USEEIO State Models and Applications

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Disclaimer

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Outline

1. Motivation
2. Methods and tools to build state USEEIO models
3. Applications
   - SMM State Tool
   - Consumption-based state GHG inventories
   - County and metro-area based work
4. Collaborators and Team

Motivation

- Support EPA's efforts to promote sustainable materials management by states
- Provide state-specific EEIO models
- Maintain full transparency and reproducibility

Sustainable Materials Management
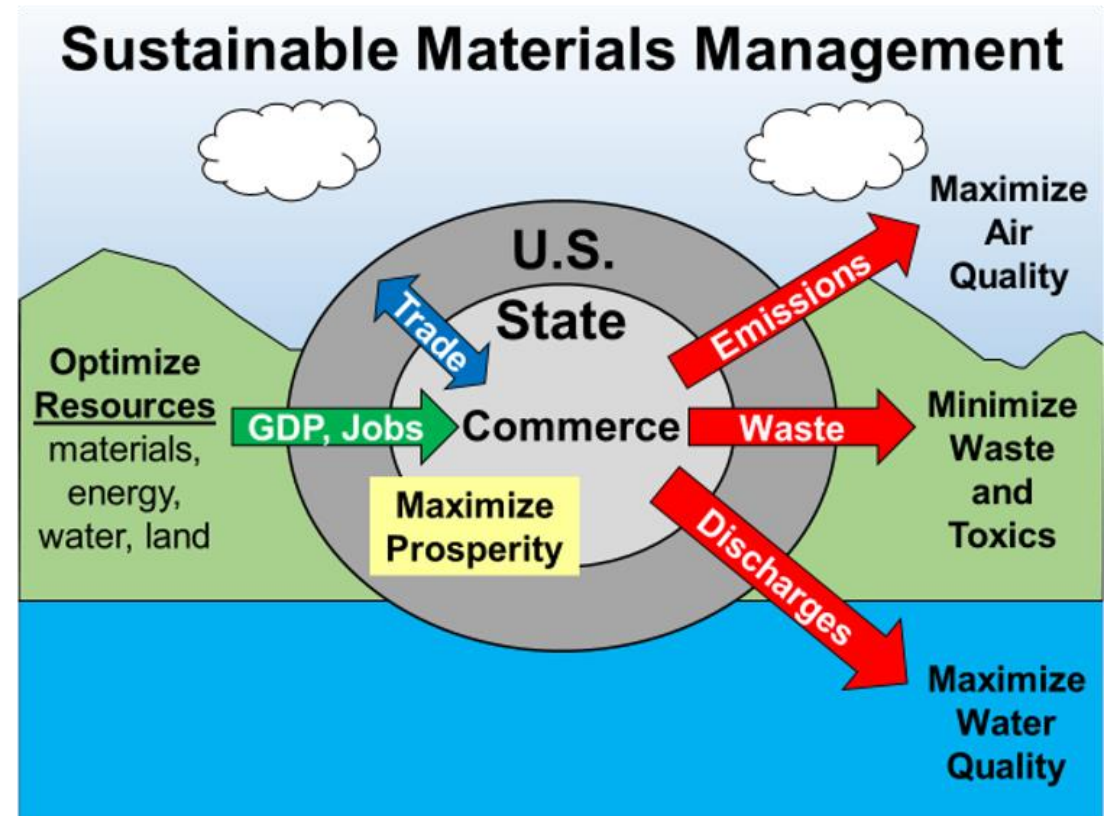
# State questions to be answered

- What are the in-state impacts?

- How much of state consumption impacts are occurring in our state?

- Where could we influence direct emissions or resources use?

State IO Modeling Needs

- Economic input-output tables for states
  - Annual tables with best possible sector resolution
  - Must pass all balance, consistency, and reality checks

- Environmental data by industry and state

- Comparable and able to integrate with the USEEIO tool ecosystem

USEEIO State – Progress

- Method for state IO tables completed (Li et al. 2021)

