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Bioenergy Update June 2008

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Articles

Coal goes to wood pellets for Nottinghamshire schools. *Energy World (Energy Institute)*; Jan 2008 (356), p.15 (1p.)
Schools in Nottinghamshire are switching from coal to wood pellets for heating.
(To request: email library@energylibrary.org.nz and quote **Bio6-EnergyWorld**) √

Environmental and economic evaluation of bioenergy in Ontario, Canada. Yimin Zhang et al. *Journal of the Air & Waste Management Association*; Aug 2007. Vol 57 (8); p.919 (15p).
(To request: email library@energylibrary.org.nz and quote **Bio6-Zhang**) √

Financing wood-fired electricity generation. Diane Greer. *BioCycle*; Vol 48 (7), July 2007, p.66-68,70
(To request: email library@energylibrary.org.nz and quote **Bio6-Greer**) √

Cellulose success. Ashley, Steven. *Scientific American*; Apr 2008, Vol 298 (4), p.32-33
Cellulose from wood chips and agricultural waste as feedstocks for biofuel may have advantages over corn, sugarcane and soybeans.
(To request: email library@energylibrary.org.nz and quote **Bio6-Ashley**) √

Burn it? Gasify it? Ferment it? Doing the right thing with biomass. M. Simpson-Holley; G. Evans. *Energy World (Energy Institute)* Jun 2007 350. p16-19.
As we face climate change and dwindling oil supplies, deriving more energy from plants may become a necessity. The extent to which the bio-energy industry will grow depends on politics, economics and international development. The authors discuss the options for biomass processing in the UK.
(To request: email library@energylibrary.org.nz and quote **Bio6-Simpson**) √

Consumer willingness-to-pay for biopower: Results from focus groups. Diane Hite et al. *Biomass and Bioenergy*; Vol 32 (1), Jan 2008, p.11-17.
To find out whether consumers are willing to pay a surcharge for biopower, the Alabama Dept. of Agriculture and Industries hosted consumer focus groups at four locations in Alabama. Results showed that consumers were willing to pay a premium in line with the costs, but that most did not have much prior information about green energy options.
(To request: email library@energylibrary.org.nz and quote **Bio6-Hite**)

Cost and sensitive analysis tools for forest energy procurement chains. Laitila, J. *Forestry Studies*; Volume 45, 2006, p.5-10
(To request: email library@energylibrary.org.nz and quote **Bio6-Laitila**)

Net energy output from harvesting small-diameter trees using a mechanized system. Fei Pan et al. *Forest Products Journal*; Jan/Feb 2008, Vol 58 (1/2), p.25-30
What amount of extra energy can be generated after subtracting the total energy consumed to produce the biomass energy? Knowing the ratio between energy output and input is a valid question when highly mechanized systems that consume fossil fuels are used to harvest and transport forest biomass for energy. We estimated the net energy generated from mechanical fuel reduction thinning treatments on pure ponderosa pine stands in Arizona. The mechanized system (felling, skidding, loading, grinding, and hauling) was monitored for energy consumption. Potential energy output from harvested forest biomass was calculated based on hog fuel moisture content and heating value.
(To request: email library@energylibrary.org.nz and quote **Bio6-Pan**) √

Global growth: The world biomass market. Knight, B. Westwood, A. *Renewable Energy World*; 2005, Vol 8 (1), p.118 – 127
(To request: email library@energylibrary.org.nz and quote **Bio6-Knight**) √

Harvesting small trees and forest residues. J-F Gingras. *Biomass and Bioenergy*; Vol 9 (1-5) 1995, p.153-160
This report summarises the progress achieved under the auspices of the Activity "Harvesting small trees and forest residues" during 1992 – 1994. The work performed included literature reviews to assess potentially recoverable material as a function of harvesting system, analysis of factors affecting chipping quality and productivity, a comparison of firewood processing technologies, small tree and residue harvesting method reviews, a description of some prototype combination machines for recovering roundwood and forest biomass and an update on multiple-tree handling harvester head development in the Nordic countries.
(To request: email library@energylibrary.org.nz and quote **Bio6-Gingras**)

