Business Case for Sustainability: 
Balancing Economic & Environmental Factors

“A truly sustainable organization balances economic & environmental factors”

2013 AEE / ASHRAE / USGBC Energy Expo
“Sustaining Together”
St. Paul River Center
October 2, 2013

Richard Murphy Jr. ASLA
President & CEO
Murphy Warehouse Co.
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&
IWLA Sustainable Logistics Initiative (SLI), Chair
&
Past Chair
Council of Supply Chain Management Professionals (CSCMP)
Center For Transportation Studies (CTS), U of MN
American Society of Landscape Architects – MN Chapter
Sustainability / Green Practices
Balancing Environmental & Economics

4 Case Studies + Why LEED / Energy Star
Project Characteristics & ROI Financial Review

1. LED vs. T-5 Lighting
2. Solar Energy Production
3. Native Prairie Planting vs. Lawn
4. Stormwater Management
5. LEED & Energy Star Certification
6. Carbon Neutrality
Where Do I Come From
In the Beginning…1904

4th Generation Family Business
“Feeding the horse-power was key”
Who is Murphy
3PL / Supply Chain Logistics Services

We are a Service Company
- Warehousing, distribution, transportation, value-added, fulfillment, international, etc.

We handle products throughout their life-cycle
- From raw materials to in-process goods to finished products to returns for numerous industry segments.

Murphy Family, 4th Generation (1904)
Square Feet Operated: 2,800,000
SKU's Controlled: 29,000+
Truck Loads Handled / Year: 120,450
Rail Cars Handled / Year: 8,000 (equivalent to 31,500 TL's)

Companies Served:
- Fortune 100 to Small Entrepreneurs
- Domestic and Global

Industries Served:
- Retail / Catalogue / Consumer
- Medical / Health Care
- Grocery / Food Processing
- Beverage
- Plastics
- Recreational / Camping
- Industrial
- Forest Products (Paper/Packaging)
- International
Sustainability Certification
LEED Gold & Silver and Energy Star

2 LEED Gold & 1 LEED Silver Certified
- Minneapolis Campus 2014 – Oldest Bldg. in Minneapolis
- Eagan Campus 2014; Target level Gold/Platinum

3 Energy Star Certifications
- Scored 99 & 98 on 100 point scale (Aug 2010).
- Central Ave scored 87 (Jan 2012).
- Minneapolis & Eagan 2014.
Sustainability Certification
ISO 14001 and SLI Certification

ISO 14001 Certification
✓ Environmental Performance & Management Certification; Nov. 2012.

Sustainable Logistics Initiative
Warehousing in Logistics
5 Billion Sq. Ft of warehousing in U.S.

Floor area equals a 4 foot walkway from here to the Moon...!!!

The 5B only includes what’s under roof. Add another 40-50% to include outdoor dock & staging areas and we get a 6 foot wide walkway.

Industry has a massive impact on the Nation’s landscape.
Lighting
Since 1980’s Murphy Has Been Changing Fixtures w New Tech

ROI of 1.8 Years Typical

- Minneapolis Site: 3x so far since 80’s
- Fridley Central: new bldg. in 1999 and changed fixtures after 5 years
- All facilities now T-8
Large Logistics Building
1980s Facility Purchased in 2012

How Should It Be Lighted
Big Decision!

✓ 350,000 sq. ft. in size
✓ Old high pressure sodium system
✓ Any decision will be $200,000+
✓ Designed system to readily accept roof raising from 22 to 32 feet in future

Key decision criteria:
✓ ROI period reasonable
✓ Long-term operational expense
✓ LEED Platinum / Gold target certification level.

Key Risk….
✓ We Couldn’t Find Anywhere to View LED in Midwest!
✓ No one in Midwest had done such a large building w LED…!!!
**T-5 vs. LED Lighting**

*How do you decide?*

**Economics + Environmental Factors**

Currently a Bleeding Edge Decision for LED

- T-5 = ½ the purchase cost
- LED = 31% less input wattage used

- T-5: Change bulls every 3 years + Bulb disposal cost
- LED: Bulb life 60-75,000 hrs. *(i.e. 17 years under 2 shift operation)*

- T-5: Motion sensor action reduces life
- LED: Motion sensor action not harmful

Remember: LED is NOT CHEAP

2x Cost to Install Today
LED Lighting
Not All Manufacturers’ Are The Same
Tech. Still Young & Leading Edge
Narrowed to 2 Options:
*Lithonia vs. Lusio*

- Motion sensor on each fixture
- Diffuse Lenses on each fixture to reduce glare and protect food if damaged
  - Discovered need for after test array installed – without lens operators are blinded looking up to read numbers, etc.
LED Lighting
Lithonia Fixture Selected

Decision Factors
Remember: LED is NOT CHEAP
2x Cost to Install Today

- Viable Product: Quality + Cost Wise
- History Behind Brand & Nationally Reputable Record
- Technically Proven LED Driver
- Cost Effective re Purchase + Install
- Motion Sensor Installed at Factory Reducing Install Expenses
- Good Light Output Reduced Fixture Count
- Good Light Distribution Pattern

