

David L. Parry, Ph.D., P.E., BCEE

*Biosolids & Energy Recovery
Technology, Senior Fellow*

Education

Ph.D., Mechanical Engineering, University of Illinois, 1989
M.E., Mechanical Engineering, Brigham Young University, 1982
B.S., Mechanical Engineering, Brigham Young University, 1980

Professional Registrations

Professional Civil Engineer: Washington, California, and Oregon
Professional Mechanical Engineer: California and Alberta, Canada
Professional Environmental Engineer: Utah, Ohio; Manitoba, and British Columbia, Canada



Relevant Experience

Dr. Dave Parry has an international reputation for providing proven innovative solutions in wastewater, biosolids, and energy. He has 40 years of experience in planning, designing, researching, and providing construction and operation assistance for wastewater treatment, solids processing, and energy projects. He has been principal investigator for research on, anaerobic digestion, co-digestion, pyrolysis, gasification, and combustion. He served as the principal investigator for the Water Environment Research Foundation's co-digestion project and the Environmental Security Technology Certification Program demonstrating the conversion of food waste to fuel at the US Air Force. Dr. Parry served as the Chair of the Bioenergy Technology Subcommittee of the Water Environment Federation Residuals and Biosolids Committee. He was the lead author of the chapter on anaerobic digestion in the published WEF/EPA/WERF Solids Process Design and Management Manual. He has authored and presented more than 50 technical papers and has conducted numerous workshops on recovery of resources from wastewater, solids processing, anaerobic digestion, and energy management.

Biosolids and Energy Management Experience

Senior Technical Consultant, Biosolids and Energy Master Plan, San Mateo, CA. Dr. Dave Parry served as senior technical consultant for the Biosolids and Energy Master Plan for the San Mateo wastewater treatment plant. The master plan included a clear description of the City's objectives, existing and future operating conditions, solids processing and energy management options, and the recommended plan. The biosolids and energy master plan addressed immediate action projects and presented the schedule and cost of recommended projects for the next 20 years. The biosolids section included evaluating the regional biosolids market and opportunity to partner with wastewater and solid waste utilities. Public private partnerships were considered, particularly for biosolids technologies such as drying, pyrolysis to produce a dried pellet or biochar. The energy section focused on the beneficial use of biogas for both a CNG (compressed natural gas) fueling station and a combined heat and power facility.

Senior Technical Consultant, Biosolids and Energy Master Plan, Richmond, CA. Dr. Dave Parry served as senior technical consultant for the Biosolids and Energy Master Plan for the Richmond wastewater treatment plant. The master plan included a clear description of the City's objectives, existing and future operating conditions, solids processing and energy management options, and the recommended plan. The biosolids section included evaluating an organic receiving facility for co-digestion.

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Collaborating with other wastewater and solid waste utilities was considered for a regional biosolids management plan.

Senior Technical Consultant, Johnson County Unified Wastewater District (JCW), Biosolids Management Plan, Johnson County, KS Dave provided technical guidance for the development of the Biosolids Management Plan that created a roadmap for the County to plan for phased improvements to their solids processing facilities at the Douglas L Smith Middle Basin Plant and the Nelson Complex wastewater treatment plants. The biosolids planning included development and comparison of high-performance anaerobic digestion processes and design criteria for fats oils and grease (FOG) loading to the digesters. The resulting plan maximized FOG receiving, biogas production, and use of existing digesters for a solution that met multiple County objectives including cost effectiveness.

Technical Advisor, Digester Improvement, Organic Waste Receiving and Bioenergy Master Plan, Des Moines Metropolitan Wastewater Reclamation Authority, Des Moines, Iowa. Dr. Dave Parry was the technical advisor for the development of the Bioenergy Master Plan for the City of Des Moines, Iowa. The Bioenergy Master Plan was produced to assess the current anaerobic digestion and biogas utilization facilities at the Des Moines WWTP and develop plans for future facilities. Dr. Parry guided a team to examine advanced digestion and digestion enhancements, biomethane production, capture of the primary scum for feed to the anaerobic digestion, and to design and implement improvements to the plants organic waste receiving stations. The Des Moines Metropolitan Wastewater Reclamation Facility is now a fully commissioned co-digestion operation and multiple benefits of these improvements are being realized, these include: collecting of revenue from tipping fees, selling biogas to local industry as well as savings on electricity at the facility. The facility serves the region for organic waste processing where over 40 percent of the solids processed are trucked into the facility for co-digestion.

