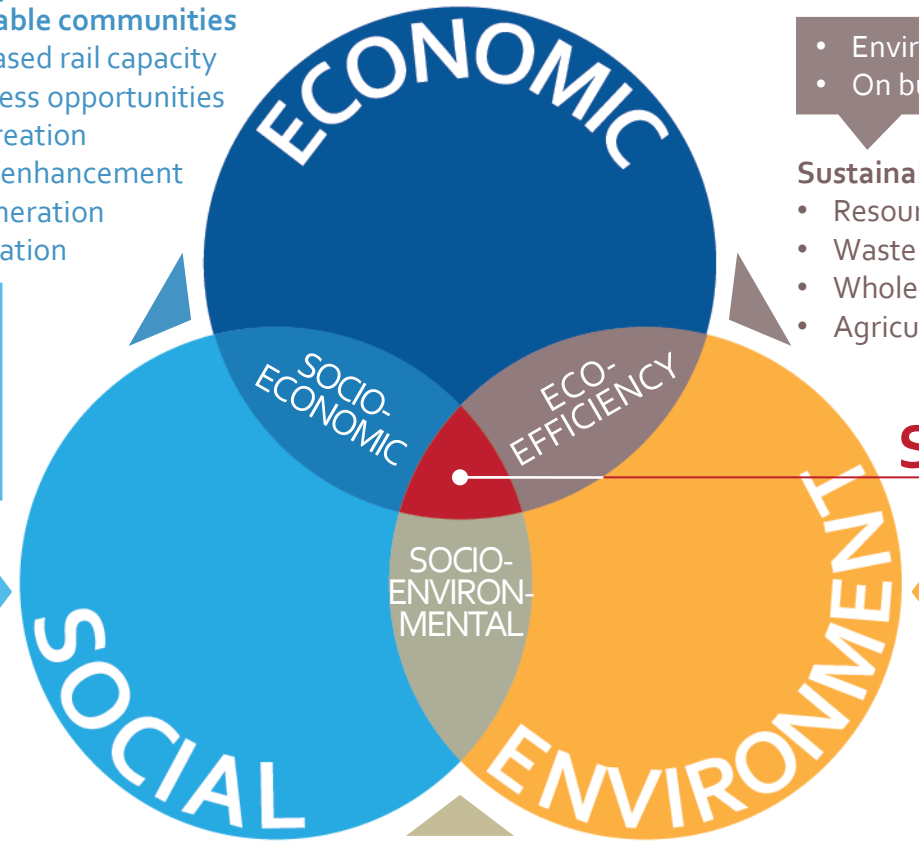
# Sustainable Construction

Tim Smart

*Head of Engineering and Operations, HS2 Ltd*

In looking at sustainability, we have tried to reach a balance combining environmental protection and enhancement, social wellbeing and opportunity, and economic wealth and prosperity




- On budget
- On time

**Sustainable economy**
- Economic welfare
- Economic prosperity
- Value to taxpayer
- Best value

- Skills & employment
- Vibrant city regions

**Sustainable communities**
- Increased rail capacity
- Business opportunities
- Job creation
- Skills enhancement
- Regeneration
- Innovation

- Environment
- On budget

**Sustainable consumption & production**
- Resource efficiency
- Waste generation
- Whole life - Whole System management
- Agriculture & soils

- Health, safety & security
- Designed for passengers
- Benchmark excellence
- Vibrant city regions
- Environment

**Sustainable communities**
- Property effects
- Noise, air quality & EMR
- Community integrity
- Access to public transport
- Health & wellbeing
- Security & safety
- Diversity
- Traffic & transport

- Environment

**Natural & cultural environment**
- Landscape & townscape
- Cultural heritage
- Wildlife & biodiversity
- Water & flooding

