Small Commercial Roof-Top HVAC

Regional Technical Forum

12 December 2005

Today: Review, modify & approve scope of work to

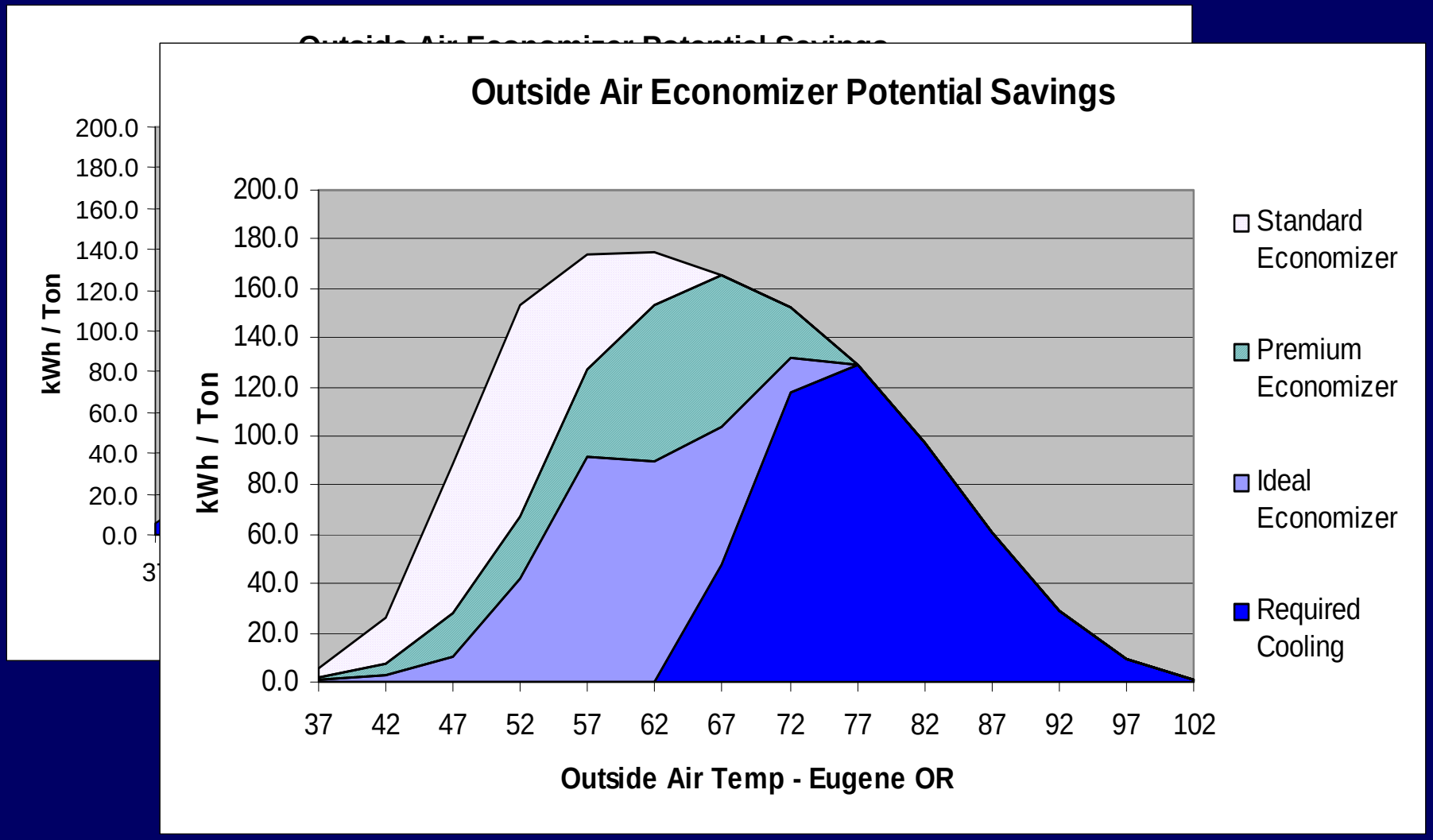
- Prepare a detailed work plan and budget to develop:

- Program specifications & evaluation or verification protocols for improving the energy efficiency & performance of packaged rooftop HVAC systems in the 5 to 20-ton size range

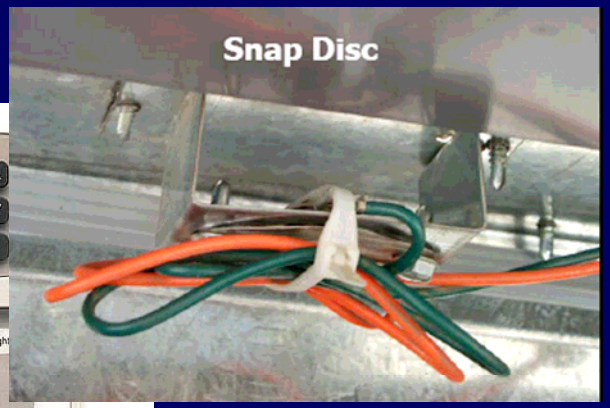
The Roof-Top Units

The Theory

(Courtesy of Reid Hart at EWEB)



The Pieces & Parts



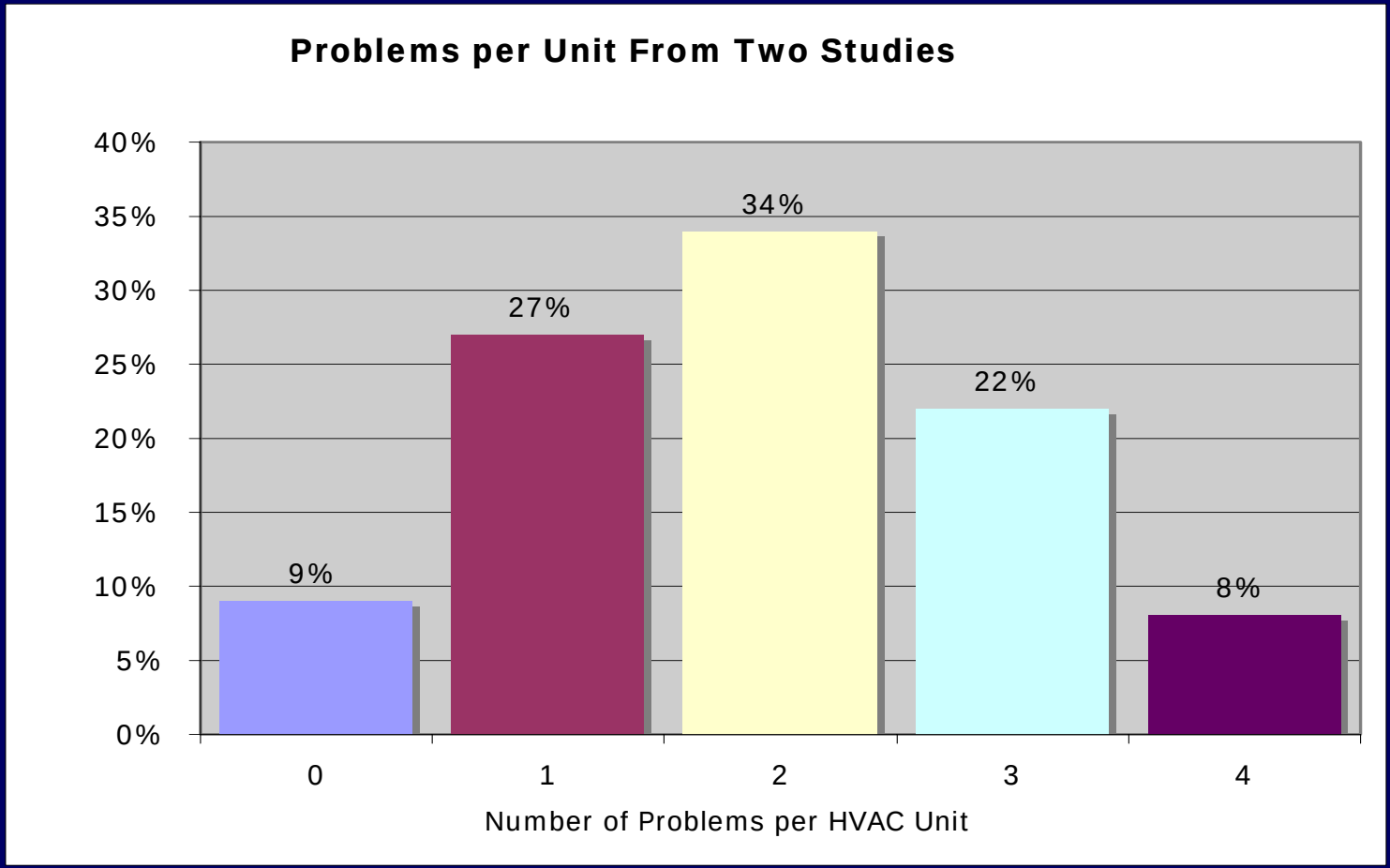
…and the guys who fix them

Where We Left Off

