U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Industrial Technology Validation

John O'Neill

Technology Manager

Industrial Efficiency & Decarbonization Office

U.S. Department of Energy | Energy Efficiency & Renewable Energy

Why Field Validation?

Field validation of the performance of next-generation technologies in a real-world operational setting compared to a bench-scale setting:

- Helps reduce the risk associated with testing new technologies
- Enables the broader integration of new technology into the industrial and manufacturing space
- Informs research and development and drives commercial markets
- Supports significant steps towards innovation, optimization and resiliency

Building on the success of commercial and military field validation programs, **IEDO's Industrial Technology Validation (ITV) Program** is launching testbeds for the industrial sector

SERDP DOD • EPA • DOE | ESTCP

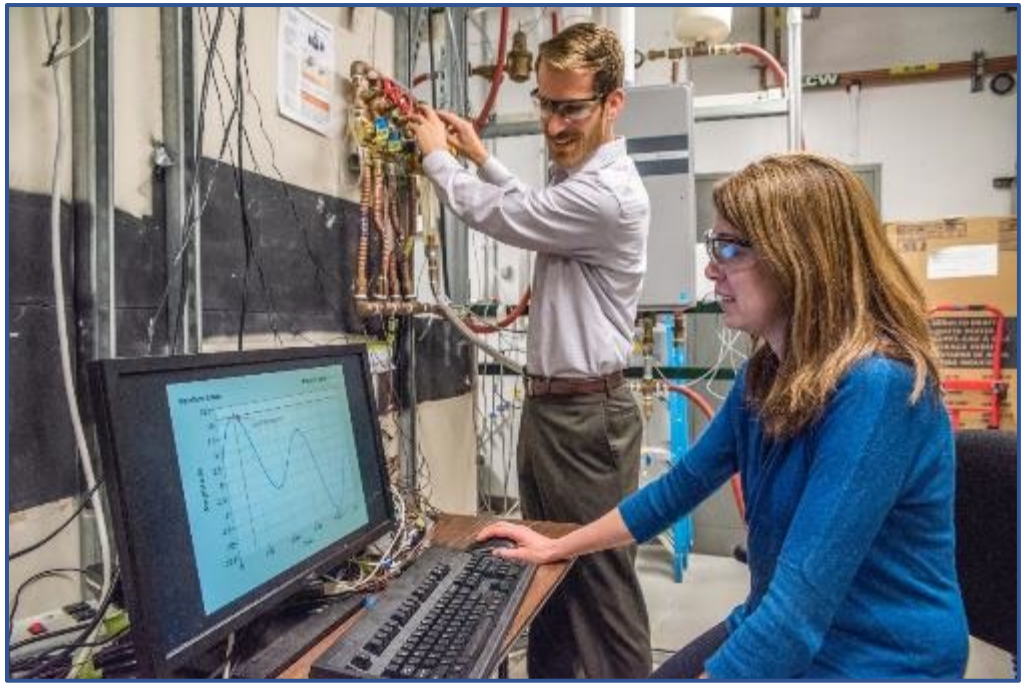
GSA

U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

ITV Objectives

Identify, install, and monitor technology performance in real world installations and communicate the results through case studies

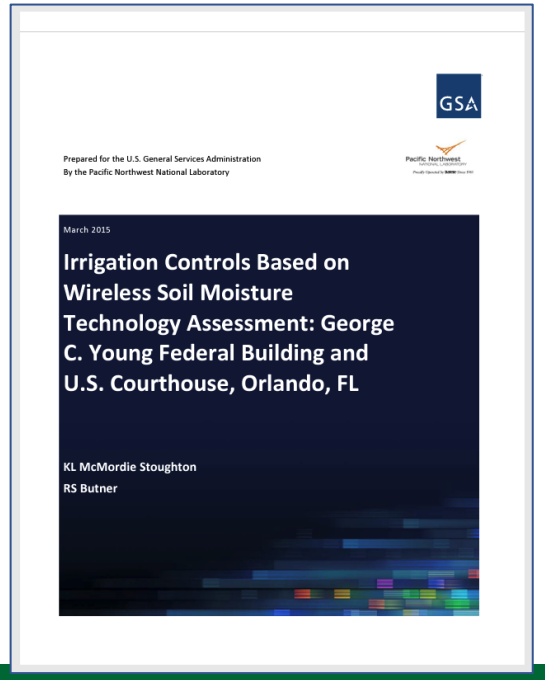
1. Validate the potential of a selected technology
2. Verify performance improvement claims
3. Project cost savings and scalability
4. Produce a publicly available M&V report for each validation

