Measure What Matters

Sustainability Data and Reporting

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October 23, 2018
What is “Sustainability”?

Balancing the **environmental**, **social equity**, and **economic** needs of our community, today – while making sure future generations will have what they need to thrive.
Outline

• Why measure?
• Common Sustainability Impacts and Metrics
• Materiality
• Reporting Frameworks
• Case Study – University of Notre Dame
• Exercise - Materiality
Why Measure?

<table>
<thead>
<tr>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>• Make better decisions</td>
<td>• Brand reputation</td>
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<tr>
<td>• Understand risk</td>
<td>• Competition</td>
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<tr>
<td>• Track improvement</td>
<td>• Employee retention</td>
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<tr>
<td>• Identify waste and</td>
<td>• Customer demands</td>
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<tr>
<td>opportunity</td>
<td>• Recognition/certification</td>
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<td>• Reduce inputs and costs</td>
<td>• Corporate values</td>
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Impacts to Consider

• Energy use and renewable energy
• Water use and wastewater
• Land use and ecology
• Climate Change
• Waste and Recycling
• Purchasing and supply chain
• Community engagement, human rights
• Labor practices, employee safety, employee well-being
• Corporate governance (policies), avoiding corruption
Example Metrics

• Energy use and renewable energy
• Water use and wastewater
• Land use and ecology
• Climate Change
• Waste and Recycling
• Purchasing and supply chain
• Community engagement, human rights
• Labor practices, employee safety, employee well-being
• Corporate governance (policies), avoiding corruption

mmBTU per $ revenue
MWh renewable energy generated
% reduction in natural gas use
Example Metrics

- Energy use and renewable energy
- Water use and wastewater
- Land use and ecology
- Climate Change
- **Waste and Recycling**
- Purchasing and supply chain
- Community engagement, human rights
- Labor practices, employee safety, employee well-being
- Corporate governance (policies), avoiding corruption

- Total tons of hazardous waste created
- % recycled materials in products
- Tons of non-hazardous waste recycled
Example Metrics

• Energy use and renewable energy  
• Water use and wastewater  
• Land use and ecology  
• Climate Change  
• Waste and Recycling  
• **Purchasing and supply chain**  
• Community engagement, human rights  
• Labor practices, employee safety, employee well-being  
• Corporate governance (policies), avoiding corruption

% purchases made from local suppliers

Significant impacts in supply chain identified thru supplier audits
Materiality

• “Relevance, Priority”
• Risk management
• Prioritize topics for reporting
  • Significant impact
  • Important to stakeholders
• Other factors
  • Business sector & core business
  • How much control do we have?
  • Strategy
  • Organizational values
  • Data availability (80/20 rule)
  • Location in supply chain
  • Competition
Varies by Sector

Restaurant

OUR 14 KEY FOCUS AREAS

SOCIETY

- Community Engagement
- Treating People Fairly
- Healthy Eating
- Responsible Marketing

ENVIRONMENT

- Water Saving
- Workplace Resources
- Supply Chain
- Waste Management
- Energy Efficiency

SOURCING

- Environmentally Positive Farming
- Local & Seasonal
- Sustainable Fish
- Ethical Meat & Dairy
- Fair Trade

Health Care

2020 DaVita Kidney Care Environmental Goals

ENERGY

- Reduce energy use and carbon emissions per treatment

WATER

- Reduce water use by 30% per treatment

WASTE

- Increase solid waste recycling to 45% of locations

BUILDINGS

- Certify major business offices as LEED Silver
- Implement Village Green certification for existing buildings

SUPPLY CHAIN

- Increase sustainability of packaging for reusable products & equipment and reduce packaging
Alphabet Soup

• **EHS vs CSR vs ESG**
  - Environmental Health and Safety
  - Corporate Social Responsibility
  - Environment, Social, Governance

• Compliance
• Risk vs Opportunity
• Stakeholders
  - Regulator/Employee
  - Investors
  - Broad stakeholder group
Reporting Across Sectors

Local Government

Global Covenant of Mayors for Climate & Energy

CDP

University

STARS, a program of AASHE

Green College 2017

Sierra Magazine Coolest Schools 2016

South Bend Office of Sustainability
Reporting Across Sectors

Corporate
Utilizing Data on the Macro and Micro Scale to Drive Carbon Reductions

October 23, 2018
Notre Dame History

- Central Energy production originates in late 1800’s
- Adjacent to Main Building
- Steam Plant Only
- 1881 First University to generate electricity
  - Less than 10 kW to 8 lights in Main Admin.
- Rail line installed in 1896 (Michigan Central Rail) for delivery of coal and campus connection to outside world
Notre Dame History

- Steam Plant circa 1900 to 1931
- Located on current site of St. Liam Hall
- Steam Plant only
Notre Dame History

- Current site occupied 1932 adjacent to St. Joseph Lake
- Lake essential resource for plant cooling water
- Steam plant only
- Coal fired, five (5) hand stoked boilers
Notre Dame History

- 1952 Addition of co-generation steam turbine and diesel generators
- Two new coal fired boilers
- 100% power independent
- The original Green Energy System!
Notre Dame History

Boiler No. 5, an oil-fired unit rolled off a rail car “just in time” for energy crisis, never significantly fired on oil and Central Building Automation System (CBAS) implemented.