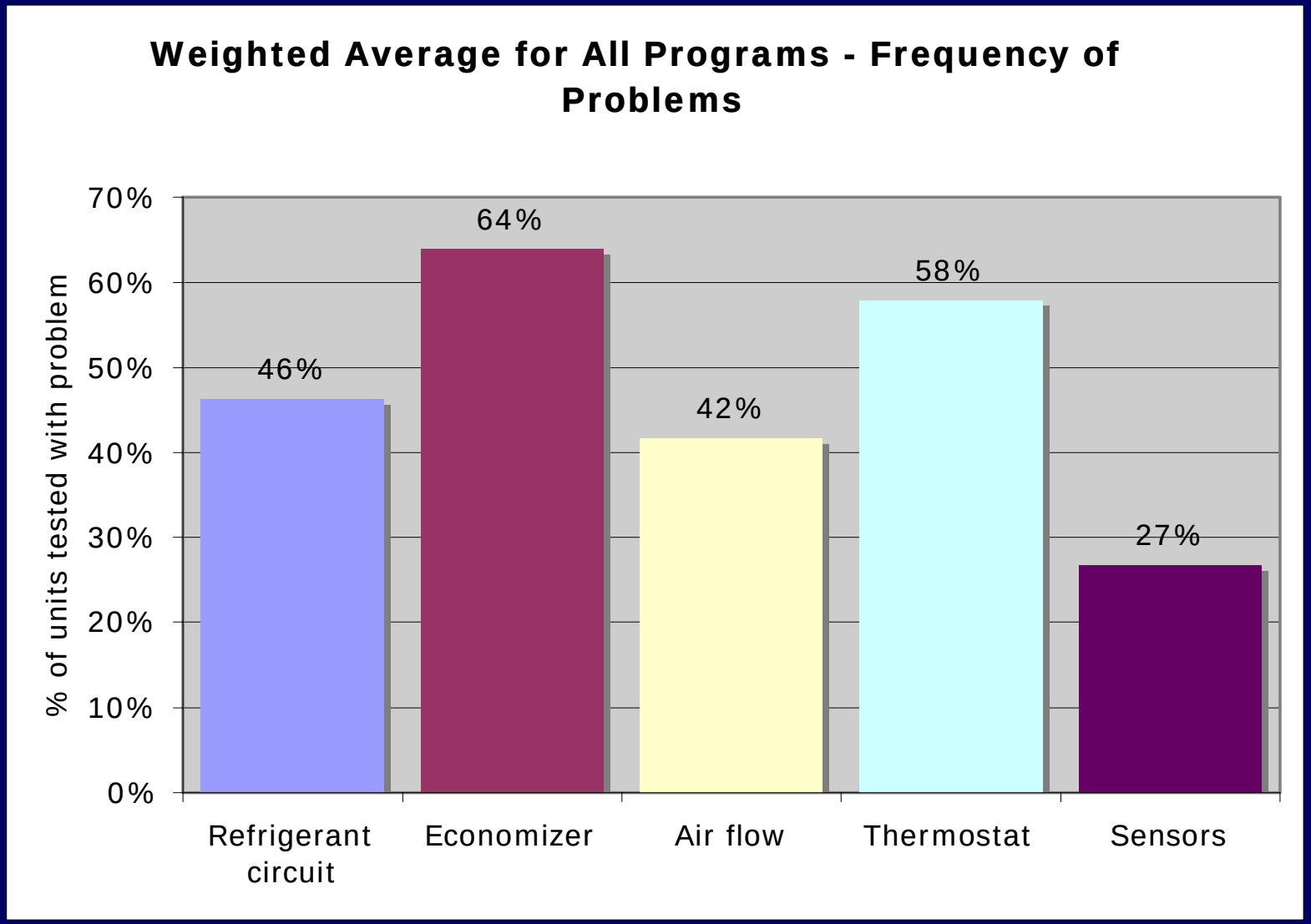
- NEEA 2004 proposed research project stalled
  - Estimated Two-years & $300K
- RTF-Sponsored Phase One Study (NBI)
  - Assessed the extent of operational, control & set-up problems
  - Completed 2004 by New Buildings Institute
- Significant Savings Potential
  - Cooling & Heating
  - 70-80 MWa @ 3.9 cents per kWh
  - Similar size & cost as Residential HP Conversions

