Recycled aggregates –some greenhouse issues

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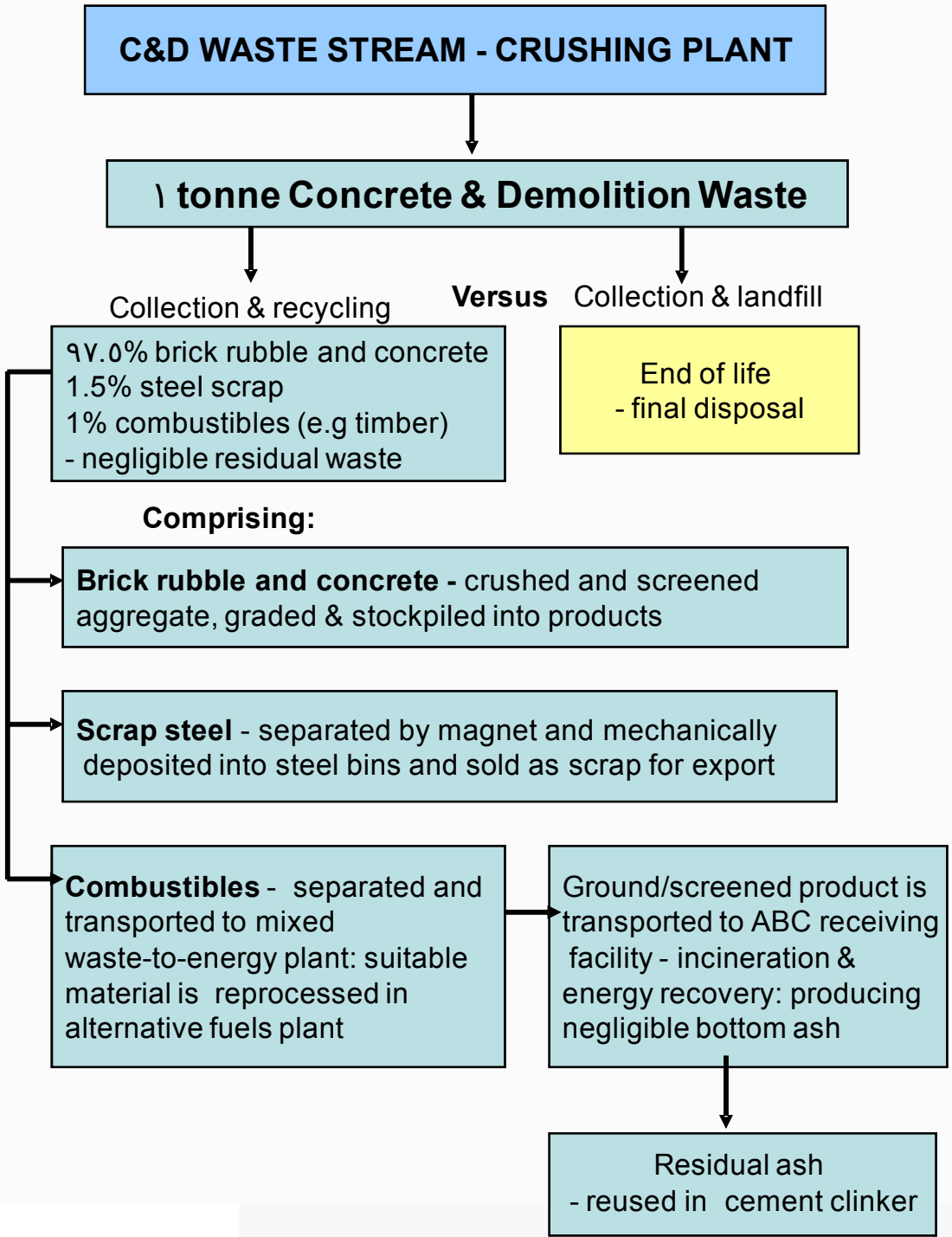
Outline

- Resourceco case study – recycling aggregates in Adelaide - Zero Waste SA initiative
- Some roadworks applications - reducing energy use and greenhouse gas emissions
- Conclusions

