

Introduction of ChE 143-144 Topics AY21-22

17 June 2021

Sustainable Food
& Water Solutions

Clean
Transportation

What we do

VISION

SPaRC will be a hub for collaborative activities that enable businesses, consumers and policy makers to create sustainable actions and strategies



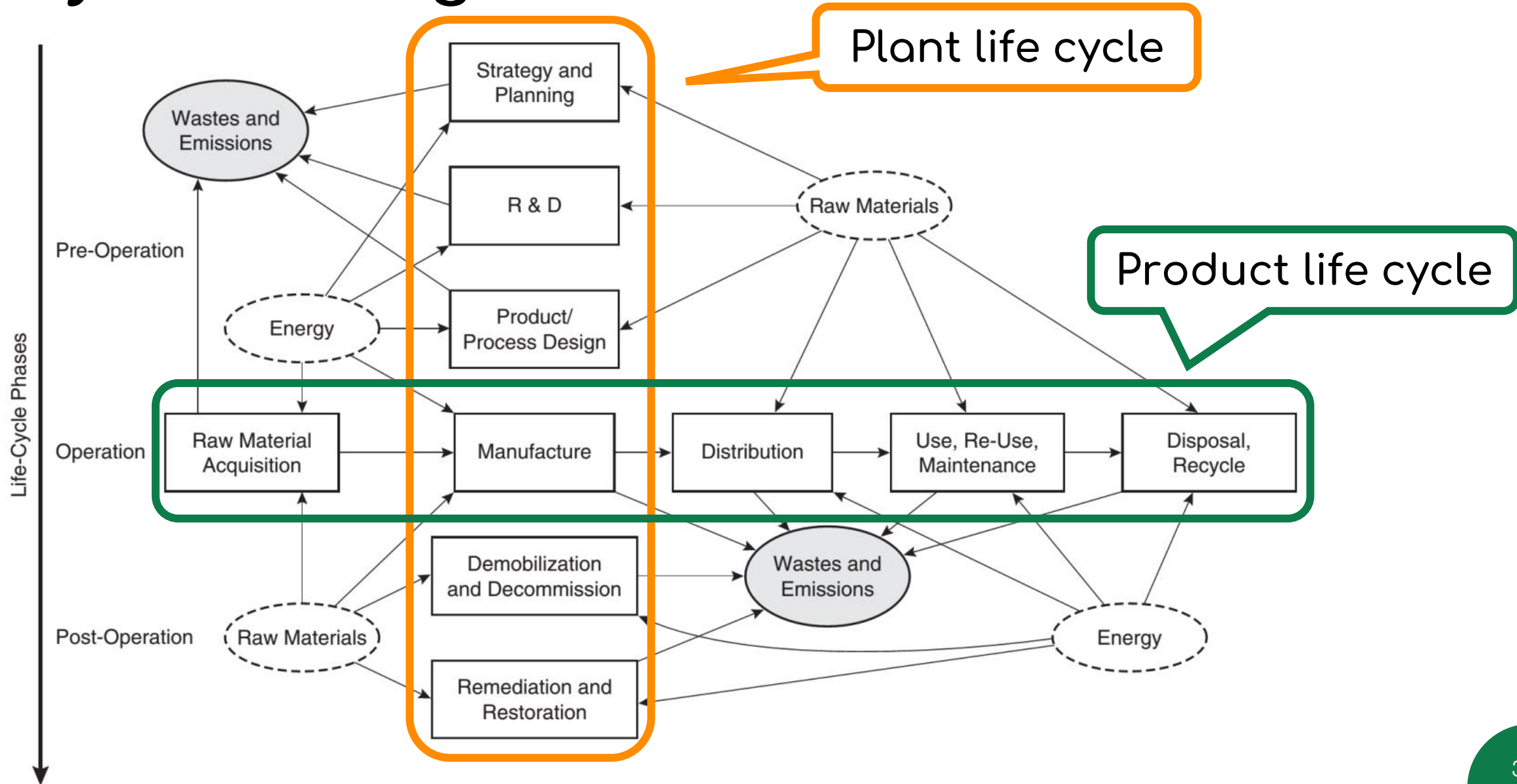
Life cycle sustainability assessment

Systems modeling and decision analysis



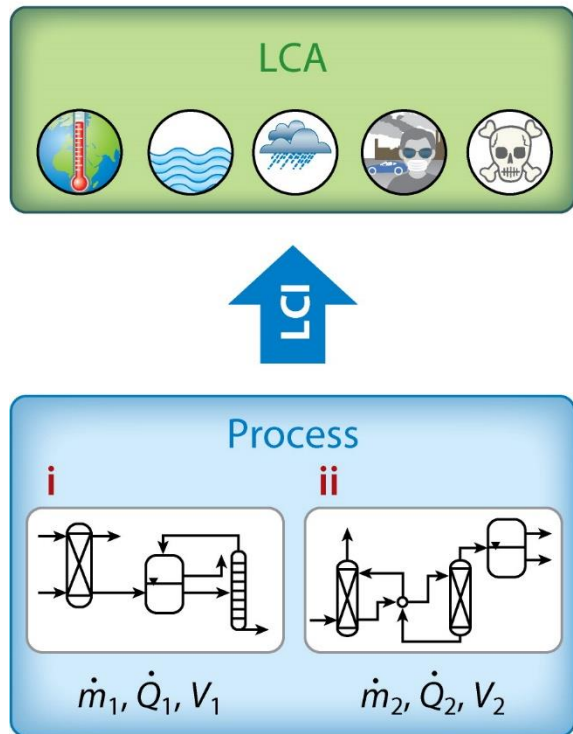
Sustainability in engineering education and policy

