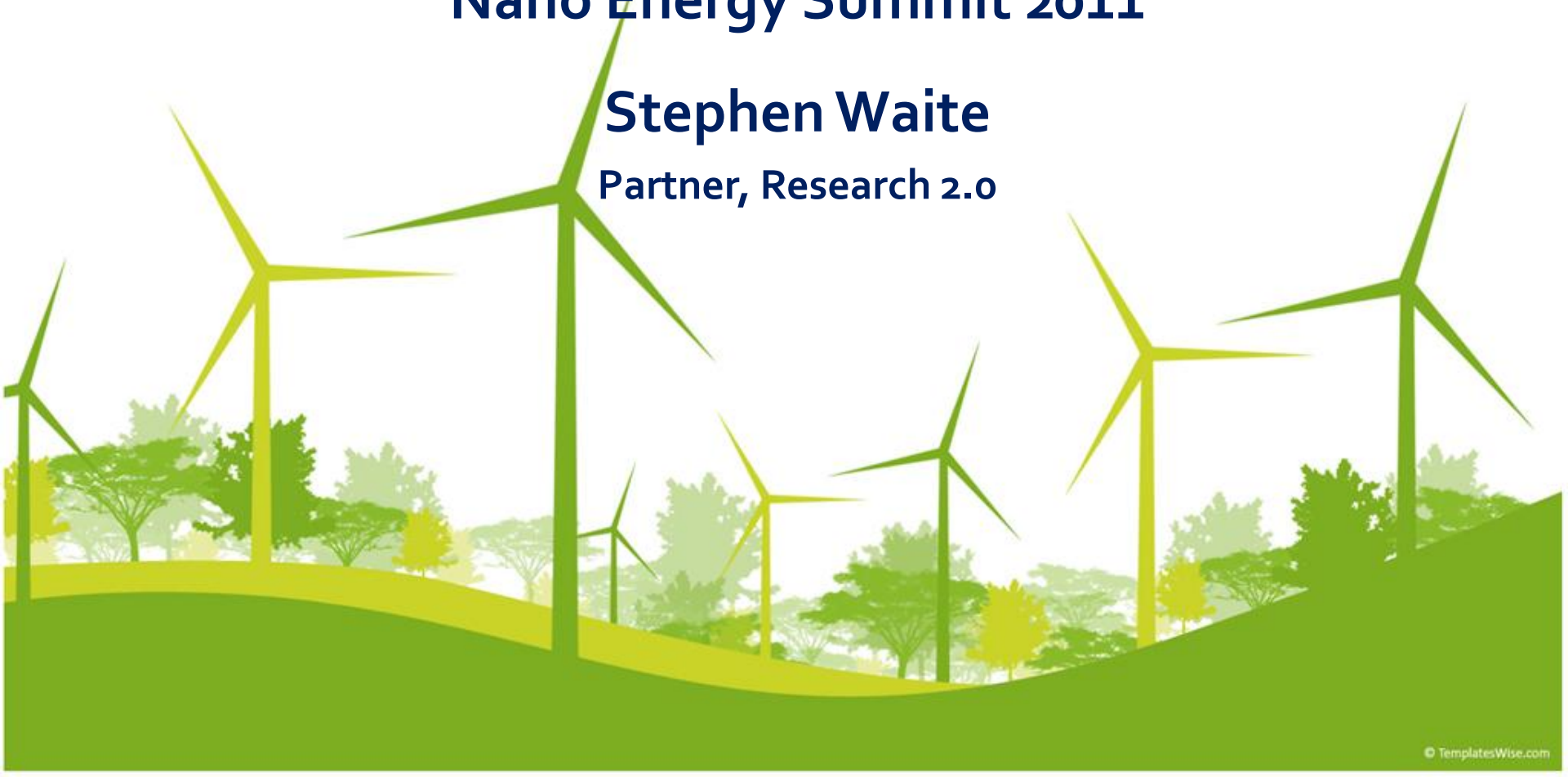


SYNTHETIC NANOBIOLOGY: COMING OF AGE

Nano Energy Summit 2011

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New Age Dawning

Synthetic Nanobiology (SNb)

A new area of biological research at the molecular level that combines science and engineering. It encompasses a variety of different approaches, methodologies, and disciplines with a variety of definitions. What they all have in common, however, is that they see synthetic nanobiology as the design and construction of new biological functions and systems not found in nature.



