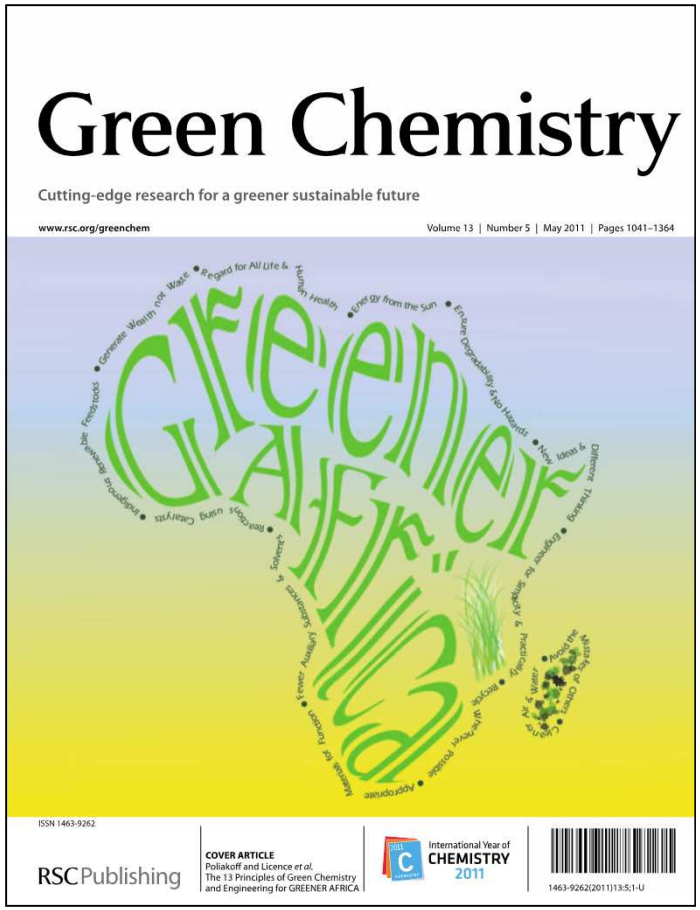

University of
Nottingham
UK | CHINA | MALAYSIA
gsk
Sustainable
Chemistry
@
Nottingham


University of
Nottingham
UK | CHINA | MALAYSIA
Chemistry: A global endeavour that delivers impact of real global significance through discoveries and the development of solutions to global challenges

The Twelve Principles of GREEN Chemistry

1. Prevention of Waste
2. Atom Economy (conservation of material)
3. Less Hazardous Chemical Syntheses
4. Designing Safer More Efficient Chemicals
5. Safer Solvents and Auxiliaries
6. Design for Energy Efficiency
7. Use of Renewable Feedstocks
8. Reduce Derivatives
9. Catalysis
10. Design for Degradation after Delivering Function
11. Real-time Analysis for Pollution Prevention
12. Inherently Safer Chemistry for Accident Prevention

(Anastas & Warner, OUP 1998)



University of Nottingham
UK | CHINA | MALAYSIA

University of Nottingham
UK | CHINA | MALAYSIA

Photo-Electro
Transforming Synthesis, Discovery, and Manufacture

EPSRC

Innovation – Process intensification

New reactions and atom efficient synthesis

Nature Chem., 2015, 7, 489–495

University of Nottingham
UK | CHINA | MALAYSIA

Howdle & Stockman

Innovation – Cleaner Processing

Unique opportunities in polymer synthesis

Polym. Chem., 2016, 7, 2882–2887

But what about our infrastructure?

