ThermoNeutronics, LLC

featuring energy solutions for tomorrow…

Generation III
Integrated Energy Technologies

The Challenge …

If there is one term that defines the future of solar and related clean energy systems,
the term is
"HIGH GROWTH"

The Evolving Solar Business

- **Generation I** (today)
  Silicon solar cells and conventional batteries
- **Generation II** (today and tomorrow)
  Printable CIGS cells, improved battery systems, etc.
- **Generation III** (tomorrow)
  High performance, economical printable CNT / batteries with integrated thermoneutronics and thermal circuitry that can compete with fossil fuel energy and displace conventional grid power

Program Goal

Capitalize on existing R&D to develop a series of high performance prototype integrated energy modules that can be scaled and used for various applications

Technical Objective

Rather than developing a specific device for a specific application, we are developing a series of generic modules that can be scaled, configured, and utilized in multiple, widespread applications (similar to the integrated circuit)

Secondary Objectives

- Electrical conductor R&D
- Electrical insulator R&D
- Electromagnetic radiation shield R&D
- Specialty military clothing
- Specialty heat dissipation applications

The Team …

Program Team

- ThermoNeutronics Corporate Team
  - State College, Pennsylvania
  - Newark, New Jersey
  - Houston, Texas
- University Collaborator – Science and Engineering
- University Collaborator – Business and Marketing
- Former NASA Consultants
- Nanotube Fabrication Company
- Green Energy Partnering Companies
- Commercial Solar Power Equipment Company
- Funding Sources

University Collaborator Science and Engineering

- Physics
- Chemistry
- Thermodynamics
- Electrical Engineering
- Integrated Circuit Engineering
- Materials Engineering
- Fabrication Engineering
- Construction Engineering
- Architectural Engineering
- Failure Analysis

University or Business Collaborator: Business and Marketing

- Business Model
- Identification of Future Markets
- Competition Analysis
- Technology Protection Strategy
- Fabrication Strategy
- Partnering Strategy
- Globalization Strategy

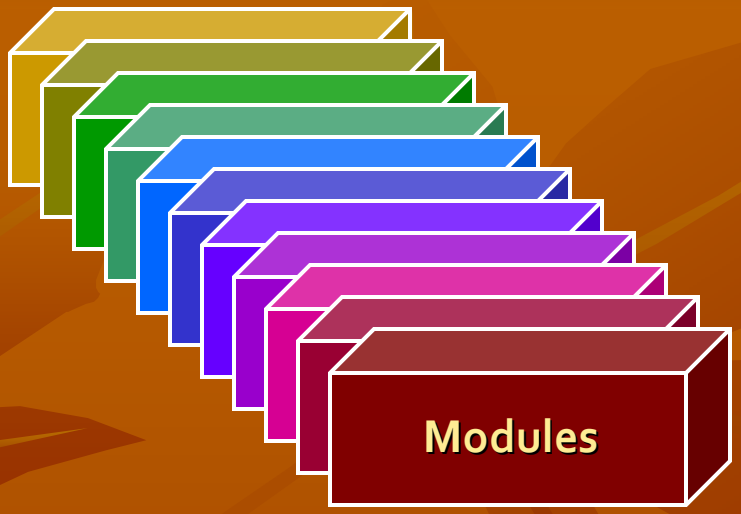
The Approach …

Progress to Date

- Proof of concept completed at laboratory bench-scale level
- Laboratory demonstration of scalability
- Laboratory demonstration shows promise of low cost, high performance energy modules with vast market potential
- Patents and patentable intellectual property