After We Made Decision, We Learned Best Buy and Target Stores Selected Lithonia for their New DCs
LED Lighting
Lithonia Fixture Selected

24,000 Lumens Fixture
At 266 wattage

Better Illumination
- Kelvin temperatures of 4000K and 5000K
- 9000, 12,000, 18,000 and 24,000 lumen packages
- Wide and narrow reflector options
- Semi-diffuse acrylic lens option

Long Life
- L92 at 60,000 hours; L70 predicted to exceed 100,000 hours
- User replaceable drivers
- Easy access to fusing and sensors from below

Energy Savings
- 14%-26% less input wattage than T5HO
- 54% less input wattage than HID
- 91 lumens per watt (LPW)
- Optional photocells and occupancy sensors decrease daily power consumption
- High-efficiency Class I driver with dimming standard

<table>
<thead>
<tr>
<th>LUMENS</th>
<th>WATTAGE</th>
<th>LENGTH</th>
<th>WIDTH</th>
<th>DEPTH</th>
<th>WEIGHT</th>
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<tbody>
<tr>
<td></td>
<td>120V</td>
<td>277V</td>
<td>347V</td>
<td>480V</td>
<td></td>
</tr>
<tr>
<td>9,000</td>
<td>102</td>
<td>98</td>
<td>107</td>
<td>106</td>
<td>45 (114.3)</td>
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<tr>
<td>12,000</td>
<td>135</td>
<td>131</td>
<td>142</td>
<td>141</td>
<td>45 (114.3)</td>
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<tr>
<td>18,000</td>
<td>203</td>
<td>199</td>
<td>213</td>
<td>211</td>
<td>45 (114.3)</td>
</tr>
<tr>
<td>24,000</td>
<td>270</td>
<td>266</td>
<td>284</td>
<td>281</td>
<td>45 (114.3)</td>
</tr>
</tbody>
</table>
LED Lighting
Final Analysis

Multiple Benefits:
- Long-term energy use reduction
- Long-term maintenance cost reduction
  - Fluorescent lighting needs the bulbs replaced every 2.5 - 3 years.
  - LED fixtures will not be touched for 60-75,000 hrs. or 17+ years!
- LEED / Energy Star impacts
- PR Leverage value in corporate strategy

<table>
<thead>
<tr>
<th>Fixture</th>
<th>KW</th>
<th>Install Cost *</th>
<th>Energy Cost per Year</th>
<th>Vs. Existing</th>
<th>Vs. T-5</th>
<th>Savings per Year</th>
<th>ROI Period Years **</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Sodium</td>
<td>302.07</td>
<td>$ -</td>
<td>$ 96,530</td>
<td>100%</td>
<td>$ -</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>(Existing)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-5</td>
<td>118.56</td>
<td>$ 210,000</td>
<td>$ 37,889</td>
<td>39%</td>
<td>100%</td>
<td>$58,647</td>
<td>2.6</td>
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<tr>
<td>LED</td>
<td>86.68</td>
<td>$ 445,900</td>
<td>$ 18,754</td>
<td>19%</td>
<td>49%</td>
<td>$77,782</td>
<td>4.4</td>
</tr>
</tbody>
</table>

* Includes sensors on each fixture.
** Savings from no T-5 bulb replacement & disposal every 3 years not included. Dakota est'ed utility credit included.
Exterior LED Lighting
Exciting New Concept

Motion Sensor Driven Exterior lights

- Run at 20% normal lumen level
- Motion sensor sees visiting driver or intruder and raises lumens to 100%
  - Safety lighting levels
  - Theft / intruder deterrent
  - Allows cameras to better see action
- Reduces neighborhood light glow
  - Especially helpful with residential nearby
- Long-term energy use reduction
Energy Creation - Solar Power
Warehouse Roofs - Large Available Flat Areas….“just sit there”

How Can We Put To Better Use?
Commercial solutions include:

✓ “Solar Energy Integrator” - 100% responsibility to design, build, own and operate the asset - including all upfront purchase and installation costs….challenge in Midwest – utility rates too low for economic models!!!

✓ ….to solutions where building owner owns the solar assets and provider merely design-builds the system.
Energy Creation
Solar Power

Myth: Solar PV better in hotter climates.
Fact: Solar PVs are more efficient the colder they get.

Minnesota’s climate is perfect!
Energy Creation  By Murphy
5th Largest Solar Energy Producer in MN

Murphy installed 11 systems 2010 - 2013
430KW total power on 5 Bldgs.
✓ Fridley Logistics Campus: produces 50% of energy use on 2% of roof…!!!