Evolved with our science to maintain safe operations

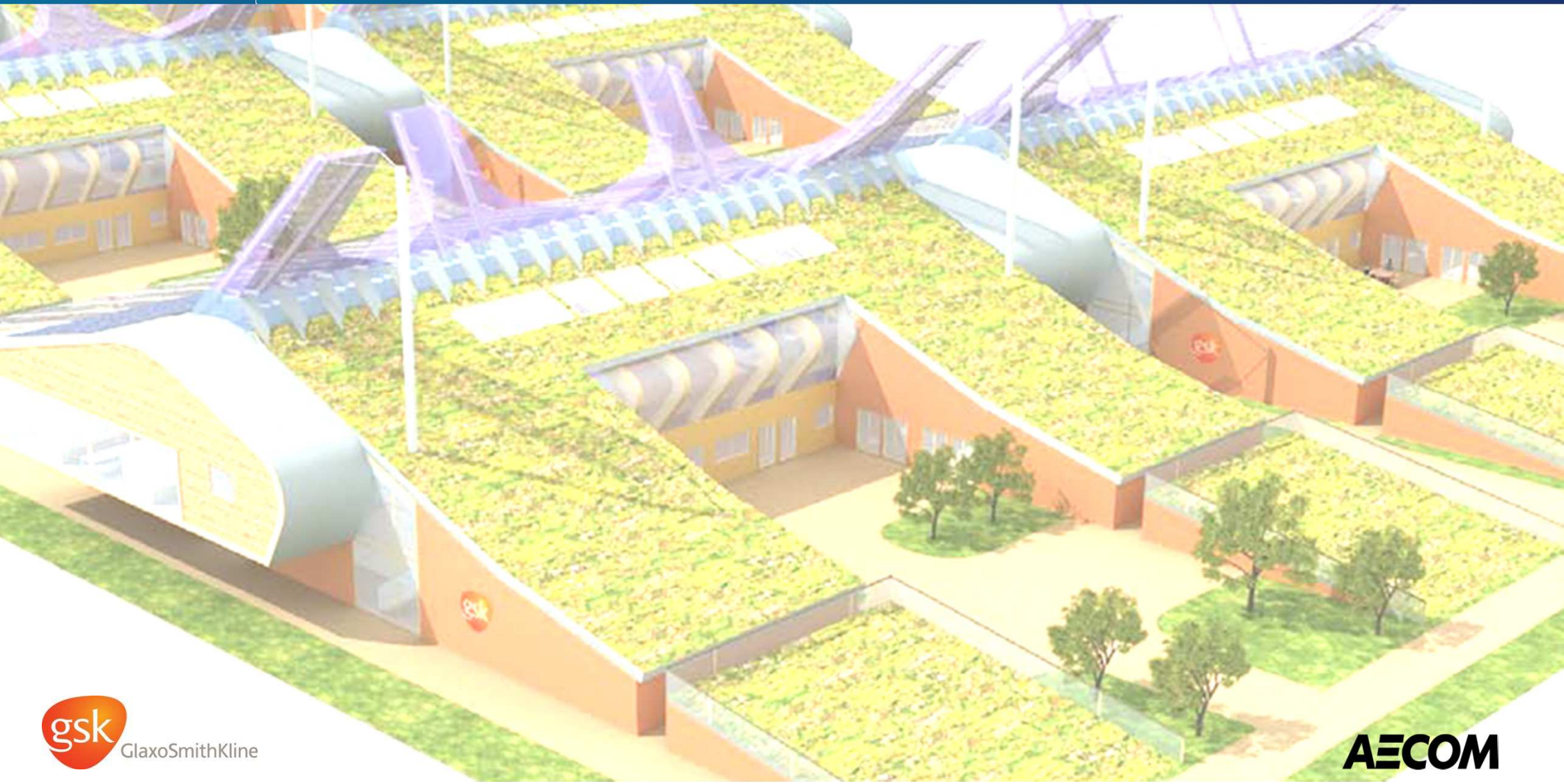
But what is the cost and the impact on our environment?

