



U.S. Coast Guard Photo by Lt. Cmdr. C. T. O'Neil



U.S. Coast Guard photo by Petty Officer 3rd Class Walter Shinn

National Energy Center of Excellence



**U.S. Coast Guard ESO Symposium
Norman, OK
August 10, 2011**



BISMARCK
STATE COLLEGE



Bismarck State College

- **Location:** Bismarck, Capital City of North Dakota
- **Established:** 1939
- **Accreditation:** Higher Learning Commission of the North Central Association of Colleges and Schools (NCA)
- **Enrollment:** 4,100 Credit Students
17,000 Continuing Education
- **Degrees:** Associate Degrees or Certificate Programs
Bachelor of Applied Science Energy Management
- **Training:** Customized Training & Apprenticeship Programs



BISMARCK
STATE COLLEGE



National Energy Center of Excellence

National Energy Center of Excellence

- **Vision** – A worldwide leader in education & training for the energy industry.
- **Mission** - Provider of choice for the education of students & the training of employees; enabling students and energy companies to succeed in a competitive, ever-changing industry.



National Energy Center of Excellence



U.S. Department of Energy (DOE) Designation
National Power Plant Operations Technology & Education Center

National Energy Center of Excellence

BISMARCK
STATE COLLEGE



National Energy Center of Excellence On-campus Programs

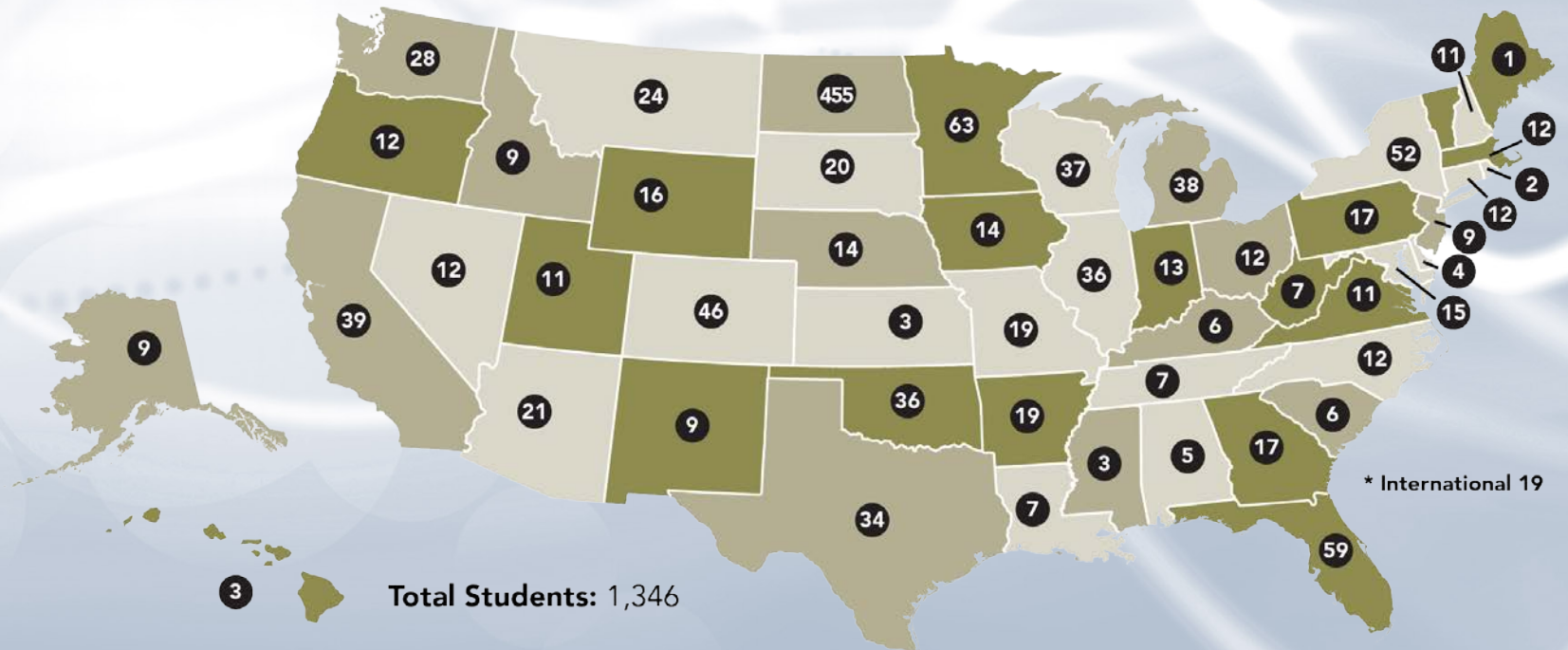
- Lineworker (1970)
- Power Plant Technology (1976)
- Process Plant Technology (1982)
- Mechanical Maintenance (2007)
- Instrumentation & Control (2008)
- Renewable Generation Technology (2010)

