

**Biodiesel Production from Virgin and Waste Canola Oil and Examination of the Cold Flow Properties in Terms of the TRNC Conditions**

Ali Evcil

Filiz Alshanableh

Cemal Gövsa

Mahmut A. Savaş

Yakın Doğu Üniversitesi, Makina Mühendisliği Bölümü, Lefkoşa, KKTC.

Tel: 90-392-223 64 64 / 285, E-Posta: [evcil@neu.edu.tr](mailto:evcil@neu.edu.tr)

**ABSTRACT**

*The fuels are at the top of the imports list in TRNC and is a major drawback in terms of the economic growth of the country. The cost of fuel and LPG imports is about twice of the whole exports of the country. Production of biodiesel fuel using oil seeds that can be harvested in the TRNC can be advantageous in terms of economy, environment and employment. In the present study, virgin and waste canola frying oil were utilized as raw materials to produce biodiesel via transesterification reaction. The cloud point, cold filter plugging point and pour point temperatures for the biodiesel produced from virgin canola oil were found as -2°C, -7.5°C and -9°C, and as 0°C, -7°C and -8.5°C for the biodiesel produced from waste canola oil, respectively. The tests were conducted following the current ASTM and EN standards. Thus, not only its virgin form but also the waste canola oil appear to be quite good candidates in term of biodiesel production. It is noted that both biodiesels can be used through a full calendar year, since the average minimum temperatures are around 5°C in Nicosia. The commercial Euro Diesel fuel was also tested in the same set-up and the solid fractions at the cold filter plugging points were estimated using the linear rule as around 26% and 40%, respectively for the Euro Diesel and home made biodiesel.*

**Keywords:** biodiesel, cold flow properties, transesterification, virgin canola oil, waste canola oil

**Optimization of Second Generation Bioethanol Production**

Asiye Gül Bayrakçı<sup>1</sup>

Günnur Koçar<sup>2</sup>

<sup>1)</sup> Uzman. Ege Üniversitesi Güneş Enerjisi Enstitüsü 35100 Evka-3, Bornova, İzmir

Tel: 90-232-311 12 38 E-Posta: [g\\_bayrakci@hotmail.com](mailto:g_bayrakci@hotmail.com)

<sup>2)</sup> Prof. Dr. Ege Üniversitesi Ege Üniversitesi Güneş Enerjisi Enstitüsü 35100 Evka-3, Bornova, İzmir

Tel: 90-232-311 12 34 E-Posta: [gunnur.kocar@ege.edu.tr](mailto:gunnur.kocar@ege.edu.tr)

**ABSTRACT**

*According to the developing industry and population growth, energy demand is increasing by the years. It is considered that, after 150 years, fossil fuels cannot be able to respond to all energy requirements. Turkey imports nearly all of its petroleum and so this causes major economic problems. In the other hand, Turkey, as a major cereal producer, has a huge potential to grow energy crops and other cellulosic biomaterials and can obtain plant's residues, which are suitable to produce second generation bioethanol. With domestic production, bioethanol can reduce the dependence of petroleum for Turkey, and greenhouse gas emissions can be decreased. But the major problem to produce second generation bioethanol is producing expenses. It is needed to optimize the production process to decrease the total cost. In this regard, with optimization of second generation bioethanol production, it will be more preferable and becomes a major alternative to petroleum and may be a key to new and clean energy source.*

**Keywords:** bioethanol, second generation, energy, Turkey

## BIOETHANOL PRODUCTION FROM POTATO WASTE

Dr. Ayşegül EFENDİOĞLU ÇELİK\* Mine AKSOY\* Dr. Reyhan KARAYEL\* Mustafa ACAR\*

\*Karadeniz Tarımsal Araştırma Enstitüsü - SAMSUN

mineaksoy@hotmail.com

### ABSTRACT

Nowadays environmental problems stemming from rapid population growth, industrialization and excessive use of fossil fuels are becoming not only regional and territorial but also global. This situation forced the governments to search alternative energy sources and make legal reforms in relation to energy issues. One of the alternative energy resources is biofuels. Bioethanol is classified as second (refined) biofuel and derived from starch. It has high octane number. Bioethanol is obtained from starch in agricultural crops by way of converting to sugar and later fermenting process.

In Turkey increase of investment in bioethanol issue led to need of cheap and great amount of feedstock. A portion of the excess production in our country of potato that having high starch rate can be assessed in bioethanol production. The aim of this study is to identify availability as bioethanol raw material of non-market value potatoes. As a result of the production of bioethanol, 1500 ml bioethanol at 86% purity from 10 kg of potato was obtained.