What to consider when selecting panels

System:
✓ Efficiency of Panels & System
✓ Weight & Roof Structural Characteristics
✓ Roof Penetrations – held in place by ballast array (vs. attaching to roof with potential roof leaks)
✓ Shadow Issue Impact – how impacted is the system to snow drifts & other shadow effects.
✓ Fire Dept. Response – will they go on roof with water hoses; can they turn system off to not get electrocuted.
✓ Ease of Installation
✓ Off-site Monitoring

Funding:
✓ Price
✓ ROI Period
✓ Available Credit / Grant Sources
✓ Utility Company – what is their support for solar: credits / grants / energy purchase, etc.
Energy Creation
What to consider when selecting solar panels

Firefighters and Solar Power
Important Feature!

✓ They will usually not go on roof with water hoses for fear of electrocution.
✓ System must be designed to “turn-off”
  • tenKsolar of Bloomington, MN system designed for this capability.

Why Firefighters Fear Solar Power  Mike Riggs - Sep 11, 2013

A 300,000 square foot refrigerated warehouse in Delanco, New Jersey, burned down last week, and the local fire chief says solar panels are partly to blame. No, the 700 solar panels on top of the Dietz & Watson warehouse didn’t cause the fire, but their presence did dissuade Delanco Fire Chief Ron Holt from putting his team on the roof. "With all that power and energy up there, I can't jeopardize a guy’s life for that," Holt told NBC Philadelphia. The only thing firefighters fear more than fire is solar.

So long as a solar panel is getting sunlight, it's impossible to turn off. "During daylight, there can be enough voltage and current to injure or even kill a firefighter who comes in contact with the energized conductors," Matthew Paiss, a fire engineer with the San Jose Fire Department, wrote in a handy guide for firefighters. The Dietz & Watson warehouse fire started when the sun was out. By the time the sun went down, the fire was beyond control. The warehouse burned for 29 hours.
Energy Creation
Solar System Characteristics

tenKsolar System (Bloomington, MN)

5 Major Innovations (state of art in world today):

✓ Run at low voltage – increases efficiency
✓ Solved “shadow problem” – shading a portion of panel now doesn’t shut system down!
✓ Can Utilize 3M Solar Reflector Tech – only solar manufacturer who can utilize this boasting power.
✓ Smart Panel Technology – panels only produce power when asked by control device.
✓ Fire Dept. Can Turn Off - Solves fire department issues with live systems; system can be turned off when fire dept. shows up for fire!
✓ No Roof Penetrations – held in place by ballast array (vs. attaching to roof with potential roof leaks!)

http://tenksolar.com/

Traditional “Serial” Connections – one path for energy flow; any disruption (i.e. shade) affects entire system.

tenK “Serial + Parallel” integrated Connections - multiple paths for energy flow; allows for non-uniform light (i.e. shadows, etc.)
Energy Creation
ROI of Solar Power

40KW - 2010 Murphy Case in Xcel Territory MN

Investment Breakdown – 4 Grants Utilized

- Normal, non grant solar ROI period is 20-25 yrs.
- Murphy’s ROI period is 4 years…!!!

### Economics

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>install cost per watt</td>
<td>$8.26</td>
</tr>
<tr>
<td>total cost installed</td>
<td>$330,000</td>
</tr>
<tr>
<td>Federal 1603 ITC (30%, no max)</td>
<td>99,000</td>
</tr>
<tr>
<td>State solar PV rebate</td>
<td>20,000</td>
</tr>
<tr>
<td>Solar Rewards rebate ($2.25/w)</td>
<td>89,910</td>
</tr>
<tr>
<td>Minnesota Made rebate</td>
<td>88,090</td>
</tr>
<tr>
<td>Sundial rebate</td>
<td>2,000</td>
</tr>
<tr>
<td><strong>Final client cost</strong></td>
<td><strong>$31,000</strong></td>
</tr>
</tbody>
</table>

NOTE: “Solar Rewards Rebate” refers to the Xcel Grant
Energy Creation
ROI of Solar Power

40KW - 2010 Murphy Case in Xcel Territory
Cash Flow Breakdown

<table>
<thead>
<tr>
<th>source</th>
<th>amount of rebate</th>
<th>within 60 days of turn-on</th>
<th>annual payment for next 4 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>$99,000</td>
<td>$99,000</td>
<td>$0</td>
</tr>
<tr>
<td>State</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$0</td>
</tr>
<tr>
<td>Solar Rewards</td>
<td>$89,910</td>
<td>$89,910</td>
<td>$0</td>
</tr>
<tr>
<td>Minnesota Made</td>
<td>$88,090</td>
<td>$17,618</td>
<td>$17,618</td>
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<tr>
<td>Sundial</td>
<td>$2,000</td>
<td>$2,000</td>
<td>$0</td>
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<tr>
<td><strong>total:</strong></td>
<td><strong>$299,000</strong></td>
<td><strong>$228,528</strong></td>
<td><strong>$70,472</strong></td>
</tr>
</tbody>
</table>

System designer, installer & grant consultant
Jon Kramer, NABCEP certified PV installer
240-463-3688; jk2surf@aol.com

3M Solar Reflector Film
tenKsolar Panel
Energy Creation
2012 Solar Case Study

350,000 sq. ft. Building
Eagan, MN
Utility: Dakota Elec.

