

MEMORANDUM

Amended
Agenda Item No. 11(A)(11)

TO: Honorable Chairman Anthony Rodriguez
and Members, Board of County Commissioners

DATE: January 22, 2025

FROM: Geri Bonzon-Keenan
County Attorney

SUBJECT: Resolution directing the County Mayor to commit to providing in-kind services in the amount of \$1,500,000.00 to be used as a match should Provident Resources Group's application for grant funds from the Department of Energy, through its FY 2024 Funding Opportunity Announcement, be accepted for a hydrothermal biosolids technology project; and directing the County Mayor to enter into a grant agreement with Provident Resources Group for such matching funds

Resolution No. R-75-25

The accompanying resolution was prepared and placed on the agenda at the request of Prime Sponsor Commissioner Raquel A. Regalado.



Geri Bonzon-Keenan
County Attorney

GBK/jp



MEMORANDUM (Revised)

TO: Honorable Chairman Anthony Rodriguez
and Members, Board of County Commissioners

DATE: January 22, 2025

FROM: 
Gen Bonzon-Keenan
County Attorney

Amended
SUBJECT: Agenda Item No. 11(A)(11)

Please note any items checked.

- _____ **"3-Day Rule" for committees applicable if raised**
- _____ **6 weeks required between first reading and public hearing**
- _____ **4 weeks notification to municipal officials required prior to public hearing**
- _____ **Decreases revenues or increases expenditures without balancing budget**
- _____ **Budget required**
- _____ **Statement of fiscal impact required**
- _____ **Statement of social equity required**
- _____ **Ordinance creating a new board requires detailed County Mayor's report for public hearing**
- _____ **No committee review**
- _____ **Applicable legislation requires more than a majority vote (i.e., 2/3's present ____, 2/3 membership ____, 3/5's ____, unanimous ____, majority plus one ____, CDMP 7 vote requirement per 2-116.1(3)(h) or (4)(c) ____, CDMP 2/3 vote requirement per 2-116.1(3) (h) or (4)(c) ____, CDMP 9 vote requirement per 2-116.1(4)(c) (2) ____) to approve**
- _____ **Current information regarding funding source, index code and available balance, and available capacity (if debt is contemplated) required**

Approved _____ Mayor
Veto _____
Override _____

Amended
Agenda Item No. 11(A)(11)
1-22-25

RESOLUTION NO. R-75-25

RESOLUTION DIRECTING THE COUNTY MAYOR OR COUNTY MAYOR’S DESIGNEE TO COMMIT TO PROVIDING IN-KIND SERVICES IN THE AMOUNT OF \$1,500,000.00 TO BE USED AS A MATCH SHOULD PROVIDENT RESOURCES GROUP’S APPLICATION FOR GRANT FUNDS FROM THE DEPARTMENT OF ENERGY, THROUGH ITS FY 2024 FUNDING OPPORTUNITY ANNOUNCEMENT, BE ACCEPTED FOR A HYDROTHERMAL BIOSOLIDS TECHNOLOGY PROJECT; AND DIRECTING THE COUNTY MAYOR OR COUNTY MAYOR’S DESIGNEE TO ENTER INTO A GRANT AGREEMENT WITH PROVIDENT RESOURCES GROUP FOR SUCH MATCHING FUNDS

WHEREAS, biosolids are nutrient-rich organic materials produced during the wastewater treatment process; and

WHEREAS, as part of its wastewater treatment process, the Miami-Dade Water and Sewer Department (“WASD”) produces approximately 700 million wet tons of biosolids per day; and

WHEREAS, the removal of biosolids is essential to maintain effluent quality, which ensures that the water released meets environmental standards and regulatory requirements for safe discharge into the environment; and

WHEREAS, once biosolids have been removed during the treatment process, they are transported to a disposal site for its end use, which includes composting, land application, landfilling, and other legally permitted disposal methods; and

WHEREAS, due to recent changes to the Florida Administrative Code (F.A.C) aimed at minimizing nutrient migration and protecting water bodies, the number of disposal facilities available to receive biosolids have significantly decreased; and

WHEREAS, as a result of these regulatory changes, utilities statewide are now competing to secure hauling and disposal allocations, leading to increased pricing and a reduction in the number of vendors with current capacity to haul and dispose of biosolids; and

WHEREAS, the County is expending approximately \$26,000,000.00 per year on various contracts for the disposal of its biosolids; and

