





edge environment

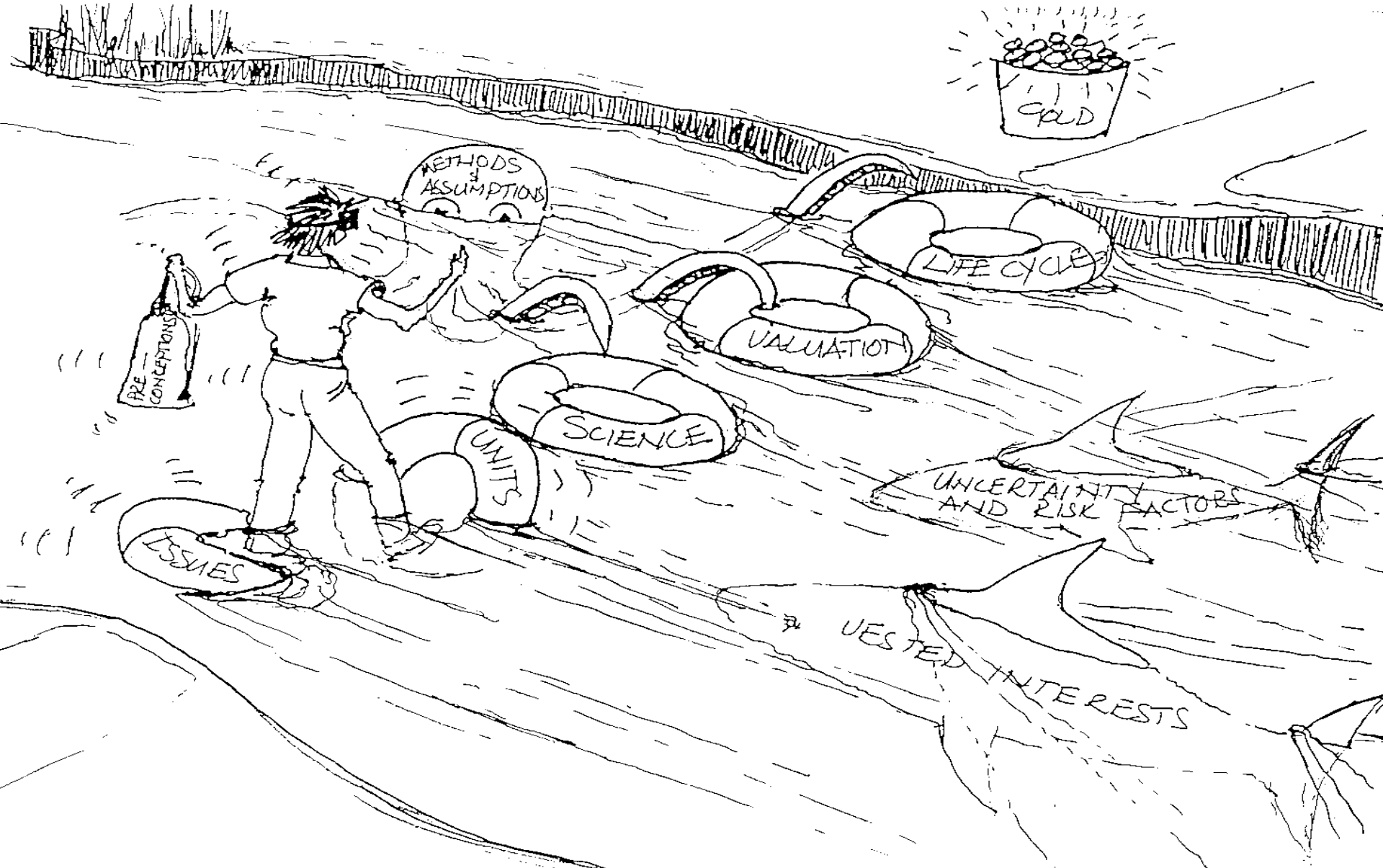
# **Materials & Resources Credits for AGIC Rating Tool**

Nigel Howard



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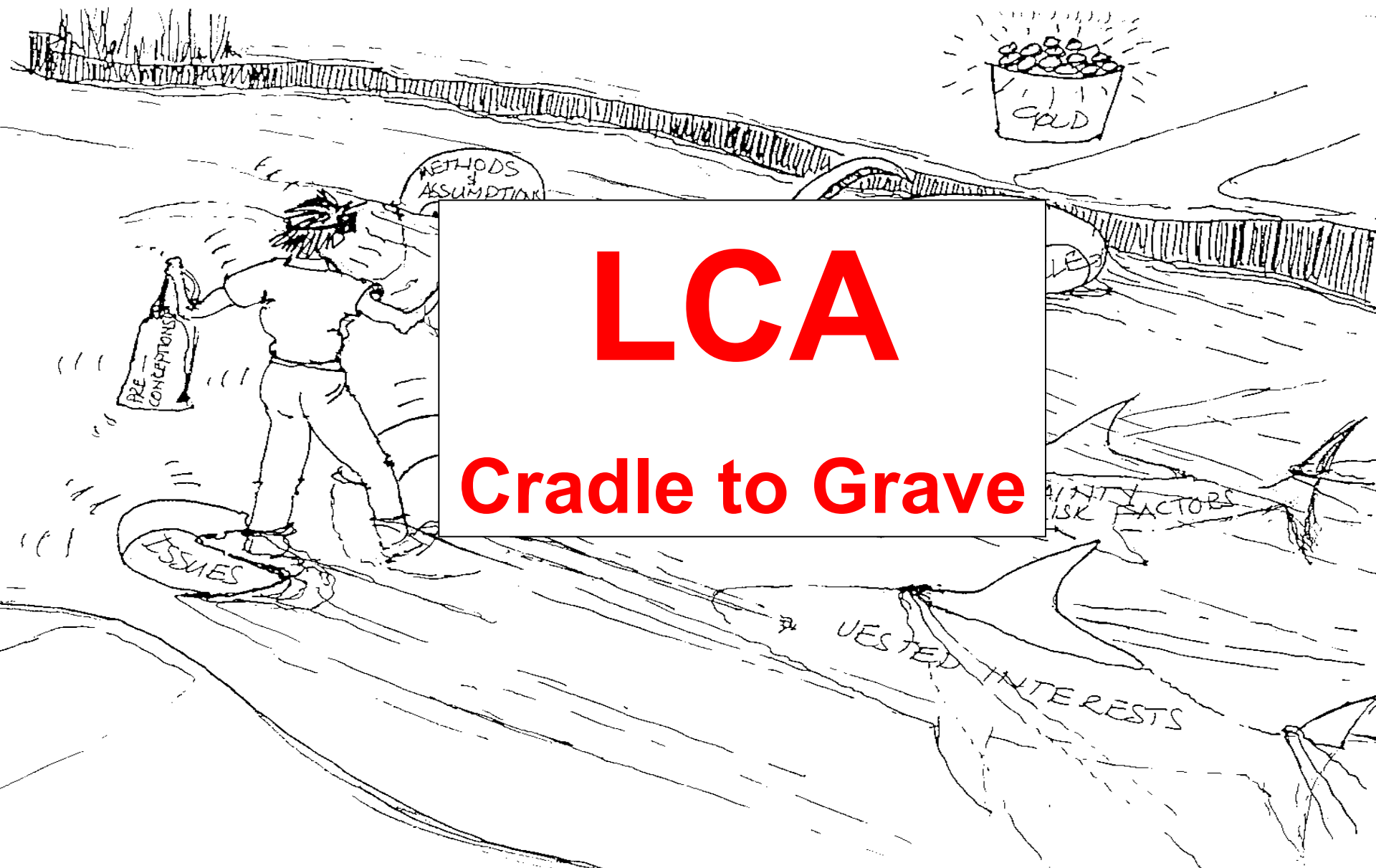
# Environmental Assessment