- Built 1978-80
- Empty for 8 years
- 2012 Murphy purchase
- $3.8M in upgrades
  - Lighting
  - Fire System
  - HVAC
  - Dock equip.
  - New access road
  - Re-establish rail
  - 98 trees
  - 2 acres Native prairie
- LEED Platinum / Gold target
- 40 KW array - Nov. 2012 install

Questions:
- Install the solar system?
- Utility involved support?
- What’s the Cost & ROI?
**Energy Creation**

**2012 Solar Case Study**

**40 KW Solar PV Array**

**Dakota Electric vs. Xcel ROI**

NOTE: Excel energy is where Murphy's other facilities w solar are sited

**QUESTION:**

_Do we Install Given the ROI Period?

### Dakota Electric

<table>
<thead>
<tr>
<th>Solar System Production</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>System size nameplate (DC watts)</td>
<td>40,000</td>
</tr>
<tr>
<td>number of tenKsolar Neptune panels</td>
<td>222</td>
</tr>
<tr>
<td>Estimated system output - Basic Energy (kWh/yr)</td>
<td>54,000</td>
</tr>
<tr>
<td>Building annual Basic energy use (kWh)</td>
<td>?</td>
</tr>
<tr>
<td>Percent of annual Basic energy offset by this solar system</td>
<td>#VALUE!</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Solar System Economics</th>
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<tr>
<td>Cost per watt to install this system</td>
<td>$5.07</td>
</tr>
<tr>
<td>Total system installed cost</td>
<td>$203,000</td>
</tr>
<tr>
<td>Utility Rebates*</td>
<td>$0</td>
</tr>
<tr>
<td>Depreciation</td>
<td>$58,667</td>
</tr>
<tr>
<td>Federal ITC rebate</td>
<td>$60,900</td>
</tr>
<tr>
<td><strong>FINAL COST OF SYSTEM</strong></td>
<td><strong>$83,433</strong></td>
</tr>
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</table>

### Xcel

<table>
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</tr>
<tr>
<td>Xcel solar rebates*</td>
<td>$121,800</td>
</tr>
<tr>
<td>Federal ITC rebate</td>
<td>$60,900</td>
</tr>
<tr>
<td><strong>FINAL COST OF SYSTEM</strong></td>
<td><strong>$20,300</strong></td>
</tr>
</tbody>
</table>

**value of energy Year 1** | $5,670

**years to breakeven** | 11.0

**years to breakeven** | 3.6
Energy Creation
2012 Solar Case Study

Why Install with 11 Year ROI?
SBA Mortgage Loan Impact

• Murphy, like others in our industry, have large buildings with few employees per sq. ft. therefore we never meet SBA criteria. This time it was no different.

• HOWEVER…..when the SBA saw on our application we were installing solar power (i.e. renewable energy) we automatically became eligible!

• Result: 95:5 structure….unheard of today!!!
  ✓ 95% is mortgage with only 5% Murphy cash

Murphy Northtown Logistics Campus
40KW array - produces 50% of power used
A Question I Ask Industry Audiences:

Have you ever given much thought to your facilities?

- Landscape?
- Stormwater?
A Question I Ask Industry Audiences:

Have you ever given much thought to your facilities?

- Landscape?
- Stormwater?

....You Should...!!!
Facility Design
Native Prairie vs. Lawn

Case Study: Fridley Logistics Campus
4700 & 4850 Main St NE, Fridley, MN 55421
Location of cost figures & 500,000 sq. ft. of warehouse.

Brown areas are native prairie
Photo taken in early spring.

6.0 Prairie acres
4.2 Cut Lawn acres
Facility Design
Native Prairie vs. Lawn

Three Questions

1. Is there an environmental difference?
2. Is there a cost difference?
3. Do they look OK?
Facility Design
Native Prairie vs. Lawn

We Know There’s An Environmental Benefit

Native Prairie Benefits:
- Native plant materials selection.
- No watering required
- No fertilization required
- Roots are deep and assist stormwater infiltration

Are There Also Financial Benefits?

Native Prairie Root System vs. Turf Root System

Root Depths

Native plant root systems can grow up to fifteen or twenty feet deep; turf grows only 3” deep.

Lawn Grass: 1-3 inches

Root Depths

Prairie Grass: 3-15 feet
Facility Design
Native Prairie vs. Lawn

Carbon Sequestration Annual Benefits
14 Acres of Native Prairie
- 24.93 MtCO₂e/Year
- 732 Trees
  - 275 Oaks, 274 Maples, 183 Spruce/Pines
  - 117.1 MtCO₂e/Year

Carbon Sequestered by Murphy’s Trees and Prairies over 14 years:
- 5,009,961 pounds

<table>
<thead>
<tr>
<th>Tree Type</th>
<th>Carbon Sequestered per Tree</th>
<th>Number of Trees</th>
<th>Actual Carbon Sequestered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb/tree/year</td>
<td>MtCO₂e/tree/year</td>
<td>lb/tree</td>
</tr>
<tr>
<td>Oak</td>
<td>588.7</td>
<td>0.163</td>
<td>6427.6</td>
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<tr>
<td>Maple</td>
<td>464.3</td>
<td>0.211</td>
<td>4030.1</td>
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<tr>
<td>Pine</td>
<td>178.6</td>
<td>0.080</td>
<td>2790.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>732</td>
</tr>
</tbody>
</table>

Facility Design
Native Prairie vs. Lawn
Economic Impacts

Manicured lawn costs 7.3x more to maintain than native prairie plants!

