

# *The GAIN Energy Calculator*

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## ***Being able to understand what drives energy choices, and how our choices manifest themselves is not an easy question***

- Complex, multiple choices
- Complex calculations and assumptions
- Hard to visualize the consequences and the actual results of the policy choices
  - Local, national and international
- GAIN has developed a tool to enable all stakeholders to better understand and engage in the conversation
  - Based on the UK "2050 Carbon Calculator" / "The MacKay Carbon Calculator"
  - "American-ized" to take into account State and Federal, as well as key assumptions

# Landing Page



# Start Page



 1) CHOOSE YOUR ENERGY MODEL

 2) MAKE CHANGES

 3) FINISH AND SHARE

Create a new energy model and emissions reduction model or choose an existing one

NATION WIDE



SELECT A STATE



IMPORT PATHWAY FILE



# Quick Facts Page



1) CHOOSE YOUR ENERGY MODEL

2) MAKE CHANGES

3) FINISH AND SHARE

Select a state below

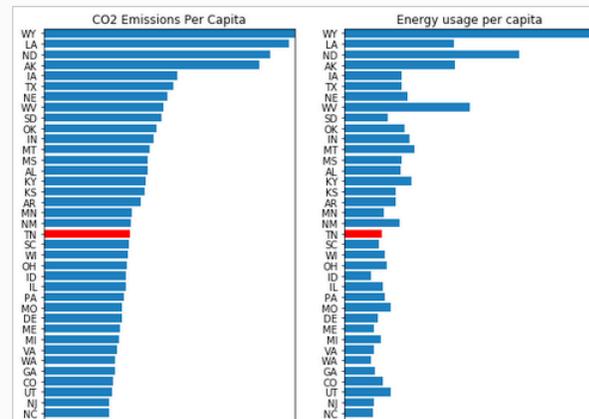
Choose one

## EIA Quick Facts

### State of Tennessee [TN]:

#### Quick facts:

- The Tennessee Valley Authority (TVA) is the nation's largest public power corporation. It owns more than 90% of Tennessee's electric generating capacity and three-fifths of the power plants, including the 10 largest power plants in the state.
- TVA's Watts Bar 2 generating plant, which began commercial operations in October 2016, is the nation's first new nuclear power reactor to enter service in the 21st century. Tennessee's two nuclear power plants provided 44% of in-state electricity in 2019.
- Tennessee's one petroleum refinery, located in Memphis, can process about 180,000 barrels of crude oil per calendar day.
- In 2019, natural gas use by Tennessee's electric power sector was about 32 times greater than a decade earlier as the state's natural gas-fired generation reached a record high and coal-fired generation declined.
- Tennessee is the largest ethanol-producing state in the Southeast and is the 14th-largest ethanol supplier in the nation.



Click To Start

# Main "Dashboard" – Set 'Levels of Ambition' in Supply & Demand

DEMAND - TRANSPORT (5)

DEMAND - HOUSEHOLDS (6)

DEMAND - BUSINESS (7)

SUPPLY - ELECTRICITY GENERATION (10)

SUPPLY - BIOENERGY (4)

OTHER (2)

**1) CHOOSE YOUR ENERGY MODEL**

**2) MAKE CHANGES**

EXAMPLE PATHWAYS

DEMAND - TRANSPORT (5)

Domestic transport behavior No change ?

Individuals travel distances increases by 1% every 5 years; no modal shift

Shift to zero emission transport No change ?

By 2050, maintains current distribution (85% internal combustion engine)

Domestic freight No change ?

Freight distance with diesel fuel increased by 1% every 5 years

International aviation No change ?

Aviation fuel use increases by 1% every 5 years

International shipping No change ?