Life Cycle Thinking in ChE

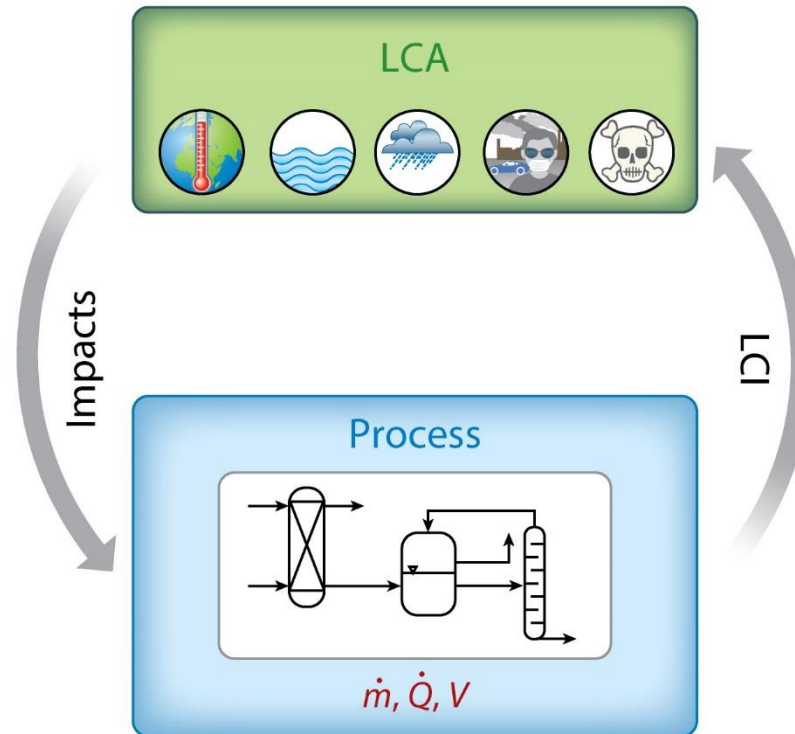


Integrating LCA with