- Benchmark excellence
- Environment

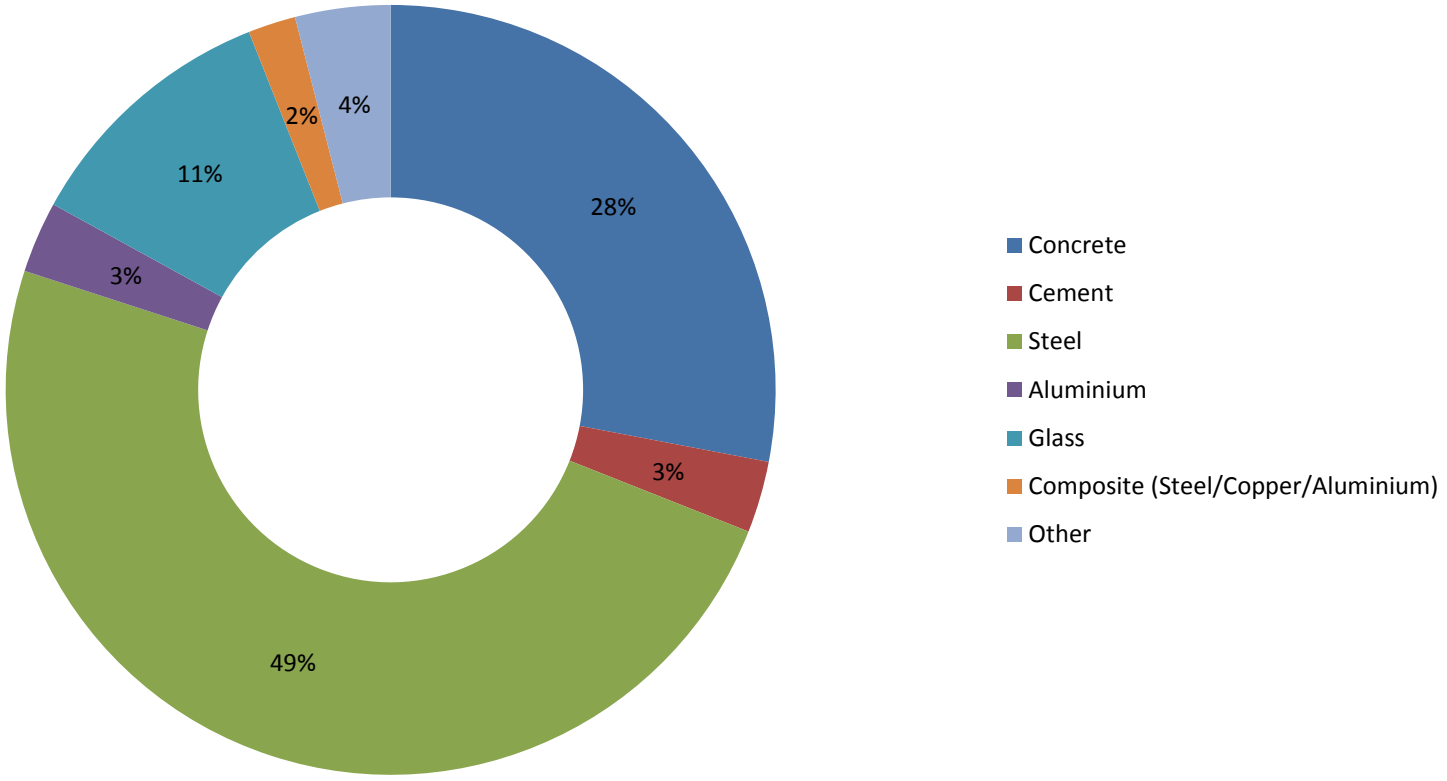
**Combating climate change**
- Mode shift
- Reduced greenhouse gas emissions
- Resilience to climate change
- Flood risk
- Green space / amenity