Annual Maintenance Costs

- Why have manicured lawn entirely surround large logistics, industrial / manufacturing facilities?

Site: 4700 & 4850 Main St NE, Fridley, MN 55421
Actual data from Murphy expense records

Native Prairie vs. Lawn
Total Cost Differences

Total Costs

$25,000
$20,000
$15,000
$10,000
$5,000
$-

6 acres
Prairie Areas

4.2 acres
Lawn Areas

$21,650

$4,240

$5,000

$10,000

$15,000

$20,000

$25,000
Facility Design
Native Prairie vs. Lawn
Economic Impacts

If all 10.2 acres is cut lawn
Annual Maintenance Costs

Native Prairie vs. Lawn
Total Cost Differences

Prairie Areas 6 acres
Lawn Areas 4.2 acres
If All Cut Lawn 10.2 acres
## Facility Design

### Native Prairie vs. Lawn

#### Economic Impacts

### Annual Maintenance Costs

<table>
<thead>
<tr>
<th>Component Costs</th>
<th>Existing Set-up</th>
<th>Cut Lawn</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prairie Areas</strong></td>
<td><strong>Lawn Areas</strong></td>
<td><strong>Lawn Areas</strong></td>
</tr>
<tr>
<td>6 acres</td>
<td>4.19 acres</td>
<td>10.19 acres</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$4,240</td>
<td>-</td>
</tr>
<tr>
<td>Mowing</td>
<td>$12,015</td>
<td>$29,220.25</td>
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<tr>
<td>Watering</td>
<td>$8,630</td>
<td>$20,988.00</td>
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<tr>
<td>Fertilization</td>
<td>$1,005</td>
<td>$2,444.14</td>
</tr>
<tr>
<td><strong>Total Cost:</strong></td>
<td><strong>$4,240</strong></td>
<td><strong>$52,652</strong></td>
</tr>
<tr>
<td><strong>Cost / Acre:</strong></td>
<td><strong>$707</strong></td>
<td><strong>$5,167</strong></td>
</tr>
</tbody>
</table>

### Native Prairie vs. Lawn Component Cost Differences

- **Prairie Areas 6 acres:** $4,240, $12,015, $8,630, $1,005, $2,500, $5,000, $7,500, $10,000, $12,500
- **Lawn Areas 4.2 acres:** $8,630, $10,000

- **Cost / Acre:** $5,167

### Site Location

- **Site:** 4700 & 4850 Main St NE, Fridley, MN 55421

### Data Source

- Actual data from Murphy expense records
Prairie Maintenance
Key to success...!!!

No Such Thing as a Maintenance Free Landscape
Provided since day one by

Prairie Restorations, Inc.  
Bringing people together with the land

Prairie Restorations of Princeton, MN  
www.prairieresto.com

✓ Services include site visits 4-6 times per growing season and burning every 2-3 years.

Brown areas are Native Prairies
Facility Design
Native Prairie vs. Lawn
Economic Impacts

“Over the last 16 years we have saved over $947,428 while being green by planting native prairies on 2 logistics Campuses!!”
Facility Design
Native Prairie vs. Lawn
Economic Impacts

ROI of Prairie vs. Lawn Installation

<table>
<thead>
<tr>
<th>Install Cost 6 Acres</th>
<th>Install Cost vs. Prairie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prairie</td>
<td>$ 34,320</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Seeded Lawn*</td>
<td>$ 48,000</td>
</tr>
<tr>
<td></td>
<td>1.4x</td>
</tr>
<tr>
<td>Sod*</td>
<td>$ 111,000</td>
</tr>
<tr>
<td></td>
<td>3.3x</td>
</tr>
</tbody>
</table>

* Does not include $30,000+ cost of sprinkler system.

<table>
<thead>
<tr>
<th>Maint. Cost 6 Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawn:</td>
</tr>
<tr>
<td>Prairie:</td>
</tr>
<tr>
<td>Cost Difference:</td>
</tr>
</tbody>
</table>

Prairie Install Cost

\[
\text{Savings per Year of Prairie vs. Lawn} = \frac{\text{Prairie Install Cost}}{\text{Cost Difference}} = \frac{34,320}{26,762} = 1.28 \text{ Years}
\]
Facility Design
Lawn Irrigation Sustainability
Latest Technology

Weather & Soil Moisture Integration
Installed at new Eagan Logistics Campus

Plant Need + Soil Moisture Level + Rain Forecasting = Adjustment

- Soil moisture sensors
- Weather adjusted irrigation
- 24/7 automatic site monitoring
- Internet mgmt.
- Est’ed ROI: 3 years
Facility Design
Native Prairie vs. Lawn
Aesthetic Impacts

Do they look OK?
Neighbors love it…!!

