US DOE's PV Program
Capturing Value

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Program Snapshot

Goal:

Reduce LEC for PV to $0.06/kWh ($1.50/W systems) by 2020

Status:

$2.10/W in 2003 (manufacturing cost for PV modules)

Approach:

Aggressive, multi-path R&D:

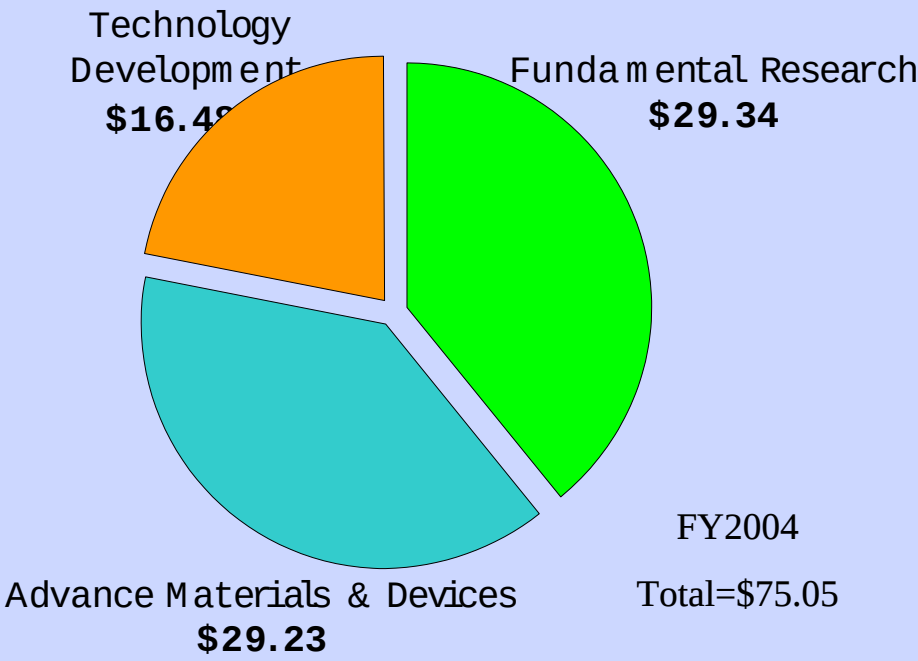
-Reduce manufacturing cost of cells and modules

-Improve cell, module and system efficiency

-Improve reliability and lower cost of the system and BOS components, e.g.inverters

-Improve understanding of materials, processes, and devices for advanced PV options, e.g. polymer cell

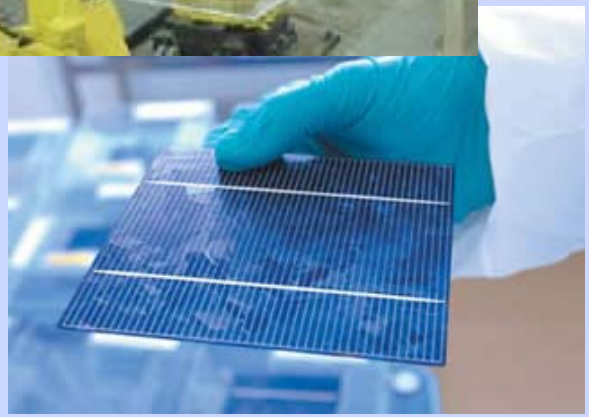
FY 2004 (millions)

