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General

Analysis of a High-Efficiency Natural Gas Assisted Steam Electrolyzer for Hydrogen Production
Lawrence Livermore National Lab., CA. 26 Jun 2001, 14p, UCRL-JC-144368. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-15013223WDE Price code: PC A03

This paper presents a description and analysis of a high-efficiency hydrogen production system. The main component of the system is a novel steam electrolyzer. In conventional electrolyzers, oxygen produced from electrolysis is usually released into the environment. In this design, natural gas is used to react with the oxygen produced in the electrolysis, reducing reduce the chemical potential difference across the electrolyzer, thus minimizing electricity consumption. The oxygen produced from the electrolysis is consumed in either a total oxidation or a partial oxidation reaction with natural gas. Experiments performed on single cells shown a voltage reduction as much as 1 V when compared to conventional electrolyzers. A heat recovery system (heat exchangers and catalytic converter) has been incorporated to the electrolyzer to obtain a high efficiency hydrogen production system. Results from a thermodynamic analysis show up to 70% efficiency with respect to primary energy source.

Barrier Issues to the Utilization of Biomass. (Final Technical Report.)
B. C. Folkedahl, J. R. Gunderson, D. D. Schmidt, G. F. Weber, and C. J. Zygarlicke.
North Dakota Univ., Grand Forks. Energy and Environmental Research Center. Sep 2002, 138p, EERC-09-02. Sponsored by National Energy Technology Lab., Pittsburgh, PA. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835032WDE Price code: PC A08/MF A02

The goal of this project was to identify the primary ash mechanisms related to grate clinkering and heat exchange surface fouling associated with cofiring coal and biomass-specifically wood and agricultural residuals-in grate-fired systems, leading to future mitigation of these problems. The specific technical objectives of the project were: Modification of an existing pilot-scale combustion system to simulate a grate-fired system; Verification testing of the simulator; Laboratory-scale testing and fuel characterization to determine ash formation and potential fouling mechanisms and to optimize activities in the modified pilot-scale system; Pilot-scale testing in the grate-fired system. The resulting data were used to elucidate ashrelated problems during coal-biomass cofiring and offer a range of potential solutions.

Controlled Synthesis of Metastable Oxides Utilizing Epitaxy and Epitaxial Stabilization. Final Report
M. P. Dvorscak.
Department of Energy, Argonne, IL. Chicago Operations Office. Jul 2003, 36p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-819922WDE Price code: PC A04/MF A01

Molecular beam epitaxy (MBE) has achieved unparalleled control in the integration of semiconductors at the nanometer. These advances were made through the use of epitaxy, epitaxial stabilization, and a combination of composition-control techniques including adsorption-controlled growth and RHEED-based composition control that we have developed, understood, and utilized for the growth of oxides. Also key was extensive characterization (utilizing RHEED, four-circle x-ray diffraction, AFM, TEM, and electrical characterization techniques) in order to study growth modes, optimize growth conditions, and probe the structural, dielectric, and ferroelectric properties of the materials grown. The materials that we have successfully

engineered include titanates (PbTiO3, Bi4Ti3O12), tantalates (SrBi2Ta2O9), and niobates (SrBi2Nb2O9); layered combinations of these perovskite-related materials (Bi4Ti3O12-SrTiO3 and Bi4Ti3O12-PbTiO3 Aurivillius phases and metastable PbTiO3/SrTiO3 and BaTiO3/SrTiO3 superlattices), and new metastable phases (Srn+1TinO3n+1 Ruddlesden-Popper phases). The films were grown by reactive MBE and pulsed laser deposition (PLD). Many of these materials are either new or have been synthesized with the highest perfection ever reported. The controlled synthesis of such layered oxide heterostructures offers great potential for tailoring the superconducting, ferroelectric, and dielectric properties of these materials. These properties are important for energy technologies.

Engineering Careers
Bureau of Reclamation, Denver, CO. 2005, 16p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-108762WDE Price code: PC A03/MF A01

This publication discusses engineering careers within the Bureau of Reclamation to meet the needs of the agency in operating existing structures as well as the development of new programs for renewable resources and alternative energy.

Nanoscience Research for Energy Needs. Report of the March 2004 National Nanotechnology Initiative Grand Challenge Workshop. Held in Arlington, Virginia on March 16-18, 2004. Second Edition
National Science Foundation, Washington, DC. Jun 2005, 90p. Sponsored by Department of Energy, Washington, DC. Office of Basic Energy Sciences. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110127WDE Price code: PC A06

The goal of this workshop was to define opportunities and goals in energy-related research for the next decade and to determine the special opportunities that the field of nanoscience affords to energy research. Participants discussed and identified research themes and specific 'hard problems' that would have the greatest impact in addressing energy needs and the specific scientific and technological hurdles that have to be overcome to achieve broader R & D goals. The group also developed strategies for solving these 'hard problems' and identified the necessary scientific infrastructure.

Zero Emission Power Generation Technology Development. Final Report. May 1-December 31, 2004
R. Bischoff, and S. Doyle.
Clean Energy Systems, Inc., Rancho Cordova, CA. 20 Jan 2005, 26p. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-838684WDE Price code: PC A03/MF A01

Clean Energy Systems (CES) was previously funded by DOE's 'Vision 21' program. This program provided a proof-of-concept demonstration that CES' novel gas generator (combustor) enabled production of electrical power from fossil fuels without pollution. CES has used current DOE funding for additional design study exercises which established the utility of the CES-cycle for retrofitting existing power plants for zero-emission operations and for incorporation in zero-emission, 'green field' power plant concepts. DOE funding also helped define the suitability of existing steam turbine designs for use in the CES-cycle and explored the use of aero-derivative turbines for advanced power plant designs. This work is of interest to the California Energy Commission (CEC) and the Norwegian Ministry of Petroleum & Energy. California's air quality districts have significant non-attainment areas in which CES technology can help. CEC is currently funding a CES-cycle technology demonstration near Bakersfield, CA. The Norwegian government is supporting conceptual studies for a proposed 40 MW zero-emission power plant in Stavager, Norway which would use the CES-cycle. The latter project is called Zero-Emission Norwegian Gas (ZENG). In summary, current engineering studies: (1) supported engineering design of plant subsystems applicable for use with CES-cycle zero-emission power plants, and (2) documented the suitability and availability of steam turbines for use in CES-cycle power plants, with particular relevance to the Norwegian ZENG Project.

Batteries & Components

Filtering and Control of High Speed Motor Current in a Flywheel Energy Storage System
B. H. Kenny, and W. Santiago.
NASA Glenn Research Center. Oct 2004, 21p, NASA/TM-2004-213343. Presented at Second International Energy Conversion Engineering Conference, Providence, RI, United States, 16-19 Aug. 2004. Publicly available Unlimited. CASI. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
N20040171483WDE Price code: PC A03/MF A01

The NASA Glenn Research Center has been developing technology to enable the use of high speed flywheel energy storage units in future spacecraft for the last several years. An integral part of the flywheel unit is the three phase motor/generator that is used to accelerate and decelerate the flywheel. The motor/generator voltage is supplied from a pulse width modulated (PWM) inverter operating from a fixed DC voltage supply. The motor current is regulated through a closed loop current control that commands the necessary voltage from the inverter to achieve the desired current. The current regulation loop is the innermost control loop of the overall flywheel system and, as a result, must be fast and accurate over the entire operating speed range (20,000 to 60,000 rpm) of the flywheel. The voltage applied to the motor is a high frequency PWM version of the DC bus voltage that results in the commanded fundamental value plus higher order harmonics. Most of the harmonic content is at the switching frequency and above. The higher order harmonics cause a rapid change in voltage to be applied to the motor that can result in large voltage stresses across the motor windings. In addition, the high frequency content in the motor causes sensor noise in the magnetic bearings that leads to disturbances for the bearing

control. To alleviate these problems, a filter is used to present a more sinusoidal voltage to the motor/generator. However, the filter adds additional dynamics and phase lag to the motor system that can interfere with the performance of the current regulator. This paper will discuss the tuning methodology and results for the motor/generator current regulator and the impact of the filter on the control. Results at speeds up to 50,000 rpm are presented.

Hybrid Electrochemical Energy Source
C. J. Patrissi, E. G. Dow, and M. M. Medeiros.
Department of the Navy, Washington, DC. Filed 5 May 05, 13p, ADD020213. This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS. Product reproduced from digital image.
PAT-APPL-8-121 711WDE Price code: PC N03/MF A04

It is a general purpose and objective of the present invention to establish an electrochemical energy source for use in an underwater environment that utilizes the hydrogen byproduct of a lithium anode battery, such as the lithium water battery, and by doing so increases the coulombic efficiency of the lithium anode battery and eliminates the noise associated with venting the hydrogen, resulting in a quiet operation energy source with high energy density. This objective is accomplished by combining a lithium water battery with a proton exchange membrane fuel cell. The reaction between the lithium and water in the battery will generate electrical energy and hydrogen (H2) gas. The hydrogen gas will then be collected and used as the fuel component for the proton exchange membrane fuel cell. The resulting hybrid electrochemical energy source has a low current density, long endurance, and a higher energy density for the entire system over the sum of its individual components.