Process Design

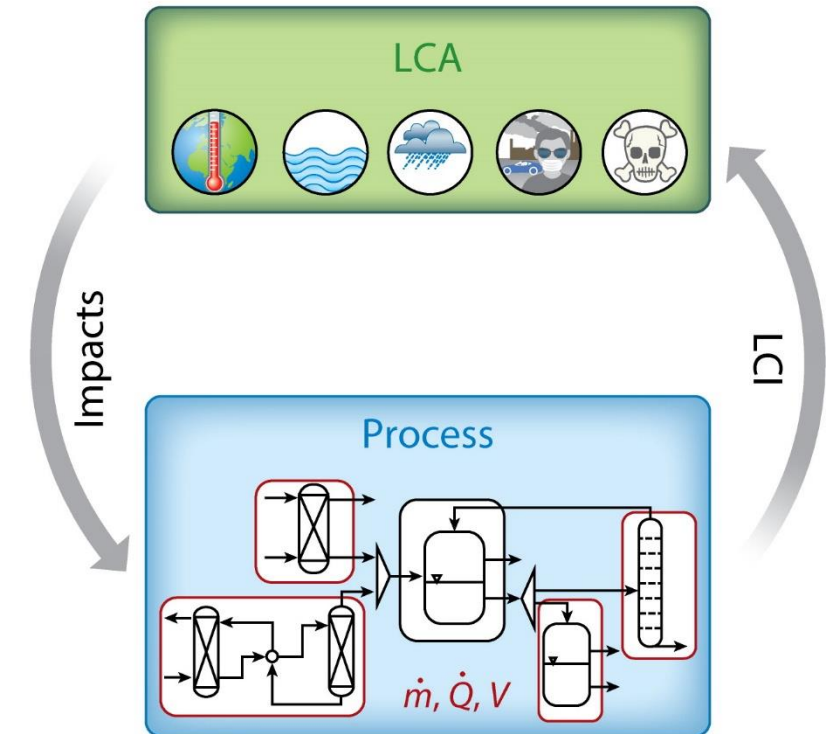
a Process selection