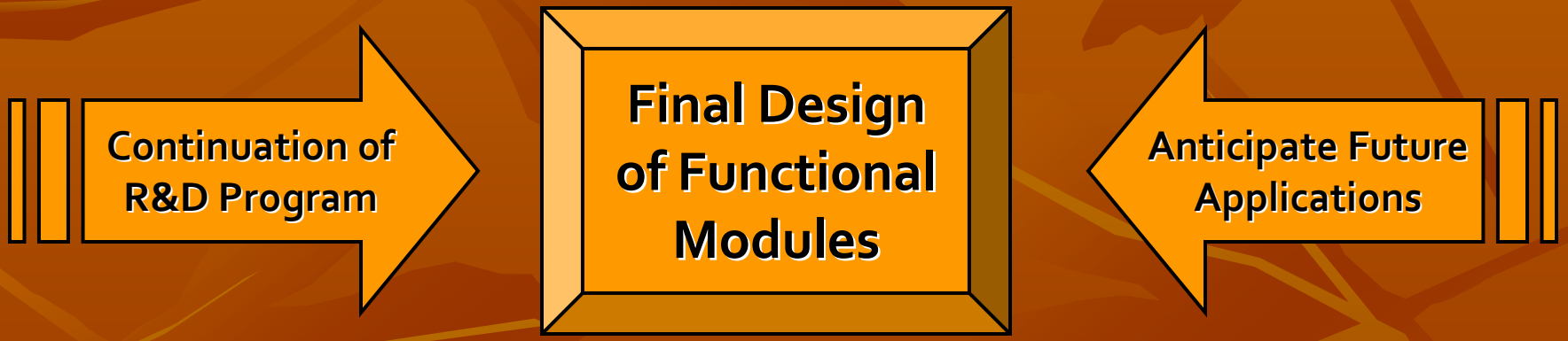
Modules Under Development

- Carbon nanotube organic photovoltaic technology (CNT-OPV)
- Carbon nanotube infrared light based organic photovoltaic technology (CNT-IR-OPV)
- Carbon nanotube glare and shading control technology (CNT-GSC)
- Carbon nanotube thermal circuitry technology (CNT-TC)
- Advanced alkaline carbon nanotube battery technology (AACNT-B)
- Advanced lithium carbon nanotube rechargeable battery technology (ALCNT-RB)
- Proprietary integration of these technologies into printable film (IT-PF)



The market is morphing.
Our success will be our ability to focus R&D efforts to meet the needs of that morphing marketplace…

Technology leapfrogs quickly. Thus, we must work from both ends toward the middle…



The key strategy is to gear ThermoNeutronic's R&D efforts to satisfy tomorrow's markets, not today's markets.

Integration of Cutting Edge, Market-Disruptive Technologies

- Carbon nanotube technology
- Organic photo voltaics
- Solar power technology
- Integrated thermal circuitry
- Thermo-neutronics
- Advanced film battery technology
- Advanced coating techniques
- Proprietary integration of technologies
- Proprietary configurations