We run 33,000 trucks / yr. through the neighborhood yet the #1 thing I hear is…….

“…oh, you’re the guys with all the pretty flowers on Main St.”

Photos show native prairies at Murphy’s Campuses - 16 acres total at five facilities.

Facility Design
Native Prairie vs. Lawn

Do they look OK?
Not only do neighbors love them

We have been robbed twice!

One 4\textsuperscript{th} of July a van was seen pulling away from the property with plants in back. Police arrested the individual.

- Contacted Ron Bowen of Prairie Restorations for a value per police request he responded: “they’re priceless!”
- These were 7 year old plants with deep roots.

Summer 2009 an elderly couple were seen digging up plants. Unfortunately not caught.
Facility Design
Stormwater Regulation Impacts

Changing facility design & management

- Traditional Focus: *get stormwater off-site fast*
- Today’s Focus: *handle stormwater onsite and reuse*

Few outside profession realize growing impact…!!!
Facility Design
Stormwater Project Case Study
Murphy Minneapolis Logistics Campus
701 24th Ave SE, 55419

• 22 Acres, highly urban site
• Buildings dating from 1904 – 1980’s
• 24/7 busy logistics operation.
• 95% impervious
  ✓ 58% building, 37% pavement, 5% green
  ✓ New suburban regulations often require 25-40% green coverage
  ✓ Nearly 100% of Stormwater running off site.
  ✓ Fee started at $58,000 and rose to $68,000 within 14 months. Today at $73,000.
Facility Design
Stormwater Project Case Study

Key Questions
Murphy Minneapolis Logistics Campus
701 24th Ave SE, 55419

**Question #1** – Could we reduce / eliminate annual stormwater fee of $68,000? Does the City have a mechanism in place?

**Question #2** – What financial factors and analysis should we consider?

**Question #3** – What qualitative factors should we consider?

**Question #4** – We are here for the long haul, therefore, could we be a good corporate citizen and do the right thing and stay financially strong?
Facility Design
Stormwater Project Case Study

Two Solutions Explored

1. Underground Storage
   ✓ Very expensive system – extra $300,000 for our project & added 5 more years to ROI.

2. Permeable Pavements - Concrete, Asphalt & Pavers
   ✓ Per respective industry associations: not capable today of withstanding the constant grinding & shear stress from truck’s turning while pulling back into docks.
Facility Design
Stormwater Project Case Study

Basic Water Flow Design

Key:

- Main Retention Pond
- Bio Retention Basins
- Surface and underground pipe flow
- Underground only flow
- Overflow release to area storm system
- Prairie grass infiltration area
Facility Design
Stormwater Project Case Study

Net Result

100% stormwater fee credit
$68,000 annual savings
50% federal depreciation deduction*

* NOTE: not known till after completion.

NOTE: Original design generated 78% stormwater fee credit.

“As-built” drawings = 102% net credit.

Site: 22 acres
% impervious: 95%

Project Cost
(Design + Const.) $ 580,000

Annual Storm water Fee $ 68,000

Payback in Years: 8.53

+ Federal Stimulus Package
Immediate 50% Depreciation: $ 290,000

7.0 yrs. after Fed Credit & Tax Impact
8.5 yrs. simple pre-tax basis
Facility Design
Stormwater Project Case Study

Before Project: 95% Impervious - 100% Runoff
After project: 80% Impervious – 0% Runoff
Facility Design
Stormwater Project Case Study

Major Retention Basin
NW Corner of Site
Photos show 1st summer plant growth
Facility Design
Stormwater Project Case Study

Major Retention Basin
NW Corner of Site

Photos show 2nd summer plant growth

Important to recognize that native prairie plantings will take 3 years to show maturity. One must be a bit patient.
Facility Design
Stormwater Regulation Impacts

Stormwater Fees
Growing in Use and Rising in Price – 2,000+ Cities Today

Property Owner Mitigation vs. City Revenue Needs
Is a Balance Possible?

- City’s need the cash to meet Federal Rules
- Private property mitigation good for environment and the city’s volume challenge
- Not all cities willing to implement mitigation credit program
- Property owners will not do if no fee reduction!

Eagan Campus:
- City interested in helping owners with a fee mitigation system but were not ready to apply when we were upgrading.
- So we chose not to implement and put the funds into other areas.
Facility Design
Stormwater Regulation Impacts

Gray + Green Infrastructure
Cities starting to treat & regulate street trees like sewers and roads.

- To handle urban heat, stormwater, and improve real estate values thus higher property tax values.

Only a matter of time before they look to private property to help in this effort.
Green Urban Infrastructure
Why Trees Will Be In Your Future

Trees and Stormwater Management
Important role seen today

✓ Mature trees hold nearly an acre-foot of stormwater...!!!
✓ In other words: the leaves & branches hold 80% of 1” rain in 24 hrs.
  • In Minneapolis this represents 90% of all storms!
✓ Reducing stormwater prolongs life of sewers and pipes. Cities today can’t afford to replace old and wearing out systems!
Why We Went LEED & Energy Star
Especially at the Height of a Recession

Put Another Way: Why Does Murphy Voluntarily Do Green Projects/Practices?

