DOE Solar Program– PV Subprogram

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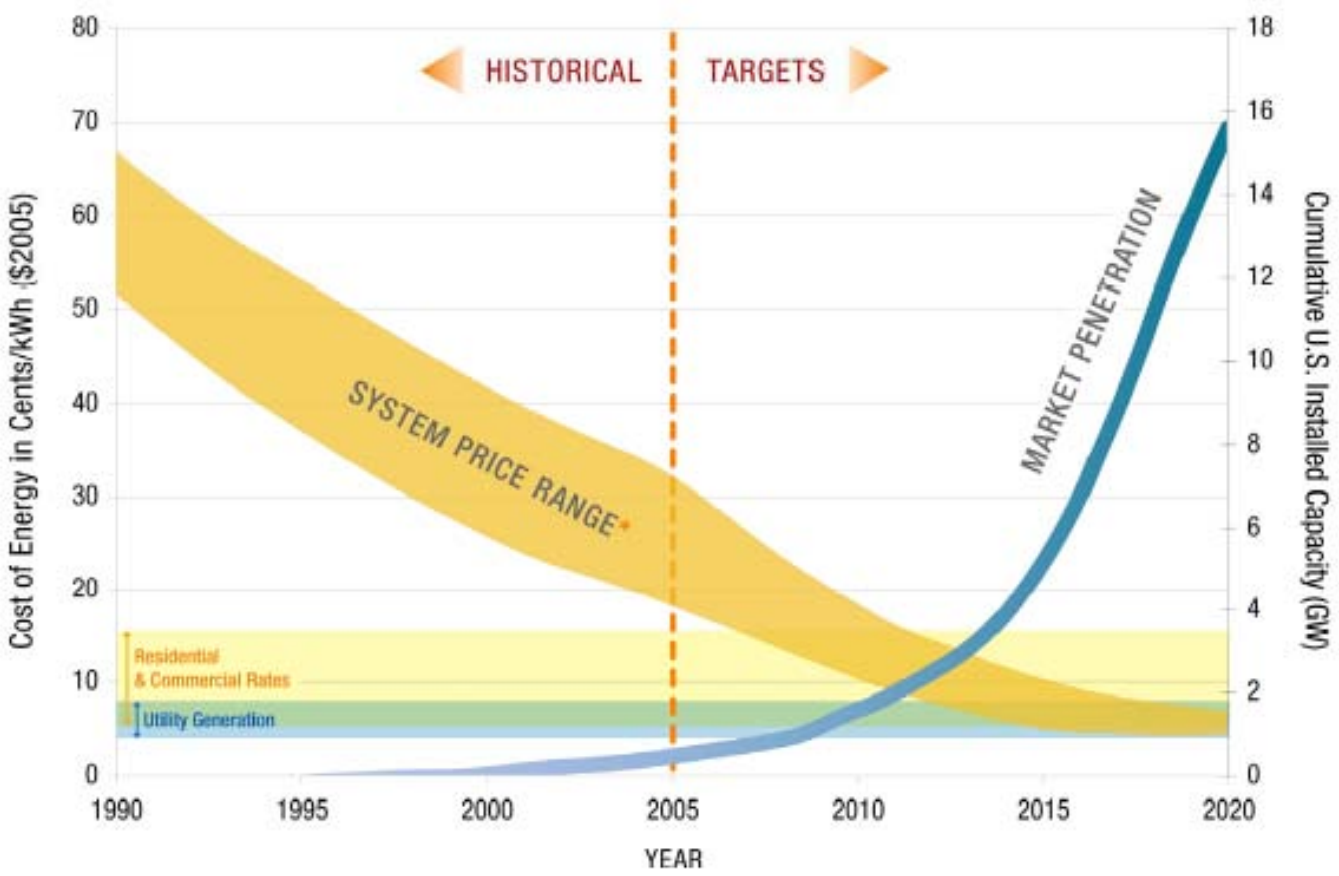
Evolution of an Initiative: Evolution of the Solar America Initiative (SAI)