1960’s

Plant expansion (boiler capacity 200%, electrical generation 133%, advent of chilled water – 6,000 tons)

1970’s

CHW co-generation, added 7,300 tons of capacity

1980’s

First new boiler since 1973 (177kpph) & 5.6 MW of diesel generation (interruptible), BMACT compliance controls – PJFF’s, sorbent injection, economizers and low NOx burners

1990’s

Continued energy demand, 9.4 MW of generation, 20 MVA purchase power substation (138 kV) & 8,000 tons of CHW

2000’s

ECM’s, renewables and ULRP

2010’s
Notre Dame Services and Services Area

Services:

1. Steam – 400 psi (plant), 70 & 10 psi (distribution) in 8.3 miles of tunnels and 1.5 miles of rivets

2. Chilled Water – 15.1 miles of direct buried steel pipe

3. Electrical – 31.7 miles of 4.16KV distribution underground in concrete encased ductbanks

4. Water – 26.5 miles direct buried cold, 9.8 miles of hot in tunnels (supply and return)

5. Storm Sewers – 35.8 miles draining to lakes and basins

6. Sanitary Sewers – 19.6 miles with conveyance to South Bend WWTP

Areas:

(Current and growing)

1. Steam – 8.9 Mgsf

2. Chilled Water – 6.7 Mgsf

3. Electric – 10.2 Mgsf
The Utilities Long Range Plan (2010) was the impetus to set an aspirational goal to reduce our Scope 1 (direct) and Scope 2 (indirect from electricity and energy purchases) carbon emissions by 50% per gross square foot from 2005 levels by 2030.

The longer range goal is to reduce such emissions by 83% from 2005 levels by 2050 and eventually become carbon neutral.
What does our Plan entail?

Energy Conservation Measures (ECM Phase 1, 2, 3 & 4) 2008 and beyond
- $13.8M invested with aggregate savings of $20.8M to date

Evolve our Central Plant (2010 Plan)
- Fuel Switching, move from coal to natural gas
- Steam first to Electricity first Combined Heat and Power Operation – implement Combustion Turbines
- Increase efficiency and reduce carbon emissions
- Increase capacity – to serve campus growth

Change in Plans (2015)
- Laudato Si, Pope Francis’s encyclical “On Care for our Common Home”
- Cease use of coal by 2020 develop renewable/recoverable energy sources

Remain flexible and able to respond to technological developments that could support our goals, protect
“Macro” Scale Data

- Energy Inputs
  - Coal, Gas, Oil (MMBtu)
- Emissions (Calculated from Energy Inputs)
- Produced Power/Purchased Power (kWh)
- Potable Water Well Production (MGD)
- Steam Production (klbs)
- Chilled Water Production (tons of chilling capacity)
- Service Area (GSF)
- Costs (Fuel, Purchased Power, Maintenance)

- Fuel Qualities (BTU, Sulfur, Ash)
- Equipment Run Time (hrs)
- Steam Temperature
- Condensate Volume
- Boiler Feedwater
- Make Up Water
“Micro” Scale Data

- Building Consumption
  - Electricity
  - Steam
  - Chilled Water
  - Domestic Cold Water
  - Domestic Hot Water

- Building Automation Systems
  - Heating/Cooling Systems
Data Driven Decisions

• Focus your resources

  – Low Hanging Fruit…Most Bang Per Buck
    • Lighting:
      – Higher Use Buildings/Rooms
      – T-12 to T-8/T-5 to LED
    • HVAC:
      – Constant Volume Systems to Variable Volume (VFD)
      – Occupancy Sensors
    • Water:
      – “Smart” Sprinkler System
Data Driven Decisions

• Then Move To

– Higher Hanging Fruit…A Little Less Bang
  • Lighting: Lower Use Buildings/Rooms
  • HVAC: Replace Pneumatics with Electronic Controls
  • Water: Low Flow Fixtures
Energy Results

Kwhr per GSF vs Campus GSF

Fiscal Years

G S F

Kwhr/GSF

4,000,000 5,000,000 6,000,000 7,000,000 8,000,000 9,000,000 10,000,000 11,000,000 12,000,000

