FTOT 2023.4

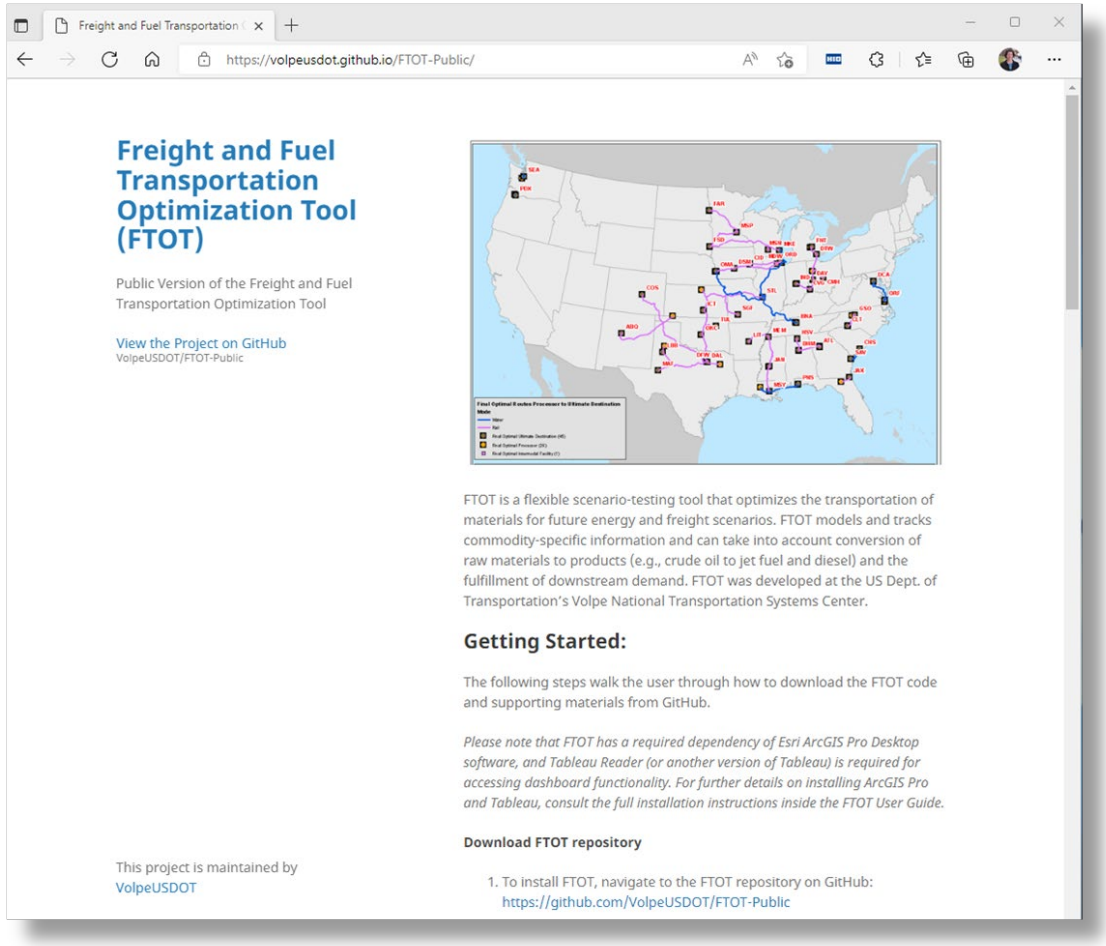
Users Group Meeting

February 14, 2024

FTOT Landing Page

volpeusdot.github.io/FTOT-Public

- FTOT is an open-source tool available on GitHub.
- Includes full documentation and “Quick Start” scenarios, default datasets, video tutorials.
- Updated versions released quarterly.
- Issues/bugs/requests can be raised on GitHub site.
- We welcome feedback and suggestions, additional projects, collaborations.

