Response to

RFP 12-13/P32 for IWCEP

(Integrated Waste Conversion and Energy Project)

Issued by

County of Maui

Department of Environmental Management

Submitted by

BNL CLEAN ENERGY AG

Dammstrasse 19
6300 Zug
Switzerland

1 Covering Letter

BNL Clean Energy AG
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28 January 2013

Dear Sirs

BNL Clean Energy - Response to RFP 12-13/P32 for IWCEP

We are happy to be able to respond as Developers to the above-mentioned RFP.

As requested, we can confirm that our primary contact for this submission is

James Marshall, Director of Systems
BNL Clean Energy AG
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6300 Zug
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In addition to this primary contact, the following people are also authorised to make representations on the behalf of BNL Clean Energy:

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Mr Sam Small, 1880 Piiholo Rd, Makawao, HI 96768
t: 973 271 0788

Yours faithfully

Mikael Rüdlinger
President and CEO, BNL Clean Energy

2 Executive Summary

2.1 Proposed IWCEP Solution

BNL Clean Energy proposes, as a core element to the solution to the County of Maui's IWCEP RFP, our new-generation power system technology as part of an integrated waste management system.

2.2 Overview of BNL Technology

The technology we propose is the result of many years of product research and development, and has resulted in a series of applications for, and receipt of, patents covering the key innovations inherent in our technology.

By going "back to basics", we have engineered a **Closed Loop Thermo-Chemical Process** (CLTCP) that allows us to take a wide range of source feedstuffs and return a wide range of useful byproducts.

A key point of our CLTCP technology is that, by definition, it is closed-loop hence there are no flues and no flue-gases being venting. *Thus there is no emission of greenhouse gases, and no emission of toxic materials into the environment.*

2.3 Feedstuffs

These include:

* Municipal Solid Waste - of virtually any organic composition

* Municipal Biosolids

* Biomass – trees, woodland/forest waste, bio power station residues

* Used tyres

* Used oils – of both fossil or vegetable origins

* Municipal Landfill Clearance (MSW cleared from existing landfill)

This list is not exhaustive, but rather to give an indication of the flexibility that can be provided – "speciality" waste streams such as medical biohazard waste or aged explosives can also be processed if required but with appropriate handling.

An important point to note is that the feedstuff mix does not have to be homogeneous; it can be varied depending on what is available at a given time, but conversely, a "recipe" can be derived that will generally dispose of feedstuffs in predefined proportions to address local storage requirements or transport issues.

2.4 Outputs

A number of options are available with our technology, and most are relevant in a higher or lower degree to the RFP:

2.4.1 Primary Outputs

2.4.1.1 Synthetic Fuels

Depending on requirements, this can be diesel (typically commercial grade, for truck and heavy plant operation), or kerosene (typically Jet A-1 for aviation use), or light fuel oil (typically for maritime use).

Note that the type of fuel can be changed dynamically; i.e. to output a different fuel type requires no physical changes to the equipment, only internal changes to the chemistry being executed within the equipment.

2.4.1.2 Electric Power Generation

A further option is to use a proportion of energy from a system to generate energy via a closed-cycle gas turbine (CCGT).

The key point to note is that a CCGT uses heat generated directly from the system – i.e. it does not burn fuel as a “normal” gas turbine does - thus the zero-emission status of the system is maintained.

2.4.1.3 Heating/Cooling

If required, a proportion of the thermal capacity of the system can be utilised for, for example, district heating/cooling, ice manufacture, lumber kilns. This has multiple benefits in terms of better utilisation by sharing infrastructure whilst reducing demand on local electricity or other energy supply systems.

2.4.1.4 Desalinated Water

If required, desalination facilities can be supported by our systems.

2.4.1.5 Feedstock Drying

Low-grade heat is available for feedstock drying – for example, of sewage-related semisolids – without loss of efficiency related to other outputs.

2.4.2 Secondary Outputs

A number of secondary outputs are generated to a varying degree that is entirely dependent on the nature and/or mix of feedstuffs used.

2.4.2.1 Inert Ash

Due to the technology process, all ash generated is clean and can be used for road construction, horticultural deployment or equivalent use.

