Title: Byproduct utilization for transportation system in Valencia, Spain

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Summary:

Valencia Community is located on the Mediterranean Coast in Spain. Its capital city, Valencia City, is the third largest city in the country. As of 2010, it has around 800,000 inhabitants. It has a land area of 134.65 km². The city's main agricultural products are rice and orange. Valencia produces around 57.6% of the orange production of the country. Spain has an estimated orange production of 2.8 million tons in 2011.

Transportation takes the largest portion of the electricity demand of the community at 39.9%. Industry, which includes farming and fishing, comprises 37.8% while residential and commercial use 12.5% and 9.8%, respectively, of its electricity [1].

In 2006, 5% of the total electricity demand of the community comes from renewable resources with 4% of it coming from biomass production. A large portion of the renewable resource comes from hydroelectric power at 75.7% while 19.3% and 0.95% come from wind and solar power, respectively [2]. 27.2% of the total primary energy supply of the community is produced locally while the 72.8% is imported [3]. Other sources of electricity of the community come from nuclear power and coal.

With the largest consumption of electricity coming from transportation and an abundance of orange production in the community, we propose the use of orange residue to produce bioethanol to fuel transportation system in Valencia City and to supply for heat utilization of the residences and industries.

In this report, we focus on the utilization of bio-ethanol from orange peel to fuel the transportation system in the city. We aim to decrease the carbon dioxide emission from transportation system and to decrease the cost of fuel for transportation. In an ambitious scale, we plan to attain energy independence on foreign resource, achieve European Union (EU) renewable energy standards, address precautions for global warming, and tackle oil price. The choice of orange residue to further production of bio-ethanol aims to reduce waste from consumption of orange.

Other sources of renewable energy such as solar power through photovoltaic cells and wind power are generally not accepted by the public, companies and the government. Electric companies have reported a deficit in terms of the supply and distribution of the electricity to the consumer due to the tariff imposed on solar power. The companies then put a high price for the individuals who wish to connect to the grid to sell the solar power they generated. The integration tariff has not been attractive for the consumers. Wind power, on the other hand, goes in the way of the preference of the people as it destroys the view of the environment.

The amount of local consumption of oranges in the community is around 0.746 million tons while 0.864 million tons is exported. Orange residue that can be recovered by weight is around 50-65% and when not used goes to waste. This comprises around 0.425 million tons of residue annually. This much amount of residue produces around 398,000,000 liters of ethanol.

In Spain, 33,888 TJ is spent for transportation system. An estimate of 580 TJ is utilized by Valencia City. The amount of energy generated from the residue is around 395.7 TJ. The demand of the transportation system in Valencia estimated to be around 579.2 TJ.

The Energy Return on Investment (EROI) of cellulosic ethanol, same mechanism which is applied for orange peel, has an average value of 5 [4]. 80% of the bio-ethanol production will be used to power the transportation system while 20% will be used to power the bio-ethanol plant for it to be self-sufficient.

Currently, a budget subsidy of 45% is directed to project cost for the production of renewable energy. An additional 10% is given for medium-sized companies and 20% for small companies. This incentive will attract further investors in the city.

Based on obtain data and the current support of the government, this project seems feasible for Valencia city.

References:

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[3] Energia y Rehabilitacion <u>http://www.energiayrehabilitacion.com/wp-</u> <u>content/uploads/2012/11/primaria5-1024x315.jpg</u> Accessed on September 11, 2014

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