



DEVELOPING IMPROVED MATERIALS TO SUPPORT THE HYDROGEN ECONOMY

Edison Materials Technology Center

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This presentation does not contain any proprietary or confidential information



Objectives

Edison Materials Technology Center (**EMTEC**) will use Hydrogen, Fuel Cells & Infrastructure Program goals to find and fund projects with near term commercialization potential

Cross cutting breakthrough materials technology

Application specific tailored nanomaterials

Ohio matching funds pending

Will use EMTEC Core Technology (CT) model



EMTEC

- EMTEC is one of 7 State of Ohio Edison Centers
 - Established in 1987 by Ohio Gov. Celeste
 - 501c(3) Not for Profit
- Membership Based with Over 100 Industry, plus University, and Government Members
- Virtual – We Own no Major Capital Equipment
- Access to Over \$2B in State-Of-The-Art Facilities
- Significant Experience in Ceramics, Metals, Polymers, and many Material Processes



Budget

- Total Funding: \$4.5 Million +
- DOE: \$2.945 Million
- State of Ohio: \$1 Million
- Private: \$.555 Million +
- Funding in FY03: NA- (new start in FFY04)

H₂ Generations & Barriers

H ₂ production method	Barriers
Distributed H ₂ production from HC	<ul style="list-style-type: none"> • Fuel processor capital cost • Carbon dioxide emissions • Safety
H ₂ production from biomass	<ul style="list-style-type: none"> • Feedstock cost & availability • Efficiency of gasification technology • Fermentative Micro-organisms
H ₂ production from photolysis	<ul style="list-style-type: none"> • Rate of hydrogen production • Materials durability & system engineering • Diurnal operation limitations & space efficiency
H ₂ production from electrolysis	<ul style="list-style-type: none"> • System capital cost & efficiency • Electricity cost
H ₂ production from high-temperature thermochemistry	<ul style="list-style-type: none"> • Unproven technology • High temperature materials & capital cost

H₂ Storage & Barriers

- H₂ storage system cost target: \$2/kWh
- Present & future H₂ storage options

Options	Barriers
Compressed hydrogen	<ul style="list-style-type: none">• Insufficient fuel storage for acceptable vehicle range• Lack of BOP components
Cryogenic hydrogen	<ul style="list-style-type: none">• Hydrogen boil-off
Solid-state hydrides	<ul style="list-style-type: none">• H₂ storage capacity & reversibility• Durability
Chemical hydrides	<ul style="list-style-type: none">• Regeneration processes for irreversible systems• By-product removal



Fuel Cell Development Targets/Barriers

Specification	Residential	Commercial	Automotive
Scale (kWe)	1-7	35-250	40-90
Fuel	Natural gas	Natural gas	Gasoline or H ₂
Life (hours)	40-120K	40-80K	3-6K
FCS cost target	300-500	300-500	25-35
Start-up/Transient	5-10	120	1/.01
Barriers	<ul style="list-style-type: none">• Similar CTE matched stack material component• Durability• Cost	<ul style="list-style-type: none">• Compatible stack material component• Durability• Cost	<ul style="list-style-type: none">• Stack materials and manufacturing cost• Thermal management• Efficiency• Thermal & water management



Approach

EMTEC will solicit and evaluate projects:

Clear Project Definition

Industry Relevance

Appropriate Resource Level

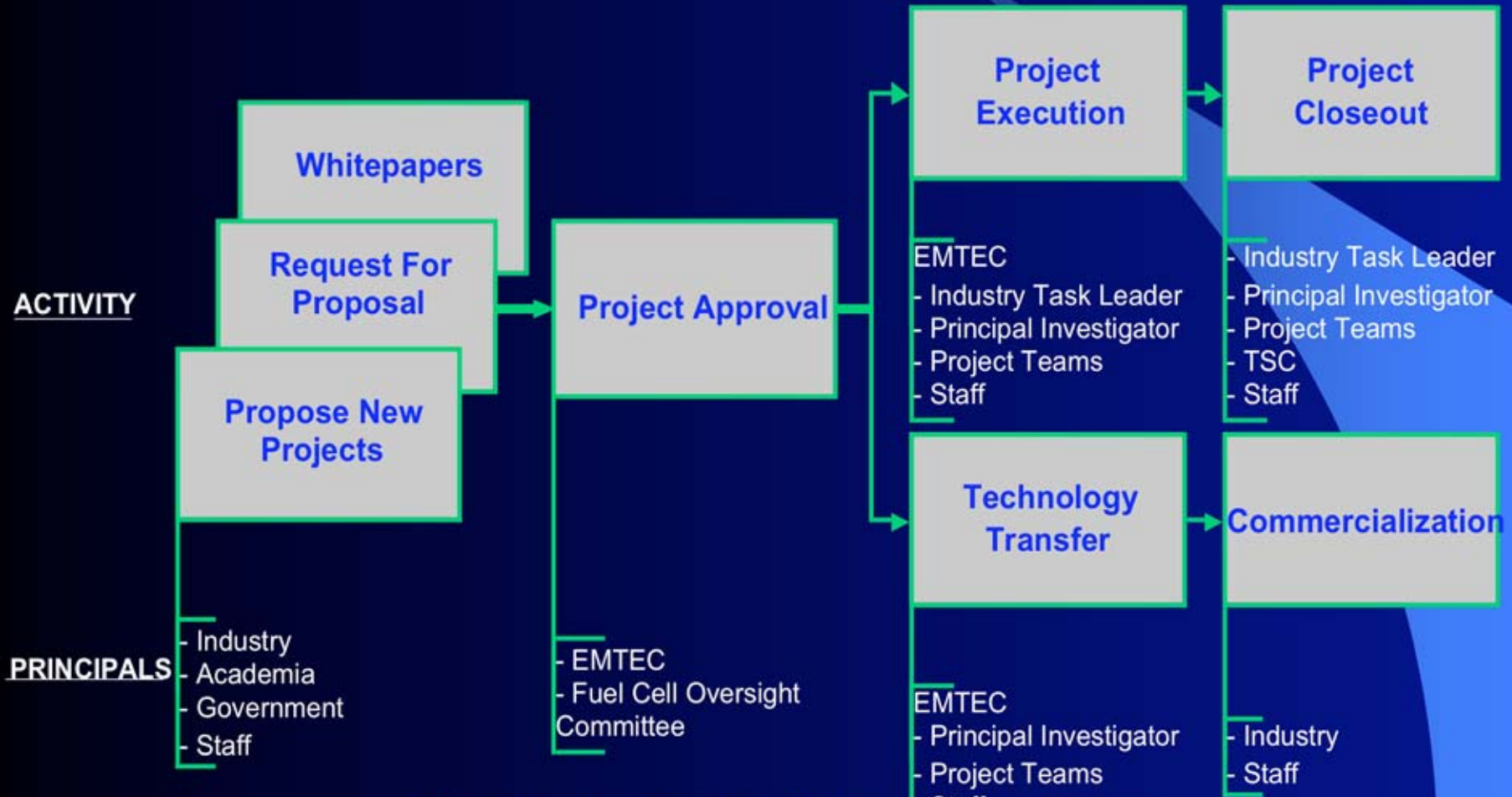
EERE Hydrogen Goal Alignment

Commercialization Viability

EMTEC has extensive experience managing technology projects

EMTEC has developed a business model for selection and management of core technology

EMTEC Proposal Flow Chart





Project Safety

EMTEC will require that project proposals for hydrogen-related technology include a preliminary safety plan.

All funded projects must complete a safety plan and report as part of the project.



Project Timeline



Phase 1A
Solicit feasibility Projects
Select projects per EERE criteria

Phase 1B
Award 1 year phase 1 projects
Monitor projects and Go/NoGo milestones

Phase 1C
Performance based deliverable review

Phase 2A
Follow on justification & Phase 2 proposals
New project solicitation



Accomplishments/Progress

- FY04 funds not yet available
- Project solicitation framework in place
- Oversight committee includes DOE Hydrogen office



Interactions and Collaborations

- State of Ohio – Department of Development – Technology Division
- State of Ohio – Department of Development – Third Frontier
- USAF – AFRL Technology Transfer program
- Procurement Technical Assistance Program (PTAP)
- Manufactures Small Business Development Center (MSBDC)
- Collaborative Technology Center CTEC
- Many established relationships MOU/MOA/NDA



Future Work

EMTEC

**will have an award winning program
with active DOE Hydrogen Office advocacy**