2.4.2.2 Rare Earths and Heavy Metals Extraction

Unlike typical open-flue systems, these are captured with other non-organic materials that are normally regarded as “problematic”. The containing wastes will be barrelled and shipped to specialist metal recycling processors, most likely in California

2.4.2.3 Sulphate, Nitrate, Phosphate Extraction

Sulphate, nitrate and phosphate derivatives are extracted for reuse as inorganic fertilizers.

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4 Developer's Team Description And Structure

Whilst BNL Clean Energy AG are the responders to the RFP at this initial time, a local Hawaii corporation will be formed in cooperation with local parties for subsequent execution of the contract, with local management and staff recruitment.

It is further anticipated that BNL Clean Energy will be a minority holder within this new entity, and that – with BNL Clean Energy support and backing, of course - local investors and other interested parties will be the main participants in the successful execution of this solution.

As the technology provider, we would further be forming a local BNL Clean Energy technical subsidiary to ensure the successful support, maintenance and execution of the proposal.

The BNL Clean Energy staff that are specifically engaged on this project from the outset are:

Mikael Rüdlinger, President and CEO

James Marshall, Director of Systems

5 Corporate Documentation

5.1 Introduction to BNL Clean Energy

The BNL Clean Energy Group is a privately-held Swiss group of companies active in the engineering design, manufacturing and operation of proprietary emission-free energy systems and plants for biomass, coal, fossil fuel and waste.

Our plants are designed and manufactured in Switzerland, Germany and USA, complying to highest international standards with guaranteed performance. Our modularized standardized plants provide short delivery time, reduced investment and operating costs.

BNL Clean Energy retains technical and engineering competence in-house and also uses its own state-of-the-art process control systems to ensure best quality and continuous operation of our emission-free plants during their entire lifetime.

5.2 Competence to Respond to RFP

Headquartered in Switzerland, we maintain offices globally – the UK, France, Germany and Sweden in Europe; Seattle, St Petersburg and Vancouver in North America; Johannesburg, Rio de Janeiro and Istanbul coming on line shortly.

Our senior staff have many years of experience in the realm of energy production and energy management, and we believe that that their knowledge, experience and drive has brought to the market place a technology that is a “game changer” in terms of not only waste management but also in relation to addressing the need for clean, sustainable energy production in a local context but applicable around the globe.

5.3 Global Partner – World Energy Council and UN SE4ALL

5.3.1 World Energy Council (WEC)

We are a Global Partner of the World Energy Council, and work with and support the council in regard to their global and regional remits in energy policy and practice.

We are their nominated Waste-To-Energy subject experts for their upcoming global survey, SERT (Survey of Energy Resources and Technologies).

We also assist in the design, development and maintenance of their PPGP (Performance of Power Generating Plants) database.

5.3.2 United Nations – SE4ALL Initiative

We are active senior participants within United Nations’ Sustainable Energy for All initiative in bringing sustainable energy and development within global reach.