Electric Power Production

Materials Selection Guidelines for Geothermal Energy Utilization Systems
P. F. Ellis, and M. F. Conover.
Radian Corp., Austin, TX. Jan 1981, 598p. Sponsored by Department of Energy, Washington, DC. Div. of Geothermal Energy. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-6664808WDE Price code: PC A99/MF A06

This manual includes geothermal fluid chemistry, corrosion test data, and materials operating experience. Systems using geothermal energy in El Salvador, Iceland, Italy, Japan, Mexico, New Zealand, and the United States are described. The manual provides materials selection guidelines for surface equipment of future geothermal energy systems. The key chemical species that are significant in determining corrosiveness of geothermal fluids are identified. The utilization modes of geothermal energy are defined as well as the various physical fluid parameters that affect corrosiveness. Both detailed and summarized results of materials performance tests and applicable operating experiences from forty sites throughout the world are presented. The application of various non-metal materials in geothermal environments are discussed. Included in appendices are: corrosion behavior of specific alloy classes in geothermal fluids, corrosion in seawater desalination plants, worldwide geothermal power production, DOE-sponsored utilization projects, plant availability, relative costs of alloys, and composition of alloys.

Nuclear Power, Small Nuclear Technology, and the Role of Technical Innovation: An Assessment
Lawrence Livermore National Lab., CA. May 2001, 16p.
DE2005-15013267WDE Price code: PC A03/MF A01

For complete citation see Policies, Regulations & Studies

Water Flow Charts--2000
G. V. Kaiper.
Lawrence Livermore National Lab., CA. May 2004, 24p, UCRL-TR-201457-00. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-15014209WDE Price code: PC A03/MF A01

Contents:
- Background and Source of Data;
- The U.S. and State Charts;
- Thermoelectric Power Use;
- Definition of Terms;
- Web Locations and Credits;
- Tables and Figures.

Energy Use, Supply, & Demand

Enhancement of Methane Conversion Using Electric Fields. (Final Report, September 1, 1994-December 31, 1999.)
Oklahoma Univ., Norman. Office of Research Administration. 2005, 72p.
DE2005-834580WDE Price code: PC A05/MF A01

For complete citation see Fuels

Final Report for the Variable Speed Integrated Intelligent HVAC Blower. (Final Report, December 2001-June 2003.)
General Electric Corp., Niskayuna, NY. Research and Development. Jun 2003, 30p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835010WDE Price code: PC A03

This comprehensive topical report discusses the key findings in the development of an advanced blower for HVAC applications. The benefits of rearward inclined blades over that of traditional forward inclined blades is well documented, and several prototype wheels are demonstrated in various housings. A comparison of retrofitted blowers to that of three typical units from the industry is presented. The design and modification of the blower housing is addressed and the impact of size limitations on static efficiency is discussed. The roadmap to rearward-inclined wheel technology insertion is presented and typical static efficiency gains

are documented.

Foreign Technology

Indirekt Energi Foer Svenska Vaeg och Jaernvaegstransporter. Ett Nationellt Perspektiv Samt Fallstudier av Botniabanan och Soedra Laenken (Indirect Energy for Road and Railway Transportation in Sweden)
D. K. Jonsson.
Swedish Defence Research Agency, Stockholm. Div. of Defence Analysis. Apr 2005, 98p, FOI-R-1557-SE(V2). Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109521WDE Price code: PC A06/MF A02

Besides energy for propulsion, there are a number of considerable indirect energy categories in the life-cycle of transport systems, e.g. construction and maintenance of infrastructure, and manufacture and service of vehicles. Indirect energy represents 64-66% of the total amount of energy used in the railway sector, while the corresponding share in the road sector is 42-45%. Consequently, decision-making and planning processes regarding transport infrastructure and environmental impacts should also consider indirect energy-use. Two energy case studies have been carried through; the railroad project Botniabanan in the north of Sweden, and the motorway tunnel Sodra Lanken in Stockholm. The result for Botniabanan corresponds with the Swedish railroad average, but Botniabanan contributes to decreased energy use in the transport sector as a whole. The infrastructural energy use for Sodra Lanken is considerably higher than the Swedish road average. Sodra Lanken also contributes to an increase of the energy use in the transport sector as a whole.

Nanoscience Research for Energy Needs. Report of the March 2004 National Nanotechnology Initiative Grand Challenge Workshop. Held in Arlington, Virginia on March 16-18, 2004. Second Edition
National Science Foundation, Washington, DC. Jun 2005, 90p.
PB2005-110127WDE Price code: PC A06

For complete citation see General

New Analysis Techniques for Estimating Impacts of Federal Appliance Efficiency Standards
Lawrence Berkeley National Lab., CA. Environmental Energy Technologies Div. 2005, 12p.
DE2005-835151WDE Price code: PC A03/MF A01

For complete citation see Policies, Regulations & Studies

Secondary Natural Gas Recovery in the Appalachian Basin: Application of Advanced Technologies in a Field Demonstration Site, Henderson Dome, Western Pennsylvania
West Virginia Univ. Research Corp., Morgantown. Dec 2000, 76p. Sponsored by National Energy Technology Lab., Morgantown, WV. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835231WDE Price code: PC A06

No abstract available.

Environmental Studies

Abstracts of Remediation Case Studies, Volume 9
Federal Remediation Technologies Roundtable. Jul 2005, 92p, EPA/542/R-05/021. See also Volume 8, PB2004-106932. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110445WDE Price code: PC A06/MF A01

This report is a collection of abstracts summarizing 13 new case studies of site remediation applications prepared primarily by federal agencies. The case studies, collected under the auspices of the Federal Remediation Technologies Roundtable (Roundtable), were undertaken to document the results and lessons learned from technology applications. They will help establish benchmark data on cost and performance which should lead to greater confidence in the selection and use of innovative cleanup technologies. The Roundtable was created to exchange information on site remediation technologies, and to consider cooperative efforts that could lead to a greater application of innovative technologies. Roundtable member agencies, including the U.S. Environmental Protection Agency (EPA), U.S. Department of Defense, and U.S. Department of Energy, expect to complete many site remediation projects in the near future. These agencies recognize the importance of documenting the results of these efforts, and the benefits to be realized from greater coordination. The abstracts are organized by technology, and cover a variety of in situ and ex situ treatment technologies and some containment remedies. The abstracts and corresponding case study reports are available through the Roundtable web site, which contains a total of 374 remediation technology case studies (the 13 new case studies and 361 previously-published case studies). Appendix A to this report identifies the specific sites, technologies, contaminants, media, and year published for the 374 case studies. Abstracts, Volume 9, covers a wide variety of technologies, including full-scale remediations and large-scale field demonstrations of soil, groundwater, and sediment treatment technologies.

Evaluation of Mercury Emissions from Coal-Fired Facilities with SCR and FGD Systems. Topical Report No. 2
J. A. Withum, S. C. Tseng, and J. E. Locke.
CONSOL Energy Research and Development, South Park, PA. Oct 2004, 200p. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-838805WDE Price code: PC A10/MF A03

CONSOL Energy Inc., Research & Development (CONSOL), with support from the U.S. Department of Energy, National Energy Technology Laboratory (DOE) is evaluating the effects of selective catalytic reduction (SCR) on mercury (Hg) capture in coal-fired plants equipped with an electrostatic precipitator (ESP) - wet flue gas desulfurization (FGD)

combination or a spray dyer absorber--fabric filter (SDA-FF) combination. In this program CONSOL is determining mercury speciation and removal at 10 coal-fired facilities. The objectives are (1) to evaluate the effect of SCR on mercury capture in the ESP-FGD and SDA-FF combinations at coal-fired power plants, (2) evaluate the effect of catalyst degradation on mercury capture; (3) evaluate the effect of low load operation on mercury capture in an SCR-FGD system, and (4) collect data that could provide the basis for fundamental scientific insights into the nature of mercury chemistry in flue gas, the catalytic effect of SCR systems on Hg speciation and the efficacy of different FGD technologies for Hg capture. This document, the second in a series of topical reports, describes the results and analysis of mercury sampling performed on a 330 MW unit burning a bituminous coal containing 1.0% sulfur.