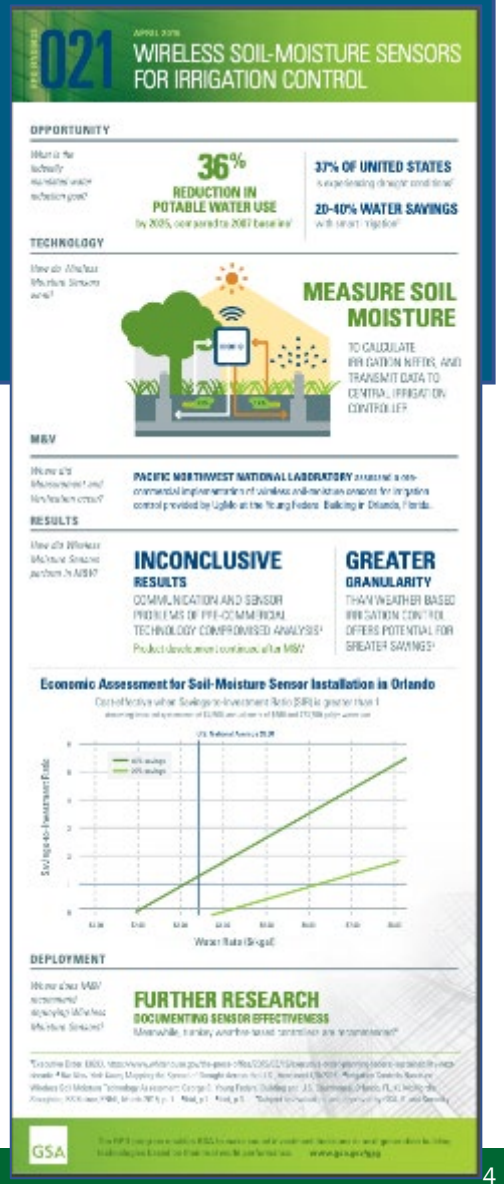


M&V Reports will include:

- Full-scale M&V report
- Four-page high level summary
- Single page graphic overview

Reports will be modeled after the GSA's Proving Ground to help maximize communication of results to multiple stakeholders.





ITV Pilot – An Inside Look

TOYOTA

Side Stream Particle Precipitator and Water Enhancement System Evaluation

NISSAN

Cooling Tower Side Stream Particle Precipitator

AHLSTROM MUNKSJÖ

Membrane System for Black Liquor Concentration

CLIFFS

Electrochemical Water Treatment & Electrocoagulation for Oil and Hydrocarbon Removal

ELECTROCELL SYSTEMS

ELECTROCELL SYSTEMS

VIA SEPARATIONS

DYNAMIC WATER TECHNOLOGIES

Other Technologies in ITV Program

- High-efficiency switched reluctance electric motor
- Thermoelectric generator to produce electricity from low-grade waste heat
- Parabolic dish solar water heating
- Shock pulse generator to replace soot-blowers in a recovery boiler
- High optical density ultraviolet water de-chlorination and microbial deactivation

Next Steps

2023 Solicitation - Coming Soon!!!!

Technology Focus Areas

- Electrification
- “Scope 1” Energy efficiency

Industrial Technology Validation (ITV) Team

Meet some of our technical experts who will help support partners and vendors throughout this field validation pilot.

John O'Neill
DOE
Program Lead

Ethan Rogers
DOE
Technical Partnership Lead

Paul Sheaffer
LBNL
Sr. Program Advisor

Amy Pevzner
LBNL
Program Manager

Shankar Earni
LBNL
Sr. M&V Lead

Prakash Rao
LBNL
Sr. Technical Program Advisor

Peter Therkelsen
LBNL
Sr. Technical Program Advisor

Bunmi Adesola
LBNL
Subcontract Specialist

Sachin Nimbalkar
ORNL
Program Advisor

Thomas Wenning
ORNL
Program Advisor

BERKELEY LAB

OAK RIDGE National Laboratory

Additional Questions?

Please Contact Us!