hs2 engine for growth

# Sustainability Policy Themes

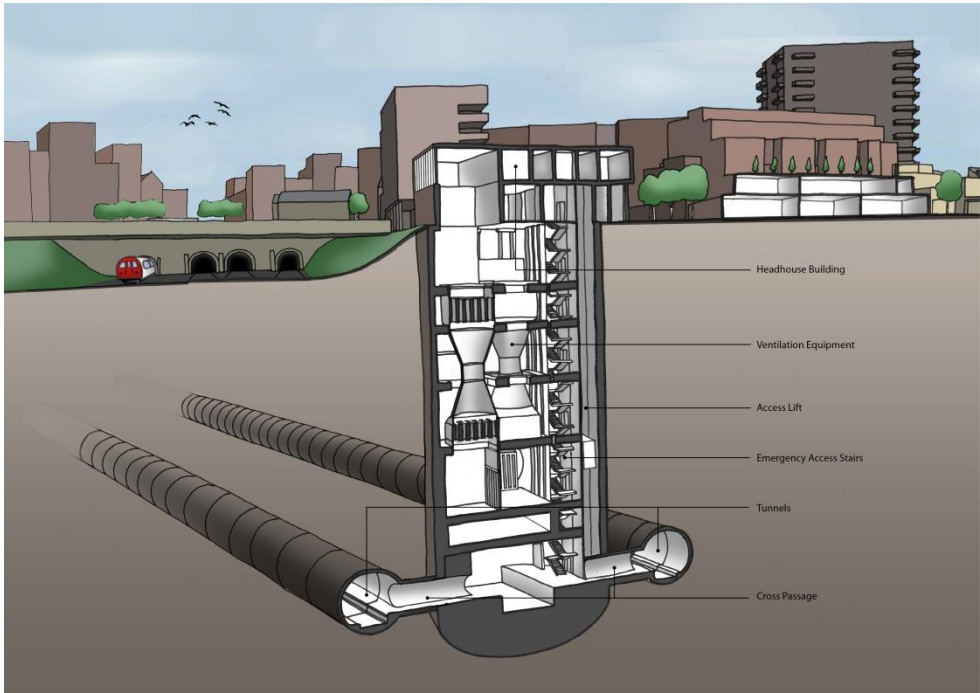
| | |
|---|---|
| **Growth and regeneration** | • Support Sustainable economic development and the localism agenda. |
| **Environmental change** | • Seek to avoid significant adverse effects on communities, business, and the natural, historic, and built environment. Minimise impacts where they occur and deliver enhancements as far as practicable to ensure there is no net loss to the natural environment. |
| **Skills and employment** | • Improve skills, jobs, education and the economy through out investment along the length of the route. Act as a driver for improvements in the sustainability of the engineering and construction sector. Promote diversity, openness and fairness. |
| **Climate change** | • Minimise the carbon footprint of HS2 as far as practicable and deliver low carbon long distance journeys that are supported by low carbon energy. |
| **Resilience** | • Build a network which is resilient for the long term and seek to minimise the combined effect of the project and climate change on the environment. |
| **Resources and waste** | • Source and make efficient use of sustainable materials, maximise the proportion of material diverted from landfill and reduce waste. |
| **Integrated transport** | • Engage with stakeholders to create seamless transport links with other modes and ensure accessibility for all. |