Market Sector	Current U.S. Market Price Range (¢/kWh)	Cost (¢/kWh) Benchmark 2005	Cost (¢/kWh) Target 2010	Cost (¢/kWh) Target 2015
Residential	5.8-16.7	23-32	13-18	8-10
Commercial	5.4-15.0	16-22	9-12	6-8
Utility	4.0-7.6	13-22	10-15	5-7

ADVANCED ENERGY INITIATIVE

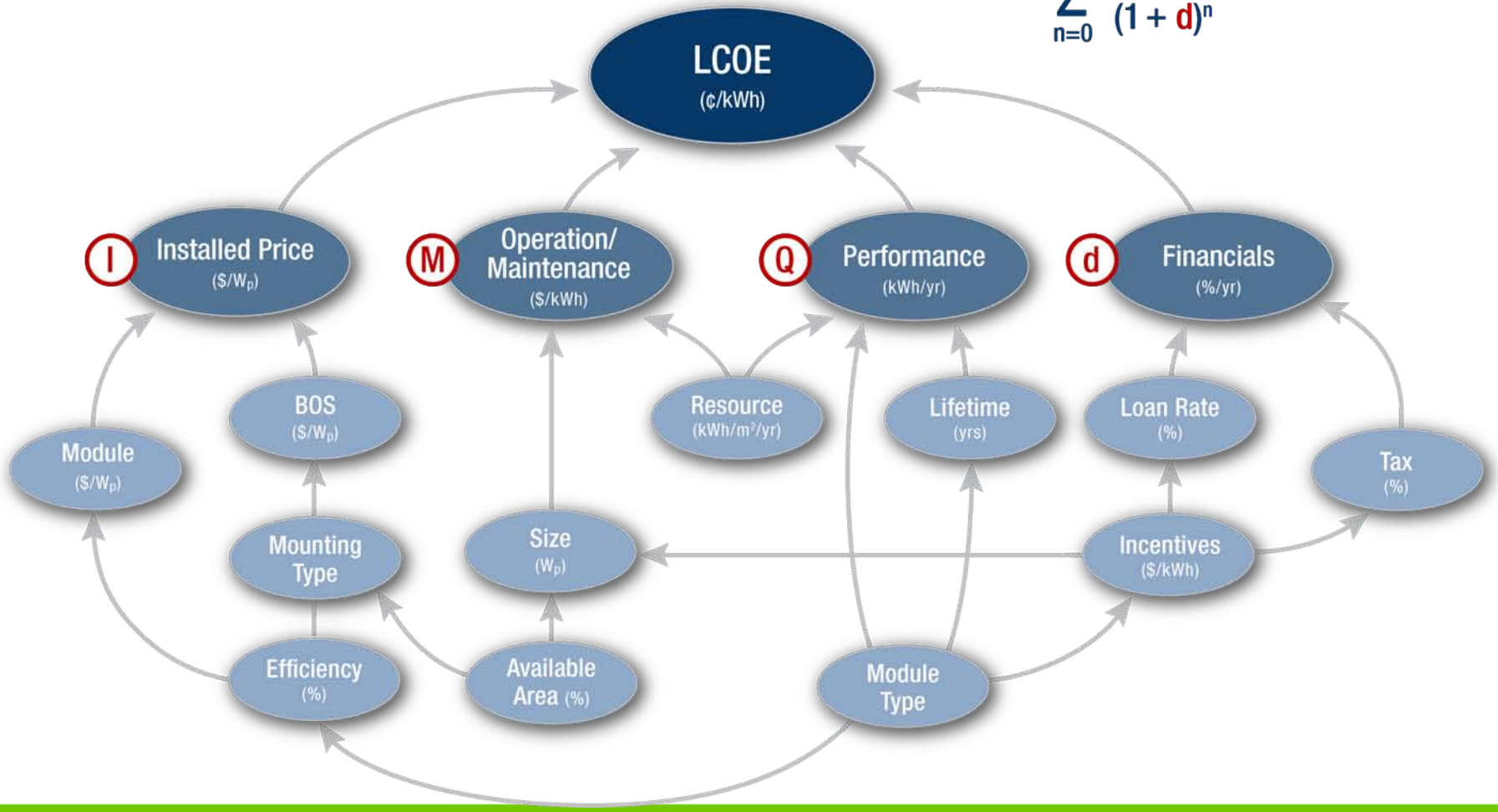
SOLAR AMERICA INITIATIVE

SOLARIA
UNI-SOLAR
BOEING
SUNPOWER
nanosolar
GREENRAY, INC.
bp solar
DOW
AMONIX
GE Energy
Konarka