WHEREAS, new technologies for the treatment and disposal of biosolids are currently being developed by companies and non-profit entities all over the world; and

WHEREAS, one of those non-profits, Provident Resources Group, in conjunction with AECOM Technical Services, Inc., Genifuel Corporation, Merrick & Company and Pacific Northwest Laboratories, has developed a technology for turning biosolids into marine fuel known as hydrothermal liquefaction, which is explained in greater detail in the Concept Paper attached hereto as Exhibit 1; and

WHEREAS, the Department of Energy (“DOE”) has announced available grant funds that can be applied for under its FY 2024 Funding Opportunity Announcement for exploration of such cutting-edge biosolids treatment processes (the “DOE Grant”); and

WHEREAS, Provident Resources Group has approached Miami-Dade County (the “County”) seeking to partner with WASD on their project and requesting that the County make a commitment to provide \$3,000,000.00 in matching funds should Provident Resources Group be awarded a DOE Grant; and

WHEREAS, the County is interested in exploring the viability of Provident Resources Group's hydrothermal liquefaction technology as a potential means for treating the biosolids generated by WASD as part of its wastewater treatment processes; and

WHEREAS, in order to facilitate development of the hydrothermal liquefaction technology, the DOE Grant would be helpful; and

WHEREAS, AECOM Technical Services, Inc.—one of Provident Resources Group's partners in the hydrothermal liquefaction technology—will provide a contribution of \$1,500,000.00 in the form of in-kind services as part of the match needed for the DOE Grant; and

WHEREAS, to the extent feasible, the County would like to partner with Provident Resources Group and its affiliated partners in the development of the hydrothermal liquefaction technology and, subject to certain conditions, is willing to commit to providing the matching grant funds for Provident Resources Group should it be awarded a DOE Grant,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that:

Section 1. This Board adopts and incorporates the foregoing recitals as if fully set forth herein.

Section 2. This Board directs the County Mayor or County Mayor's designee to commit to providing \$1,500,000.00 in in-kind services as a match if: (a) Provident Resources Group demonstrates by no later than March 31, 2025, to the County's satisfaction, that its hydrothermal liquefaction technology is effective in treating the biosolids generated by the Miami-Dade Water and Sewer Department, and (b) Provident Resources Group's application for grant funds from the DOE, through its FY2024 Funding Opportunity Announcement, is accepted and a DOE Grant is awarded to Provident Resources Group. If Provident Resources Group's application

is accepted by DOE, the County's contribution toward the match needed for the DOE Grant will not be due until January 2026.

Section 3. This Board authorizes the County Mayor or County Mayor's designee to enter into, and execute on the County's behalf, a grant agreement with Provident Resources Group, which will set forth the terms for the County's provision of the \$1,500,000.00 in in-kind services in the event Provident Resources Group receives the DOE Grant, which grant agreement should provide, among other things, that: (1) WASD will receive all results from the hydrothermal liquefaction testing conducted using the County's matching funds and DOE Grant as well as the County's site location and materials for testing; (2) at the County's discretion, provide that the County will become the owner of all capital improvements made at WASD facilities once testing of the hydrothermal liquefaction technology is completed pursuant to the DOE Grant; and (3) at the County's discretion, provide for an ownership interest for the County in the hydrothermal liquefaction technology, if such testing shows the technology is a cost-effective and environmentally-sound technology for treatment of biosolids. In addition, the grant agreement with Provident Resources Group will set forth milestones, as determined by the County Mayor or County Mayor's designee, that Provident Resources Group must satisfy throughout: (1) the testing phase of the hydrothermal liquefaction technology at any WASD facility, and (2) any Phase Two part of the project.

The Prime Sponsor of the foregoing resolution is Commissioner Raquel A. Regalado. It was offered by Commissioner **Raquel A. Regalado**, who moved its adoption. The motion was seconded by Commissioner **Eileen Higgins** and upon being put to a vote, the vote was as follows:

Anthony Rodriguez, Chairman	aye		
Kionne L. McGhee, Vice Chairman	aye		
Marleine Bastien	aye	Juan Carlos Bermudez	aye
Kevin Marino Cabrera	aye	Sen. René García	absent
Oliver G. Gilbert, III	aye	Roberto J. Gonzalez	aye
Keon Hardemon	aye	Danielle Cohen Higgins	aye
Eileen Higgins	aye	Raquel A. Regalado	aye
Micky Steinberg	aye		

The Chairperson thereupon declared this resolution duly passed and adopted this 22nd day of January, 2025. This resolution shall become effective upon the earlier of (1) 10 days after the date of its adoption unless vetoed by the County Mayor, and if vetoed, shall become effective only upon an override by this Board, or (2) approval by the County Mayor of this resolution and the filing of this approval with the Clerk of the Board.