Phase One: Multiple Problems per Unit

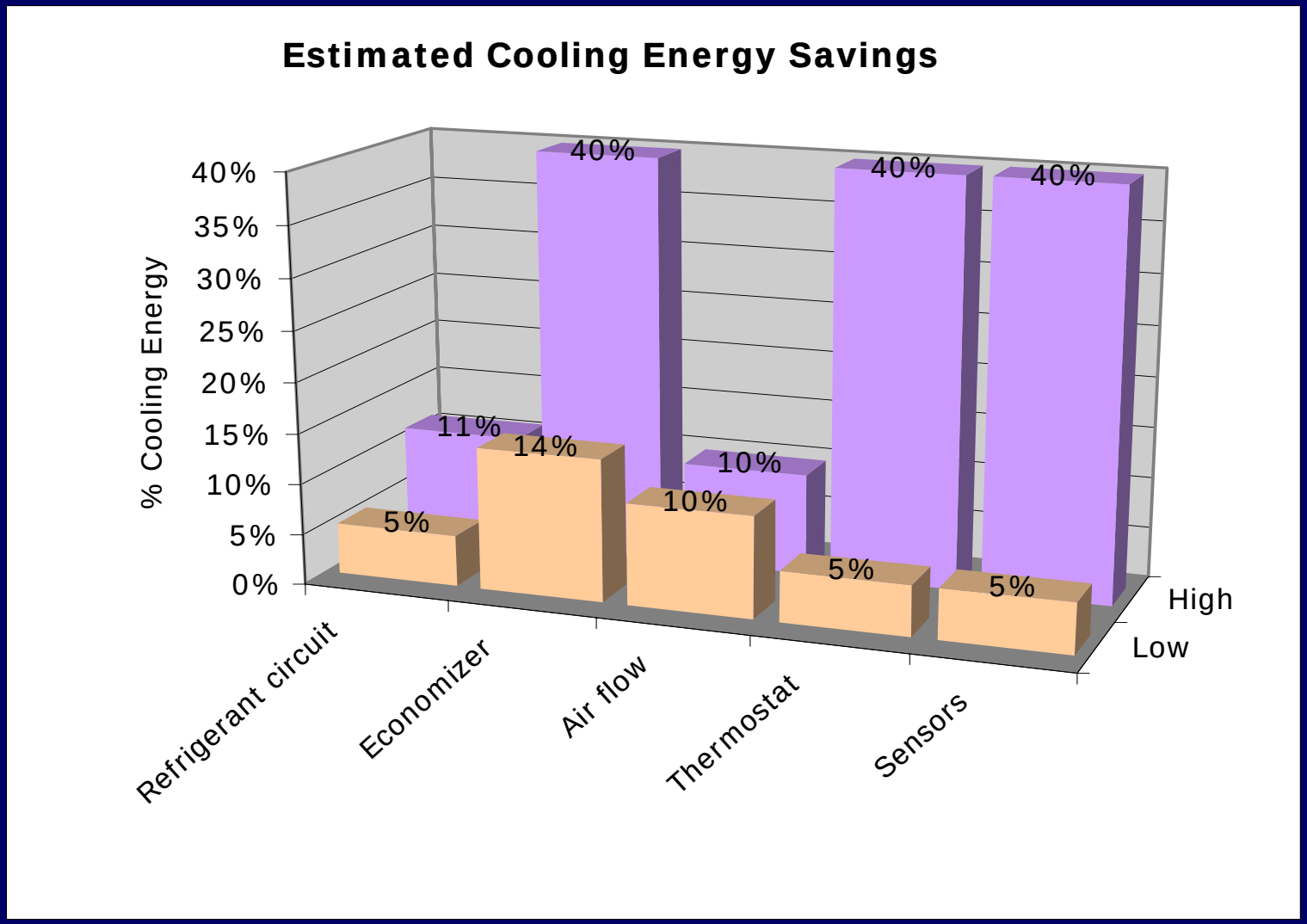
(PSE & PECI Data Only)