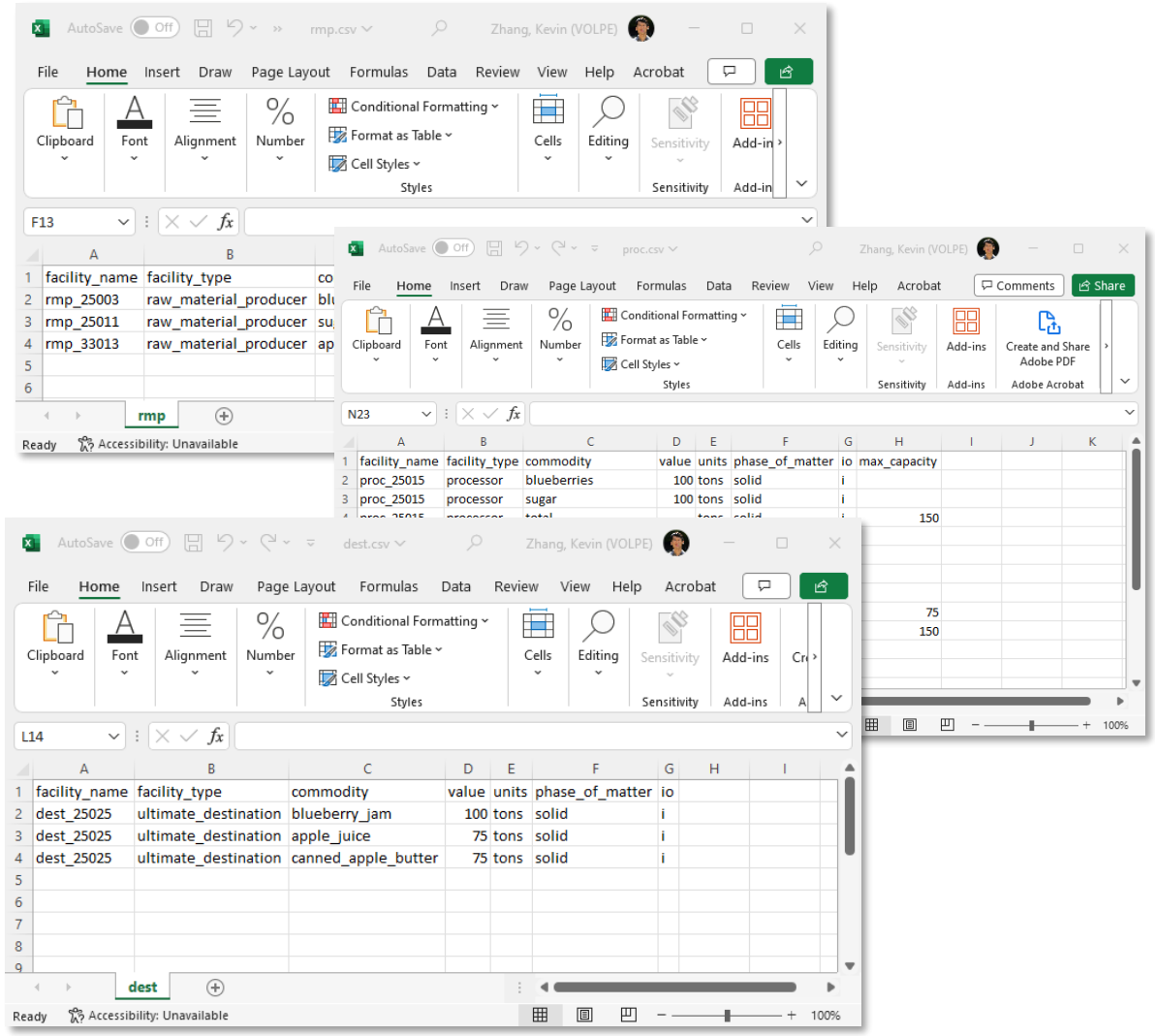


Agenda

- 2023.4 Release
  - Expanded input data validation
    - Facility-commodity CSV files
    - Schedules CSV file
  - Updated XLSX input data template
  - Enhanced network validation helper tool
  - Improved reporting
    - CO_2 emissions for routes
    - Network used metrics
    - Processor utilization
  - Other updates
    - FTOT rank and removal tool
- Example Case Study: Scenarios for Freight Planning

