Internship Opportunities in Civil & Environmental Engineering

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CE 105
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Overview

- Department of Natural Resources Pollution Prevention Internship- Hy-vee, INc.
- U.S. Environmental Protection Agency-Fellowship Program
- RISE- Germany: Research Internships in Science and Engineering
DNR Pollution Prevention

- **What is Pollution Prevention (P2)?**
  - Act of changing manufacturing operations or practices in order to reduce or eliminate waste and pollutants at the source
- **P2 Services**
  - No-cost, confidential and non-regulatory assistance designed to improve a company’s bottom line while helping the environment
P2 Intern Program

- One week of training in P2 methodologies
- 11 weeks at company
- 22 interns at companies around Iowa (2008)
- Interns are project managers or team members with company employees
- Technical support from DNR
My experience with P2 Program: Hy-Vee

**Project goal**
Develop a model for increasing the efficiency of the facility waste reduction and handling procedures

**Project Focuses**
- Cardboard Recycling
- Paper Recycling
- Organic Waste
- Plastic Recycling

**Current Waste Production**

<table>
<thead>
<tr>
<th>Warehouse</th>
<th>Estimated Waste Tons/Year</th>
<th>Approx. Disposal Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery</td>
<td>564</td>
<td>$34,000</td>
</tr>
<tr>
<td>Perishables</td>
<td>396</td>
<td>$23,900</td>
</tr>
<tr>
<td>HBC</td>
<td>22</td>
<td>$1,300</td>
</tr>
<tr>
<td>Totals</td>
<td>982</td>
<td>$59,200</td>
</tr>
</tbody>
</table>
# Project Impact Summary

<table>
<thead>
<tr>
<th>Project</th>
<th>Annual Cost Savings</th>
<th>Environmental Results</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard Recycling</td>
<td>$100,275</td>
<td>388 tons diverted</td>
<td>In progress</td>
</tr>
<tr>
<td>Paper Recycling</td>
<td>$2,600</td>
<td>40+ tons diverted</td>
<td>Implemented</td>
</tr>
<tr>
<td>Organic Waste</td>
<td>$12,785</td>
<td>252 tons diverted</td>
<td>Recommended</td>
</tr>
<tr>
<td>Plastic Recycling</td>
<td>$15,485</td>
<td>27 tons diverted</td>
<td>Recommended</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$131,145</strong></td>
<td><strong>707 tons diverted</strong></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- Recommendations will result in:
  - Over 700 tons of solid waste diverted
  - 1,916 tons of CO$_2$ diverted
- Employee education and cooperation crucial!
- To get best recycling rebates, materials should be bid out to recycling companies
- Equipment should also be bid out
  - Balers
  - In-vessel composting equipment
- Keep waste management and recycling information organized and monitor regularly
U.S. EPA: National Network for Environmental Management Studies

- Provide students with practical research opportunities and experiences in an EPA office or laboratory
- Fellows work in 10 regional offices/laboratories
- Full-time during summer, part-time during school year
- Categories
  - Environmental Policy, Regulation, and Law
  - Environmental Management and Administration
  - Environmental Science
  - Public Relations and Communications
My project: Waste-to-energy Technologies in the Midwest

• Research waste-to-energy (WtE) technologies
• Quantify waste in Midwest (Region 5) that could be used for energy
• Give presentation, report for EPA use to educate employees about WtE
Waste-to-Energy Technologies

• Combustion/Incineration
• Anaerobic digestion
• Mechanical-Biological Pretreatment
• Gasification Technologies
• Methane collection at landfills
• Biodiesel/Ethanol production
Quantity of Energy Available From Waste in Region 5

- Biomass Waste
- If 30% conversion efficiency, there would be enough energy for 16,000 homes/year