Marine bunker fuel use increases by 0.5% every 5 years

SUPPLY - ELECTRICITY GENERATION (10)

Nuclear power stations

No new nuclear energy

Carbon capture and storage power plants

Demonstration plants only, no commercial

Carbon capture and storage fuel

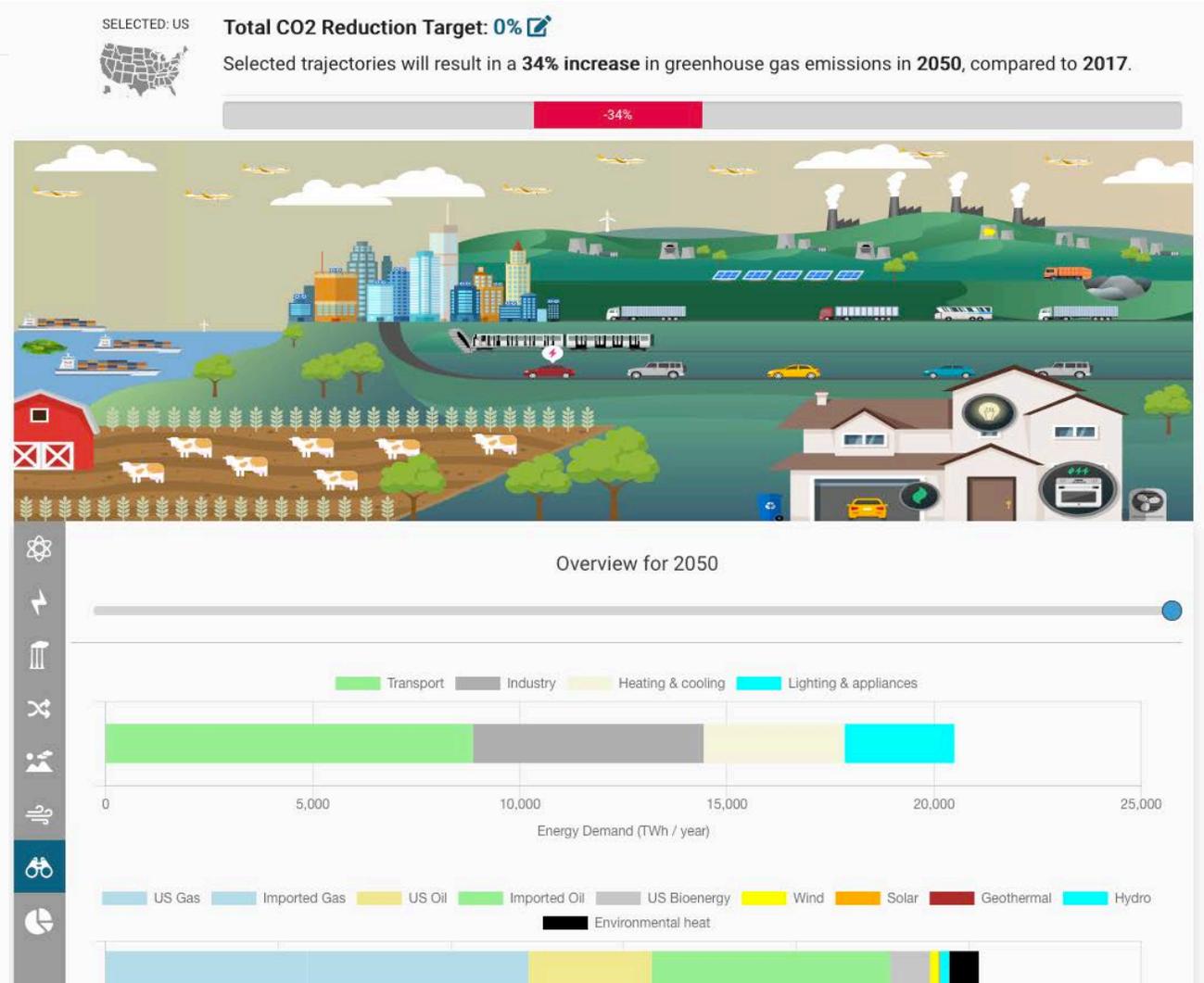
Current fraction (38% Coal, 62% Nuclear)

