



Skyline Skystream 3.7 & INL's Teaming with Teachers Program
September 12, 2007

WIND ENERGY FOR EDUCATORS



I. Introduction

- Wind Energy for Educators is bringing Renewable Energy into our region's classrooms for over a decade
 - We have compiled research and developed educational resources relating to Renewable Energy
 - 3 schools within our district that have websites that display current weather conditions
 - 2 schools have Whisper Turbines from Southwest Wind
 - 1 school, Skyline, now has a Skystream 3.7 turbine
 - Teachers are working to utilize the Skystream 3.7 for hands-on learning experiences
- 



Let's take a look at our web site, where we share with other educators. . .



<http://www.d91.k12.id.us/>

<http://www.d91.k12.id.us/weather.aspx>

<http://www.d91.k12.id.us/hawth/windenergyforeducators/Wind%20Energy.htm>

We are a regional resource embedded with the Idaho Falls School District bringing wind and renewable energy into classrooms

[Home](#) | [Search](#) | [Contact Us](#)

690 John Adams Parkway, Idaho Falls, Idaho 83401 (208) 525-7500 | FAX: (208)525-7591



IDAHO FALLS SCHOOL DISTRICT 91



Welcome

District 91 is located in Idaho Falls, Idaho (population 55,000). About 600 teachers educate 10,400 students in the two high schools, three junior high schools, twelve elementary schools, and one alternative school. To get the latest information on school closures and other events call 525-7502.

Learn about Renewable Energy Education, the Skyline Wind Turbine and more at our [weather page](#).

Missoula Children's Theatre will be holding auditions for their production of The Little Mermaid on Monday, September 17 from 4-6pm in the cafeteria at Taylorview Jr. High. Students grades 1-12 who wish to participate must have the entire week free for rehearsals, which will be 4-8:30pm, and 2 shows on Saturday. For any questions, please call the Music Office at 525-7572.

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NEW! [Announcements](#)

Wednesday, September 5, 2007

[Longfellow's Second Annual Panther Prowl](#) 3K Family Walk/Jog Saturday, September 8th at 9:00 am

[Whole Child, Whole Teacher](#) Regional Conference, October 4, 2007

[Technology Classes](#) - Start Sept 17th

[Sub Finder Login](#)

[Prospective Teacher Information](#)

[Idaho Falls, ID](#)
[Get the 10 day forecast](#)

[Hurricane Central](#)
[Interstate Forecast](#)
[Local Festivals](#)

 **61 °F**
Cloudy
Feels Like: 61°F
Humidity: 71%
Wind: NNW at 4 mph
Enter city/zip **GO!**

[Free Weather Alerts](#)

[weather.com](#)

INL and Teaming with Teachers

<http://www.inl.gov/wind/outreach.shtml>

Idaho National Laboratory - Power Systems - Microsoft Internet Explorer

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Address <http://www.inl.gov/wind/outreach.shtml> Go Links

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Center for Advanced Energy Studies

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Idaho National Laboratory is operated for the U.S. Department of Energy's Office of Nuclear Energy by Battelle Energy Alliance.



Outreach
INL's Renewable Engineering Department works with high school and college students along with local teachers on renewable energy projects.

Current and Past Projects:

- [Wind Energy For Educators](#)



Contacts:
Gary Seifert, (208) 526-9522, [Send E-mail](#)
Kurt Myers, (208) 526-5022, [Send E-mail](#)
Shawn West, (208) 526-2971, [Send E-mail](#)

Last Updated: Friday, August 24, 2007
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Internet



Additional Web Resources for Wind Energy Assessment and Education

- http://www.dg1.k12.id.us/Taylorview/weatherstation/Current_Monitor.htm
 - <http://www.inl.gov/wind/index.shtml>
 - <http://w>
 - www.inl.gov/wind/idaho/
- 



First let us show you what
we have done beyond the new
Skystream. . .

The Wind Energy for Educators link will take you to all teacher resources not associated with the new Skystream 3.7

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IDAHO FALLS
SCHOOL DISTRICT 91

District 91 Weather Stations

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-  [Eagle Rock Jr. High's Weather Station](#)
-  [Taylorview Jr. High's Weather Station](#)
-  [Skyline High's Weather Station](#)
- [Wind Energy for Educators](#)
- [Skyline Wind Turbine](#)

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We supply lesson plans and ask teachers to send us their ideas.