71/72 73/74 75/76 77/78 79/80 81/82 83/84 85/86 87/88 89/90 91/92 93/94 95/96 97/98 99/00 01/02 03/04 05/06 07/08 09/10 11/12 13/14 15/16

Total GSF
Kwhrs per GSF
Energy Results
Energy Results

28% Gross Reduction, 48% per GSF Reduction through FY18
Combustion Gas Turbines (CGT) with Heat Recovery Steam Generators (HRSG) 2 – 5.5 MW units to provide increased electrical capacity, incremental steam capacity, higher efficiency and continued benefits of CHP approach
2-2000 ton Electric Chillers to use the energy produced by the CGT’s along with 2 Mgal of thermal storage to make use of off-peak electricity
Renewable/Recoverable Initiatives

<table>
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<tr>
<th>Initiative</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>East Quad Geothermal</strong></td>
<td>A 300-ton well field estimated to reduce CO2 by 1,336 tons annually</td>
</tr>
<tr>
<td><strong>South Campus Geothermal</strong></td>
<td>A 1,000-ton geothermal well field will have the capacity to reduce CO2 by 4,454 tons</td>
</tr>
<tr>
<td><strong>Ricci Fields Geothermal</strong></td>
<td>A 1,350 ton well field estimated to reduce CO2 by 6,013 tons</td>
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Renewable/Recoverable Initiatives

**Kenmore Warehouse Photovoltaic Array**
At a warehouse facility owned by the University near the Michiana Regional Airport a ground-mounted PV array has been installed. The system has a rated capacity of 145 KW. This would provide an estimated **122 tons** of CO2 reduction on an annual basis.
Renewable/Recoverable Initiatives

Hydroelectric Plant

• A project to build a 2.5MW hydroelectric plant on the St. Joseph River at the South Bend Dam. The project is estimated to produce 7% of campus’s current electrical energy usage and would offset nearly 9,710 tons of CO2 annually.
Other Data Uses

• Benchmarking
  – Similar building type comparisons
    • Building Type to Building Type
    • University to University

• “Continuous Commissioning”
  – Discover system anomalies that contribute to energy inefficiencies

• Sustainability Competitions
QUESTIONS?
Data Planning Activity
Materiality

• “Relevance, Priority”
• Risk management
• Prioritize topics for reporting
  • Significant impact
  • Important to stakeholders
• Other factors
  • Business sector & core business
  • How much control do we have?
  • Strategy
  • Organizational values
  • Data availability (80/20 rule)
  • Location in supply chain
  • Competition
Instructions

• Review the sample list of impacts
• Rank impacts from 1 (least) to 5 (most) important to
  • Stakeholders
  • Your core business
• Map impacts on the Materiality Matrix based on the two scores
  • The dark grey quadrant = “critical issue”
• For all critical issues, consider the “Reporting on Critical Issues” questions. Use the blank space to take notes.
<table>
<thead>
<tr>
<th><strong>Environmental (E)</strong></th>
<th><strong>Social (S)</strong></th>
<th><strong>Corporate Governance (G)</strong></th>
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<tbody>
<tr>
<td>E1. Direct &amp; Indirect GhG Emissions</td>
<td>S1. CEO Pay Ratio</td>
<td>G1. Board - Separation of Powers</td>
</tr>
<tr>
<td>E2. carbon Intensity</td>
<td>S2. Gender Pay Ratio</td>
<td>G2. Board - Transparent Practices</td>
</tr>
<tr>
<td>E5. Primary Energy Source</td>
<td>S5. Temporary Worker Ratio</td>
<td>G5. Supplier Code of Conduct</td>
</tr>
<tr>
<td>S12. Board - Diversity</td>
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<table>
<thead>
<tr>
<th>Internal assessment (Impact on business)</th>
<th>Materiality Matrix</th>
<th>Reporting on Critical Issues</th>
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<tbody>
<tr>
<td>0</td>
<td></td>
<td>Data availability/quality</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Relevance to core business, corporate values</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Competitors excel/lack/create baseline</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Strategic advantage</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Level of control, location in supply chain</td>
</tr>
<tr>
<td>5</td>
<td></td>
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### Materiality Matrix

- **External assessment (impact on stakeholders):**
  - 0: Not relevant
  - 1: 1
  - 2: 2
  - 3: 3
  - 4: 4
  - 5: 5

- **Internal assessment (Impact on business):**
  - 0: Not relevant
  - 1: 1
  - 2: 2
  - 3: 3
  - 4: 4
  - 5: 5

### Reporting on Critical Issues

- Data availability/quality
- Relevance to core business, corporate values
- Competitors excel/lack/create baseline
- Strategic advantage
- Level of control, location in supply chain