



VIRTUAL DISTRIBUTED ENERGY SUMMIT 2021 - MODERNIZING NEW MEXICO ENERGY

Distributed Energy Technologies Program

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July 30, 2021

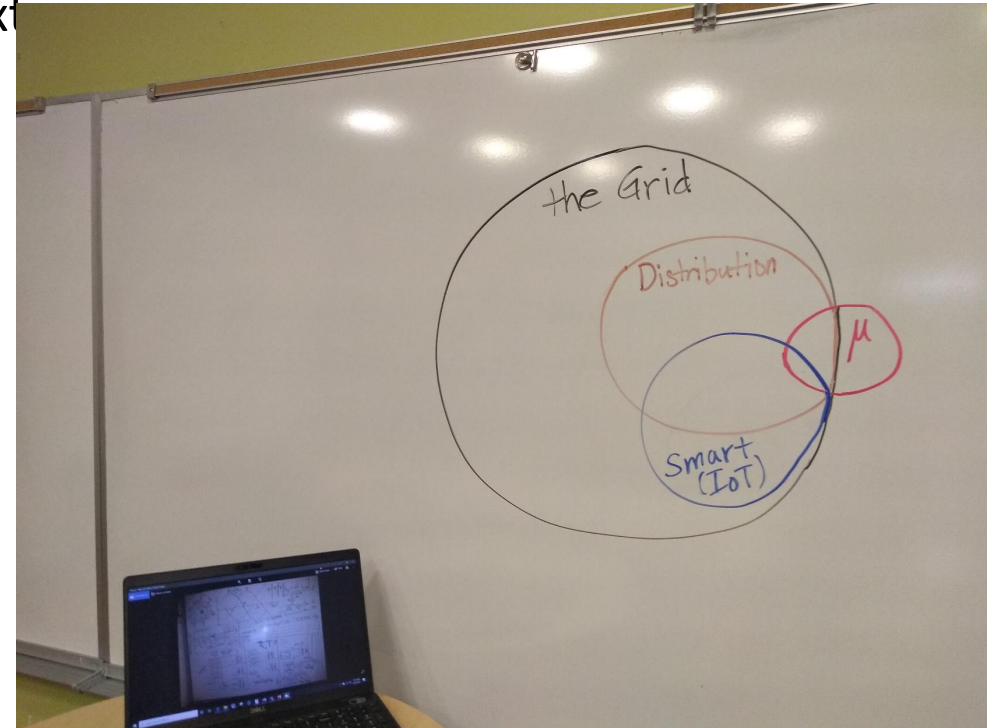


*Empower Students, Strengthen Community.
Empoderar a los Estudiantes, Fortalecer a la Comunidad.*

Smart- and Microgrid Training Center (SMTC)

SMTC is a comprehensive center for training the next generation of smart- and microgrid professionals.

- Curriculum and courses –
 - 4 Courses
 - 3 Certificates
 - 3 Degrees
- Educational equipment and software
- Educational microgrid



Smart- and Microgrid Training Center (SMTC)

New Courses

- **DESG 1120 – Introduction to Power Systems** -- energy conversion/generation, transmission, and use
- **DESG 1110 – Introduction to Smart Grids** – Distributed energy and smart grid design consideration
- **DESG 2998 – Distributed Energy Capstone** – team project based – ideas??
- **DESG 2999 – Distributed Energy Internship** – individual experience in a microgrid topic chosen by the student and instructor – employers, research/design project – if you're an employer interested in internships, contact us!