INL Idaho National Laboratory

Wind Energy for Educators

Teaming with Teachers

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The Skyline Skystream page is still under construction.

Teaming with teachers to bring Renewable Energy into to the classroom.

So far teachers within Idaho Falls School District #91 have compiled research and developed a Renewable Energy Curriculum. Currently there are three schools within the district that have websites that display current weather conditions. Two of those schools have Whisper Turbines from Southwest Wind. Teachers are now working on a plan to utilize the power that is gained from those turbines for hands-on learning experiences



The INL and the team of teachers are expanding that Educational Product to more schools and districts. A team is looking at data to find other schools in surrounding counties and states that could benefit from either Solar or



Wind Energy. The INL would like to develop a product that would consist of: 1. a turbine and or solar cell, 2. software to monitor energy production, and 3. a curriculum that would interface. With this product teachers could use current weather conditions and have hands-on activities for students to discover renewable energy.



We have a variety of resources available to teachers of all levels.

Wind Energy for Educators
Teaming with Teachers

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Lesson Plans

K - 6 Lesson Plans

- Outline
- Wasting Energy
- Energy Sources
- Energy Activities
- How Much Energy do you use?
- Weather Station
- Hot Air
- How does the wind Blow?
- Suggestions on how to use a kite
- AMEC Lessons
- Teachers Guide

7 - 9 Lesson Plans

- Background Information
- Building a turbine
- Wind Unit

10 - 12 Lesson Plans

- Using plates to measure wind
- Overview
- Monday Wind Intro PowerPoint
- Monday Lesson Plan
- Monday Homework
- Monday Teacher Key
- Tues. & Wed. Power Point
- Tues. & Wed. Lesson Plan
- Tues. & Wed. Homework
- Tues. & Wed. Teacher Key
- One example for building turbine
- Second example for building turbine
- Thurs. & Fri. Power Point
- Thurs. & Fri. Lesson Plan
- Thurs. & Fri. Homework
- Thurs. & Fri. Teacher Key
- 2nd Monday Power Point
- 2nd Monday Lesson Plan
- 2nd Monday Homework
- 2nd Monday Teacher Key
- 2nd Tues. Power Point
- 2nd Tues. Lesson Plan
- 2nd Tues. Homework
- 2nd Tues. Teacher Key

Here is an example of a unit with lesson plans:

Wind as a Resource:

Information and Activities To Increase the Understanding of Wind as a Natural Resource

Grade Level: Middle School/Junior High

By Scott M. Smith

Revised (2007) by Kristoffer Smith

Written as part of a summer appointment with the Idaho National Engineering and Environmental Laboratory Gary Seifert, Mentor



In this Unit

Background	2
Energy Resources	3
Internet Resource List	4
Wind as a Resource	5
Lesson 1: What is Wind?	7
Lesson 2: Wind is Energy	11
Kite Activities	13

Here is
another
unit:

Using Biotic Factors to Estimate Average Annual Wind Speed

Lab Activities Enabling Students to Estimate Wind Speed
Using Biotic Factors in the Environment
Grade Levels: High School (Middle with Modifications)

By K.C. Jones
In cooperation with Scott Smith, Justin Taylor, and Jennifer Vollmer,
Revised (2007) by Kristoffer Smith

Written as part of a summer appointment with the Idaho National Engineering and
Environmental Laboratories; Gary Seifert, Mentor; Kurt Meyers, Scientific Advisor



Estimating Wind Speed Using the
Griggs-Putnam Index of Deformity

Estimating Wind Speed Using the
Ponce-Mattio Formula

Estimating Wind Speed Using the
Watts-Winston Wind Speed Constant

One more for good measure

Weather Station Unit Using Weather in Your Classroom

Grade Levels: 4-6

By Shirley Boardman, Interning Student Teacher at the Idaho National Lab

Revised by Kristoffer Smith, INL Intern and Teacher at Hawthorne Elementary, Idaho Falls, Idaho

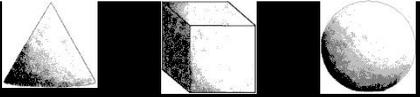
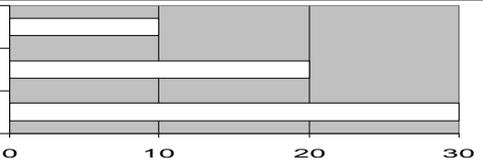


Understanding weather is a life-long skill.