National Energy Center of Excellence Online Programs

- Power Plant Technology (2000)
- Process Plant Technology (2000)
- Electric Power Technology (2001)
- Electrical Transmission Systems Technology (2003)
- Nuclear Power Technology (2004)
- Instrumentation & Control (2008)
- Bachelor of Applied Science – Energy Management (2008)
- Renewable Generation Technology (2010)
- Petroleum Production Technology (2011)
- Smart Grid Courses (2011)

National Energy Center of Excellence

Fall 2009 – Summer 2010 STUDENT ENROLLMENT PER STATE



Industry Partners



**BASIN ELECTRIC
POWER COOPERATIVE**

A Touchstone Energy® Cooperative



Constellation Energy



GREAT RIVER
ENERGY

A Touchstone Energy® Cooperative



Honeywell



MidwestISO



TESORO

NWPPA

Northwest Public Power Association

nationalgrid

OG&E



National Rural Electric
Cooperative Association

A Touchstone Energy® Cooperative



A Division of MDU Resources Group, Inc.

In the Community to Serve

National Energy Center of Excellence

Military Partners

- SOCCOAST, SOCNAV & SOCMAR - Approved for Five Online Energy AAS Programs
- Navy College Program Distance Learning Partner
- SOCAD Member (Power Plant Technology)
- Army Career Degree Program (12P Prime Power School)
- Air Force General Education Mobile (GEM) Course Provider
- Air University Associate to Baccalaureate Cooperative Program (AU-ABC)

Online Partner

- BSC Has Partnered with Pearson eCollege to Provide the Platform for Online Courses
 - BSC's Simulations & Animations to Reinforce Difficult Concepts
 - 24/7 Technical Help Desk
 - Online Platform is Accessible 99.9% of the Time
 - Assists with Instructional Design and Course Audits
 - Provides Online Training for Faculty