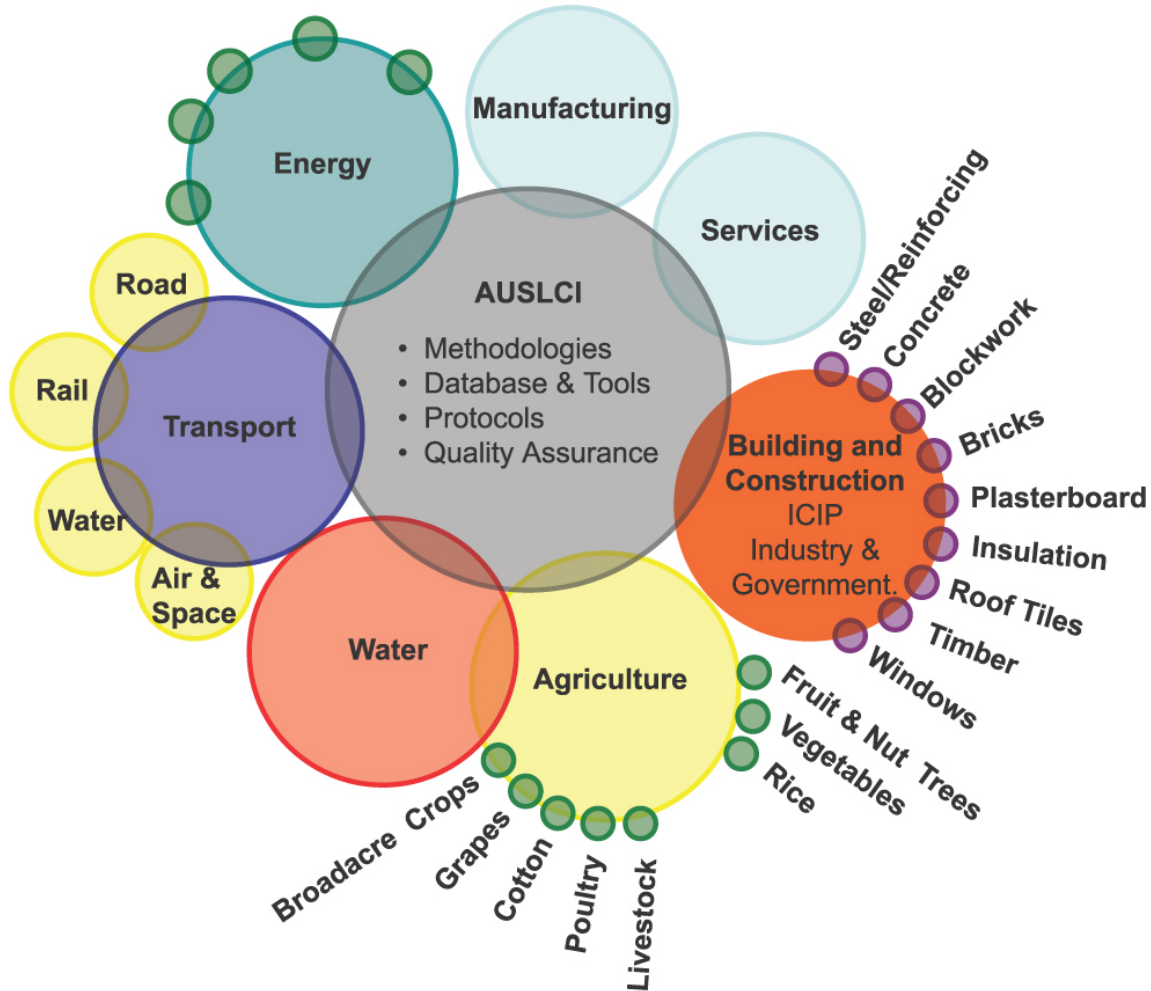
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# Environmental Assessment

