Consider Adding Info on panel facets
and advanced reflectors

USA Trough Workshop
Concentrator Status & Development

Tim Wendelin

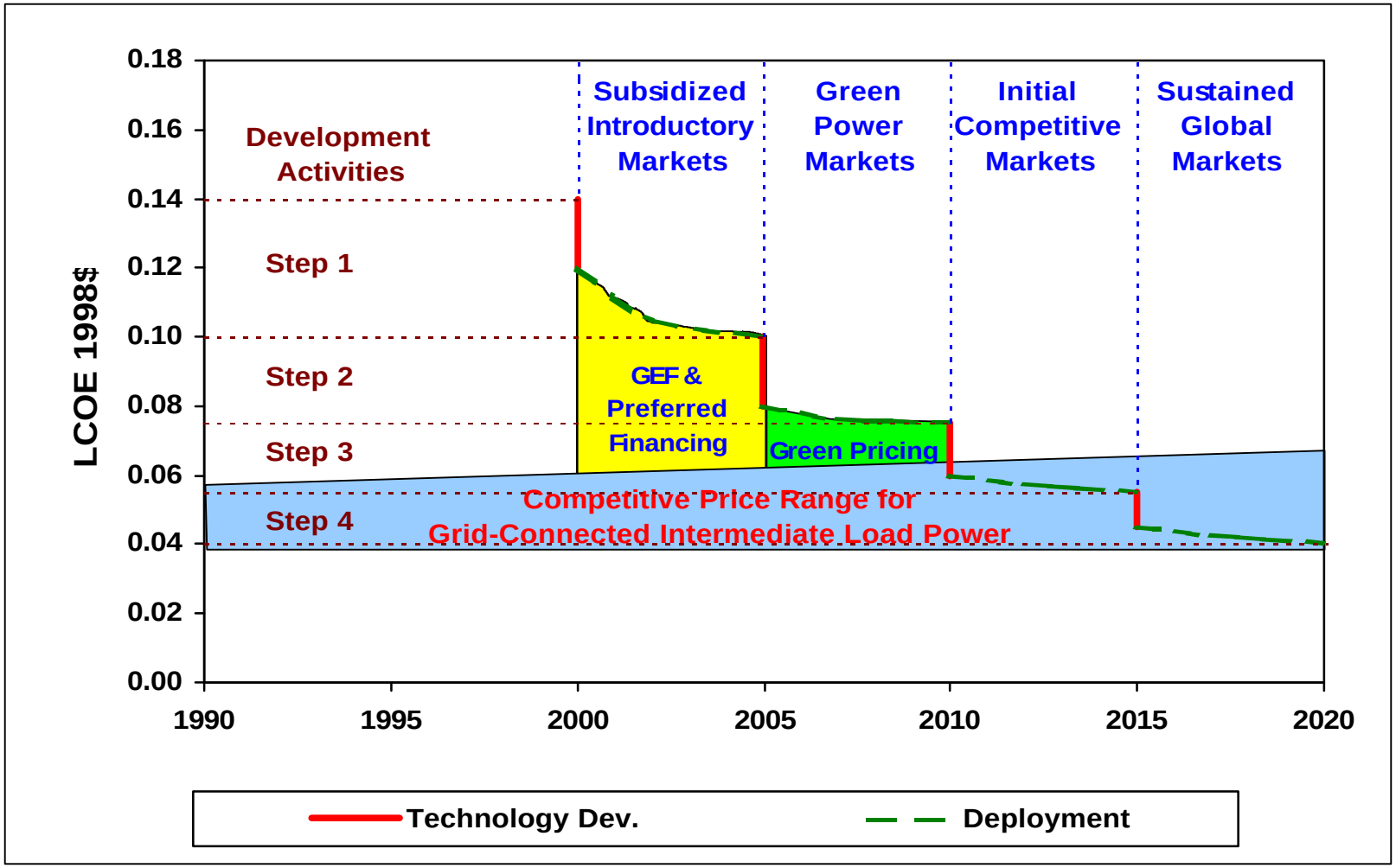
August 16, 1999

CONCENTRATING S O L A R POWER
Sun♦Lab
Sandia National Laboratories, Albuquerque, NM
National Renewable Energy Laboratory, Golden CO

- Goal - Improve concentrator technology to enable troughs to penetrate both near and longer term real markets.
  - Through cost reduction
    - Re-engineer components/new designs for lower 1st costs
    - Re-engineer components to be manufactured less expensively
  - Through performance improvements
    - Re-engineer components/new designs for better performance
  - Through decreased O&M
    - Re-engineer components to be more trouble free
  - Combinations of the above

- Current Status
  - SunLab recently issued an RFP resulting in a concentrator development contract with Duke Solar.
  - EuroTrough
  - This workshop.
    - Purpose: Develop a plan consisting of a prioritized list of proposed concentrator activities supporting USA Trough.