Resourceco case study

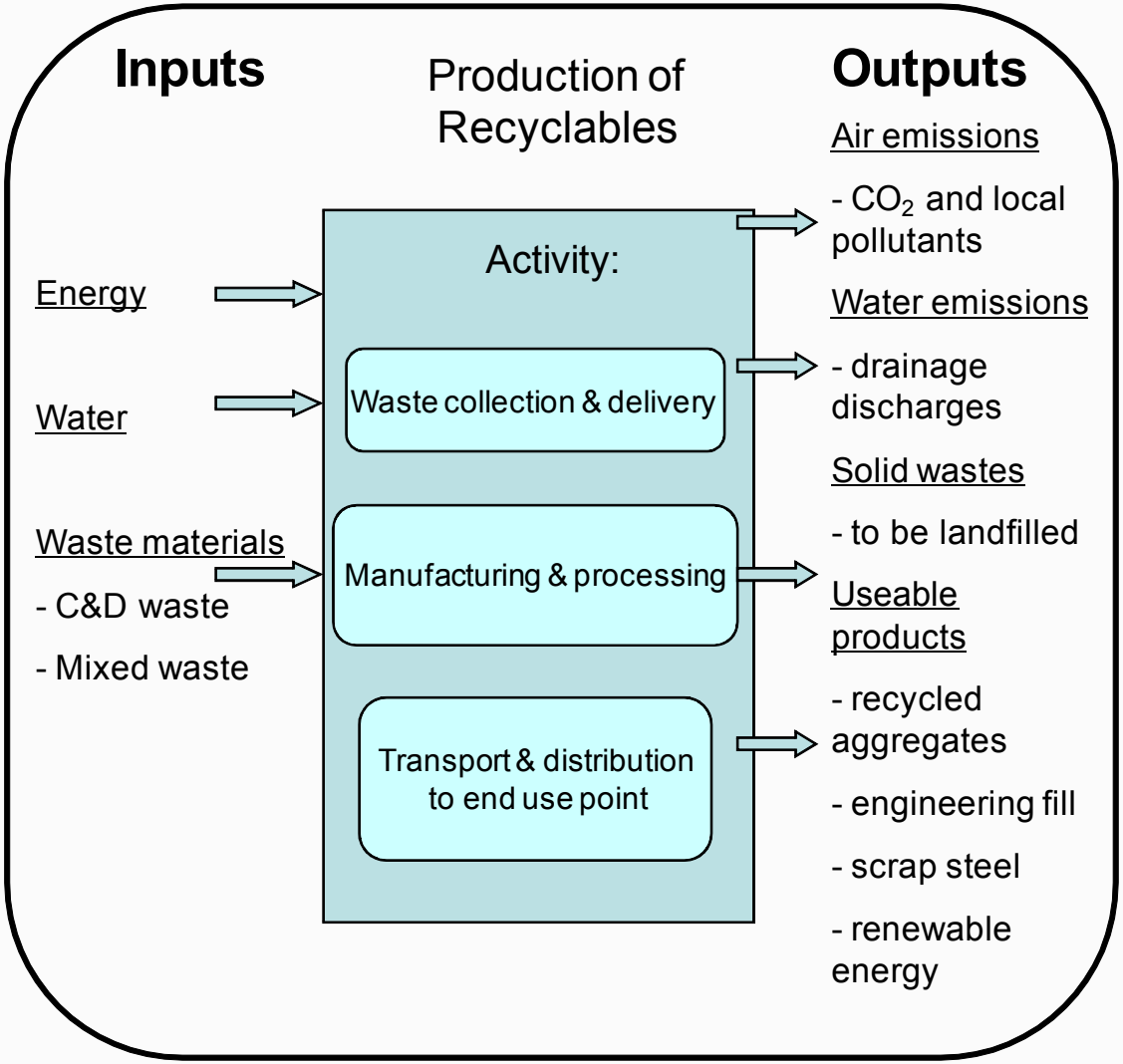
Study aimed to develop a method and collect data on:

- Energy use, greenhouse gas emissions and other enviro/social impacts of Resourceco's recycling operations
- Beneficial reuse options for recycled materials
- Crushing plant at Resourceco ~ 45 to 50,000 tonnes road base per month (90,000 in Nov'08)



** From every tonne of waste delivered to Resourceco

- there are recyclables extracted and through reprocessing, there are a range of recycled products produced



Overall impact assessment:

Recycling C&D and mixed waste versus landfill :

- greenhouse emissions, toxicity, pollution (air, water), biodiversity, social (noise, dust, aesthetics, severance, odours)

Comparison: CO_{2-e} emissions

Total CO_{2-e} per unit of production (preliminary)

- Resourceco study – 3 kg CO_{2-e}/tonne (21 MJ/t)
- Victorian quarry study – 7.5 kg CO_{2-e}/tonne (31 MJ/t)

- Process energy use and emissions of recycled aggs could represent up to 60% fewer emissions - equivalent quarry product

