

# OriginOil™

**The New Energy Challenge:  
Can We Make a Difference Fast Enough?**

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President and CEO**

A BREAKTHROUGH TECHNOLOGY TO TRANSFORM ALGAE INTO OIL

# New Energy: Where We Stand

## A New Mandate:

- Climate change issue well accepted.
- US Administration Committed to New Energy for Job Creation.
  - 10 million jobs in next decade, 30 million *net new jobs* by 2030.
  - Engine = repatriation of trillion-dollar energy import budget.
- Energy Independence now a National Security Mandate.

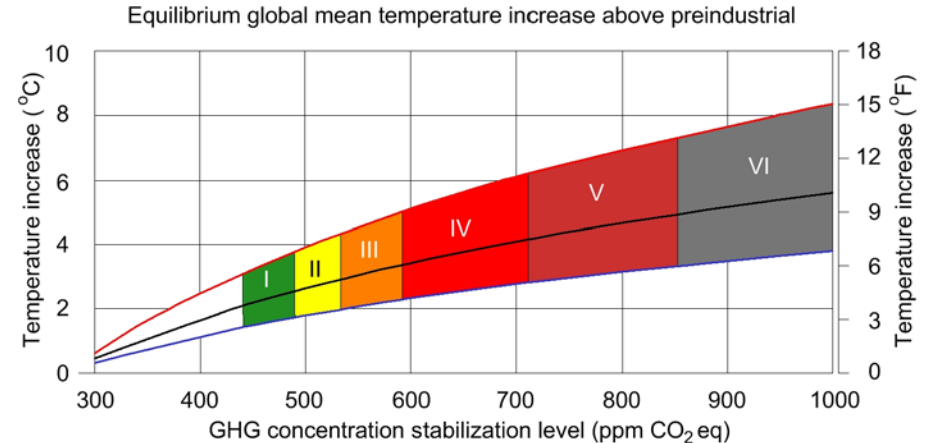
## New Challenges:

- 2030-2060 – The Problem
- “Black Swans” – The Solution

## 2030-2060 – The Problem

# CO2 Emissions Spiraling Out of Control

- As a result of petroleum use, over 3 billion tons of carbon dioxide (CO<sub>2</sub>) are emitted into the atmosphere annually.
- Scientists predict that carbon dioxide levels by the year 2100 could be as high as 970ppm, nearly triple the CY2000 levels of 367ppm.
- Meanwhile, 15-37% of all plant and animal species could be wiped out by global warming by the year 2050, which could further cause considerable damage to our planet's ecosystem. Source
- The carbon problem may be accelerating ahead of projections.



The projected temperature increase for a range of greenhouse gas stabilization scenarios (the colored bands). The black line in middle of the shaded area indicates 'best estimates'; the red and the blue lines the likely limits. From the work of [IPCC AR4, 2007](#).

## 2030 Is Not Too Soon To Solve This Problem.

# The Global Energy Transformation Model

- Researchers built a comprehensive global energy model, and then subjected it to stringent CO<sub>2</sub> limits of 400ppm – just 33ppm above today’s levels.
- Here’s the problem:

It is interesting to note that oil remains the dominant energy source in the transportation sector for such a long time, even if stringent CO<sub>2</sub> constraints are applied. However, given the allowable CO<sub>2</sub> emissions (for a 400 ppm target), it should come as no surprise. For such a target, we may emit 500 Gton C over the period 1990-2100. The present oil and natural gas reserves combined contain 200 Gton C. In our scenarios, we have assumed that the available supplies are twice the present reserves. **This means that all oil and natural gas reserves can be used even if we stabilise at 400 ppm.** Now, since carbon abatement policies will increase their relative competitiveness of oil and natural gas over coal, we can expect that most, if not all, of the oil and gas resources will be used. Further, oil has a competitive advantage in the transportation sector. Thus, this is where most of this energy source will be used.

