Illinois Green Economy Network (IGEN)
Comprehensive Energy Study

ICCCFO Fall Conference
Rend Lake Resort
October 17, 2014
Agenda

- Introductions
- Project Background
- Project Outputs
  - Energy Procurement
  - Energy Efficiency
  - Clean Energy Development
- Supplemental Reports
- Conclusions and Discussion
- Thanks and Acknowledgements
**Introductions**

- **Gary Reed, Patrick Engineering**
  - Project lead and coordinator
  - Past life: Director of Facilities Planning and Management at Eastern Illinois University

- **Mark Pruitt, The Power Bureau**
  - Energy procurement and clean energy development
  - Past life: Director of the Illinois Power Agency

- **David Kramer, Patrick Engineering**
  - Energy efficiency clean energy development
  - Past life: Efficiency Engineer at Illinois Department of Commerce and Economic Opportunity
Background

- **Project Sponsor**
  - Illinois Green Economy Network

- **Objectives**
  - Identify opportunities to reduce operating costs through energy procurement, energy efficiency, and renewable energy resources

- **Funding**
  - DCEO Renewable Energy Grant #13-026001

- **Timeline**
  - Patrick Engineering selected May 2013
  - Draft Report completed March 2014
  - Client review July 2014
Project Outputs

• Comprehensive Report
  ◦ Recorded system-wide energy consumption and costs
  ◦ Compared consumption and costs across Regional and Peer institutions
  ◦ Identified general opportunities for procurement, energy efficiency, and renewable energy assets
  ◦ Recommended system-wide structures to assist Colleges capture procurement, energy efficiency, and renewable energy opportunities

• Supplemental Reports
  ◦ Individual reports for all 39 districts
  ◦ Graphical placement of College within its Regional and Peer Groups
  ◦ Identified magnitude of potential savings opportunities
Project Outputs - General

• Data Sources
  ◦ Annual Energy Reports from Colleges
  ◦ Questionnaires completed by the Colleges

• Data Comparisons
  ◦ Peak vs. Average kW
  ◦ Seasonal use intensity
    ➢ BTU / square foot / year
    ➢ $ / square foot / year
  ◦ Average daily consumption / average daily temperature
  ◦ $ / Unit of energy (total)
  ◦ $ / Unit of energy (distribution)
  ◦ $ / Unit of energy (commodity)
  ◦ Units of Energy / student
  ◦ Units of energy / credit hour
### Regional Groupings of Illinois Community Colleges

<table>
<thead>
<tr>
<th>Central Region</th>
<th>Northern Region</th>
<th>Southern Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danville Heartland</td>
<td>Black Hawk Chicago</td>
<td>Illinois Eastern</td>
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<tr>
<td>Illinois Central</td>
<td>Chicago</td>
<td>Kaskaskia</td>
</tr>
<tr>
<td>Lake Land</td>
<td>Du Page</td>
<td>Lewis &amp; Clark</td>
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<tr>
<td>Lincoln Land</td>
<td>Elgin</td>
<td>Logan</td>
</tr>
<tr>
<td>Parkland</td>
<td>Highland</td>
<td>Rend Lake</td>
</tr>
<tr>
<td>Richland</td>
<td>Illinois Valley</td>
<td>Shawnee</td>
</tr>
<tr>
<td>Sandburg</td>
<td>Joliet</td>
<td>Southeastern</td>
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<td>Spoon River Wood</td>
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<td>Southwestern</td>
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<td>Lake County</td>
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<td>McHenry</td>
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<td></td>
<td>Moraine Valley</td>
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<td>Morton</td>
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<td>Oakton</td>
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<td>Prairie State</td>
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<td>Rock Valley</td>
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<td>Sauk Valley</td>
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<td>South Suburban</td>
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<td>Triton</td>
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<tr>
<td></td>
<td>Waubonsee</td>
<td></td>
</tr>
</tbody>
</table>

- **Regional Groupings to facilitate**
  - Comparisons on common weather patterns
  - Comparisons on common utility rate structures
## Project Outputs – College Groupings