These have all been approved by the SFCC Curriculum Committee and are in our catalog

Curriculum Side

Certificates

- **Distributed Energy Technician** – focus on basic skills to function as a technician: math, energy conversion, computer skills (programming/cyber security/networking)
- **Grid Modernization** – for working professionals to learn about the fundamental issues of grid modernization
- **IT Support** – IT/certification focus, but with an emphasis on smart- and microgrid issues

Certificate In Distributed Energy Technician

(Nests into Engineering Technologies AAS)

PROGRAM REQUIREMENTS: (38-41 CREDITS)

BLDG 111 –Workplace Health and Safety **Credits: 3**

DIST 1110 – Introduction to Smart Grids **Credits: 4**

DIST 1120 – Introduction to Power Systems **Credits: 4**

ELCT 227 – National Electrical Codes **Credits: 2**

ELEC 111 - Electronic Fundamentals **Credits: 4**

ELEC 122 – Digital Circuits **Credits: 4**

ENVR 113 – Instrumentation and Controls **Credits: 3**

ISCS 114 – PC Hardware and Software **Credits: 4**

ISCS 122 – Computer Networks **Credits: 3**

MATH 1220 – College Algebra **Credits: 4** [OR]

MATH 1350 – Introduction to Statistics **Credits: 3**

SOLR 121 - Design and Installation of PV Systems I **Credits: 3**

RELATED REQUIRMENTS (1-3 CREDITS)

DIST 268 – Distributed Energy Capstone **Credits: 3** [OR]

DIST 298 – Distributed Energy Internship **Credits: 1-3** [OR]

ISCS 298 – Information Systems and Computer Science Internship
Credits: 1-3

Certificate In Grid Modernization

(Nests into Engineering Technologies AAS)

PROGRAM REQUIREMENTS: (13 CREDITS)

DESG 2298 – Distributed Energy Internship **Credits: 2** [OR]

DESG 2299 – Distributed Energy Capstone **Credits: 2**

DESG 1110 – Introduction to Smart Grids **Credits: 4**

DESG 1120 – Introduction to Power Systems **Credits: 4**

SOLR 121 - Design and Installation of Photovoltaic Systems I **Credits: 3**

RELATED REQUIREMENTS: (3 CREDITS MIN)

ISCS 171 – Computer and Security Fundamentals **Credits: 3** [OR]

ISCS 175 – Disaster Recovery **Credits: 3** [OR]

ISCS 273 – Computer and Network Defenses and Countermeasures **Credits: 3**

Certificate In IT Support for Smart- and Microgrids

(Nests into Computer and Information Technologies AAS)

PROGRAM REQUIREMENTS: (29 CREDITS)

ELEC 111 - Electronic Fundamentals **Credits: 4**

ENVR 113 – Instrumentation and Controls **Credits: 3** [OR]