**Key words:** Biofuels, Bioethanol, potatoes

## The Effect of Usage Biodiesel on Emission Changes in Thermal Barrier Coated Diesel Engine

Cenk SAYIN<sup>1</sup>, Selman AYDIN<sup>2</sup>, A. Korhan BİNARK<sup>1</sup>

<sup>1</sup>Marmara Üniversitesi, Teknoloji Fakültesi, Makine Mühendisliği Bölümü, İstanbul

<sup>2</sup>Hakkâri Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü, Hakkâri

### ABSTRACT

In this study, biodiesel was produced from safflower oil by transesterification method and B100 and B 80 fuels formed. The surfaces of the piston and valve were coated with the thickness of 200 micron ZrO<sub>2</sub> ceramic material via plasma spraying method. B100, B80 and D2 fuels were used in one cylinder, four strokes, direct injection and air cooled diesel engine whose piston and valves are coated by ZrO<sub>2</sub>, and measured exhaust emissions. Emissions result of using normal diesel and biodiesel mixed fuel were compared. When results of measurements were compared; according to normal diesel (D2), increase NO<sub>x</sub> and O<sub>2</sub> emissions, and decrease HC, CO<sub>2</sub> and CO emissions was observed in safflower biodiesel fuel.

**Keyword:** Biodiesel, Exhaust Emissions, Diesel Engine, Thermal barrier, ZrO<sub>2</sub>

**COMBUSTION OF BIODIESEL MIXTURES IN DIESEL VEHICLES AND EXHAUST GAS PRODUCTS MODELLING**

Emrah ERÇEK<sup>1</sup>

Prof. Dr. Mustafa ACAROĞLU<sup>2</sup>

<sup>1</sup>Selçuk University The Graduate School of Natural and Applied Science Konya Turkey

<sup>2</sup>Selçuk University Technology Faculty Mechanical Engineering Department Konya Turkey

**ABSTRACT**

*In this study, combustion and exhaust emissions of diesel engines to improve, which has provided practical and realistic methods of mathematical models using the MATLAB computer program was developed. Modeling as the fuel was created model a separate according to the characteristics biodiesel and diesel fuels. Models with the experimental values were obtained close to the results of studies, compared with exhaust emissions and engine performance. Modeling thermodynamics 1 law, the cycle parameters, equilibrium concentrations of burned products, the ideal gas equation, using the internal and the effective parameters of a four-stroke, supercharging, direct injection diesel engine is made.*

*As a result of modeling, with the increase in engine speed for diesel fuel and biodiesel, CO, CO<sub>2</sub> and NO<sub>x</sub> emissions reductions occurred. In the average of all engine speeds, according to diesel fuel biodiesel fuel, were reduced CO emissions 33.65 %, CO<sub>2</sub> emissions 10.77 %, NO emissions 10.28 %. In addition, other combustion products are analyzed, an average of all engine speeds, according to biodiesel diesel fuel, H<sub>2</sub>O, H<sub>2</sub>, H, N, N<sub>2</sub>, O and OH emissions reductions, while the increase in emissions is O<sub>2</sub>.*

*Performance analysis look with the use of biodiesel according to diesel fuel was observed 5.03 % reduction in torque and engine power, specific fuel consumption an increase of 22.82 %.*

**Keywords:** Biodiesel, combustion modeling, diesel engine, energy, exhaust emissions, fuels and combustion.

**Effects of Engine Performance on Engine with Electronic Control of Bioethanol - Gasoline Blends**

A.Engin ÖZÇELİK<sup>1</sup>

Hasan AYDOĞAN<sup>2</sup>

Mustafa ACAROĞLU<sup>3</sup>

<sup>1</sup>Dr. S.Ü. Teknoloji Fakültesi Enerji ABD 42031 Kampüs Konya

<sup>2</sup>Yrd.Doç.Dr. S.Ü. Teknoloji Fakültesi Enerji ABD 42031 Kampüs Konya

<sup>3</sup>Prof. Dr. S.Ü. Teknoloji Fakültesi Enerji ABD 42031 Kampüs Konya

**ABSTRACT**

*In this study, four-stroke, four-cylinder, water-cooled, electronically controlled (ECU) with a spark-ignition engine with a fuel injection system of bioethanol-gasoline blends on engine performance were investigated. Volume of gasoline and diesel, respectively, in 10% ethanol mixed with 20 and 30 have been tested and the test results were compared with each other. As a result of the study, the use of gas as fuel, and gasoline-ethanol, bio-ethanol fuel mixture ratio due to the increase in the reduction of engine torque and power, specific fuel consumption to 30% were found to be enhancements of up.*

