



CCUS Opportunities for CO₂-Derived Carbon Nanostructures via Molten Carbonate Electrolysis

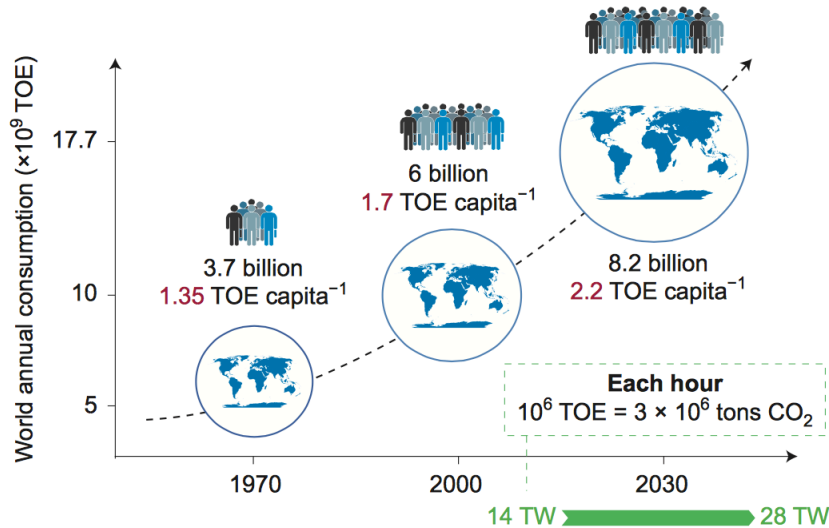
BACKED BY SCIENCE + BUILT FOR SCALE

David L. Wood, III

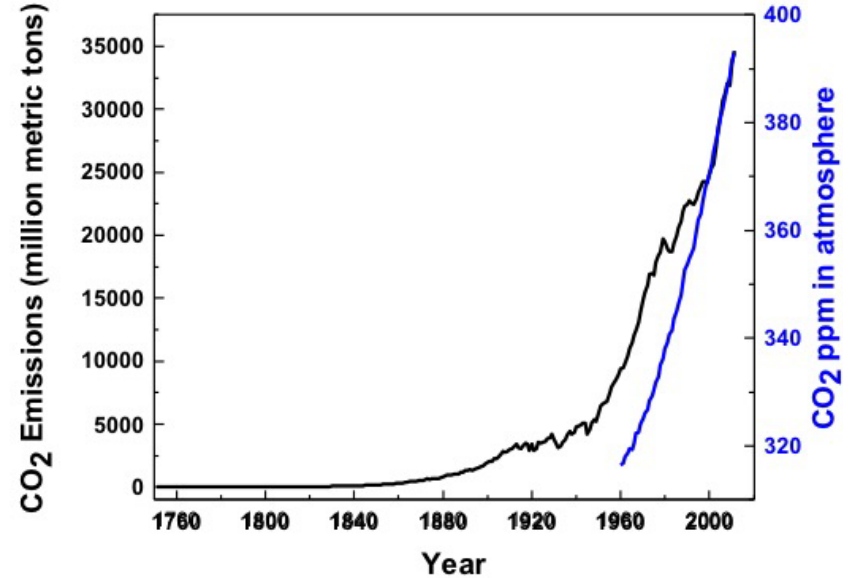
Director of Engineering, SkyNano Technologies

8/30/22

FUNDAMENTAL CHALLENGE



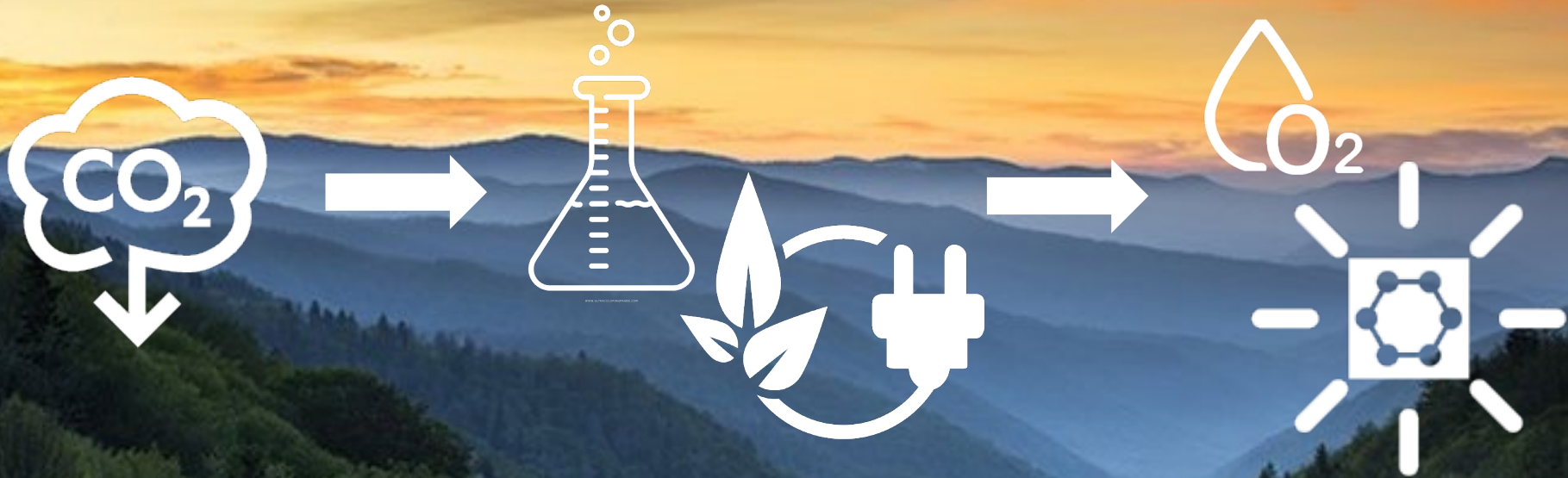
Growing population + growing demand for materials and energy



VS.