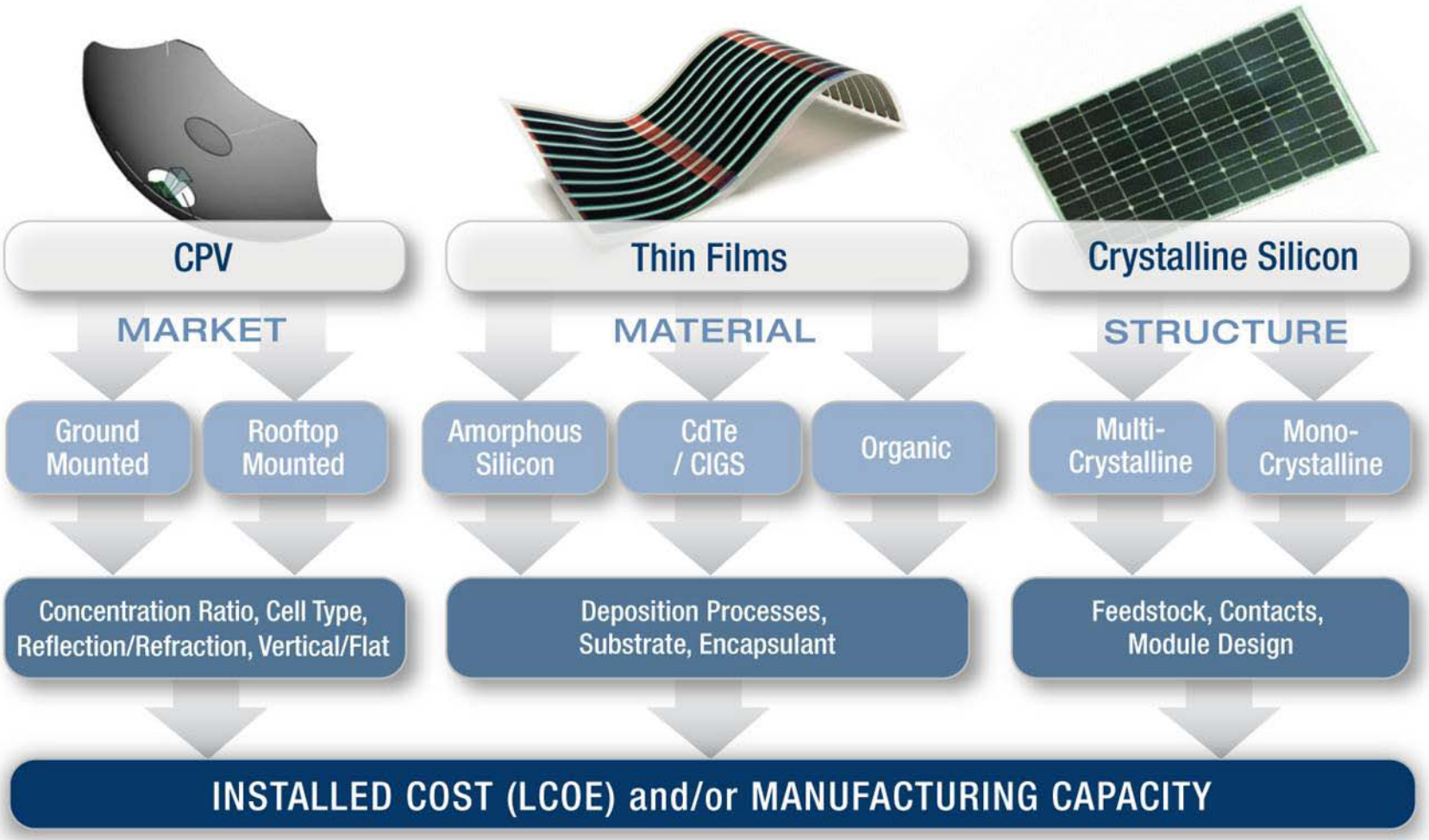
Technology Pathway Partnerships

Levelized Cost of Electricity (LCOE)