Offshore wind

No offshore wind

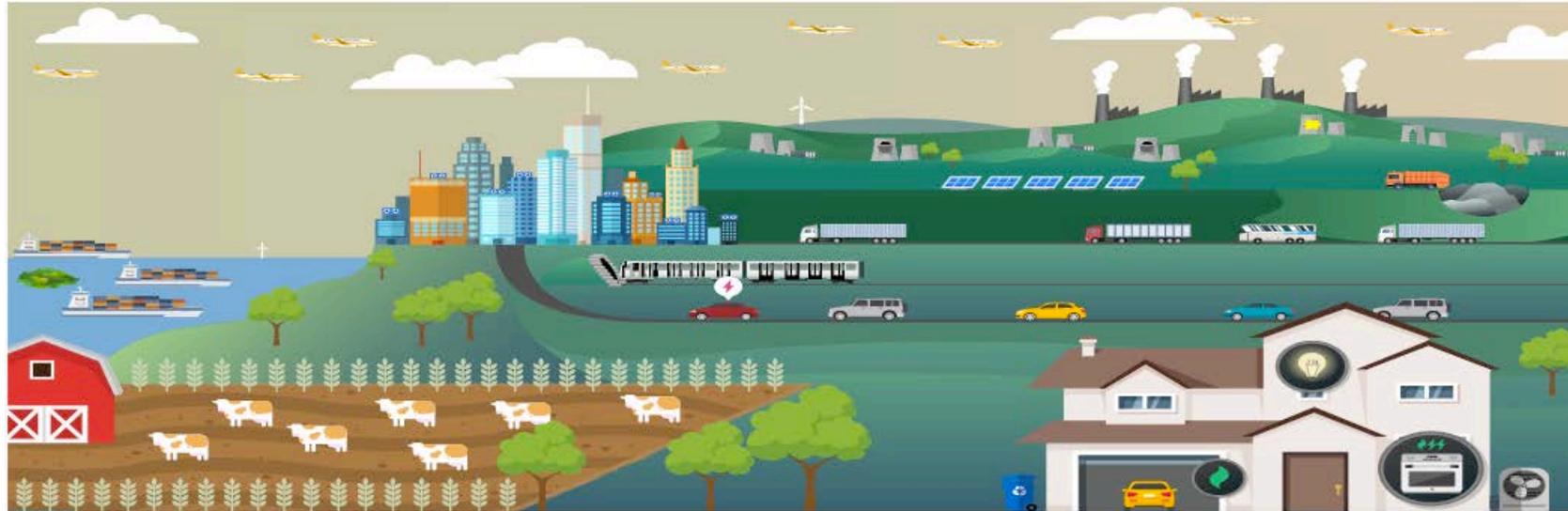
Onshore wind

Follow current regional trajectory