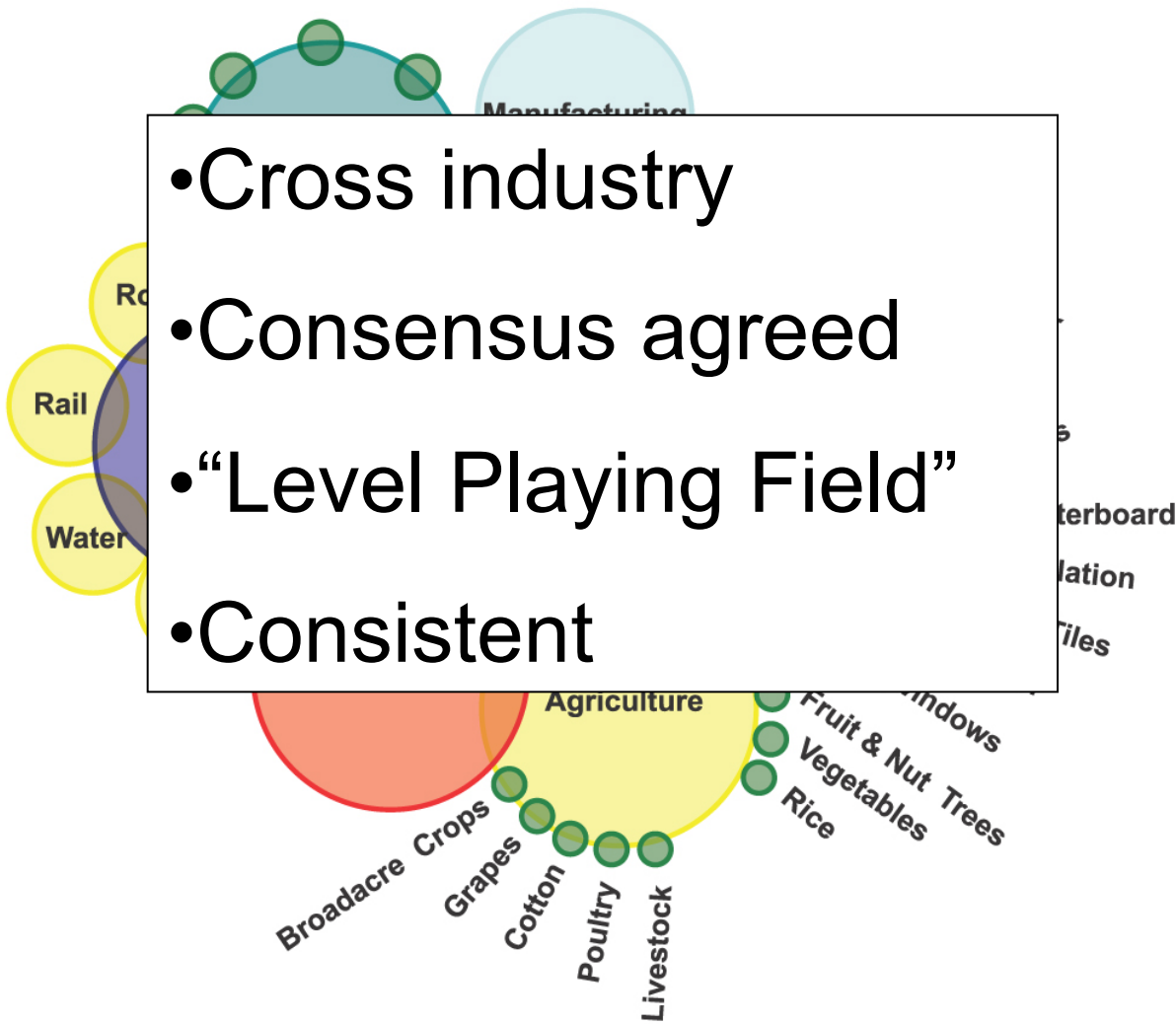


**LCA**  
**Cradle to Grave**

# Product Supply -ALCAS/ AusLCI



# Product Supply -ALCAS/ AusLCI

- 
- Cross industry
  - Consensus agreed
  - “Level Playing Field”
  - Consistent



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# BPIC/ICIP Project

- **Building Products Innovation Council:**
  - ASI, AWA, CCAA, CMA, GBMA, IMAA, RTAA, SRIA, Think Brick, WCA
  - **50% industry funding**
- with:
  - Australian Life Cycle Assessment Society
  - CSIRO
  - BRANZ (Edge Environment)
- Department of Innovation Industry Science and Research – 50% government funding



# Outcomes

- Consensus agreed consistent methodology for assessing building/construction materials and products:
  - Inventory data
  - Impact assessment:
- Database of 150+ Life Cycle Inventory unit processes
- Protocol for the correct use of the data
  - Functionally equivalent comparisons over the full life (of buildings)
- Cleaning, maintenance, replacement life database (for buildings)

# Where the Industry is - Infrastructure Projects

- Tulla Sydney Alliance – Materials Innovation
- LineOne CBD Metro bid contribution – LCA of Construction Impacts
- NSW RTA Greenhouse gas Inventory Tool Emission Factors Review
- Hunter Expressway M5 Extension – Energy and GHG Assessment
- AGIC Materials Selection & Use
- “Greenhouse Gas Assessment Workbook for Road Projects”. Australian state road authorities and NZ Transport Agency - Transport Authorities Greenhouse Group

# Where Industry is – Infrastructure Providers

## Infrastructure Project

Roads

Rail

Bridges

Tunnels

Ports, Wharves and Marinas

Aiports

Gas Distribuiton

Water Transmission

Electricity Distribution

Telecommunications

Water Supply

Wastewater Treatment

Waterway and Foreshore Management

Civil head works for industrial processes



# Where Industry is – Infrastructure Providers

## Infrastructure Project

Roads

- Little consideration for Materials environmental impacts
- Roads, Water, Rail
- Main consideration – Greenhouse Gases

Water Supply

Wastewater Treatment

Waterway and Foreshore Management

Civil head works for industrial processes



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# Where the Industry is:

- Supply Side
  - Great methodology
  - Great Data
  - 16 Impact categories
  - Ready to go
- Demand side
  - Carbon assessment of Roads
  - Carbon assessment of Water Infrastructure

Disconnect the  
problem and the  
opportunity



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# Where the Industry is:

- Supply Side

- Great methodology
- Great Data
- 16 Impact categories
- Ready to go

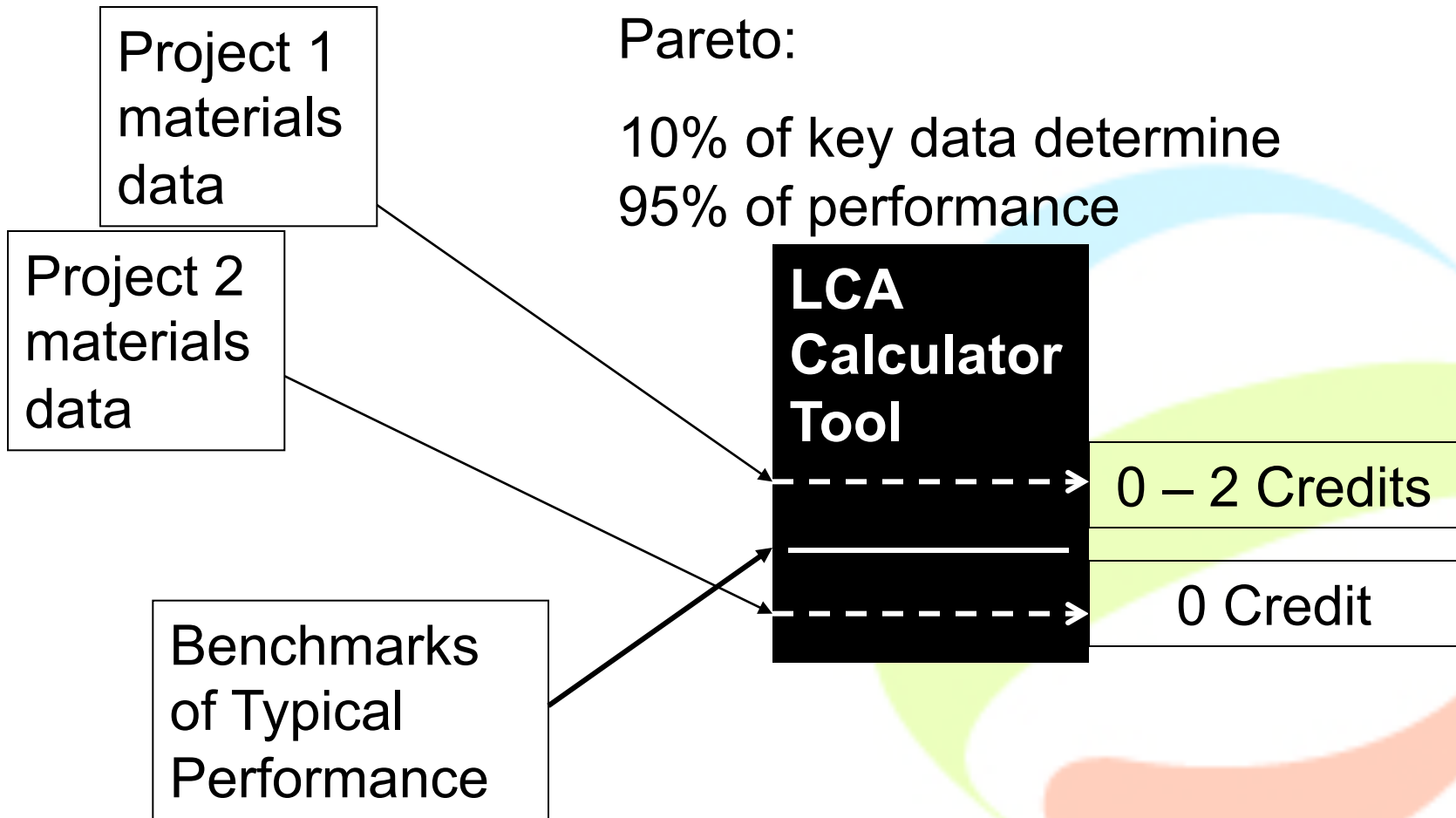
- Demand side

- Carbon assessment of Roads
- Carbon assessment of Water Infrastructure

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# AGIC Materials Credits – The Vision