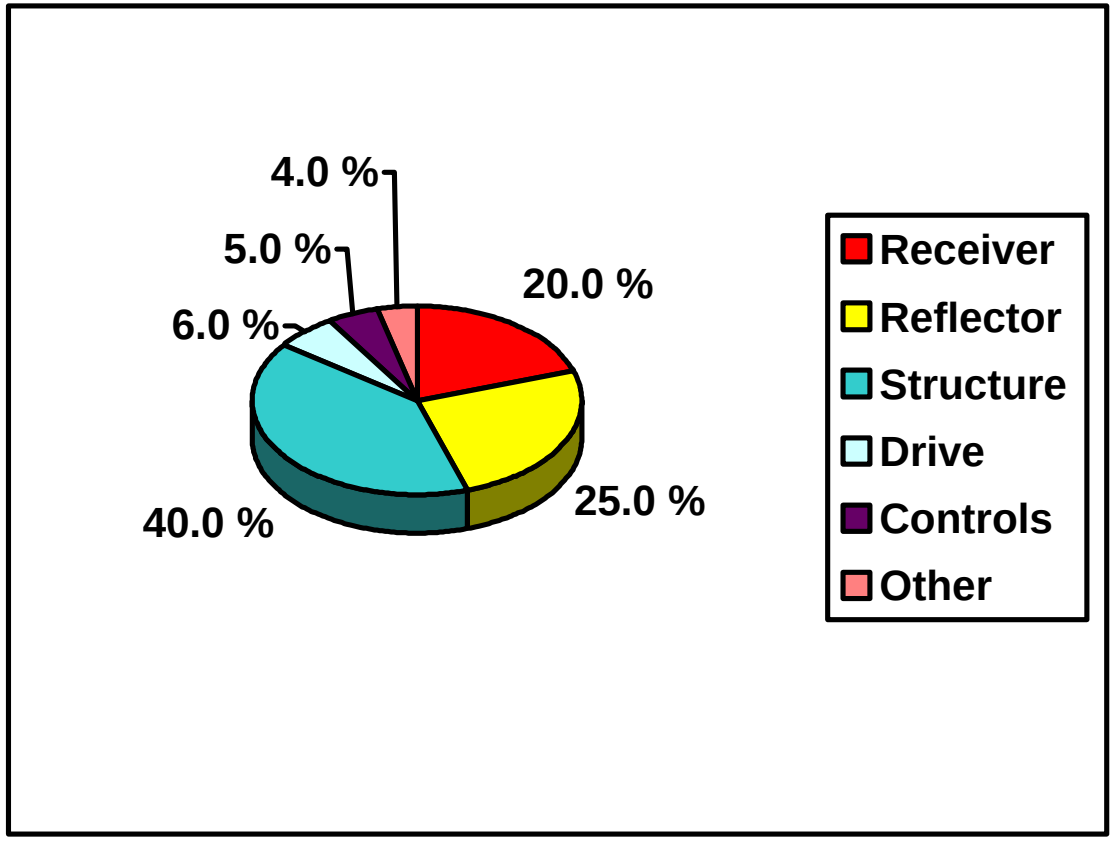
- Issues
  - Establish baseline
  - Need near and longer term view
  - Cost
  - Performance
  - O&M
  - Drives
  - Controls
  - Flex Hoses/Ball Joints
  - Others: Field preparation, ???


0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
LCOE 1998$
1990
1995
2000
2005
2010
2015
2020
Development Activities
Subsidized Introductory Markets
Green Power Markets
Initial Competitive Markets
Sustained Global Markets
Step 1
Step 2
Step 3
Step 4
GEF & Preferred Financing
Green Pricing
Competitive Price Range for Grid-Connected Intermediate Load Power
Technology Dev.
Deployment

This is a repeat

- Issues
  - Establish baseline
  - Need near and longer term view
  - Cost
  - Performance
  - O&M
  - Drives
  - Controls
  - Flex Hoses/Ball Joints
  - Others: Field preparation, ???

Projected Solar Field Costs: $215/m^2



- Near Term Objectives (2-5 year time frame)
  - Establish baseline - Suggest LS-2 over LS-3. Benefits: Optically accurate, maintains alignment, requires less O&M. Need good cost data though. LS-3 advantages: size, ease of assembly and known costs but should it be baseline?
  - Cost - Identify/develop reflector, structure, and/or drive modifications/designs which would result in significant (20%) cost savings and be implemented (designed, tested, proven) in near term.
  - Performance - For near term, considered secondary to cost. Performance improvement concepts which can be implemented in near term w/o increasing costs should be considered.
  - O&M - Identify concepts which would reduce O&M costs by ???% within near term. (Mirror cleaning, field alignment)

- Near Term Objectives (continued)
  - Drives - ???
  - Controls - ???
  - Flex Hoses/Ball joints - ???
  - Others - ???

- Near term approach (deployable in 2-5 year time frame)
  - Industry and SunLab working together to:
    - Perform DFMA on baseline design with goal of reducing manufacturing costs by ???%
    - Collaborate with EuroTrough, (What about Duke??)understand where they are, where they are going. Incorporate lessons learned, leverage on knowledge base.
    - Develop RFP's targeted at specific areas identified by DFMA and Eurotrough results
    - Manufacture and test resultant hardware to validate performance
    - Test loop at existing SEGS facility
    - Implement results in next plant

- Longer term objectives (5- 10 years)
  - Cost - Identify and develop innovative designs which have potential to be significantly less costly (30-50%?) than baseline but require more R&D to get there.
  - Performance - Identify and develop innovative designs which improve optical performance W/O increasing installed costs. Highly dependent on other factors such as current/new end user power cycles, HCE designs, etc.
    - New reflector concepts/materials
    - New optical geometries
    - Secondaries
    - Trough tilting
    - Fixed receivers
    - Etc.

- Longer term objectives (continued)
  - O&M - Identify and develop new designs/strategies significantly minimizing O&M costs
    - New mirror materials requiring minimal cleaning
    - In-field tools for rapid alignment assessment and adjustments
    - New cleaning techniques/strategies
    - State of the art mirror with 30 year + lifetime
  - Controls - RF communications, fiber optics, etc.
  - Flex hoses/ball joints
  - Other

- Long-term approach (deployable in 5-10 year time frame)
  - Develop RFP's targeted at specific areas
  - Utilize SunLab for ideas and development and testing