



# Energy Transition simulator

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 **Lauritzen Inc.**

The logo features a stylized sunburst icon to the left of the text 'Lauritzen Inc.', where 'Lauritzen' is in orange and 'Inc.' is in blue.

# What is an Energy Transition Simulator?

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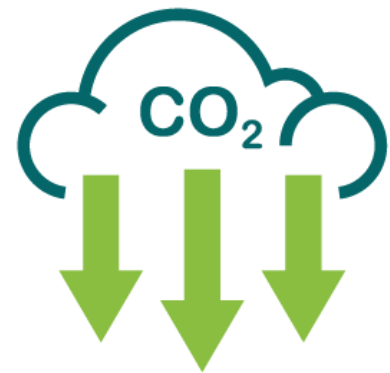
- **Ability to simulate a regional electricity network, such as:**
  - **Independent System Operator New England (ISONE)**
  - **[California Independent System Operator \(CAISO\)](#)**
  - **Or - UNH/Durham network!**
- **ETS components: Generation, Transmission, and Consumption**
- **ETS variables: Weather, Capital and Fuel Cost, and Calendar Period**



# What can be done with an Energy Transition Simulator?

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- **ETS outputs: Electricity cost, Network Robustness, CO2 emissions**
- **Calculate network robustness with new generation sources**
- **Study impact of new appliances such as Heat Pumps and/or EV's**
- **Study most cost-effective methods to reduce CO2 emissions**



# Why is it important to make an ETS?

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- **Create a tool for the public good**
- **Find cost effective methods to reduce CO2 emissions**
- **Increase awareness of how to deal with Climate Change**
- **Create a PR opportunity for UNH**
- **Questions?**



# ETS Contents:

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- **Introduction**
- **Project 1 : Weather and Transmission Module**
- **Project 2: Consumption Module**
- **Project 3: Generation Module**



# PROJECT 1: WEATHER MODULE

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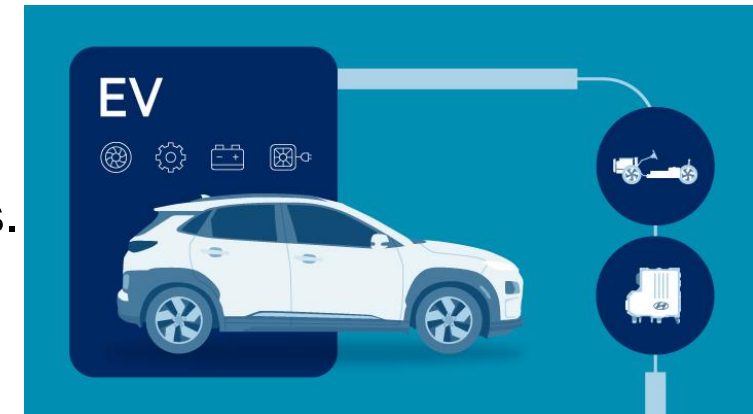
- Generate historical and projected weather data at points within simulated area.
- Problem: Historical data is limited to available weather stations.
- Solution: Compute local weather data from available stations. Generate future best/average/worst case weather data..
- Expectations:
  - Create sample weather data set ASAP.
  - Provide historical data.
  - Finally, generate future data.
- Group: 2xCS or CS/DS, plus IT



# PROJECT 2: Consumption module

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- Create several consumer models which collectively exhibit current energy consumption behaviour and can be reconfigured to project future demand.
- Problem: only historical aggregate electricity consumption data is available.
- Solution: analyse historical data and create model to match historical behavior.
- Expectation:
  - Immediately create single aggregate consumption model.
  - Analyse historical data and create discrete consumption models.
  - Create consumption models for future energy devices.
- Group: 2xCS or CS/DS plus IT
- NOTE; Prof. Marek Petrik has offered to consult with historical data analysis



# PROJECT 3: GENERATION

## MODULE

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- Create several generation models which collectively represent a regional's generation behaviour.
- Create models to represent all major energy sources such as coal, oil, NG, nuclear, hydro, wind and solar.
- Expectation:
  - Immediately create one model capable of delivering unlimited power
  - Create models for traditional power sources
  - Create models for renewable power sources
- Group: 2x CS, plus IT





# ETS Project Summary

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- Simulators have become an important computational subject
- Help provided by sponsor/Mogens Lauritzen (UNHCS-1982)
  - Hands-on engineer
  - Weekly project conferences++
- Exposure to
  - Formal documentation
  - LAMP stack (Linux, Apache, MySQL DB?, Python)
  - Input parsing, data structures, computation, possible IPC, output formatting
  - HTML front end
- Exposure to renewable energy field.
- Ownership!



# Energy Transition Simulator Future Plans

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- ETS is a tool to be used when studying Energy Transition
- ETS users can be
  - UNH Economics/Business
  - UNH Sustainability Institute
  - 3<sup>rd</sup> parties
- By summer-2022, ETS can be used by 3<sup>rd</sup> parties
  - Publish ETS availability
  - Promote ETS features
- ETS-2023 will be an improvement based on user experience/feedback



# QUESTIONS:

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In-depth meeting Saturday Sep-4 @11:00 AM EDT

<https://meet.google.com/qoz-xyzm-rwb>



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[www.lauritzen.biz](http://www.lauritzen.biz)

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