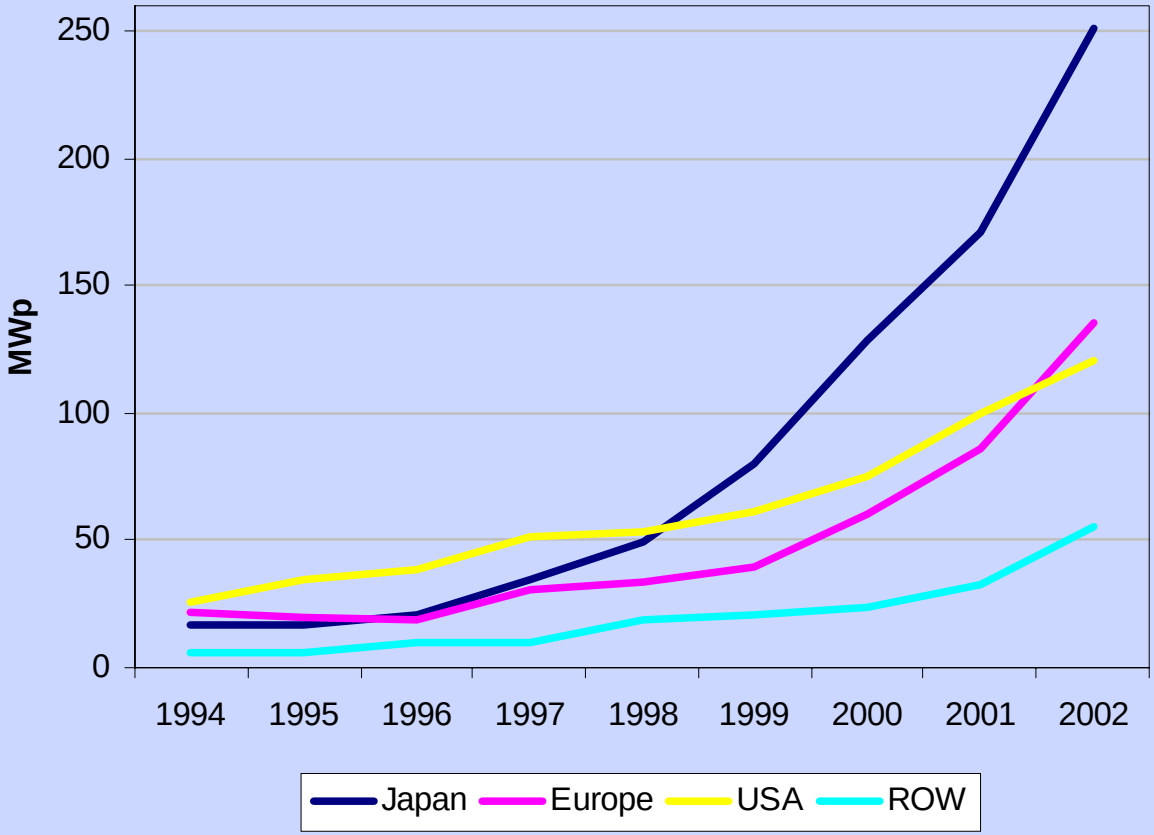


Industry and Market Facts

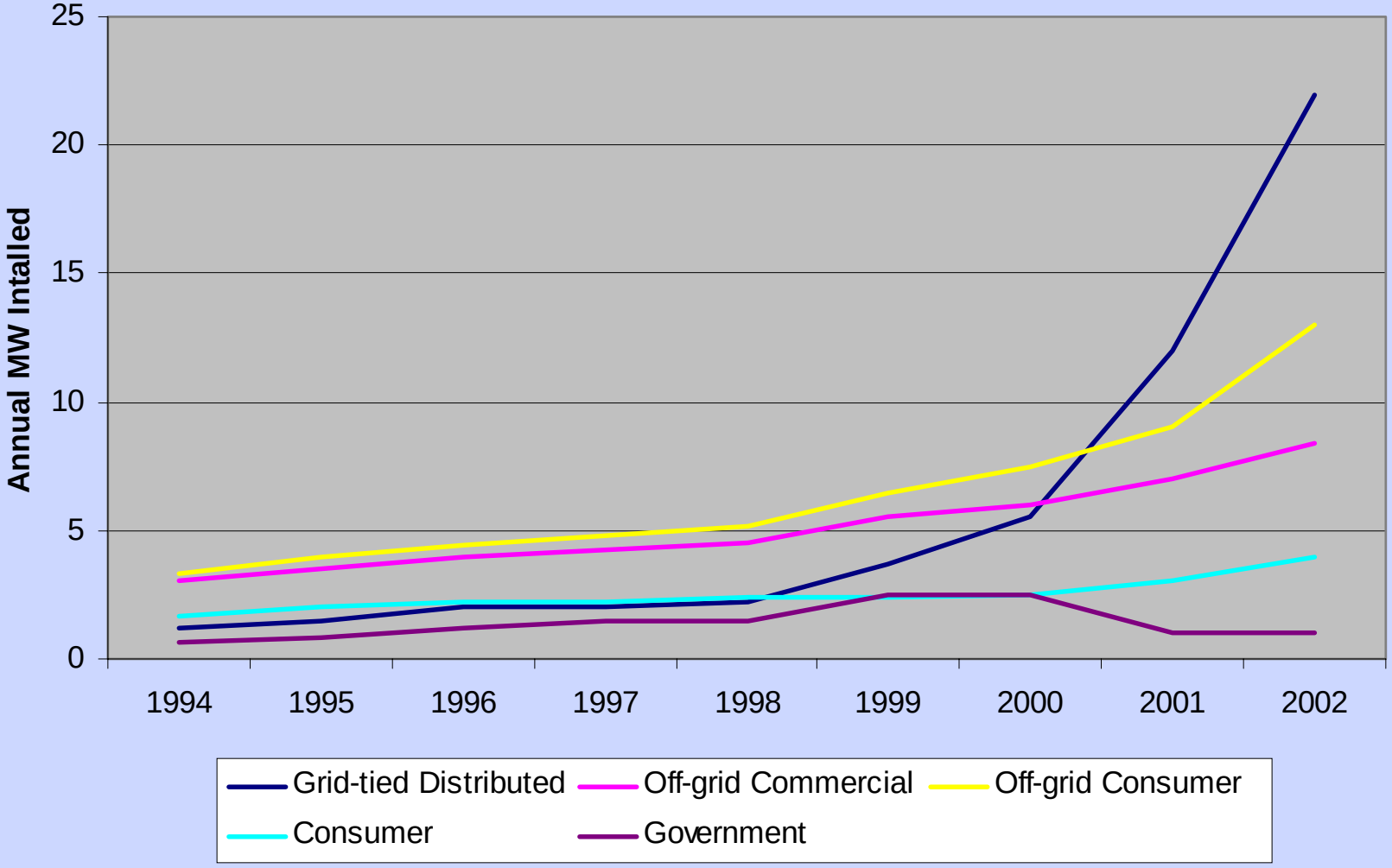
- 2003 Production - ~740 MW
- Average Annual Growth
  - Last 10 years – 31%
  - Last 5 years – 37%
- Consolidation in last five years – 85% of production by top 10 producers
- Most production growth seen in countries with largest markets
- Largest market segment growth – distributed systems – especially grid-tied residential and commercial