6 Proposed Technical and Commercial Approach

6.1 Technology Description

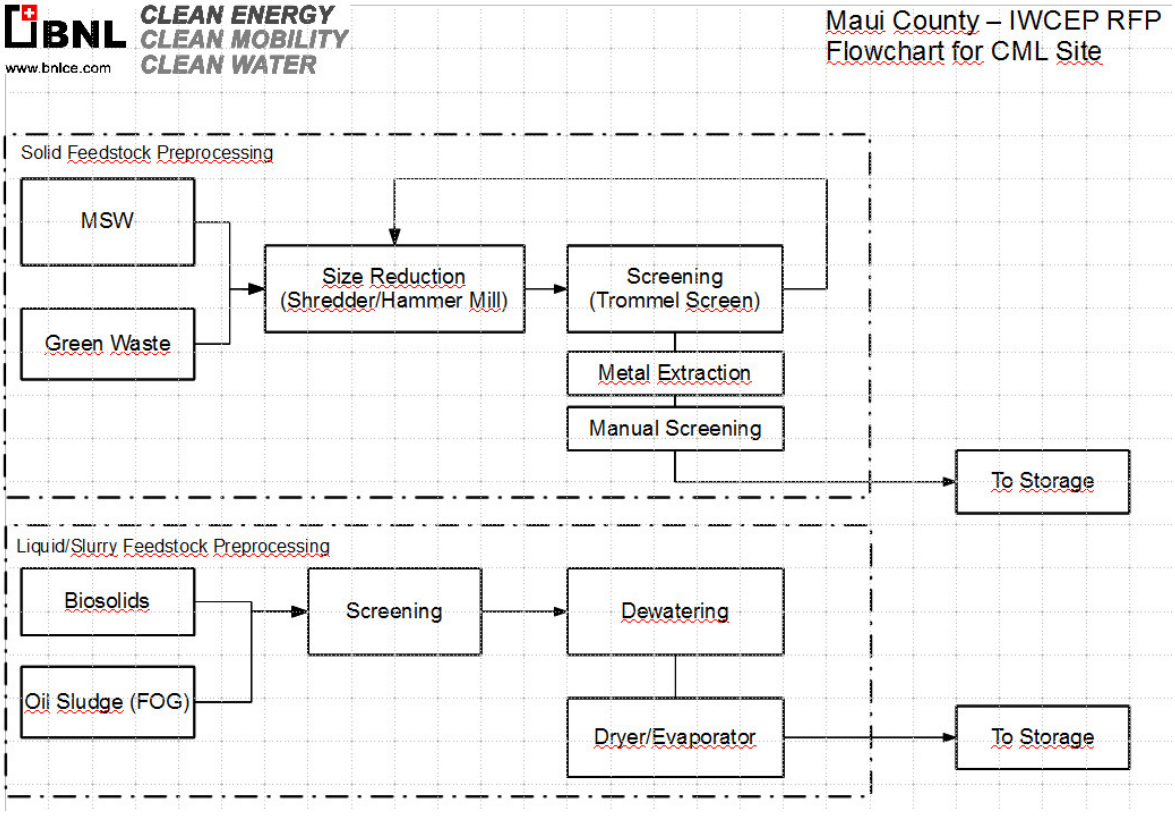
The technology is a modular implementation of our proprietary (with patents pending) high-temperature, high pressure closed-loop thermo-chemical process (CLTCP).

The modules are assembled in the required customer configuration at one of our fabrication sites, then assembled locally for first-stage commissioning (including full test and calibration), and finally shipped to the operational location for reassembly and final commissioning.

The systems require no external power or water supplies for operation, and are fully self-starting and self-sustaining. The two major operational processes are illustrated and described in more detail below.

6.1.1 Preprocessing of Incoming Waste

For mixed feedstuff applications such as IWCEP, all incoming feedstuff material will be preprocessed as shown in the figure below.