**Keywords:** gasoline, bioethanol, ECU, engine performance

**Using Vegetable Oil and Waste Animal Fat Based Biodiesels in a DI Diesel Engine**

Ertan Alptekin<sup>1</sup> Mustafa Çanakcı<sup>2</sup> Ahmet Necati Özsezen<sup>3</sup> Ali Türkcan<sup>4</sup> Hüseyin Şanlı<sup>5</sup>

<sup>1</sup>Arş. Gör. Kocaeli Üniversitesi Teknoloji Fakültesi Otomotiv Mühendisliği Bölümü 41380 İzmit

<sup>2</sup>Prof. Dr. Kocaeli Üniversitesi Teknoloji Fakültesi Otomotiv Mühendisliği Bölümü 41380 İzmit

<sup>3</sup>Doç. Dr. Kocaeli Üniversitesi Teknoloji Fakültesi Otomotiv Mühendisliği Bölümü 41380 İzmit

<sup>4</sup>Arş. Gör. Dr. Kocaeli Üniversitesi Teknoloji Fakültesi Otomotiv Mühendisliği Bölümü 41380 İzmit

<sup>5</sup>Öğr. Gör. Kocaeli Üniversitesi Gölcük Meslek Yüksek Okulu Otomotiv Bölümü 41650 Gölcük

**ABSTRACT**

*In this study, performance, combustion and exhaust emission characteristics of vegetable oil and waste animal fat based biodiesels used in a direct injection diesel engine were investigated and compared to the diesel fuel. Corn oil and safflower-canola oil biodiesels were used as vegetable oil biodiesels while waste fleshing oil and chicken fat biodiesels were used as waste animal fat biodiesels. Engine tests were performed under 1400 rpm and 600 Nm test conditions. According to the results, brake specific fuel consumption, maximum cylinder gas pressure and NO<sub>x</sub> emissions increased while CO and HC emissions reduced when using biodiesels compared to diesel fuel. If the biodiesels were compared to each other, brake specific fuel consumption, maximum cylinder gas pressure and HC emissions are close to each other, NO<sub>x</sub> emissions increased and CO emissions reduced with the vegetable oil biodiesels use.*

**Keywords:** vegetable oil, waste animal fat, biodiesel, performance, exhaust emissions

**Investigation Of Effect On Engine Emissions Of Bioethanol Gasoline Blends**

Hasan AYDOĞAN<sup>1</sup> A.Engin ÖZÇELİK<sup>2</sup> Mustafa ACAROĞLU<sup>3</sup>

<sup>1</sup>Yrd.Doç.Dr. S.Ü. Teknoloji Fakültesi Enerji ABD 42031 Kampüs Konya

Tel: 90-332-223 33 21 E-Posta: [haydogan@selcuk.edu.tr](mailto:haydogan@selcuk.edu.tr)

<sup>2</sup>Dr. S.Ü. Teknoloji Fakültesi Enerji ABD 42031 Kampüs Konya

Tel: 90-332-223 33 21 E-Posta: [eozececik@selcuk.edu.tr](mailto:eozececik@selcuk.edu.tr)

<sup>3</sup>Prof. Dr. S.Ü. Teknoloji Fakültesi Enerji ABD 42031 Kampüs Konya

Tel: 90-332-223 33 21 E-Posta: [acaroglu@selcuk.edu.tr](mailto:acaroglu@selcuk.edu.tr)

**ABSTRACT**

*In this study, ethanol-gasoline blends in spark-ignition engine is taken from the engine exhaust emissions were investigated. Volume of gasoline and diesel, respectively, in 10% ethanol mixed with 20 and 30 have been tested and the test results were compared with each other. As a result of the study, the use of gas as fuel, and gasoline-ethanol fuel in the exhaust emissions of CO in the exhaust gases are increasing the amount of ethanol in a reduction in the amount of 85%, about 20% of the amount of CO<sub>2</sub> reduction, a 25% increase in the amount of HC, O<sub>2</sub> and 2 times the amount of determined to be increased by up to.*

**Keywords:** engine, emission, bioethanol, gasoline

**WASTE BASED FUELS AND QUALITY STANDARDS****Hilal Aydemir****Hürriyet Mah. Cami Sokak No:50 Orhangazi/BURSA****Tel: 0554 289 03 76 E-Posta: hilal.aydemir@ogr.yalova.edu.tr****ABSTRACT**

Rapid growth of population, developing industries and the change of consumption habits cause the increase of waste amount day by day and also lots of environmental problems.