Module Production

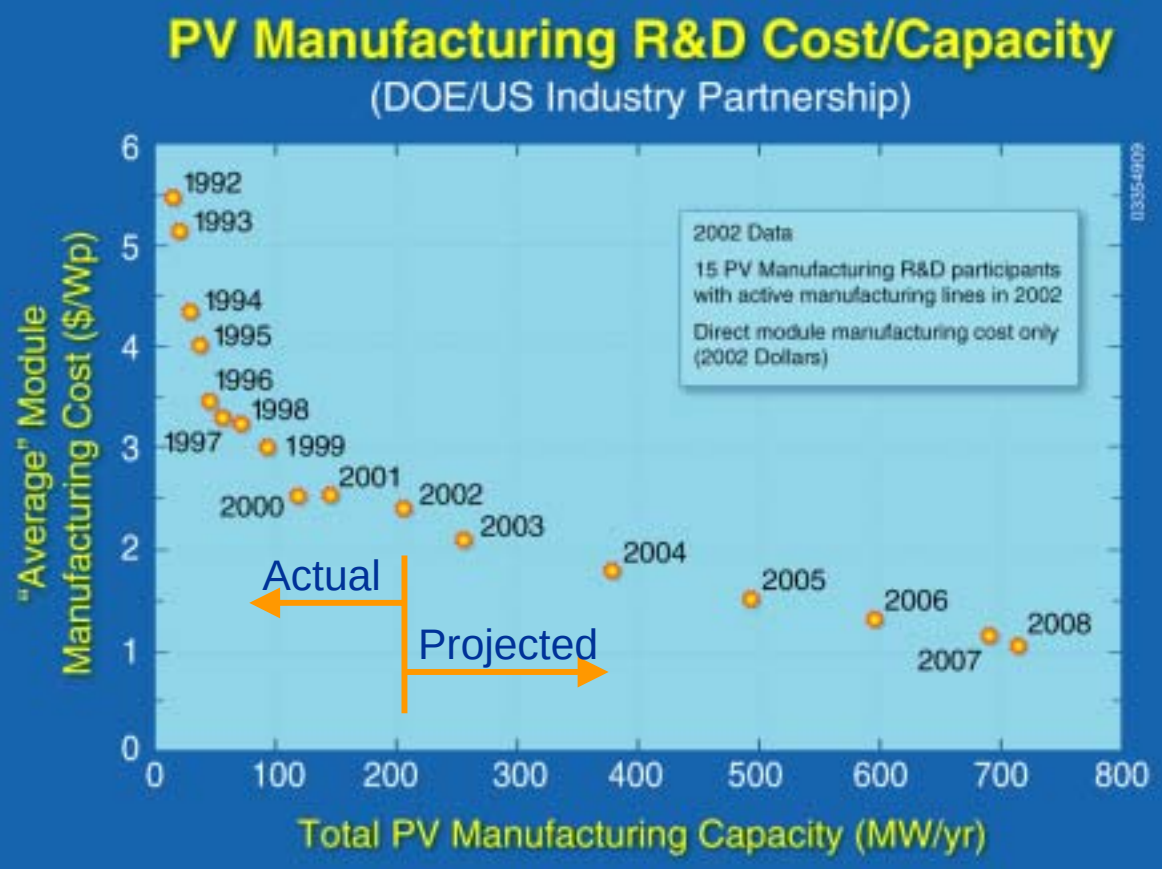




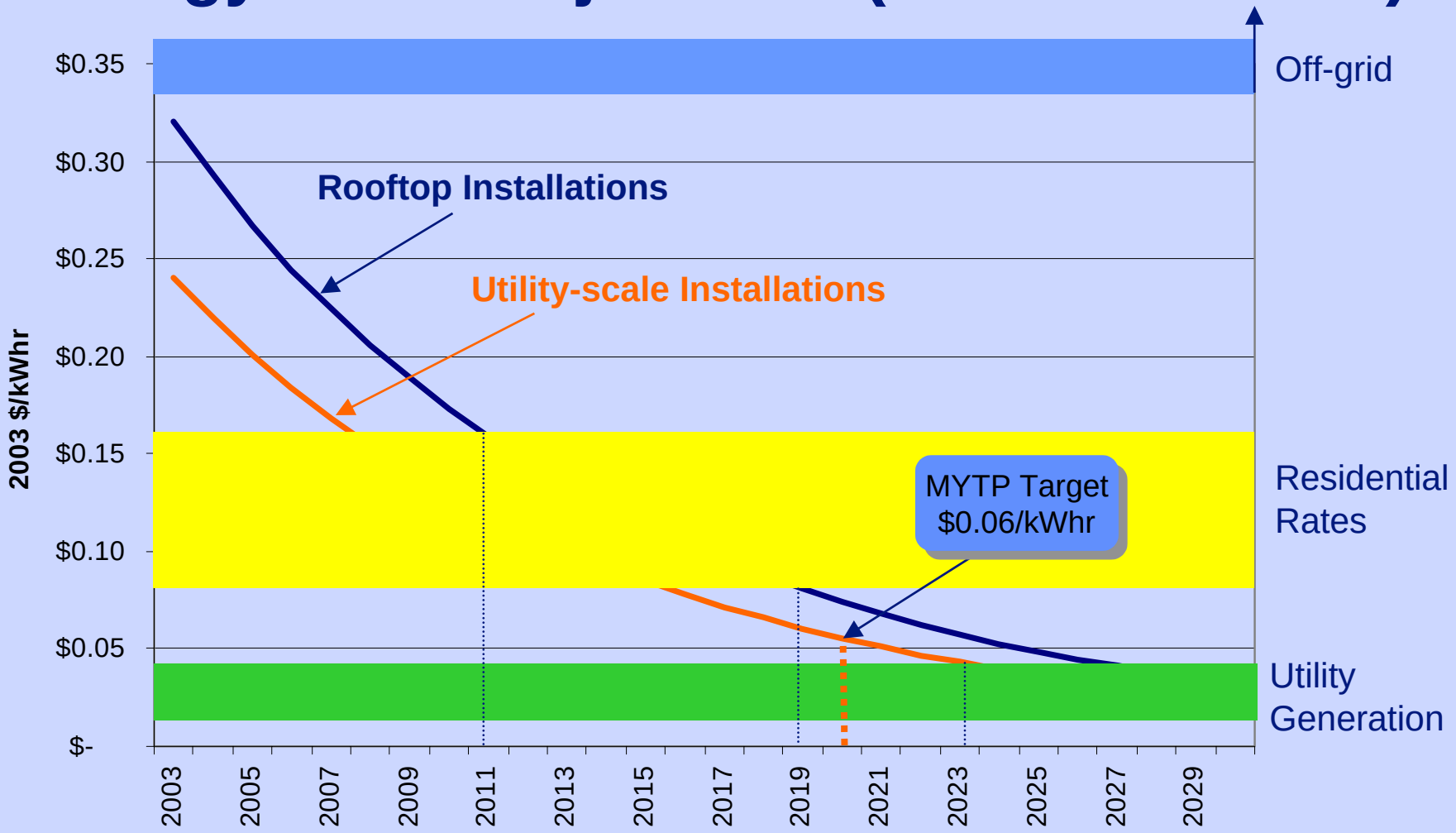
US Market Trends



U.S. Production Costs



Energy Cost Projections (1st Order Value)



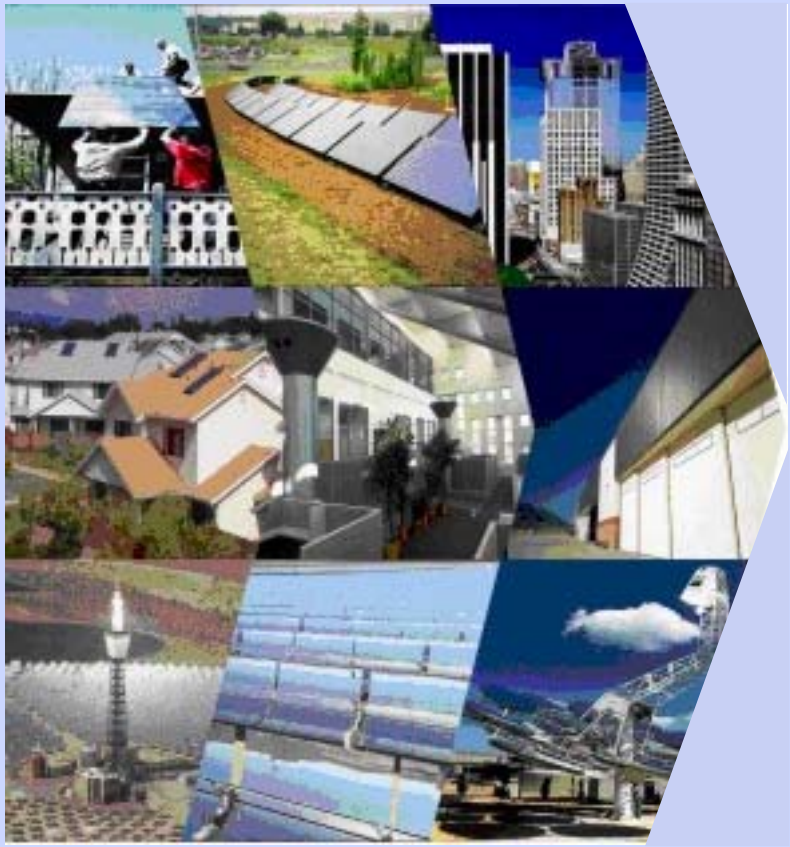
PV Value – Other Than Price

- Modular – Load specific
- Distributed – Power where you need it, less centralized infrastructure
- No (or few) moving parts
- Noise and pollution free
- Low operating costs
- Abundant, pervasive resource – put it anywhere
- Flexible mounting (BIPV)

