

Overview of the Office of Biological and Environmental Research

Multi-Scale Modeling and Analysis Program

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U.S. DEPARTMENT OF
ENERGY

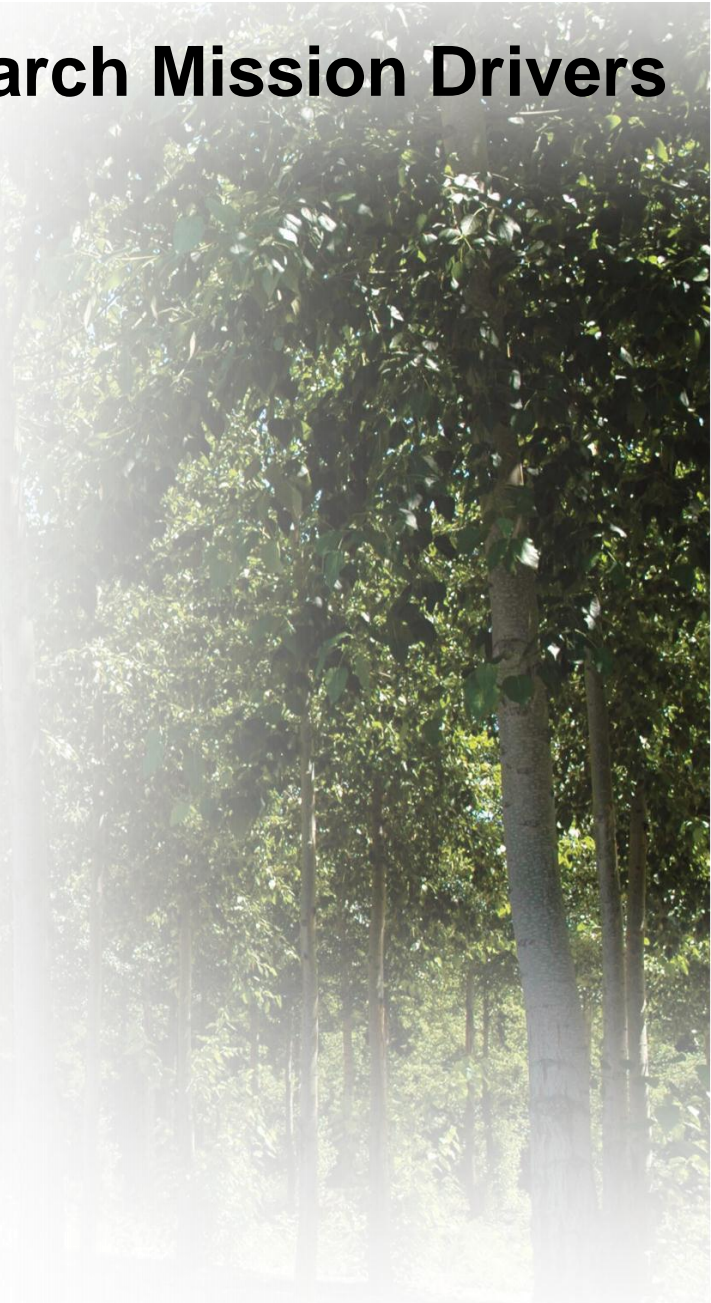
Office
of Science

Office of Biological
and Environmental Research

Biological and Environmental Research Mission Drivers

Provide the foundational science for:

- Supporting the development of biofuels as major, secure, and sustainable national energy resources
- Understanding potential effects of energy-related greenhouse gas emissions on Earth's climate and biosphere
- Predicting and controlling the cycling and mobility of materials in the subsurface and across key surface-subsurface interfaces in the environment
- Developing new tools to explore the interface of biological and physical sciences



The Genomic Science Research Enterprise

- Foundational Genomics Research

- Function and organization of complex biological (plant and microbe) systems; biodesign

- Genomics Analysis and Validation

- Experimental validation and improvement of genome annotation and modeling

- Metabolic Synthesis and Conversion

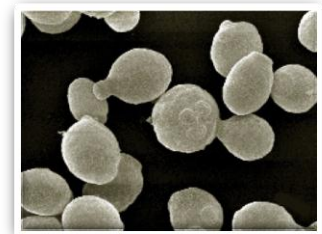
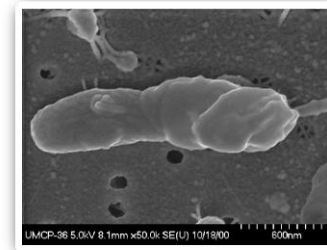
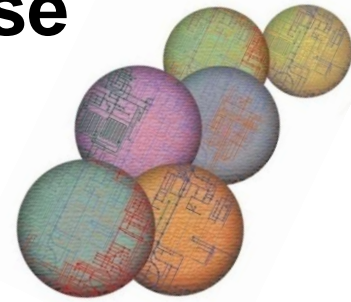
- Research on mechanisms and regulation of carbon storage in plant biomass or for sequestration

- Computational Biosciences

- **Enabling data integration and analysis with a systems biology knowledgebase**