# Materials Transport (often) Matters

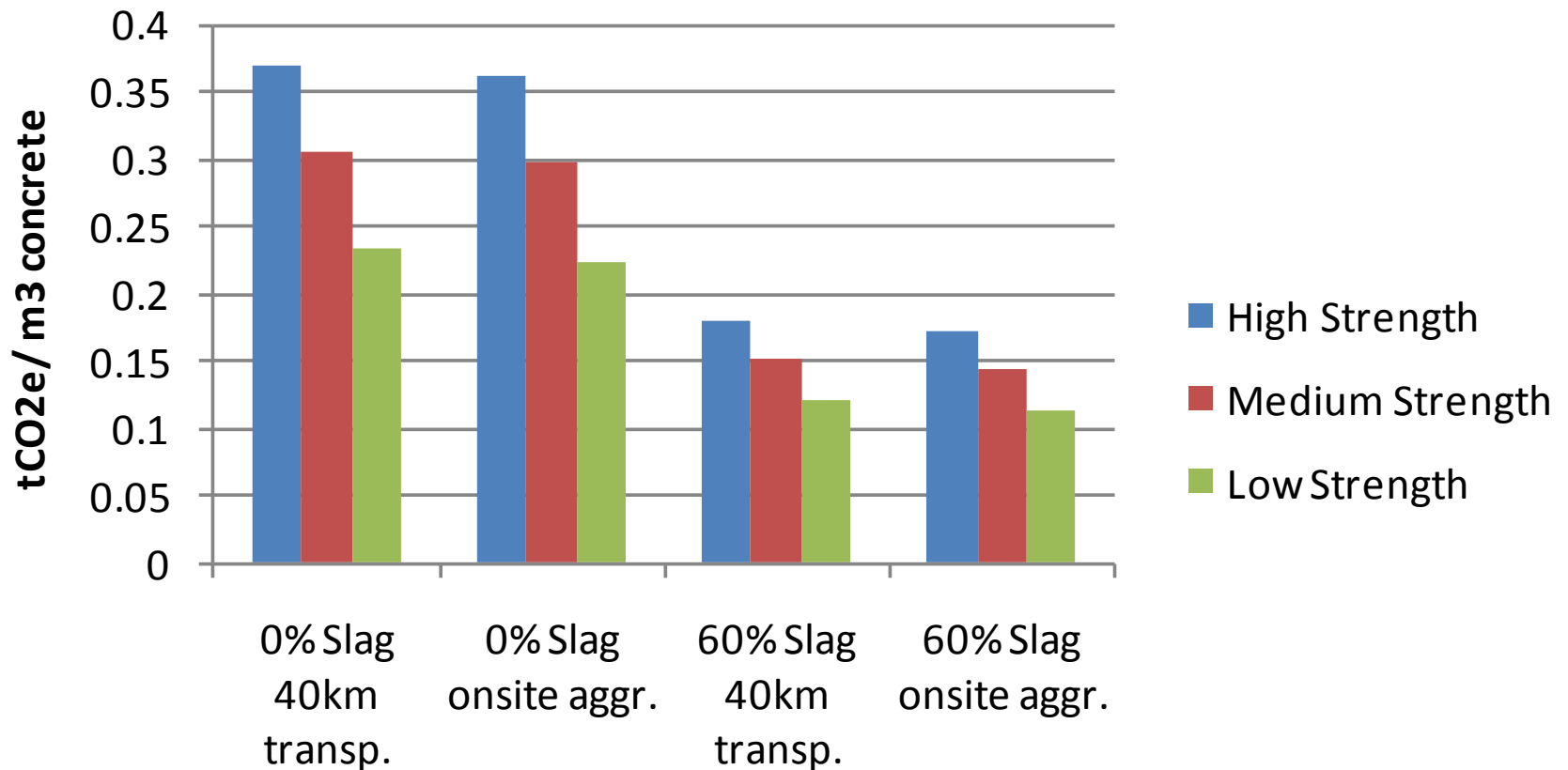
- Transports to Sydney

Construction Materials	tCO2e/t	
Imported fill	0.002	Transport always significant
Coarse aggregate	0.017	Transport always significant
Fine aggregate	0.017	Transport always significant
Ground granulated BFS	0.046	Transport always significant
Blast furnace slag	0.046	Transport always significant
Steel furnace slag	0.046	Transport always significant
Fly ash	0.134	Transport always significant
Bitumen	0.434	< 10% unless trucked from Newcastle, by rail from Adelaide or ship from NZ
Steel (recycled)	0.717	< 10% unless trucked from Port Macquarie, by rail from Perth or shipped from NZ
Cement	0.804	< 10% unless trucked from Port Macquarie, by rail from Perth or shipped from NZ
Lime	1.200	< 10% unless trucked from Melbourne, by rail from Perth or shipped from Shanghai
Aluminium (recycled)	1.372	< 10% unless trucked from Melbourne, by rail from Perth or shipped from Shanghai
PVC	2.200	< 10% unless trucked from Adelaide or shipped from Europe
Steel	2.350	< 10% unless trucked from Adelaide or shipped from Europe
Copper	6.200	< 10% unless trucked from Perth (ship and rail transports very little impact)
Aluminium	22.400	< 10% unless trucked from Perth (ship and rail transports very little impact)