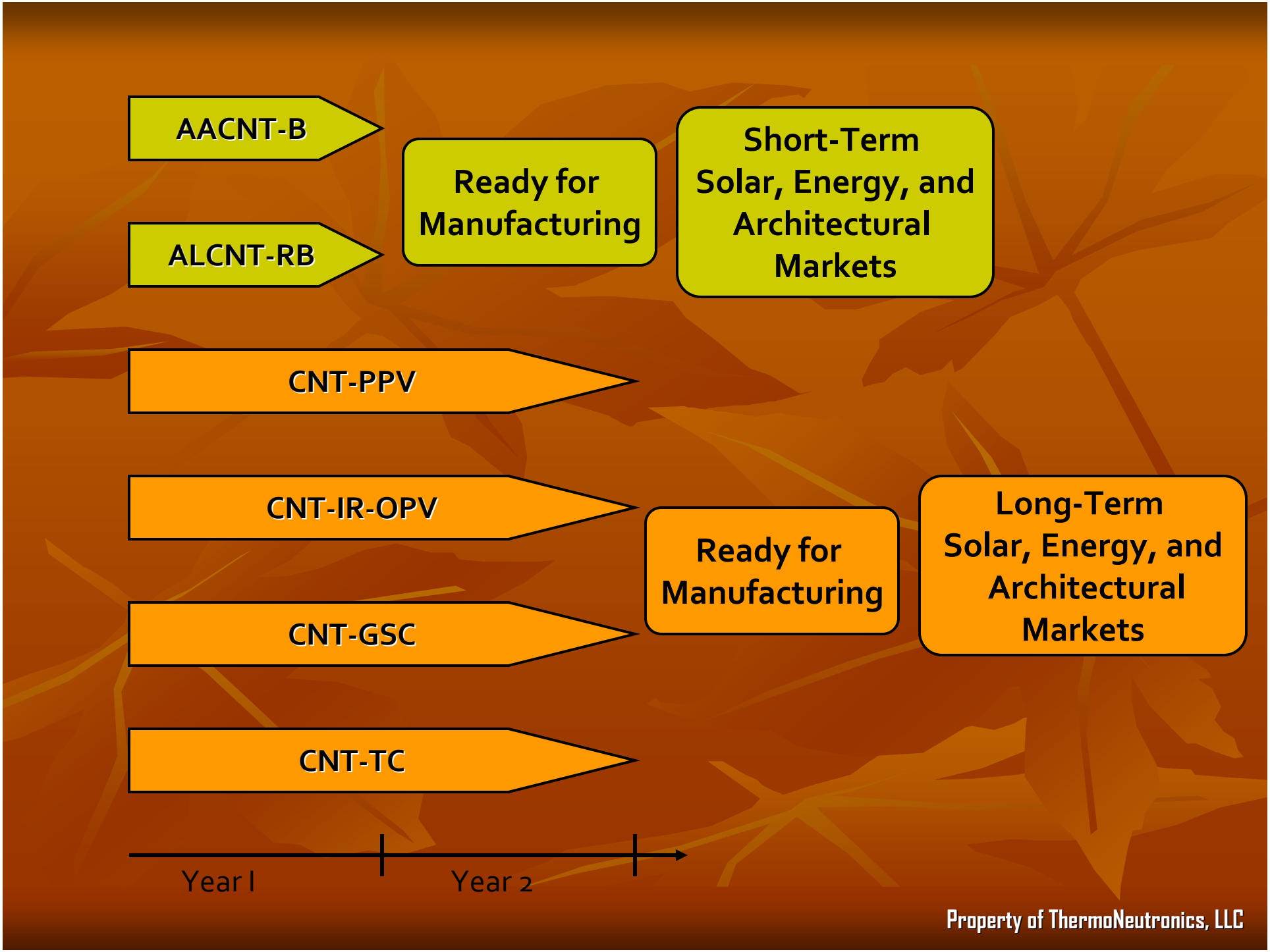
Example Application

- Technology has potential applications ranging from cell phones to advanced building design to power generation systems
- Could be configured as transparent coating for glass windows to collect solar energy, produce electricity, store electricity, and control heat and glare…

Getting it from the laboratory onto the roof top …

Parallel Efforts

ThermoNeutronics seeks a parallel effort of [1] completing R&D quickly on the battery modules for "manufacture ready" within 12 months and [2] completing R&D on the solar modules for "manufacture ready" within 24 months



Building Generation III

Completed R&D
Carbon Nanotubes
Solar Power Cells
Thermal Circuitry
Thermo-Neutronics
Film Battery

+

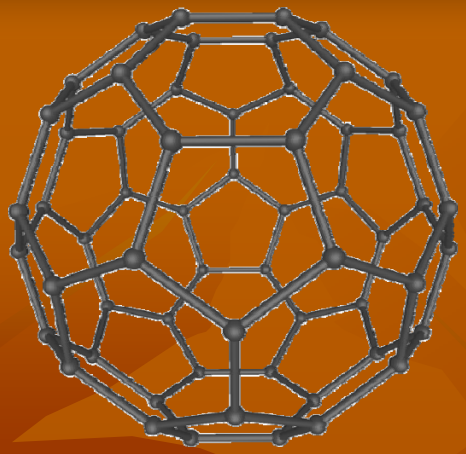
University R&D
Science
Engineering

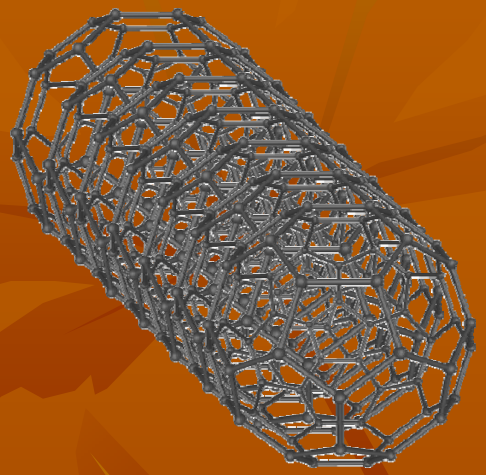
R&D Objective
Prototype Size
High Performance
Energy Modules

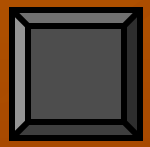
Required Research and Development of New Prototype Module

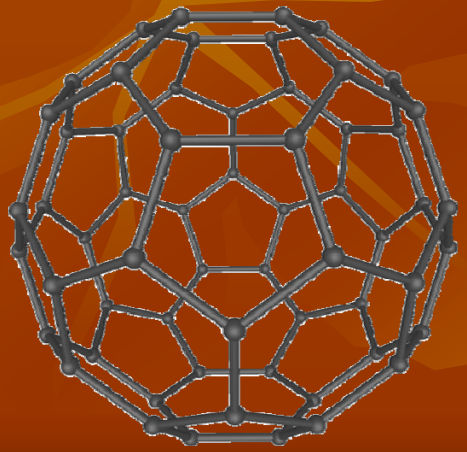
- Performance Evaluation
  voltage, power output, power density
- Alternative Configurations
  flexible, rigid, 2-D, 3-D, brass monkey
- Scaling of Technology
  multiple modules, large modules, fabricated rolls
- Durability Analysis
  protective coatings, installation best practices
- Reliability and Failure Analysis
  electrical failure, thermal failure, structural failure
- Ease of Manufacture
  integrated circuit fabrication, 2D printing, 3D printing, film fabrication
- Application Analysis
  commercial, residential, electrical devices, military

Scale Up









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