In this Unit

Understanding Meteorology	1
Temperature and Thermometers	2
Precipitation and Rain Gauge	3
Humidity and Hygrometer	4
Wind Direction and Wind/Weather Vane	5
Wind Speed and Anemometer	6
Air Pressure and Barometer	7
Student Assessments for this Unit	8
Examples for Recording Data in the Student Weather Log	9
Bibliography	10

Here is an example of a 3rd grade warm up activity aligned to Idaho Standards:

Number and Operation	Measurement								
<p>Circle the number that is the largest:</p> <p style="text-align: center;">2,400 3,400 2,500</p>	<p>Answer the question using a ruler.</p> <p>How long is this line in inches?</p> <p style="text-align: center;">_____</p>								
Algebra & Functions	Geometry								
<p>$100 - \square = 10$</p>	<p>Cube Cone Sphere</p>  <p>_____ _____ _____</p>								
Data Analysis, Probability and Statistics									
<p>Carrie, Juan and Barry all filled their cars up with gas. Who used the <u>fewest</u> gallons of gas? How much?</p>	<p>Barry</p> <p>Juan</p> <p>Carrie</p>  <table border="1" style="display: none;"> <caption>Gas Usage Data</caption> <thead> <tr> <th>Name</th> <th>Gallons Used</th> </tr> </thead> <tbody> <tr> <td>Barry</td> <td>10</td> </tr> <tr> <td>Juan</td> <td>20</td> </tr> <tr> <td>Carrie</td> <td>30</td> </tr> </tbody> </table>	Name	Gallons Used	Barry	10	Juan	20	Carrie	30
Name	Gallons Used								
Barry	10								
Juan	20								
Carrie	30								

(the renewable energy connection is in the Data Analysis, Probability and Statistics section)



PARTNERING SCIENCE AND MATH

Scott M. Smith
Idaho Department of Education
Science Coordinator





DOE and Idaho **STEM** Education Collaborative

- “**S**cience, **T**echnology, **E**ngineering and **M**athematics”
 - Currently the Idaho Department of Education and the State Board of Education are developing a partnership between education, government and industry to enhance education of STEM
 - Collaborative teaching: where are there proven “cross-curricular” programs?
- 

http://www.stemedcaucus.org

Idaho's K-12 STEM ED Report Card
Federal Funding for K-12 STEM Education: An Urgent National Priority — *Our future depends upon it!*

JOBS, OUR STANDARD OF LIVING, AND NATIONAL SECURITY: Advances in science and engineering are essential for ensuring America's economic growth and national security. During the next decade, U.S. demand for scientists and engineers is expected to increase at four times the rate for all other occupations. But today's high school students overall are not performing well in math and science, and fewer of them are pursuing degrees in technical fields.

Congress has an opportunity to help close this alarming gap. We applaud the House and Senate for establishing **Math and Science Partnerships** as part of the *Elementary and Secondary Education Act* to improve teacher quality and student achievement in these subjects. These partnerships between school districts, universities, businesses, and education organizations enjoy bipartisan support and will be critical for improving K–12 science and math education across all states and school districts. We also urge Congress to support the portfolio of STEM education programs at the National Science Foundation (NSF) and the *NSF Math and Science Partnerships* whose aims are to improve teacher quality and student achievement in these areas.

FEDERAL INVESTMENT IN K-12 SCIENCE & MATHEMATICS EDUCATION HELPS KEEP OUR ECONOMY COMPETITIVE: Without public funds invested in K-12 science and mathematics education, there can be little or no basis for future job growth and our national security will be imperiled. Over the past 50 years, taxpayer **investment** in science and mathematics education has indirectly produced more than half of the nation's economic growth. Prominent economists agree that no other investment generates a greater long-term return to the economy than scientific R&D, and that starts with educational systems. Research, education, the technical workforce, scientific discovery, innovation and economic growth are intertwined. To remain competitive on the global stage, we must ensure that each remains vigorous and healthy. That requires sustained investments and informed policies that will strengthen our K-12 mathematics and science education system.