Biosolids Facility Design Experience

Senior Technical Consultant, Metro Biosolids Center Improvements Project, San Diego, CA. Dr. Parry was the senior technical consultant for the improvements to the Metro Biosolids Center (MBC) solids processing facility. As a member of the Clean Water Program, he conceptually designed the facility 25 years ago and oversaw the design as a member of the program management team. The MBC consists of sludge grit removal, thickening, and digestion of the North City water reclamation sludge. Digested sludge from the Point Loma wastewater treatment plant is dewatered with the North City digested sludge. Improvements include additional sludge grit removal capacity, new thickening centrifuges, digester pump mixing upgrades, and digester gas system upgrades. The MBC was conceived by Dave and serves the greater San Diego area as a regional biosolids processing center.

Technical Advisor, Biosolid Digester Facilities Project, San Francisco Public Utilities Commission. The San Francisco Public Utilities Commission is replacing its solids processing facility at its Southeast Water Pollution Control Plant (SEP). Jacobs, as part of an engineering consortium, is providing engineering for the 80 dry ton per day facility. Following conceptual design, which evaluated alternatives and selected the process scheme, preliminary and detailed design were completed and construction will start soon. The solids process includes sludge screening, thermal hydrolysis pre-treatment of combined, thickened primary and waste activated solids, followed by anaerobic digestion and dewatering. A combined heat and power system utilizing a gas turbine will produce electricity and heat (steam and hot water) from conditioned biogas to offset power usage and provide process and plant heating. Dr. Parry is part of the technical leadership team responsible for the technical overview of the design and quality review of the new biosolids digester facilities project.

Technical Advisor, Thermal Hydrolysis Process, Anaerobic Digestion, Design Build Project, DC Water, Washington, DC. Dr. Parry served as the Technical Advisor and chief process engineer for the thermal hydrolysis process (THP) anaerobic digestion system, design-build project at the District's Blue Plains Advanced Wastewater Treatment Plant. This was the first THP installation in North America and the largest THP installation in the world. Dr. Parry oversaw the detailed design and developed a detailed day-to-day feed sludge, startup and optimization procedure that resulted in commissioning the digestion system a few months ahead of schedule.

Lead Practitioner, Trinity River Authority (TRA) of Texas, Arlington, Texas. Dr Parry was the lead practitioner providing technical review for the design of the Solids Management Improvements for the Central Regional Wastewater System Wastewater Treatment Plant. The improvements will convert the solids treatment process from 150 dry tons per day of lime stabilization to a thermal hydrolysis process (THP) followed by anaerobic digestion. A conceptual design report and a preliminary design report were completed that explain the basis of design, and adherence to governing codes, standards and project requirements. The improvement project was designed and constructed.

Lead Practitioner, Canoas Wastewater Treatment Plant, Bogota, Colombia. Dave Parry lead the technical review for the design of the 365 MGD Canoas wastewater treatment plant (WWTP) in Bogota, Colombia for Empresa de Acueducto, Alcantarillado y Aseo de Bogotá (EAB). The plant, once completed, will be the largest WWTP in South America. Phase 1 includes chemically enhanced primary clarification, thermal hydrolysis process (THP) pre-treatment, anaerobic digestion, and beneficial use of the biogas. Phase 2 will provide secondary treatment and disinfection. Phase 3 will add nutrient removal. The project includes conceptual design for all three phases of the WWTP and detailed design of Phase 1. The multi-phase project will improve Bogota River water quality and reduce contamination of local food supplies, much of which is irrigated with the Bogota River.

Technical Advisor, Atotonilco Wastewater Treatment Plant, Mexico City, Mexico. Dr. Dave Parry served as the technical advisor on the program management team. He worked with Acciona staff, responsible for continued operation, to successfully startup the thirty mesophilic digesters at the Atotonilco Wastewater Treatment Plant (WWTP). The Atotonilco WWTP was constructed by the Mexican Government's National Water Commission, CONAGUA, with a dry weather flow capacity of 1,990 ML/day (525 MGD), it will be the largest plant serving the greater Mexico City population of 21 million people, to produce water for the irrigation of crops. Thirty 13,000 m³ (3.4 million gallon) mesophilic digesters handle 790 dry tonnes per day (dtpd) of solids during dry weather and up to 1,310 dtpd during wet weather conditions. These mesophilic anaerobic digesters were successfully started up using primary sludge as seed. A food to microorganism (F:M) ratio was used to determine the allowable volatile solids feed rate. Dave assisted with the startup of the 34 MW digester gas cogeneration system that consists of twelve 2.8 MW internal combustion engine-driven generators.