Nuclear Power, Small Nuclear Technology, and the Role of Technical Innovation: An Assessment
Lawrence Livermore National Lab., CA. May 2001, 16p.
DE2005-15013267WDE Price code: PC A03/MF A01

For complete citation see Policies, Regulations & Studies

Revision of the OCS Oil-Weathering Model: Phases II and III
SINTEF Materials and Chemistry, Trondheim (Norway). Dec 2004, 208p.
PB2005-107477WDE Price code: PC A11

For complete citation see Fuels

Zero Emission Power Generation Technology Development. Final Report. May 1-December 31, 2004
Clean Energy Systems, Inc., Rancho Cordova, CA. 20 Jan 2005, 26p.
DE2005-838684WDE Price code: PC A03/MF A01

For complete citation see General

Fuel Conversion Processes

Enhancement of Methane Conversion Using Electric Fields. (Final Report, September 1, 1994-December 31, 1999.)
Oklahoma Univ., Norman. Office of Research Administration. 2005, 72p.
DE2005-834580WDE Price code: PC A05/MF A01

For complete citation see Fuels

Predicting the Operating Behavior of Ceramic Filters from Thermo-Mechanical Ash Properties
G. Hemmer, and G. Kasper.
Karlsruhe Univ. (Germany, F.R.). Inst. fuer Mechanische Verfahrenstechnik und Mechanik. 2005, 16p. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835857WDE Price code: PC A03/MF A01

Stable operation, in other words the achievement of a succession of uniform filtration cycles of reasonable length is a key issue in high-temperature gas filtration with ceramic media. Its importance has rather grown in recent years, as these media gain in acceptance due to their excellent particle retention capabilities. Ash properties have been known for some time to affect the maximum operating temperature of filters. However, softening and consequently 'stickiness' of the ash particles generally depend on composition in a complex way. Simple and accurate prediction of critical temperature ranges from ash analysis--and even more so from coal analysis--is still difficult without practical and costly trials. In general, our understanding of what exactly happens during break-down of filtration stability is still rather crude and general. Early work was based on the concept that ash particles begin to soften and sinter near the melting temperatures of low-melting, often alkaline components. This softening coincides with a fairly abrupt increase of stickiness, that can be detected with powder mechanical methods in a Jenicke shear cell as first shown by Pilz (1996) and recently confirmed by others (Kamiya et al. 2001 and 2002, Kanaoka et al. 2001). However, recording (sigma)-(tau)-diagrams is very time consuming and not the only off-line method of analyzing or predicting changes in thermo-mechanical ash behavior. Pilz found that the increase in ash stickiness near melting was accompanied by shrinkage attributed to sintering. Recent work at the University of Karlsruhe has expanded the use of such thermo-analytical methods for predicting filtration behavior (Hemmer 2001). Demonstrating their effectiveness is one objective of this paper. Finally, our intent is to show that ash softening at near melting temperatures is apparently not the only phenomenon causing problems with filtration, although its impact is certainly the 'final catastrophe'. There are other significant changes in regeneration at intermediate temperatures, which may lead to long-term deterioration.

Production and Screening of Carbon Products Precursors from Coal. Final Report
West Virginia Univ. Research Corp., Morgantown. 31 May 2001, 24p.
DE2005-835013WDE Price code: PC A03/MF A01

For complete citation see Fuels

Refractory for Black Liquor Gasifiers. (Report for July 1, 2004-September 30, 2004)
Missouri Univ.-Rolla. Oct 2004, 56p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835184WDE Price code: PC A05

The University of Missouri-Rolla will identify materials that will permit the safe, reliable and economical operation of combined cycle gasifiers by the pulp and paper industry. The primary emphasis of this project will be to resolve the material problems encountered during the operation of low-pressure high-temperature (LPHT) and low-pressure low-temperature (LPLT) gasifiers while simultaneously understanding the materials barriers to the successful demonstration of high-pressure high-temperature (HPHT) black liquor gasifiers. This study will define the chemical, thermal and physical conditions in current and proposed gasifier designs and then modify existing materials and develop new materials to successfully meet the formidable material challenges. Resolving the material challenges of black liquor gasification combined cycle technology will

provide energy, environmental, and economic benefits that include higher thermal efficiencies, up to three times greater electrical output per unit of fuel, and lower emissions. In the near term, adoption of this technology will allow the pulp and paper industry greater capital effectiveness and flexibility, as gasifiers are added to increase mill capacity. In the long term, combined-cycle gasification will lessen the industry's environmental impact while increasing its potential for energy production, allowing the production of all the mill's heat and power needs along with surplus electricity being returned to the grid. An added benefit will be the potential elimination of the possibility of smelt-water explosions, which constitute an important safety concern wherever conventional Tomlinson recovery boilers are operated. Developing cost-effective materials with improved performance in gasifier environments may be the best answer to the material challenges presented by black liquor gasification. Refractory materials may be selected/developed that either react with the gasifier environment to form protective surfaces in-situ; are functionally-graded to give the best combination of thermal, mechanical, and physical properties and chemical stability; or are relatively inexpensive, reliable repair materials. Material development will be divided into 2 tasks: Task 1, Development and property determinations of improved and existing refractory systems for black liquor containment. Refractory systems of interest include magnesium aluminate and barium aluminate for binder materials, both dry and hydratable, and materials with high alumina contents, 85-95 wt%, aluminum oxide, 5.0-15.0 wt%, and BaO, SrO, CaO, ZrO(sub 2) and SiC. Task 2, Finite element analysis of heat flow and thermal stress/strain in the refractory lining and steel shell of existing and proposed vessel designs. Stress and strain due to thermal and chemical expansion has been observed to be detrimental to the lifespan of existing black liquor gasifiers. The thermal and chemical strain as well as corrosion rates must be accounted for in order to predict the lifetime of the gasifier containment materials.

Reusable Calcium-Based Sorbet for Desulfurizing Hot Coal Gas
Iowa State Univ., Ames. Dept. of Chemical Engineering. 2005, 14p.
DE2005-836423WDE Price code: PC A03/MF A01

For complete citation see Fuels

Technical Progress Report for the Project Entitled 'Create a Consortium and Develop Premium Carbon Products from Coal.'
Pennsylvania State Univ., University Park. Office of Sponsored Programs. Aug 2003, 46p.
DE2005-836484WDE Price code: PC A04/MF A01

For complete citation see Fuels

Fuels

Atomic-Level Imaging of CO2 Disposal as a Carbonate Mineral: Optimizing Reaction Process Design
M. J. McKelvy, R. Sharma, A. V. G. Chizmeshya, H. Bearat, and R. W. Carpenter.
Arizona State Univ., Tempe. Center for Solid State Science. Nov 2002, 108p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835031WDE Price code: PC A07

Fossil fuels, especially coal, can support the energy demands of the world for centuries to come, if the environmental problems associated with CO(sub 2) emissions can be overcome. Permanent and safe methods for CO(sub 2) capture and disposal/storage need to be developed. Mineralization of stationary-source CO(sub 2) emissions as carbonates can provide such safe capture and long-term sequestration. Mg-rich lamellar-hydroxide based minerals (e.g., brucite and serpentine) offer a class of widely available, low-cost materials, with intriguing mineral carbonation potential. Carbonation of such materials inherently involves dehydroxylation, which can disrupt the material down to the atomic level. As such, controlled dehydroxylation, before and/or during carbonation, may provide an important parameter for enhancing carbonation reaction processes. Mg(OH)(sub 2) was chosen as the model material for investigating lamellar hydroxide mineral dehydroxylation/carbonation mechanisms due to (1) its structural and chemical simplicity, (2) interest in Mg(OH)(sub 2) gas-solid carbonation as a potentially cost-effective CO(sub 2) mineral sequestration process component, and (3) its structural and chemical similarity to other lamellar-hydroxide-based minerals (e.g., serpentine-based minerals) whose carbonation reaction processes are being explored due to their low-cost CO(sub 2) sequestration potential. Fundamental understanding of the mechanisms that govern dehydroxylation/carbonation processes is essential for minimizing the cost of any lamellar-hydroxide-based mineral carbonation sequestration process. This final report covers the overall progress of this grant.

Characterization of Mixed Wettability at Different Scales and Its Impact on Oil Recovery Efficiency. (Final Report, August 4, 1999-August 3, 2003.)
M. M. Sharma, and G. J. Hirasaki.
Texas Univ. at Austin. Sep 2003, 240p. Prepared in cooperation with Rice Univ., Houston, TX. Sponsored by Department of Energy, Tulsa, OK. National Petroleum Technology Office. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-834162WDE Price code: PC A12

The objectives of the this research project were to: (1) Quantify the pore scale mechanisms that determine the wettability state of a reservoir; (2) Study the effect of crude oil, brine and mineral compositions in the establishment of mixed wet states; (3) Clarify the effect of mixed-wettability on oil displacement efficiency in waterfloods; and (4) Develop a new tracer technique to measure wettability, fluid distributions, residual saturations and relative permeabilities.