Source: “Hydrogen or methanol in the transportation sector?”, July 2000, KFB Stockholm <http://www.kfb.se/pdf/R-00-35.pdf>

# Electricity Production @ 400ppm CO2

The use of natural gas grows as well, but mainly in the electricity sector (see figure 6.4). However, this growth is much less pronounced than that of biomass. Oil is phased out in electricity and heat production, but its use in the transportation sector increases so that the overall use continues to grow, although at a very low rate. The use of coal remains roughly constant over the first couple of decades, and grows rapidly thereafter since carbon sequestration technologies are employed on a large scale.

- By 2060:
  - Wind achieves a maximum level of ~20%.
  - Solar is just starting to grow.
  - Biomass, Hydrogen just starting.
  - Natural gas is still peaking.

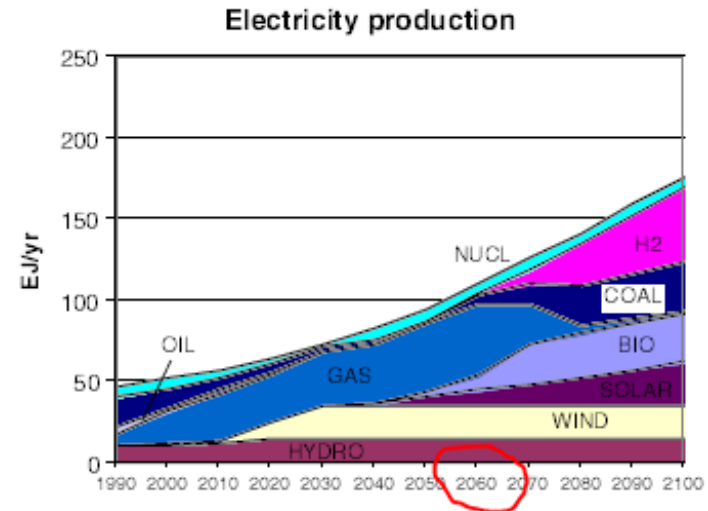


Figure 6.4 World electricity supply by fuel

# Energy Supply Model @ 400ppm CO2

A general feature that is obtained in all runs of the model is that the use of biomass increases rapidly in response to stringent CO<sub>2</sub> targets. Biomass is used for residential heating and process heat. Similarly, all other renewable energy technologies, hydropower, wind and solar, grow. Wind and solar start from very low values and it takes several decades before they make a significant contribution to the global electricity supply.

- By 2060:
  - Oil finally begins to tail off.
  - Biomass plateaus at 1/3 of total.
  - Coal is on the way back, 'clean'.
  - Wind never becomes a factor.
  - Solar is just starting its run.

This is the 2030-2060 Problem.

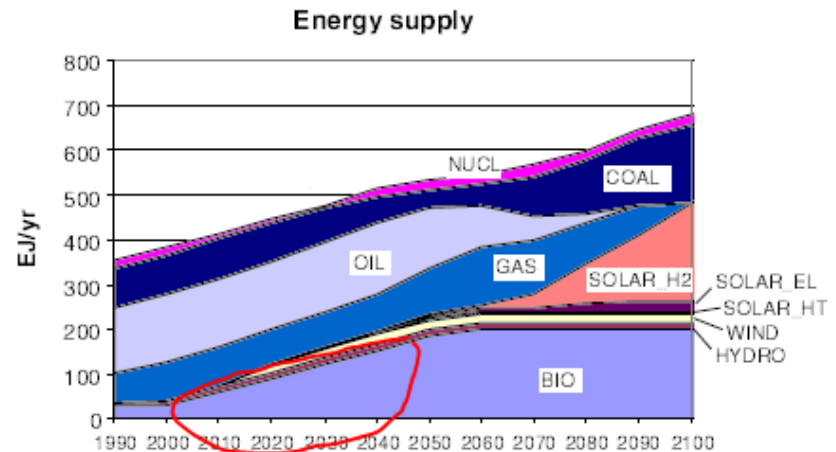


Figure 6.3 World primary energy supply. The three solar energy technologies used in the model (H2, EL, HT) produce hydrogen, electricity (e.g., PV), and heat (for processing and heating), respectively.