DESG 1110 – Introduction to Smart Grids **Credits: 4**

DESG 1120 – Introduction to Power Systems **Credits: 4**

SUST 1130 – Sustainable Energy Technologies **Credits: 3**

ISCS 114 – PC Hardware and Software **Credits: 4**

ISCS 122 – Computer Networks **Credits: 3**

ISCS 171 – Computer and Security Fundamentals **Credits: 3**

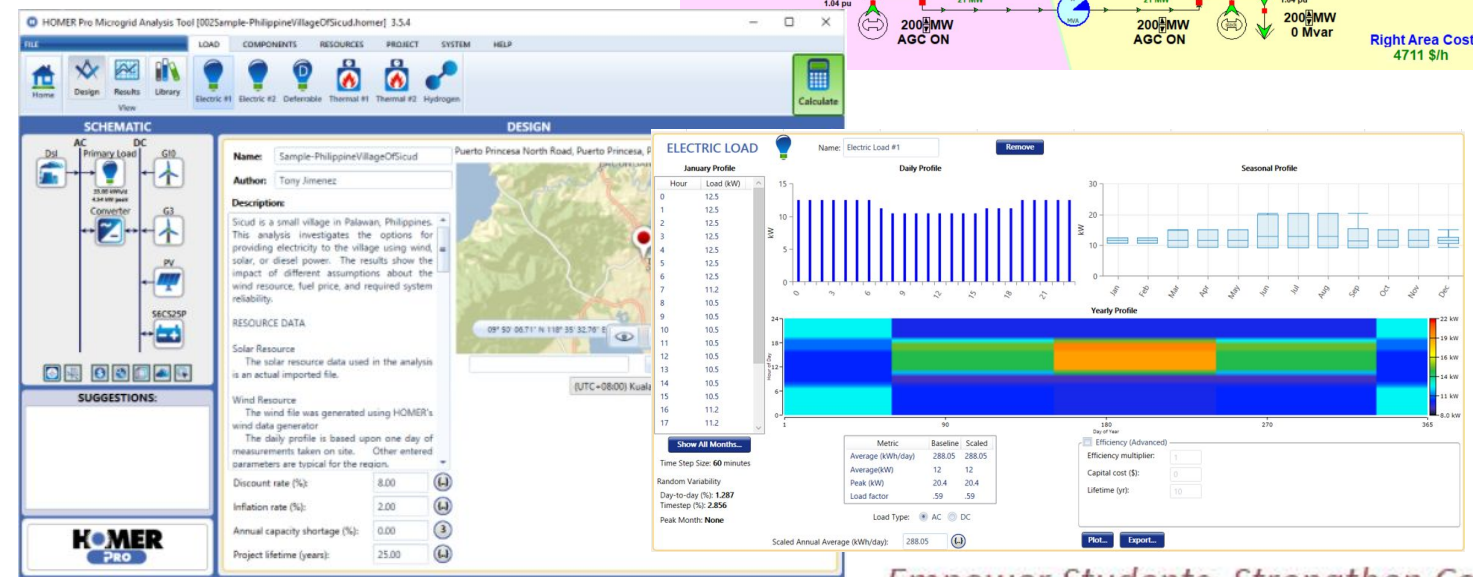
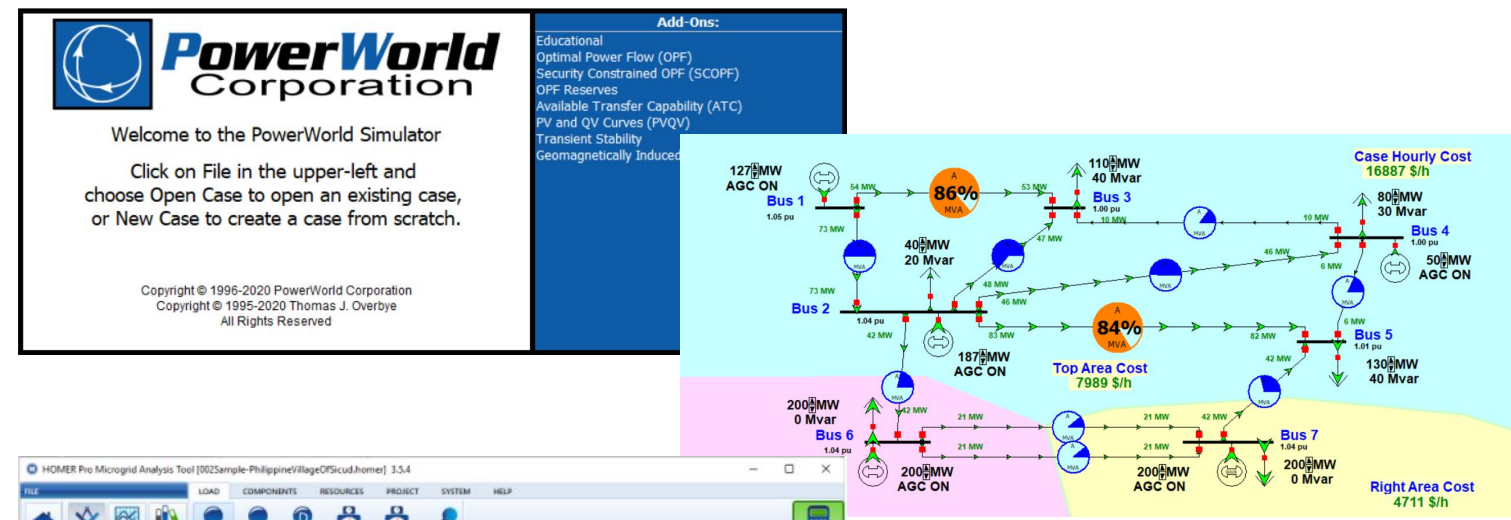
ISCS 273 – Computer and Network Defenses and Countermeasures **Credits: 3**