# A typical breakdown of embedded carbon for the construction of a high speed rail network



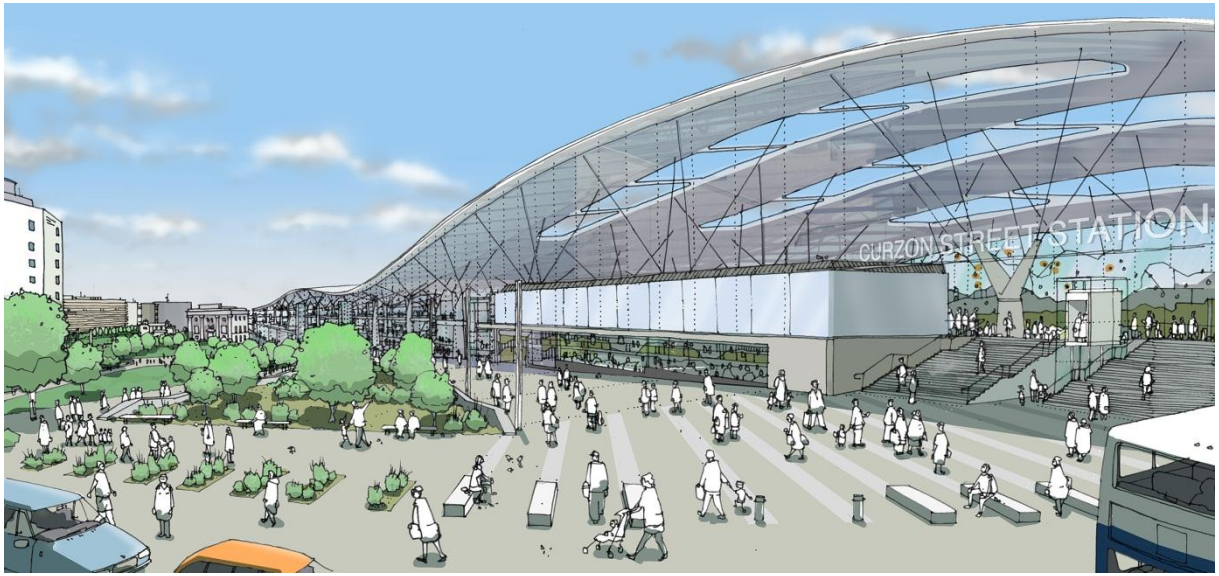
# Opportunities of reducing embedded carbon

- Develop materials with lower embedded carbon.
- Maximise opportunities to reuse excavated material on site and minimise transportation.
- Use 4-D modelling to plan efficient logistics using low carbon modes (such as rail).
- Build off site.



# Example 1: 'Sustainable' concrete

- Reducing CO2 by the reduction of cement through the increased use of cement replacement, such as PFA and GGBS.
- Increased use of recycled aggregate.
- Better prediction of strength gain using 'START'.



# Example 2: Re-use of excavated material

- Secondary treatment of unsuitable material to allow re-use in engineering works.
- Use in non-engineering mitigation earthworks.
- Construction integration and joined-up logistics.

# Example 3: Build off site

- Reduction in concrete compared to in-situ solutions.
- Produced in quality factory conditions results in reduced wastage and recycling of 'off-cuts'.
- Reduced transportation. Finished product only rather than larger workforce, plants and materials.

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# Sustainable case study: Greening the M25