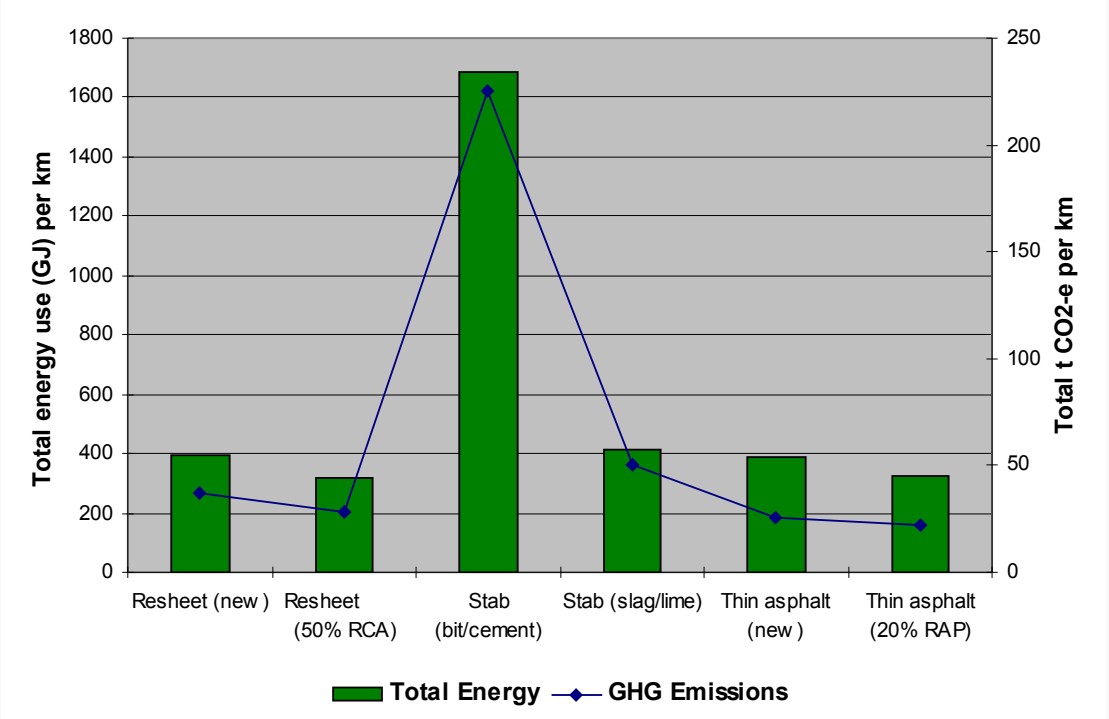
- USA (2003 EPA study) - 30% less emissions for recycled aggs
- UK (2008 Quarry Products Assoc) - 6kg CO_{2-e}/tonne overall & 4 kg/tonne for crushed rock - recycled ?

Comparison: $CO_{2\text{-}e}$ emissions

Difficulties in comparing studies:

- need to know what's behind published figures
- emission factors will vary according to methodology (scope-direct/indirect) and local electricity generation (gas or coal fired, nuclear …)

Roadworks application – cement substitutes & recycled aggregates



ARRB study for RTA (2005):

- Aim – reduce emissions in road construction & maintenance

Maintenance treatments:

- Recycled aggregates use in resheeting: RAP & RCA
- Cement substitutes in stabilisation: slag & fly ash

Cement substitution can reduce emissions by 70%
Recycled aggregates substitution - by 25 - 40%

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Environmental gains - recycled aggregates

- Reduced resource consumption
- Diversion of waste materials from landfill
- Lower embodied energies and emissions (more work)
- Reduced transport emissions when reused in close proximity to reprocessing site

  - e.g. in a 10,000 tonne road construction project (~ 1 km length) there is approx. 1 tonne $CO_{2\text{-}e}$ emissions produced per km travelled to site

Conclusions

This study has begun to collect some of the required data and develop a suitable framework.

There is a need for further local studies investigating local applications:

- Quarrying and aggregates recycling – energy assessments to generate some indicative benchmark figures

- Roadworks & general construction and maintenance case studies

Conclusions

"Carbon neutral" road construction
- industry, individual business or agency level

There are limits to the carbon neutral claim

In choosing a carbon neutral path, there is a recognised carbon neutral hierarchy:

- **Reduce**: most cost effective but requires practice change
- **Renew**: purchase of renewable energy
- **Offset**: usually cheapest but its value is questionable