Phase One: Frequency of Problems by Problem Area



Phase One: High & Low Range of Estimated Cooling Savings by Problem Area



Phase One: Insights

1. Both New & Old units are problem ridden
2. Greatest savings from economizers & t-stats
3. Initial installation & setup is problematic
4. Economizer/controller interaction not well understood
5. Cost & market barriers make repair/service & retro-commissioning problematic
6. Field-testing of refrig. charge is problematic
7. Favor dry bulb sensors for economizers
   - Enthalpy control & snap disk have problems

Phase One Insights:
Three Approaches to Fixes

- System Specifications
  - New or replacement system upgrades
- Component Specifications
  - Economizer replacement
- Service Protocols
  - System & economizer service & repair

Phase One: Recommendations

- Address problems at three levels
  - Manufacturer, Design/Installation, Repair/Service
- Priority intervention point is during installations & change-out specifications
  - Low cost, high leverage
- Convene regional experts to scope research & monitoring agenda & funding options

Phase One Recommendations: New & Replacement Units

- Develop specs for a Northwest Premium RTU
- Review elements of
  - EWEB Western Premium Economizer
  - CEC PIER Fault Detection Diagnostics (FDD) Program
- Identify best combination of features responsive to Northwest conditions
- Develop regional procedure for acceptance testing

Phase One Recommendations:
Service, Repair, Retro-Commissioning

- Need better understanding of components & operation
- Research & field monitoring needed to
  - Improve & simplify service protocols
  - Identify savings from protocols
- Monitor performance of PSE Premium Service program (and others)

So What's Happening Now?

What’s Happening Now?

- Some Programs Operating
  - PECI AirCare Plus (CA, VT, Avista)
  - EWEB, Western Premium
  - PSE, Premium Service Pilot
  - Energy Trust, Building Tune Ups & Retro Commissioning
- Some Relevant PIER R&D in California
- Emerging Evaluations

End Goals

- Specifications
  - Equipment, protocols, & programs
- Qualifying Measurement & Verification for BPA reimbursement
- Savings validation
- Tools to estimate savings

What's Next?

- Convene regional experts
  - Scope research & monitoring agenda & funding options
- Develop a Detailed Work Plan & Budget
- Find Money to Implement Work Plan

How?

Contract for Development of Work Plan

- Convene Technical Advisory Committee
- Develop Detailed Work Plan & Budget over four meetings
  - Preliminary assessment of regional R&D, verification & evaluation needed to pin down approach, savings, cost-effectiveness & other issues
  - Develop & discuss potential work plan elements
  - Prepare & review draft scope & budget for work plan
  - Finalize scope & budget and present to RTF

Estimated Cost about $20K

Then ...

- Shop to region & get commitment to fund
- Conduct and manage the work identified

Today:

- Need RTF to review, modify and approve attached draft scope of work