RENEWABLE ENERGY PRODUCTION PLANNING IN THE NORTH-EAST OF ITALY BY MEANS OF MULTI-CRITERIA ANALYSIS

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ABSTRACT

The excessive energy reliance on fossil fuels, together with the need to assure energy supplies and the will of reducing environmental emissions in order to comply with Kyoto's objectives, has fostered the interest towards energy savings and renewable energy. In Italy, many initiatives have been proposed regarding renewable fuels. These projects range from heat production fed by ligneous-cellulosic and undergrowth residues, to power plants coupled to anaerobic digesters fuelled by animal dejections, Combined Heating-Power (CHP) plants fed by vegetal oil together with district heating (DH), and Combined Cooling-Heating and Power (CCHP), all these projects being focused on energy saving. Such initiatives, in limited territorial contexts (Regions, Districts and Municipalities) are often in competition with each other, both for the economic incentives and the availability of energy sources. Public bodies' decisions on which plant has to be firstly financed, because of its major benefits in terms of both energy supply and inhabitants' wellbeing, have thus achieved major importance. Multi-criteria analysis therefore appears as a natural tool in order to support such decisional process. This memoir shows a real case study in which the Analytic Hierarchy Process (AHP) has been applied to choose the priority of financing different energy plants, in order to reduce the dependency from fossil fuels and improve the overall efficiency of an area in the North-East of Italy. A survey on 16 municipalities in the district of Udine (Italy) is presented. Various feasible plants have been evaluated by means of the AHP regarding technical, economic, environmental and social issues. Technical, economic and environmental criteria were furthermore disaggregated into more detailed sub-criteria. A pairwise comparison between different options was then conducted – where feasible – through real design data, while a panel of experts evaluated the non-quantifiable criteria. However, having been the will of the public administration to finance projects which better complained with the Kyoto's objectives, the environmental aspect always resulted as the main criterion. As a consequence of this analysis, the best alternative has been identified in a CCHP plant serving the 'Ham District" in San Daniele, well-known on international level. The AHP has been confirmed as an efficient tool to promote communication and participation of all the actors who take part in the decisional process.

Keywords: AHP, Local Energy Planning, Prioritization, Rationalization, Renewable Energy,