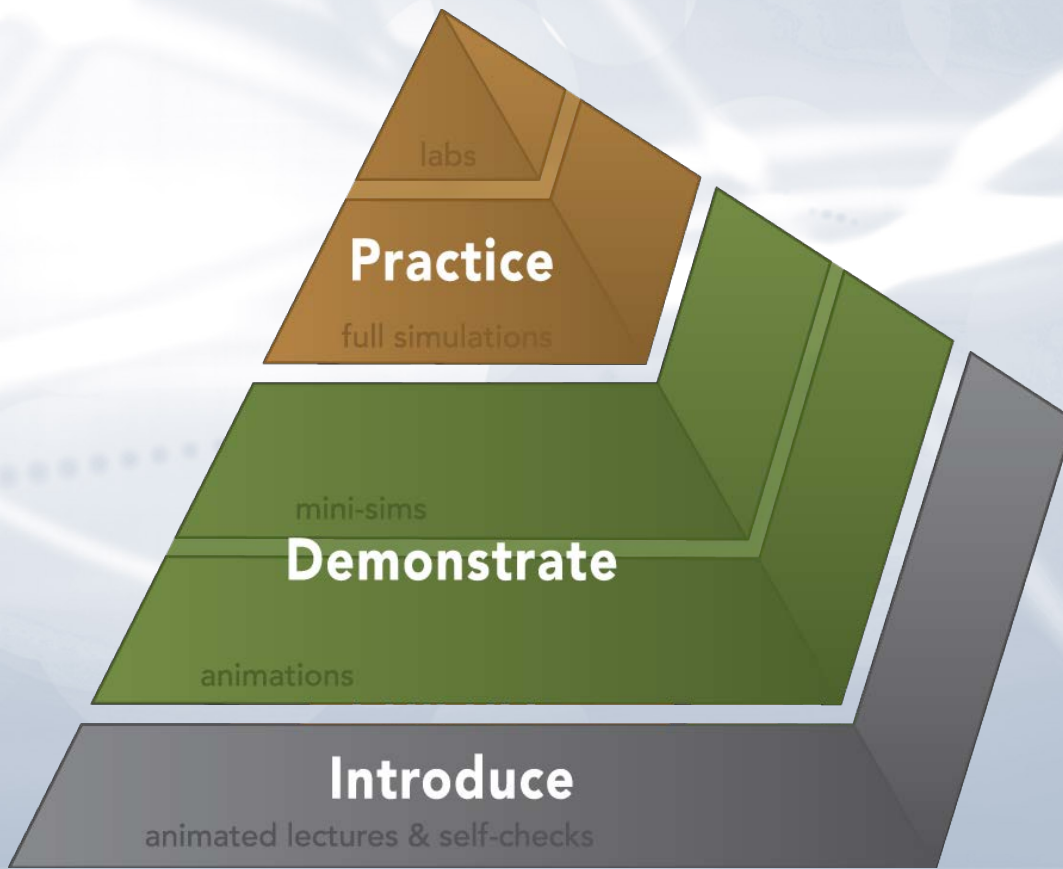
Online Courses

- Courses Are Offered in Blocks of 3-5 Weeks
- Students Complete One Course at a Time
- Most Courses Are Offered Three Times a Year
- Students Can Access the Courses from any Location with Internet Capabilities at any Time

Classroom & Online Education Strategies

- Accessibility
- Flexibility
- Responsiveness

Education & Interactivity



- Real-Time Control of Remote Laboratory Equipment
- Simulations with Robust System Models
- Simulations with Partial or Sub-System Models
- Sequenced & Interactive Diagrams, Systems, & Processes
- Online Version of Classroom Lectures & Un-Graded Formative Quizzes

Interactive Learning Tools Examples

Interactive Quiz / Exercise Demonstration: Version

The purpose of this project is to demonstrate the different type of quiz or interactive exercises that can be developed by the NEEC's Curriculum Development Center (CDC) in addition to animations, mini-simulations, and simulations. Please contact your program manager for more information.

Interactive Schematic

Next

Active Power Loss Calculator: Version

This calculator shows active power losses (PR) on a hypothetical transmission line. You can adjust the load using the slider below to see the effect of different line flows and their associated losses. If the losses become too high, try selecting a different line voltage, conductor, or length. This calculator does not consider reactive power or thermal and stability limits.

System One-Line Diagram:

Line Metering & Load Control:

400 MW Line Flow (100 MW Line Flow)

300 MW

200 MW

100 MW

100 MW Line Flow

3.45 MW IPR Losses

96.66 % Efficiency

Drag Fader to Adjust

Line Data:

Nominal Voltage:

- 115 KV
- 230 KV
- 345 KV
- 500 KV
- 765 KV

Line Length:

- 25 Miles
- 50 Miles
- 75 Miles
- 100 Miles
- 150 Miles

Conductor:

- 556 ACSR Dove
- 795 ACSR Drake
- 1272 ACSR Bittern
- 2156 ACSR Bluebird
- 1272 ACSR Bittern (2 Per Φ)

AC Generator: Version

This animation illustrates how a basic AC Generator operates. Below and to the left is a permanent magnet AC Generator. A control panel and key in the lower center allow the generator to be turned on & off, the speed to be increased or decreased, and the pole configuration to be changed.

Permanent Magnet Generator:

Waveform: Frequency: 0.13 Hz

Control Panel:

Power Off

Slower Faster

4 Poles

Legend:

Magnetic Lines of Flux

Magnetic North Magnetic South

Rotor Angle to Flux:

Relative Degrees: 0°

Speed: 8 RPM

Voltage: 3 V

Transmission Line Protection: Instructions Version

This simulation demonstrates the operation of different transmission line protection packages. Clicking on the online diagram will initiate a fault. Click reset to clear the fault and reset the relay.