According to the proposed sustainable solution to the waste problem, waste should be prevented or reduced at source, reusable wastes should be evaluated, recyclable or recoverable wastes should be evaluated, if none of these processes can be performed the final disposal method should be chosen. By this approach wastes that are unrecyclable but which are rich in energy content should be used for energy recovery purposes. At this point consumers face with different waste derived fuel types and quality standards that are accepted by different countries. The existence of different quality standards is an obstacle to international trade of waste derived fuels. And also the confusion in identification and classification of those fuels prevent the trade between waste derived fuel manufacturers and users in the domestic market.

In this paper, waste derived fuels and existing quality standards will be discussed and attention is drawn to the need for an international quality standard.

**Keywords:** waste derived fuel, SRF, RDF, quality standards

**Optimization of Methanolysis of Waste Frying Oil Sample as a Low-Cost Biodiesel Feedstock****Hüseyin Şanlı<sup>1</sup> Mustafa Çanakcı<sup>2</sup> Ertan Alptekin<sup>3</sup>**

<sup>1</sup>Öğr. Gör. Kocaeli Üniversitesi Gölcük Meslek Yüksek Okulu Otomotiv Bölümü 41650 Gölcük

<sup>2</sup>Prof. Dr. Kocaeli Üniversitesi Teknoloji Fakültesi Otomotiv Mühendisliği Bölümü 41380 İzmit

<sup>3</sup>Arş. Gör. Kocaeli Üniversitesi Teknoloji Fakültesi Otomotiv Mühendisliği Bölümü 41380 İzmit

**ABSTRACT**

In the current study, it is aimed to determine the optimum reaction parameters of base-catalyzed methanolysis of waste frying oil as a low-cost feedstock. Since the free fatty acid content of feedstock was 0.75%, the acid-catalyzed pretreatment reaction was not needed. In the first step of the study, the purpose was to determine the best alkaline catalyst type and concentration. Therefore, KOH, NaOH, CH<sub>3</sub>OK and CH<sub>3</sub>ONa were used in the amounts of 0.75-1.00% and 1.25% wt. After determination of the best catalyst type and concentration, the optimization study continued with reaction temperatures - durations and methanol: feedstock molar ratio experiments. To optimize the reaction duration and temperature, 30-45-60-120-180 and 240 minutes and 30-40-50 and 60 °C were used. At the last stage of the study, the optimum molar methanol amount was determined at the ratios of 3:1, 4:1, 5:1, 6:1, 7:1, 8:1 and 9:1. CH<sub>3</sub>OK concentrations did not meet the upper viscosity limit of 5 mm<sup>2</sup>/s given in European Biodiesel Standard (EN 14214). However, only the catalyst of 1.25% CH<sub>3</sub>ONa meets the standards but its product yield was relatively low. The optimum reaction parameters were determined at 6:1 molar ratio, 0.75% KOH, 60 min and 60 °C. With these reaction parameters, yield, viscosity and density were 97.18%, 4.73 mm<sup>2</sup>/s and 885 kg/m<sup>3</sup>, respectively.

**Keywords:** waste frying oil, base catalyst, biodiesel, optimization, fuel standard

**Theoretical Investigation the Effects of Biodiesel Blends**

**İsmet Sezer<sup>1</sup>**

<sup>1</sup>Doç. Dr. Gümüşhane Üniversitesi Makine Mühendisliği Bölümü 29100 Bağlarbaşı/Gümüşhane  
Tel: 90-456-233 74 25 E-Posta: [isezer@gumushane.edu.tr](mailto:isezer@gumushane.edu.tr)

**ABSTRACT**

***Theoretical Investigation the Effects of Biodiesel Blends***

*In this study, the effects of using the soybean oil methyl ester (SOME) biodiesel fuel as an additive at various percentages in diesel fuel and as a pure on the spray and combustion characteristics, engine performance and exhaust emissions investigated in details theoretically. For this purpose, a model for a direct injection commercial vehicle diesel engine has been built by using a program namely as Diesel-RK that can be used liberally on the net. The injection, combustion, performance and emission data obtained for diesel (D) and biodiesel (BD) fuels and D-BD fuel blends by means of the constructed model was compared each other. The results of the study show that the biodiesel fuel generally has a close brake thermal efficiency to diesel fuel, while it causes a reduction in engine output power and particulate matter (PM) emissions and an increase in specific fuel consumption and nitric oxides (NOx) emissions. Additionally, D-BD fuel blends usually gave the spray, combustion, performance and emission values between those of the diesel and biodiesel fuels depending on the blending ratios.*

