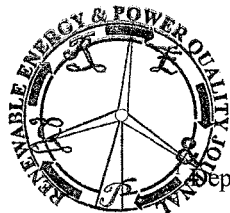


European Association for the
Development of Renewable Energies,
Environment and Power Quality (EA4EPQ)

International Conference on Renewable Energies and Power Quality
(ICREPQ'11)
Las Palmas de Gran Canaria (Spain), 13th to 15th April, 2011



Energy valuing of forest biomass residues in Bizkaia

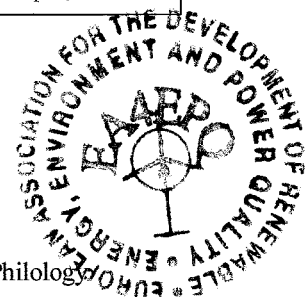
E. Mateos¹, J. M. González² and J. M. Eguzkitza³

¹Department of Chemical and Environmental Engineering ²Department of English and German Philology
³Department of Applied Mathematics

E.U.I.T.I., University of the Basque Country, Plaza La Casilla 3, 48012 Bilbao (Spain)

¹Phone/Fax number: +0034 946014343 / +0034 946014300, e-mail: esperanza.mateos@ehu.es

²Phone: +0034 946014322, e-mail: josemiguel.gonzalez@ehu.es ³Phone: +0034 946014411: josemari.eguzkitza@ehu.es



Abstract.

The aim of this research work is the development of a methodology to quantify and yield cartography of the prospective energy production of residual biomass from the most representative forest species of Bizkaia, using a Geographic Information System (GIS) computer tool. A model of indirect estimation has been used in order to estimate the evolution of forest masses throughout in any area of *Bizkaia*. Arboreal species have timber-yielding utility, and this is the reason why the remains obtained after the forest treatments carried out for the preservation and improvement of arboreal masses, are those quantified in this work as energy production biomass (EPB). After analyzing statistically the results obtained, 52,214 metric tons of residual forest biomass per year are estimated. This means a potential energy supply of 32,011 toe per year. The estimation of biomass quantities that may generate forest activity will allow us to accomplish its planned exploitation, taking into account both economic and environmental aspects, with the aim of determining which the optimum location for setting up an energy production plant is.

Key words

GIS, biomass, forest residues, resources map

1. Introduction

Modern times have helped us to become aware of the serious environmental and energy problems due to the excessive use of energy in the so-called industrialized countries. The classical energy model based on the massive use of fossil fuels has become unsustainable both from an environmental point of view and from the viewpoint of exhaustion of this resource; accordingly, it is necessary to establish a new energy model based on the diversification of sources, rationalization, and efficiency in its consumption, as well as respect for the environment [1]. The goal pursued by the European Directive in 2008 is

that 20% of the total energy consumed in Europe must come from renewable energy resources, among which biomass is included. Biomass of vegetal origin constitutes the 4th worldwide exploited resource, this entailing 14% of energy consumption in the planet. However, the use of biomass for energy purposes is not very widespread in Europe and it just represents a mere 2%, excluding Austria, Finland and Sweden, where it occupies a position of certain relevance. Conversely, biomass occupies a privileged position in developing countries, with an important increase from 1990 (736,000 toe) to 2003 (nearly 900,000 toe). In local terms, the goal for the Autonomous Community of the Basque Country (ACBC) in 2010 is to reach 795,000 toe of biomass exploitation. As far as the contribution of forests and lands from the ACBC as carbon drains is concerned, the net drain effect has been estimated in 1.33 MtCO₂ [2, 3].

Forest residues are those materials removed in timber-yielding exploitation which are not usually extracted due to the fact that they cannot be converted into by-products, but they can be used as organic fuel. These residues come from the remains left in the forest after forestry, pruning, clearing, and final cutting remains in forest production (cleaning, pruning, tree felling). They can be utilized for energy uses due to their excellent features as fuels. One of the main barriers for using this resource is the lack of knowledge of its real forest-mass biomass production capacity. This is a key aspect, since it prevents to know the steady biomass supply that could assure production in thermoelectric plants that might use it [4, 5]. The main aim of this project can be described within the following master lines:

- Selection of the main forest species in the zone.
- Obtaining residue estimators by means of the use of biomass production equations, so that they let us calculate the residual biomass per arboreal species obtained from forest treatment.