(Not talking about “our” molecules now)

William Brock 2017

University of Nottingham
UK | CHINA | MALAYSIA

GSK Sustainable Chemistry Laboratory - Key Concepts



gsk GlaxoSmithKline

AECOM

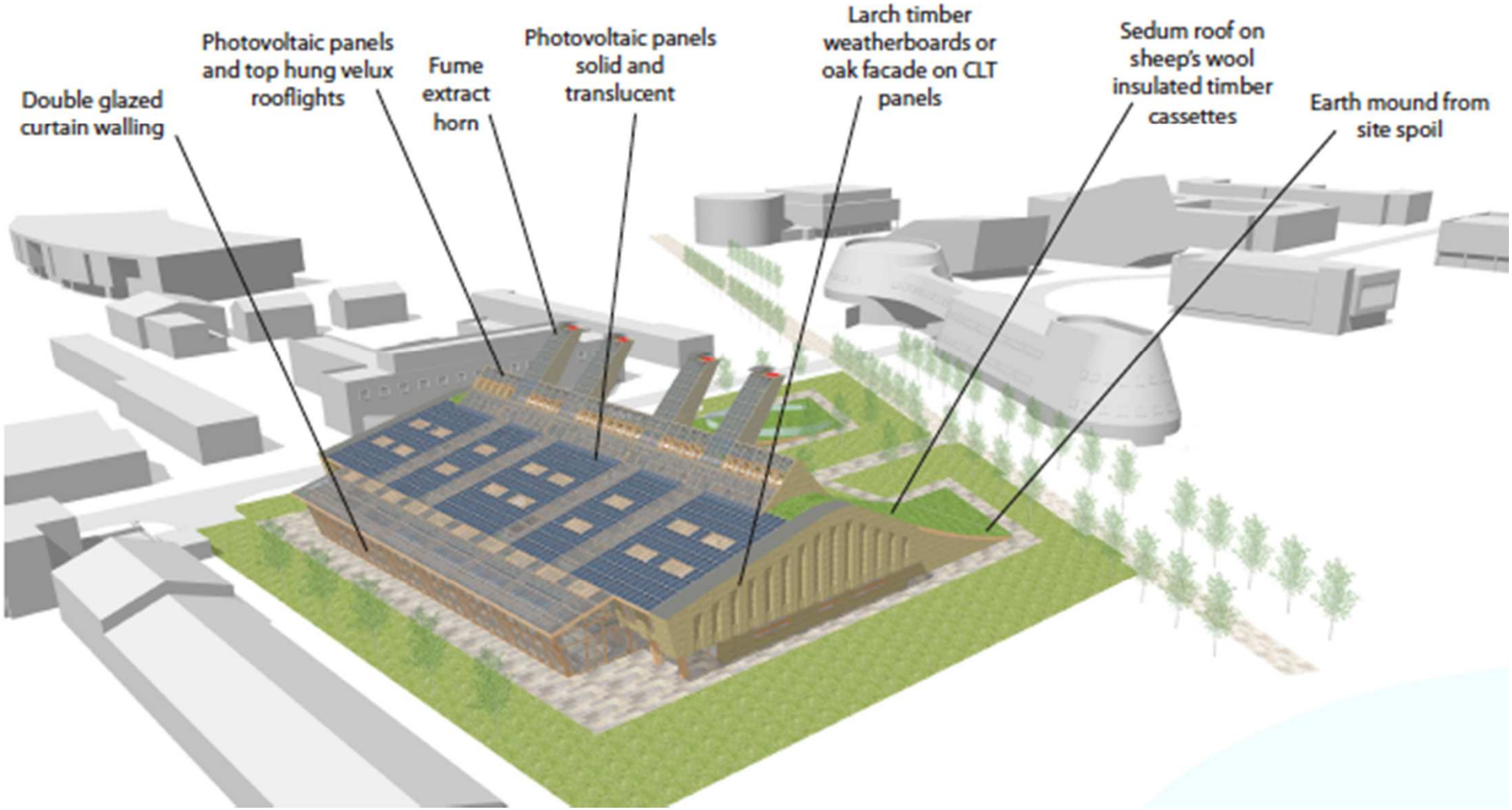
GSK Sustainable Chemistry Laboratory - Key Concepts

- Reduce Impact of Chemistry
- Inspire the next Generation

- Low impact construction materials
- Operational energy (??Fume Cupboards??)
- Renewables based energy supply