Physical characterisation and chemical composition of densified biomass fuels with regard to their combustion behaviour. I. Obernberger and G. Thek. *Biomass and Bioenergy*; Vol 27 (6), Dec 2004, p.653-669
With respect to the use of densified biomass fuels in fully automatic heating systems for the residential sector a high quality of these fuels is required. Several European countries already have implemented standards for such fuels. In other countries such standards are in preparation or planned. In some countries also standards from associations already exist (e.g. from the Austrian Pellets Association). In addition to these national standards, European standards for solid biomass fuels are under development. For producers of densified biomass fuels, especially for pellet producers, it is therefore very important to produce high-quality fuels that adhere to the standards.
(To request: email library@energylibrary.org.nz and quote **Bio6-Thek**)

Old fuel for modern times: Socio-economic drivers and impacts of bioenergy use. Domac, Julije et al. *Renewable Energy World*; Jul/Aug 2005 Vol 8 (4), p.113-114, 116, 118, 120-123.
(To request: email library@energylibrary.org.nz and quote **Bio6-Domac**) √

Importance of biodiesel as transportation fuel. Ayhan Demirbas. *Energy Policy*; Vol 35 (9) Sept 2007, p.4661-4670
(To request: email library@energylibrary.org.nz and quote **Bio6-Demirbas**) √

The optimal size for biogas plants. C. Walla and W. Schneeberger. *Biomass and Bioenergy*; Vol 32 (6), June 2008, p.551-557
The costs of biogas and electricity production from maize silage in relation to plant size are investigated in this paper. A survey of manufacturers' engineering data was conducted to derive a reliable relationship between the capacity of a combined heat and power (CHP) unit and its electrical efficiency. Then a model was developed to derive cost curves for the unit costs of biogas and electricity production and for the transport costs for maize silage and biogas slurry. The least-cost plant capacity depends to a great extent on the local availability of silage maize, and ranges in the model calculations from 575 to 1150 kWel. Finally, the paper deals with the optimum operating plant size due to the investment support available and the graduated tariff for green electricity in Austria.
(To request: email library@energylibrary.org.nz and quote **Bio6-Walla**)

Pyrolysis of wood and bark in an auger reactor: Physical properties and chemical analysis of the produced bio-oils. L. Ingram et al. *Energy & Fuels*; Vol 22 (1) 2008, p.614-625.
(To request: email library@energylibrary.org.nz and quote **Bio6-Ingram**)

Electrical savings by use of wood pellet stoves and solar heating systems in electrically heated single-family houses. Tomas Persson et al. *Energy and Buildings*; Vol 37 (9), Sept 2005, p.920-929
This study investigates how electrically heated single-family houses can be converted to wood pellets- and solar heating using pellet stoves and solar heating systems. Four different system concepts are presented and system simulations in TRNSYS evaluate the thermal performance and the electrical savings possible for two different electrically heated single-family houses.
(To request: email library@energylibrary.org.nz and quote **Bio6-Persson**)

Implications of fuel moisture content and distribution on the fuel purchasing strategy of biomass cogeneration power plants. S. Prasertsan and P. Krukanont. *Biomass and Bioenergy*; 24 (1) 2003, p. 13-25.
Biomass-fired power plant projects are usually developed with high risk in comparison to the conventional fossil power plant, merely because of the uncertainty of long-term fuel supply and cost. The project development is traditionally carried out by initially assuming the fuel cost followed by detailed engineering design, project cost estimation and economic analysis. This paper presents an alternative way of project development by finding the maximum affordable fuel cost to settle the fuel purchasing agreement before commencing the engineering part of the project development. Mathematical models of fuel cost incorporating various fuel parameters and power plant operating parameters are developed. The maximum affordable fuel cost was found to depend on the fuel moisture content, area-base annual availability, the required financial return, size of the power plant, and the operation of the power plant. Maximum affordable fuel cost is sensitive to the specific investment cost, change of electricity export factor, fuel moisture content, price of electrical energy, equipment efficiencies and annual operating time.
(To request: email library@energylibrary.org.nz and quote **Bio6-Prasertsan**)

Comparative study on energy sustainability of biofuel production chains. D Cocco. *Proceedings of the Institution of Mechanical Engineers.: Part A Journal of power and energy*; Aug 2007. Vol 221 (A5), p.637-645
This paper is concerned with a comparative study of the energy sustainability of the production of biodiesel from oleaginous plants (rape and sunflower), of bioethanol from sugar crops (sugar beet and sweet sorghum) and of electricity from lignocellulose materials (miscanthus and short rotation forestry poplar).
(To request: email library@energylibrary.org.nz and quote **Bio6-Cocco**) √