You can email any questions about resources, to be added to our mailing list, or any program information:

ITV-Support@lbl.gov

APPENDIX SLIDES

Better Buildings®
U.S. DEPARTMENT OF ENERGY

Validations

Project Overview and Findings

U.S. DEPARTMENT OF ENERGY

ITV Testbed Demonstration

Objectives

Proposed Impact and benefits:

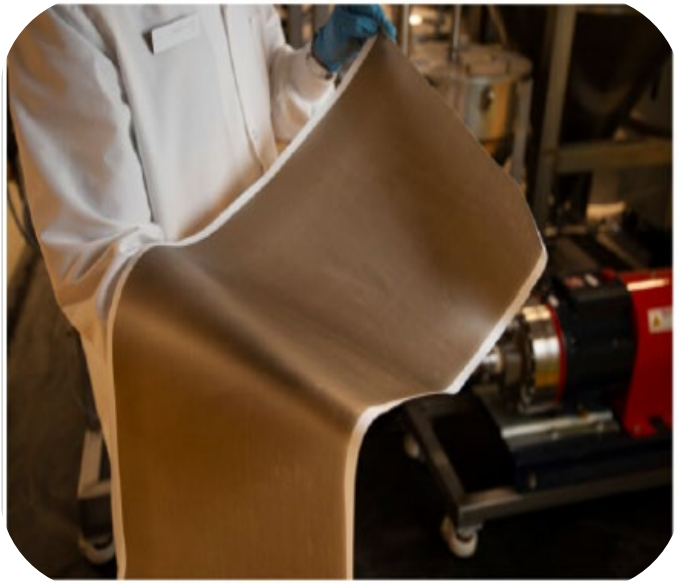
- ✓ Energy requirements
- ✓ Mill throughput by expanding evaporator capacity

*As stated in the application

Better Plants Partner Site:
Ahlstrom-Munksjö
Mosinee, Wisconsin

AHLSTROM MUNKSJÖ

Technology:
Membrane System for Black Liquor Concentration



VIA SEPARATIONS

Evaluation Process and Results

Black liquor concentration in pulp and paper industry

AHLSTROM MUNKSJÖ

Evaluation Period - **3 weeks** with a small scale system

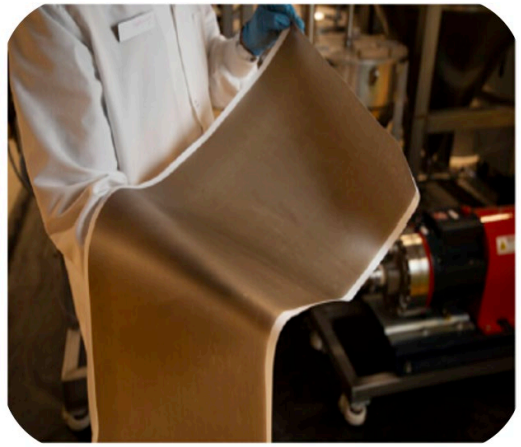
- Modeled baseline - Thermal based multi-effect evaporators

Energy efficiency

- At mean weak black liquor flow of **0.55 gpm**
- Site Pump Energy - **Electricity – 1.28kW (4,360 Btu/hr)**
- Site Steam Conserved - **4,930 – 6,340 Btu/hr**
  - Based on steam economy of 4.2-5.4 (lb H_2O/lb Steam)

GHG Impact

- Via - **1.05 lb of CO_2 per hr**
- MEE - **0.91-1.17 lb of CO_2 per hr**



VIA SEPARATIONS

ITV Testbed Demonstration

Objectives

Proposed Impact and benefits:

- ✓ More effective wastewater treatment
- ✓ Improved oil recovery
- ✓ Reduced chemical use
- ✓ Energy requirements

*As stated in the application

Better Plants Partner Site:
Cleveland Cliffs
Cleveland, Ohio

CLIFFS
CLEVELAND-CLIFFS INC.

Technology:
Electrocoagulation for Oil and Hydrocarbon Removal

DYNAMIC WATER TECHNOLOGIES

Evaluation Process and Results

Treating oily waste water from the steel hot rolling operation

CLIFFS
CLEVELAND-CLIFFS INC.

Evaluation Period - 4 weeks of side by side evaluation

- Incumbent – Chemical Flocculation based water treatment
- Proposed – Electrocoagulation
- 10% of water treated by the EC system

Wastewater - **EC lowered the turbidity by 97%**

Recovered oil

- **% water in the recovered oil dropped by 29%**
- **Btu/lb of recovered oil improved by 19%**

Energy to treat wastewater stream

- **0.05 kWh/gal of water treatment by EC**

DYNAMIC WATER TECHNOLOGIES