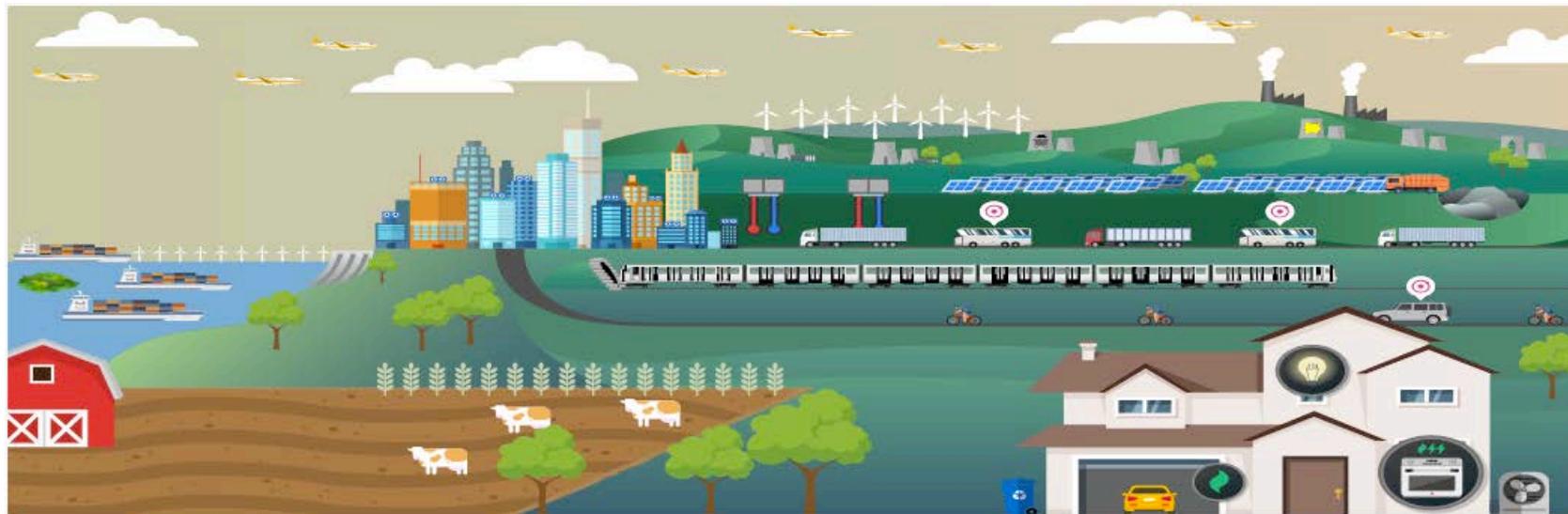


# Seeing how the 'Levels of ambition' impact the world around us