Anaerobic biogasification of undiluted dairy manure in leaching bed reactors. Demirer, G.N. and Chen, S. (2008) *Waste Management*; 28 (1), p.112-119. Dry anaerobic digestion of high solids animal manure is of increasing importance since conventional slurry digestion is not an effective system for these manures. The investment costs for large-size reactors, costs for heating these reactors, handling, dewatering, and the disposal of the digested residue decrease the benefits of conventional slurry anaerobic digestion for high solids animal manure. Even though leaching bed reactors (LBR) constitute a promising option for dry anaerobic biogasification of animal manure, no study is cited in the literature for animal manure, excluding a single study on cattle waste which utilized a similar concept in a different experimental set-up, namely a packed bed digester. Therefore, this work was undertaken to investigate the anaerobic biogasification of undiluted dairy manure in LBRs.
(To request: email library@energylibrary.org.nz and quote **Bio6-Demirer**)

Biomass – a burning issue: Policies needed to spark the biomass heating market. Heinz Kopetz. *Refocus*; Vol 8 (2), Mar-Apr 2007, p.52-54, 56-58
Governments that consistently ignore the potential that renewable energy has for the heating market can't see the wood for the trees. A reFOCUS focus on biomass for heat begins with an overview of the biomass marketplace by Heinz Kopetz, chairman of the European Biomass Association (AEBIOM).
(To request: email library@energylibrary.org.nz and quote **Bio6-Kopetz**)

Best uses of biomass: Comparing lifecycle data and maximising GHG emission reductions from biomass. Martin Tampier. *Refocus*; Vol 5 (5), Sept-Oct 2004, p.22-25
Waste biomass is available in limited quantities, and likewise, agricultural land that can be used to grow bioenergy crops is scarce. On the other hand, there are many competing uses of biomass - from transportation fuels over electricity generation to bioplastics, all displacing fossil fuels, and if examined by themselves, all resulting in net greenhouse gas (GHG) emission reductions. Martin Tampier, of Envirochem Services Inc., Canada examines which uses should be preferred if the biomass resource is to yield the highest possible emission reductions.
(To request: email library@energylibrary.org.nz and quote **Bio6-Tampier**) √

Monitoring and operational results of a hybrid solar-biomass heating system. D. Chasapis et al. *Renewable Energy*; Vol 33 (8) Aug 2008, p.1759-1767
(To request: email library@energylibrary.org.nz and quote **Bio6-Chasapis**)

Influence of site characteristics and costs of extraction and trucking on logging residue utilization in southern West Virginia. Grushecky, Shawn T. et al. *Forest Products Journal*; Jul/Aug 2007, Vol 57 Issue 7/8, p.63-67
The increased utilization of logging residues has received considerable attention as a potential source of renewable biomass and as a raw material for engineered and conventional wood profiles. We investigated the relationship between logging residue accumulations and site characteristics on 70 timber harvests that occurred during 2000 to 2001 in southern West Virginia.
(To request: email library@energylibrary.org.nz and quote **Bio6-Grushecky**) √

Towards a sustainably certifiable futures contract for biofuels. John A. Mathews. *Energy Policy*; Volume 36, Issue 5, (May 2008), p.1577-1583
How are biofuels to be certified as produced in a sustainable and responsible fashion? In the global debate over this issue, one party to the proceedings seems rarely to be mentioned—namely the commodities exchanges through which a global biofuels market is being created. In this contribution, I propose a solution to the problem of sustainability certification through a biofuels futures contract equipped with 'proof of origin' documentation.
(To request: email library@energylibrary.org.nz and quote **Bio6-Mathews**) √

Experimental investigation of a 125 kW twin-fire fixed bed gasification pilot plant and comparison to the results of a 2 MW combined heat and power plant (CHP). Kramreiter, R. et al. *Fuel Processing Technology*; 89 (1) 2008, p.90-102.
(To request: email library@energylibrary.org.nz and quote **Bio6-Kramreiter**)

Miscanthus and willow heat production: An effective land-use strategy for greenhouse gas emission avoidance in Ireland? David Styles and Michael B. Jones. *Energy Policy*; Vol 36 (1) Jan 2008, p.97-107
Recent decoupling of EU direct payments from agricultural production, to land-area-based payments, has accelerated the national trend of declining livestock numbers, presenting opportunities for new agricultural products. This paper uses life-cycle analyses to quantify the national magnitude and area-based efficiency of greenhouse gas (GHG) emission reductions possible from utilising indigenously grown willow and Miscanthus as heating fuels in domestic/commercial premises.
(To request: email library@energylibrary.org.nz and quote **Bio6-Styles**) √

