• Three Tenn. School Districts in Program
  * Hamilton County – Brainerd High School
  * Hardeman County – Bolivar High School
  * Lawrence County – Lawrence Public School and South Lawrence Elementary

• Tenn. EESI Hy-GSHP Grant Program Administration
  * Ron Graham, Executive Director EESI
  * Jay Enck, Program Administrator, CxGBS
  * Terry E. Townsend, Principal Investigator, Townsend Engineering/TAC-EESI
Types of HY-GSHP Systems

• GSHP Sized for Base Load; CT Sized for Peak Cooling Loads

• GSHP, CTs and Innovative Interior Distribution Loop Piping Concept

• GSHP, CTs, Innovative Interior Distribution Loop Piping Concept and Common Geothermal Loops Serving Multiple Buildings
• Hamilton County Brainerd High School
  * Renovation Project – 400 Tons
  * Vertical Bore-field, Cooling Tower, Combination of Fan Coil Units and Rooftop Units using Reverse-Return Interior Piping Loop. All pumps to have Variable Frequency Drives. Performance Monitoring thru BAS.
  * RFP for Consulting Engineering Design Services – Selection Process Underway
• Hamilton County Brainerd High School
  Total Project Cost = $4,120,000
  DOE Grant Amount = $1,676,160 (41%)

  Estimated Simple Payback = 7.9 Years
  Estimated Life Cycle Payback = 5.0 Years

  # Permanent Jobs Created = 31
Tn EESI GSHP Program

• Hardeman County Bolivar Central High School
  * Combination Existing Loop Expansion + Renovation of a 2\textsuperscript{nd} School Wing = 150 Tons
  * Existing Vertical Bore-field with New Vertical Bore-field + Common Cooling Tower using both Reverse-Return (existing) & Single Pipe (new) Interior Loop Piping, VFD Pumps, and New BAS for Performance Monitoring
  * Engineering Design Consultant Chosen
Hardeman County Bolivar Central High School
Total Project Cost = $1,545,000
DOE Grant Amount = $721,680 (47%)

Estimated Simple Payback = 9.9 Years
Estimated Life Cycle Payback = 6.4 Years

# Permanent Jobs Created = 15
• Lawrence County Lawrence Public School
  * Renovation of Gym Facility’s and Separate Cafeteria Facility’s HVAC and DWH Systems = 65 Tons
  * Existing Horizontal Bore-field with Cooling Tower, Single Pipe Distribution Loop Serving Rooftops w/ERVs and Water-to-Water HPs and VFD Loop Pump. New BAS for Performance Monitoring
  * Engineering Design Consultant Chosen
Lawrence County Lawrence Public School

Total Project Cost = $515,000
DOE Grant Amount = $197,880 (38%)

Estimated Simple Payback = 11.6 Years
Estimated Life Cycle Payback = 7.7 Years

# Permanent Jobs Created = 8
• Lawrence County South Lawrence Elementary School
  * Renovation of Gym and Separate Fieldhouse Facility’s HVAC and DWH Systems = 75 Tons
  * Existing Horizontal Bore-field with Cooling Tower, Reverse-Return Distribution Loop Serving Rooftops w/ERVs, Packaged WSHPs and Water-to-Water HPs and VFD Loop Pump. New BAS for Performance Monitoring
  * Engineering Design Consultant Chosen
• Lawrence County South Lawrence Elementary School

Total Project Cost = $515,000
DOE Grant Amount = $197,880 (38%)

Estimated Simple Payback = 12.2 Years
Estimated Life Cycle Payback = 7.7 Years

# Permanent Jobs Created = 7
• **Project Management Approach**

**Principal Investigator** – Coordinates All Grant & Funding Activities Between SDs, Program Administrator, TN EESI and DOE

**Program Administrator** – Ensures Grant Program Meets Goals/Objectives Within Defined Time-lines and Conducts Cx Activities with Participating SDs During All Project Phases
• Project Targets/Milestones
  * **Design Ø** – Lawrence & Hardeman SDs = 6 Wks; Hamilton SD = 8 Wks → THIS IS THE ONLY PHASE THAT DOE HAS RELEASED FUNDING TO EESI
  * **Construction Ø** – Lawrence SD = 6 Wks; Hardeman SD = 10 Wks; Hamilton SD = 40 Wks
  * **Acceptance Ø** – Hamilton, Hardeman & Lawrence SDs = 4 Wks
• **Project Targets/Milestones**
  * **Warranty Ø** – Hardeman & Lawrence SDs = 2 Wks; Hamilton SD = 3 Wks
  * **Data Collection** – Hamilton, Hardeman & Lawrence SDs = 2 Yrs
  * **Grant Closeout** – Hamilton, Hardeman & Lawrence SDs = 4 Wks
Roles, Responsibilities & Capabilities

* PI & Project Administrator + EESI/TAC
Collective Hy-GSHP Experience > 75 Years

* Cx Experience with Hy-GSHP > 25 Years

* Performance Measurement & Monitoring Experience > 60 Years

* Performance Database > 20 Years
• Future Direction by EESI
  * Based Upon the Hy-GSHP Installation Costs, Annual Performance and Annual O&M Costs, EESI will Promote the Most Cost Effective Hy-GSHP Concept(s) to the 130 SDs in TN Without Geothermal Systems
  * EESI will Provide One-time Grant Monies (per Prescriptive Guidelines) and/or Low Interest Loans to any SD Seeking to Install a Hy-GSHP System if Annual Cost Savings (Energy + O&M) will Repay Loan Amount
• Future Awards by EESI

* EESI will Provide Grant Funding @ $1,000 per Ton for Hy-GSHP Applications per EESI Prescriptive Measure Guidelines (www.tn.gov/eesi/prescriptive)

* EESI will Provide Low Interest (1 ½% to 2 ½%) Loans (max. term 12 years) to SDs Seeking to Install Hy-GSHPs as a Custom Application (www.tn.gov/eesi/custom) if Total Annual Savings (Energy + O&M) = Annual Loan Payments
• **TN SDs Setting on “GO” for Hy-GSHP Funding by DOE ($2 Million Req’d)**
  * Hardeman SD – Middleton High School, 150 Tons ($1,545,000); Building Renovation & Upgrade To Geothermal Stopped
  * Lawrence SD – Coffman Elementary, 120 Tons ($1,235,000); Vertical Bore-field Installed; Construction Stopped
  * Blount SD – Morrison High School, 215 Tons ($2,215,000); Vertical Bore-field Installed; Construction Stopped