- Carbon neutral 25 years
- Lean construction methodology
- “Low impact” construction and operation
- Renewables based construction materials wherever possible
- Renewables based energy – Biomass / PV (Export of excess heat and power)
- BREEAM Outstanding and LEED Platinum
- Intelligent architecture (Function v’s Form), solar, wind and water
- Appropriate components throughout (engineering and labs)

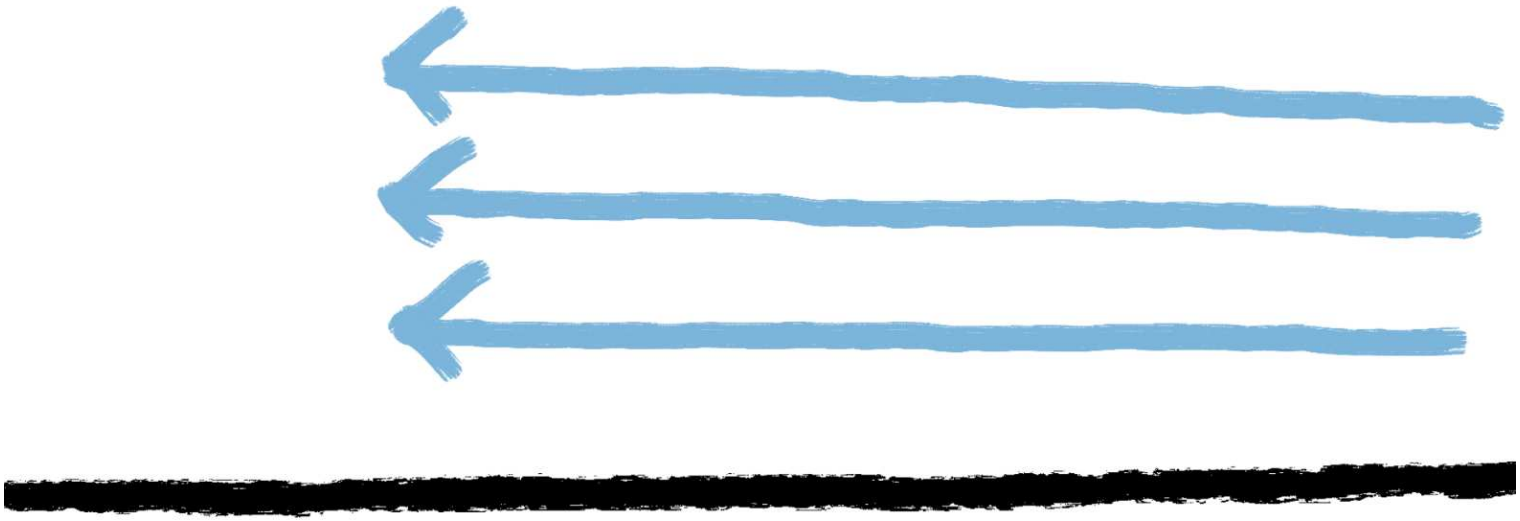
- Inspire next generation of leaders
- Define “better ways of working”