SNb in Perspective

"I believe the best examples of disruptive technologies that could change our future are in the new fields of synthetic biology, synthetic genomics, and genome engineering. These fields can change the way we think about life by showing that we can use living systems to increase our chances of survival as a species. Simply put: this area of research will enable us to create new fuels to replace oil and coal."

- J. Craig Venter, 2007 ([Dimpleby Lecture](#))

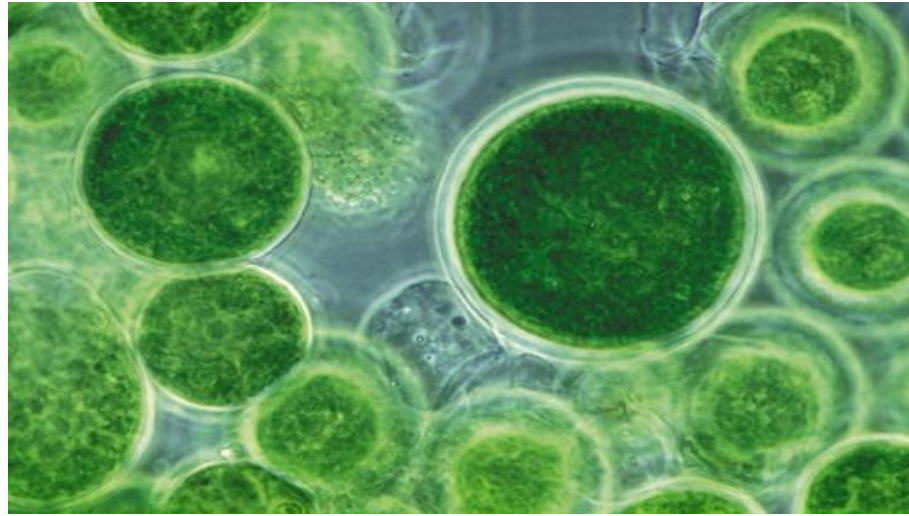


Foundation of SNb

- Driven by accelerating change in information and communications technologies.
- Ongoing convergence of scientific disciplines (think E. O. Wilson's *'consilience'*).
- Impact across sectors: eg., A scientist working in health care area creates metabolic disruption technology for treatment of cancer; same technology can be applied to microalgae and used to produce biofuels and designer oils for nutrition and consumer markets (Dr. Newell Rodgers, VG Energy)
- SNb has game changing potential in the marketplace



Oil-producing Microalgae



Microalgae have evolved over billions of years to produce large amounts of oil rapidly when grown in the right conditions. Companies today are harvesting biofuels and other types of oils out of synthetic forms of microalgae.

