



# DACUM Research Chart for Bioenergy Conversion Technology

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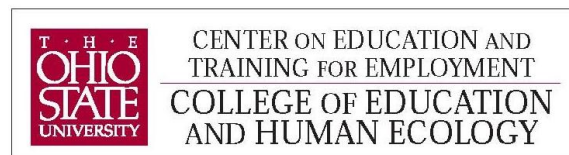
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Possible job titles for graduates within this occupational area include but are not limited to:

- Bioenergy Conversion Technician
- Bioenergy Plant Operator
- Digester Maintenance Technician
- Bioenergy Lab Technician
- Bioenergy Manufacturer's Rep
- Feedstock Procurement Technician
- Bioenergy Digestate/Effluent Technician
- Bioenergy Construction Manager

## Produced by



1900 Kenny Road  
Columbus, OH 43210

February 21-22, 2012

# DACUM Research Chart for Bioenergy Conversion Technology

Duties		← Tasks				
A	<b>Perform Bioenergy Feasibility Studies</b>	A-1 Execute confidentiality agreement	A-2 Identify project for study	A-3 Define project goals & objectives	A-4 Complete technical due diligence	A-5 Perform geographic analysis
		B-1 Determine regulatory permitting requirements	B-2 Obtain regulatory permits	B-3 Develop bid specifications	B-4 Source parts & components	B-5 Select project contractor
C	<b>Evaluate Bioenergy Feedstock Quality &amp; Supply</b>	C-1 Evaluate feedstock supplier reliability (e.g., source, quantity, source process)	C-2 Pilot test feedstock suitability	C-3 Assess feedstock energy content	C-4 Assess feedstock biodegradability	C-5 Assess feedstock nutrient balance
		C-11 Optimize feedstock biological characteristics (e.g., biodegradability, nutrient balance)	C-12 Optimize feedstock chemical characteristics (e.g., COD, pH)			
D	<b>Perform Lab Analyses</b>	D-1 Calibrate lab equipment	D-2 Perform COD analysis	D-3 Perform VS/total solids analysis	D-4 Perform pH analysis	D-5 Perform VFA analysis
		D-13 Prepare lab results report	D-14 Prepare samples for outside lab analysis	D-15 Maintain lab SOPs	D-16 Order lab supplies & reagents	D-17 Maintain lab MSDS binder
E	<b>Monitor Anaerobic Digester Performance</b>	E-1 Evaluate digester pH trends	E-2 Monitor digester temperatures	E-3 Monitor system levels (e.g., tank, mixer coolant levels)	E-4 Check digester for foam	E-5 Monitor digester agitation/mixing rate
F	<b>Monitor Biogas Processes</b>	F-1 Sample for gas composition	F-2 Monitor hydrogen sulfide removal efficiency	F-3 Determine optimal biogas system utilization	F-4 Adjust genset settings	F-5 Initiate boiler start-up
G	<b>Evaluate Bioenergy Effluent Quality &amp; Disposal</b>	G-1 Evaluate effluent lab results (e.g., nutrient value, solids content)	G-2 Quantify effluent volume	G-3 Determine effluent pathogen/toxin content	G-4 Determine effluent users	G-5 Prepare effluent for disposal
H	<b>Perform Administrative Tasks</b>	H-1 Prepare daily operations report	H-2 Prepare monthly summary report	H-3 Prepare regulatory compliance reporting	H-4 Schedule incoming feedstock	H-5 Maintain shipping & receiving documentation
		H-13 Prepare purchase requisitions	H-14 Supervise interns	H-15 Prepare timesheets	H-16 Maintain plant MSDS binder	
I	<b>Perform Bioenergy Marketing Tasks</b>	I-1 Participate in conferences & trade shows	I-2 Participate in industry/community networking events	I-3 Participate in public awareness workshops	I-4 Conduct facility tours	I-5 Prepare product samples for customer trials

A-6 Conduct project risk assessment	A-7 Conduct project stakeholder analysis	A-8 Conduct market analysis	A-9 Conduct bench top scale testing	A-10 Evaluate technology scalability	A-11 Conduct environmental study	A-12 Customize financial model
B-6 Develop project schedule	B-7 Participate in site preparation	B-8 Determine construction impact on existing processes	B-9 Participate in plant construction	B-10 Provide construction updates to stakeholders	B-11 Participate in plant commissioning	B-12 Develop lessons learned report
C-6 Evaluate feedstock nuisance potential (e.g., odor, ease of handling)	C-7 Evaluate feedstock pathogenic/toxic potential	C-8 Determine logistics of feedstock source (e.g., proximity, shipping cost)		C-9 Procure feedstock	C-10 Optimize feedstock physical characteristics (e.g., particle size, viscosity, total solids)	
D-6 Perform alkalinity analysis	D-7 Perform fecal coliform analysis	D-8 Perform TKN analysis	D-9 Perform phosphorous analysis	D-10 Perform heavy metals analysis	D-11 Perform PCB analysis	D-12 Perform ammonia analysis
D-18 Dispose of hazardous wastes	D-19 Clean lab equipment	D-20 Maintain lab equipment	D-21 Maintain lab certification			
E-6 Track pH chemicals added	E-7 Monitor gas production flow rate	E-8 Sample for COD/VFA/TS	E-9 Evaluate process data	E-10 Determine process corrective actions		
F-6 Initiate scrubber start-up	F-7 Initiate flare start-up	F-8 Initiate CNG start-up	F-9 Manage fueling stations			
G-6 Determine logistics of effluent disposal (e.g., transportation, method)	G-7 Supervise effluent shipping process	G-8 Perform disposal site compliance inspection				
H-6 Perform safety inspections	H-7 Check incoming feedstock	H-8 Order plant supplies	H-9 Conduct materials inventory	H-10 Prepare expense reports	H-11 Conduct training (e.g., operations, safety, maintenance)	H-12 Participate in training
I-6 Conduct project demonstrations	I-7 Conduct presentations to government entities	I-8 Promote carbon credits	I-9 Prospect for waste streams	I-10 Conduct market research	I-11 Conduct sales calls	I-12 Develop sales proposals

