

The Carbon Life Cycle

■ Assessment of the Production of Shelterbelt species in Saskatchewan

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Introduction - Shelterbelts

- Shelterbelt adoption in Saskatchewan throughout the 1900s (Amichev et al., 2015)
- Prairie Farm Rehabilitation Administration (PFRA)
- Saskpower's Shand Greenhouse provides approximately 500,000 seedlings a year (SaskPower, 2019)



Introduction – Carbon and LCA

- Carbon sequestration/
storage in shelterbelts as
a mitigation tool
(Amichev et al., 2016)
- Carbon Life Cycle
Assessment (LCA) (ISO,
2006)



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Objective

- Estimate CO₂eq emissions during the production of shelterbelt seedlings as part of a comprehensive carbon LCA.



Courtesy of Mad Lab

Methods

- Data collection
 - Relevant LCA and forestry literature review
 - Interviews with management at Shand Greenhouse
 - Greenhouse heating calculator (ACF Inc., 2019)

- SimaPro – Life Cycle Assessment Software
 - EcolInvent
 - Run analyze using data → IPCC GWP 100a (PRé, 2018)



<https://simapro.com/>

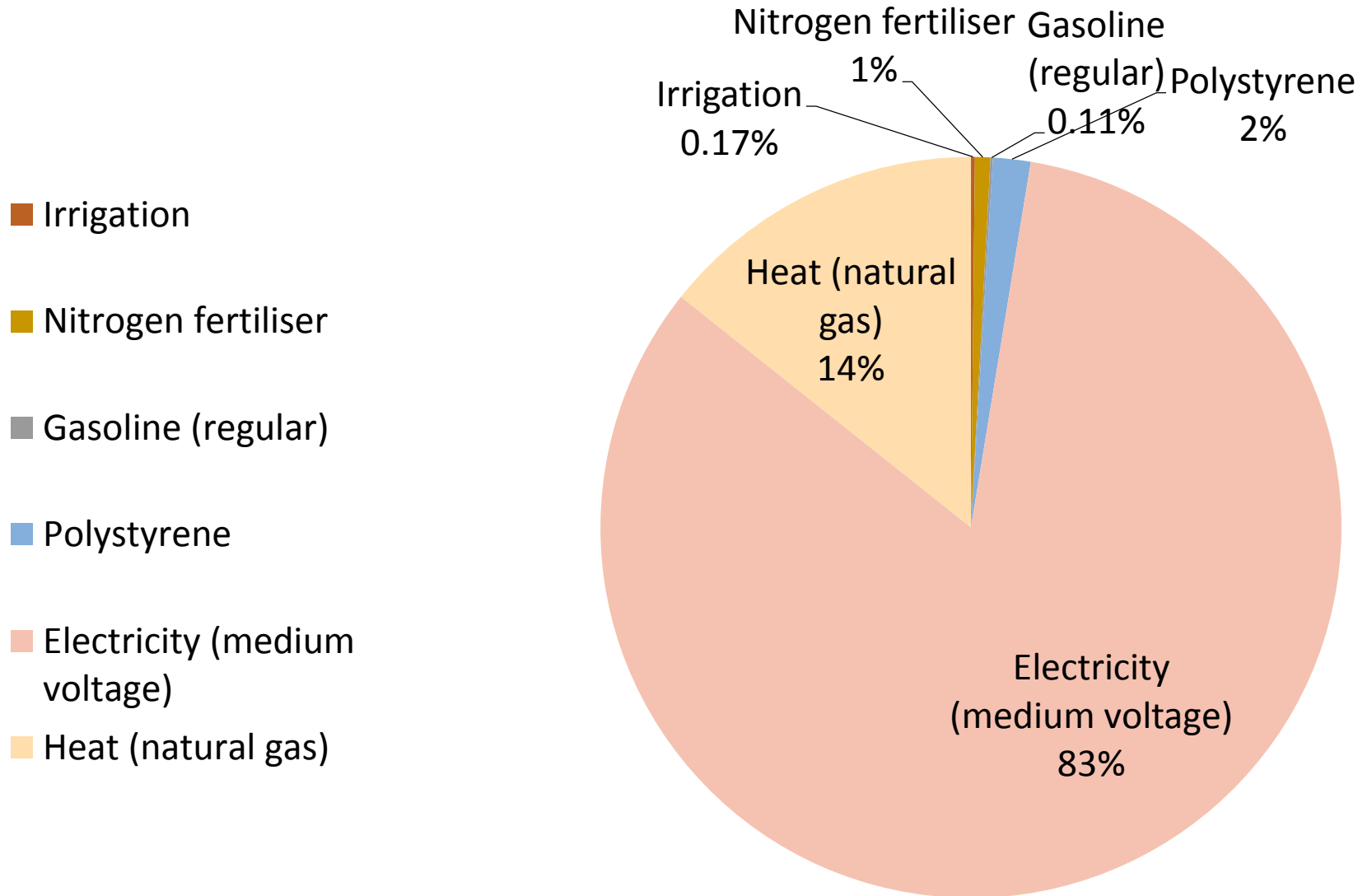
Preliminary Results



Image courtesy of Mad Lab

IPCC GWP 100a

Natural Gas Heating



Discussion

- Overall CO₂eq of the first life cycle stage
- Highlight the highest CO₂eq producing facets of a process:
 - Electricity for all operations (greenhouse, office space, storage, etc.) = 83% of CO₂eq
 - Natural gas for heating greenhouse year-round = 14%
 - Other inputs register as miniscule in comparison*

*Miniscule ≠ insignificant

Limitations

- Choices and Assumptions (ISO, 2006)
- Data gaps
- Proxies
- Manipulation

Conclusion

- Electricity and heating are highest contributors to CO₂eq
- Each life stage must be understood in order to have a comprehensive carbon LCA

Take home message

- Tool to inform policy
- LCA research must be **transparent** and **justified**
- Importance of understanding individual steps as well as the LCA as a whole



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Image references

In order as they appear

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Questions?