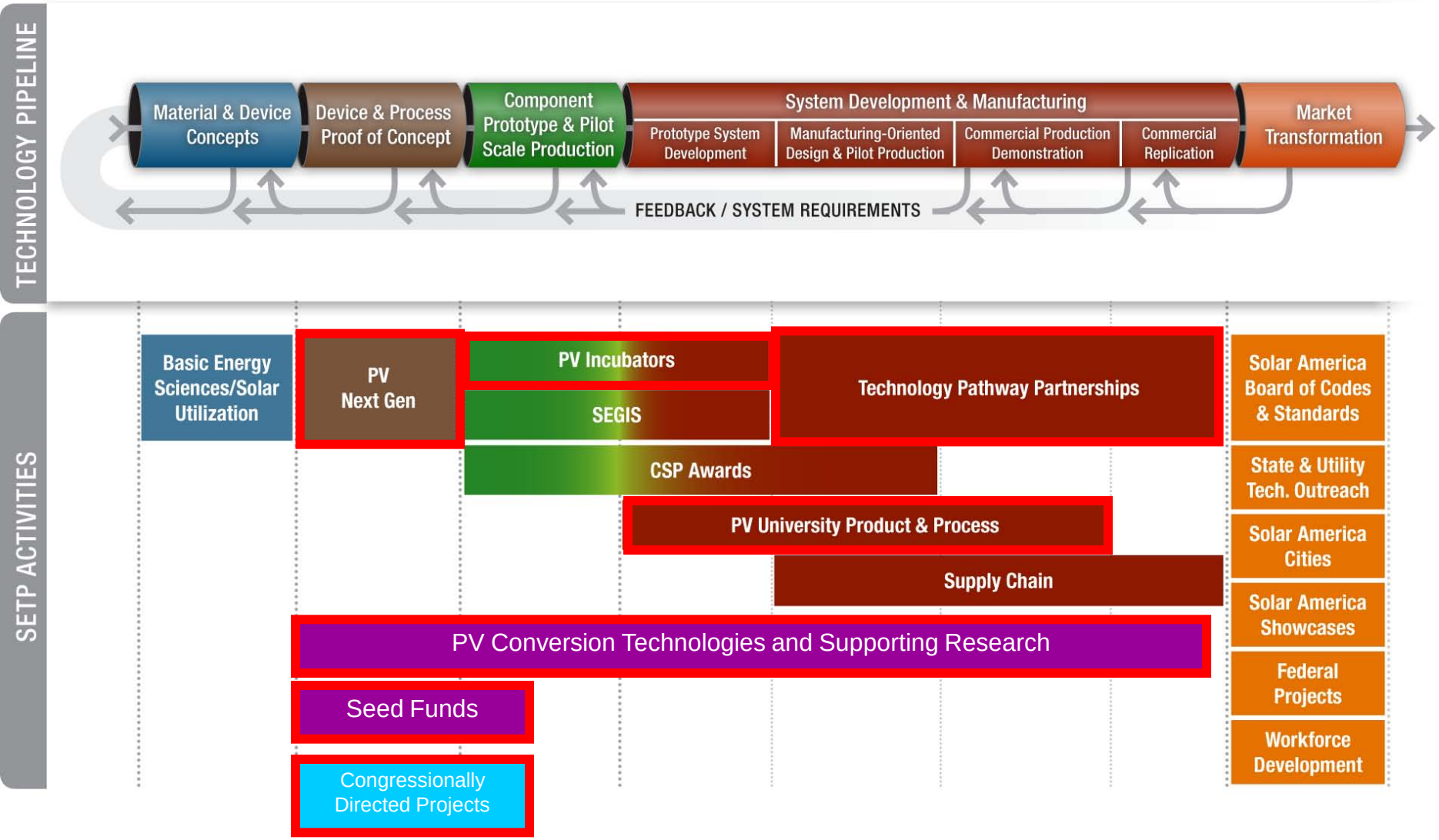
$$LCOE = N.P.V.\frac{(price)}{(energy)} = \frac{\sum_{n=0}^{N}\frac{I_0 + M_n}{(1+d)^n}}{\sum_{n=0}^{N}\frac{Q_n}{(1+d)^n}}$$