Environmental destruction

SKYNANO TECHNOLOGY

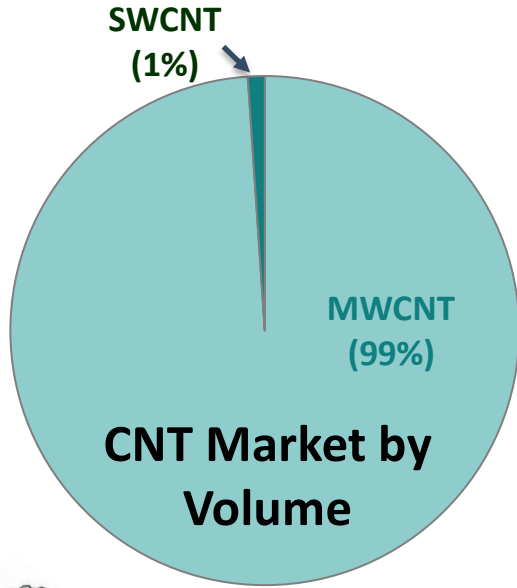


Case for CNTs:

proven market demand + high value + our low costs + energy saving in use phase of LCA

CARBON NANOTUBES

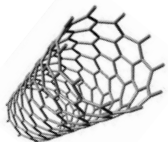
Carbon Nanotubes are **non-naturally** earth **occurring** supermaterials with **extraordinary** physical properties.



CNT Market by Volume



MWCNT: multi-walled CNT
-\$100+/kg



SWCNT: single-walled CNT
-\$2,000/kg low purity
-\$50,000/kg high purity

Mechanical



200X tensile strength of steel at 1/3 weight

Thermal



7.5X higher than Cu, on par with diamond

Electrical



approaching Cu at 5E6 S/cm

Carbon nanotubes have been 2 years away from revolutionizing the world... for 20 years now.

MARKET OPPORTUNITY



**Current CNT
Market: \$671M**
(aerospace +
specialty
applications)

Adapters

\$2.8B

*1-5 years to
capture this
market*

Deicing
EMI Shielding

Adopters

\$3.9B

*3-8 years to capture
this market*

Battery Additives
Elastomer Additives

Converters

\$102B+

*8+ years to capture
this market*

Transparent Conductors
Filtration Membranes
Wires
Sensors
Concrete Additives
Coatings
Smart Textiles
+ MORE!

**\$6.7B Immediate Opportunity: EXISTING markets
+ desire for CNTs + want the CNTs we can produce
now**



SkyNano

SKYNANO TIMELINE



SkyNano



Company founded by Prof.
Cary Pint + Anna Douglas

INNOVATION
CROSSROADS



\$6.5M total
funding

- Scaled up 20X
- 60% improvement in fast charge Li-ion
- First sales



- \$350K in R&D grants
- Identified first customers
- Design for scaling

2020



2021



2022

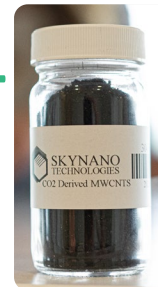
2017

2018

2019

- Identified markets
- Product quality improvement
- Hired first non-founder

- Additional \$2.7M in DOE grants
- Hired 2 more full-time engineers



- Scaled up 50X
- 2 more staff
- \$2.25M in grants

SKYNANO TEAM

Stan Hunter

Research Engineer

MS Mechanical
Engineering & MBA



Anna Klug

Mechanical Engineer

BS Mechanical
Engineering



David Wood

Director of Engineering

PhD Electrochemical
Engineering

World-renown energy storage
scientist

Industrial experience at SGL
Carbon, Cabot, GM, ORNL



Anna Douglas

Co-Founder & CEO

PhD Materials Science
Business training
through DOE-funded
accelerator
Forbes 30 Under 30



Cary Pint

Co-Founder & CTO

PhD Applied Physics
from Smalley lab @ Rice
"iron chef" of CNTs
Forbes 30 Under 30



James O'Malley

Senior Chemical Engineer

BS Chemistry
Prior experience scaling
electrochemical energy
systems



Alyssa Cannistraci

Data Scientist

MS Atmospheric
Science



SkyNano

CARBON IMPACT

20 MT/yr

CO2 removal/yr supported by existing
carbon additive markets

GT/year

CO2 impact/yr is possible and profitable

EQUITABLE ENERGY TRANSITION

decarbonization of fossil assets for their useful existing lifetime – protects vulnerable populations from energy price hikes that would take place in the case of sudden switch to renewables

REGIONAL CHALLENGES FOR CCUS

- Nascent nature of cross-collaboration between large institutions
- Unclear pathway for small or newer entities to utilize regional resources
- Lack of local “buy-in” to carbon management compared to other states + regions

REGIONAL OPPORTUNITIES FOR CCUS



High caliber startup accelerator
Unmatched Incubator program w/
laboratory space



Launch
Tennessee

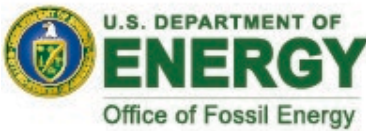
SBIR/STTR microgrants + matching
funds
Internship support
Training + programming



DOE investment in regional
entrepreneurship in Southeast US
User programs at ORNL accessible to
corporations, startups, academics

Robust entrepreneurial community now active in the Knoxville-
Oak Ridge region thanks to ORNL's IC + UT's Spark

It takes a village...



Energy Efficiency & Renewable Energy

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