

# Survey of Sustainable Biomass Resources for the Iron and Steel Industry

N. Haque<sup>1</sup>, M. Somerville<sup>1</sup>, S. Jahanshahi<sup>1</sup>, J.G. Mathieson<sup>2</sup>, P. Ridgeway<sup>3</sup>  
<sup>1</sup>CSIRO Minerals, <sup>2</sup>BlueScope Steel, <sup>3</sup>OneSteel

## Introduction

A collaborative project between BlueScope Steel, OneSteel, CSIRO and CSRP\* commenced in late 2006 to identify, evaluate and demonstrate specific opportunities where biomass or sustainable and renewable carbon can be used in ironmaking and steelmaking processes. As one of the activities of this project, a survey of currently available biomass resources from several regions of Australia was carried out and is reported here. Residues have been targeted because of their current low value utilisation and waste disposal issues.

\* CSRP Cooperative Research Centre for Sustainable Resource Processing



Figure 1: Biomass charcoal for iron making.

## Biomass Resources being Investigated

Potential waste biomass categories are:

- woody biomass from forestry and wood processing
- residues from agriculture and horticulture
- biomass from woody weeds.

## Methods

The data collection for biomass was based on:

- Interviews and meetings with personnel from the state forest agencies and wood processing industries
- Other data available in the open literature, including forest management plans and plantation inventory data
- Estimated production from agricultural and horticultural industries for non-forestry biomass resources.

## Key Results

- Total dry residues from all regions were estimated to be around 7.5 Mt per year.
- Forest residues (e.g. wood chips, reject logs, out-of-specification logs, bark, stump, branches, foliage (leaves and twigs) and other biomass in the tree crown) are 45% of total residues.
- Wood processing residues (e.g. chips, sawdust, shavings, off-cuts) are 30% of total residues.
- Non-forestry residues (e.g. biomass from grain crops such as wheat and maize, olive pomace, grape skin, almond waste, cut flowers waste and sugarcane based residues (e.g. bagasse, infield cane crop residues), woody weeds such as Camphor Laurel and waste from macadamia nut processing) account for 25% of the total biomass resources.

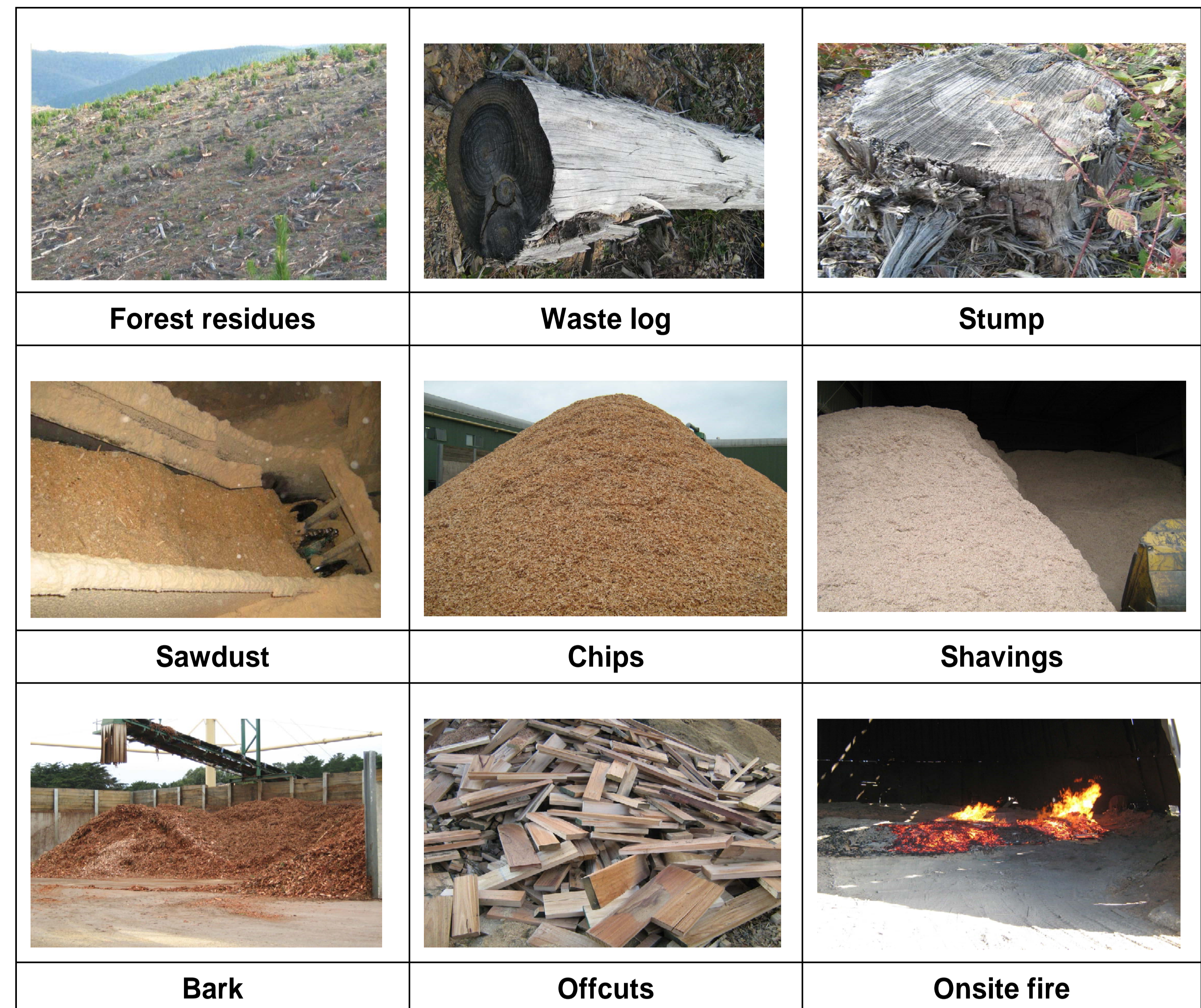


Figure 2: Photos of sample forest residues and during processing.

Table 1: Consolidated weight of biomass from all regions per year.

Resource category	Thousand dry tonnes
Forestry harvesting residues	3,385
Wood processing residues	2,255
Non-forestry residues	1,905
<b>Total</b>	<b>7,546</b>

Table 2: Charcoal requirements for the Iron and Steel Industry.

Applications	kt/year
Recarburisation	1.8
Slag foaming	9.7
Coke making	727
Sintering	254
Pulverised coal injection	453
<b>Total</b>	<b>1440.5</b>

## Conclusion & Further Research

- There appears to be sufficient biomass residues to supply the estimated theoretical charcoal requirements that may potentially be utilised in the Australian iron and steel industry for metallurgical processing in the short to medium term.
- It is envisaged that the study will be expanded into a more detailed and focussed evaluation of biomass sources concurrent with the other research and development works on biomass processing, transport, pyrolysis and steel industry application.



### Acknowledgements

This work was carried out by CSIRO under the auspice of the CRC for Sustainable Resource Processing (CSRP) with financial support from BlueScope Steel, CSIRO, OneSteel and CSRP (web: www.csrp.com.au).

### Further information

contact: Dr Nawshad Haque  
 phone: +61 (03) 9545 8931  
 email: Nawshad.Haque@csiro.au  
 web: www.csiro.au/people/Nawshad.Haque.html

[www.csiro.au](http://www.csiro.au)