- Software tool `stateior` created to produce all state IO tables for all recent years and two-region models

stateior integration into ecosystem
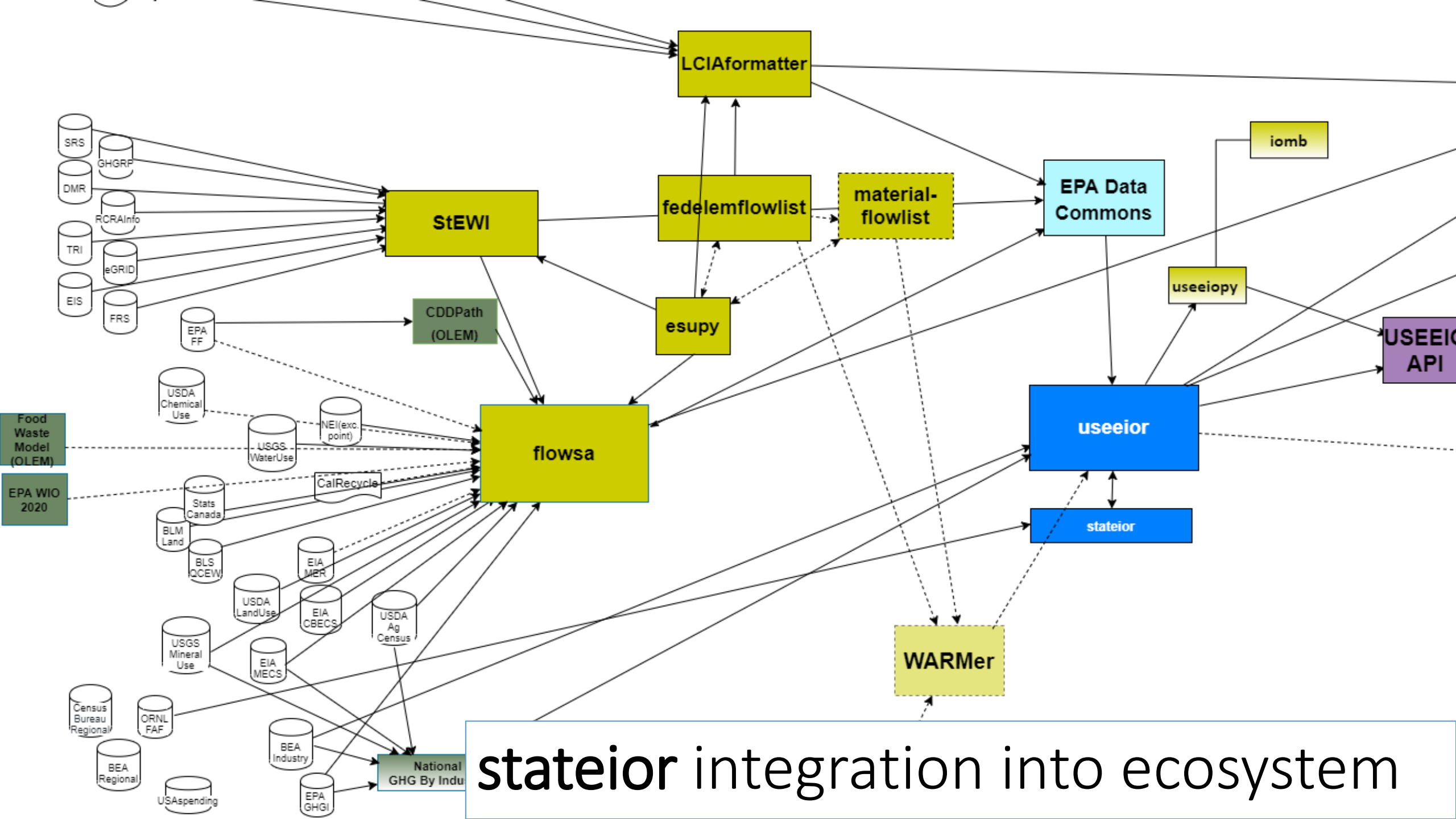
Structure of USEEIO State Models

73 commodities, 2 regions

    1. State of Interest (e.g. GA)

    2. Rest of US (RoUS)

The Rest of World (RoW) is not explicitly represented, but proportion of impacts from RoW can be determined

Applications

SMM State Prioritization Tool

- Analogous to the national tool
- Ready and waiting for USEEIO state models

Consumption-based GHG Inventories for States

Acronyms

GHGI = territorial GHG inventory (traditional)