Modeling chemical and physical processes of wood and biomass pyrolysis. C. De Blasi. *Progress in Energy and Combustion Science*; Vol 34 (1) Feb 2008, p.47-90
This review reports the state of the art in modeling chemical and physical processes of wood and biomass pyrolysis. Chemical kinetics is critically discussed in relation to primary reactions, described by one- and multi-component (or one- and multi-stage) mechanisms, and secondary reactions of tar cracking and polymerization. A mention is also made of distributed activation energy models and detailed mechanisms which try to take into account the formation of single gaseous or liquid (tar) species. Different approaches used in the transport models are presented at both the level of single particle and reactor, together with the main achievements of numerical simulations. Finally, critical issues which require further investigation are indicated.
(To request: email library@energylibrary.org.nz and quote **Bio6-Blasi**)

Experimental analysis of low-temperature bed drying of wooden biomass particles. Bengtsson, P. *Drying Technology*; 26 (5) 2008, p.602-610.
(To request: email library@energylibrary.org.nz and quote **Bio6-Bengtsson**)

A new pulverized biomass utilization technology. Kobayashi, N. et al. *Powder Technology*; 180 (3) 2008, p.272-283.
Pulverized wood biomass utilization technologies, such as gasification and liquefaction, are discussed. Firstly, the pulverization technique of wood biomass by a vibration mill is introduced, and pulverized wood biomass characteristics are evaluated. The wood powder pulverized by the vibration mill has a round shape, and the wood fibers are completely broken. Therefore, the diameter of wood powder is fine and the crystallinity of cellulose is very low. By using this pulverized wood biomass, a high temperature gasification experiment and liquefaction experiment was conducted.
(To request: email library@energylibrary.org.nz and quote **Bio6-Kobayashi**)

Biomass energy in industrialised countries - A view of the future. Hall, D.O. *Forest Ecology and Management*; 91 (1), 1997, p.17-45
The author describes the current situation with regards to biomass energy in developed countries. Case studies are presented for several countries and the constraints involved in modernising biomass energy along with the potential for turning them into entrepreneurial opportunities are discussed.
(To request: email library@energylibrary.org.nz and quote **Bio6-Hall**)

Wood fuel on back-burner in South East. *Forestry & British Timber*; May 2007, Vol. 36 Issue 5, p24-27, 3p.
(To request: email library@energylibrary.org.nz and quote **Bio6-Burner**) √

Environmental implications of renewable distributed generation technologies in rural electrification. Karki, S. et al. *Energy Sources, Part B: Economics, Planning and Policy*; 3 (2) 2008, p.186-195.
The life-cycle cost of several renewable DG sources (photovoltaics, small-scale wind turbines, and biomass gasifiers) are examined and contrasted with centralized generation in the context of an isolated island in India. The Hybrid Optimization Model for Electric Renewables (HOMER) is employed for this analysis.
(To request: email library@energylibrary.org.nz and quote **Bio6-Karki**)

Large-scale economic integration of electricity from short-rotation woody crops. Varela, M. et al. *Solar Energy*; 70 (2) 2001, p.95-107.
This paper presents an assessment of the installation of a large-scale biomass scheme for production of electricity for distribution via the national grid in Spain. The biomass scheme studied is based on woody biomass (eucalyptus, acacia and poplar) as short rotation crops in arable lands.
(To request: email library@energylibrary.org.nz and quote **Bio6-Varela**)

Lower emissions from biodiesel combustion. Dincer, K. (2008) *Energy Sources, Part A: Recovery, Utilization and Environmental Effects*; 30 (10), pp. 963-968.
(To request: email library@energylibrary.org.nz and quote **Bio6-Dincer**)

Conference Papers

Cogeneration with wood waste: A New Zealand case study. (1996) Norris, T.D. In: *Applications of Bioenergy Technologies Conference (1996: Rotorua)* p.97 (6p.)
(To request: email library@energylibrary.org.nz and quote **Bio6-Norris**) √