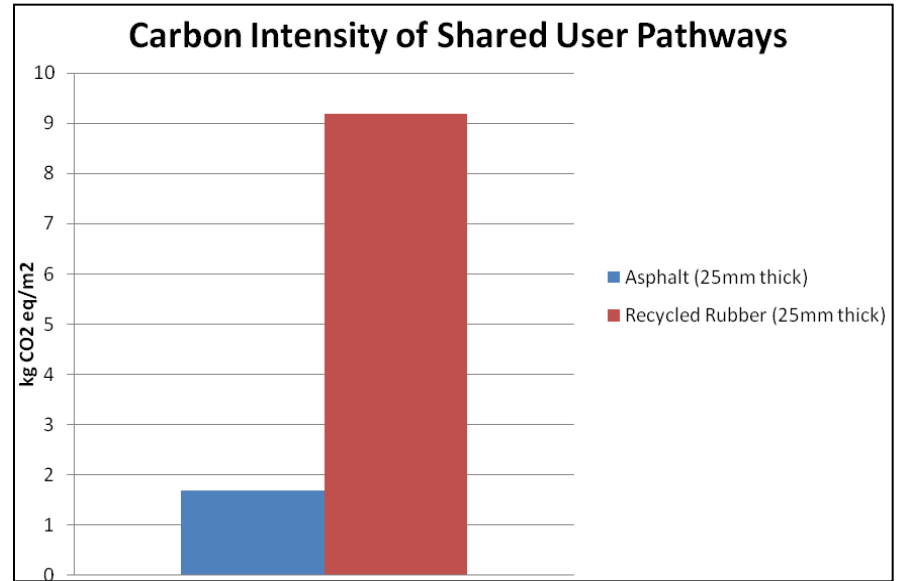
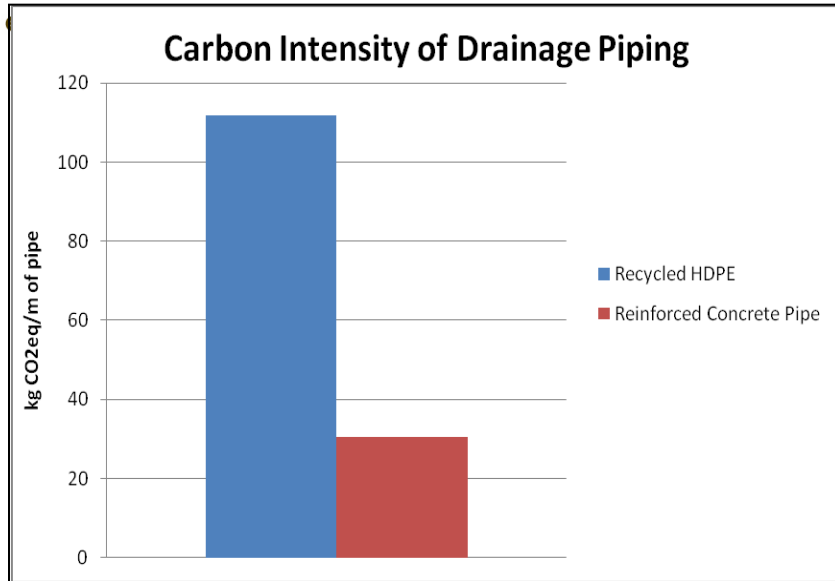
# Material Substitution Matters

## Carbon Intensities of Concrete

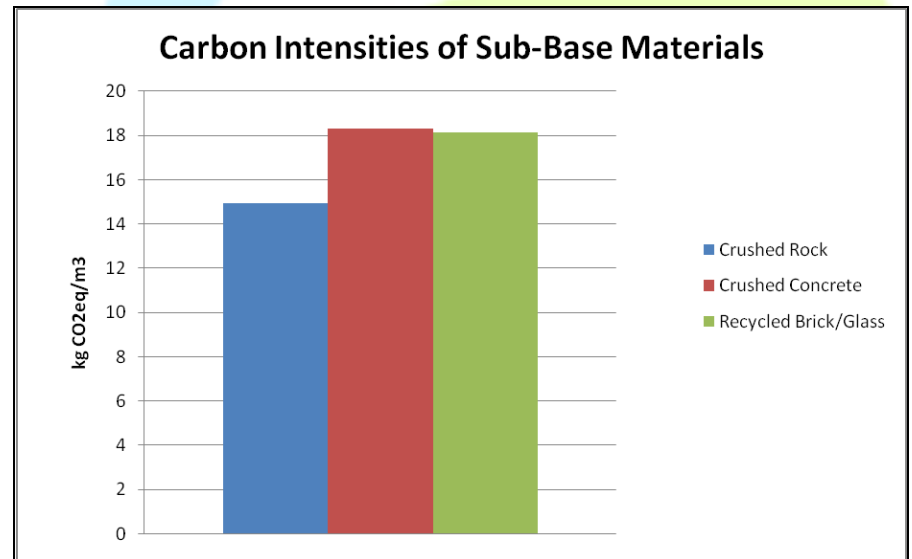




# Carbon Intensity of Road Materials

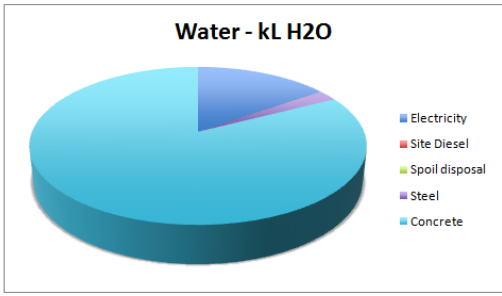
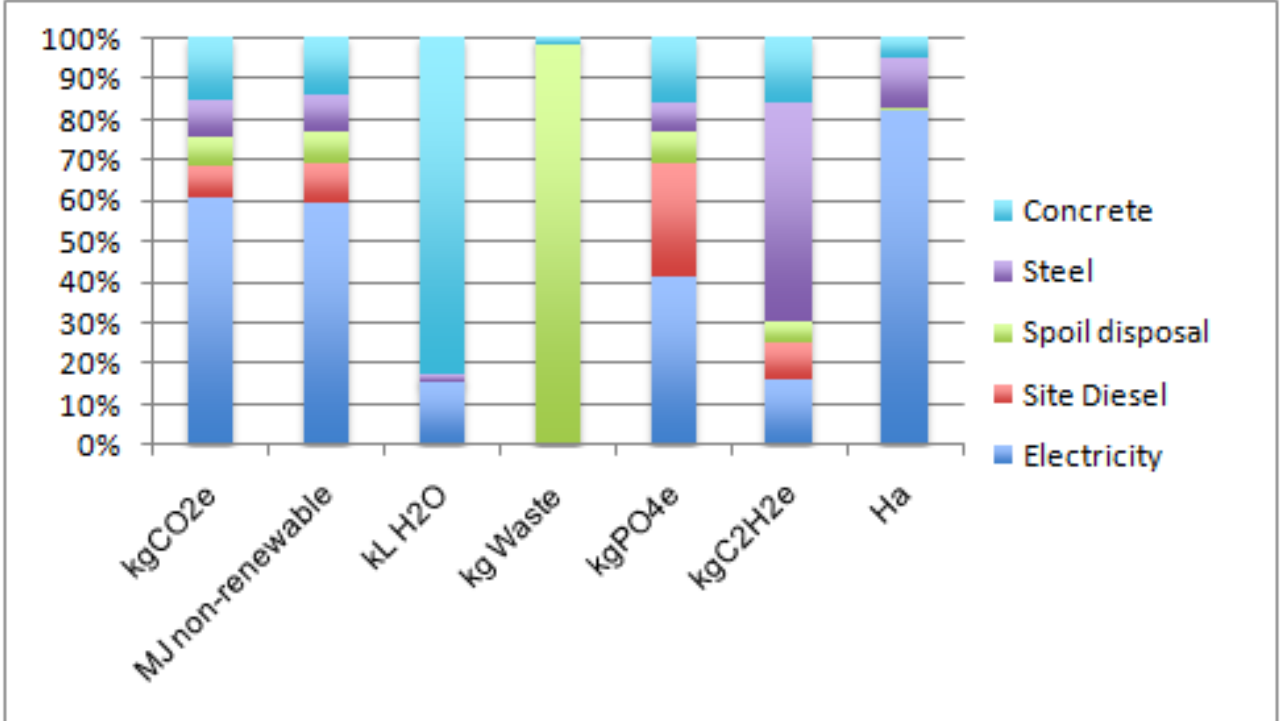
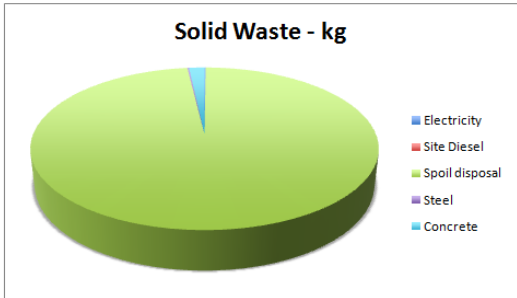
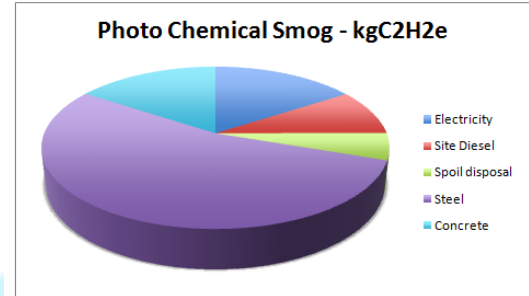
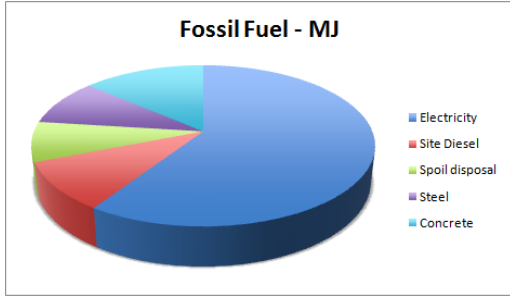
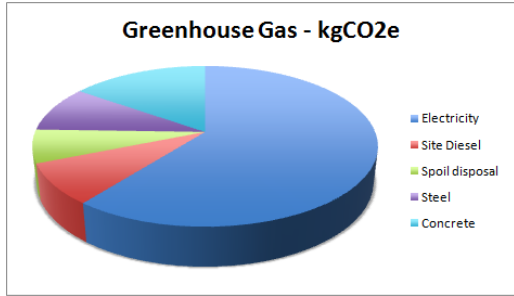