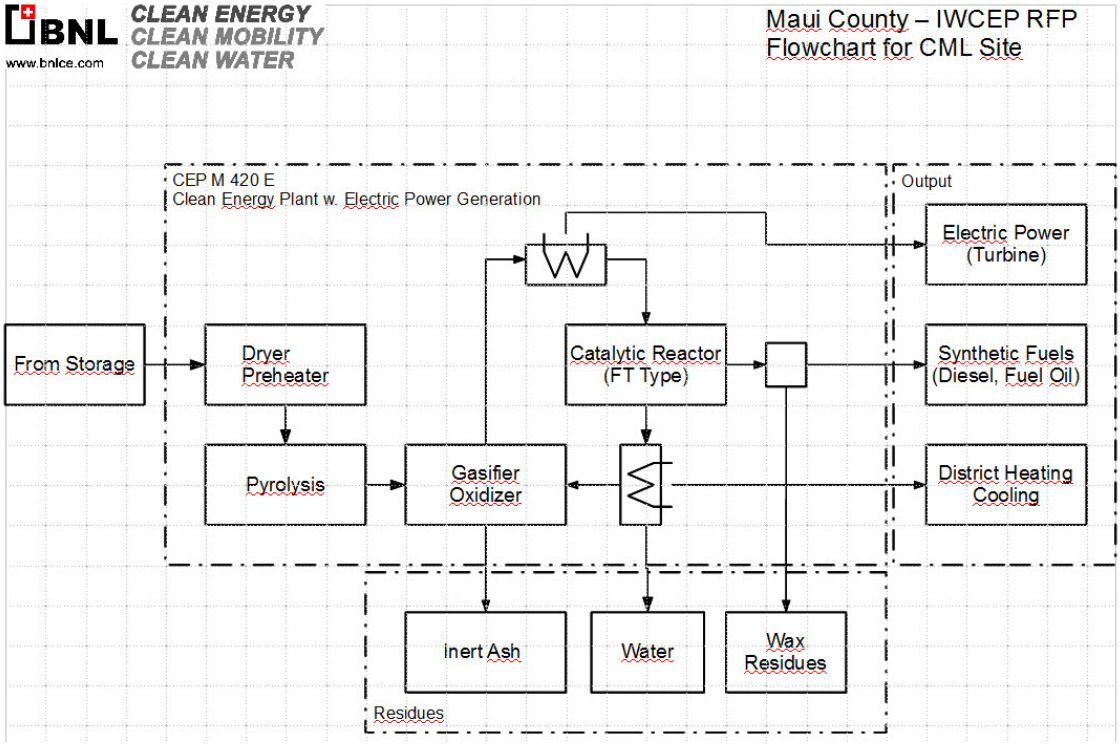


As noted previously, all power required for operation of shredder/hammer units,

screening drums and dryer/evaporator units comes directly from the system itself.

6.1.2 Primary Processing of Waste

A summary of the main plant system is shown in the diagram below.



6.2 Site Layout

TBA

6.3 Reference Operating Facilities

The BNL Clean Energy technology is currently in the process of being deployed at the first reference sites in Europe, and these installations will be available for visitation in early Q3/2013.

6.4 Project Scalability

The proposed technology is compact and modular, hence additional parallel processing streams can be added if and when increased waste flows make this option desirable and viable.

7 Financial Plan

Below are presented our BNL Clean Energy Proforma calculations for IWCEP.

7.1.1 Proforma #1 – Feedstock Composition & Revenues

Clean Energy Plant – M Series
Project Calculations / Proforma

Project: Maui County – IWCEP
Location: Central Maui Landfill Site

Feedstock Composition

Description	Supply [t/a]	HV (dry) [MJ/kg]	Moisture [%]	Unit Price [USD/t]	Revenue [USD/a]	Dry Feed [t/h]	Thermal [MW]
MSW	115'590	15	30%	68	7'860'120	9.7	40.6
Green Waste	23'000	12	30%	33	759'000	1.9	6.5
Biosolids	21'400	10	85%	88	1'883'200	0.4	1.1
Oil Sludge (FOG)	3'600	20	5%	116	417'600	0.4	2.3
	0	0	0%	0	0	0.0	0.0
Total	163'590				10'919'920	12.5	50.4

Notes:
- MSW in metric tons (MT), excluding metals and inert fractions
- Green Waste in metric tons (MT) with typical European moisture content
- Biosolids in metric tons (MT) received as slurry (wet)
- Oil Sludge in metric tons (MT) and assumed to have some moisture included
- Tipping Fees (Unit Price) have been converted to USD/MT by factor 1.1023

7.1.2 Proforma #2 – Plant Capacities and CAPEX

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CLEAN WATER
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Clean Energy Plant – M Series
Project Calculations / Proforma

Project: Maui County – IWCEP
Location: Central Maui Landfill Site

					Unit Price [USD/unit]	Revenue [USD/a]
Clean Energy Plant						
Greenhouse Gas Emissions	0	t/a				
Est. Thermal Capacity Required	50	MW(t)				
Installed Thermal Capacity	50	MW(t)				
Annual Operating Hours	8'300	h/a	Utilization	95%		
Annual Synthetic Fuel Capcity	46'684	t/a		25%	600	28'010'424
Optional Assessories						
Electric Power Generation	1	12.6	MW(e)	25%	150	15'702'031
Process Steam	0	0.0	MW	30%	40	0
District Heating/Cooling	0	0.0	MW	30%	20	0
Seawater Desalination	0	0.0	MW	30%	20	0
Feedstock Drying	1	15.1	MW	30%	-5	-628'081
Capital Expenditure (CAPEX)						
Feasibility Study& Geological Survey	1		500'000			
SPV, Contract & Legal	1		500'000			
Site Infrastructure	1		10'000'000			
Clean Energy Plant	1		50'000'000			
Feedstock Preparation System	1		4'000'000			
Synthetic Fuel Handling	1		2'000'000			
Electric Power Generation	1		15'000'000			
Process Steam Interconnection	0		0			
District Heating/Cooling Interconnecti	0		0			
Seawater Desalination Interconnectio	0		0			
Plant Commissioning	1		10'000'000			
Total CAPEX for Installation			**92'000'000**			