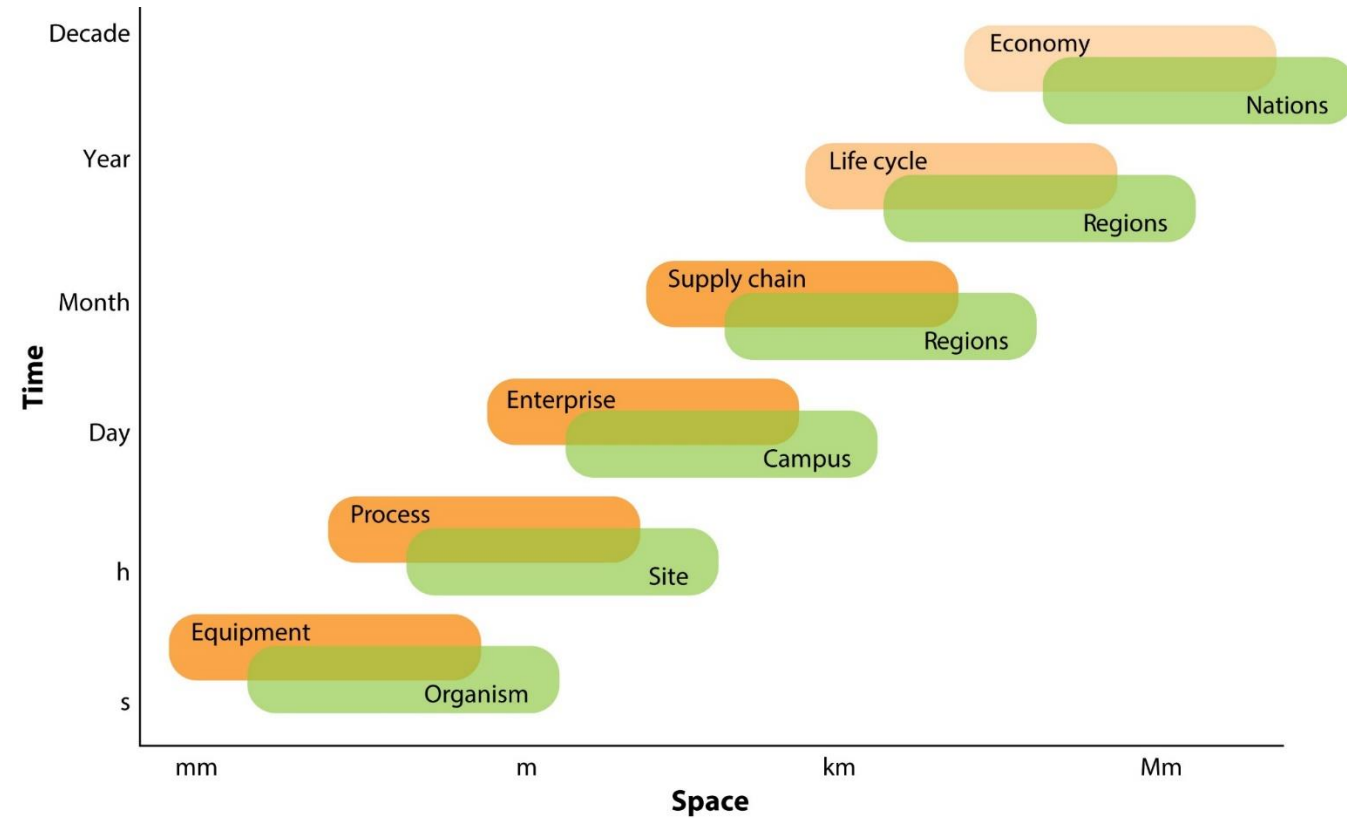
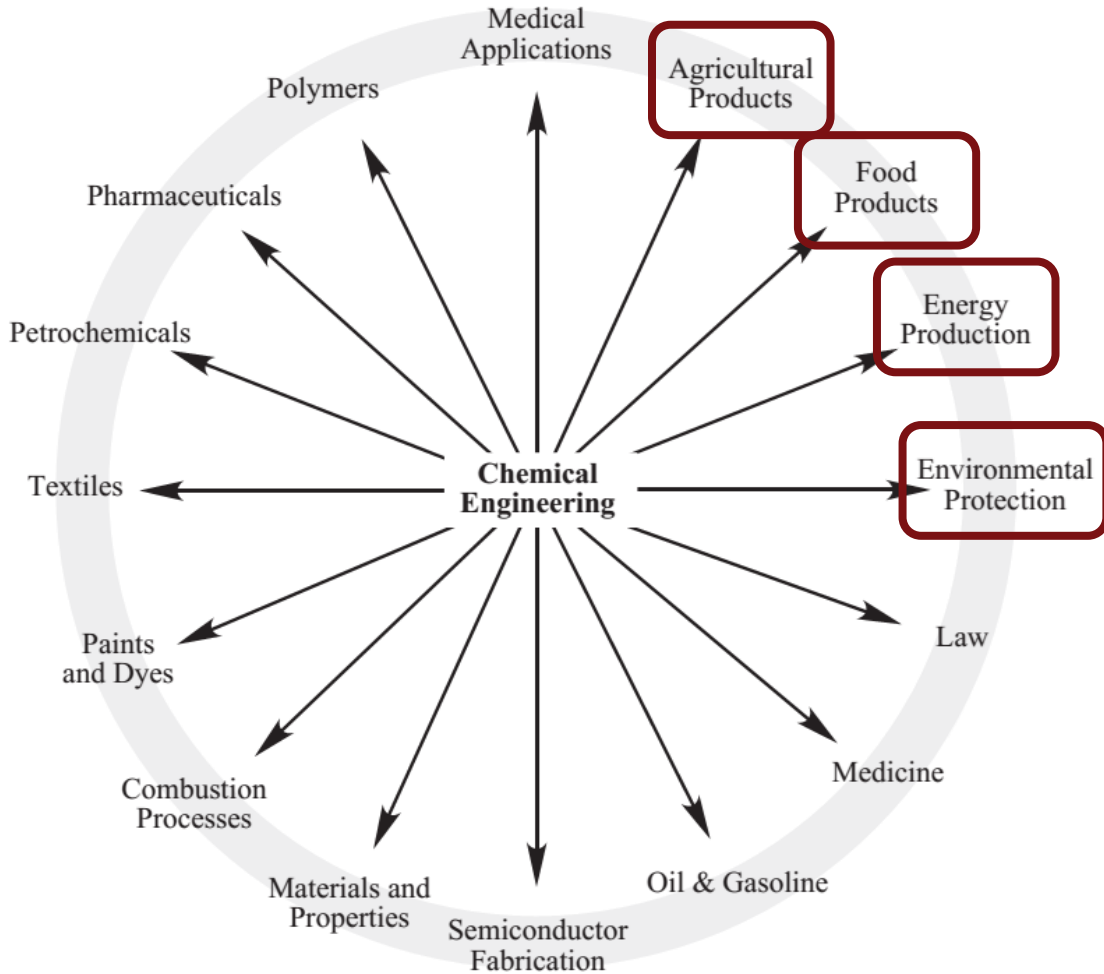
b Process optimization



