



# ExxonMobil Algae Biofuels Research and Development Program

## 2010 Update: SGI Greenhouse – La Jolla, Calif.



In July 2010, ExxonMobil and Synthetic Genomics Inc. (SGI) opened a greenhouse at SGI headquarters in La Jolla, Calif. The greenhouse will facilitate the next level of research and testing in this long-term program, and help us determine whether large-scale quantities of affordable algae-based biofuels can be produced.

**Greenhouse Activities:** This greenhouse will help us evaluate the most productive strains of algae and the most efficient production methods.

- Our scientists are looking at different growth systems for the algae such as open ponds and closed photobioreactors.



Open ponds: One potential growth system



Closed Bioreactors: Another growth system option



## Greenhouse Activities (continued):

- The team will evaluate the productivity and product profiles of different algal strains in each of these growth systems and under a wide range of conditions including various temperatures, light levels and nutrient concentrations.
- To date, our evaluations have occurred in indoor laboratories using artificial lighting. The larger, free-standing greenhouse will allow us to conduct these evaluations in a setting that more closely reflects real-world conditions.
- The greenhouse also will facilitate additional research activities into other elements of the algae fuel production process, including algae harvesting and bio-oil recovery.



Taking an algae sample from an open pond



Filtering and isolating algae cultures in the lab

Since the program launched in July 2009, we have made substantial progress, including:

- Isolating and/or engineering a large number of candidate algal strains and developing growth conditions under which these strains could be made more productive;
- Identifying and testing some of the preferred design characteristics of the different production systems; and
- Initiating life cycle and sustainability studies to assess the impact of each process step on greenhouse gas emissions, land use and water use.

If milestones are met, ExxonMobil plans to spend over \$600 million on this program over the next decade. It may take billions more to bring algae biofuels to commercial production.

ExxonMobil and SGI are continuing to scale up research and development facilities. The next phase in the program will include a larger, outdoor test facility anticipated to open in mid-2011.