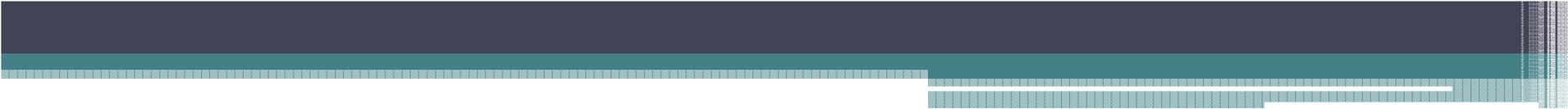


Internship Opportunities in Civil & Environmental Engineering

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CE 105

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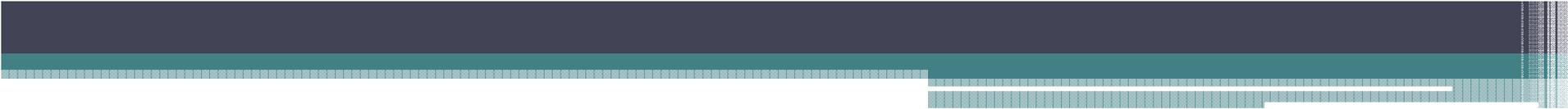
Overview

- 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

| Warehouse | Estimated Waste Tons/Year | Approx. Disposal Cost |
|---------------|---------------------------|-----------------------|
| Grocery | 564 | \$34,000 |
| Perishables | 396 | \$23,900 |
| HBC | 22 | \$1,300 |
| Totals | 982 | \$59,200 |

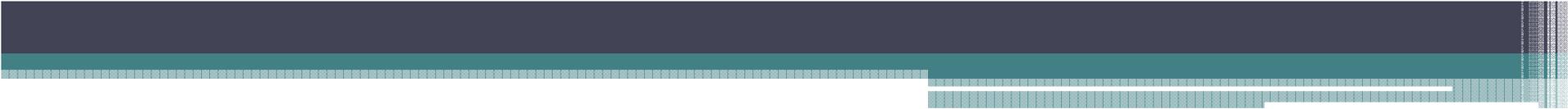


Project Impact Summary

| Project | Annual Cost Savings | Environmental Results | Status |
|---------------------|----------------------------|------------------------------|---------------|
| Cardboard Recycling | \$100,275 | 388 tons diverted | In progress |
| Paper Recycling | \$2,600 | 40+ tons diverted | Implemented |
| Organic Waste | \$12,785 | 252 tons diverted | Recommended |
| Plastic Recycling | \$15,485 | 27 tons diverted | Recommended |
| Totals | \$131,145 | 707 tons diverted | |

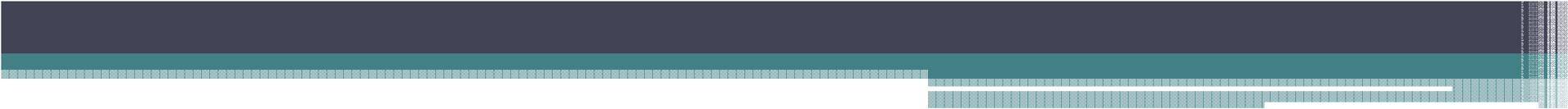
Conclusions

- Recommendations will result in:
 - Over 700 tons of solid waste diverted
 - 1,916 tons of CO₂ 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



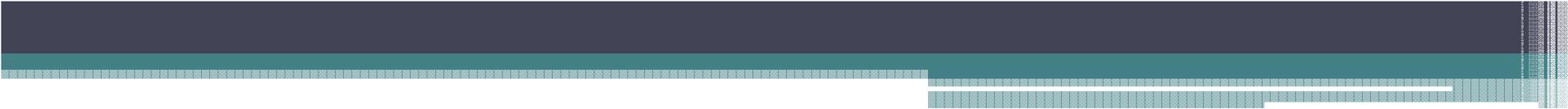
U.S. EPA: National Network for Environmental Management Studies

- 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

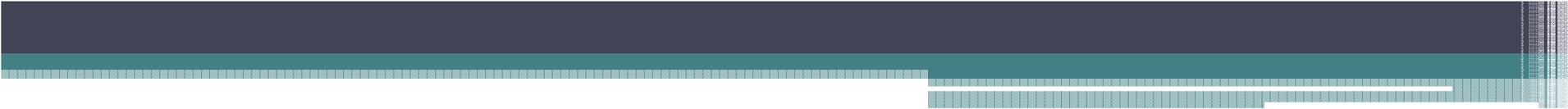
- Biomass Waste
- If 30% conversion efficiency, there would be enough energy for 16,000 homes/year

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

Quantity of Energy Available From Waste in Region 5

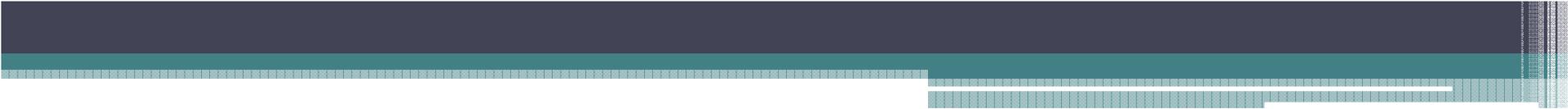
- MSW
- If 30% conversion efficiency, there would be enough energy for 18.5 million homes/year

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



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)