Project Director, Mey Ezor Dan (MED) Region Anaerobic Digestion and Cogeneration Facility, Tel Aviv, Israel. Dr. Dave Parry served as the project director for the design of anaerobic digestion and cogeneration facilities for the Dan Region, an association of 22 cities and towns in central Israel. Dr. Parry directed the design project that included providing sludge screening, staged thermophilic anaerobic digestion, as well as the treatment and beneficial use of biogas to produce electricity and heat for the 100 MGD Dan Region wastewater treatment plant (Shafdan). The facility produces Class A biosolids using eight 3-million gallon thermophilic digesters. An 11 MW cogeneration system, consisting of eight 1.4 MW internal combustion engines beneficially uses the biogas to produce heat and power. Dave is now directing the design to expand the digestion facility to process the sludge from the Shafdan

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plant that is being expanded to 150 MGD. Dave is also assisting the Dan Region as owner's engineer with adding a biosolids drying facility.

Senior Technical Consultant, Green Bay Facility Resource Recovery and Electrical Energy (R2E2) Project, NEW Water (formerly Green Bay Metropolitan Sewerage District), Green Bay, WI. The Green Bay Metropolitan Sewerage District (GBMSD) retained Jacobs to carry out engineering to implement its long-term biosolids management strategy. GBMSD own and operate the Green Bay Facility (GBF) and the De Pere Facility (DPF). Waste activated solids is pumped from DPF to GBF and processed with primary and waste activated solids at the 40 mgd (150 MLD) GBF. The Resource Recovery and Electrical Energy (R2E2) Project replaced the existing dewatering and multiple hearth furnaces with an innovative approach to solids management. The primary and waste activated solids are combined with imported high strength organic waste and converted to biosolids in anaerobic digesters. The biogas produced powers engine/generators to produce electricity and heat for use in the plant. The biosolids is dewatered with centrifuges, pre-dried in an indirect disc dryer using heat recovered from the combustion of the biosolids and the pre-dried biosolids are combusted in a fluid bed reactor (FBR). In addition to the energy recovered from combustion, the FBR is equipped with state-of-the-art air pollution control equipment to meet the MACT SSI rule 40 CFR Part 60 subpart LLLL. Ash is decanted in repurposed ash tanks for landfilling. Dr. Dave Parry served as the senior technical consultant for commissioning the anaerobic digesters. He oversaw the development of the commissioning plan and guided the on-site team for a successful commissioning of the anaerobic digesters. Commissioning included providing operator training involved coordination with the other components of the solids process including dewatering, drying, and incineration.

Energy Experience

Senior Technical Consultant, Cogeneration Facility Design/Build Project, San Jose-Santa Clara Regional Wastewater Facility, San Jose, California. Dr. Dave Parry is currently the Senior Technical Consultant for the San Jose-Santa Clara Regional Wastewater Facility cogeneration system design build project. The 14 MW facility will use internal combustion engine-driven generators to meet current and planned future electrical requirements at the facility. The digester gas treatment system will remove hydrogen sulfide and siloxanes to protect the engine and emission control equipment. Dave led the development of the energy strategic plan that recommended the new cogeneration facility.

Project Director, Energy Management Strategic Plan, San Jose, California. Dr. Dave Parry served as project director for the Energy Management Strategic Plan, which built upon the 2010 Plant Master Plan, and was conducted to further assess the energy system of the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The purpose of this plan was to provide a detail analysis of the existing energy system at the WPCP, evaluate ongoing or future plans that impact the energy system, and develop an energy management plan that meets both the short-term and long-term objectives of the WPCP. The plan recommended building a new 14 MW cogeneration facility. This cogeneration facility is now under design and Dr. Parry is the senior technical consultant for the progressive design build project.

Project Director, Energy Plan and Cogeneration Design, Redwood City, California. Dr. Dave Parry led a team in providing energy management planning and a plant cogeneration design for Silicon Valley Clean Water (SVCW). A biogas-fueled combined heat and power (CHP) system using internal combustion engines was recommended; increasing biogas production through co-digestion of food waste, building upon SVCW's already successful fats, oils, grease (FOG) co-digestion program; and improving electrical reliability by upgrading the existing electrical system. Dr. Parry directed the design of the new 1200 kW (two 600 kW units) CHP system that has been constructed and commissioned successfully.

Principal-in-Charge, Columbia Boulevard Wastewater Treatment Plant Cogeneration Facilities, Bureau of Environmental Services, Portland, Oregon. Dr. Dave Parry led the effort to provide The City of Portland, Bureau of Environmental Services (BES) with the pre-design, design, and construction phase services for the development of wastewater treatment plant-related cogeneration facilities, which centers on two 850 kW internal combustion engine-generators, equipped with the latest in lean-burn technology and heat recovery. A comprehensive biogas treatment system was designed to remove hydrogen sulfide, moisture, and siloxane to protect and reduce the maintenance costs on the engines. Dave is now overseeing the design of solids processing improvements including co-thickening, digestion, and dewatering.