Coupled Vadose Zone and Atmosheric Surface-Layer Transport of CO2 from Geologic Carbon Sequestration Sites
C. M. Oldenburg, and A. J. A. Unger.
Lawrence Berkeley National Lab., CA. 29 Mar 2004, 40p. Prepared in cooperation with Waterloo Univ. (Ontario). Dept. of Earth Sciences. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other

countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835812WDE Price code: PC A04

Geologic carbon dioxide (COsub2) sequestration is being considered as a way to offset fossil-fuel-related carbon dioxide emissions to reduce the rate of increase of atmospheric carbon dioxide concentrations. The accumulation of vast quantities of injected carbon dioxide in geologic sequestration sites may entail health and environmental risks from potential leakage and seepage of carbon dioxide into the near-surface environment. We are developing and applying a coupled subsurface and atmospheric surface-layer modeling capability built within the framework of the integral finite difference reservoir simulator TOUGH2. The overall purpose of modeling studies is to predict carbon dioxide concentration distributions under a variety of seepage scenarios and geologic, hydrologic, and atmospheric conditions. These concentration distributions will provide the basis for determining above-ground and near-surface instrumentation needs for carbon sequestration monitoring and verification, as well as for assessing health, safety, and environmental risks.

Enhancement of Methane Conversion Using Electric Fields. (Final Report, September 1, 1994-December 31, 1999.)
R. G. Mallinson, and L. L. Lobban.
Oklahoma Univ., Norman. Office of Research Administration. 2005, 72p. Sponsored by Federal Energy Technology Center, Morgantown, WV. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-834580WDE Price code: PC A05/MF A01

This report summarizes the conditions and results of this multifaceted program. Detailed experimental descriptions and results and discussion can be found in the publications cited in the Appendix. The goal of this project is the development of novel, economical, processes for the conversion of natural gas to more valuable projects such as synthesis gas or direct conversion to methanol, ethylene and other organic oxygenates or higher hydrocarbons. The methodologies of the project are to investigate and develop low temperature electric discharges and electric discharge-enhanced catalysis for carrying out these conversions. With the electric discharge-enhanced conversion, the operating temperatures are expected to be far below those currently required for such processes as oxidative coupling, thereby allowing for a higher degree of catalytic selectivity while maintaining high activity. In the case of low temperature discharges, the conversion is carried out at ambient temperature, trading high temperature thermal energy for electric energy as the driving force for conversion. The low operating temperatures remove thermodynamic constraints on the product distribution due to the non-equilibrium nature of the low temperature plasma. This also removes the requirements of large thermal masses that need very large-scale operation to maximize efficiency that is the characteristic of current technologies, including high temperature plasma processes. This potentially allows much smaller scale processes to be efficient. Additionally, a gas conversion process that is electrically driven provides an internal use for excess power generated by proposed Fischer Tropsch gas-to-liquids processes and can increase their internal thermal efficiency and reduce capital costs. This project has studied three primary types of low temperature plasma reactor and operating conditions. The organization of this program is shown schematically in the report. Typical small scale laboratory reactor systems were developed that used mass flow controllers for feed gas mixture delivery and GC and MS analysis of products. The range of operation included flow rates from a few sccm to a few hundred sccm with residence times from less than a tenth of a second to about 30 minutes. Temperatures used were generally from ambient to 100 C, but were from as low as about 0 to a high of 800 C. Pressures were generally atmospheric, but for most of the configurations pressures up to 3 atmosphered were also used.

Evaluation of Alyeska Pipeline Service Company's Operation of the Trans-Alaska Pipeline System. Comprehensive Monitoring Program Report
Department of the Interior, Washington, DC. Feb 1999, 44p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110448WDE Price code: PC A04/MF A01

The Joint Pipeline Office (JPO) conducted field surveillances and assessments in 1997 and 1998, to evaluate selected aspects of Alyeska Pipeline Service Company's operation of the Trans-Alaska Pipeline System (TAPS). This report explains the issues which were addressed, describes their current status, and identifies instances of noncompliance with the Federal Agreement and Grant and State Lease of Right-of-Way. This reports conclusions will not surprise Alyeska. To their credit, Alyeska's own audits and surveillances have identified these concerns and corrective action is underway. In 1999, JPO will continue to oversee Alyeska's TAPS Operation Program, including compliance with the stipulations of the Grant and Lease, to determine Alyeska's effectiveness in resolving these issues.

Experimental Investigation and High Resolution Simulator of In-Situ Combustion Processes. (Quarterly Report, July-September 2004)
M. Gerritsen, and A. R. Kovscek.
Stanford Univ., CA. Dept. of Petroleum Engineering. Oct 2004, 22p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835936WDE Price code: PC A03

Accurate simulation of in-situ combustion processes is computationally very challenging because the spatial and temporal scales over which the combustion process takes place are very small. In this third quarterly report of our DoE funded research, we continue the discussion of the design of a new simulation tool based on an efficient Cartesian Adaptive Mesh Refinement technique that allows much higher grid densities to be used near typical fronts than current simulators. Also, we discuss the possibility of using Strang splitting for handling the large disparity in time-scales between the kinetics and transport in the in-situ combustion process. On the experimental side, we show results of experiments with our scanning electron microscope (SEM) to investigate the sand-clay-salt mixtures that are used for combustion in which we focus on grain sizes, shapes,

orientations, characteristic inter-structures, and element analysis. SEM is shown to be a very effective tool in studying these mixtures.

Glass and Glass-Derivative Seals for Use in Energy-Efficient Fuel Cells and Lamps. (Topical Report, October 1, 2003-August 15, 2004.)
S. Misture, A. Varshneya, A. Hall, S. DeCarr, and S. Bancheri.
New York State Coll. of Ceramics, Alfred. 15 Aug 2004, 122p. Sponsored by Department of Energy, Washington, DC.
Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835124WDE Price code: PC A07/MF A02

As the project approaches the end of the first year, the materials screening components of the work are ahead of schedule, while all other tasks are on schedule. For solid oxide fuel cells (SOFC), a series of 16 sealing glasses have been prepared and characterized. Traditional melting was used to prepare all of the glasses, and the sol-gel approach has been used to prepare some of the glasses as well as other compositions that might be viable because of the low processing temperatures afforded by the sol-gel method. The glass characterization included measurements of the viscosity and thermal expansion of the glasses, as well as the thermal expansion of the partly crystalline glass ceramics. In addition, the wetting and sintering behavior of all glasses has been measured, as well as the crystallization behavior. The time and temperature at which crystalline phases form from the glasses has been determined for all of the glasses. Each glass ceramic contains at least two crystalline phases, and most of the crystalline phases have been positively identified. Room temperature leak testing has been completed for all sealants, and experiments are in progress to determine the DC electrochemical degradation and degradation in wet hydrogen. The second component of the work, focused on seals for higher-temperature discharge lighting, has focused on determining the phase relations in the yttria - alumina - silica system at various silica levels. Again, traditional melting and sol-gel synthesis have been employed, and the solgel method was successful for preparing new phases that were discovered during the work. High temperature diffraction and annealing studies have clarified the phase relations for the samples studies, although additional work remains. Four new phases have been identified and synthesized in pure form, from which full structure solutions were obtained as well as the anisotropic thermal expansion for each phase. Functional testing of lamps are on on-going and will be analyzed during year 2 of the contract.

Maintenance of the Coal Sample Bank and Database. (Final Report, September 20, 1993-March 30, 1999.)
A. W. Scaroni, A. Davis, and D. C. Glick.
Pennsylvania State Univ., University Park. Coal and Organic Petrology Labs. Nov 1999, 208p. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-834652WDE Price code: PC A11/MF A03

This project generated and distributed coal samples and accompanying analytical data for use in research by DOE contractors and others. All activities specified under the five-year contract (as revised) and a six-month no-cost extension have been completed. Eleven DECS samples were collected, processed to a variety of particle sizes, heat-sealed in foil laminate bags under argon, and placed in refrigerated storage. All were analyzed for basic chemical composition, inorganic major and trace element composition including hazardous air pollutant elements, petrographic composition and characteristics, thermoplastic behavior (if applicable), and other properties relevant to research and commercial utilization. Most were also analyzed by NMR, py/gc/ms, and a standardized liquefaction test; trends and relationships observed were evaluated and summarized. Twenty-two DECS samples collected under the previous contract received further processing, and most of these were subjected to organic geochemical and standardized liquefaction tests as well. Selected DECS samples were monitored annually to evaluate the effectiveness of foil laminate bags for preserving samples in long-term storage. In addition to the 33 DECS samples, 23 PSOC samples collected under previous contracts and purged with argon before storage were also maintained and distributed, for a total of 56 samples covered by the contract. During the 5.5 years, 570 samples in 1,586 containers, 2,109 data printouts, and individual data items from 34,208 samples were distributed. All DECS samples are now available for distribution at minus 6 mm (-1/4 inch), minus 0.85 mm (-20 mesh U.S.), and minus 0.25 mm (-60 mesh U.S.).

