

# Biomass to heat



The models we can learn from

30% or more of our energy is as heat  
and cooling

Heat energy is the lowest cost  
renewable

Fuels for heat: straw, wood or wastes

# Heat can be from combined heat and power (CHP) plants



# Biomass to energy



Heat, electricity and fuels from unutilised forestry and agricultural biomass and municipal wastes

Vic. towns and cities were largely self-sufficient for energy up till 1930s



Now they import almost all energy- LPG, natural gas, electricity and transport fuels



some renewable energy options are being explored, but it's a minute share



# We can be producing up to 50% of our energy locally again. The benefits?

- Use wasted biomass, slash GHG emissions
- Create permanent energy jobs
- Keep money in the local economy
- Saleable RECs
- Increased Carbon sequestration
- Attract new 'green' businesses
- New income stream to farmers
- New enterprises in value-adding
- Slash landfill costs, boost recycling





# We have extensive available residues

**Municipal Flammable  
Waste (40% MC)  
45,000 tonnes X 2.5 MWh/t**



**Farm forestry residues 15-30,000 tonnes  
X 2.7 MWh/t (40% MC)**



**Bluegum harvest residue**  
**About 20t/ha x 3 MWh/t (25% MC)**



**Industrial plantation residues up to 100,000 tonnes  
X 2.7 MWh/ green tonne (40% MC)**



# Short rotation coppice for energy wood- 2.7 MWh/tonne x ??ha/yr





**Straw - up to 500,000 tonnes  
X 3-3.5 MWh/t (12% MC)  
(Or for ethanol or pellets)**

# Straw and wood chip-fired CHP plant

**Danish plant built 1996**

**Input: 45,000 t big straw bales & 5,000 t woodchip**

**Output: 9 MW-e, 30 MW-th**

**Enough for town of 30-40,000 people (30-40% of Ballarat)**



# Wet waste to biogas

Swedish municipal plant – 60,000 m<sup>3</sup> to 6 million Nm<sup>3</sup> gas





# Biomethane as LPG substitute



# wood waste to heat (and cooling?)



**Timber processing waste and  
urban waste wood  
Up to 40,000 tonnes @3 -3.5  
MWh/t (20% MC)**

# Methane, biodiesel and ethanol fuels



# And gasification for fuelling engines

