Recent history has shown that geopolitical and economic factors can have profound effects on petroleum cost and availability. In turn, this can impact materials and energy both of which are primarily derived from fossil sources. As a consequence, there are numerous ongoing efforts to develop sources for these products that are less sensitive to potential disruptions, sustainable and more environmentally benign. Among the alternatives that are being examined, the utilization of biomass has been proposed an approach with considerable potential. Furthermore, such opportunities are coincident with changes in markets for traditional forest products and interest in the forest biorefinery concept. The latter relies on complementary biochemical and thermochemical platforms for the efficient utilization of biomass. This paper will focus on ongoing thermochemical work on woody biomass and the refining of the products into “drop-in” fuels. The effect of feedstock on products and process conditions of pilot-scale gasification will also be described.