MIAMI-DADE COUNTY, FLORIDA
BY ITS BOARD OF
COUNTY COMMISSIONERS

JUAN FERNANDEZ-BARQUIN, CLERK

By: Basia Pruna
Deputy Clerk

Approved by County Attorney as
to form and legal sufficiency.

SED

Sarah E. Davis

Scaling Up Hydrothermal Liquefaction for Renewable Marine Fuel Production: Demonstrating Integrated Biorefinery Solutions in Municipal Wastewater Treatment

DE-FOA-003371: FY24 Scale-Up of Integrated Biorefineries – Concept Paper

Control Number: 3371-1547

Topic Area 2: Demonstration Scale-up of Integrated Biorefineries – Phase 1 Preliminary Design and Phased Construction



Points of Contacts

Business Contact

Todd Holder
Provident Resources Group
tholder@provident.org
727.480.9337

Technical/Principal Investigator Contact

Dan Levy, PG
AECOM Technical Services, Inc.
dan.levy@aecom.com
305.519.1194

Project Participants

AECOM Technical Services, Inc.
Ft. Lauderdale, FL
Genifuel Corporation
Salt Lake City, UT
Merrick & Company,
Greenwood Village, CO

Pacific Northwest National Laboratories,
Richland, WA
Miami-Dade County, Water and Sewer
Department (WASD)
Miami, FL

Proposed Technology

Hydrothermal Liquefaction (HTL) technology, developed over 15 years at PNNL, has undergone extensive testing in bench and engineering scale initiatives, including DOE-funded projects. These studies have demonstrated promising conversion rates, achieving 37-59% for primary and secondary sludge on both a mass and carbon basis (Marrone, 2016). However, high costs and scaling challenges have made municipalities hesitant to adopt such new technologies. Financial support from DOE is therefore crucial to advancing HTL as a cost-effective solution for biosolid management and renewable fuel production.

HTL produces a biocrude similar to fossil crude that can serve as a feedstock to produce “drop-in” fuels after pretreatment and refining at existing refineries. The HTL process uses subcritical water conditions (~350°C and 200 bar, without introducing air or oxygen) to convert wet organic matter, such as biosolids, into renewable biocrude. The final products are sustainable fuels like Sustainable Aviation Fuel (SAF), renewable diesel and marine fuel (Cronin D.J., et al. 2022).

This proposal directly supports DOE’s FOA objective to develop a sustainable biofuel solution that reduces greenhouse gas emissions and provides a replicable, commercial pathway for integrated biorefineries. By scaling HTL technology, we aim to convert municipal wastewater biosolids into biocrude—aligning with Bioenergy Technologies Office (BETO) strategy to decarbonize transportation sectors, especially hard-to-electrify industries such as aviation, marine, and rail.

How the Technology is Unique: HTL offers a favorable energy balance, using less energy input to produce a high-energy-output biocrude compared to other waste-to-energy technologies. Additionally, HTL efficiently processes wet organic material directly thereby avoiding the high-energy demands of drying the feedstock or using supercritical conditions. This significantly reduces energy consumption compared to pyrolysis and gasification, which often require pre-drying and higher operational temperatures (>500 °C). HTL has shown energy recovery efficiencies up to 60% when converting wet biomass into biocrude, meaning that the energy content of the biocrude produced is significantly greater than the energy required for processing. This high energy return on investment (EROI) is partly due to HTL’s efficient transformation of biomass into energy-dense hydrocarbons, which, unlike other methods, can be directly refined into transportation fuels. Consequently, HTL presents a practical, energy-efficient pathway to convert organic waste into renewable fuels, enhancing its appeal as a sustainable and scalable technology for waste-to-energy.

Technology Advancement: This proposal leverages Miami Dade County Water and Sewer Department’s (WASD’s) substantial waste generation, environmental constraints, and proximity to one of the world’s largest passenger cruise terminal and major cargo operations to showcase how HTL-derived biocrude as an alternative source for renewable marine fuels. The location allows HTL biocrude to be potentially used directly as a viable marine fuel, enabling near-term off-take while establishing longer-term, higher-value off-take agreements.