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Duties		Tasks				
I	<b>Perform Bioenergy Marketing Tasks</b>	I-13 Maintain social media content (e.g., Facebook, Twitter, YouTube)		I-14 Contribute to marketing materials (e.g., text, photographs, data)		
	J	<b>Perform Routine Bioenergy Plant Maintenance</b>	J-1 Develop preventative maintenance plan	J-2 Develop maintenance SOPs	J-3 Perform preventative maintenance (e.g., pump leaks, lubrication, fluid levels)	J-4 Calibrate system monitoring devices (e.g., flow controllers, pressure sensors, temperature sensors)
J-5 Adjust PLC parameters		J-6 Troubleshoot equipment performance failures	J-7 Perform corrosion inspections	J-8 Clean conversion system	J-9 Clean tanks, lines, pits, & hoppers	
J-10 Perform general housekeeping (e.g., paint, power wash, sweep)		J-11 Replace damaged parts	J-12 Complete maintenance documentation	J-13 Maintain parts inventory	J-14 Repair damaged equipment	
J-15 Install new plant equipment						

## Acronyms

CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
EPA	Environmental Protection Agency
HMI	Human Machine Interface
ICP	Inductively Coupled Plasma
MSDS	Material Data Safety Sheet
OSHA	Occupational Safety & Health Administration
P&ID	Piping & Instrumentation Diagram
PCB	Polychlorinated Biphenyls
PLC	Programmable Logic Control
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
TKN	Total Kjeldahl Nitrogen
TS	Total Solids
VFA	Volatile Fatty Acids
VS	Volatile Solids

## Worker Attributes

Physically fit	Honest
Strong sensory perception	Organized
Analytical	Flexible
Observant	Hands on
Detail oriented	Punctual
Not squeamish	Dedicated
Dependable	Creative
Self starter	Pleasant
Mechanically inclined	Adaptable
Passionate	Resourceful
Multi-tasker	Team Player
Able to take direction	
Common sense	
Good judgment	
Sense of humor	

# DACUM Research Chart for Bioenergy Conversion Technology

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## General Knowledge and Skills

Knowledge of EPA regulations  
Knowledge of OSHA regulations  
Blueprint/P&ID/schematic reading knowledge  
Knowledge of lab safety  
Communication skills (listening, speaking, writing)  
Knowledge of toxic & explosive gases  
Knowledge of computers/software  
Knowledge of basic chemistry  
Knowledge of basic biology  
Knowledge of basic plumbing  
Knowledge of basic electricity  
Knowledge of basic math  
Troubleshooting skills  
Basic mechanical knowledge  
Organizational skills  
Selling skills  
Interpersonal skills  
Analytical skills  
Knowledge of lab procedures  
Knowledge of confined space requirements  
Knowledge of lockout/tag out requirements  
Driving skills  
Equipment operating skills  
Knowledge of programmable logic controls  
Time management skills  
Problem solving skills  
Training skills  
Knowledge of basic finance  
Basic logistics knowledge  
Supervisory skills  
Knowledge of equipment components  
Knowledge of "green" economy  
Basic marketing knowledge

## Future Trends and Concerns

Introduction of new/refined technology  
New regulations for carbon credits  
New regulations for nutrient discharge  
Move toward more automation  
Trend toward more stringent environmental regulations  
Tremendous potential for job growth  
Lack of qualified employees  
Improvement in process efficiency and reliability  
Lack of available capital  
Increases in targeted education  
Increasing energy prices  
Increasing feedstock price  
Increasing demand for energy  
Increasing demand for effluent  
Development of new value-added product streams  
Identification of new feedstock  
Increased demand for vehicles converted to CNG

## Tools, Equipment, Supplies and Materials

Fume hood	Spectrophotometer
Computer	Incubator
Phone	Shovel
Lab supplies	PPE
Centrifuge	Titration setup
Gas chromatograph	Inert gas
pH meter	Forklift
oven	High shear mixers
ICP	Heating block
Vehicle	Fire extinguishers
Pilot scale digester	Ladders

Basic office supplies  
Spill kit  
Gas detection badge  
Probes  
Pathogen testing kit  
Software: data acquisition, PLC, purchasing, HMI  
Chemical reagents  
COD analyzer  
Hand tools  
Dry ice