<table>
<thead>
<tr>
<th>Biomass Type</th>
<th>Higher Heating Value (MJ/kg)</th>
<th>Quantity of Waste, kg</th>
<th>Maximum Energy Potential, TJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Residues*</td>
<td>17.65</td>
<td>55,806,000</td>
<td>985.0</td>
</tr>
<tr>
<td>Forest Residues**</td>
<td>19.56</td>
<td>7,851,000</td>
<td>153.6</td>
</tr>
<tr>
<td>Primary Mill Residues††</td>
<td>20.00</td>
<td>194,000</td>
<td>3.9</td>
</tr>
<tr>
<td>Secondary Mill Residues††</td>
<td>20.00</td>
<td>505,000</td>
<td>10.1</td>
</tr>
<tr>
<td>Urban Wood Residues†</td>
<td>19.56</td>
<td>5,564,000</td>
<td>108.8</td>
</tr>
<tr>
<td>Methane from Landfills***</td>
<td>141.91</td>
<td>3,014,000</td>
<td>427.7</td>
</tr>
<tr>
<td>Methane from Manure***</td>
<td>141.91</td>
<td>314,000</td>
<td>44.6</td>
</tr>
<tr>
<td>Methane from Wastewater**</td>
<td>141.91</td>
<td>83,000</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>1,746</td>
</tr>
</tbody>
</table>
Quantity of Energy Available From Waste in Region 5

- MSW
- If 30% conversion efficiency, there would be enough energy for 18.5 million homes/year

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Higher Heating Value (MJ/kg)*</th>
<th>Quantity of Waste, MT</th>
<th>Maximum Energy Potential, TJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper/cardboard</td>
<td>16</td>
<td>15,387,388</td>
<td>246,198</td>
</tr>
<tr>
<td>Wood</td>
<td>17</td>
<td>2,112,776</td>
<td>35,917</td>
</tr>
<tr>
<td>Cotton/wool</td>
<td>20</td>
<td>757,410</td>
<td>15,148</td>
</tr>
<tr>
<td>Leather</td>
<td>23</td>
<td>597,956</td>
<td>13,753</td>
</tr>
<tr>
<td>Yard trimmings**</td>
<td>15</td>
<td>5,102,554</td>
<td>76,538</td>
</tr>
<tr>
<td>Food wastes</td>
<td>17</td>
<td>4,026,234</td>
<td>68,446</td>
</tr>
<tr>
<td>Plastics</td>
<td>33</td>
<td>3,946,506</td>
<td>130,235</td>
</tr>
<tr>
<td>Rubber</td>
<td>23</td>
<td>597,956</td>
<td>13,753</td>
</tr>
<tr>
<td>Fabrics</td>
<td>20</td>
<td>757,410</td>
<td>15,148</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>615,137</strong></td>
</tr>
</tbody>
</table>
Summary/Conclusions

• Many new WtE technologies
  ▫ Most are still in developmental stages
• WtE has great potential for use in the Midwest/Region 5
• Obstacles need to be addressed and overcome
• Need more incentives for implementing WtE technology vs. landfilling
• No single technology will be the solution
RISE: Research Internships in Science and Engineering in Germany

- North American undergraduates work with German doctoral students in their labs for the summer (6-12 weeks, between mid-May and August)
- Real world research experience with thorough experience of today's Germany
- No language requirement
- Web-based matching process
- Through DAAD (German Academic Exchange Service)
In 2008 RISE scholars were placed at 102 institutions in 56 cities all across Germany.
The Scholarship 2009

- A two weeks preparatory language course for 50 students
- A scholarship grant based on a rate of € 21 per day (for a maximum of € 650 per month)
- Health insurance as well as accident and personal liability insurance, issued directly through the DAAD
- A paid-for three-day meeting in Heidelberg, July 9-11
- A five-day German Rail Pass for the participants of the meeting
My RISE Experience
Saarbruecken, Summer 2006

• Research experience
  • Co-author on a paper published in 2008
• Germany during the World Cup!
More Information

- P2 Internship Program:  
  http://www.iowadnr.gov/waste/p2/intern.html
- EPA Fellowship Program:  
  http://www.epa.gov/enviroed/students.html
- RISE Internship Program:  
  http://www.daad.de/rise/en/
  - Information Sessions on Campus
    - 11/16, 5 pm, Study Abroad Center (3224 MU)
    - 12/7, 5 pm, Study Abroad Center (3224 MU)