High-value Applications

High-value Applications

Systems Driven Approach



Goal

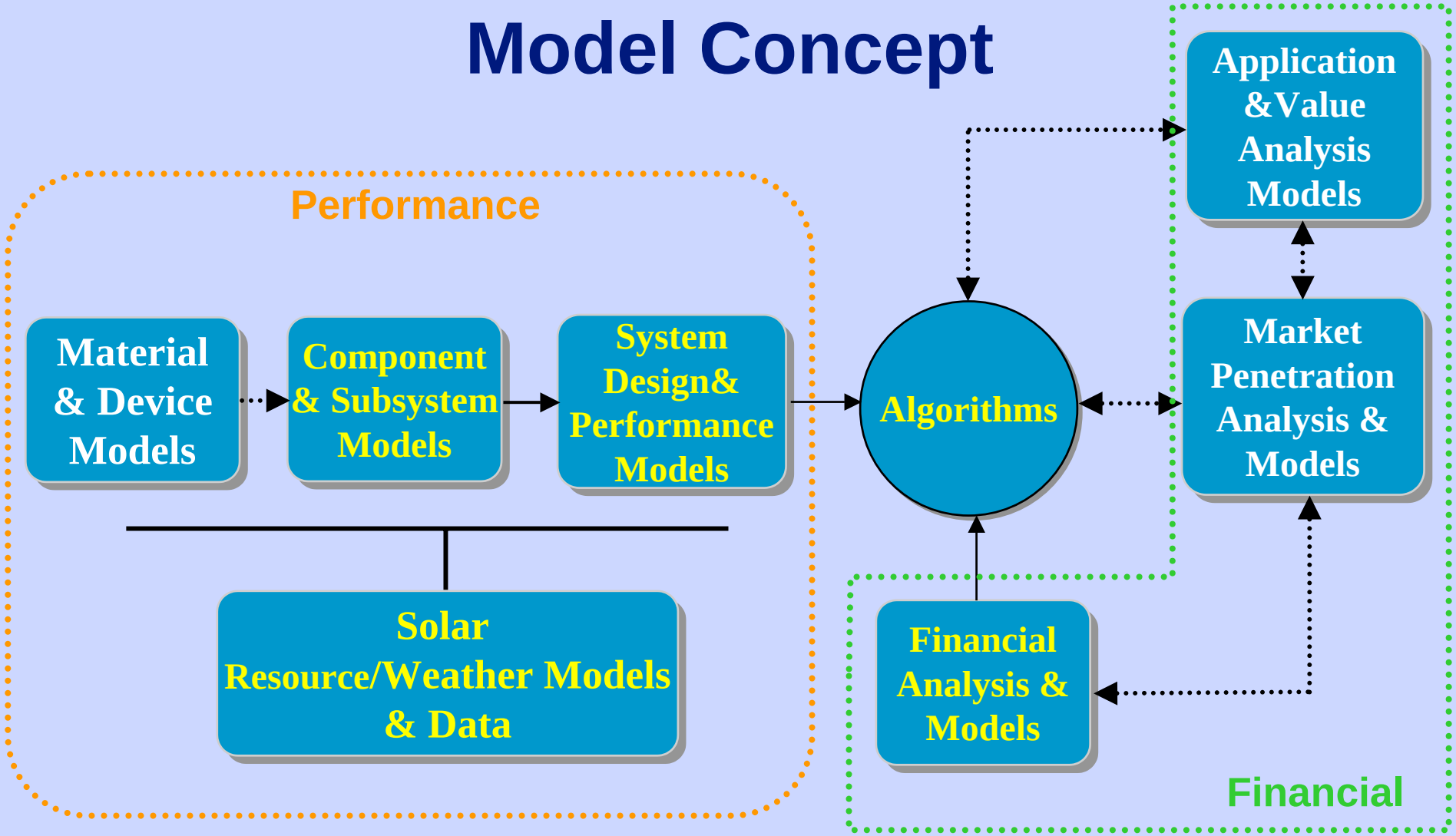
- Develop capability to evaluate the interaction between R&D, applications, and markets to guide program investment