Low emission and high efficiency residential pellet-fired heaters. J. Houck et al. (2000) *Proceedings of the Ninth Biennial Bioenergy Conference*
(To request: email library@energylibrary.org.nz and quote **Bio6-Houck**)

Biomass in Spain: Activities, policies and strategies. The renewable energy promotion plan. C. Hernández. (2001). *First World Conference on Biomass for Energy and Industry;* p.1213-1216
(To request: email library@energylibrary.org.nz and quote **Bio6-Hernandez**)

Comparison of emission levels of different air pollution components from various biomass combustion installations in the IEA Countries. O. Skreiberg and O. Saanum. (1995). *Report to IEA-Project - Emissions from Biomass Combustion.*
(To request: email library@energylibrary.org.nz and quote **Bio6-Skreiberg**)

Description of a pilot lignocellulosic pellets stove plant. J.L. Míguez et al. (2002). *Sixth European Conference on Industral Furnaces and Boilers.*
(To request: email library@energylibrary.org.nz and quote **Bio6-Miguez**)

15th European Biomass Conference and Exhibition, From Research to Market Deployment. 7-11 May 2007, Berlin. Proceedings published by ETA-Florence, Italy and WIP-Munich, Germany. DVD, 594 papers, 179 slides of presentations.
Topics include: Biomass Resources; Thermochemical Conversion (Gasification for power and CHP; Gasification for clean synthesis gas production; Pyrolysis for power, CHP and chemicals; Combustion and Co-Combustion; Combustion for small scale applications); Biological Conversion (Fermentation; Biogas); Conversion to liquid Biofuels; Chemical Conversion to industrial materials; Market; Policies
(To request: email library@energylibrary.org.nz and quote **Bio6-Conference**)

Dissertations

Opportunities for bioenergy utilisation of biomass residues: A Rotorua case study. Wall, K.L. (2000) Thesis submitted for Master of Science (Technology), University of Waikato, February 2000.
(To request: email library@energylibrary.org.nz and quote **Bio6-Wall**)

Estimating regional supply and delivered cost of forest and wood processing biomass available for bioenergy. Robertson, Kimberly Ann (2006). Masters thesis. University of Canterbury. This publication is available online.

Biomass potential for heat, electricity and vehicle fuel in Sweden. Hagström, Peter (2006) Doctoral dissertation, Department of Bioenergy, SLU. *Acta Universitatis agriculturae Sueciae*; Vol 2006 (11), 173p. This publication is available online.

Optimal recovery of resources: A case study of wood waste in the Greater Sydney Region. (2006) Matthew Warnken. University of Sydney. Chemical Engineering. This publication is available online.

Web links

First American wood fiber-based ethanol plant begins production – Jan 2008 Press release

South Wales power station will burn wood chips – *The Times*; Nov 2007 news

Industrial farming of fuel crops speeds global warming - October 2007 news of a study that found grasses and woody coppice species had potentially more positive impacts on the climate than other fuel crops.

Particulate emissions from biomass combustion in IEA Countries: Survey on measurements and emission factors. (2008). Thomas Nussbaumer et al. Zürich: On behalf of IEA Bioenergy Task 32; Swiss Federal Office of Energy (SFOE). This publication is available online.

Technoeconomic assessment of fluidized bed combustors as municipal solid waste incinerators: A summary of six case studies. This IEA Bioenergy Task 36 publication is available online.

Biodiesel cold weather blending study. (2005). Cold Flow Blending Consortium. Report prepared as an account of work sponsored by the National Biodiesel Board and the Cold Flow Consortium. The report is available online.

Bioenergy Feedstock Information Network (BFIN) – website of information resources from U.S. research organizations.

Current state and development possibilities of wood chip supply chains in Austria. This 2006 *Croatian Journal of Forest Engineering* article is available online.

Cellulosic ethanol path is paved with various technologies. This 2008 *Ethanol Producer Magazine* article is available online.

Ethanol fuels: Energy balance, economics, and environmental impacts are negative. This 2003 *Natural Resources Research* article is available online.

Realities, opportunities for cellulosic ethanol. Diane Greer. *BioCycle*; Jan 2007. Vol 48 (1), p.46-48,50. This article is available online.

Wood supply chain efficiency and fiber cost: What can we do better? This 2006 *Forest Products Journal* article is available online.

Investors focus on opportunities in cellulosic ethanol production. Don Sorenson et al. *Pulp & Paper Magazine*; May 2007. This article is available online.

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