Diverse technologies for cost reductions and various markets

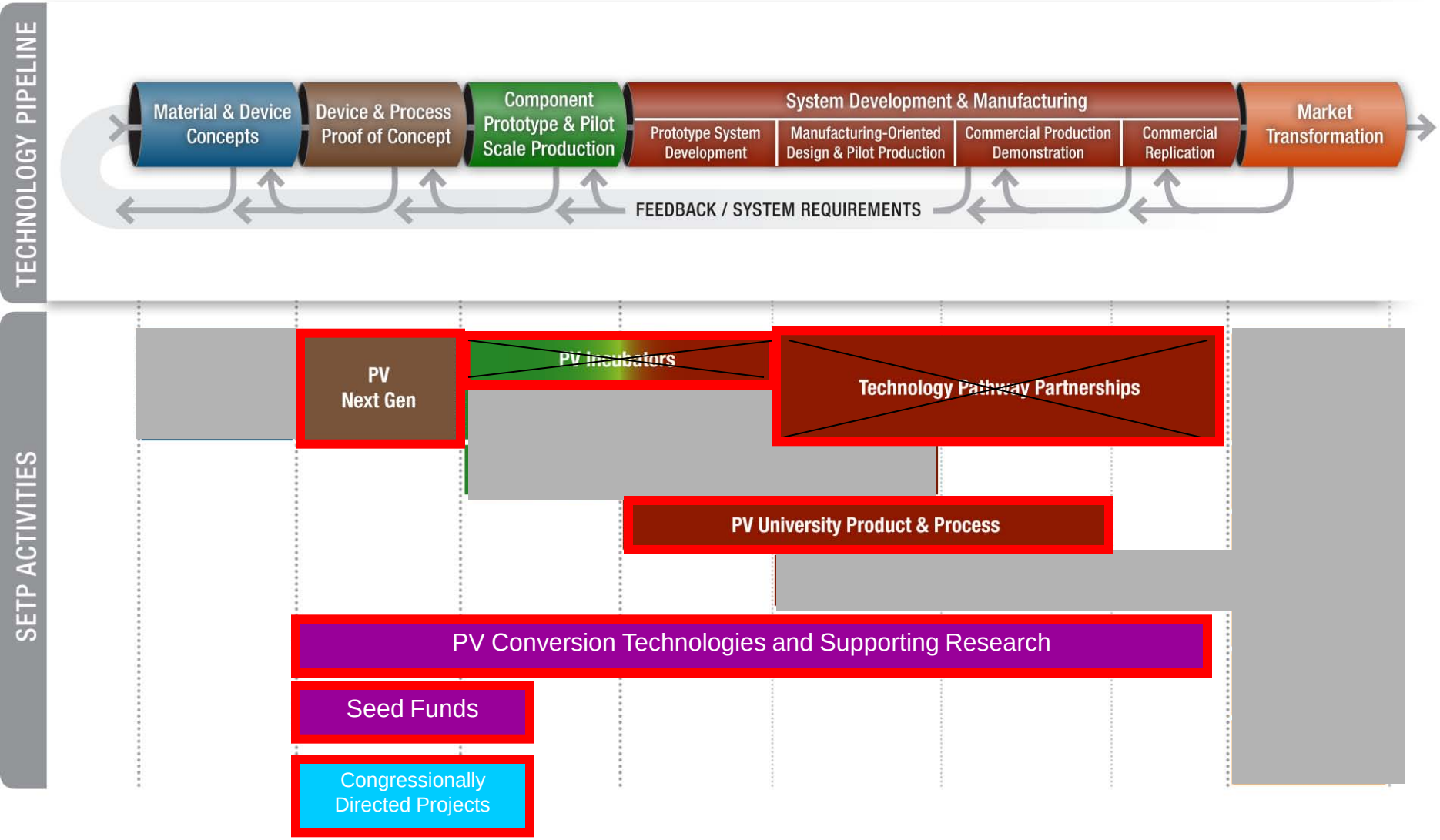


Major Solar Program PV Subprogram Elements



Major Solar Program PV Subprogram Elements

Projects going through Stagegate Review are not reviewed in this Peer Review



SWOT– PV Subprogram

- **Strengths**
  - Tech Development (great tech diversity across disruptive and revolutionary technologies)
  - Voice – people listen to DOE (reputation is money)
  - Great transparency into industry (trends, comparison)
  - World Class resources, especially National Lab personnel
- **Weaknesses**
  - Maintaining relevancy of Lab R&D and supporting activities
  - Communication with stakeholders and coordination with other R&D organizations
  - Lag between budget appropriations and management of project
- **Opportunities**
  - Track installations and costs to record progress of grid parity
  - Financial crisis puts more attention on DOE's role to support technology development and deployment
  - DOE as coordinator could increase manufacturing advances by organizing industry consortia and roadmaps
  - A lot of talented scientists and engrs want to work in this area
- **Threats**
  - Fall out from failure to execute large budget increase
  - Proprietary concerns make coordination and collaboration untenable in industry

Management Challenges and Opportunities

Challenges

- Stimulus bill brings new challenges for spending in wise ways
- New Secretary with a new agenda; unclear what the importance of photovoltaics and applied research will be
- Research at national labs continues to be a large part of the budget, needs to be managed with care
- Managing Congressional earmarks to align with portfolio as much as possible
- Interagency coordination more important than ever

Opportunities

- Stimulus bill makes funding more research in critical areas possible
- Research at a broader number of DOE National Labs may bring new strengths to portfolio
- Opportunity to take stock of current market realities and retune portfolio with new solicitations, possibly with more emphasis on earlier, riskier technologies