Minerals Management Service Five Year Royalty in Kind Business Plan, May 2004
Minerals Management Service, Herndon, VA. May 2004, 60p.
Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110429WDE Price code: PC A05

The Minerals Management Service (MMS) has developed a Five Year Royalty in Kind (RIK) Business Plan that outlines business principles, objectives, and specific action items that will guide and evolve the Federal RIK program from fiscal years 2005 through 2009. The Federal RIK program has entered into an operational phase after six years of pilot project testing. This Plan provides a management blueprint for the RIK program over its first five years of operational activity. In the mid-1990s, MMS began exploring the potential for a broadly applied RIK program to increase efficiencies, decrease conflict, and enhance net revenues generated from oil and gas production royalties. Several pilot projects tested this approach under a variety of conditions for crude oil and natural gas, and for onshore and offshore production volumes.

Nickel-Coated Aluminum Particles: A Promising Fuel for Mars Missions
E. Shafirovich, and A. Varma.
Purdue Univ. Aug 2004, 11p. Publicly available Unlimited. CASI. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
N20040161238WDE Price code: PC A03/MF A01

Combustion of metals in carbon dioxide is a promising source of energy for propulsion on Mars. This approach is based on the ability of some metals (e.g. Mg, Al) to burn in CO2 atmosphere and suggests use of the Martian carbon dioxide as an oxidizer in jet or rocket engines. Analysis shows that CO2/metal propulsion will reduce significantly the mass of propellant transported from Earth for long-range mobility on Mars and sample return missions. Recent calculations for the near-term missions indicate that a 200-kg ballistic hopper with CO2/metal rocket engines and a CO2 acquisition unit can perform 10-15 flights on Mars with the total range of 10-15 km, i.e. fulfill the exploration program typically assigned for a rover. Magnesium is currently recognized as a candidate fuel for such engines owing to easy ignition and fast burning in CO2. Aluminum may be more advantageous if a method for reducing its ignition temperature is found. Coating it by nickel is one such method. It is known that a thin nickel layer of nickel on the surface of aluminum particles can prevent their agglomeration and simultaneously facilitate their ignition, thus increasing the efficiency of aluminized propellants. Combustion of single Ni-coated Al particles in different gas environments (O2, CO2, air) was studied using electrodynamic levitation and laser ignition. It was shown that the combustion mechanisms depend on the ambient atmosphere. Combustion in CO2 is characterized by the smaller size and lower brightness of flame than in O2, and by phenomena such as micro-flashes and fragment ejection. The size and brightness of flame gradually decrease as the particle burns.

NOx Control Options and Integration for US Coal Fired Boilers. (Quarterly Report, April 1, 2001-June 30, 2001)

M. Bockelie, M. Cremer, K. Davis, B. Hurt, and E. Eddings. Reaction Engineering International, Salt Lake City, UT. Jul 2001, 30p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

DE2005-835070WDE Price code: PC A03

This is the third Quarterly Technical Report for DOE Cooperative Agreement No: DE-FC26- 00NT40753. The goal of the project is to develop cost effective analysis tools and techniques for demonstrating and evaluating low NOx control strategies and their possible impact on boiler performance for firing US coals. The Electric Power Research Institute (EPRI) is providing cofunding for this program. This program contains multiple tasks and good progress is being made on all fronts. A Rich Reagent Injection (RRI) design has been developed for a cyclone fired utility boiler in which a field test of RRI will be performed later this year. Initial evaluations of RRI for PC fired boilers have been performed. Calibration tests have been developed for a corrosion probe to monitor waterwall wastage. Preliminary tests have been performed for a soot model within a boiler simulation program. Shakedown tests have been completed for test equipment and procedures that will be used to measure soot generation in a pilot scale test furnace. In addition, an initial set of controlled experiments for ammonia adsorption onto fly ash in the presence of sulfur have been performed that indicates the sulfur does enhance ammonia uptake.

NOx Control Options and Integration for US Coal Fired Boilers. (Quarterly Report, July 1, 2001-September 30, 2001)

M. Bockelie, M. Cremer, K. Davis, C. Senior, and E. Eddings. Reaction Engineering International, Salt Lake City, UT. 10 Oct 2001, 44p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

DE2005-835071WDE Price code: PC A04

This is the fifth Quarterly Technical Report for DOE Cooperative Agreement No: DE-FC26- 00NT40753. The goal of the project is to develop cost effective analysis tools and techniques for demonstrating and evaluating low NOx control strategies and their possible impact on boiler performance for firing US coals. The Electric Power Research Institute (EPRI) is providing cofunding for this program. This program contains multiple tasks and good progress is being made on all fronts. Field tests for NOx reduction in a cyclone fired utility boiler due to using Rich Reagent Injection (RRI) have been started. CFD modeling studies have been started to evaluate the use of RRI for NOx reduction in a corner fired utility boiler using pulverized coal. Field tests of a corrosion monitor to measure waterwall wastage in a utility boiler have been completed. Computational studies to evaluate a soot model within a boiler simulation program are continuing. Research to evaluate SCR catalyst performance has started. A literature survey was completed. Experiments have been outlined and two flow reactor systems have been designed and are under construction. Commercial catalyst vendors have been contacted about supplying catalyst samples. Several sets of new experiments have been performed to investigate ammonia removal processes and mechanisms for fly ash. Work has focused on a promising class of processes in which ammonia is destroyed by strong oxidizing agents at ambient temperature during semi-dry processing (the use of moisture amounts less than 5 wt-%). Both ozone and an ozone/peroxide combination have been used to treat both basic and acidic ammonia-laden ashes.

Production and Screening of Carbon Products Precursors from Coal. Final Report

West Virginia Univ. Research Corp., Morgantown. 31 May 2001, 24p. Sponsored by National Energy Technology Lab., Pittsburgh, PA. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

DE2005-835013WDE Price code: PC A03/MF A01

The authors have examined effects of blending a raw coal extract (EXT) with an extracted coal-tar pitch (ECTP). Previous reports were concerned with the addition of 15 wt% EXT, or less, on the physical characteristics of the blend and on the development of optical texture following carbonization. Two additional blends of ECTP and EXT were prepared at the 30 and 50 wt% EXT content using a procedure already described. The characteristics of the blends are presented. The density for these blended materials is not much different than the density for the blends reported earlier. The softening point temperature for the 30 wt% EXT increased to over 200 C while the softening point temperature for the 50 wt% EXT blend was too high to be determined by the Mettler method. Coke yields approximately follow the law of

mixtures. The optical texture of the green cokes for the 30 and 50 wt% EXT blends is shown. Though the optical texture of the green cokes was not significantly affected where the level of EXT is 15 wt% or less, larger proportions of EXT exert a marked reduction in anisotropy. The co-processing of coal with petroleum residues or other heavy hydrocarbons at elevated temperature and pressure has received considerable attention in the research community as a means to upgrade simultaneously coal and byproducts. Heavy hydrocarbons can function as sources of hydrogen, as well as performing as a medium for dissolution and dispersion of coal fragments. However, the focus of much of the prior research has been on developing fuels, distillable liquids, or synthetic crudes. Comparatively little effort has been deliberately directed toward the production of heavier, non-distillable materials which could perform as binder and extender pitches, impregnants, or feedstocks for cokes and other carbons.

Recovery and Sequestration of CO2 from Stationary Combustion Systems by Photosynthesis of Microalgae. (Quarterly Report No. 15, April 1, 2004-June 30, 2004)
T. Nakamura.
National Energy Technology Lab., Pittsburgh, PA. Nov 2004, 44p, PSI-1356-15. Prepared in cooperation with PSI Technology Co., Andover, MA. and Hawaii Natural Energy Inst., Honolulu. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-836104WDE Price code: PC A04

Most of the anthropogenic emissions of carbon dioxide result from the combustion of fossil fuels for energy production. Photosynthesis has long been recognized as a means, at least in theory, to sequester anthropogenic carbon dioxide. Aquatic microalgae have been identified as fast growing species whose carbon fixing rates are higher than those of land-based plants by one order of magnitude. Physical Sciences Inc. (PSI), Aquasearch, and the Hawaii Natural Energy Institute at the University of Hawaii are jointly developing technologies for recovery and sequestration of CO(sub 2) from stationary combustion systems by photosynthesis of microalgae. The research is aimed primarily at demonstrating the ability of selected species of microalgae to effectively fix carbon from typical power plant exhaust gases. This report covers the reporting period 1 April to 30 June 2004 in which PSI, Aquasearch and University of Hawaii conducted their tasks. Based on the work during the previous reporting period, Aquasearch run further, pilot and full scale, carbon sequestration tests with actual propane combustion gases utilizing two different strains of microalgae. Aquasearch continued testing modifications to the coal combustor to allow for longer-term burns. Aquasearch also tested an alternative cell separation technology. University of Hawaii performed experiments at the Mera Pharmaceuticals facility in Kona in mid June to obtain data on the carbon venting rate out of the photobioreactor; gas venting rates were measured with an orifice flow meter and gas samples were collected for GC analysis to determine the carbon content of the vented gases.