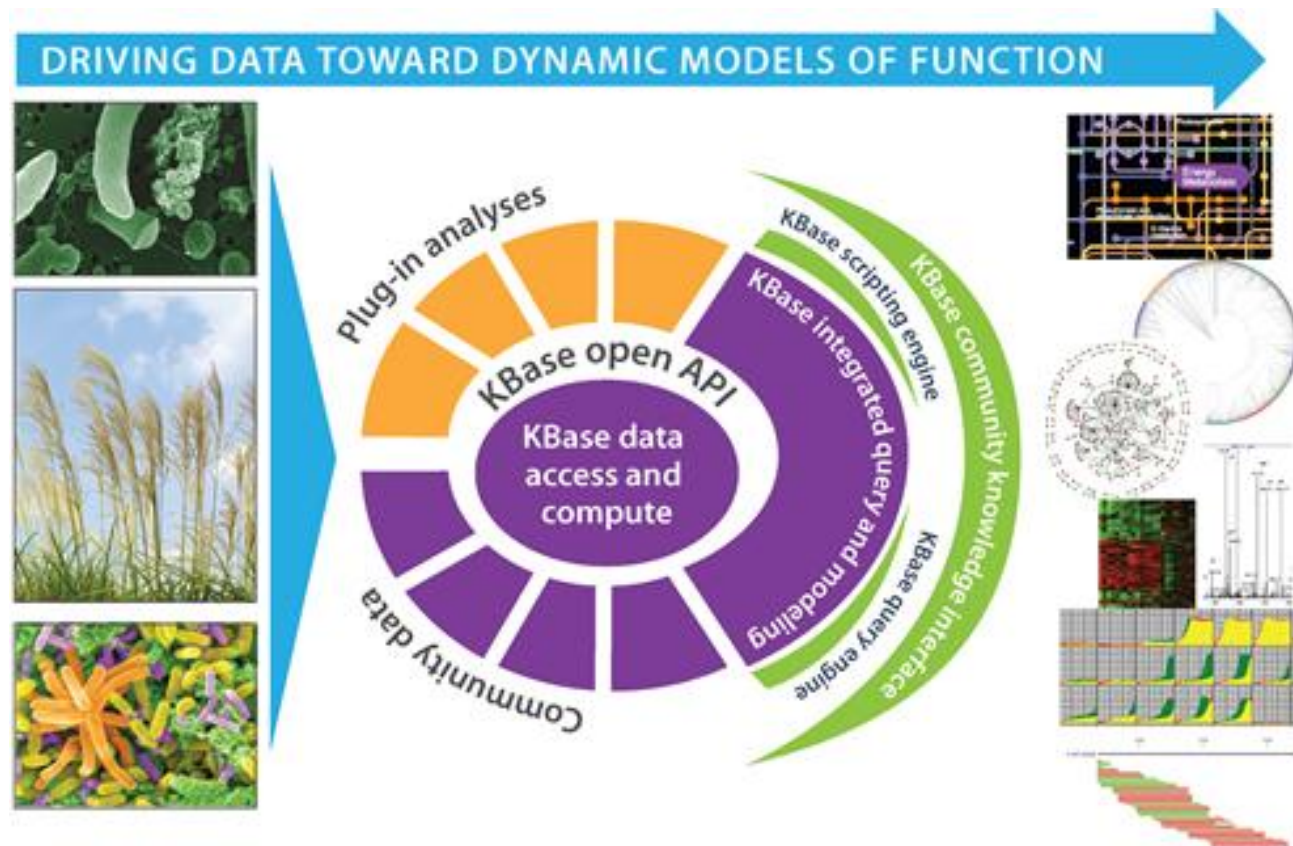
- Bioenergy Research Centers

- Accelerate the development of clean and sustainable (bio)energy solutions



Kbase, working to build a(n)...

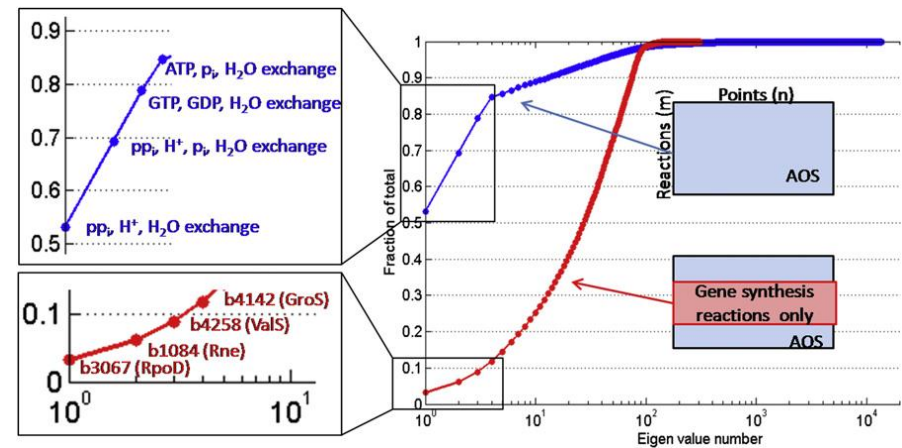
- **Knowledgebase** enabling *predictive* systems biology.
- Powerful modeling framework.
- Community-driven, extensible and scalable open-source software and application system.
- Infrastructure for integration and reconciliation of algorithms and data sources.



- Framework for standardization, search, and association of data.
- Resource to enable experimental design and interpretation of results.

Goals for Multi-Scale Modeling within BER

- Development of dynamic regulatory and metabolic networks methods
- Microbial community scale –omics data integration and data visualization methods
- predictive multiscale models that strongly incorporate uncertainty quantification



Thiele et al. Biophysical Journal 98(10) 2072–2081

Resources for Multi-Scale Modeling within DOE

The DOE's Office of Science supports a computing user facility, National Energy Research Scientific Computing Center:

(<http://www.nersc.gov/>)

Thank You!

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