Additionally, it positions HTL technology to help meet future demand for SAF, as outlined in the DOE's SAF Grand Challenge, aligning with BETO's objectives to develop scalable renewable fuels that address both regional needs and emissions targets.

The successful scale-up of HTL technology holds transformative potential for both the wastewater treatment industry and the renewable fuels sector. With over 15,000 wastewater treatment facilities in the U.S. processing approximately 34 billion gallons of wastewater annually, HTL technology could significantly reduce fossil fuel reliance within marine and aviation sectors. This aligns with BETO's goals to reduce greenhouse gas emissions and expand renewable fuel production. Projections indicate that HTL technology could produce over 1 billion gallons of distillate fuels annually.

Currently, biosolids are primarily used as soil amendments; however, emerging contaminants such as PFAS and pharmaceuticals are increasingly restricting land-application options, as evidenced by Maine's recent ban on biosolids. This project aims to demonstrate how waste-to-energy pathways like HTL can effectively address these environmental and regulatory challenges, providing an innovative and economically viable solution for biosolid management that also supports transportation decarbonization.

Beyond environmental and energy impacts, HTL provides municipalities with a sustainable biosolid management pathway which is becoming more critical and has few other options. Integrating HTL into Miami-Dade's wastewater treatment system offers a scalable biosolid management solution for densely populated areas with limited land availability, meeting the FOA objectives by combining environmental, economic, and technical performance.

Overcoming Challenges: This project tackles scale-up challenges through a strategic collaboration with HTL leaders—PNNL, Genifuel, Merrick & Company, and AECOM—providing comprehensive engineering and design expertise. WASD will provide the funding match for Phase 1 (verification and design), along with biosolids and land for Phase 2 (final design, construction, and operations) while Provident Resources Group will supply the funding match for Phase 2. This collaborative approach aims to establish a replicable model that aligns with DOE's FOA objective of advancing scalable, market-driven biofuel solutions. While HTL technology itself is well-proven, several challenges remain for large-scale adoption. Our proposal identifies and addresses these barriers as follows:

HTL Plant Size and Scale: Achieving financial viability for HTL technology is projected to require a facility capable of processing approximately 110 dry tons per day, according to Snowden-Swan et al. (2022). Scaling up from Metro Vancouver's 2 dry ton pilot plant to this optimal capacity involves a significant financial commitment. This project proposes constructing a 30 dry ton per day facility, which balances cost-efficiency with scalability and aligns with FOA objectives for demonstration feasibility. A successful implementation would position this unit as a pioneering model for wastewater treatment providers across the nation.

Addressing Cost Barriers for HTL Adoption: High capital costs have historically hindered the early adoption of HTL technology, especially among fiscally conservative municipalities. However, with DOE funding and Provident Resources Group's access to cost-effective capital,

this project is positioned to overcome those initial cost barriers, making early HTL adoption feasible and aligning with FOA objectives.

Compared to the substantial investment required for traditional biosolid treatment facilities, such as incinerators, gasification plants, and digesters, HTL offers a more cost-effective alternative. HTL's unique ability to generate additional revenue through biofuels and environmental credits significantly offsets its operating costs, making it a financially viable solution for municipal waste management.

A key outcome of this project will be a comprehensive Techno-Economic Analysis (TEA), which will quantify and compare the costs of HTL against these traditional alternatives. This analysis will highlight HTL's economic advantages, providing a strong foundation for Phase 2 and paving the way for broader adoption of this innovative technology.

HTL Effluent Management: WASD's deep injection well network, currently used for treated wastewater disposal, has the potential to provide a low-cost, sustainable solution for managing HTL effluent. This setup reduces typical operational challenges and disposal costs associated with HTL effluent treatment while offering a carbon sequestration pathway for residual carbon not converted by the HTL process. Leveraging the central plant's existing deep wells, the Miami-Dade County Central Treatment facility becomes an ideal site to validate HTL technology at scale.