Refractory for Black Liquor Gasifiers. (Report for July 1, 2004-September 30, 2004)
Missouri Univ.-Rolla. Oct 2004, 56p.
DE2005-835184WDE Price code: PC A05

For complete citation see Fuel Conversion Processes

Reusable Calcium-Based Sorbet for Desulfurizing Hot Coal Gas
T. D. Wheelock, and D. J. Hasler.
Iowa State Univ., Ames. Dept. of Chemical Engineering. 2005, 14p. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-836423WDE Price code: PC A03/MF A01

The overall objective of this project has been to develop a superior, regenerable, calcium-based sorbent for desulfurizing hot coal gas. The sorbent should be strong, durable, inexpensive to manufacture, and capable of being reused many times. To achieve these objectives the project has focused on the development of the very promising core-in-shell sorbent.

Revision of the OCS Oil-Weathering Model: Phases II and III
M. Reed, P. Daling, M. Moldestad, F. Leirvik, P. Brandvik, and J. Resby.
SINTEF Materials and Chemistry, Trondheim (Norway). Dec 2004, 208p, MMS-2005-020. Sponsored by Minerals Management Service, Anchorage, AK. Alaska Outer Continental Shelf Office. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-107477WDE Price code: PC A11

The report documents oil-weathering analyses done on six North Slope Alaska and Gulf of Mexico Region crude oils, revisions to the oil weathering model through Version 3.0, and collates experimental oil weathering data, suitable for model testing and validation, from international spill field trials.

Roadmap for Biomass Technologies in the United States
Department of Energy, Washington, DC. Dec 2002, 48p.
ADA436527WDE Price code: PC A04/MF A01

For complete citation see Policies, Regulations & Studies

Sebesta Blomberg Biomass-to-Energy Feasibility Study. (Final Report, October 15, 2001-May 30, 2002)
Sebesta Blomberg & Associates, Roseville, MN. Sep 2002, 158p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835464WDE Price code: PC A09/MF A02

The purpose of this study was to assess the economic and technical feasibility of producing electricity and thermal energy from biomass by gasification. For an economic model we chose a large barley malting facility operated by Rahr Malting Co. in Shakopee, Minnesota. This plant provides an

excellent backdrop for this study because it has both large electrical loads and thermal loads that allowed us to consider a wide range of sizes and technical options. In the end, eleven scenarios were considered ranging from 3.1 megawatts (MWe) to 19.8 MWe. By locating the gasification and generation at an agricultural product processing plant with large electrical and thermal loads, the expectation was that some of the limitations of stand-alone biomass power plants would be overcome. In addition, since the process itself created significant volumes of low value biomass, the hope was that most of the biomass gathering and transport issues would be handled as well. The development of low-BTU gas turbines is expected to fill a niche between the upper limit of multiple spark ignited engine set systems around 5 MWe and the minimum reasonable scale for steam turbine systems around 10 MWe.

Technical Progress Report for the Project Entitled 'Create a Consortium and Develop Premium Carbon Products from Coal.'
J. M. Andersen.
Pennsylvania State Univ., University Park. Office of Sponsored Programs. Aug 2003, 46p. Prepared in cooperation with West Virginia Univ., Morgantown. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-836484WDE Price code: PC A04/MF A01

The Consortium for Premium Carbon Products from Coal, with funding from the U.S. Department of Energy's National Energy Technology Laboratory and matching funds from industry and academic institutions continued to excel in developing innovative technologies to use coal and coal-derived feedstocks to produce premium carbon product. During Budget Period 5, eleven projects were supported and sub-contracted were awarded to seven organizations. The CPCPC held two meetings and one tutorial at various locations during the year. Budget Period 5 was a time of growth for CPCPC in terms of number of proposals and funding requested from members, projects funded and participation during meetings. Although the membership was stable during the first part of Budget Period 5 an increase in new members was registered during the last months of the performance period.

Geothermal Energy

Geobotanical Remote Sensing for Geothermal Exploration
W. L. Pickles, P. W. Kasameyer, B. A. Martini, D. C. Potts, and E. A. Silver.
Lawrence Livermore National Lab., CA. 22 May 2001, 16p, UCRL-JC-143938. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-15013210WDE Price code: PC A03

This paper presents a plan for increasing the mapped resource base for geothermal exploration in the Western US. We plan to image large areas in the western US with recently developed high resolution hyperspectral geobotanical remote sensing tools. The proposed imaging systems have the ability to map visible faults, surface effluents, historical signatures, and discover subtle hidden faults and hidden thermal systems. Large regions can be imaged at reasonable costs. The technique of geobotanical remote sensing for geothermal signatures is based on recent successes in mapping faults and effluents the Long Valley Caldera and Mammoth Mountain in California.

Geothermal Prospecting using Hyperspectral Imaging and Field Observations, Dixie, Meadows, NV
Lawrence Livermore National Lab., CA. 3 Mar 2005, 16p, UCRL-CONF-204141. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-15014131WDE Price code: PC A03/MF A01

In an ongoing project to relate surface hydrothermal alteration to structurally controlled geothermal aquifers, we mapped a 16 km swath of the eastern front of the Stillwater Range using Hyperspectral fault and mineral mapping techniques. The Dixie Valley Fault system produces a large fractured aquifer heating Pleistocene aged groundwater to a temperature of 285DG C at 5-6 km. Periodically over the last several thousand years, seismic events have pushed these heated fluids to the surface, leaving a rich history of hydrothermal alteration in the Stillwater Mountains. At Dixie Hot Springs, the potentiometric surface of the aquifer intersects the surface, and 75 degrees C waters flow into the valley. We find a high concentration of alunite, kaolinite, and dickite on the exposed fault surface directly adjacent to a series of active fumaroles on the range front fault. This assemblage of minerals implies interaction with water in excess of 200 degrees C. Field spectra support the location of the high temperature mineralization. Fault mapping using a Digital Elevation Model in combination with mineral lineation and field studies shows that complex fault interactions in this region are improving permeability in the region leading to unconfined fluid flow to the surface. Seismic studies conducted 10 km to the south of Dixie Meadows show that the range front fault dips 25-30 degrees to the southeast (Abbott et al., 2001).

Heating & Cooling Systems

Energy Cost and IAQ Performance of Ventilation Systems and Controls. Report 6: Meeting Outdoor Air Requirements in Very High Occupant Density Buildings. A Study of Auditoriums and Schools
Environmental Protection Agency, Washington, DC. Office of Air and Radiation. Jan 2000, 46p, EPA-402-S-01-001F. See also PB2005-109164. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109845WDE Price code: PC A04/MF A01

ASHRAE Standard 62-1989 (and the subsequent Standard 62-19991) raised the outdoor air requirements for acceptable indoor air quality for very high occupant density buildings such as schools and auditoriums from its previous level of 5 cfm per occupant to 15 cfm per occupant. Since occupant

densities in these buildings can be very high (e.g. 30-150 occupants per 1000 square feet), the absolute increase in outdoor air volumes in these buildings due to ASHRAE Standard 62 is exceptionally large, and outdoor air fractions (proportion of supply air which is outdoor air) rise significantly. Therefore, air flows in these buildings become heavily dominated by indoor air quality requirements rather than by thermal load requirements. This raises questions as to whether VAV systems can effectively meet the ASHRAE requirements under part load conditions. At part load conditions, supply air flows may be less than the required outdoor air flows unless VAV box minimum flow settings are sufficiently high. However, as VAV box minimum flow settings are raised in VAV systems, the operational characteristics of the VAV system approach that of a CV system (see Project Report no. 3), so that the energy savings of VAV systems over CV systems may be diminished or lost in these buildings. This further suggests that VAV systems in very high occupant density buildings whose design settings are meant to achieve the ASHRAE requirement of 15 cfm per occupant, may not in actuality be meeting that requirement unless their VAV box minimum flow settings are higher than normal practice would provide.

Energy Cost and IAQ Performance of Ventilation Systems and Controls. Report 7: The Cost of Protecting Indoor Environmental Quality During Energy Efficiency Projects for Office and Education Buildings. Integrating Indoor Environmental Quality with Energy Efficiency
Environmental Protection Agency, Washington, DC. Office of Air and Radiation. Jan 2000, 26p, EPA-402-S-01-001G. See also PB2005-109845. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-109846WDE Price code: PC A03/MF A01

Many building owners and managers are under increased pressure from many circles to provide good indoor environmental quality (IEQ). There are many opportunities to advance IEQ during the course of energy projects without sacrificing energy efficiency. These opportunities could provide the energy service companies and other energy professionals with the ability to gain a competitive edge as they market their services to a clientele that is becoming increasingly sensitive to indoor environmental quality issues. Many energy professionals believe that IEQ necessarily leads to significant energy penalties and therefore deliberately ignore it in their projects.