Approach

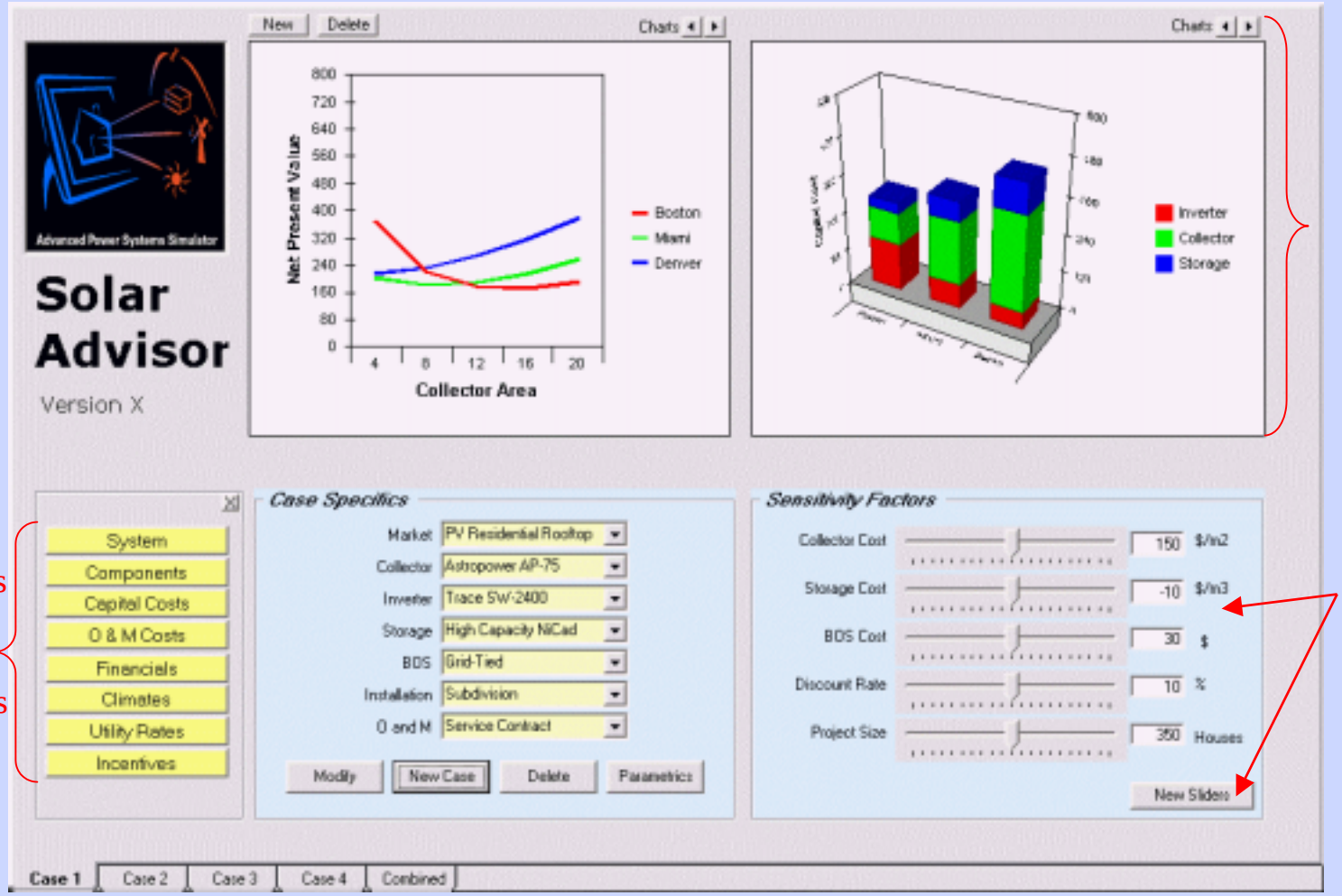
- Develop an interactive sensitivity model to evaluate R&D vs. LEC
- Collect field data on performance and cost for input and validation
- Analyze markets to establish targets

Systems Driven Approach

Model Concept



Model Interface



User-selectable output graphs display sensitivity results

Slider-bars adjust variables for sensitivity analysis. Drop-down menu for selecting parameters of interest.

User inputs via data fields or sub-models

Workbook format allows for analysis of multiple cases

Conclusions

- PV is a technology that offers multi-dimensional value
- Technologies that offer value find markets
- The Systems Driven Approach to program planning directly links R&D priorities to market targets
- The SDA to program planning will ensure that DOE supported R&D maximizes PV values