CBEI = consumption-based GHG emission inventory

CBEI Origins

- Consumer orientation for an inventory/footprint (Hertwich 2005; Larsen and Hertwich 2009; Peters 2008)
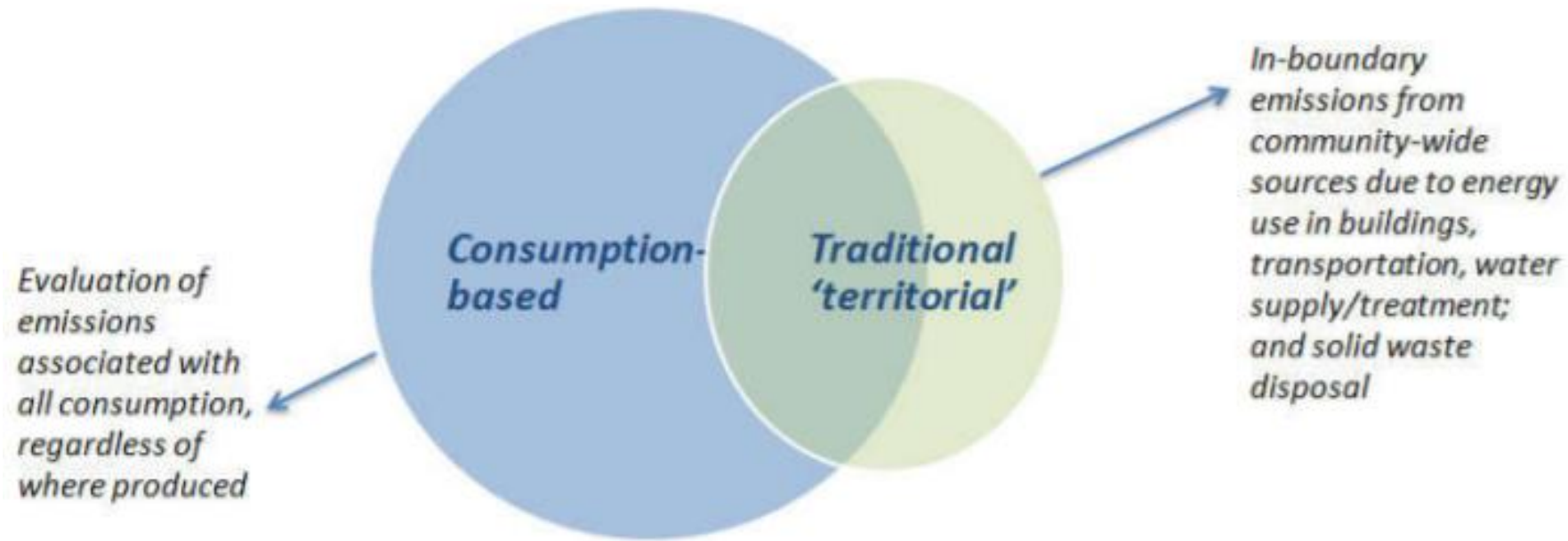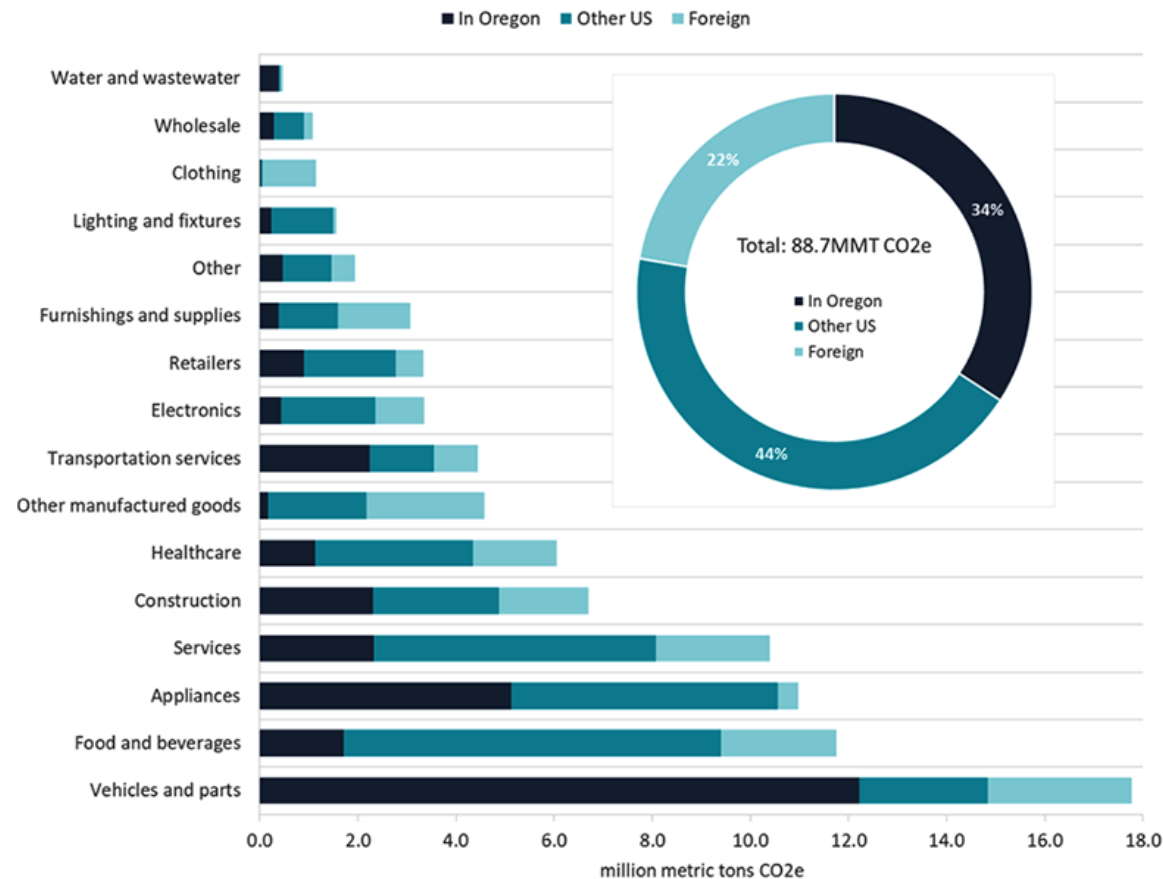