Final Report for the Variable Speed Integrated Intelligent HVAC Blower. (Final Report, December 2001-June 2003.)
General Electric Corp., Niskayuna, NY. Research and Development. Jun 2003, 30p.
DE2005-835010WDE Price code: PC A03

For complete citation see Energy Use, Supply, & Demand

Miscellaneous Energy Conversion & Storage

Development of a Direct Drive Permanent Magnet Generator for Small Wind Turbines. Final Technical Report September 30, 2003-September 30, 2004
K. Bennett, and P. McTaggart.
TIAX LLC., Cambridge, MA. 7 Jan 2005, 34p. Sponsored by Department of Energy, Washington, DC. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-839305WDE Price code: PC A04

In this program, TIAX performed the conceptual design and analysis of an innovative, modular, direct-drive permanent magnet generator (PMG) for use in small wind turbines that range in power rating from 25 kW to 100 kW. TIAX adapted an approach that has been successfully demonstrated in high volume consumer products such as direct-drive washing machines and portable generators. An electromagnetic model was created and the modular PMG design was compared to an illustrative non-modular design. The resulting projections show that the modular design can achieve significant reductions in size, weight, and manufacturing cost without compromising efficiency. Reducing generator size and weight can also lower the size and weight of other wind turbine components and hence their manufacturing cost. The objective of this project was to design and assess an improved Direct Drive Permanent Magnet Generator (DD PMG) architecture for use in small wind turbines ranging from 25 kW to 100 kW in size. In this work TIAX adapted an existing permanent magnet motor/generator architecture now employed in mass-produced consumer products to the wind-turbine application with the objective of reducing the size, weight and manufacturing cost of the generator without compromising efficiency.

Simulation and Analysis of Three-Phase Rectifiers for Aerospace Power Applications
L. V. Truong, and A. G. Birchenough.
NASA Glenn Research Center. Oct 2004, 15p, NASA/TM-2004-213346. Presented at Second International Energy Conversion Engineering Conference, Providence, RI, United States, 16-19 Aug. 2004. Publicly available Unlimited. CASI. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
N20040171484WDE Price code: PC A03/MF A01

Due to the nature of planned planetary missions, fairly large advanced power systems are required for the spacecraft. These future high power spacecrafts are expected to use dynamic power conversion systems incorporating high speed alternators as three-phase AC electrical power source. One of the early design considerations in such systems is the type of rectification to be used with the AC source for DC user loads. This paper address the issues involved with two different rectification methods, namely the conventional six and twelve pulses. Two circuit configurations which involved parallel combinations of the six and twelve-pulse rectifiers were selected for the simulation. The rectifier s input and output power waveforms will be thoroughly examined through simulations. The effects of the parasitic load for power balancing and filter components for reducing the ripple voltage at the DC loads are also included in the analysis.

Details of the simulation circuits, simulation results, and design examples for reducing risk from damaging of spacecraft engines will be presented and discussed.

Policies, Regulations & Studies

Documentation for FY2002 BTS GPRA Metrics
D. B. Belzer, K. A. Cort, J. A. Dirks, and D. J. Holstick.
Pacific Northwest National Lab., Richland, WA. Jan 2002, 186p, PNNL-13766. Sponsored by Department of Energy, Washington, DC. Office of Building Technology State and Community Programs. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-15010660WDE Price code: PC A10

PNNL estimated the FY2002 energy, environmental, and financial benefits (i.e., metrics) of the technologies and practices in the U.S. Department of Energy's (DOE's) Office of Building Technology, State and Community Programs (BTS). BTS uses the estimates of benefits as part of its annual budget request. This report includes an overview of the analytical approaches used to estimate energy savings for the FY2002 appropriated budget for BTS. The report also includes descriptions of key assumptions and the methodology that is used to calculate energy savings estimates for each BTS program.

Final Report for the Variable Speed Integrated Intelligent HVAC Blower. (Final Report, December 2001-June 2003.)
General Electric Corp., Niskayuna, NY. Research and Development. Jun 2003, 30p.
DE2005-835010WDE Price code: PC A03

For complete citation see Energy Use, Supply, & Demand

Implementing Royalty in Kind Business Processes and Support Systems: Road Map to the Future
Minerals Management Service, Denver, CO. Minerals Revenue Management Program. Jan 2001, 44p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110289WDE Price code: PC A04/MF A01

Since 1995, the Minerals Management Service (MMS) has been conducting feasibility studies and pilot projects to determine if royalty in kind (RIK) is in the Nation's best interests and, if so, to build the business case and framework for making RIK an integral part of the royalty management process. Based on experiences to date, senior MMS management has decided to proceed with the development and implementation of RIK as a viable option for managing the Nation's royalty assets. This Road Map sets forth the vision and strategic direction to implement, over a three year period, the operational RIK activity within MMS' Minerals Revenue Management (MRM) organization. Senior management defined the following business objectives for the future RIK activity: Implement RIK where applicable and when it is an improvement over royalty in value (RIV); Leverage the MRM position as an asset holder; Take advantage of potential inter-agency synergies; Minimize the cost of royalty administration; Reduce business cycle time; Accelerate timing of revenue collections; and Adopt energy industry business practices and controls wherever feasible. MMS senior management also established the following performance objectives to be met when the RIK option is exercised: Confirm and reconcile within 90 days all production royalties taken in kind; and Accelerate the timing of revenue receipt by 5 days over the RIV approach. MMS senior management designated the Gulf of Mexico (GOM) as the core strategic area for the evolution of the RIK activity. For onshore Federal leases, MRM will pursue a strategy of identifying high potential RIK opportunities, which will be pursued only with the support and participation of the affected States. Regarding Indian lands, MRM will work with Tribes when they express an interest in exercising the RIK option.

Minerals Management Service Five Year Royalty in Kind Business Plan, May 2004
Minerals Management Service, Herndon, VA. May 2004, 60p.
PB2005-110429WDE Price code: PC A05

For complete citation see Fuels

Nanoscience Research for Energy Needs. Report of the March 2004 National Nanotechnology Initiative Grand Challenge Workshop. Held in Arlington, Virginia on March 16-18, 2004. Second Edition
National Science Foundation, Washington, DC. Jun 2005, 90p.
PB2005-110127WDE Price code: PC A06

For complete citation see General

New Analysis Techniques for Estimating Impacts of Federal Appliance Efficiency Standards
J. E. McMahon.
Lawrence Berkeley National Lab., CA. Environmental Energy Technologies Div. 2005, 12p, LBNL-52945. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-835151WDE Price code: PC A03/MF A01

Impacts of U.S. appliance and equipment standards have been described previously. Since 2000, the U.S. Department of Energy (DOE) has updated standards for clothes washers, water heaters, and residential central air conditioners and heat pumps. A revised estimate of the aggregate impacts of all the residential appliance standards in the United States shows that existing standards will reduce residential primary energy consumption and associated carbon dioxide (CO2) emissions by 8-9% in 2020 compared to the levels expected without any standards. Studies of possible new standards are underway for residential furnaces and boilers, as well as a number of products in the commercial (tertiary) sector, such as distribution transformers and unitary air conditioners. The analysis of standards has evolved in response to critiques and in an attempt to develop more precise estimates of costs and benefits of these regulations. The newer analysis elements include: (1) valuing energy savings by using marginal (rather than average) energy prices specific to an end-use; (2) simulating the impacts of energy efficiency increases over a sample population of consumers to quantify the proportion of households having net benefits or net costs over the life of the appliance; and (3) calculating marginal markups in distribution channels to derive the

incremental change in retail prices associated with increased manufacturing costs for improving energy efficiency.

Nuclear Power, Small Nuclear Technology, and the Role of Technical Innovation: An Assessment
R. N. Schock, N. W. Brown, and C. F. Smith.
Lawrence Livermore National Lab., CA. May 2001, 16p, UCRL-JC-142964. Sponsored by Department of Energy, Washington, DC. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
DE2005-15013267WDE Price code: PC A03/MF A01

An overview of energy-system projections into the new century leads to the conclusion that nuclear power will play a significant role. How significant a role will be determined by the marketplace. Within the range of nuclear-power technologies available, small nuclear-power plants of innovative design appear to fit the needs of a number of developing nations and states. These plants have the potential advantage of modularity, are proliferation-resistant, incorporate passive safety features, minimize waste, and could be cost-competitive with fossil-fuel plants.

Oil RIK Value and Volume Reporting Recommendations
Minerals Management Service, Herndon, VA. 9 Sep 1997, 74p. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
PB2005-110288WDE Price code: PC A05/MF A01

In June 1996 the Royalty Policy Committee (RPC) recommended that the Minerals Management Service (MMS) review the oil Royalty-In-Kind program (RIK), stating that 'The current method of administering the Federal oil RIK program is time consuming and burdensome on producers, small refiners , and MMS.' As a result of this recommendation and MMS's desire to streamline 1 and simplify the oil RIK program, MMS formed a team to study ways to improve the program. The study team has completed the first phase of its study, which is reported below. The team identified program changes to address concerns with the program and recommends a pilot study to test the proposed changes.