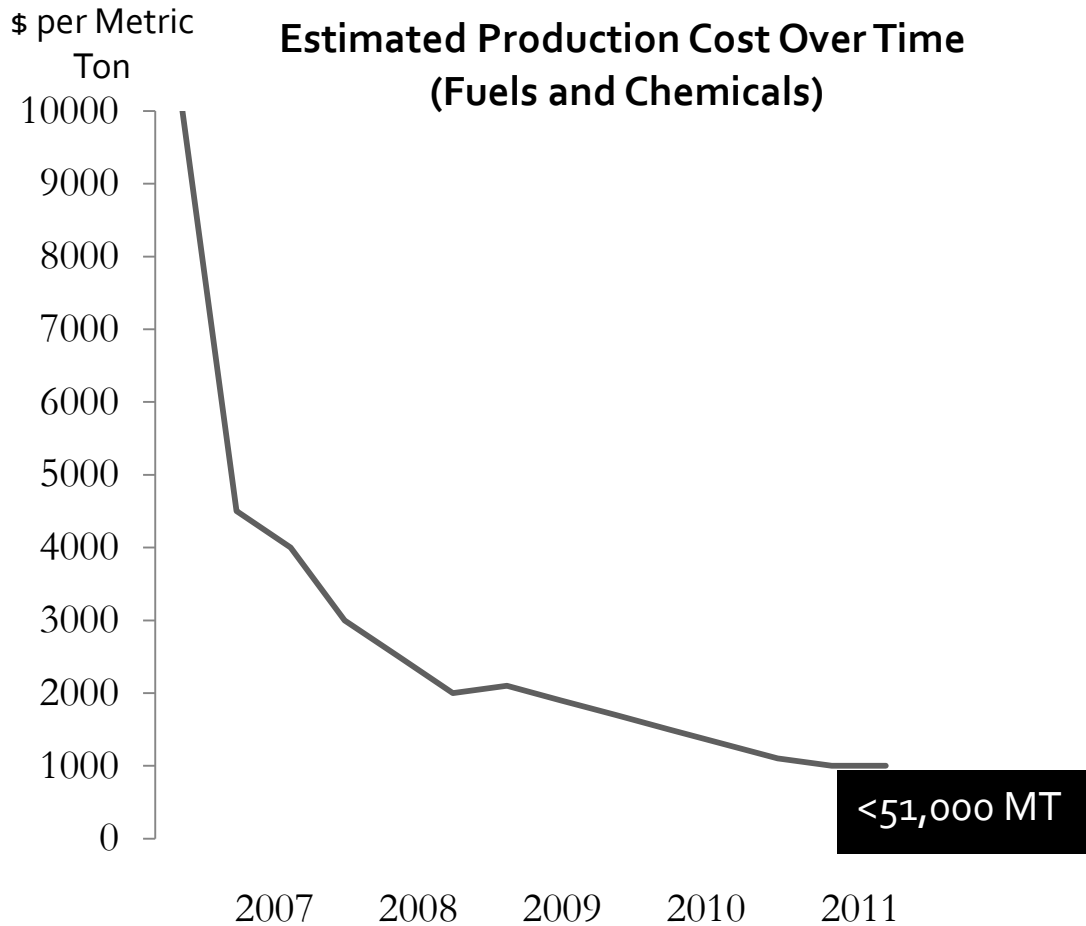


SNb Comes to Market

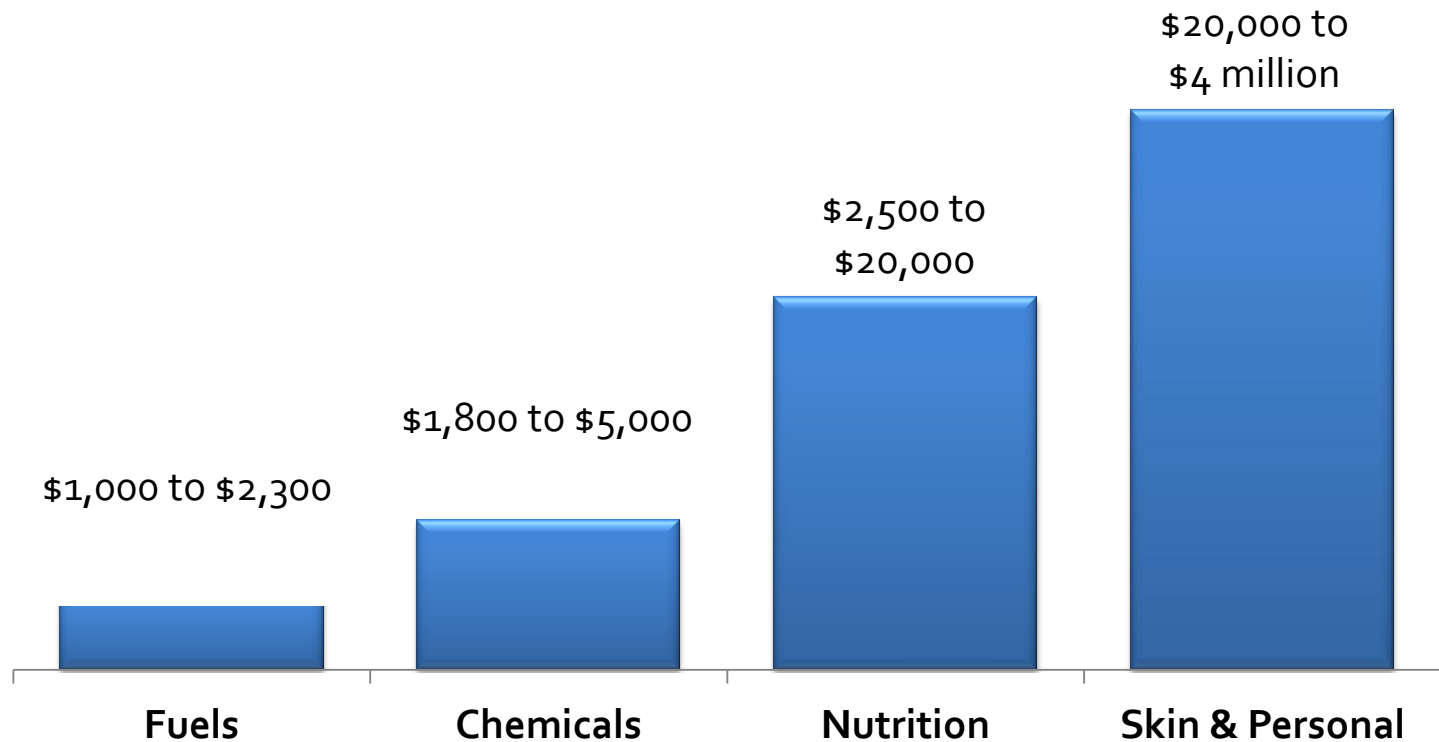
- Solazyme has developed a unique approach to producing oil from microalgae using a process called “indirect photosynthesis” that has the potential to bring large volumes of oil to the market profitably.
- Using standard fermentation equipment, Solazyme grows microalgae in the dark by feeding them sugar directly in large steel tanks, as opposed to conventional processes that rely on direct sunlight in open ponds.