### ICCB Peer Groups

<table>
<thead>
<tr>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>Group IV</th>
<th>Group V</th>
<th>Group VI</th>
<th>Group VII</th>
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<tr>
<td>Sandburg</td>
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<td>Illinois Eastern</td>
<td>Black Hawk</td>
<td>Elgin</td>
<td>Chicago</td>
<td>DuPage</td>
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<tr>
<td>Shawnee</td>
<td>Highland</td>
<td>Illinois Valley</td>
<td>Heartland</td>
<td>Morton</td>
<td>Daley</td>
<td>Harper</td>
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<td>Southeastern</td>
<td>Kaskaskia</td>
<td>Kankakee</td>
<td>Illinois Central</td>
<td>Prairie State</td>
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<td>Spoon River</td>
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<td>South Suburban</td>
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<tr>
<td>John Wood</td>
<td>Rend Lake</td>
<td>Lewis &amp; Clark</td>
<td>Parkland</td>
<td>Waubonsee</td>
<td>Truman</td>
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<td>John A. Logan</td>
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<td>Washington</td>
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<td>McHenry</td>
<td>Rock Valley</td>
<td></td>
<td>Wilbur Wright</td>
<td>Triton</td>
</tr>
</tbody>
</table>

- Peer Groupings to facilitate
  - Comparisons on common programming
Energy Use Summary - Regional Groupings

- Northern  109.00MBTU/sq ft  11<  10>
- Central    98.73MBTU/sq ft  6<  4>
- Southern   82.22MBTU/sq ft  6<  2>

TOTAL: 23<  16>
Potential Savings Summary - Regional Groupings

Savings if the >16 reduce to their Region Average

- Northern: $2,862,891
- Central: $811,224
- Southern: $434,895

TOTAL: $4,109,010/yr.
<table>
<thead>
<tr>
<th></th>
<th>Energy Use Summary – ICCB Peer Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>79.25MBTU/sq ft 2&lt; 3&gt;</td>
</tr>
<tr>
<td>II</td>
<td>94.45MBTU/sq ft 4&lt; 2&gt;</td>
</tr>
<tr>
<td>III</td>
<td>96.93MBTU/sq ft 3&lt; 4&gt;</td>
</tr>
<tr>
<td>IV</td>
<td>97.04MBTU/sq ft 6&lt; 2&gt;</td>
</tr>
<tr>
<td>V</td>
<td>124.38MBTU/sq ft 2&lt; 3&gt;</td>
</tr>
<tr>
<td>VI</td>
<td>87.86MBTU/sq ft NA NA</td>
</tr>
<tr>
<td>VII</td>
<td>118.61MBTU/sq ft 6&lt; 2&gt;</td>
</tr>
<tr>
<td></td>
<td>TOTAL: 23&lt; 16&gt;</td>
</tr>
</tbody>
</table>
Potential Savings Summary – ICCB Peer Groups

Savings if the 16≥ get to their Peer Group Average

- I  $223,500
- II $545,238
- III $362,951
- IV $628,741
- V  $481,824
- VI NA
- VII $949,893

TOTAL: $3,192,147/ yr.
Project Outputs – Energy Procurement
### Project Outputs – Energy Procurement

<table>
<thead>
<tr>
<th>Year</th>
<th>Electricity</th>
<th>Natural Gas</th>
<th>Annual Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$26,936,277</td>
<td>$18,034,047</td>
<td>$44,970,325</td>
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<tr>
<td>2009</td>
<td>$30,339,877</td>
<td>$14,592,113</td>
<td>$44,931,991</td>
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<tr>
<td>2010</td>
<td>$36,811,241</td>
<td>$15,356,416</td>
<td>$52,167,657</td>
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<tr>
<td>2011</td>
<td>$39,904,810</td>
<td>$15,372,137</td>
<td>$55,276,947</td>
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<tr>
<td>2012</td>
<td>$35,864,012</td>
<td>$8,563,382</td>
<td>$44,427,394</td>
</tr>
</tbody>
</table>

The chart above illustrates the annual procurement costs for electricity, natural gas, and the annual total from 2008 to 2012.
Project Outputs – Energy Procurement

Colleges ($/MMBTU Electricity)
EIA ($/MMBTU Electricity for Illinois)
Colleges ($/MMBTU Natural Gas)
EIA ($/MMBTU Natural Gas for Illinois)
Historical Energy Unit Cost Index Ranges ($/MMBTU)

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Project Outputs – Energy Procurement

• Findings
  ◦ Most Colleges purchase energy supply from third parties
  ◦ Supplier selection methods vary
  ◦ Ultimately transact with only a few suppliers
  ◦ Generally transact on 1-2 year contracts
  ◦ Many accept standard supplier contract terms and conditions