Roadmap for Biomass Technologies in the United States
Department of Energy, Washington, DC. Dec 2002, 48p. The original document contains color images. Product reproduced from digital image. Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)605-6900; and email at orders@ntis.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.
ADA436527WDE Price code: PC A04/MF A01

The purpose of this document is to outline a research and development roadmap and identify public policy measures for promoting and developing environmentally desirable biobased fuels power and products. It represents the collective assessment and expertise of the Biomass Research and Development Technical Advisory Committee. The research strategies outlined in this road map will help achieve the goals established by the Committee in the Vision for Bioenergy and Biobased Products in the United States. The Committee represents experts from wide-ranging backgrounds relevant to biomass resources technologies and markets, A list of Committee members is provided in Appendix I. The Committee was established by the Biomass R AND D Act of 2000 (RL. 106- 224) Its responsibilities include advising the Secretaries of Energy and Agriculture on the technical focus and direction of requests for proposals issued under the Biomass R AND D Initiative and evaluating and performing strategic planning on program activities relating to the Biomass Research and Development Initiative (P.L. 106-224, Sec 206). The Committee developed this roadmap at the request of the U.S. Department of Energy and the U.S. Department of Agriculture as a tool to assist in biomass-related research planning and program evaluation. Through the Roadmap for Biomass Technologies in the United States the Committee has provided direction to the Department of Energy the Department of Agriculture the Department of the Interior the Environmental Protection Agency the National Science Foundation and the Office of the Science and Technology Policy. The Roadmap was developed through a series of public meetings of the Biomass Research and Development Technical Advisory Committee.

Sebesta Blomberg Biomass-to-Energy Feasibility Study. (Final Report, October 15, 2001-May 30, 2002)
Sebesta Blomberg & Associates, Roseville, MN. Sep 2002, 158p.
DE2005-835464WDE Price code: PC A09/MF A02

For complete citation see Fuels

PRODUCT ANNOUNCEMENT

21ST Century Agriculture: A Critical Role for Science and Technology

New USDA report addresses issues of technology transfer to developing countries

The future of agriculture increasingly is being determined by technology and innovation. A new report from the U.S. Department of Agriculture – *21st Century Agriculture: A Critical Role for Science and Technology* – illustrates the opportunities and challenges of using science and technology to strengthen global food security and reduce hunger. Printed copies of the report are available from the National Technical Information Service.

The report was prepared especially for the *International Ministerial Conference and Expo on Agricultural Science and Technology* held June 2003 in Sacramento CA. The conference was attended by agricultural and other ministers from more than 100 countries. The goal was to provide a supportive policy environment to discuss methods to increase agricultural productivity, spur economic growth and help alleviate world hunger and poverty.

The report showcases a broad range of conventional and emerging technologies that can

- increase farm productivity,
- enhance the nutrient content of foods, and
- utilize new processing and marketing strategies for crops and livestock.

It also discusses advances in soil, water nutrient, pest, and risk management, and ways to improve food safety and nutrition. It emphasizes key issues of technology transfer, and the need for sustainable agricultural systems that can remain productive in the long run.

Twenty-First Century Agriculture: A Critical Role for Science and Technology is available from NTIS, call 1-800-553-6847 or (703) 605-6000, for $25.50 plus $5 handling fee, no additional charge for shipping; quote order number PB2003-105830KSS. Most major credit cards accepted. Fax orders to (703) 605-6900. Order online at http://www.ntis.gov/products/specialty/usda/usdapubs.asp.

Other USDA products available from NTIS include *Amber Waves, AgExporter and World Agricultural Production*. For more information about USDA products, visit the NTIS web site at http://www.ntis.gov/products/specialty/usda/

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PRODUCT ANNOUNCEMENT

A Guide to Creating Vernal Ponds

All the Information You Need to Build and Maintain an Ephemeral Wetland

Vernal ponds are a type of seasonal or temporary wetland. They were once common, naturally occurring features on the landscape. For a variety of reasons vernal ponds are not as common as they once were. Many natural vernal pond wetlands have been claimed by society and are now covered by infrastructure such as roads, buildings, and parking lots. Discover how to make a vernal pond that looks and functions like a natural wetland with *A Guide to Creating Vernal Ponds*. The Guide is now available from the National Technical Information Service.

The techniques described in the publication have been used successfully in Kentucky, Ohio, and Minnesota. They draw from basic pond building principles and are coupled with the concepts of vernal pond ecology. The author, Tom Biebighauser began making wetlands in 1982 on the Superior National Forest in Minnesota, and has since moved on to the Daniel Boone National Forest in Kentucky where he has established over 700 seasonal, permanent, emergent and forest wetlands throughout Kentucky and Ohio. The Guide is divided into four chapters that give detailed information on:

- Background about Vernal Ponds
- Planning a Vernal Pond Construction Project
- Constructing a Vernal Pond
- Reference Materials

A Guide to Creating Vernal Ponds is designed to help private landowners, teachers and biologists establish vernal ponds or ephemeral wetlands. They will find out how to establish a wetland that contains water long enough for aquatic plants, hydric-soils and amphibian larvae to develop.

A Guide to Creating Vernal Ponds is available from NTIS, call 1-800-553-6847 or (703) 605-6000, for $12 plus $5 handling fee, no additional charge for shipping; quote order number PB2003-106610KST. Most major credit cards accepted. Fax orders to (703) 605-6900. Order online at http://www.ntis.gov/products/vernalponds.asp

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PRODUCT ANNOUNCEMENT

HIPAA 101 Video Gives Basics of the Administrative Simplification Provisions for Electronic Transactions

Centers for Medicare and Medicaid Services video now available from NTIS

HIPAA 101 is a video program designed to inform the health care provider community about the administrative simplification provisions of the Health Insurance Portability and Accountability Act of 1996 or HIPAA. In addition to creating consumer protection for health care benefits, HIPAA standardizes financial and administrative health transactions for privacy and security. The *HIPAA 101* video program is available from the National Technical Information Service.

This video will help the health care provider community understand:

- The history of HIPAA and its benefits
- How to tell if you are a 'covered entity'
- The standards that have been adopted for electronic transactions and code sets
- Why the designated standards maintenance organizations may be important to you
- What you need to do to be compliant with the administrative simplification provisions
- How HIPAA's rules and deadlines will be enforced

HIPAA applies to all health care clearinghouses, all health plans, and health care providers that conduct certain transactions in electronic form or who use a billing service to conduct transactions on their behalf.

HIPAA 101 (Health Insurance Portability and Accountability Act of 1996): The Basics of HIPAA Administrative Simplification is available from NTIS, call 1-800-553-6847 or (703) 605-6000, for $13, no additional charge for shipping or handling; quote order number AVA21211VNB1KSU. Most major credit cards accepted. Fax orders to (703) 605-6900. Order online at http://www.ntis.gov/products/hipaa.asp

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D06	$426.00	T06	$ 960.00
D07	$519.00	T07	$1,132.00
D08	$584.00	T08	$1,297.00
D09	$651.00	T09	$1,449.00
D10	$743.00	T10	$1,600.00
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D12	$902.00	T12	$1,916.00
D13	$981.00	T13	$2,068.00
D14	$1,060.00	T14	$2,233.00
D15	$1,127.00	T15	$2,397.00
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A04	$ 59.00	$ 74.00	E04	$ 60.00
A05	$ 63.00	$ 79.00	E05	$ 67.00
A06	$ 68.00	$ 85.00	E06	$ 74.00
A07	$ 76.00	$ 95.00	E07	$ 83.00
A08	$ 83.00	$ 104.00	E08	$ 92.00
A09	$ 95.00	$ 119.00	E09	$ 102.00
A10	$ 102.00	$ 127.50	E10	$ 111.00
A11	$ 109.00	$ 136.50	E11	$ 120.00
A12	$ 118.00	$ 147.50	E12	$ 132.00
A13	$ 125.00	$ 156.50	E13	$ 141.00
A14	$ 129.00	$ 161.50	E14	$ 152.00
A15	$ 134.00	$ 167.50	E15	$ 164.00
A16	$ 138.00	$ 172.50	E16	$ 180.00
A17	$ 143.00	$ 179.00	E17	$ 196.00
A18	$ 151.00	$ 189.00	E18	$ 210.00
A19	$ 156.00	$ 195.00	E19	$ 233.00
A20	$ 160.00	$ 200.00	E20	$ 267.00
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D08	$1,168.00	T08	$ 2,594.00
D09	$1,302.00	T09	$ 2,898.00
D10	$1,486.00	T10	$ 3,200.00
D11	$1,619.00	T11	$ 3,504.00
D12	$1,803.00	T12	$ 3,832.00
D13	$1,962.00	T13	$ 4,136.00
D14	$2,121.00	T14	$ 4,466.00
D15	$2,254.00	T15	$ 4,794.00
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