**Keywords:** *biodiesel blends, diesel engine, engine performance, exhaust emissions*

**Determination Potantial of Biothermal Energy of Maize and Sunflower Residues in Turkey**

**Mahmut POLAT<sup>1</sup>**

<sup>1</sup>Dr. Makine Yüksek Mühendisi Geçit Kuşığı Tarımsal Araştırma Enstitüsü Müdürlüğü Eskişehir  
Tel: 90-222-237 57 00 E-Posta: [mahmutpolat@gktaem.gov.tr](mailto:mahmutpolat@gktaem.gov.tr)

**ABSTRACT**

*Biomass energy derived from substances is called biyothermal energy. The raw material of biyothermal energy are manure, municipal or agricultural waste or residues. Occurring in the mixture of this waste or residues is called compost. A result of refutation of organic substances by microorganisms in the compost pile such as water vapor, CO<sub>2</sub>, etc. gases, the addition of heat is released to the environment. That heat energy is biyothermal energy source.*

*The biothermal energy capacity values of maize and sunflower was used from the number resulting of the Eskişehir Transitional Zone Agricultural Research Institute project TAGEM-BB-090210E01 are run between in the years 2009-2012.*

*The amount of dry matter of maize and sunflower wastes was calculated arround 3.342.362 tonnes in terms can be used to have of it in Turkey, 2012. The amount of biyothermal energy potential of this dry matter is determined to be about 4.341.138.114 MJ. and 1.207.616 kWh.*

*As a result, the total monetary cycle TL 578.066.535 of TL 434.741.760 energy, and TL 143.324.776 chemical fertilizers is calculated.*

**Keywords:** *biothermal energy, composting process, heat conduction coefficient, heat capacity, Eskişehir; agricultural compost, agricultural residues.*

**DETERMINATION POTANTIAL OF BIOENERGY OF AGRICULTURAL RESIDUES IN TURKEY**

**Mahmut POLAT<sup>1</sup> Ahu FİKİRCİOĞLU<sup>2</sup>**

<sup>1</sup>Dr. Makine Yüksek Mühendisi Geçit Kuşağı Tarımsal Araştırma Enstitüsü Müdürlüğü Eskişehir  
Tel: 90-222-237 57 00 E-Posta: [mahmutpolat@gktaem.gov.tr](mailto:mahmutpolat@gktaem.gov.tr)

<sup>2</sup>Ziraat Yüksek Mühendisi Geçit Kuşağı Tarımsal Araştırma Enstitüsü Müdürlüğü Eskişehir  
Tel: 90-222-237 57 00 E-Posta: [ahufikircioglu@gktaem.gov.tr](mailto:ahufikircioglu@gktaem.gov.tr)

**ABSTRACT**

*In general, biomass contains organic materials that can be burned as fuel. Usually the biomass materials measured by dry weight. Bioenergy is energy derived from biomass as a result of incineration. Biomass is agricultural wastes or residues that are the raw material of agricultural origin.*

*In this study, the agricultural production data year of 2012 were used for common five species; wheat, barley, sunflower, maize and sugar beet which have most cultivation area of 81 Province in Turkey.*

*The amount of dry matter of agricultural wastes was calculated around 11 868 134 tons in terms can be used to have of it in Turkey, 2012. The amount of bioenergy potential of this dry matter is determined to be about 58 116 663 MWh.*

**Keywords:** Turkey, biomass, bioenergy, agricultural waste, calorific values.

**POTENTIAL CONTRIBUTION OF BIOMASS RESOURCES TO TRANSPORTATION SECTOR OF PAKISTAN**

**Muhammad Arsalan Tariq<sup>1</sup>**

**Muhammad Jibrán S. Zuberi<sup>1</sup> Dhawal Shah<sup>2</sup>**

<sup>1</sup>Graduate Program in Sustainable Environment & Energy Systems, METU – Northern Cyprus Campus

<sup>2</sup>Department of Petroleum and Chemical Engineering, Sultan Qaboos University

Tel: 90-533-848 92 74 E-Mail: [arsalantariq70@gmail.com](mailto:arsalantariq70@gmail.com)

**ABSTRACT**

*Pakistan is under a lot of economic and energy crises. The demand for energy is rapidly increasing. Pakistan has abundant natural gas reserves but the whole country has been using it for households and transportation purposes and it has depleted the resources by a large extent. The reserves are eventually going to exhaust. There is a very important need to find alternate resources or fuels to be used for the transportation sector. This paper analyzes and investigates the potential of two major biomass energy resources available in Pakistan: Livestock and Bagasse for sustainable transportation. If these resources are utilized by the use of smart techniques and fair amount of investment, it can lead to a huge load reduction of the natural gas reserves. The biomass resource quantification is done along with its potential application to the transportation sector of the country. The outcomes of this paper may also be considered and used as a reference for other developing countries having abundant biomass resources.*