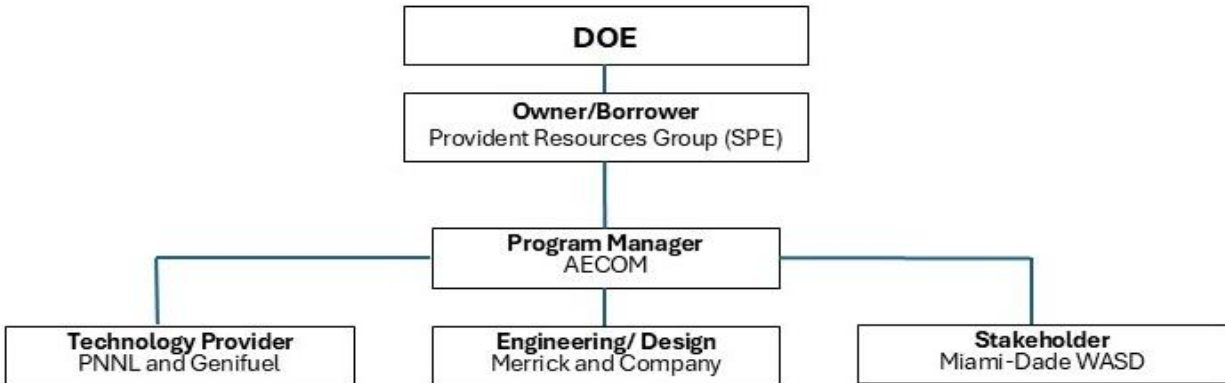
Financial Risk: DOE funding and Provident's nonprofit borrowing rates minimize financial risk, making this project a replicable model for cost-effective HTL implementation.

Our project aims to construct the nation's first large-scale HTL facility to demonstrate the technology's capability in converting biosolids into biocrude. Building on successful bench- and pilot-scale trials across various feedstocks, this demonstration at one of WASD's two Wastewater Treatment Plants—a large scale facility generating 250 wet tons of biosolids daily—will validate HTL's efficiency in a high-throughput setting. WASD operates three wastewater treatment plants, collectively producing about 700 wet tons (140 dry tons) of biosolids daily. The proposed HTL plant will initially process approximately about 20% of the county's total biosolids production.

The project's ultimate goal is to develop and commission a 30 dry ton per day HTL facility or greater capable of producing 1 million gallons of biocrude annually, aligning with DOE FOA's objective of scaling integrated biorefineries. This facility will also lay the foundation for potential future expansions to treat Miami-Dade County's full biosolids. Upon successful demonstration, this scalable model will encourage widespread municipal adoption across the U.S.

Addendum - Project Team and Qualifications

This project's team combines deep expertise in HTL technology, engineering, and financing to meet the DOE FOA requirements and ensure project success:



Provident Resources Group, through a dedicated Special Purpose Entity (SPE), will serve as the project's owner and borrower, leveraging its nonprofit structure to secure cost-effective capital, essential for scaling up HTL. **Todd Holder, Senior Vice President**, brings over 32 years of project finance experience to lead funding efforts for this initiative and will serve as the primary business contact.

AECOM Technical Services, Inc. is a global leader in environmental engineering and sustainable infrastructure, with deep expertise in advancing innovative technologies from pilot projects to full-scale commercial operations. **Dan Levy, PG, founder of AECOM's algae and wet waste-to-biofuel programs**, will serve as Principal Investigator, overseeing the project from engineering design through to commercialization, ensuring comprehensive, end-to-end solutions.

Genifuel Corporation specializes in HTL technology for converting wet organic waste into fuel. Genifuel has been at the forefront of developing commercial-ready HTL systems and is a leading expert in HTL operations. **Jim Oyler, President and Founder of Genifuel**, brings over 40 years of management and technical experience, offering unparalleled expertise to this project.

Merrick & Company, a leader in HTL systems design and implementation, has been instrumental in advancing waste-to-energy technology through its work with Genifuel on the Reliance Industries (India), Hydrothermal Processing of Wastewater Biosolids (HYPOWERS) and Metro Vancouver HTL projects. Merrick's engineering team has experience in the design, fabrication, commissioning and start-up of HTL systems. This multidisciplinary team combines technical, financial, and operational expertise, uniquely qualifying them to address the scale-up challenges of HTL and advance its adoption nationwide. **Michael Washer, Craig Ware and Brendan Brown** will lead Merrick's technical team.

Pacific Northwest National Laboratory (PNNL) brings decades of HTL research and development experience, including bench- and pilot-scale facilities, and has collaborated with AECOM, Genifuel, and Merrick on HTL projects. PNNL researchers, including, **Uriah Kilgore, Miki Santosa and Peter Valdez**, will support this project.