Principal-in-Charge, Owner's Representative, Design/Build/Maintain Cogeneration Project for Lethbridge, Alberta, Canada. Dr. Dave Parry worked with the City as the owner's representative to implement a design-build/maintain project for the cogeneration facility that included the results of the preliminary design. He provided a feasibility study, pre-design and owner's representative services were provided for design-build/maintain process for two 800 kW lean-burn engine driven generators designed and installed with switchgear and heat recovery. He assisted the city in deciding on the delivery method and then wrote the RFI, RFQ, and RFP for the DBM project.

Project Manager; Phase V Water Pollution Control Facility Expansion, Encina Wastewater Authority; Carlsbad, California. Dr. Dave Parry was the project manager and mechanical engineering lead for the design of improvements to the Encina Wastewater Authority, including a 3.5 MW cogeneration system, aeration and agitation air system, and interface with the biosolids drying and plant odor control system. Dave led the energy management studies that recommended the new cogeneration system and analyzed the integrated wastewater, solids, and energy operation.

Project Manager, West Point Wastewater Treatment Plant Beneficial Use of Digester Gas Project, King County, Seattle, Washington. Dr. Dave Parry led a team to develop a variety of alternative uses of the digester gas at the West Point Wastewater Treatment Plant. The alternatives were based on historical and forecasted energy needs at the plant. Alternatives ranged from different technologies (internal combustion engines and gas turbines) for converting the digester gas to heat and power to converting the digester gas to pipeline quality natural gas through gas scrubbing.

Research Experience

Principal Investigator, Demonstration Project for Renewable Energy Production from Organic Wastes, United States. Dr. Dave Parry served as Principal Investigator for a demonstration project with the Department of Defense (DoD), through the Environmental Security Technology Certification Program (ESTCP), that demonstrated the ability to anaerobically digest DoD food wastes to generate a renewable energy source in the form of biomethane and to reduce landfill disposal costs. Demonstration activities include bench-scale and 14 months of pilot scale operations. The organic loading rate for anaerobic digestion of food waste with fats, oils, and grease (FOG) was determined.

Principal Investigator, Co-Digestion of Organic Waste Products with Wastewater Solids, Water Environment Research Foundation (WERF). Dr. Dave Parry was the principal investigator of the WERF co-digestion research that involved waste characterization, including the biochemical methane potential of several organic wastes. Extended laboratory experiments were conducted on restaurant grease and biodiesel glycerol as co-digestion feedstocks. Pilot-scale tests using two 300 gal (1200 liter) digesters were conducted to determine the upper limits of fats, oils and grease (FOG) and glycerol that can be fed to municipal anaerobic digesters. An economic model was developed to facilitate decision making

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regarding the economics of handling and treating different organic wastes based on tipping fees, biogas production, side stream impacts, and residual biosolids.

Principal Investigator, Pyrolysis of Dried Biosolids for Increased Biogas Production, Private Research.

Dr. Dave Parry served as Principal Investigator for research that involved the pyrolysis of dried biosolids and the digestion of the condensate to increase biogas production. The oils, acids, and compounds in the condensate were found to be digestible and it was determined that coupling the thermal process of pyrolysis with the biological process of anaerobic digestion was technically feasible.

Peer Reviewer, Wastewater Treatment Plant Carbon Recovery Project, City of Edmonds, WA.

Dr. Dave Parry served as the peer reviewer of the design of the new solids- handling facility including a new belt dryer and pyrolysis process to produce biochar. The new facility will replace an aging multiple hearth incinerator at the Edmonds WWTP that is space constrained. Dr. Parry reviewed the design and provided guidance on constructing, commissioning, operating the pyrolysis system and marketing the biochar product. The potential for pyrolysis to reduce PFAS (per- and polyfluoroalkyl substances) contamination in the biochar was considered.

Principal Investigator, Analysis of a Carbon Gasifier for Internal Combustion Engine Application,

Graduate Research, Brigham Young University. Dave Parry served as Principal Investigator for research that involved analyzing a down-draft carbon (coal and charcoal) gasifier to generate producer gas for fueling an internal combustion engine. The composition of the producer gas was measured, and the gas was cleaned and used to fuel an internal combustion engine. The difficulty in cleaning the gas (containing tars and oils) to protect the engine was observed.

Principal Investigator, Heat Transfer from Solid Combustion Flames, Graduate Research, University of Illinois at Urbana-Champaign.

Dave Parry served as Principal Investigator for evaluating the heat transfer from multi-phase flames resulting from the combustion of solids containing metal. The products of combustion were predicted by an equilibrium combustion model and compared to empirical data to determine the radiative properties of molten aluminum oxide.