Recycling is not always good for the environment in infrastructure



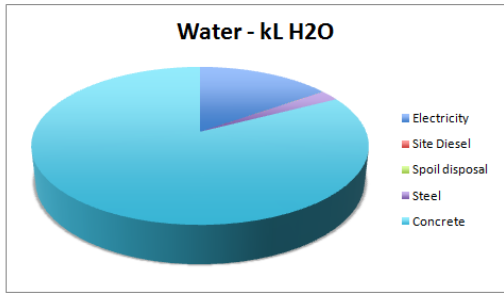
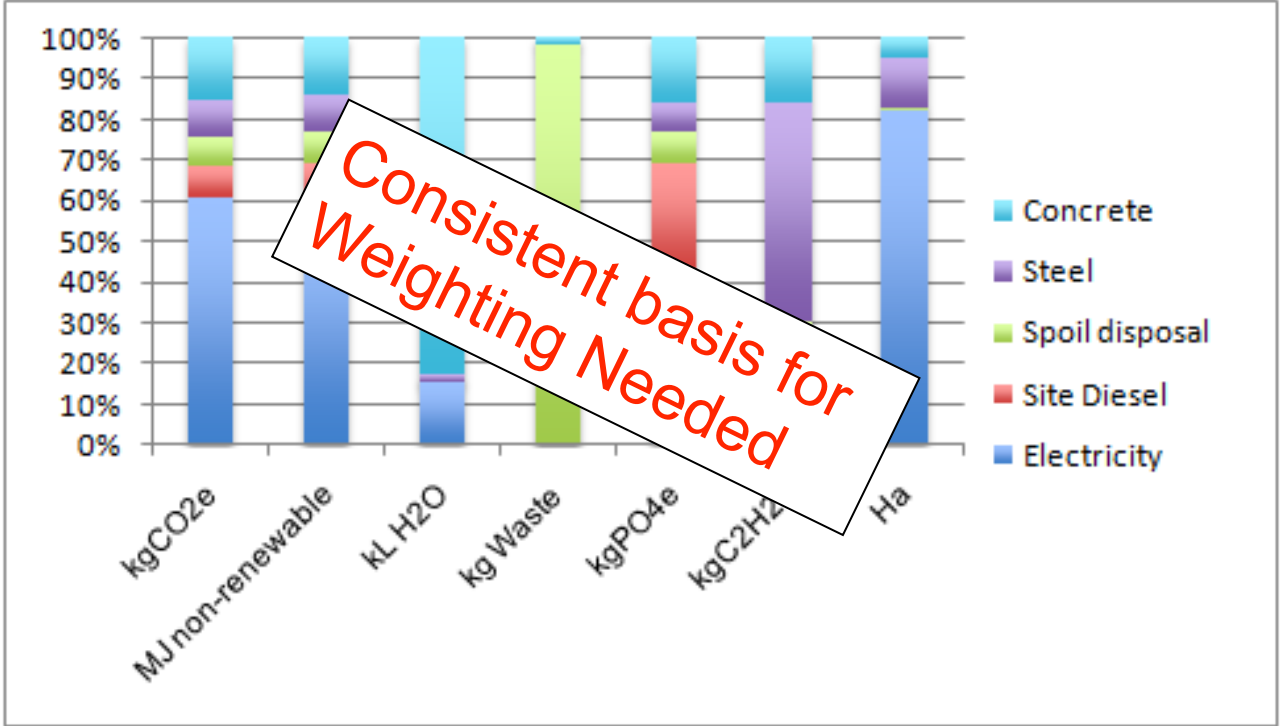
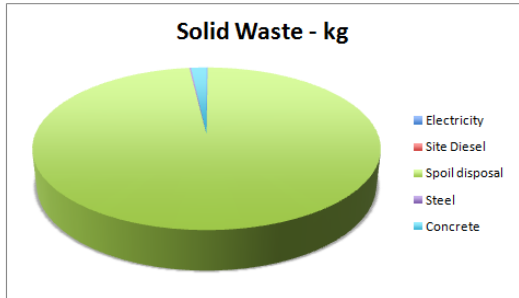
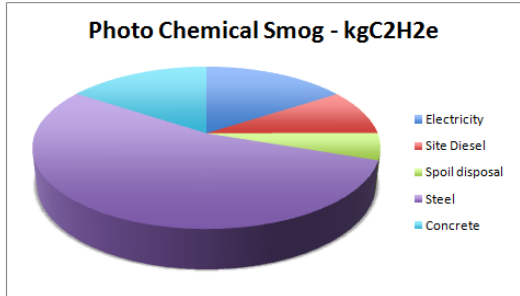
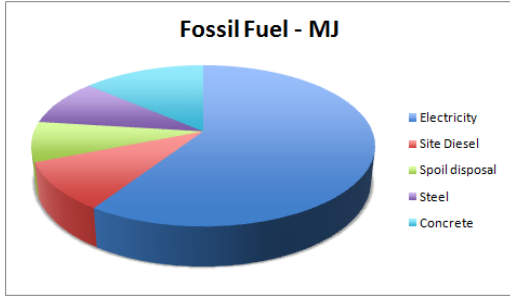
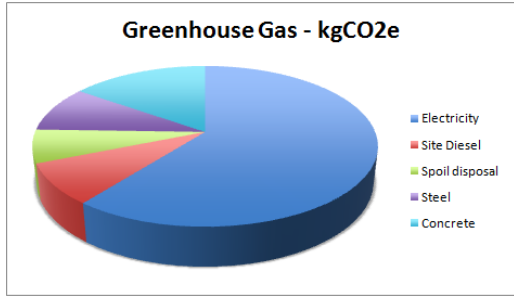
# Project: LineOne - CBD Metro