GlaxoSmithKline

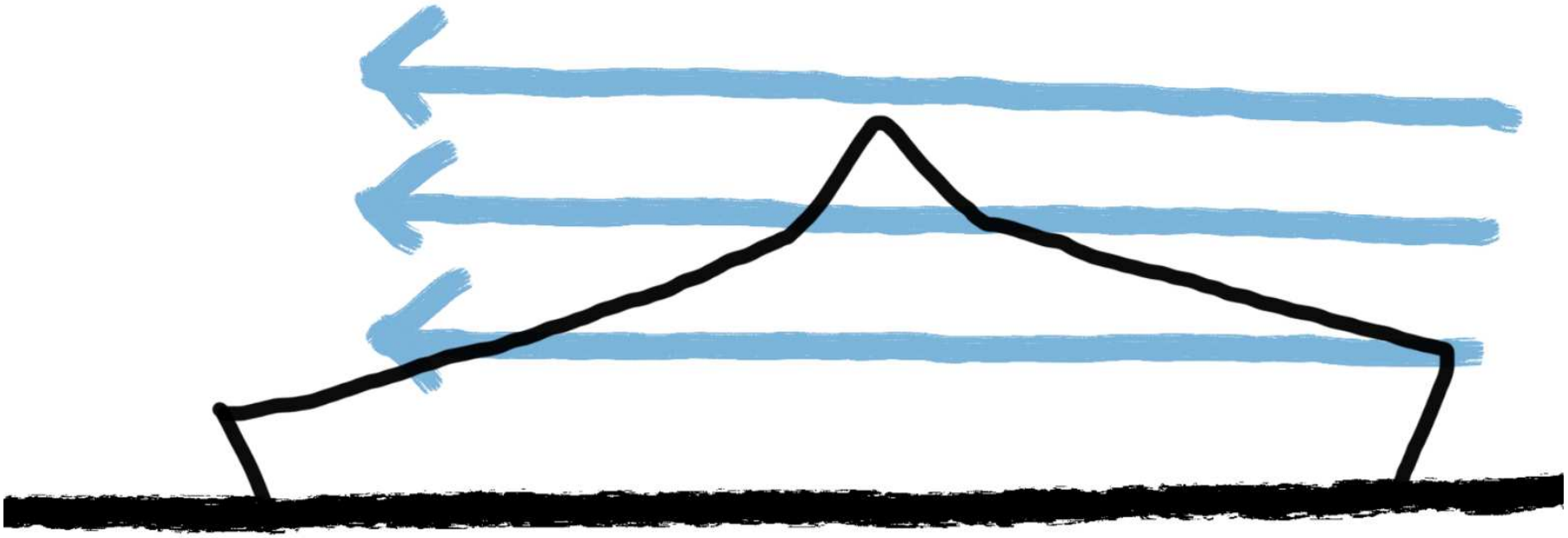
AECOM

The Concept – Wind Driven Ventilation



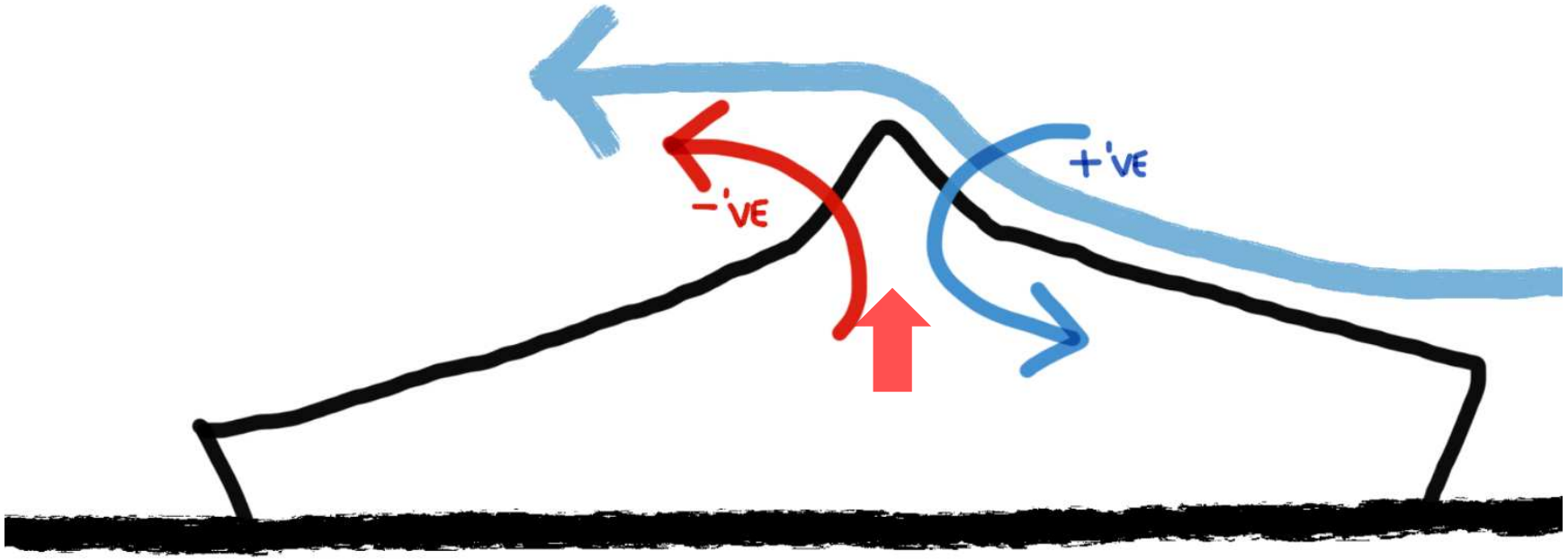
fairhursts design group

The Concept – Wind Driven Ventilation



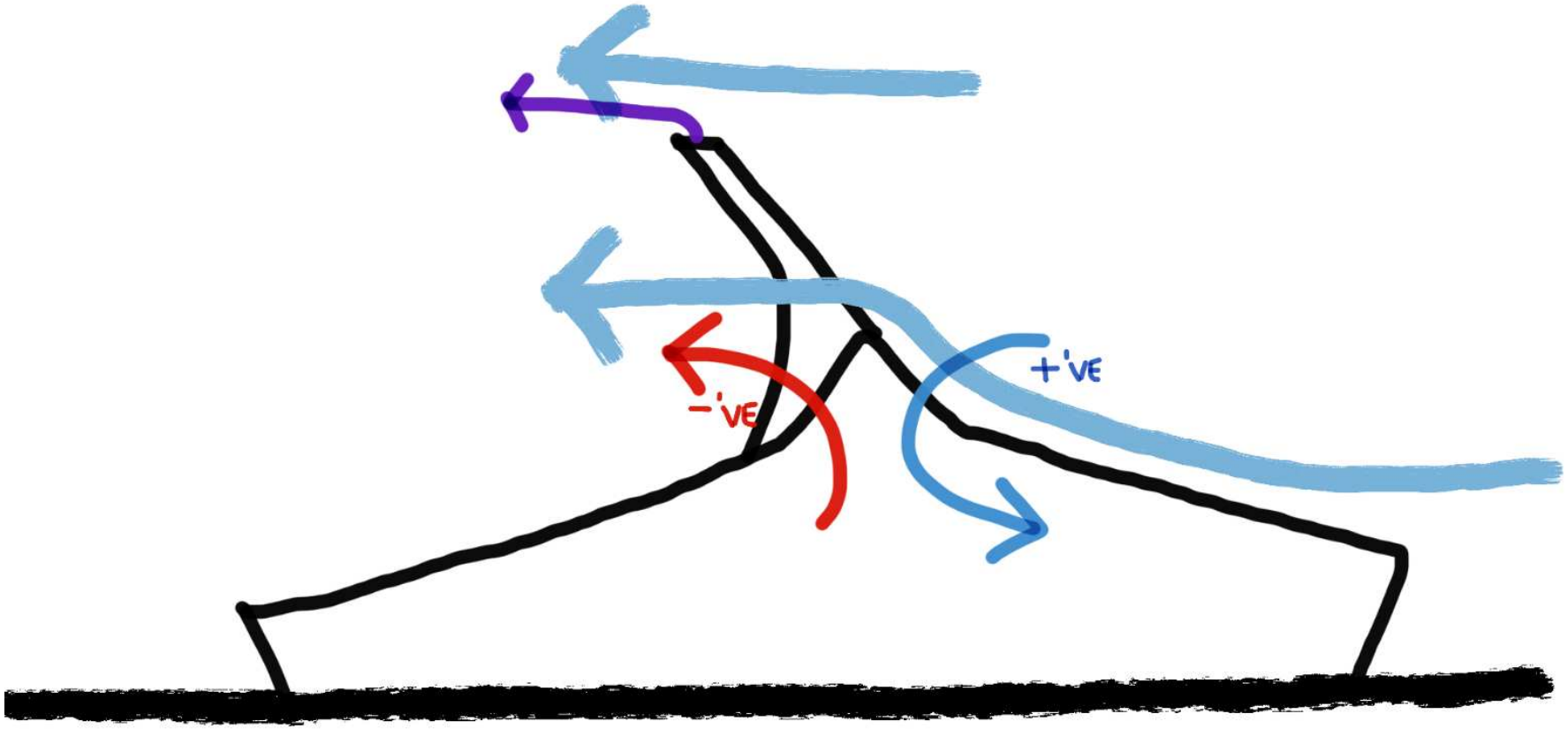
FDG
fairhursts design group

The Concept – Wind Driven Ventilation