ISCS 298 – Information Systems and Computer Science Internship **Credits: 1-3**

Smart- and Microgrid Training Center

Simulation Capabilities:

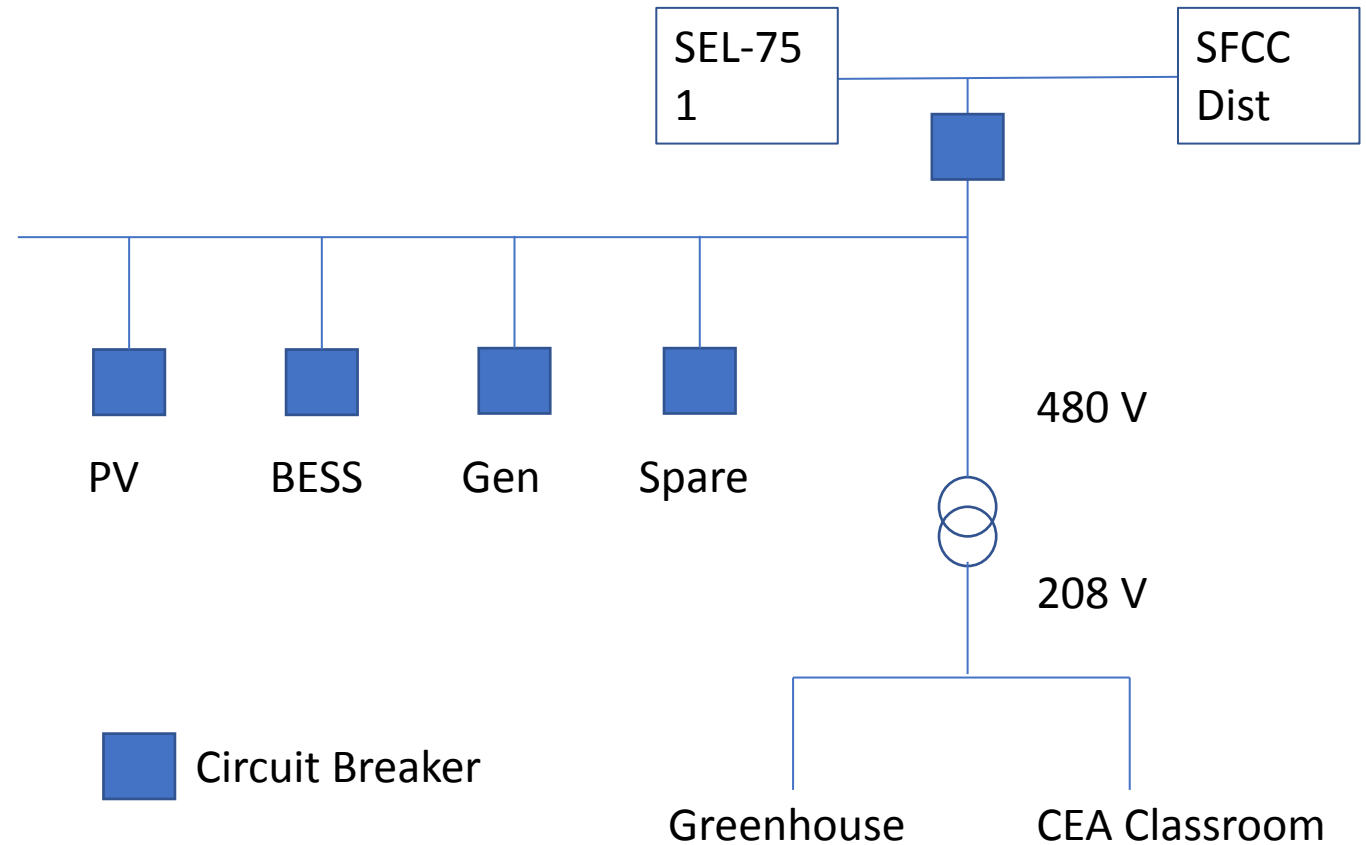
- Dedicated Computers
- PowerWorld Simulator – Grid Simulation Software
- HOMER Pro – Microgrid Design Software
- Siemens Campus Microgrid Simulators