James Richardson
Operations director, Skanska UK
5 November 2013

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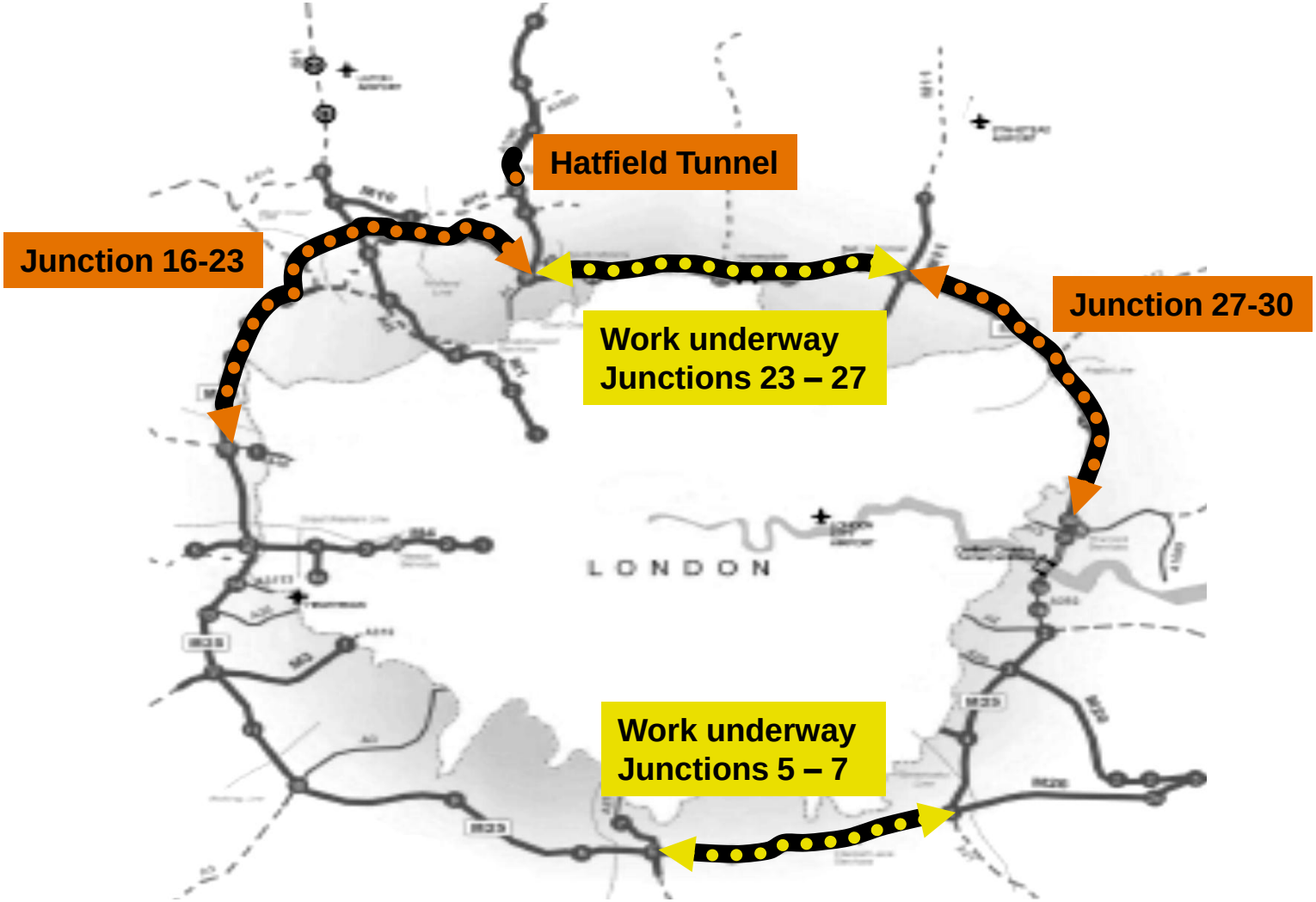
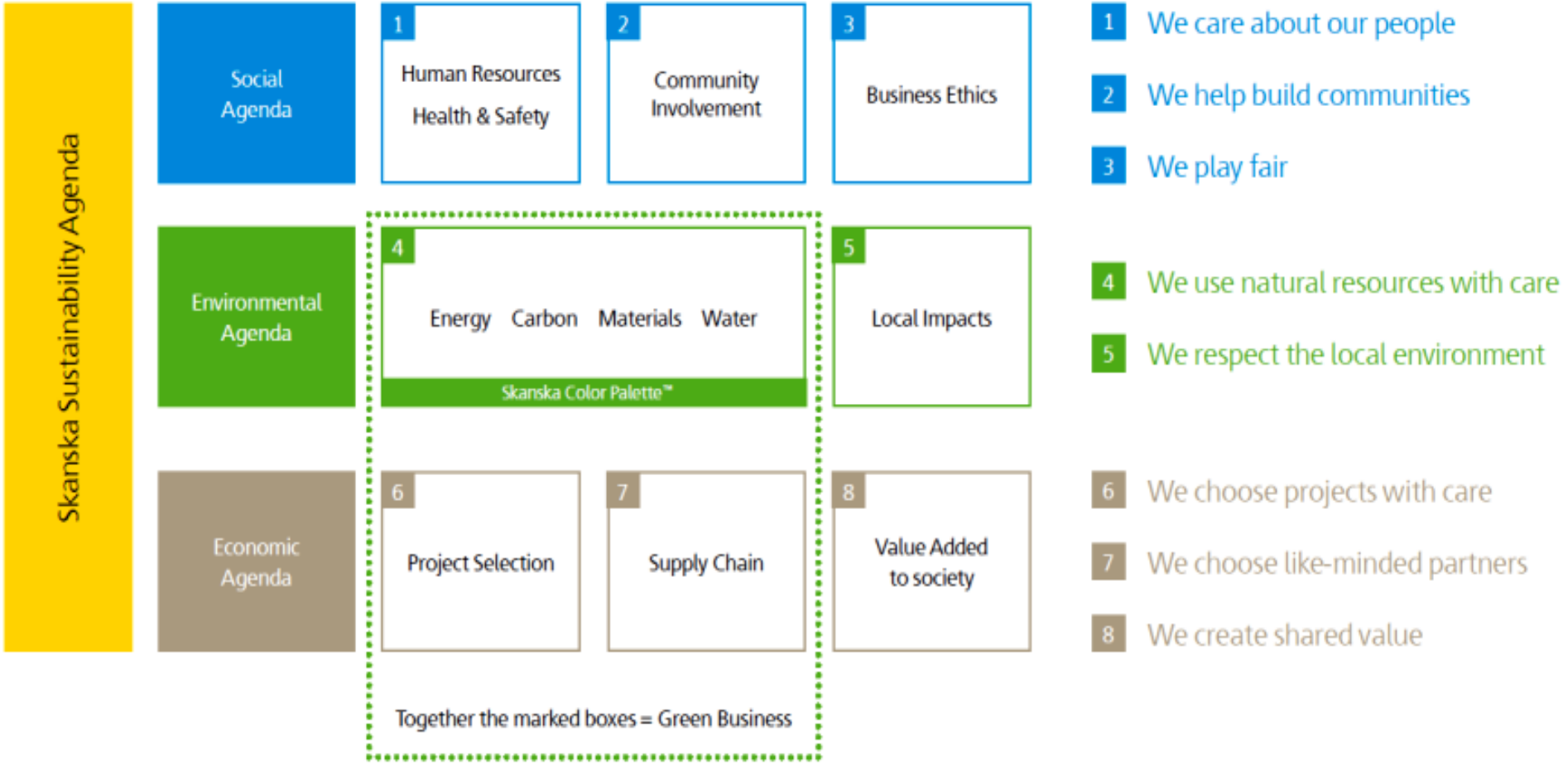
# M25 DBFO