• Recommendations
  ◦ Adopt common supplier specifications and selection practices
    • Improve transparency, increase competition, and reduce counterparty risks
  ◦ Utilize group purchasing
    • Projected $2.2 million in internal operating costs and vendor margins
Project Outputs – Energy Efficiency
Project Outputs – Energy Efficiency

Total Energy Usage vs Gross Square Footage

- 2008
- 2009
- 2010
- 2011
- 2012
- Linear (2008)
- Linear (2009)
- Linear (2010)
- Linear (2011)
- Linear (2012)

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Project Outputs – Energy Efficiency

Historical EUI (MMBTU/SqFt) Variance for all Colleges

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>0.2455</td>
<td>0.2321</td>
<td>0.2390</td>
<td>0.3291</td>
<td>0.3287</td>
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<tr>
<td>Low</td>
<td>0.0547</td>
<td>0.0548</td>
<td>0.0467</td>
<td>0.0672</td>
<td>0.0440</td>
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<tr>
<td>Average</td>
<td>0.1157</td>
<td>0.1141</td>
<td>0.1187</td>
<td>0.1254</td>
<td>0.1103</td>
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</table>
### College Districts Applying for DCEO Energy Efficiency Grants

<table>
<thead>
<tr>
<th>Program Year</th>
<th>Number of Systems Applied</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>27</td>
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<tr>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>
Project Outputs – Energy Efficiency

• Findings
  ◦ Strong correlation between facility size and consumption intensity
    • Energy Use Index - Energy Use Index expressed as MBTU/square foot
  ◦ Weaker relationship between facility size and cost intensity
    • Energy Use Cost Index - Energy Unit Cost Intensity expressed as $/square foot
  ◦ Varying levels of project development
    • Project and funding driven / not programmatic

• Recommendations
  ◦ Adopt Comprehensive Energy Master Planning
  ◦ Extend Group Purchasing and grant applications
  ◦ Promote system wide approaches
  ◦ Develop internal performance contracting services

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Project Outputs – Clean Energy
Project Outputs – Clean Energy

- Results from a recent survey from Clean Energy Trust:
  - 86.5% of likely voters believe it is very or somewhat important to “maintain policies to bring renewable energy to Illinois”, with 55% calling it “very important”.
  - 79.6% of respondents prefer that at least one quarter of the state’s electricity “come from renewable energy sources like wind and solar” with more than 61% wanting the state’s renewable energy requirement to double to at least one half of the state’s electricity.
Project Outputs – Clean Energy

Price History of Installed Photovoltaic Systems

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Illinois Market Price Parity for Solar PV

Energy costs from solar PV fall to $0.10/kWh when capital costs fall to $2,300/kW.
Project Outputs – Clean Energy

Viability of CHP: Seek spark spread of 4.5 to 6¢/kWh

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Project Outputs – Clean Energy

• Findings
  ◦ Several Colleges have successfully installed clean energy projects
  ◦ System wide load is large enough to support long term power purchase agreements for a centralized clean energy asset
  ◦ Renewable Energy Credit purchases do not support new clean energy development in Illinois
Project Outputs – Clean Energy

Recommendations

- Focus campus development on solar PV, solar thermal, geothermal and Combined Heat and Power (CHP)
- Compete in upcoming Illinois Power Agency procurements of Solar Renewable Energy Credits ($30+ million)
- Consider development of long term power purchase agreement to support centralized clean energy asset
Conclusions and Discussion

• Conclusions
  ◦ In the aggregate, the College districts represent one of the state’s larger energy consumers
  ◦ Substantial cost savings and risk reductions can be achieved in energy procurement, energy efficiency and clean energy categories
  ◦ Impressive levels of internal expertise already exist within the Colleges
  ◦ Efficiencies of scale can benefit procurement, planning, and financing
Conclusions and Discussion

Discussion items

- What cooperative initiatives are most achievable in the near term?

- What energy initiatives have you seen in your or other colleges that yield results?
Acknowledgements

- IGEN Steering Committee:
  - Co-chairs: Dr. Georgia Costello, Dr. Jerry Weber,
  - Dr. Alice Jacobs, Dr. Sylvia Jenkins, Dr. Dale Chapman, Dr. Karen Anderson, Ms. Cheryl Hyman, Dr. Dale Chapman, Mr. Rob Hilgenbrink and Mr. Stephen Bell, IGEN Executive Director

- IGEN Staff
  - Stephen Bell, Rob Hilgenbrink, Katie Davis and Marcia Lochmann

- Community College System Staff:
  - Ed Smith and others

- All participating community colleges and staff
Our Thanks

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