Smart- and Microgrid Training Center

Educational Microgrid

- 12 kW Tracking PV Array
- 100 kW/85 kWh Lithium-ion Energy Storage System
- 30 kW Natural Gas Backup Generator
- 11,000 sf greenhouse and classroom/lab building – about 20 kW peak, 10 kW min, 15 kW average



Smart- and Microgrid Training Center

Microgrid Loads

- 11,000 sf greenhouse
- CEA classroom/lab
- 3-phase, 480 V
- ~20 kW currently



A	B	C	D	E	F	G	H	I	J	K	L
Location/System	TAG	QTY	Description	Manuf	Part #	Voltage (V)	Current (A)	Power (W)	Power Total (kW)	Usage 9/23	Link
Overhead Fans											
Greenhouse	M1	36	Medium Basket Fans - front, overhead	J&D Manufacturing	VDB20G	115	-	102	3.672	~80-90% fans on 3-5pm	
OVERHEAD FANS TOTAL									3.672 kW		
Exhaust Fans + Wet Wall											
Greenhouse	M2	8	Large Exhaust Fans - front/ground	American Coolair Century	N CBL/MBF48 SPUNK56 115/208-230	9.3/5.0-4.8		1069.5	8.556	5 out of 8 fans on 3-5pm	
Wet wall	M3	1	Large Pump back corner	?	?	?	?	2000	2	100% on 3-5pm	
EXHAUST FANS + WETWALL PUMP TOTAL									10.556 kW		
Growing Pumps											
Various	M4	14	Air Compressor / Pump	Active AQUA	AAPA110L	120	-	112	1.568	100% on 3-5pm	http://www.
Various	M5	5	Submersible Pump	EcoPlus	ECO1110assumed mult	120	-	92	0.46	100% on 3-5pm	https://fa
NFT/Hydroponic	M6	1	AC DrivePump/Motor	Fuji ElectricFlint & Walling	FRN002C1S-7UCJ10:200-240208-2:87.4 (S.F. Am			1760	1.76	100% on 3-5pm	https://w
???	M7	2	Motor / Pump - on Floor, front of house, 1/15HP	Iron MIGHT / US Motors	K55MYHBM-8529	115	1.3	149.5	0.299	100% on 3-5pm	
Dutch Bucket (Tomato) Blue Bucket M8		1	Water Pump - 1/2HP	Flolec	FP5112-08	115	7	805	0.805	100% on 3-5pm	
Algae Systems	M9	3	DC Motor	Leeson	CM34D29NZ10C	90	2.3	207	0.621	100% on 3-5pm	
Dutch Bucket (Tomato) Blue Bucket C1		1	Pump Start Relay	Hunter	PSR-22				0	100% on 3-5pm	
Dutch Bucket (Tomato) Blue Bucket C2		1	Controller	Hunter	PRO-C				0	100% on 3-5pm	
Dutch Bucket (Tomato) Blue Bucket C3		1	pH/EC Control	Black Stone	BL981411 / BL983317				0	100% on 3-5pm	
Algae Systems	C4	1	DC Motor Control	Leeson Speedmaster	DC Motor Control				0	100% on 3-5pm	
Igrow 1400	C5	1							0	100% on 3-5pm	
GROWING PUMPS TOTAL									5.513 kW		
Heating											
Heater	M10	4	Heater 1			115	4.2	483	1.932		
Heater	M11	4	Heater 2			115	1.5	172.5	0.69		
HEATING - TOTAL									2.622 kW		
LIGHTING - Exterior											
Greenhouse Exterior	L1	14	LED Lights	?	?	120?		50	0.7	On at 5pm when I left	
LIGHTING - Exterior Total									0.7 kW		
LIGHTING - Interior											
Greenhouse	L2	64	LED	?	?	120?	?	50	3.2	All off 3-5pm. Do these turn on at night	
Greenhouse	L3	20	Emergency Lamps	Lithonia Lighting				20	0.4	All off 3-5pm	
LIGHTING - Interior TOTAL									3.6 kW		