fairhursts design group

The Concept – Wind Driven Ventilation

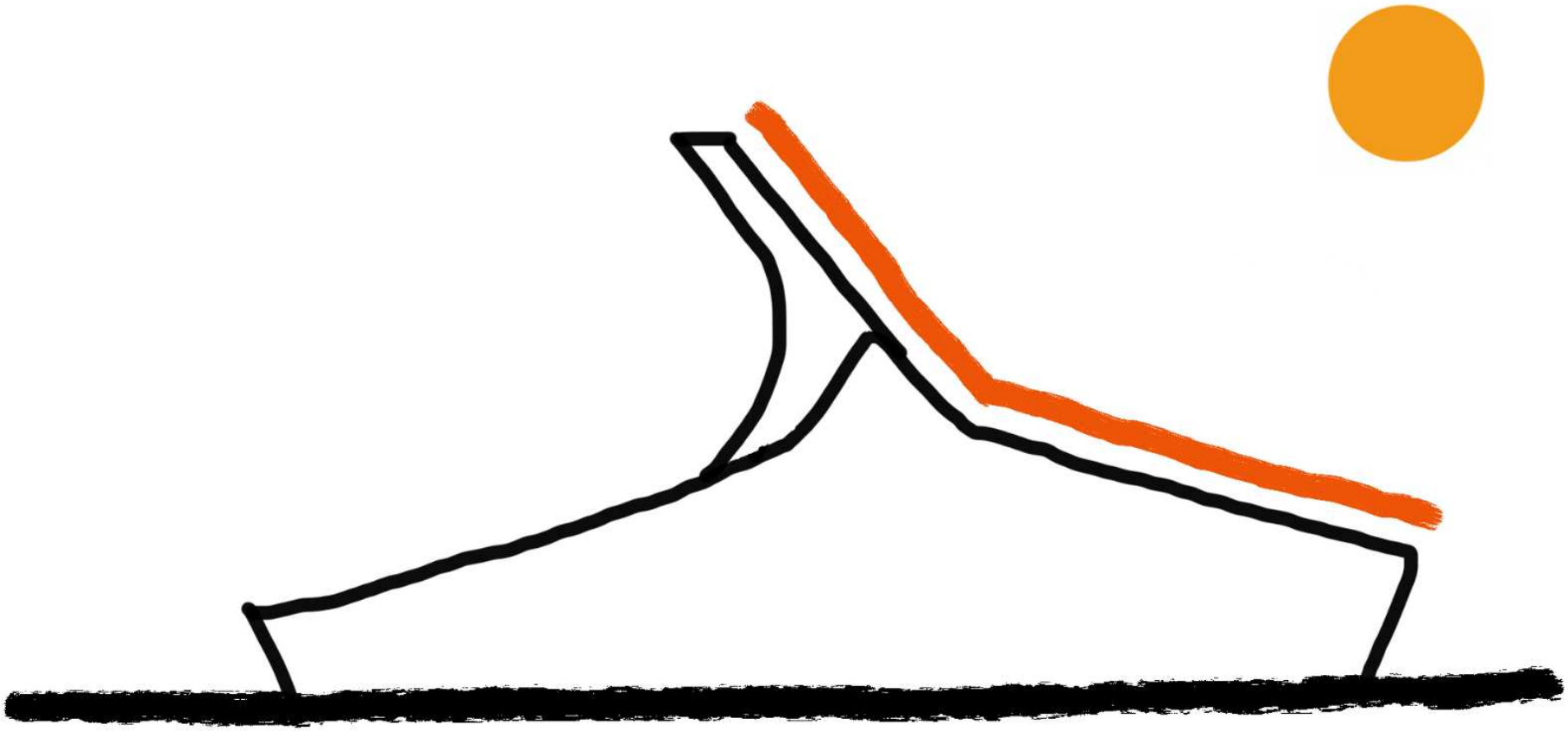


fairhursts design group

The Concept – Wind Driven Ventilation

fairhursts design group

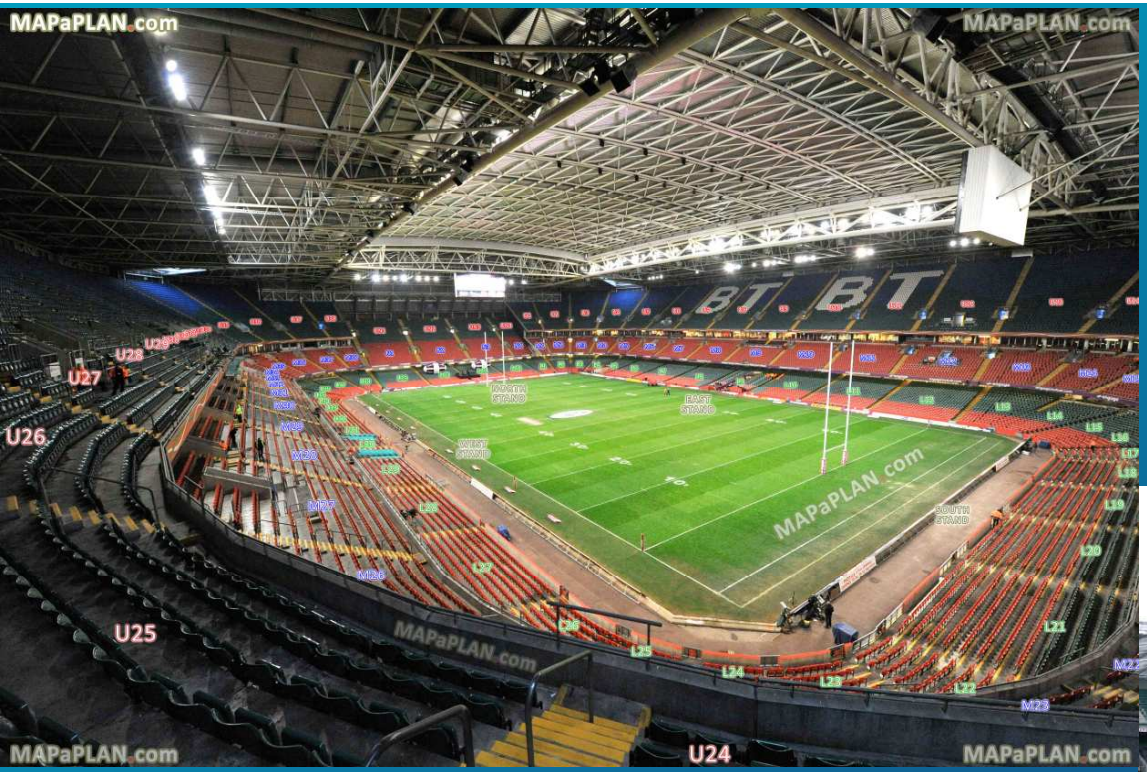
The Concept – Renewable Energy



FDG
fairhursts design group

1,396.5 Tn Timber

Approx 100 mature alpine spruce (*picea abie*)



Approx. 3 Hectares
2 rugby fields
(Stadia not included)

Approx 100 mature alpine spruce (*picea abie*)

Energy Consumption is just 32% when compared to a traditional design laboratory of equivalent size/activity

Energy Performance Certification A+
Reduced Water Consumption by 45%
No Compromise on Scientific Facilities or Activity

120 FTE researchers, Fully Instrumented
NMR spectrometers etc , He recovery…..


The University of Nottingham
UNITED KINGDOM • CHINA • MALAYSIA
The GSK Carbon Neutral Laboratories for Sustainable Chemistry
gsk