5 Part Strategy

1. Leader’s and Family’s Perspective on Leadership
2. Doing most of the actions anyway so why not get 3rd party recognition
3. Strategic Business Reasons
4. Green practices are showing positive economic ROI results
5. Marketing and Branding
Why We Went LEED & Energy Star Leadership Strategy (Item 1)

- **Leader a Landscape Architect**
  - “what can we say…..”

- **4th generation family business**
  - “in for the long haul”

- **Family believes it is important to be a leader - being sustainable is important and will grow**
Why We Went LEED & Energy Star

Business Strategies

(Item 2)

• Doing most of the actions anyway so why not get 3rd party recognition

  ✓ Client’s sustainability departments don’t understand what we have been up to for years.
  ✓ They do not readily understand where the rubber literally hits the pavement.
Why We Went LEED & Energy Star

Strategic Business Strategy
(Item 3)

• Listening and responding to our client’s “future” needs
   Major corporations will have “Green” initiatives and requirements – once the recession in finally over!
   They need assistance from their Carriers, 3PL’s, Suppliers, etc. to contribute to their “greenness” measures.
   They cannot achieve their goals without the suppliers involvement and assistance.
### Why LEED & Energy Star Economic Strategy (Item 4)

- **Green practices showing financial paybacks & positive ROI**
  - In many cases must be willing to take longer view than Wall Street ROI period of 1 - 3 yrs.

#### Native Plantings

<table>
<thead>
<tr>
<th>Native Prairie vs. Lawn Total Cost Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Costs</td>
</tr>
<tr>
<td>$</td>
</tr>
<tr>
<td>$25,000</td>
</tr>
<tr>
<td>$20,000</td>
</tr>
<tr>
<td>$15,000</td>
</tr>
<tr>
<td>$10,000</td>
</tr>
<tr>
<td>$5,000</td>
</tr>
<tr>
<td>$0</td>
</tr>
</tbody>
</table>

#### LED vs. T-5 Lighting

<table>
<thead>
<tr>
<th>Fixture</th>
<th>KW</th>
<th>Install Cost *</th>
<th>Energy Cost per Year</th>
<th>Vs. Existing T-5</th>
<th>Vs. T-5</th>
<th>Savings per Year</th>
<th>ROI Period Years **</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Sodium (Existing)</td>
<td>302.07</td>
<td>$ -</td>
<td>$ 96,530</td>
<td>100%</td>
<td>$ -</td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>T-5</td>
<td>118.56</td>
<td>$ 210,000</td>
<td>$ 37,889</td>
<td>39%</td>
<td>100%</td>
<td>$58,647</td>
<td>2.6</td>
</tr>
<tr>
<td>LED</td>
<td>86.68</td>
<td>$ 445,900</td>
<td>$ 18,754</td>
<td>19%</td>
<td>49%</td>
<td>$77,782</td>
<td>4.4</td>
</tr>
</tbody>
</table>

* Includes sensors on each fixture.
** Savings from no T-5 bulb replacement & disposal every 3 years not included. Dakota estimated utility credit included.

#### Stormwater Fee Mitigation

<table>
<thead>
<tr>
<th>Site:</th>
<th>22 acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>% impervious:</td>
<td>95%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Cost (Design + Const.)</th>
<th>$ 580,000</th>
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<td>Annual Storm water Fee</td>
<td>$ 68,000</td>
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<tr>
<td>Payback in Years</td>
<td>8.53</td>
</tr>
</tbody>
</table>

| + Federal Stimulus Package | Immediate 50% Depreciation: | $ 290,000 |

#### Solar PV Power

<table>
<thead>
<tr>
<th>Solar PV Power</th>
<th>Economics</th>
<th>4700</th>
</tr>
</thead>
<tbody>
<tr>
<td>install cost per watt</td>
<td>$8.26</td>
<td></td>
</tr>
<tr>
<td>total cost installed</td>
<td>$330,000</td>
<td></td>
</tr>
<tr>
<td>Federal 1603 ITC (30%, no max)</td>
<td>99,000</td>
<td></td>
</tr>
<tr>
<td>State solar PV rebate</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Solar Rewards rebate ($2.25/w)</td>
<td>89,910</td>
<td></td>
</tr>
<tr>
<td>Minnesota Made rebate</td>
<td>88,090</td>
<td></td>
</tr>
<tr>
<td>Sundial rebate</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Final client cost</td>
<td>$31,000</td>
<td></td>
</tr>
</tbody>
</table>
Why LEED & Energy Star
Marketing / Branding Strategies
(Item 5)

- Leveraging "Green" brand via marketing / PR
  - Murphy gets far more "press" time than a typical business its size – esp. at the national level.
Why LEED & Energy Star Marketing / Branding Strategies (Item 5)

Industry Recognition

World Trade 100
2012 Article Highlighting Murphy

“You can’t buy this kind of exposure”

Top 50 Green Supply Chain Partners List
Murphy has been listed since list inception 7 Yrs. ago

Murphy is Synonymous with ‘Green’

Practicing green operations is crucial in the warehousing and transportation industries, where Murphy Warehouse Company strives to be a leader. By voluntarily conducting green projects and practices, the company believes they can truly make a positive difference for their customers, employees and overall environment.