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12 kW Tracking PV Array

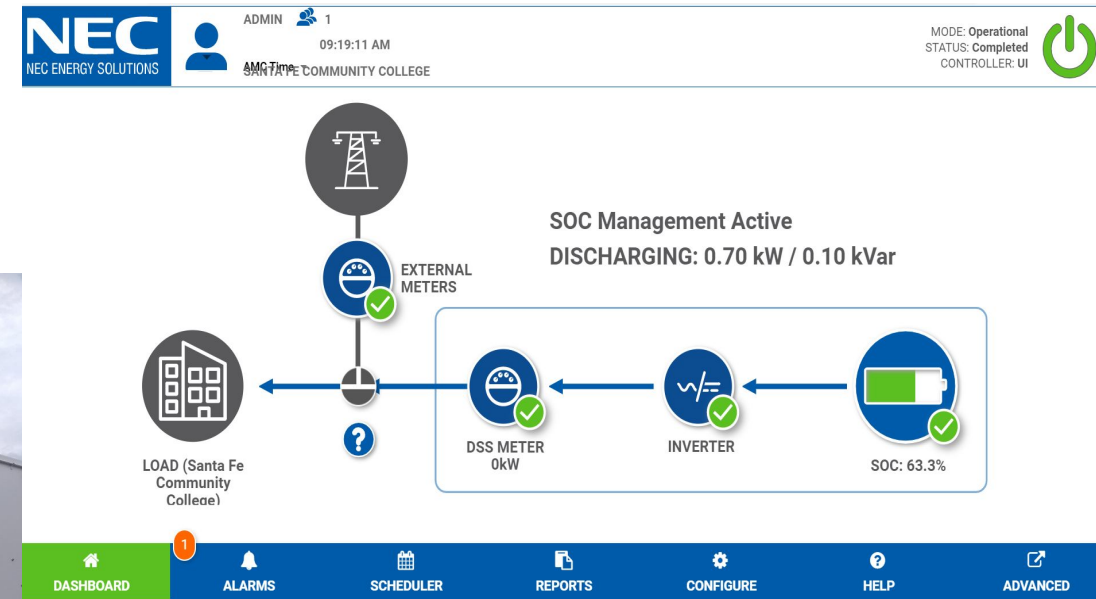
- 3 x 4 kW tracking arrays
- 3 x 4 kW inverters – one per phase



Smart- and Microgrid Training Center

Energy Storage System (ESS)

- 100 kW/85 kWh
- Aeros Controller
- Demand Reduction
- Resilience for Greenhouse
- Research



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In Progress

- 30 kW natural gas generator
- Load bank – resistive and inductive loads
- Water Catchment system – pumps and controls will become part of the microgrid

Future

- Cold storage,
- the “Dome”
- PV expansion
- Concentrating PV integration

Smart- and Microgrid Training Center

Campus Microgrid

The educational microgrid is being integrated into the broader campus microgrid project that is part of an energy performance contract with Siemens and moves the campus towards state and federal energy targets.