**Keywords:** Biogas, Transportation, Bio-CNG, Pakistan

**Fertilizer and Soap Production Of Electricity**

**Nurettin Çek**

Elazığ, E-Posta: [nurettincek001@gmail.com](mailto:nurettincek001@gmail.com)

**ABSTRACT**

*We use in our homes, cleaning is one of the instruments of the soap and national legislation in turkey does not hurt. The necessary conditions are present, soap as well as energy source can also be used as fertilizer. - Forming substances, soap with some of electron transfer between the items by ensuring soap electricity. This study-forming substances, soap supplied with soil in terms of soil minerals enrichment by providing soil, plants, food and soap has been a source of electricity produced.*

**Keywords:** batteries, zinc, graphite, electricity generation from the soil

**MATERIAL TYPE AND PROCESS THE EFFECT OF THE TERMS BIOFUEL PRODUCTION****Oğuzhan Uçar**<sup>1</sup>**Nevin Geçgil**<sup>1</sup>**Nevser Bilge**<sup>1</sup><sup>1</sup>Kadıköy Anadolu Lisesi, İstanbul, TürkiyeTel: 0530 660 83 25 E-Posta: [ucar1996@gmail.com](mailto:ucar1996@gmail.com)**ABSTRACT**

Bioethanol energy is very important due to fighting against environmental pollution, climate change and dependency on petroleum liquid fuels. It has been proven that use of ethanol in automotive applications has also an economical value. It is generally used as bioethanol/gasoline blends in the range of 2- 10%, this range can sometimes reach to 70-80%.

In this study, different raw material such as black raisin, raisin, white flour, corn flour, whole wheat, potato slices are used for bioethanol production process. The effects of fermentation time and the amount of yeast and the usage procedure of yeast and the usage of pulped/unpulped raw material and salt on CO<sub>2</sub> production during fermentation were examined. The CO<sub>2</sub> production is the indicator for bioethanol production, i.e., an increase of CO<sub>2</sub> results to an increase of bioethanol. The CO<sub>2</sub> is increased in the order of potato slices, corn flour, white flour, whole wheat and black raisin, raisin. An increase of fermentation time and the amount of raw materials and the amount of yeast also results to an increase of the CO<sub>2</sub> production. It is seen that un-pulped raisin leads to higher bioethanol production than pulped raisin. The usage of all of the yeast in one loading into solution instead of partially loading of all of the yeast results to higher CO<sub>2</sub> production. Although at the beginning of the experiment the unsalted solution yields a higher ethanol production, after, the salted solution have an outstanding higher rate of ethanol production, approximately 3 hours later. For one experimental study, the ethanol production has been measured as 48.34% due to leakage of water vapor into solution, leading 14,1 Mmol/kj.

**Keywords:** biofuels, energy, yeast, salt, raisin, CO<sub>2</sub>

**Title: Availability of Biochar in Agricultural and Energy Sector for the Province of İzmir****Özben ERSÖZ**<sup>1</sup>**Günnur KOÇAR**<sup>1</sup><sup>1</sup>Ar. Gör., Ege Üniversitesi Güneş Enerjisi Enstitüsü, Bornova/İzmirTel: 90-232-311 12 38 E-Posta: [ozben.ersoz@ege.edu.tr](mailto:ozben.ersoz@ege.edu.tr), [kutluozben@gmail.com](mailto:kutluozben@gmail.com)<sup>2</sup> Prof. Dr., Ege Üniversitesi Güneş Enerjisi Enstitüsü, Bornova/İzmirTel: 90-232-311 12 34 E-Posta: [gunnur.kocar@ege.edu.tr](mailto:gunnur.kocar@ege.edu.tr)**ABSTRACT**

Biochar is a solid fuel that is gained from thermal process of biomass at 270°C-300°C with air absence. Biochar is known as wood charcoal or barbeque coal in Turkey, and the obtaining process is carried out uncontrolled, unfruitful, primitive, and in bad situation by using only oak, pine and other acarpous citrus woods. If it is taken into account that Turkey is an agricultural country, it is important that all available woody remains should be converted into energy or carbon source as soil improver. For this aim, new technological production approaches should be developed and the woody remains should be used under control. In this study, production capacity and disponibility of biochar for Izmir has been researched, basic soil characteristics and cultivated agricultural products have been analyzed according to districts' distribution. In this regard, it can be suggested that biochar could be used for as an alternative cleaning method the soil in north side of Izmir where soil pollution is seen and corn silage, olive, cotton, and wheat residues should be used in this process primarily. According to the calculation, the theoretical waste amount and energy content obtained from these products was about 2.806.739 ton and 67 million GJ, respectively. As well, both ease of accessibility and using biochar in immediate vicinity, Bergama has been considered as the most suitable district to build a biochar production facility.