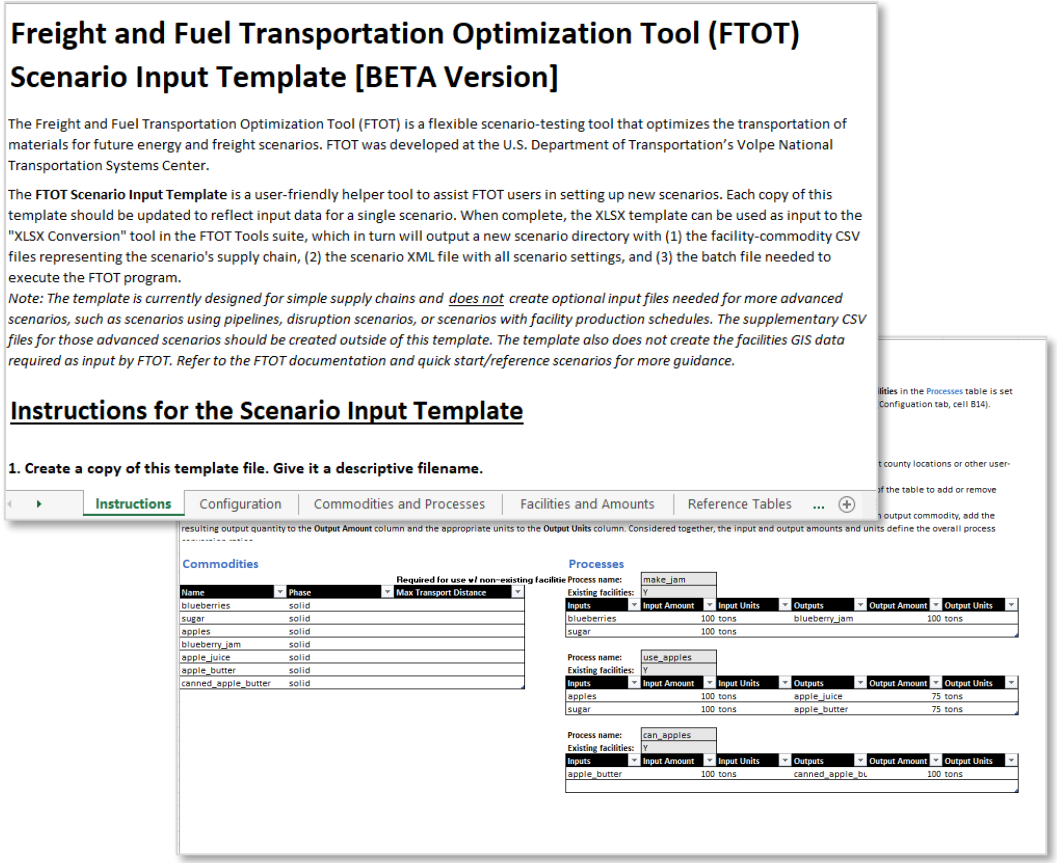
Expanded: Input data validation

- Goal: Help users correctly and consistently set up scenario input files
- Facility-commodity CSV files (e.g., rmp.csv, dest.csv)
  - Consistent with GIS data layers
  - Consistent with facility type (RMP, proc, dest)
  - Correct columns, data types
  - Leading/trailing whitespace
- Schedules CSV file
  - Correct columns
  - Default schedule available
- Validation checks and error messaging warn the user to issues with their scenario input files
- Input validation will continue to be expanded in future releases



Updated: XLSX input data template

- User-friendly tool to turn scenario data into FTOT input files
- Template is included in the FTOT codebase:
  - C:\FTOT\program\tools
- Process
  1. Complete Excel-based template with supply chain data and scenario settings
  2. Run FTOT Tool to convert Excel workbook into FTOT input files → creates a .bat file, scenario XML, and facility-commodity CSVs*
- FTOT 2023.4 expands input validation



Freight and Fuel Transportation Optimization Tool (FTOT)
Scenario Input Template [BETA Version]

The Freight and Fuel Transportation Optimization Tool (FTOT) is a flexible scenario-testing tool that optimizes the transportation of materials for future energy and freight scenarios. FTOT was developed at the U.S. Department of Transportation's Volpe National Transportation Systems Center.