- New companies serving the PV space may free up traditional national lab support areas

Program Criticisms and Justifications:

- "Overly focused on funding mature technology"
  - SAI objectives necessitate near term cost reductions, DOE mitigates risk, encourages additional private investment, and accelerates R&D
- "NREL has lost it's edge in CIGS, CdTe, III/V, etc"
  - Lab R&D must have relevance to industry work
- "DOE lacks a robust university program"
  - FY07-08 efforts focused primarily on university involvement thru TPPs, with industry projects, and on Next Gen awards.
- "Labs are overwhelmed with support requests"
  - Labs should restrict their support to what's not available elsewhere. Also, quantify how much more is needed
- "No outlet for national collaboration on pre-competitive R&D"
  - Scope of 'pre-competitive' work has changes substantially as PV have become profitable. Additionally some university stakeholders were disappointed in the 'NREL teams'.
- "Not enough international collaboration"
  - No direct fit under SAI, unclear what opportunities exist. APP, IPVRW, etc.
- "DOE lacks a strategic R&D vision of how it's earlier stage projects relate to past work and future relevance"
  - DOE relies on merit reviewers for project selections. We've considered more robust R&D roadmaps but are unsure if DOE has the capabilities to lead these efforts.

Constraints

- Competitive Procurement: No rolling selection, generic applicability, anticipate industry trends, legacy investments, oversight/management of grants and contracts
- Breadth of Interaction: Active funding of over 50 projects (20-30 companies) with limited resources
- Political Considerations: Programmatic ‘Progress’, Difficult down-selections,
- Transparency: Concerns over FOIA, information spillover (particularly at labs), IP
- HR Obligations and Legacy: Lab funding has enormous momentum in terms of future funding obligations and resistance to cutting edge R&D.