## Assessing more than Carbon



# Project: LineOne - CBD Metro

## Assessing more than Carbon





# Key Data

- Largest Mass materials and/or
- Largest impact materials
- Plus Transport of materials and spoil (where it contributes significantly)
- Favours material efficient projects
- Favours cut and fill
- Favours on-site recycling

# AGIC Materials Credits – The Vision

Pareto:

10% of key data determine  
95% of performance

Project 1  
materials  
data

Project 2  
materials  
data

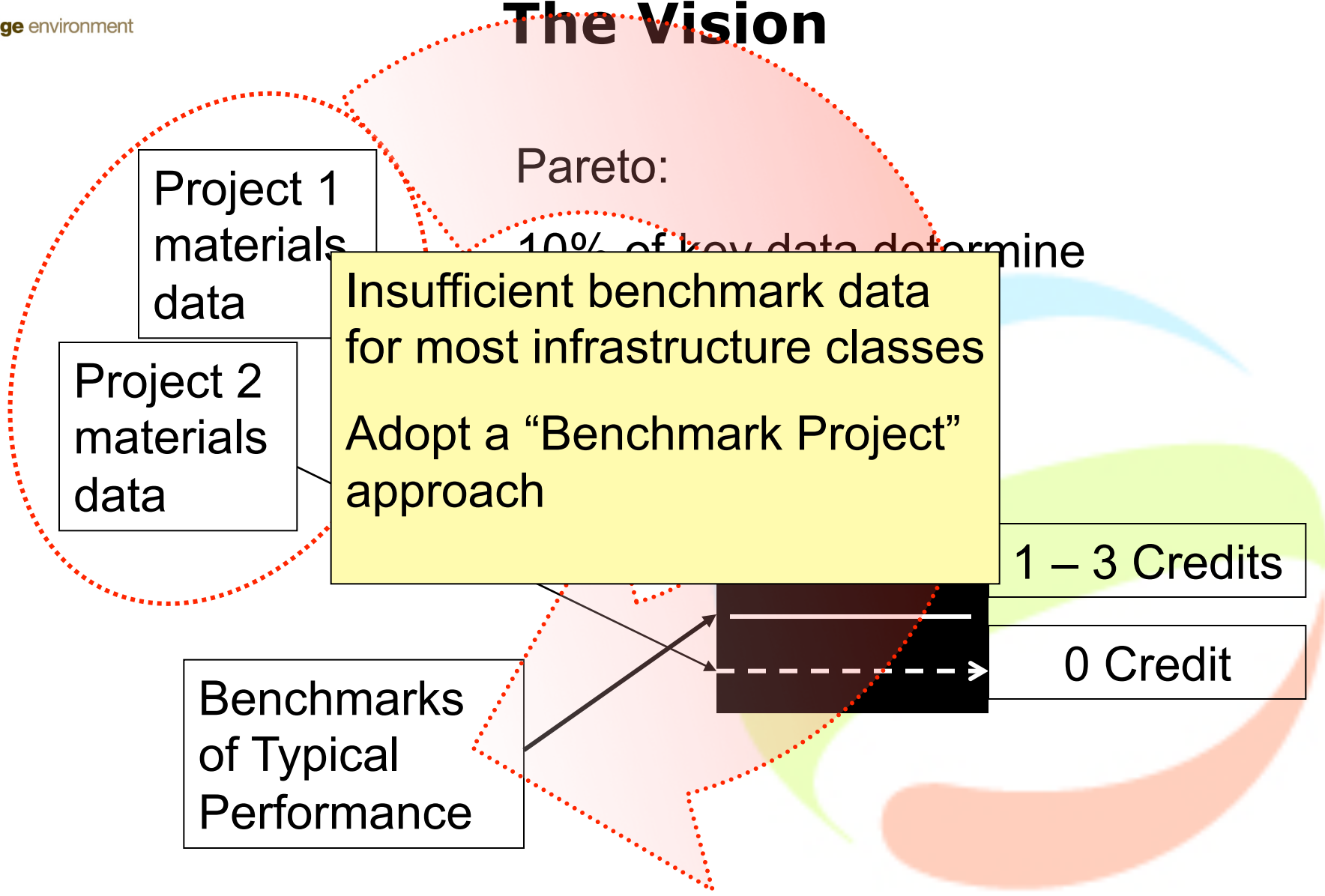
Benchmarks  
of Typical  
Performance

**LCA  
Calculator  
Tool**

1 – 3 Credits

0 Credit

# AGIC Materials Credits – The Vision



# Design Credit Calculator

Benchmark Project Design		Total		Actual Project Design		Total	
		GHG (tCO2-e)	Ecopoints			GHG (tCO2-e)	Ecopoints
		0	0	<b>AGIC CREDITS</b>	0	0	0
<b>Infrastructure Project Type 1:</b>				<b>Infrastructure Project Type 1:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 2:</b>				<b>Infrastructure Project Type 2:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 3:</b>				<b>Infrastructure Project Type 3:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 4:</b>				<b>Infrastructure Project Type 4:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 5:</b>				<b>Infrastructure Project Type 5:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 6:</b>				<b>Infrastructure Project Type 6:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 7:</b>				<b>Infrastructure Project Type 7:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 8:</b>				<b>Infrastructure Project Type 8:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 9:</b>				<b>Infrastructure Project Type 9:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		
<b>Infrastructure Project Type 10:</b>				<b>Infrastructure Project Type 10:</b>			
Select Infrastructure project type:	<input type="text"/>	0	0	Select Infrastructure project type:	<input type="text"/>	0	0
Select Infrastructure project sub-category:	<input type="text"/>			Select Infrastructure project sub-category:	<input type="text"/>		

Signed by the Responsible Professional as an Accurate

Signature

Date

and Representative Record

Name (Please Print)

Title (Please Print)



# Benchmark/Project Detail

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Home

Clean Entries

## Infrastructure Project Type 1:

Infrastructure Project Type 1:  
Infrastructure project sub-category:  
cable length

Electricity Distribution
High Voltage Transmission below ground
5 km
0

GHG (tCO2-e)	Ecopoints	
1366	3	Total
273	1	per km

## Asphalts

Select **Asphalt 1**:  
Enter Amount of Asphalt 1  
Select Asphalt 1 Transport:  
Asphalt 1 Transport Distance