Line 1 Relays Simulation Running

Line A Relays

Line B Relays

Bus A Relays

Bus B Relays

Simulation Controls

Reset Pause

Change Relay Package

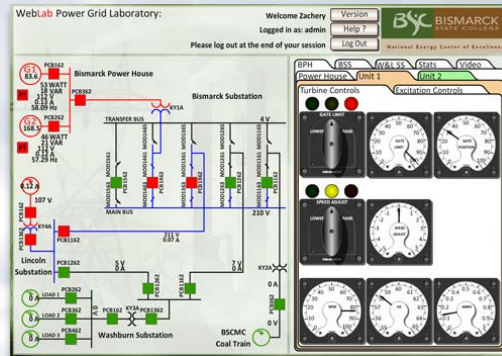
Instructor Mode

Off On

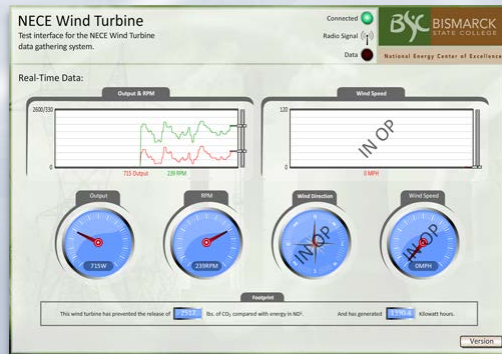
Remote Laboratory Examples



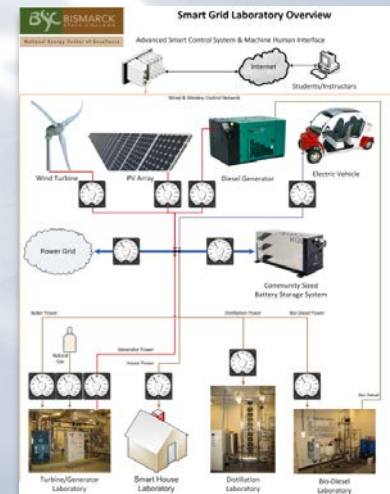
Process Laboratories 1 & 2



Power Grid Laboratory



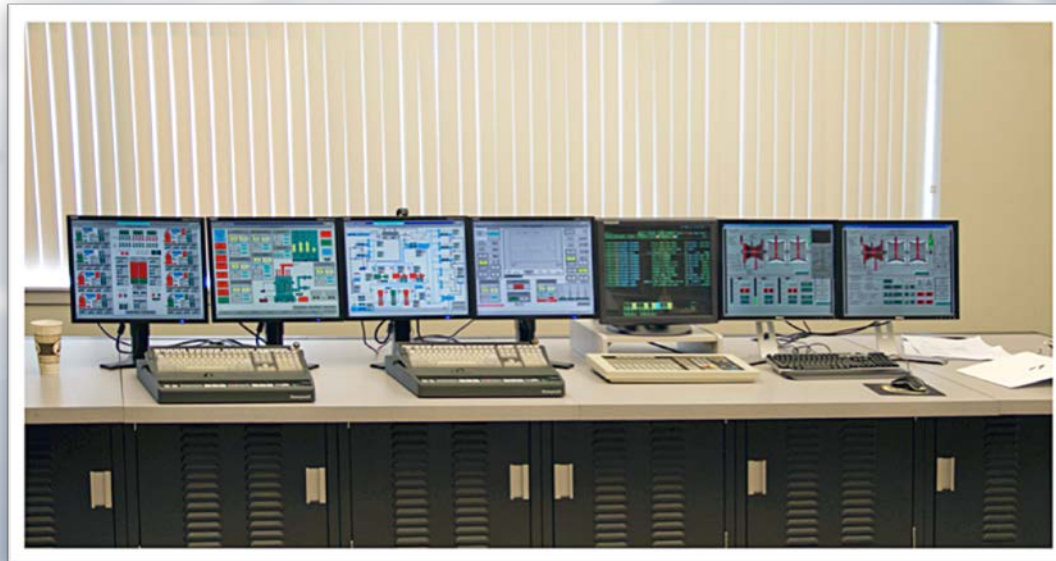
Wind Laboratory



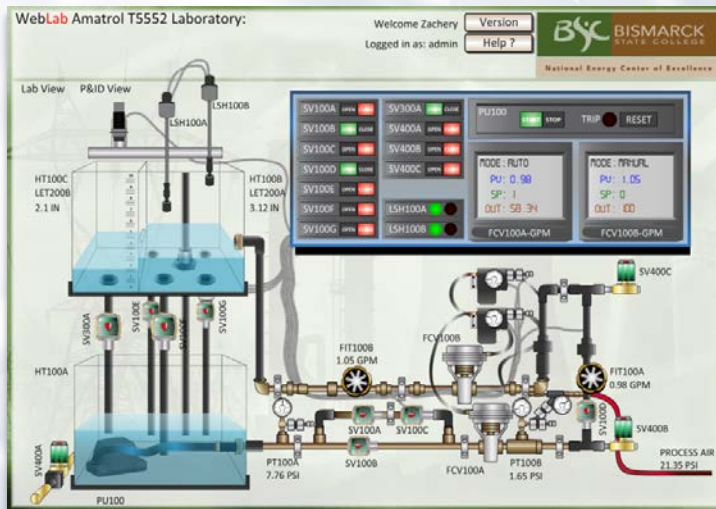
Smart Grid Laboratory

Simulator Partnership

- Great River Energy Coal Creek Station Simulator
 - Training of students and GRE industry operators
 - Provide customized training to utility industry