HOW Idaho K-12 SCIENCE & MATHEMATICS EDUCATION COMPARES: Idaho ranked 20th in the nation on the 2005 NAEP scores for mathematics with a score of 281 (national average was 278). In 2004, 48% of Idaho middle school math teachers were certified in math (national average was 49%) and 40% of middle school science teachers were certified in science (national average was 54%). 4% of Idaho's 12th grade students took the AP Calculus exam in 2004 (the national average was 7%). Idaho assesses students in grades 2-10 for math and in grades 5, 7 and 10 for science.

U.S. VERSUS INTERNATIONAL STUDENT ACHIEVEMENT IN MATHEMATICS AND SCIENCE: For the 2003 **Trends in International Mathematics and Science Study (TIMSS)** — an international student assessment conducted in 45 countries — the Mathematics score for American grade 8 students was 504, which exceeded the international average score of 466. The Science score for American 8th graders was 527, which also exceeded the international average of 473. Although there was a significant improvement



Overview of Integrated Programs that Work in the State of Idaho

▪ Idaho National Lab Programs:

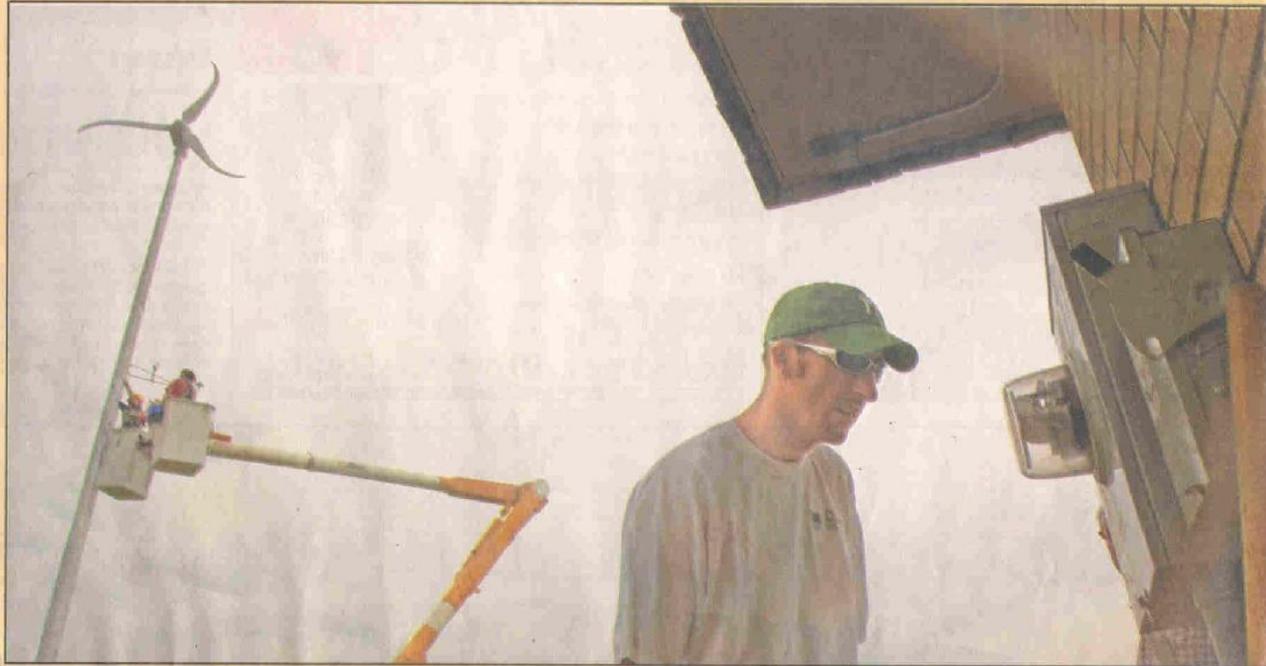
- JASON Project
 - Project Lead the Way
 - Student Action Teams
 - students work in teams that conduct research, carry out work-based projects, and solve real-world problems. A team may consist of junior and/or senior level students
 - For Teachers: Teaming Teachers with INL
 - INL Mini Grant.....
 - Monsanto Grants: Music and Math, etc...
- 

The Skystream 3.7



From the Idaho Falls Post Register

POWERFUL POTENTIAL



Robert Bower / Post Register

Justin Taylor checks for movement on the power meter connected to the new wind turbine at Skyline High School. Energy and education will be combined at the school as a new 45-foot-tall wind turbine with 6-foot blades turns above the school grounds. On Thursday, installers wrestled a 170-pound turbine assembly onto the top of a steel mast that will stand between the high school and day-care center. The first electrical power began at 2:20 p.m. Thursday.