**Keywords:** biochar, biomass, solid biofuel, soil amendment, renewable energy



**COMPARISON OF PROCESS SIMULATION OF FLUIDIZED BED REFORMER USING ASPEN AND HYSYS**

**H. Bashiri, R. Sotudeh-Gharebagh, A. Sarvar-Amini and N. Mostoufi**

School of Chemical Engineering, University of Tehran, P.O. Box 11155-4563, Tehran, Iran, Tel: +98-21-61112855, [sotudeh@ut.ac.ir](mailto:sotudeh@ut.ac.ir),

**ABSTRACT**

*In this study, a simulation model is developed by commercial simulation programs (ASPEN and HYSYS) in order to predict the performance of fluidized bed reformer (FBR). As many physical and chemical phenomena take place in the reformer, two sub-models seem necessary in the overall model. These sub-models are the hydrodynamic and reaction sub-models. The hydrodynamic sub-model is based on the dynamic two-phase model and the reaction sub-model is derived from the literature. In the overall model, the bed is divided into several sections. At each section, the flow of the gas is considered as plug flow through the bubble phase and perfectly mixed through the emulsion phase. The sets of the experimental data from the literature were used to validate the model. Close agreement was found between the model predictions by ASPEN and HYSYS and the experimental data.*

**Keywords:** HYSYS, ASPEN, fluidized bed reformer, process simulation

**INDUSTRIAL POLICY AND THE ROLE OF STATE INDUSTRIALISATION STRATEGIES IN THE MALAYSIAN PALM OIL BIOECONOMY INDUSTRY**

**Rahmat, Siti Rahyla<sup>1</sup> Hamid, Ahmad Amirruddin<sup>2</sup>**

<sup>1</sup> Center for Development Research, University of Bonn, Germany

Tel: +4917632827160, E-Posta: [rahyla@uni-bonn.de](mailto:rahyla@uni-bonn.de)

<sup>2</sup> Universiti Malaysia Terengganu (UMT)

**ABSTRACT**

*Palm oil is identified as the most efficient amongst vegetable oils and fats and a bioeconomy product but its sustainability issues are continually debated. The use of bio-based (certified organic) materials in palm oil production and the potential to achieve a zero-waste production process motivated this assessment of the potential for the palm oil industry to participate sustainably in the bioeconomy. This study analysed case studies of German rapeseed biodiesel and US corn ethanol to propose a policy framework for biofuel production by the Malaysian palm oil industry, as there is not yet a comprehensive relevant policy framework for the country. The policies adopted by the Malaysian government can be adopted by other palm oil producing countries and the international policy examples can be used by the Malaysian government to improve policy strategies in the palm oil biofuel industry. A case study on recycling waste for renewable energy in palm oil processing mills in Malaysia will also presented in this study. Several policy recommendations on joint venture mills, biomass companies, efforts to reduce waste, and fostering bioeconomy industries are also discussed in this study.*

**Keywords:** Palm Oil, Bioeconomy Industry, Policy framework, Case Studies, Renewable energy

**Sustainability and Optimization of Energy Crops for Producing Biogas**

**Günnur Koçar**<sup>1</sup>

**Nilgün Civaş**<sup>2</sup>

<sup>1</sup> Prof. Dr. G.E.E. Enerji Teknolojileri ABD 35100 Ege Üniversitesi, İzmir

Tel: +90 232 388 40 00/1230-1234 E-Posta: [gunnur.kocar@ege.edu.tr](mailto:gunnur.kocar@ege.edu.tr)

<sup>2</sup> Doktora öğrencisi, G.E.E. Enerji Teknolojileri ABD Ege Üniversitesi, İzmir

**ABSTRACT**

*Depending on the industrial development of Turkey, the increasing amount of energy use based on fossil fuels has brought about an increase in environmental degradation and air pollution. Despite possessing high domestic resources in terms of the application of various types of renewable energy, the external dependence of Turkey in terms of meeting its energy needs is a socio-economic disadvantage.*

*In this context, the importance of producing second generation biofuels from lignocellulosic biomass resources is on the increase. Food safety can be ensured in biofuel production by carrying out energy farming by using switchgrass and sorghum species that are able to adapt to the floral and climate structures in the non-arable land of Turkey. Besides, energy sustainability can be provided through innovative agricultural approaches.*

*The positive effect of these C4 crops with their features of high photosynthetic conversion, soil improvement and water retention on the decrease in the greenhouse gas effect is striking. The use of animal wastes together with these crops in anaerobic fermentation processes is also essential to waste management.*