## **“Black Swans” – The Solution**



# Black Swans Are Our Future

- Black Swans are unique solutions with game-changing impact:
  - “The strategy is more at-bats, more shots on goal...Most of your approaches will fail, but a few will succeed. You will build from each others’ experience, and get better and better.” Vinod Khosla, *Algae Biomass Summit 2008*
- Black Swans are no Manhattan Project:
  - "Twelve guys and gals going off to Los Alamos won't solve this problem...We need 100,000 people in 100,000 garages trying 100,000 things — in the hope that five of them break through... the climate-destroying fossil-fuel age will end only if we invent our way out of it.” Thomas L. Friedman, *Hot Flat and Crowded*

## How It Adds Up

- Current structural approach is no solution to carbon problem.
- Massive investment doesn't help, since we don't yet know what to invest in.
- Model for current phase:
  - More like Internet of the 90s
  - Less like TVA (Tennessee Valley Authority) of the 30s.

**Black Swans can beat the 2030-2060 issue.**

## It's Been Done Before

- Historical Analogy: The Personal Computer
  - In 1982, IBM invented the PC.
    - IBM expected to sell most of the PCs in the world.
    - Instead, the PC was massively cloned.
  - But... every PC had a Microsoft OS.
- The PC transformed society because :
  - The machine was a commodity (could be built anywhere).
  - The technology became universal (a common global platform).

**The Technology Export Model:  
Premium Technology,  
Commoditized Construction,  
Universal Distribution.**

# The Scalable Business Model

- Operating principle: “help the rest of the world build what you invent”.
- Key: help local operators tap local capital pools to sell, build, install and operate New Energy plants worldwide.
- Corporate model: light and adaptive, low capital.
- **The Technology Export Model best fits the “Black Swan” model of technology innovation.**

**“Mushrooms After Rain”**

## What Can We Do?

- Create a great environment for innovation. *Fund innovation, not brick & mortar (yet)!*
- Export innovations worldwide through the Technology Export Model:

**The Technology Export Model  
Can Help Transform The World by 2030.**

# OriginOil: Practice What You Preach

- Our view: algae will dominate once technology issues solved.
- OriginOil's mission: help others make algae.
- Key to technology distribution: a global cross-network.
  1. R&D Partners.
  2. Application and Service Partners.
  3. Regional Licensees.
- Result: a knowledge network facilitated by OriginOil.

## Initial Markets

- Triage principle: avoid any application that requires infrastructure, distribution networks, transportation or heavy capital.
- Initial markets: simple applications that target existing industrial requirements.
  - a. **Natural Gas-Fired Furnaces:** Absorb CO<sub>2</sub>, gasify for onsite combustion as natural gas.
  - b. **BioDiesel Refining:** Captive algae oil production line plus biomass for supplementary power.
  - c. **Ethanol Production:** Start by absorbing CO, then replace land crops entirely as feedstock.
  - d. **Manure to Energy / Landfill to Energy :** Absorb CO<sub>2</sub>, send back into waste digestion system.
  - e. **Wastewater treatment:** Provide nutrient (N, P) removal capabilities and rapidly absorb CO<sub>2</sub> generated by energy consumption processes.
- Benefits:
  - Get algae into market, generate jobs and revenues fast.
  - Ancillary benefits help improve value and ROI.
  - Grants and subsidies may be available for ancillary benefits e.g. clean water budgets.
  - Capital requirements relatively low:

*“if you can build a brewery, you can build an algae plant.”*



# Interested in Becoming a Partner?

- Please go to OriginOil's Contact Page...

## Contact

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### Contact Us

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For all other inquiries, send us an email:

**Thank you!**



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# Notes



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