

## TECHNICAL-ECONOMIC AND FINANCIAL ANALYSIS FOR RENEWABLE ENERGY CHAINS: THE CASE OF BIO-ENERGY

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### EXTENDED ABSTRACT

We are all familiar with current environmental deterioration and problems due to a large number of factors. Some of the most important pollutants are generated in conventional energy utilisation (fossil primary energy). Additionally, one of the strategic objectives of EU's White Paper on Energy (European Commission 1997) is to increase the contribution of renewable energy sources to 12% of the EU's gross inland energy consumption, by 2010. In this field, biomass based energy is regarded as a significant potential contributor towards the reduction of pollution caused by extended use of fossil fuels. Biomass crops are an important source of energy biomass. In comparison to conventional crops, perennial energy crops have lower input requirements and their cultivating techniques are more environment friendly.

Although today biomass energy does not contribute economically to more than a small fraction of energy requirements, institutional and governmental support can both increase its usage and accelerate cost reduction along the learning curve. Towards such goals, researchers develop models of technical and economic analyses of energy crops production, by adding up production and conversion costs.

In this work we present some methodological aspects of an extended economic model which is being developed. It includes the usual technical-economic analysis and more features such as:

- Detailed monthly monitoring of the various types of labour and machinery used, the amount of energy consumed as well as a detailed amount of all required chemicals
- Full financial analysis in the form typically adapted by industrial accounting today for decision making and the development of strategic plans. This analysis is based on estimated future balance sheets, financial results and expected cash-flows
- Identification of relevant cash-flows for investment appraisal, using the findings of the financial analysis.

It is logical that through rigorous financial analysis of energy crops production and conversion, the model will not only face this option on a practical and pragmatic base, but it will also provide a very useful decision making tool to the investor (state/public or private). The model presented in this paper attempts to bridge the gap between academic research and industrial feasibility and is intended to be used for the preparation of integrated business plans ready to be discussed on financial terms. Need for possible subsidies as well as externalities can be easily identified and added to the basic model results.

It is expected that such models, i.e. models that express actual market reality, can provide a very useful and solid basis or first step to a more elaborate treatment of renewable energy sources (such as for example biomass), aiming at a more intensive effort towards the estimation of the potential of technologies of energy production friendlier to the environment.

**Key words:** Biomass, Bio-energy, Economic Modelling, Energy Crops, Environment