PE INTERNATIONAL
SUSTAINABILITY PERFORMANCE

# Carbon Sequestration in Building Level Assessment

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**PE INTERNATIONAL**

March 2013

# Global **leader** in sustainability performance solutions

- The only player with an end-to-end value proposition
- 9/10 of the top Green Brands 2011 use PE sustainability solutions
- More than 20,000 software users; over 1,500 leading businesses
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- Globally reputed for thought leadership – several publications by expert consultants
- Undisputed global leader in integrated sustainability performance solutions
- Unparalleled roster of sustainability experts: Half of PE International's experts have over 10 years of sustainability experience

# Biomass and Carbon
## Calculating sequestered carbon

- Method proposed in prEN 16449, Wood and wood-based products – Calculation of atmospheric carbon dioxide sequestration
- Method proposed for TC350 standards
- Same as method used in BRE Environmental Profiles (1999, 2007, 2013)
- Same as method used in IBU EPDs (EN 15804 compliant)

# Biomass and Carbon
## Calculating sequestered carbon

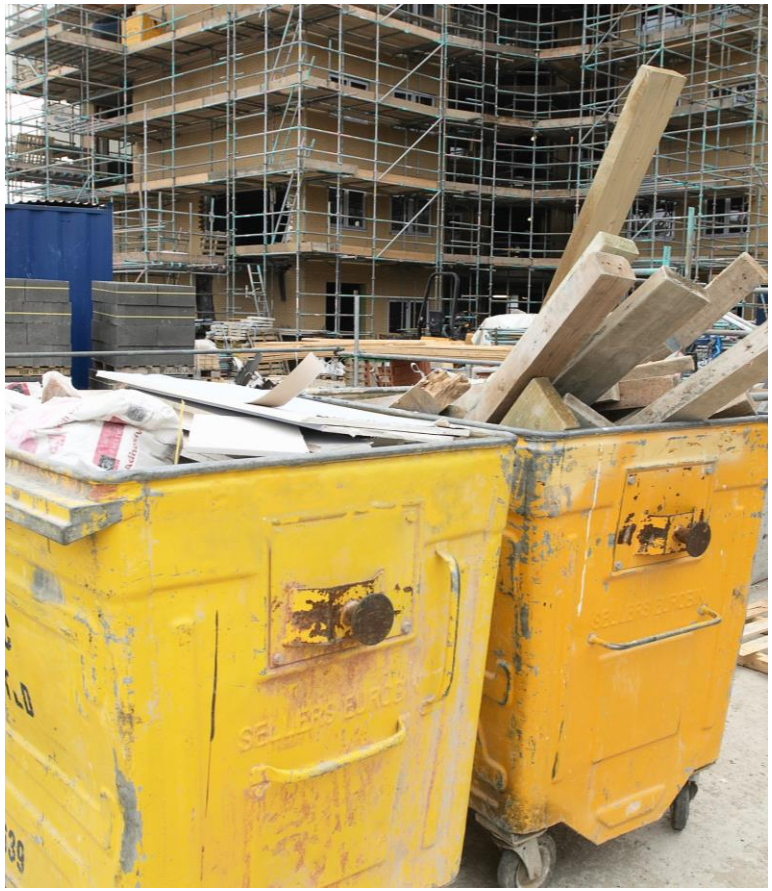
- Uses the physical carbon content, calculated using stoichiometry: for **WOOD**, generally 50% of dry mass is carbon
- Sequestered carbon is allocated physically, not economically (eg. Between sawn timber, chips, bark and sawdust)

# Biomass and Carbon
## Calculating sequestered carbon

| Chemical | Formula | RMM (g) | Mass Carbon (g) | % carbon |
|---|---|---|---|---|
| Lignin | $C_9H_{10}O_2$, $C_{10}H_{12}O_3$, $C_{11}H_{14}O_4$ | 540 | 360 | 67% |
| Cellulose | $(C_6H_{10}O_5)_n$ | 162 | 72 | 44% |
| Hemi-cellulose* | $(C_5H_8O_4)_n$ | 132 | 60 | 45% |

- Lignin content varies (mainly by species) from around 15% (giving a carbon content of ≈ 48%) to 35% (giving a carbon content of 52%).
- Moisture content of timber is more uncertain than assuming the carbon content is 50%

# Biomass and Carbon
## Calculating sequestered carbon

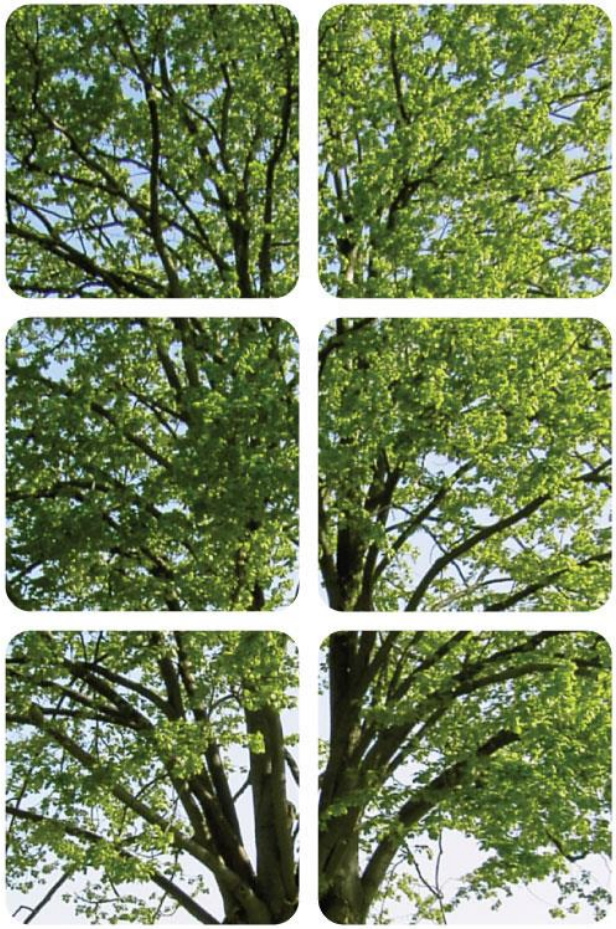


- Sequestered carbon considered alongside impacts of extraction, manufacture and disposal
- Carbon sequestration or emissions are recorded in the life cycle modules as they occur
- Sequestered carbon in waste tracked through to disposal and resulting emissions