Hot Mix Asphalt
20 tonnes
Rigid Truck
30 km

1213	3
153	0

Select **Asphalt 2**:  
Enter Amount of Asphalt 2  
Select Asphalt 2 Transport:  
Asphalt 2 Transport Distance

tonnes
km

0	0
0	0

## Concretes

Select **Concrete 1**:  
Enter Amount of Concrete 1  
Select Concrete 2 Transport:  
Concrete 2 Transport Distance (km):

tonnes
km

0	0
0	0



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# Benchmark Project Concerns

- Gaming the benchmark project to benefit the actual project score
- Doubling the documentation effort and cost for projects
- Doubling the effort, cost for project adjudication
- Increased need for appeals and controversy

**BUT Experience using the AGIC tool in early years should quickly allow absolute benchmarks to be determined and adopted for the future**



# Inside the Black Box

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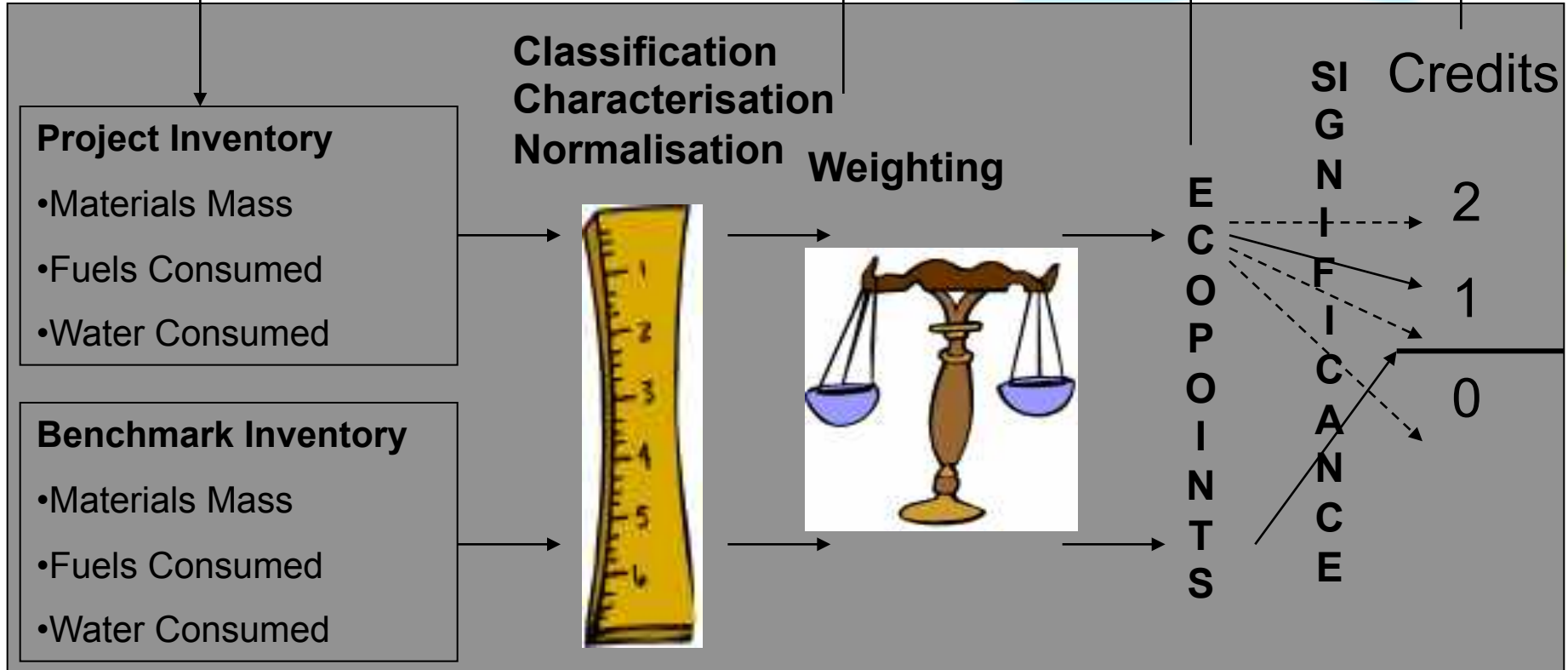
**Input Data**

- Materials Mass
- Transport Distances
- Transport Modes

kgCO2-e  
per  
functional  
unit

Ecopoints  
per  
functional  
unit

1





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# Inside the Black Box

- An implementation of the Building Products LCI for Infrastructure
- Comprehensively documented at <http://www.bpic.asn.au/LCIMethodology.htm>



# Functional Units vary by Infrastructure Class

Infrastructure Project	Functional Unit
Roads Freeway Expressway Major arterial Minor arterial Collector	per lane.km of road per lane.km of road per lane.km of road per lane.km of road per lane.km of road
Rail	per lane.km of road
Bridges Road bridges Rail bridges Other bridges	per lane.km of span per track.km of span per m width.km of span
Tunnels Road tunnels Rail tunnels Other tunnels	per lane.km of tunnel per track.km of tunnel per m width.km of tunnel
Ports, Wharves and Marinas Port/wharves Port/wharves storage Marinas Harbours	per km of wharf per km <sup>2</sup> of storage per km <sup>2</sup> of sheltered water per km of harbour wall water
Aiports	



# Other Credits

- Procurement of ecolabelled products encourages products third party evaluated as environmentally preferential
- Procurement from companies with EMS encourages suppliers making a corporate commitment, monitoring and continuously improving their performance
- Deconstruction, disassembly and adaptability was added from others' work
- Other credits were added to align the format of this section with others



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# Industry Transformation

- **LCA Calculator:** **48.4 Points**
  - Materials Minimisation (t)**
    - X **(Low Impact Materials Selection (ecopoints/t)**
    - + **Local Sourcing (t.km)**
    - X **(2 - Return Journey Utilisation (%) )**
    - X **Low Impact Transport Mode (ecopoints/(t.km)**
    - + **Spoil Disposal Minimisation (t)**
    - X **(Spoil Disposal Impacts (ecopoints/t)**
    - + **Local Spoil Disposal (t.km)**
    - X **2 (empty return journeys assumed)**
  - **Ecolabelled Products** **2.9 Points**
  - **EMS** **2.9 Points**
  - **Deconstruction, Dissassembly Adaptability** **5.8 Points**



# Conclusion

- Through the BPIC/ICIP project, the material and product supply sectors have agreed methodology and data for most major materials and products used in infrastructure
- By contrast, the infrastructure sector is generally not advanced in assessing the environmental impacts of infrastructure over the life cycle for a comprehensive range of impacts (Roads, Water have made significant progress on Carbon assessment)
- AGIC materials credits are mostly based on the BPLCI methods and data
- A credit calculator calculates credit for improvements of the project compared to a baseline project.
- Experience using the tool should quickly enable absolute benchmarks to be substituted
- Industry Transformation will happen through a broad range of improvements in product selection, local sourcing and disposal, transport mode selection, ecolabelled products, promoting the use of EMS up the supply chain



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Thank you