Remote Laboratory Examples



WebLab Amatrol T5552



Remote Laboratory Examples

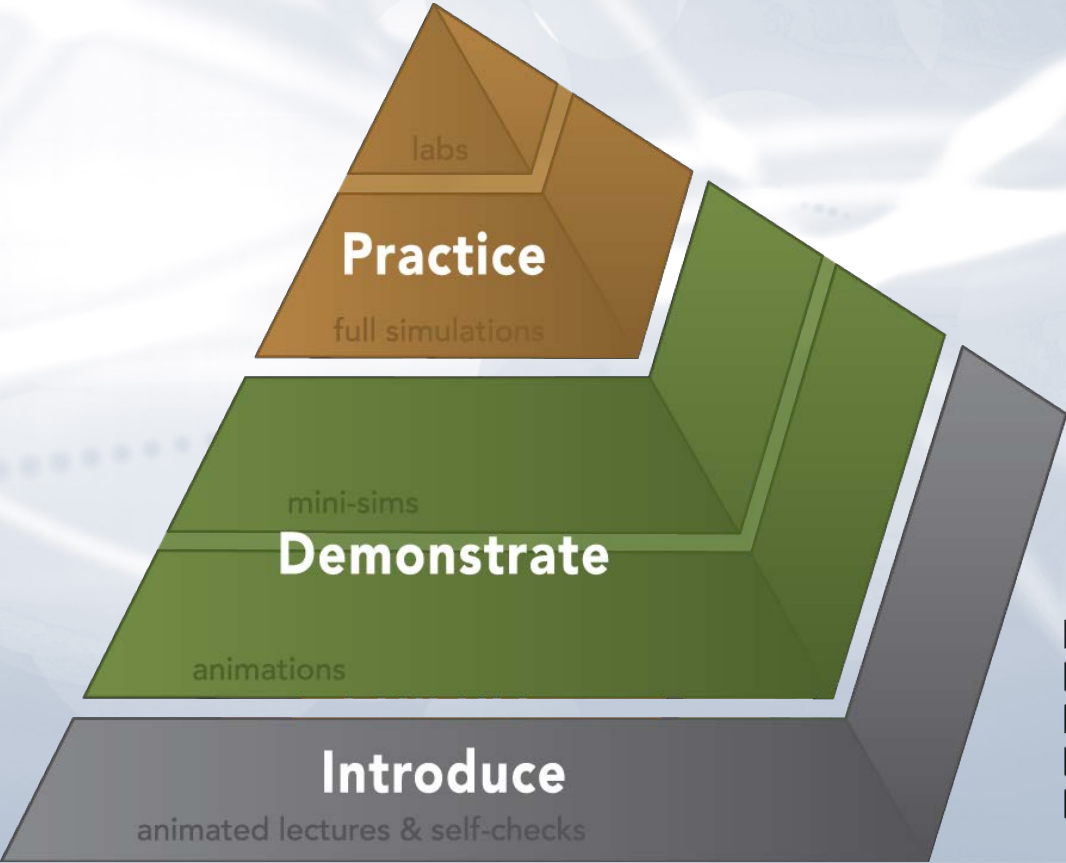


WebLab Power Grid Laboratory

U.S. Secretary of Energy Dr. Steven Chu
observes WebLab Pedagogy

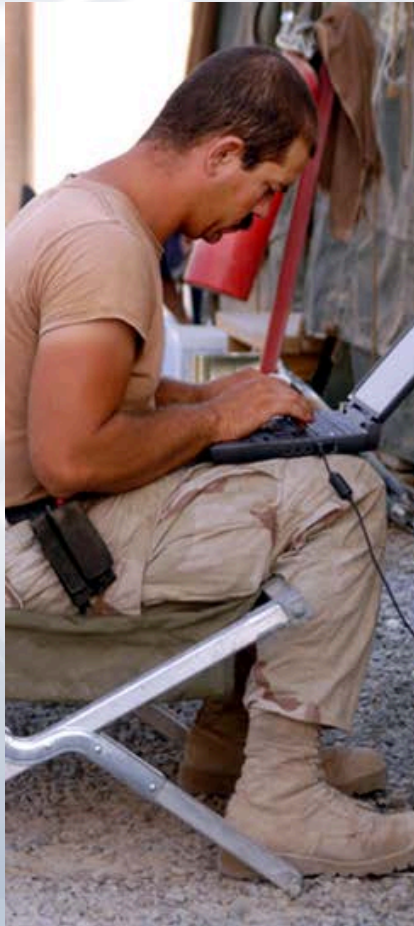