Hoping for a windy Skyline

Students receive firsthand education about renewable energy

■ The power generated by the wind turbine will be used by Skyline High School's day-care center.

By RACHEL COOK
rcook@postregister.com

Turbine stats

Manufactured in Flagstaff, Ariz.
Weight: 800 pounds
Blade rotation: 12 feet
Cost: \$6,000
Speed: 50 to 325 rotations per minute

duces. Taylor said the turbine would save the school \$10 to \$20 a month.

Taylor said he hopes students visiting the turbine will take an interest in the math and science behind renewable energy. He is developing a Web site so students can keep up on the turbine's meter and watch videos of it in action.

With the turbine in place, Taylor is eager to get

Cows grazing next to Skyline High School here.

The Skyline Wind Turbine is the latest addition to our extensive web resource for educators.

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We will have live data streaming from the turbine available to teachers via our web site. Lesson plans and activities are written that utilize this software. Teachers will be able to use live data for classroom applications. We are currently waiting on backordered supplies from Southwest Wind.



Skyline High School Skystream
1767 Big Sky Drive Idaho Falls, Idaho Phone: (208) 525-7770.



**Southwest Wind
Skystream 3.7**

With help from Idaho National Laboratory, City of Idaho Falls, Wheeler Electric, and Idaho Falls School District #91, Skyline High School is producing renewable energy. With this equipment, teacher and students around the area can use data from the Skystream within their classrooms.



- ▶ Home
- ▶ Wind Energy Curriculum
- ▶ Skystream Lessons
- ▶ Pictures of Skystream
- ▶ Installation

**Coming soon!
Under Construction
More to come**

The First Skystream Unit

Skystream Unit

Grade Levels: 7-12

Kristoffer Smith, Editor

INL Intern & Teacher at Hawthorne Elementary, Idaho Falls, Idaho



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*If you would like your students to have even more background knowledge (or you can not access the web site needed for this lesson), teach the "Wind as a Resource" unit located on our Web site



Regional Outreach and Education



Regional Outreach and Education



Our plan is to promote renewable energy integration into math and science classrooms in our region. We also want to advance future wind and solar installations.

We are involved in INL's SCIENCE EXPO





We are conducting trainings throughout the state of Idaho in October 2007

Our goals at these trainings are to:

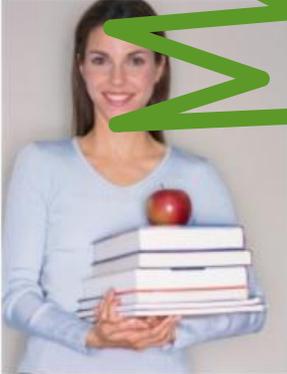
1. Guide teachers to resources currently available.
 2. Show teachers how to easily incorporate renewable energy into their classrooms.
 3. Show teachers how to apply to get a turbine or solar installation of their own.
- 
- 

Eastern Idaho Conference

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IDAHO FALLS
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*Whole Child, Whole Teacher Regional
Conference, October 4, 2007
Skyline High School, Idaho Falls, Idaho*

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Northern Idaho Conference

Registration For 2007 P.I.E. Conference

(Please Print or Type)

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Name: _____
Home Address: _____
Street: _____
City/State/Zip: _____
School Name: _____
School District/College: _____
Telephone #. (Home) _____
(Work) _____ (Fax) _____
E-mail: _____

CONFERENCE FEES

- General:
- | | |
|--|------|
| <input type="checkbox"/> 2-Day Conference, preregister by 10/02/07: | \$50 |
| <input type="checkbox"/> 2-Day Conference, register after 10/02/07 or on-site: | \$60 |
| <input type="checkbox"/> 1-Day Only, Thursday 10/04/07 | \$35 |
| <input type="checkbox"/> 1-Day Only, Friday 10/05/07 | \$35 |

Discounted Registration Categories:

- | | |
|--|------|
| <input type="checkbox"/> Retired Teacher: | \$10 |
| <input type="checkbox"/> Substitute Teacher: | \$10 |
| <input type="checkbox"/> Aide/Instructional Assistant: | \$10 |
| <input type="checkbox"/> Workshop Presenter: | Free |
| <input type="checkbox"/> Full-Time College Student: | Free |

Student ID Card # _____

Total Fee: \$ _____

- Total Fee Enclosed
 Paid by School District

Make Checks Payable & Mail to:
Partnerships in Education
Attn: Registration
P.O. Box 1837
Lewiston, ID 83501

DETAILS

- Group Registration: Your school district or institution is solely responsible for collection and sending ONE check with all of the individual registration forms and fees.
- Registrations postmarked after Oct. 2 will be charged the full fee of \$60.
- Refunds: Written requests for refunds will be honored (less a \$5 handling fee) through Oct. 2, 2007. No refunds after Oct. 2, 2007.
- Registration for college credit (LCC & UI) is conducted on-site at the conference.
- A maximum of 12 Washington State clock hours will be available at no cost for attendance at the conference.
- For information, call (208) 743-1755

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Partnerships in Education, Inc.
P.O. Box 1837
Lewiston, ID 83501

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Registration must be mailed in an
envelope with appropriate postage.

A Professional Conference for Educators
www.lewistonpie.com

Partnerships
In Education

October 4-5, 2007
Lewiston High School • Lewiston, Idaho

Idaho State Science Teachers Association Conference



Idaho Science Teachers Association

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**Solving Tomorrows' Problems
Through Today's Scientific Innovation
October 4-5, 2007**

Capitol High School
805 Goddard Road
Boise, ID 83704



School Board Associations



Providing leadership to local school boards
for the benefit of students and
advocacy of public education.



5909 W. State Street
Boise, ID 83703-3039
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2007 Convention Information

The ISBA Annual Convention is November 14 to 17, 2007.

The theme is "Implementing the Key Work of School Boards"

A convention brochure will be mailed to all trustees and superintendents in late summer or early fall. Each district will need to submit a completed registration form to complete registration. For your convenience, the registration form for the 2007 Annual Convention may be found by **following this link**. Please complete it and e-mail, mail or fax it to ISBA with payment or purchase order, attention Socorro Bomar. Faxed registrations can be sent to 208-854-1480.

The convention is being held at The Coeur d'Alene A Resort on the Lake in Coeur d'Alene, Idaho. Lodging is available by calling reservations at 800-866-5253. Please identify yourself as being with ISBA.

Room rates are as follows:
Economy - \$85 Single or Double
Deluxe - \$100 Single or Double
Premier - \$145 Single or Double

Last updated August 21, 2007

ISBA | 5909 West State Street | Boise | ID 83703-3039 | Phone (866) 799-4722 | Fax 208-854-1480

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Skystream Lesson Ideas

- We are just getting started. Ideas for next lessons include;
 - Economic and business lessons on investment and payback
 - Construction technology (Drawings for construction, Concrete volume and placement, Permitting information, etc
 - Impact on environment (kwhr translated to saved CO₂, Sox, NO_x, Pounds of coal saved, etc,)
 - Sound monitoring and daily performance monitoring and logging of remote meter
 - Journalism – scientific reporting and environmental benefit articles
 - Anemometer monitoring and comparison to predicted power generation
 - Math units on geometry (height, surveying, etc)
 - Preparing real time web page (computer science) with various calculators (environmental, summary power, etc)



Skystream Performance So Far

- Anemometer and wind vane mounted at 30 feet on Skystream tower.
 - Temperature sensor mounted at 6 feet.
 - Data currently recorded with NRG Wind Explorer logger.
 - These types of equipment necessary for many of the validation and educational opportunities.
 - First few weeks of operation, wind data has been collected once so far.
 - Data adjusted to hub height using normal wind shear as an estimate.
 - Wind data applied to power curve and adjusted for site altitude.
 - Actual energy production so far was within $\frac{1}{2}$ kWh of energy production estimated through wind data analysis.
- 

Questions?