Evaluation of emissions associated with all consumption, regardless of where produced

Consumption-based

Traditional 'territorial'

In-boundary emissions from community-wide sources due to energy use in buildings, transportation, water supply/treatment; and solid waste disposal

Image source: (BCIT and Consulting 2017)

First US State CBEI

- Oregon CBEI (Erickson et al. 2012)

CBEI = GHGl + EEIO

- Most common approach to CBEI is to use the GHGI together with an EEIO model
- EEIO models - Single region or multi-region

CBEI for State or Community - Challenges

- Missing GHGI
- Missing IO data for EEIO

CBEI Approach with USEEIO

Inputs

1. Either state-provided GHGI or new (2021) EPA state GHGI
2. USEEIO State Models
3. Imports CO_2eq multipliers from a global EEIO model

Benefits

1. Consistency with supply chain GHG factors and national models for SMM
2. Fully reproducible/open source
3. Models can provide other results beyond GHGs (air quality, water quality, human health)

Constraints

1. Concurrent ongoing USEEIO state model completion
2. Year range selection

County and State Region Analysis

- Need to estimate sub-state level impacts
- Use state models with county level data to estimate county final demand and the calculate impact
- Will work with existing widgets

https://model.earth/apps/beyondcarbon/#state=GA&mapview=state&regiontitle=West+Central+Georgia

USEEIO State Team

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External Collaborators

[Georgia Center of Innovation](#), [Maine DEP Sustainability](#), [MPCA Resource Management](#), [NEWMOA](#), [OR DEQ Materials Management](#), [WA Department of Ecology](#)

Acknowledgements

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Additional Slides

stateior Overview

- **stateior** is an R package that generates and provides US state Make and Use tables for building regionalized IO models and other purposes.
- Public, transparent, reproducible, immediate updates and validation
- Two regions:
  - State of Interest (SoI, e.g. Georgia)
  - Rest of US (RoUS)
- IO data at BEA (Bureau of Economic Analysis) Summary level:
  - 73 commodities, 71 industries, and 10 final demand sectors
  - Single-region Make and Use tables
  - Two-region use tables (SoI2SoI, SoI2RoUS, RoUS2SoI, RoUS2RoUS)
- 2012-2017 annual IO tables for 50 US states that pass balance, consistency, and reality checks