# Building Life Cycle
## TC 350 Approach

| System boundaries and modules according to EN 15804 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product stage | | | Construction Process stage | | Use stage | | | | | | | End of life stage | | | | Benefits and Loads for the next product system |
| Raw material supply (extraction, processing, recycled material) | Transport to manufacturer | Manufacturing | Transport to building site | Installation into building | Use/application | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction / demolition | Transport to EoL | Waste processing for reuse, recovery or recycling | Disposal | Reuse, recovery or recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |

# Biomass and Carbon
## Considering Building Carbon

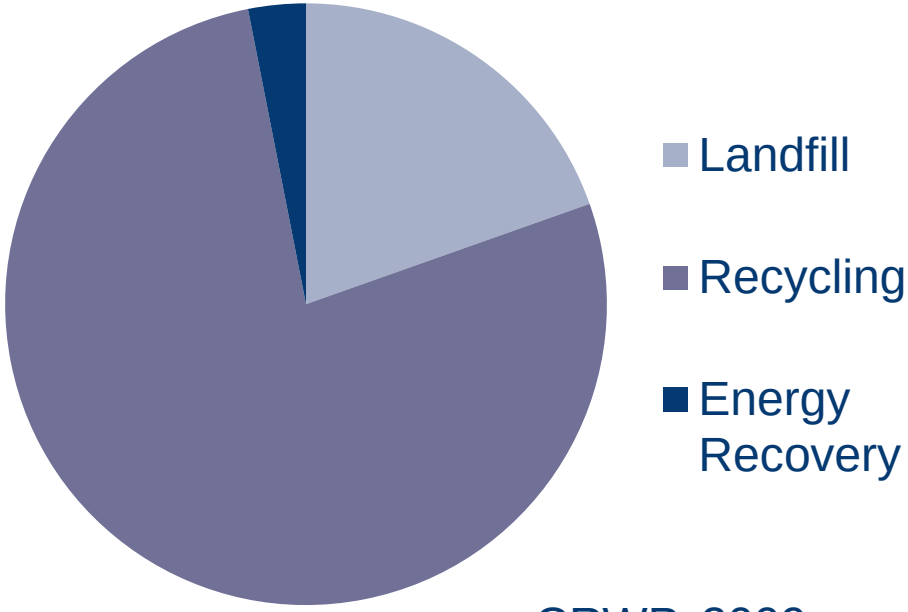


- Sequestered carbon tracked through use in building to disposal
- Wood for recycling transfers sequestered carbon to next product system
- Wood in landfill produces methane and $CO_2$, some is collected and used for energy recovery (methane>$CO_2$)
- Wood incineration with or without energy recovery produces $CO_2$
- Energy recovery shown as benefit from avoided conventional energy production in Module D

# Wood Waste

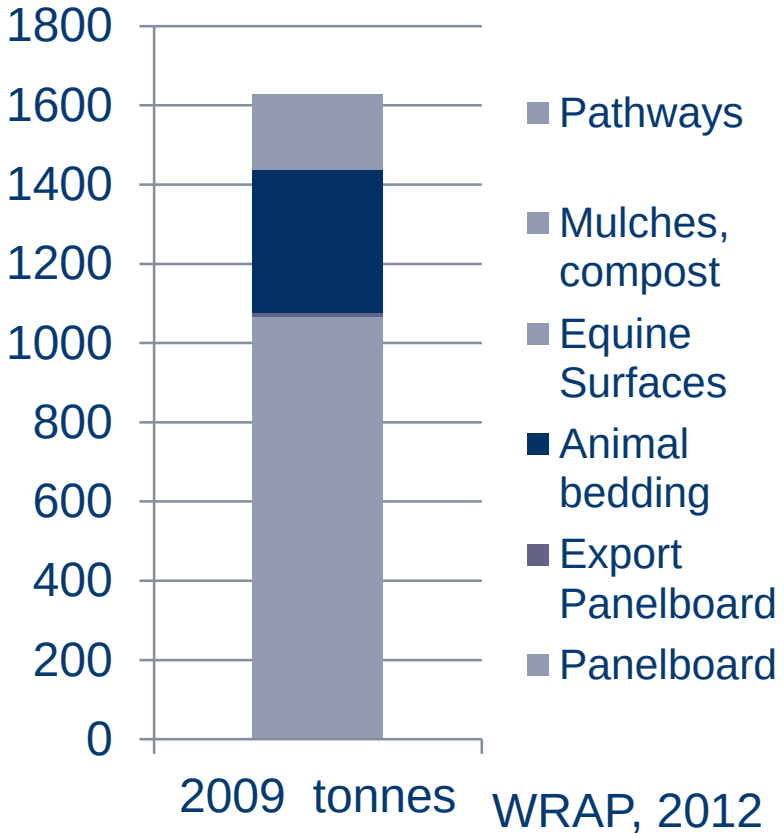
## UK Disposal disposal

### Disposal Routes for Construction and Demolition Wood Waste




CRWP, 2009

### Recovered Wood Markets




WRAP, 2012

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# Thank you

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