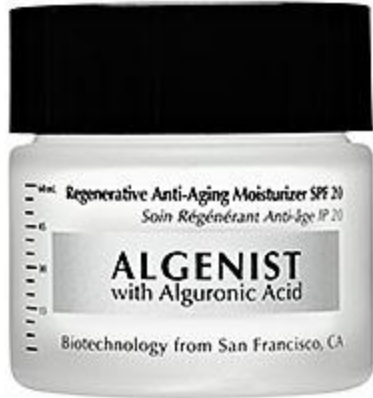
Solazyme's Production Cost Curve



Solazyme Bioproduct ASPs



SNb Now in Stores Near You



Solazyme's Algenist Regenerative Anti-Aging Moisturizer (\$90-\$135); Sold globally in Sephora stores

Golden Chlorella®

Golden Chlorella is a family of ultra-pure, sustainably grown microalgae powders that offer unique and highly beneficial nutrient profiles. Golden Chlorella® Omega powder contains over 50% by weight heart-healthy omega 3, 6 and 9 oils and 20% dietary fiber. It also provides naturally occurring carotenoids, phospholipids, tocopherols, tocotrienols and sterols, making it a perfect stand-alone ingredient for next-generation heart-health formulas. Available at GNC and Whole Foods stores



The Magic of SNb



SZYM Stock Price Performance



IPO in late May 2011 – netted over \$225 mm. Current market cap around \$600 mm – market cap potential is in the billions



Innovation Ahead

Solayzme (SZYM) – Developing SNb-products for wide range of markets and applications; partnerships with Unilever, Chevron, Qantas Airways, Bunge, Honeywell UOP, and Roquette.

Gevo (GEVO) - Developing bio-based alternatives to petroleum-based products using a combination of biotechnology and classical chemistry (Based in Colorado)

Amyris Biotechnologies (AMRS) - Using its industrial synthetic biology platform to convert plant sugars into a variety of hydrocarbon molecules

Synthetic Genomics (privately held) – J. Craig Venter's company; founded to commercialize genomic-driven technologies; partnership with ExxonMobil

VG Energy (subsidiary of Viral Genetics VRAL) – founded to commercialize innovations in energy and agriculture based on metabolic disruption technology



Friendlier Skies Ahead

July 2011: Lufthansa is today launching a six-month biofuel trial on regular scheduled flights. A Lufthansa Airbus A321 with the registration D-AIDG will fly the Hamburg-Frankfurt-Hamburg route four times daily. One of its engines will run on a 50/50 mix of regular fuel and biosynthetic kerosene.



To Infinity and Beyond

The successful Solazyme IPO earlier this year marks an inflection point. What lies ahead is a dawning of new era of accelerated innovation in the fuels, chemicals, food and consumer product markets driven by advances in synthetic nanobiology.



Steve Jobs: 1955-2011 RIP



Thank You!

Stephen Waite

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