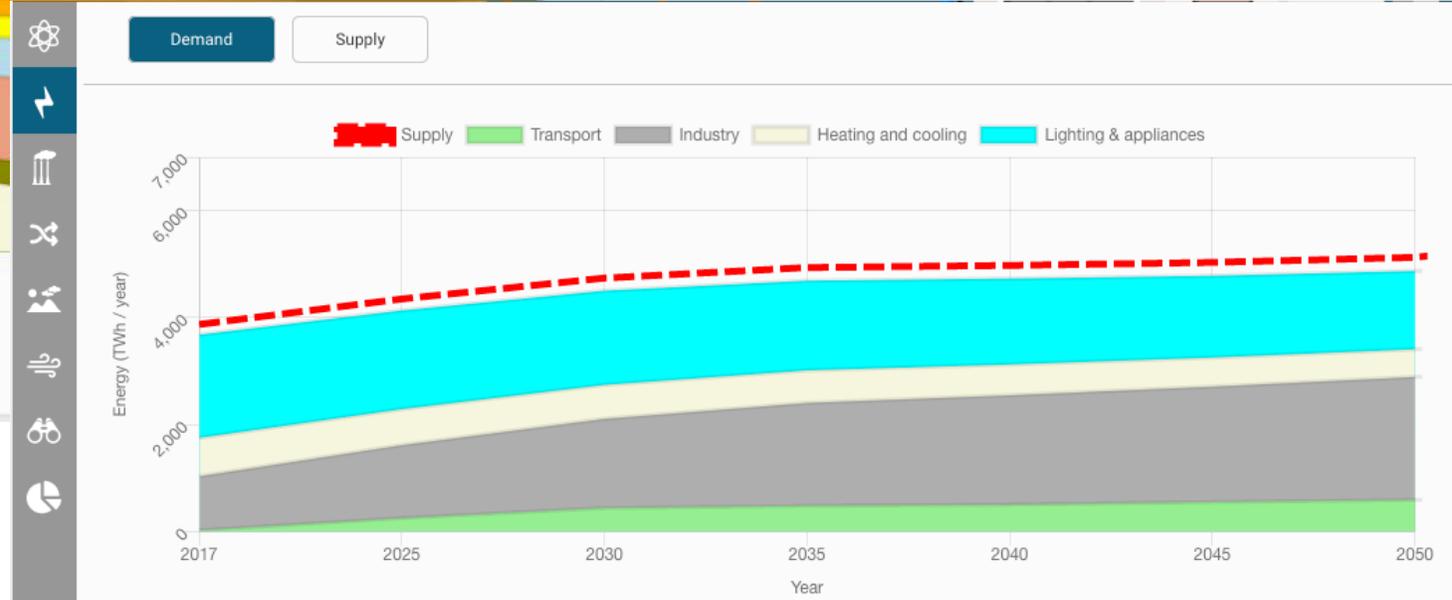
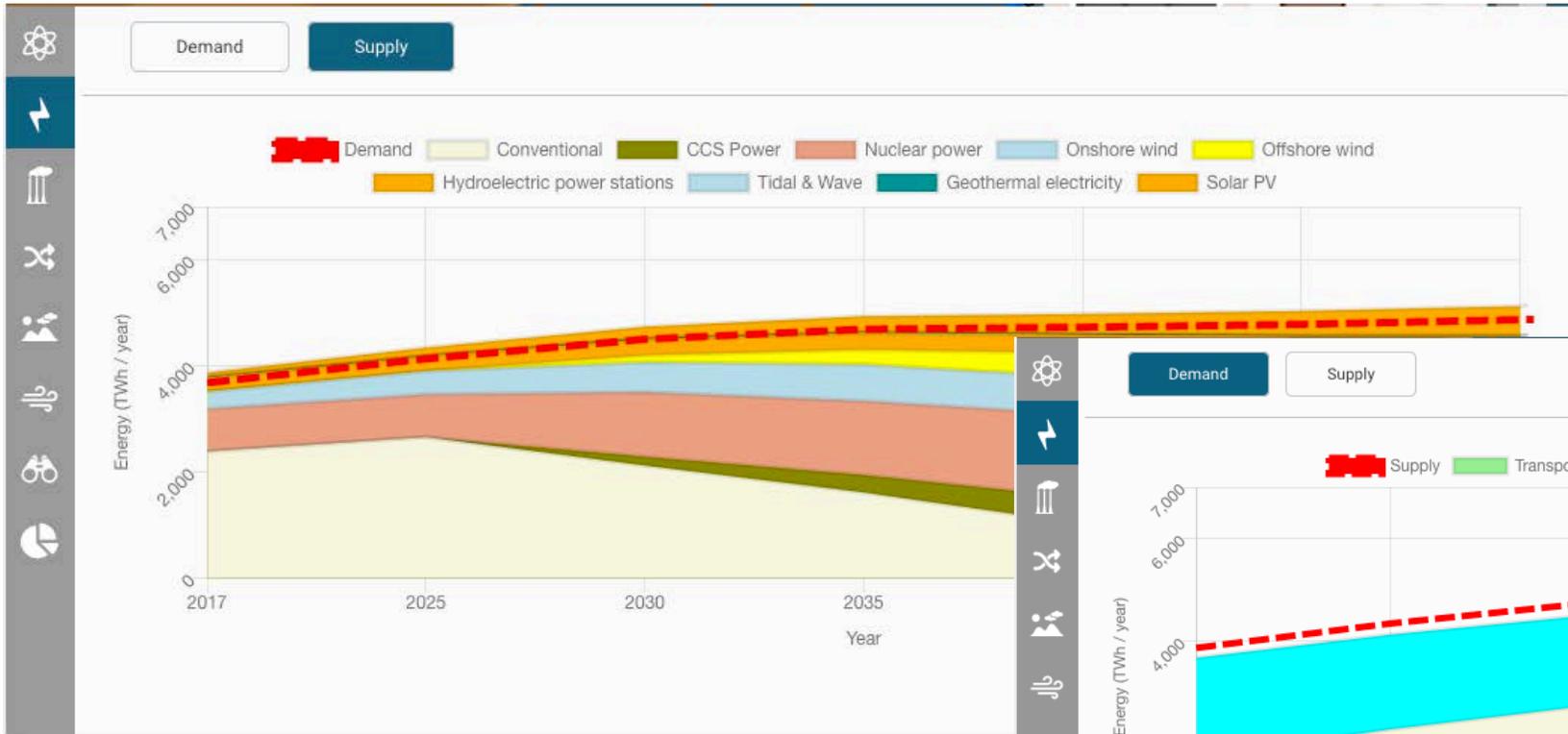
Starting  
position in  
policy