# The M25 team


HIGHWAYS AGENCY
Balfour Beatty
ATKINS
Connect Plus
SKANSKA
egis projects
Developer of Infrastructure & Services
CJV Team
O&M Team
SKANSKA
Balfour Beatty
Balfour Beatty
Infrastructure Services
ATKINS
egis road operation

# Sustainability and Green



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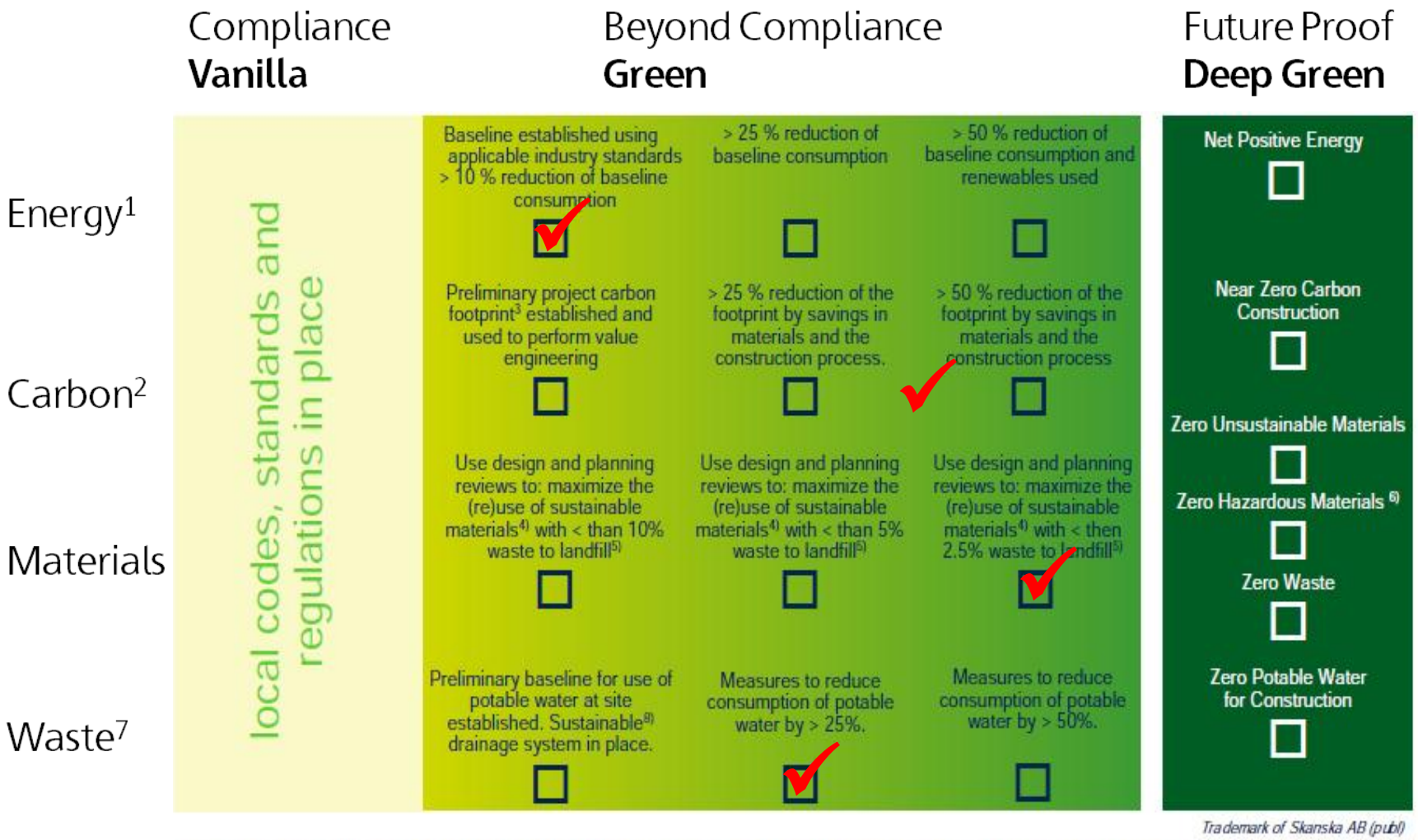
# Our Green Targets



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# Our approach to green on the M25

# Materials and waste

- **Design** out waste
- **Retain** inert waste on site; through work with EA and planning.
- **Challenge** specification to use non-primary sources; C&D waste, glass sand, PFA, IBA, road plannings

# Materials and waste

- Retention of 100% inert material on site
- 92% recycled/secondary content for aggregates
  - 2.4 million tonnes total
  - Surety of supply and quality
- Waste disposal **236**t/£100k **vs** UKCG target **8.11**t/£100k

carbon

cost

~35,000t ~£18m

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## Energy

9%

## Transport

14%

## Materials

76%


## Waste

1%

# Carbon

SUPPLY CHAIN SUSTAINABILITY SCHOOL

- Carbon management
- Sustainable procurement process
  - Work with the supply chain to reduce carbon
- Lean studies of transport movements
- Energy efficient technology
- Quarterly carbon targeting

