion tonnes a year. Over the next decade we may consume more oil, gas, iron and other mineral resources than in our entire history<sup>1,2</sup>.**
- 2. However, the world economy now uses 30% fewer natural resources to produce \$1 of GDP than it did 30 years ago<sup>1</sup>.**
- 3. People in rich nations consume up to 10 times more natural resources than those in the poorest<sup>1</sup>.**
- 4. Commodity prices have risen dramatically and then fallen since 2000 and are likely to become more volatile in future<sup>3</sup>.**
- 5. Production of mined metals is expected to increase by 250% by 2030, largely originating in developing countries<sup>4</sup>.**
- 6. China produces 85% of global rare earth metals, with implications on global supply security and market control<sup>3</sup>.**
- 7. Conventional oil production peaked in 2005 with subsequent growth coming from harder and more expensive to extract shale or deep water sources.**

The UK generated 200 million tonnes of waste in 2012.<sup>13</sup>

50% was generated by construction.  
24% by commercial & industrial.  
14% by households.

86% of construction waste was recycled.  
45% of household waste was recycled.



## LDA Design Insights:

As a developed economy lacking many resources of its own, the UK is reliant on imports of key minerals for energy and materials for construction, exposing it to often volatile global markets. In parallel, over half of all waste is disposed of in landfill, with just 115 million tonnes out of 600 million recycled annually<sup>2</sup>.

★ Levels of waste, especially food, are considerable. The impact on greenhouse gas emissions<sup>8</sup>, human health, the environment and the economy is significant, with disposal and material costs generally rising over time<sup>1</sup>. Progress has been made, through the landfill tax, and waste levels appear to have stabilised or are falling<sup>7</sup>, but issues persist. Ultimately, we need to rapidly move from a linear to a ‘circular’ economy, which is restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value. For example, through designing buildings, places and products with their end of life in mind so that materials can be reused. In development, regeneration, infrastructure and public realm schemes, designers need to start from an understanding of systems: how the parts influence one another within a whole, and the relationship of the whole to the parts<sup>12</sup>.

★ UK domestic natural resource production has declined and imports have risen<sup>7</sup>, most notably for energy. Reliance on imports can be costly and exposes us to international market volatility. Despite rising resource efficiency and dramatic drops in installation costs, developing indigenous zero carbon energy sources presents huge policy, spatial and design challenges<sup>7</sup>. However, the opportunities for businesses to develop solutions to these are significant, be they in the design and implementation phases or decommissioning and remediation.

★ Resource extraction can cause considerable environmental harm<sup>1</sup>. While extraction is limited in the UK, the Government’s desire for a home-grown shale oil and gas industry is leading to mounting opposition. Collaboration between public and private sectors is key to managing change and delivering positive and sustainable strategies. Investors have a responsibility to finance environmentally-sound projects that consider the full project lifecycle.

★ New technologies like 3D printing offer potential and, with its strong science and research base, the UK is well placed to exploit this. Even more excitingly, biomimicry is allowing designers and innovators to apply the lessons that nature has learned over billions of years to create more efficient products, transportation systems and buildings<sup>14</sup>.

## What is LDA Futures?

The world is changing in response to a set of environmental, economic, social and technological drivers, and these are shaping the types of infrastructure and development we need and the way we use land.

*LDA Futures* explores these drivers and their implications to enable us to make appropriate responses through our projects and the advice we give to clients.



## References

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14. See Biomimicry 3.8 for more information <http://biomimicry.net/>