BSC Education & Interactivity



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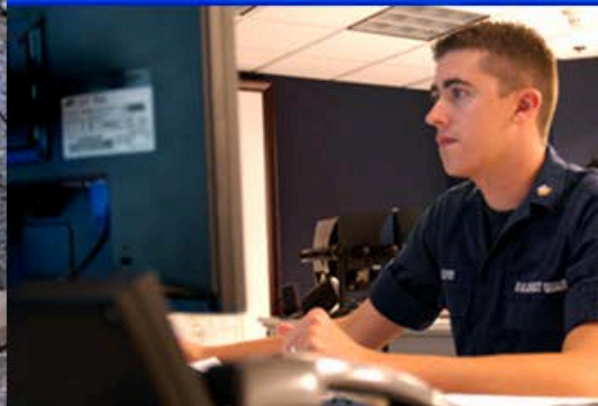
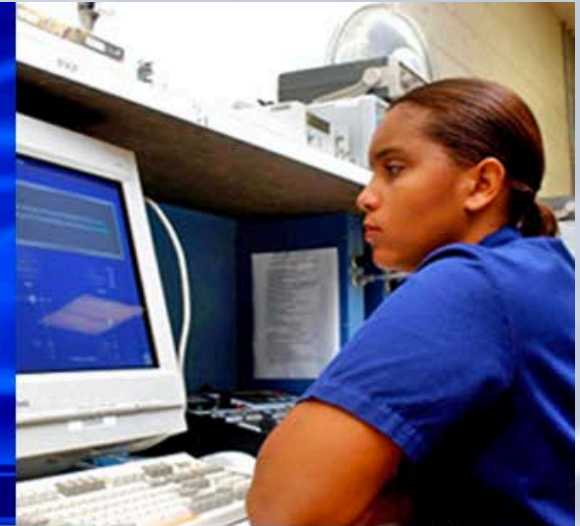
Questions?



**Thank you
for your service**

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