Kris Smith 208-569-7692

smitkris@d91.k12.id.us

Justin Taylor 208-520-9656

tayljust@d91.k12.id.us

Scott Smith 208-332-6952

ssmith@sde.idaho.gov

Bill Cairns 208-589-5839

cairbill@d91.k12.id.us

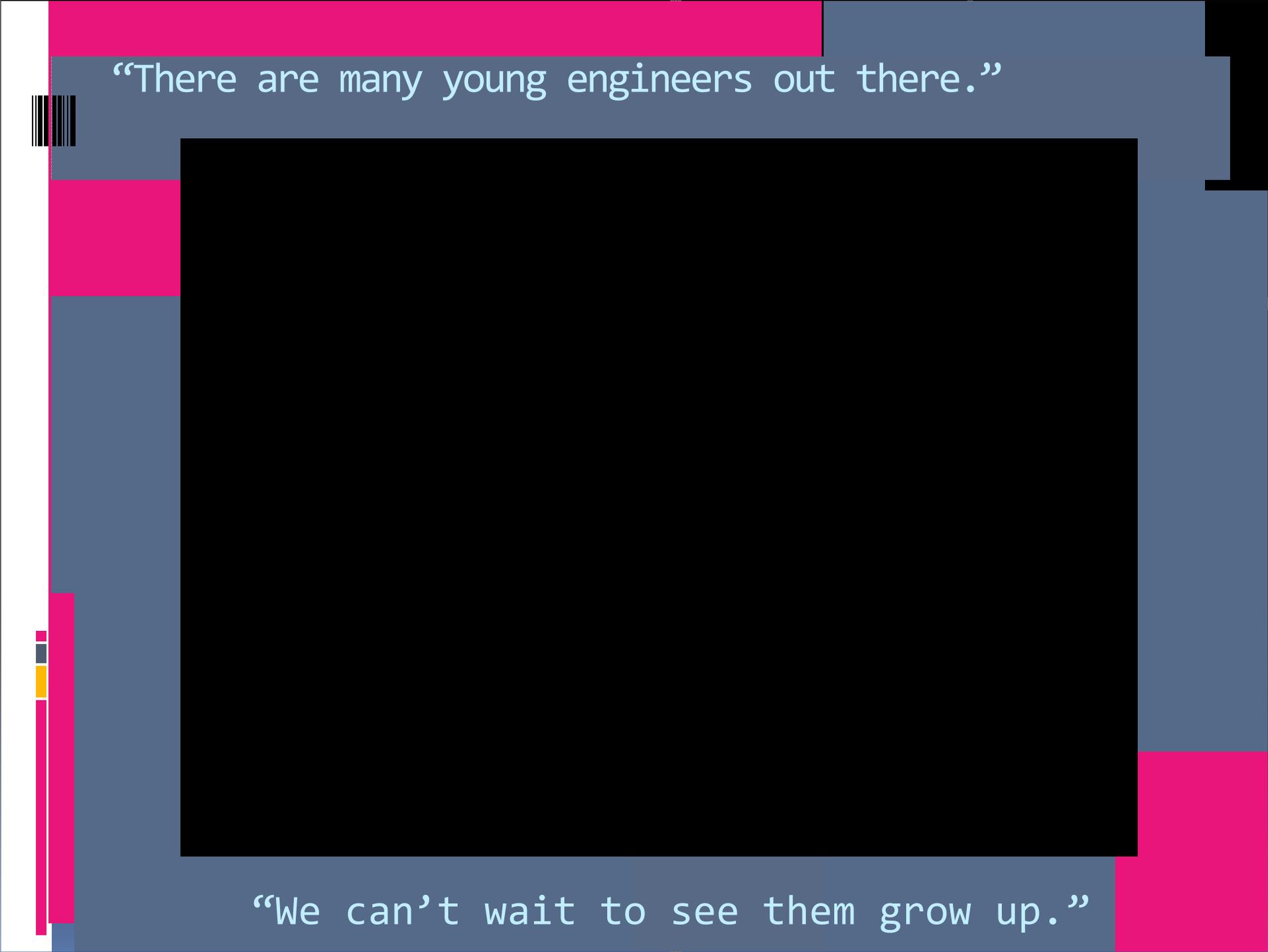
Kurt Myers 208-526-5022

kurt.myers@inl.gov

Gary Seifert 208-526-9522

gary.seifert@inl.gov





“There are many young engineers out there.”

“We can’t wait to see them grow up.”