The **FTOT Scenario Input Template** is a user-friendly helper tool to assist FTOT users in setting up new scenarios. Each copy of this template should be updated to reflect input data for a single scenario. When complete, the XLSX template can be used as input to the "XLSX Conversion" tool in the FTOT Tools suite, which in turn will output a new scenario directory with (1) the facility-commodity CSV files representing the scenario's supply chain, (2) the scenario XML file with all scenario settings, and (3) the batch file needed to execute the FTOT program.

Note: The template is currently designed for simple supply chains and does not create optional input files needed for more advanced scenarios, such as scenarios using pipelines, disruption scenarios, or scenarios with facility production schedules. The supplementary CSV files for those advanced scenarios should be created outside of this template. The template also does not create the facilities GIS data required as input by FTOT. Refer to the FTOT documentation and quick start/reference scenarios for more guidance.

Instructions for the Scenario Input Template

1. Create a copy of this template file. Give it a descriptive filename.

Instructions | Configuration | Commodities and Processes | Facilities and Amounts | Reference Tables

Commodities

Name	Phase	Max Transport Distance
blueberries	solid	
sugar	solid	
apples	solid	
blueberry_jam	solid	
apple_juice	solid	
apple_butter	solid	
canned_apple_butter	solid	

Processes

Process name:	make_jam				
Existing facilities:	Y				
Inputs	Input Amount	Input Units	Outputs	Output Amount	Output Units
blueberries	100	tons	blueberry_jam	100	tons
sugar	100	tons			

Process name:	use_apples				
Existing facilities:	Y				
Inputs	Input Amount	Input Units	Outputs	Output Amount	Output Units
apples	100	tons	apple_juice	75	tons
sugar	100	tons	apple_butter	75	tons

Process name:	can_apples				
Existing facilities:	Y				
Inputs	Input Amount	Input Units	Outputs	Output Amount	Output Units
apple_butter	100	tons	canned_apple_bu	100	tons

*Currently does not create required GIS inputs or optional CSV files

Updated: Network validation helper tool

- Helpful for evaluating custom networks based on the FTOT network specification
- FTOT 2023.4 enhancements:
  - Network connectivity checks
  - Additional summary statistics
- Connectivity checks for road, rail, and water can identify portions of the network that may be isolated (unreachable) from other parts of the network
  - In some cases, these isolated portions of the network might be expected (e.g., roads on islands or a standalone rail network).
  - In other cases, this might identify issues with the source network data (e.g., if roads that should be connected are not).
- Summary statistics include network segment counts and lengths
  - By mode,
  - By link type, and
  - By “artificial” status

Updated: Metrics for reporting

- Added CO_2 emissions to the all_routes CSV report
  - all_routes.csv – a supplementary report generated for scenarios run with Network Density Reduction (NDR) on
  - Also added a new database table called “all_routes_results” with the same information provided in all_routes report

- Corrected reporting metrics for:
  - **Amount of network used** to avoid double-counting links used by multiple commodities
  - **Processor utilization** = commodity flow in / out of a processor facility as a fraction of maximum processor capacity when specified

Other Updates

- Aligned the FTOT rank and removal tool with FTOT version 2023.1 and updated demonstration scenario in the tool instructions to Reference Scenario 7.
- Corrected a bug in certain versions of ArcGIS Pro preventing the completion of the M2 step (time and commodity mapping).
- Corrected a bug in assigning CO_2 emission factors to artificial links for non-road modes, specifically for use in CO_2 optimization scenarios.
- Moved Tableau template file from the supplementary materials to the “lib” folder in the FTOT codebase.
- Updated the optimization problem formulation in the technical documentation to align with the codebase.
- Added high-level guidance for how to conduct end-to-end source tracking using database tables. See documentation files for additional details.

Questions and Feedback on FTOT 2023.4