*The small-sized biogas systems which can be integrated into agricultural land by using domestic raw material resources and technical instruments & equipment will meet the local energy need and provide rural development and new workforce opportunities.*

**Keywords:** Biogas, energy crops, biomethane potential (BMP), pretreatment

**The Design Parameters of a Trigeneration System**

**H. Hüseyin ÖZTÜRK**<sup>1</sup>

<sup>2</sup> Prof. Dr. Ç.Ü. Ziraat Fakültesi Tarım Makinaları Bölümü 01330 Balcalı Adana

Tel: 90-322-3387434 e-posta: [hhozturk@cu.edu.tr](mailto:hhozturk@cu.edu.tr)

**ABSTRACT**

*Trigeneration systems have even bigger potential for economic and energy savings due to their further utilization of primary fuel. The design of such trigeneration systems is a very complex issue, because many different aspects interact and condition their profitability: irregular and decoupled energy demands, plant configuration, equipment sizing, operation management, energy prices, legal context. All these parameters should be taken into account together while designing a trigeneration system, which complicates largely the establishment of a general design method for the configuration, sizing and management of the plant. In addition to this, the evaluation of the systems constitutes a difficulty itself, because their performance may involve benefits of very different nature. In this context, different evaluation criteria based on primary energy saving or pollutant emissions avoidance should be combined with profitability parameters. Therefore, the development of tools and procedures to design and evaluate consistently trigeneration plants has a great relevance in order to promote the spread of these high efficient*

**Keywords:** trigeneration, design parameters.

## BEYPAZARI LIGNITES SONO ELECTRO CHEMICAL METHOD FOR THE IMPROVEMENT

**İlkay KANAL<sup>1</sup> Duygu Dinç<sup>2</sup> Aylin Aytaç<sup>1</sup> Ayşe Elif SANLI<sup>3</sup>**

- 3) Yrd. Doç. Dr. Gazi Üniversitesi, Fen Fak, Kimya Böl, Ankara  
Tel: 90-533-512 76 81 E-Posta: [aytaca@gazi.edu.tr](mailto:aytaca@gazi.edu.tr)
- 4) Adularya Enerji Elektrik Üretimi ve Madencilik Ltd. Şti, Ankara  
Tel: 90-545-608 34 04 E-posta: [Duygu.Dinc@adularya.com](mailto:Duygu.Dinc@adularya.com)

- 3) Yrd. Doç. Dr. Turgut Özal Üniversitesi, Mühendislik Fak, Elektrik&Elektronik Müh. Ankara  
Tel: 90-555-965 01 21 E-Posta: [aecsanli@turgutozal.edu.tr](mailto:aecsanli@turgutozal.edu.tr)

### ABSTRACT

*In this study, Beypazarı lignite coal was enhanced using the sonoelectrochemical method. The effect of the treatment conditions were studied in the alkaline coal solution. Ultrasonic treatment was applied 25 min. The conditions include potential of electrolysis (-1V and +1V) and the addition ionic solution. Comparing with the enhanced treatment by the potential applied, sonoelectrochemical method is an effective technology with the addition of ionic solution. While the removal of the ash and sulfur were being achieved under the potential of -1V, the calorific value of the coal increased more than the other sample.*

**Key words:** *electrochemistry, Ultrasonic, Desulfurization, ash removal*

## Fuel Oil Properties of Obtaining Oil from Camelina [*Camelina sativa* (L.) Crantz] Seeds

**M. Nevzat Örnek<sup>1</sup>, Mustafa Acaroğlu<sup>2</sup>, Ali Yavuz Şeflek<sup>3</sup>, Murat Acar<sup>4</sup>, Haydar Haciseferoğulları<sup>3</sup>**

- 1) S.Ü. Teknik Eğitim Fakültesi, Konya  
2) S.Ü. Teknoloji Fakültesi Enerji ABD Konya  
3) S.Ü. Ziraat Fakültesi Tarım Makinaları Bölümü, Konya  
4) Zir. Müh. Konya Şeker Beta Ziraat Ticaret A.Ş.

### ABSTRACT

*In this study, fuel oil properties of obtaining oil from camelina seeds was determined in Konya province which is produced in 2013. Crude oil was obtained by transition from hot press of seeds. Obtaining crude oil was filtrated, and biodiesel was produced by NaOH catalyzer and transesterification method. In the experiments, EN 14214-2010 standard test methods were taken into consideration. While biodiesel density of Camelina, kinematic viscosity and ester content was found within standard values, cold filter plugging point, cloud point and oxidation stability values were low according to standards. In addition, flash point and iodine values were also detected to be more from standard values related.*

**Keywords:** *Camelina oil, transesterification, biodiesel*