7.1.3 Proforma #3 – Annualised Profit & Loss

BNL CLEAN ENERGY
CLEAN MOBILITY
CLEAN WATER
www.bnlce.com

Clean Energy Plant – M Series
Project Calculations / Proforma

Project: Maui County – IWCEP
Location: Central Maui Landfill Site

		Estimate
Profit & Loss Proforma		
Feedstock		10'919'920
Synthetic Fuels		28'010'424
Electrical Power		15'702'031
Process Steam		0
District Heating/Cooling		0
Seawater Desalination		0
Feedstock Drying		-628'081
Total Revenue		**54'004'294**
Plant Maintenance Cost		5'680'000
Plant Operating Cost		8'100'000
Plant Staffing Cost	30	1'500'000
Administration & Overhead	5	400'000
Total Operating Cost		**15'680'000**
Plant Leasing		13'800'000

7.2 Finance and Equity

As well as working with local persons, groups and investors specific to Maui, BNL Clean Energy also has a number of Investor Pool groups established who will be able to participate in financing and executing the project, if required.

E&OE: Please note that figures and data presented in this response document by BNL Clean Energy are provided in good faith and to the best ability of BNL Clean Energy staff, but should be regarded as indicative at is time and not final.

8 Environmental Benefits

The key environmental benefit deriving from BNL Clean Energy technology is that, by not requiring any fossil fuels as inputs, **all energy outputs** – synthetic fuels, electricity, heating/cooling – **are carbon-neutral**.

8.1 Greenhouse Gases - emissions and reductions

8.1.1 Greenhouse Gas Emissions

BNL technology is emission-free, i.e. processing of feedstuffs incurs no greenhouse gas release.

8.1.2 Greenhouse Gas Reductions

Due to the closed-loop technology, there are no greenhouse gas implications from byproducts produced by the technology process.

8.2 Other Emissions

Again, due to the closed-loop nature of the technology proposed, there are no toxic emission implications from the technology process.

Compounds such as VOCs are thermo-chemically decomposed as part of the process.

Useful recoverable variants such as NOx and SOx are precipitated as salts and reused/recycled accordingly, typically as agricultural fertilisers.

8.3 Coexistence with LFG Collection

LFGs can be used as part of the feedstuff mix and processed by the technology as an additional source of fuel, and removed entirely from the ecosystem with no subsequent emission implications.

8.4 Coexistence with Wind and PV (Photovoltaic) Sources

The BNL technology can use any over-capacity of wind- or PV-generated electricity as “boost” input to the process, thus helping to “smooth out” disparities between supply and demand to better match electricity demand on renewable energy sources with the “time-variable” output constraints implicit in these types of sources.

The benefits of being able to so much better match supply-side curves to demand-side curves are clear – existing and future investments in wind and PV renewable sources are no longer limited to delivering only when there is consumer demand. They become an important part of an *integrated* clean energy system, allowing long-term renewable strategies to be realised.

9 Local Content of Material and Labour

It is intended and expected that – with the sole exception of the manufacture of the process technology plant components themselves – all material and labour will be locally sourced.

10 Permits and Schedule

10.1 Permits

TBA

10.2 Outline Project Schedule

Detailed Field Engineering Visit	March 2013
Revisions to Proposal	April 2013
Legal Entity established	April 2013
Contract awarded	June 2013
Process systems allocated to manufacture	June 2013
Site preparations initiated	End 2013
First process system onsite for commissioning	Q2 2014
First process line running	Q3 2014
Second process line running	Q2 2015

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