



OPINION PIECE

Be bold with biomass

by MARKO NOKKALA

KEY ACCOUNT MANAGER FOR BIOENERGY AND BIOFUELS
VTT Technical Research Centre of Finland Ltd.

Finland is a country with large woody biomass resources and 40% of its energy comes from renewable sources. As the country lacks deposits of fossil fuels, it is natural that over the past few decades energy generation has focused heavily on the utilisation of these.

South Africa – with its commercial plantation resources – has large volumes of unused residues in the form of cuts and shaves left in forests, side streams from the pulp and paper sector and sawdust from the saw milling and timber industry. Such residues do not exist in Finland as they are utilised in the production of energy and biofuels.

While it is difficult to estimate local volumes as official statistics on these streams simply are not available, a conservative estimate would be around 20% of forest residues, but this could easily be almost double. These streams represent an opportunity for localised energy generation for the following products:

- Electricity
- Bioethanol, biodiesel and jet fuel
- Heat and steam
- White or black pellets

The conversion of what is currently discarded as waste into valuable energy-generating products will not happen systematically, and in my view, it is all about mind-set. If you work at a sawmill or pulp and paper business, it is likely that you are not an expert in bioenergy. While you may have access to free by-products, you may not be equipped to look into efficient technologies that could make use of these.

In Finland, demand for woody residues is so great that testing is currently taking place using more challenging fuels like eucalyptus bark and waste wood from the construction sector. Eucalyptus bark is a moist, highly-corrosive fuel. Sawdust also has great conversion potential by using processes like pyrolysis.

This being said, I have witnessed biomass being landfilled by a pulp plant in South Africa. When people are willing to spend money on landfilling instead of generating energy from valuable biomass, there is something fundamentally wrong.

One of the main reasons biomass is becoming increasingly scarce in Nordic countries is the biorefinery concept. Whereas conventional single product mills face challenges in maintaining their profitability, biorefineries seek higher yield fractions of biomass. These fractions create higher value add and greater revenue from the same biomass source.

This approach benefits from integrated partnerships as the business responsible for the core process does not have to get involved in downstream processing. This can be sourced out to companies specialising in, for instance, the chemical, pharmaceutical or cosmetics industries.

With the increased complexity of managing side streams comes the cost of conversion. Moving from mass value to atomic value is a leap that normally does not happen overnight. This is why the concept of biorefinery is an important consideration.

When people are willing to spend money on landfilling instead of generating energy from valuable biomass, there is something fundamentally wrong.

The evolution of bioeconomy-related activities from a research and development perspective has been rapid and can be summarised by the work carried out at VTT over the past 25 years. A big boost in the promotion of the bioeconomy has been the aim of the circular economy by reducing or beneficiating waste streams. This trend has been given a further push by new European landfill legislation that will effectively forbid the opening of new landfills over the next few years.

Landfill fees have already been steering waste away for alternative uses (ranging from R160 per tonne in poorer EU member states to around R1,500 per tonne in wealthier countries). To compare, South Africa's R400 per tonne is considered to be on the high side.

One of the implications of this has been the rapid development of conversion technologies. While grate boilers are used widely in central Europe, multifuel technologies for combustion and gasification have also emerged. Despite higher capital expenditure, these technologies have proved to provide greater efficiency in conversion. For example, waste gasification to fuel and syngas as opposed to waste incineration can increase conversion efficiency up to four-fold.

It would be important to compare the cost of installing a gasification plant and the cost of treating the waste for gasification against just burning it. Biogas production reaches approximately 10% efficiency in conversion whereas gasification to syngas and fuel gas can reach up to 40%. This naturally has to be factored in when looking at investment costs (bearing in mind that biogas production has more limits to fuel, thus still creating untreatable residues - with gasification less so).

Grate burners for mass burning reach efficiency in between 10 and 40% but then again they lack storage options as well as variety in conversion to final products.

The big drivers can be identified from the timeline. Enzymes are now applied to biomass fractioning, and new types of fibre are entering the market. In the past decade, advanced biofuel developments have shaped biofuel production processes. Now the focus is shifting to the inner core of the value-added circle, with bio-based chemicals, plant-based foods and innovative bio-based packaging materials.