SFCC CAMPUS MICROGRID

Siemens Microgrid Controls

1.5 MW Solar PV

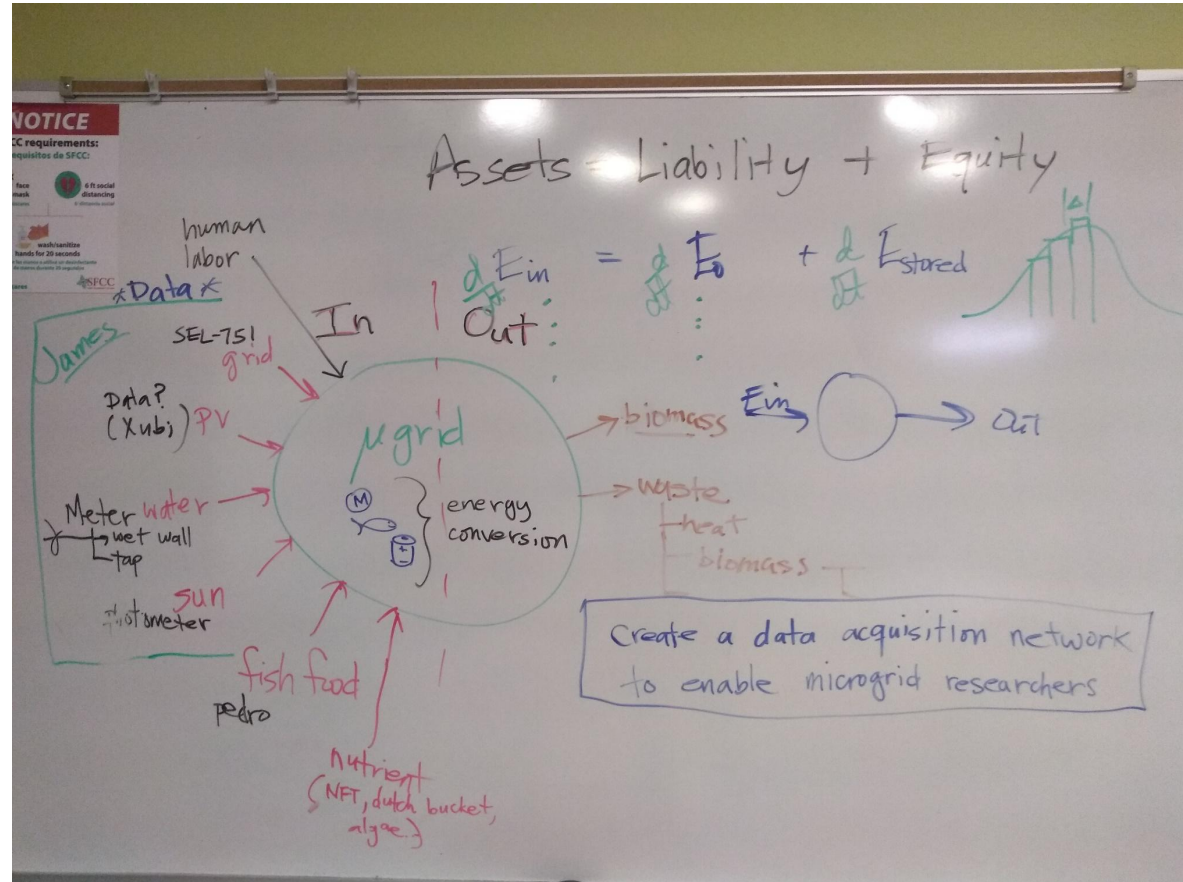
1 MW Nat Gas Generator

1 MW Li Ion BESS

Smart- and Microgrid Training Center

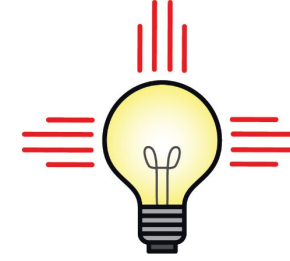
Summer Equipment Installations & Our First Intern!

Set up a data acquisition network to enable education, training, and research





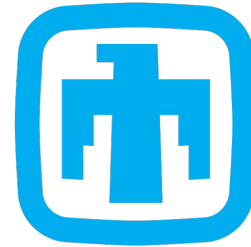
Partners



New Mexico
SMART Grid Center



New Mexico
EPSCoR



Sandia
National
Laboratories

SIEMENS



EDD

ECONOMIC
DEVELOPMENT
DEPARTMENT



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