c Process synthesis



Our Scope



Bakshi BR. 2019.
Annu. Rev. Chem. Biomol. Eng. 10:265–88

Multi-scale, multi-disciplinary approach to sustainability

Tools and Methods

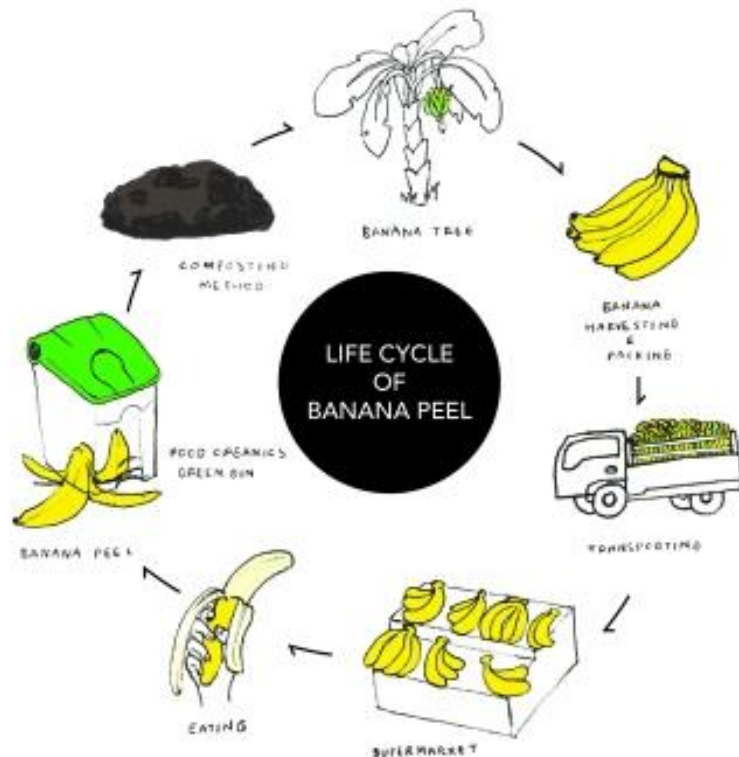
- Energy and process modeling
 - Demand and supply profiles
 - Technology simulation
 - Economic analysis
- Life cycle assessment
 - Material flow analysis, life cycle inventory
 - Life cycle impact assessment
- Scenario analysis
 - Sensitivity analysis
 - Scenario development
- Decision analysis
 - Social impact assessment
 - Multi-criteria decision analysis



Topic 1: Banana waste utilization



- Different banana by-products (both pre- and post-harvest)
- Potential for conversion to different materials (both food and non-food)



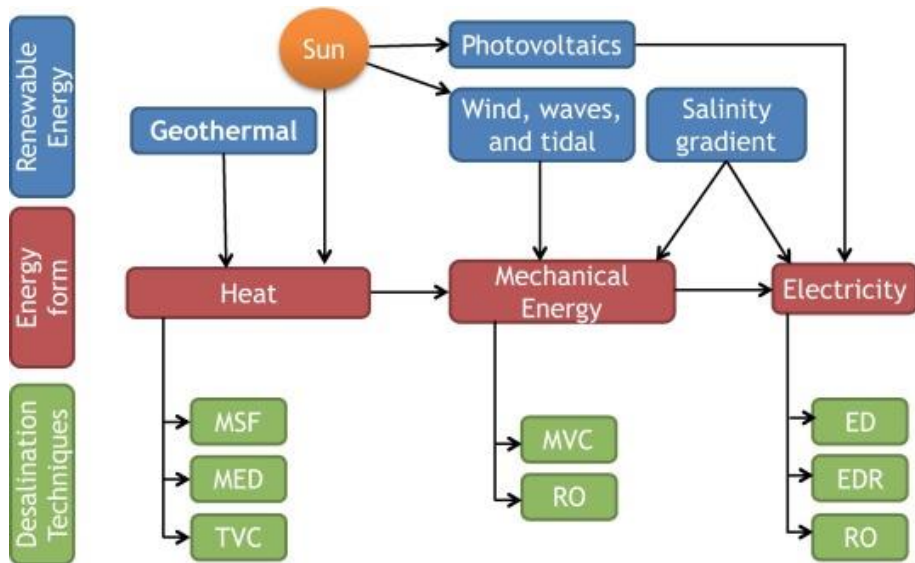
GOAL: elucidate **environmental benefits and trade-offs** of banana waste utilization using LCA

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4252442/>
<https://doi.org/10.1002/9781119528265.ch10>
<https://doi.org/10.1016/j.jclepro.2017.10.298>
<https://doi.org/10.1016/j.jenvman.2020.110493>

Topic 2: Renewable desalination



- Various technology options for desalination in remote communities
- Process models for energy+water systems in different configurations



GOAL: develop **LCA models of renewable desalination** for environmental and economic optimization

<https://www.irena.org/publications/2015/Dec/Renewable-Desalination-Technology-Options-for-Islands>

<https://doi.org/10.1016/j.desal.2017.11.018>

<https://doi.org/10.1016/j.desal.2021.115066>

<https://doi.org/10.1016/B978-0-12-809240-8.00015-0>

SPaRC is looking for affiliates!

Get in touch via email: [joaberilla\[at\]up.edu.ph](mailto:joaberilla@up.edu.ph)
Visit our website: pages.upd.edu.ph/jmaberilla



Who are we looking for?

- Strong interest in sustainability
- Strong background in material and energy balances
- Familiarity with process industries related to the topic
- Understanding of environmental, economic and social issues
- Excellent communication skills
 - Comes handy when dealing with external partners and stakeholders
- Preferably can prepare literature review during the midyear term