Key factors for successful Biomass briquette production
Advantages of briquettes for fuel
Biomass materials that can be pressed
Case studies
Types of briquette presses
Summary
Key Factors for Biomass Briquetting

- Moisture content should not exceed 15% (Optimum <12%)
- Availability of continuous supply of raw material
- Material size (large variation depending on the type of press being used) A mixture of fines/shavings/chips is ideal.
- Dry storage availability (raw material inwards and briquettes outwards)
- Adequate equipment installation area
- Uniform size of briquettes
- Automated system for efficient flow of material
- A market for the briquettes (look locally – to sell or re-use in factory)
- Production of high density briquettes requires high pressure – this enables the lignin to soften and bind the briquettes.

Think of it like an egg in a cake recipe.
Advantages of Briquettes

- Less storage area required for residues
- Less potentially hazardous dust/waste lying around
- Potentially sitting on a mountain of money if converted to briquettes
- High energy and clean burning view (environmentally clean)
- Low ash residual compared to burning of loose material
- Increased thermal efficiency compared to loose material
- Economical advantage by increased revenue / low handling costs
- Potential savings for dumping costs
- A disadvantage being the initial capital cost
- Smaller operators may be able to setup a co-op??
- **Residues should not be seen as a waste pile; but rather a PROFIT PILE**

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**Advantages of Briquettes**

*Briquetts Greatly Enhance Woodstove Performance* (each test run used 16 kg of fuel)

- Area under curves represents heat delivered to house!

- Result: 9.49 kg of Briquetts equals 0.77 kg of cordwood
## Types of Biomass that can be processed

- Wood waste
- Cotton
- Cardboard packing
- Hemp
- Bank notes
- PU Foam
- Hay
- Mallee tree
- Olive pumice
- MDF / Particle board
- Macadamia nuts*
- Peanuts
- Medical packaging
- Food waste
- Corncob
- Almond shells
- Cow manure
- Algae

* Macadamias have been successfully trialled in Europe – however we have not had success here.

Please note this list is not exhaustive – we are continually trialling all types of biomass.
Types of Biomass that can be processed

Dry Softwood Chips
Types of Biomass that can be processed

Dry Hardwood Chips

Types of Biomass that can be processed

Hemp / Wheat straw
Types of Biomass that can be processed

Hay / Animal food

Types of Biomass that can be processed

Miscanthus
Types of Biomass that can be processed

Miscanthus

Types of Biomass that can be processed

Processing dry Miscanthus
Types of Biomass that can be processed

Briquettes packed and ready for shipping

Types of Biomass that can be processed

Briquette Sizes for Hydraulic mould type press
Case Study 1

Boral Hancock Plywood – Ipswich Qld

- Project – Processing Sander dust & Plywood Off-cuts

- Sander dust and plywood off-cuts were originally going to landfill
- RUF 200 Hydraulic Mould type press installed to process sander dust into briquettes
- Dust briquettes were then used in their boiler for fuel
- Plywood off-cuts are processed through a Reinbold AZR 2000 shredder unit
- The shredded pieces are transferred directly into the burner fuel storage bin and fed to the burner as required.
- Boral reduced their landfill from around 7 x 30m³ / week to one only.

Case Study 2

Austral Plywood – Tennyson Qld

- Project – Processing Sander dust

- Sander dust was originally going to landfill – but as prescribed waste
- RUF 4 1600 80 Hydraulic Mould type press installed to process sander dust into briquettes
- Dust briquettes were then used in their boiler for fuel
- Austral Plywood reduced their landfill and made substantial cost savings
Case Study 3

Holding Cordes – Hamburg in Germany

- Project – Processing wood residues (purchased raw material)
  - 3 trucks/day with approx 72t wet wood chips (app. 40-60 % rest humidity) every day
  - 1 truck/day with approx. 25t dry (7 %) grinding dust every day
  - The capacity of the Drum dryer is 3000 kg/hour
  - 44t/day dry wood chips from their main manufacture
  - Total capacity: 90 up to 115t/day briquettes (3-shift)

Summary of costs:
- Every 12.5 minutes one packed palette is ready for despatch.
- Price paid for wet wood chips: 60-70,00 €/t
- Price paid for dry wood chips: 90,00 €/t

Costs for manufacture:
- 10,00 €/t for wrapping and handle bar
- 17,00 €/t for drying
- 5,00 €/t for maintenance (RUF presses)
- 20,00 €/t for electricity (crusher / hammermill)

Total: 112 - 125,00 €/t

- Sales price: 135 - 150,00 €/t
- Benefit: 250,000 – 750,000,00 €/year
Residues to Revenues 2009

**Case Study 3**

Fully automatic briquetting plant with 12 presses

**Case Study 4**

Briquette Press system for hard paper
- machine with a capacity of approx. 70 kg/h with hard paper dust and chips
- feeding via screw from a silo without any rotary valve.
- with the reconstruction of the silo bottom discharge with the subsequent briquetting process 20 working hours per week can be saved
Case Study 5

Furniture producer in Germany
Approx. 120 workers  www.krueger-und-sohn.de
Briquetting of plywood dust with aprx. 350 kg/hour
•Previously paying for disposal of dust
•Customer now sells briquettes to heat/energy plants
Types of Briquette Presses

- Hydraulic press with mould
- Hydraulic press with clamp system
- Piston of mechanical press
- Screw press

Hydraulic mould type press:

- Each briquette is made individually
- High density achieved through high pressure (up to 1.4 depending on material)
- Uniform size and consistency of briquettes
- Moisture content 8 – 12% optimal (no greater than 15%)
- Maximum chip size up to approx. 50mm
- Long burning life with low ash residual (varies among biomass types)
- Simple and economical replacement of wear parts
- Heavy industrial construction for multi-shift operation (in standard form)
- Full automation possible
Types of Briquette Presses

Hydraulic shutter/clamp type press:
- Briquettes made against a shutter/clamp system
- Density up to 0.9 (depending on material)
- Possible variations in length of briquettes
- Average burning (varies among biomass types)
- Lower capital cost
- Can be optioned for multi-shift operation
- Moisture 8 – 12% (maximum 15%)
- Maximum chip size of approx 12mm

Types of Briquette Presses

Mechanical or Piston type press:
- Extrusion type press system
- Density up to 1.0 (depending on material)
- Heating collar used on start up to soften lignin in biomass
- Briquettes require a cooling line to harden (15 – 30m long)
- Good burning life (varies among biomass types)
- Can be optioned for multi-shift operation
- Maximum chip size 8mm
- Maximum moisture content 12%
Residues to Revenues 2009

Types of Briquette Presses

Screw type press:
- Extrusion type press system
- Density achieved (up to 1.0 depending on material)
- High wearing and expensive replacement of ceramic wear parts
- Heavy industrial construction for multi-shift operation (in standard form)
- Maximum chip size 6mm
- Maximum moisture content approx 8%

Summary

- Management typically looks at manufacturing equipment only to increase their efficiency and profitability
- That thought process must change to extract all revenue possibilities from their business – recycling their residues is critical.
- Technology allows for more types of biomass to now be processed and burned for fuel
- Customers are welcome to send samples to our Melbourne factory for trials