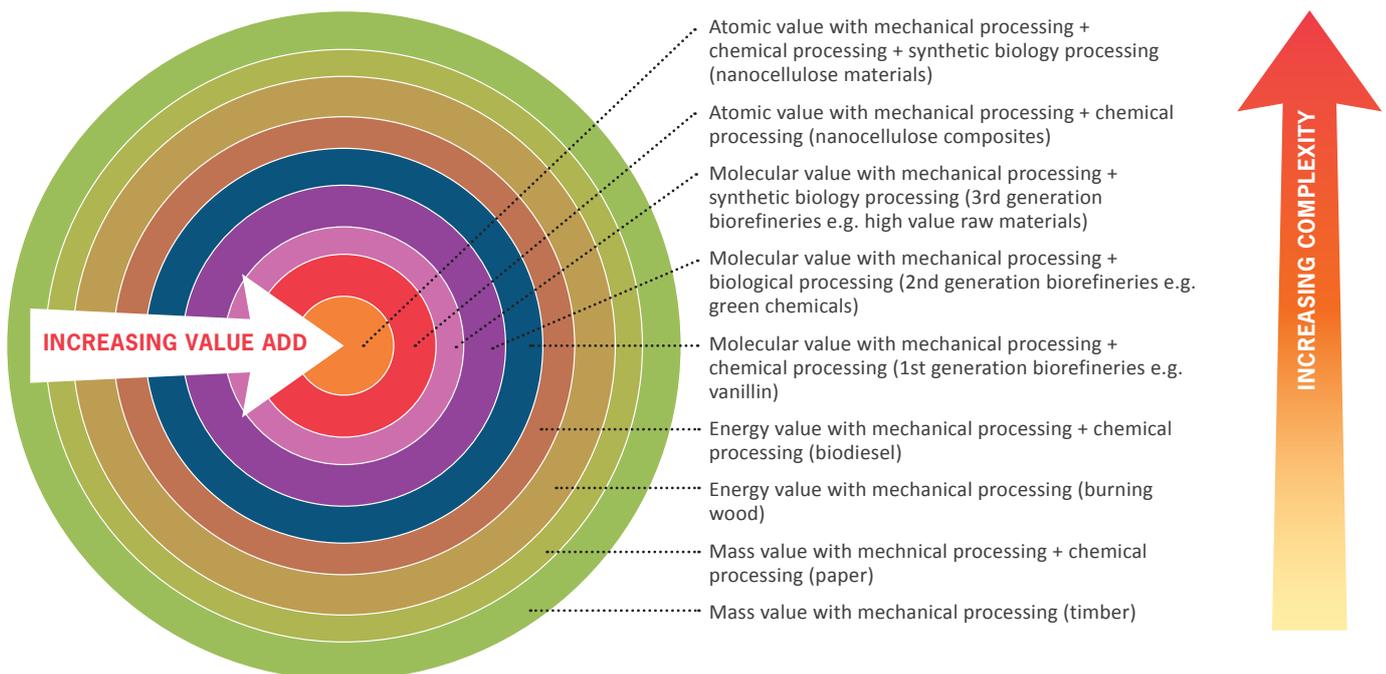
Be bold to be competitive and relevant

There are global companies that compete with South African businesses producing similar products for similar markets, and which are already reviewing their production processes and how to optimise their various waste and side streams.

If South Africa wishes to keep up, it must start to plan its business plan and market position 10 years from now at this very moment. There is enough global foresight work and able consultants are available to assist in such a transition. Clearly, this is not the time to stick to a business as usual model. It is time to act. ■

About the author.

Marko Nokkala delivered a presentation at the Forest Industrialisation Conference hosted by SAFCOL (South African Forestry Companies Limited) in October. He has a Licentiate Degree in Agriculture and Forestry from the University of Helsinki and a MSc Economics Degree from the University of Joensuu, Finland. He has nearly 20 years of experience in applied economics research and joined VTT in 2000. Nokkala has also spent four years working in Tanzania and on various projects in the southern Africa region. As key account manager for bioenergy and biofuels at VTT, he serves major industry players including Valmet and Andritz.



Source: Kettle, John; Roos, Goran; Vanderhoek, Nafty; Harlin, Ali and Allender, Bruce. (2012) "Is the Australian pulp and paper industry still at the crossroads?" *Appita Journal*. Vol. 65, No. 3: 222-229