By fulfilling certain audits, authorizations and other required green documentations, Murphy is readily able to assist and contribute to their customers’ green needs directly. They can handle products throughout their life-cycle, and through sustainability efforts, create customized, cost effective solutions while cutting back on their environmental impact.

To that end, Murphy Warehouse Company has purchased its first full-scale facility to serve southern Minnesota. The 350,000 square-foot warehouse in Eagan, Minn. will serve customers in food, medical, retail, paper and home construction, according to the company.

Murphy operates 11 facilities in the Twin Cities (Minneapolis/St. Paul) area.

Under Murphy Warehouse ownership, the 350,000 square-foot Eagan logistics campus will undergo $3 million in improvements including several environmentally sustainable features, from native prairies to solar panels; common to the company’s other logistics campuses.

Murphy Warehouse also will transform the campus to include several other green features. Upgrades have already begun to meet LEED and Energy Star certifications, including the installation of state-of-the-art, energy efficient HVAC, sprinkler and lighting systems. Murphy Warehouse is working with partner tenKsolar Inc. to install solar panels on the roof to generate energy for the building and to feed excess energy back into the grid – something that four Murphy buildings already feature.

The Eagan campus will include native prairie grasses, trees and sensor-controlled irrigation to manage storm water and bring aesthetic value – a signature feature of all Murphy Warehouse facilities.

Future improvements being explored include raising the roof of the warehouse building an additional 10-12 feet in the next decade, bringing its total height to 32 feet. All current upgrades are designed to facilitate this height.

“We want to be a good neighbor in Eagan,” says Richard Murphy, Jr., president and CEO of Murphy Warehouse. “Bringing this building back to life, and making it better than before with green features, is the Murphy way of doing business.”
Why LEED & Energy Star Marketing / Branding Strategies (Item 5)

KARE 11 TV
Richard Interviewed on Simply Science Feature Discussing Murphy's Prairies and Stormwater

MN Pollution Control Agency
Small Business Enterprise Newsletter Feature - How many of you would like to not fear the MPCA….

The business case for greening your grounds

When businesses “go green,” they tend to focus on the inside of their facilities, yet many of these facilities are surrounded by traditional lawns that are expensive to maintain, require chemical fertilization, and create polluted runoff. Businesses can and should do more with native prairies, stormwater management systems, and tree plantings. Greenery is not only beautiful, but helps preserve our environment.

It is a common misconception that managing for stormwater is too expensive or will not have a good return on investment. Murphy Warehouse’s experience with stormwater management has shown the opposite.

Big savings tracked

Murphy Warehouse Co. is a logistics firm with several local warehouse facilities. They began greening their grounds more than 15 years ago, and have achieved more than $500,000 in cost savings since then.

Simply Science: Storm water runoff

MINNEAPOLIS – Storm water runoff is a problem for city infrastructures and the environment and because of that cities have been forced to issue storm water fees.

“About three years ago we woke up with a $56,000 bill, and we thought this is interesting will it ever go away?” said Richard Murphy, Jr., CEO & President of Murphy’s in Minneapolis.

The financial solution was also a very green solution.

“We took this site which is an old industrial site, 95% impervious because of the asphalt and flat roofs. All the storm water basically used to run off of here.” said Murphy, Jr.

“We now capture over 85% of it in a series of retention basins and bio-retention basins, and rain gardens and prairies as part of the solution and we no longer pay a storm water fee.” said Murphy, Jr.

All that, by basically restoring pieces of natural prairie habitat.
Toward Carbon Neutrality
Murphy Fridley Logistics Campus
500,000 sq. ft.; 21 acres

12.83% carbon emission vs. standard warehouse **

** Source: US EPA / US DOE Energy Star Program; 3873 GHG reflects an average warehouse with score of 50. Murphy bldg’s scored 99 & 98 respectively out-of-possible 100 points, thus placing them in top 1% category.
Business Case for Sustainability: 
Balancing Economic & Environmental Factors

“A truly sustainable organization balances economic & environmental factors”

2013 AEE / ASHRAE / USGBC Energy Expo
“Sustaining Together”
St. Paul River Center
October 2, 2013

Richard Murphy Jr. ASLA
President & CEO
Murphy Warehouse Co.
E-mail: richard@murphywarehouse.com

&
IWLA Sustainable Logistics Initiative (SLI), Chair
&
Past Chair
Council of Supply Chain Management Professionals (CSCMP)
Center For Transportation Studies (CTS), U of MN
American Society of Landscape Architects – MN Chapter