Center for Transportation Analysis
Research Brief
Oak Ridge National Laboratory

Biofuel Supply Chain Infrastructure:
Optimizing the Evolution of Cellulosic Biofuel

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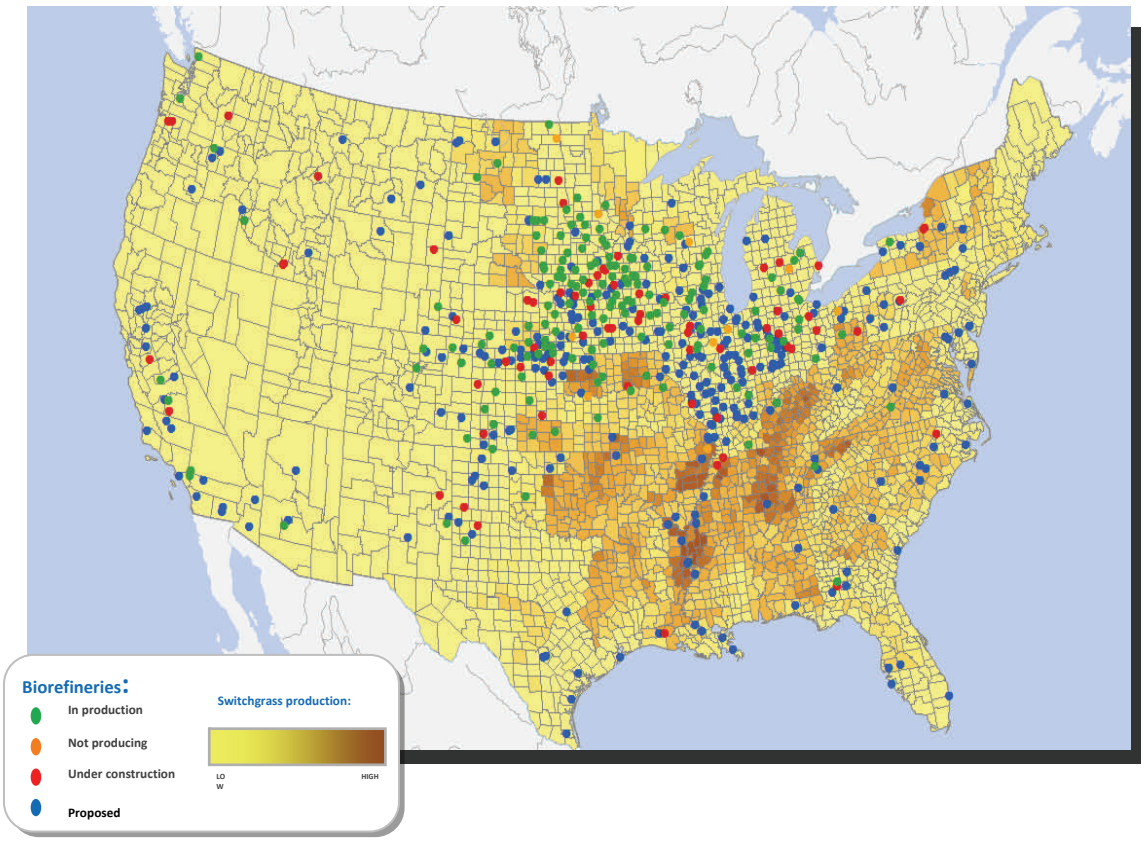
The Infrastructure Challenge of Moving to Cellulosic Ethanol

The rapid growth of the corn-based ethanol industry suggests that infrastructure development was not a major limitation. Cellulosic-based advanced biofuel has a target of 21 billion gallons by 2022 and requires almost all new infrastructure concentrated in a different region. The transition requires not only advances in agricultural engineering and chemistry, but also in modeling and optimization. Combining the best logistic and production options for an economically viable supply chain while considering the geographic and transportation limitations requires new tools and fundamental new approaches.



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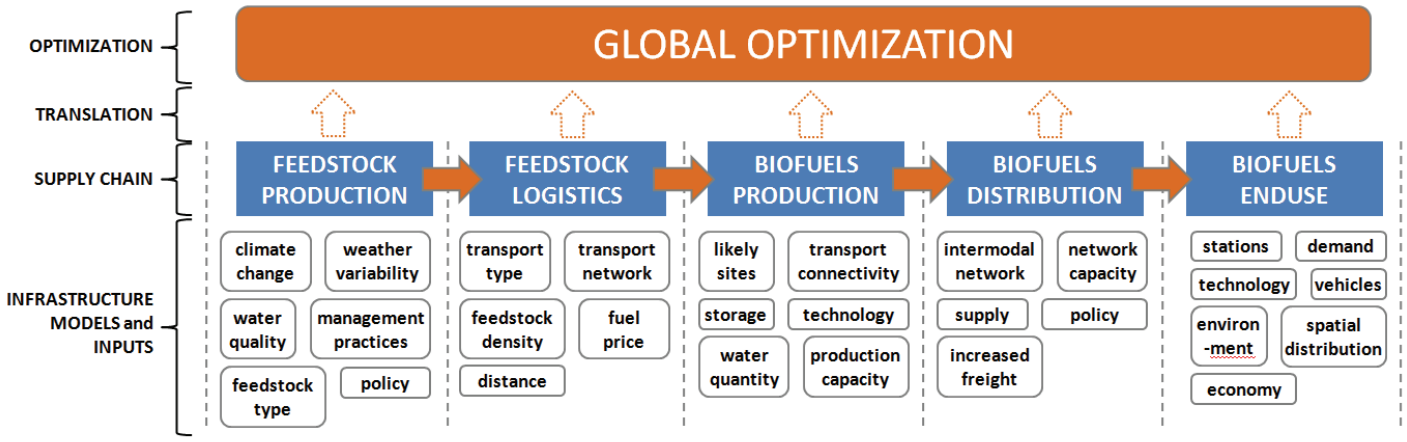
Leveraging expertise across the laboratory, ORNL is developing a prototype optimization model, capable of simultaneously and optimally specifying infrastructure for the entire supply chain. Current approaches must significantly reduce data resolution to examine an entire supply chain, compromising the critical processes that drive each infrastructure component and ignoring realistic demand predictions and transportation architecture. Results from detailed models and studies will provide the inputs for the supply chain options and constraints.

The supply chain will be modeled through a multi-objective mixed integer linear program, a technique ideally suited for problems with multiple complex and contradictory objectives and constraints including the economic collaboration between entities. The MILP approach can be effectively parallelized for high performance computing, allowing the global optimization model to solve difficult problems and scale up for nationwide analyses.



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