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# Carbon

Recycled Aggregates

**35,000** t $CO_2$

Retaining walls

**45,000** t $CO_2$

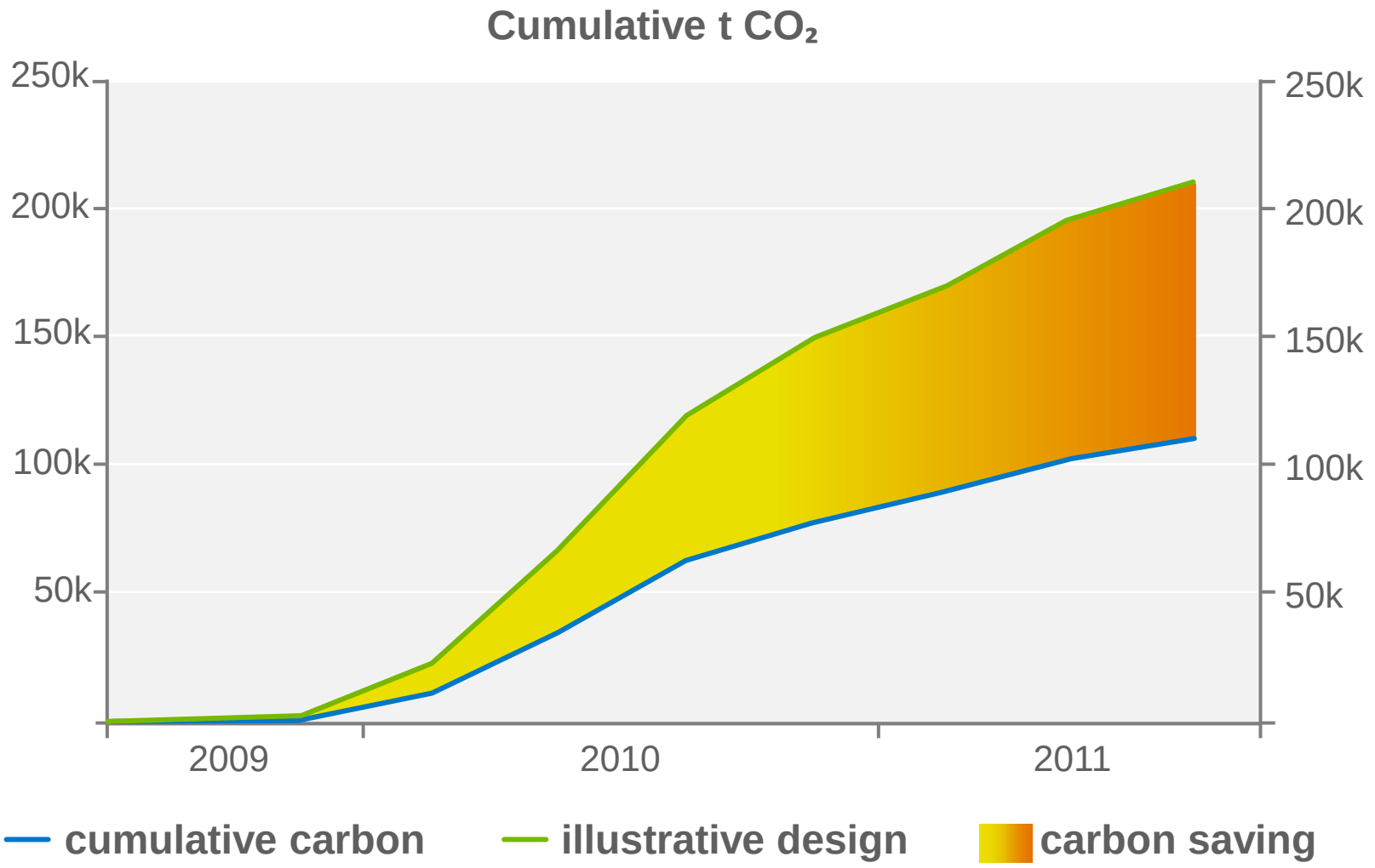
Environmental Barrier

**166** t $CO_2$

Concrete Barrier

**336** t $CO_2$

# Carbon


Cumulative t $CO_2$
250k
200k
150k
100k
50k
2009
2010
2011
cumulative carbon
illustrative design
carbon saving

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# Summary M25 DBFO

# Question to the floor

What are the key obstacles for delivering sustainable construction?

- *ISO/TSI standards, specifications etc;*
- *Client acceptance;*
- *Quality;*
- *Cost.*

# Question to the floor

Who do you consider has the greatest influence in delivering change?

- *Government/Industry bodies;*
- *Client;*
- *Supply chain.*