Move to  
renewables,  
and fewer  
cows

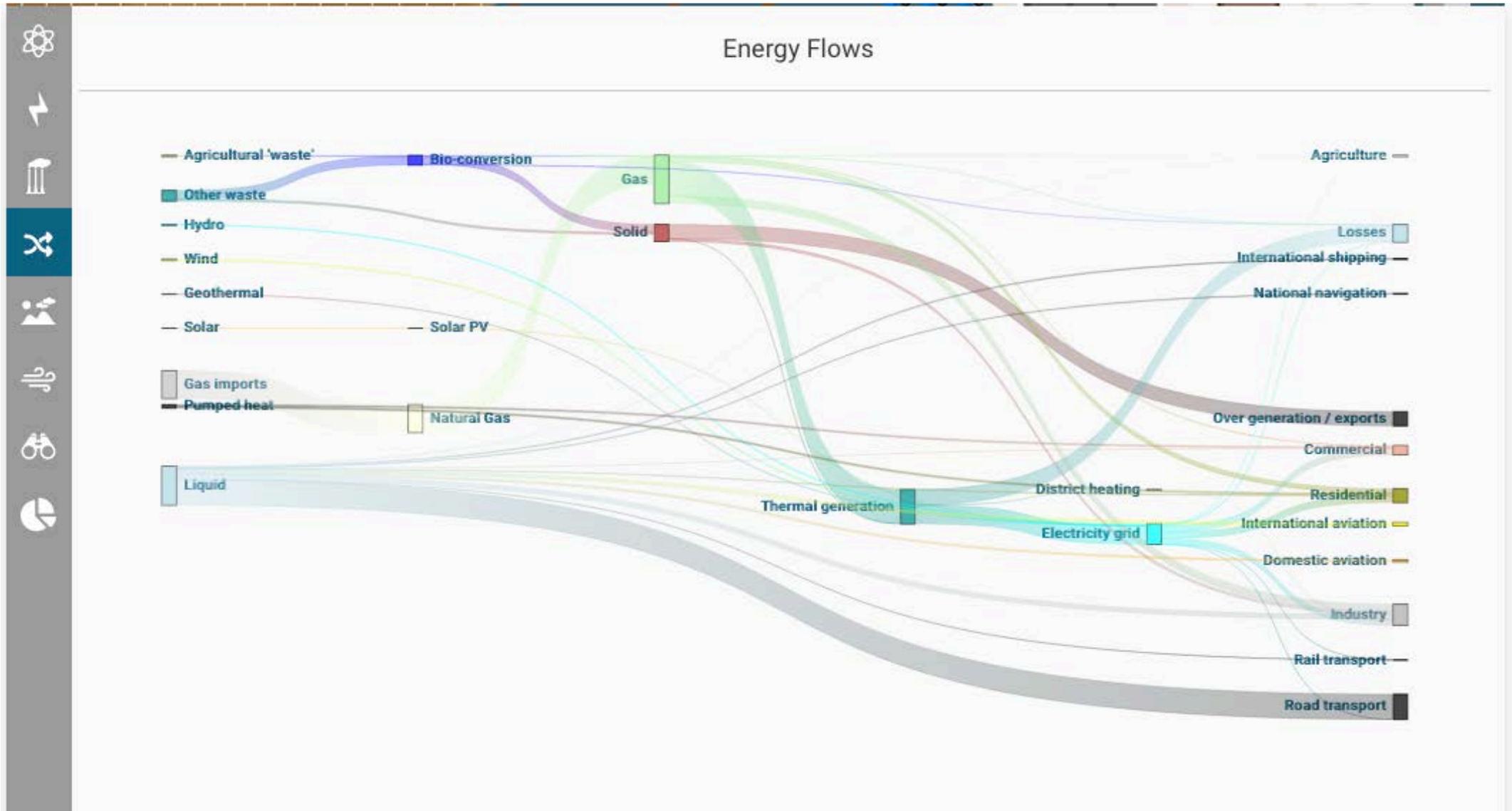


# Results – Supply and Demand for electricity (energy too, not shown here)

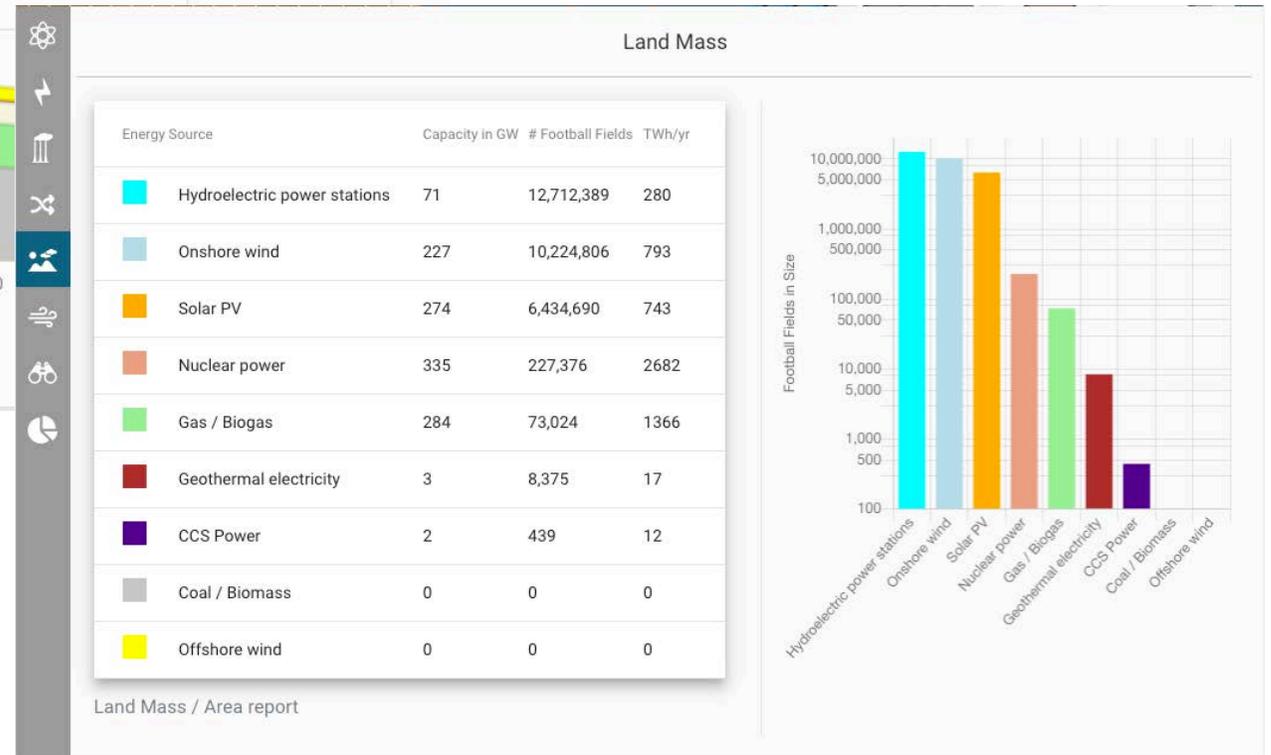
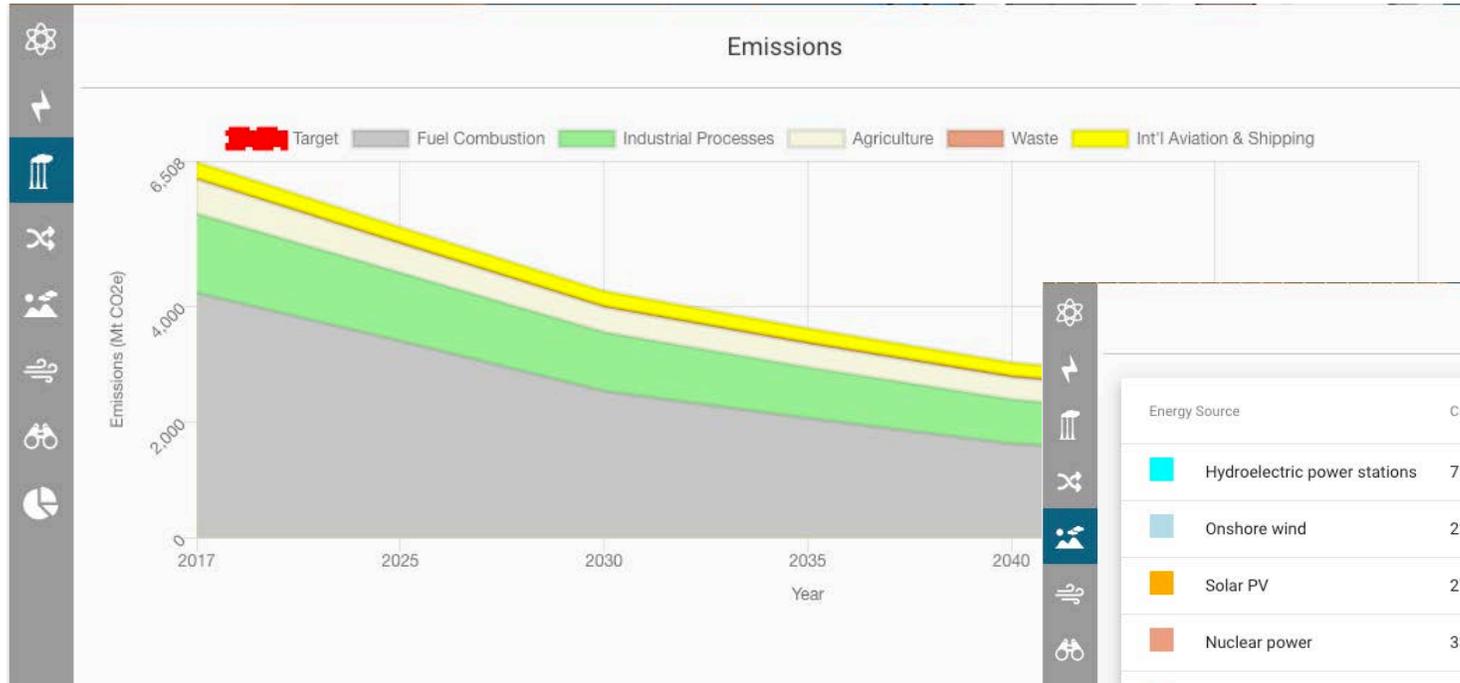


Supply is higher than demand because supply considers raw electricity production and does not take into account transmission losses to the end user. Transmission losses are assumed to be ~5% in this model.

# Energy 'Flow' / Sankey Diagram



# Environmental Considerations



## ***Join us in evaluating your State's or Nation's energy options!***

- We will be releasing the tool for public use in the next few days
  - Stay tuned to social media, the LinkedIn group etc!!
- See what you can come up with as options to tackle “Our Carbon Free Future”
- Save and share your findings
  - The GAIN Energy Calculator allows you to not only save, but also share your developed scenarios and findings!
- Future developments will include previously saved cases for each State reflecting their future policy, as well as “regional” electricity grids



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