

ION Advanced Solvent CO₂ Capture Pilot Project
DE-FE0013303
DOE NETL Project Kick Off Meeting
December 17th 2013

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CEO, ION Engineering

Outline

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- Project Background
- Project Goals & Objectives
- Project Team
- Project Overview
- Project Schedule
 - BP 1
 - BP 2 & 3
- Project Partner Status
- TEA
- EH&S
- PMP
- Wrap Up & Closing Comments

Technology Background

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ION Technology:

Second generation, advanced solvent process for post-combustion carbon capture.

Non-Aqueous – Amine Solvent Matrix

- Manipulate both physical & chemical properties
- Impacting reaction rates, reaction completion and thermal requirements
- Water tolerant

Previous

Accomplishments:

Completed 500 hrs parametric and steady state testing at EERC using coal and natural gas-fired flue gas, demonstrating:

- 40% increase in CO₂ working capacity
- 60% decrease in regeneration energy

Recent Solvent Results

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- Coal-fired flue gas test results
- CO₂ absorption kinetics of ION's advanced solvent in comparison to other amine mixtures
- CO₂ desorption kinetics of ION's advanced solvent in comparison to other amine mixtures

Economic Analysis – Results 2011\$

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	DOE Case 9 550 MW Coal	DOE Case 10 Econamine	EERC 30% MEA	ION Advanced Solvent
TOC	\$1,331,192	\$2,440,898	\$2,131,187	\$1,886,451
OC _{FIX}	\$44,884	\$76,066	\$71,795	\$59,115
OC _{VAR}	\$38,458	\$67,389	\$63,427	\$51,662
Fuel	\$131,491	\$184,909	\$177,593	\$155,870
COE,	\$82	\$142	\$130	\$112
ICOE, %	NA²	73%	57%	37%
\$/ton CO₂	NA	\$57	\$46	\$34

Solvent	MEA EERC	ION
L/G Ratio	1	0.75
Regeneration Energy	1	0.57

Project Background

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Project Goal:

Meet or exceed DOE's goal for 90% CO₂ capture rate with 95% CO₂ purity at a cost of \$40/tonne CO₂ captured by 2025.

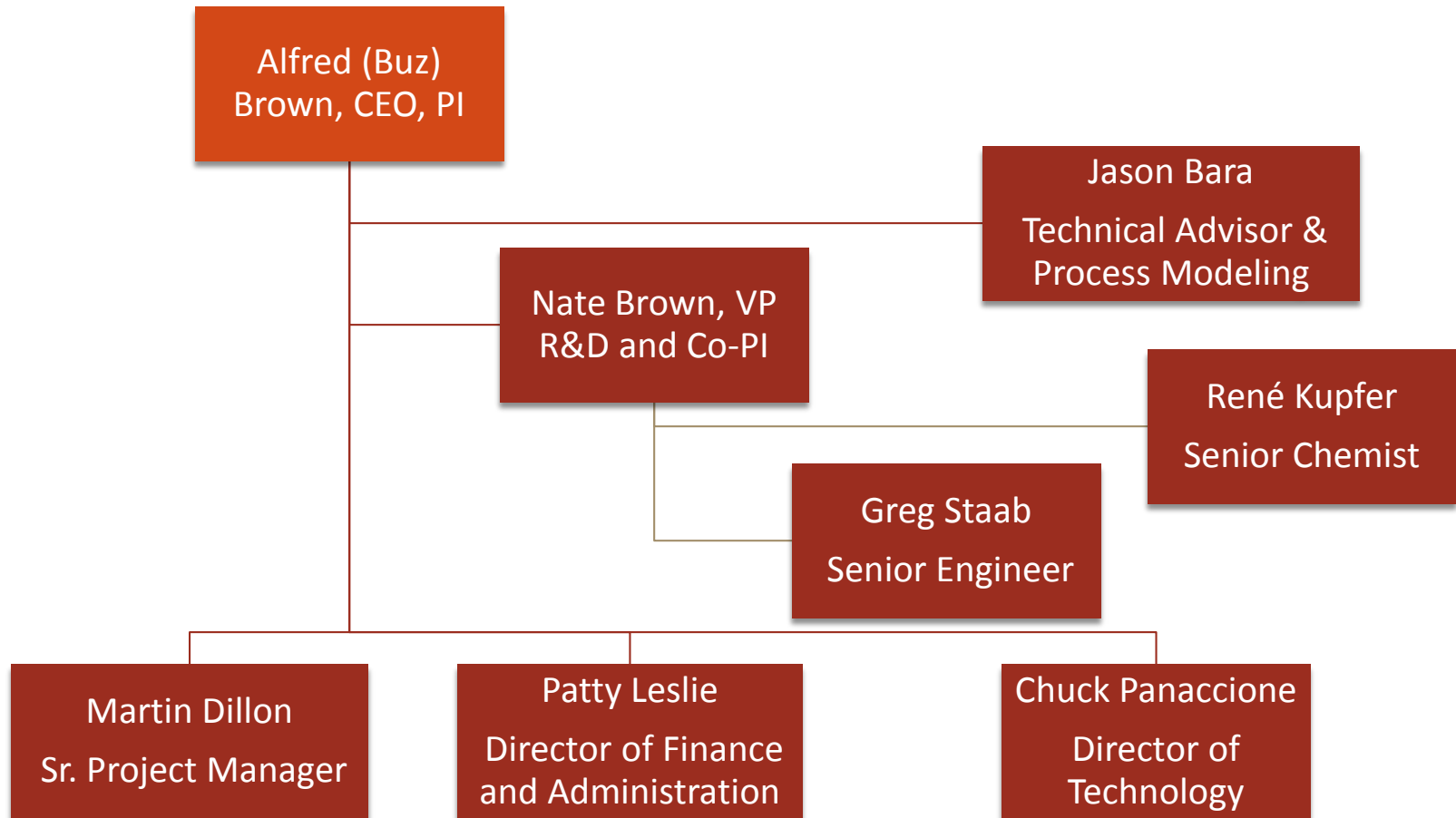
Project Objective:

Demonstrate ION's Advanced Solvent process at the equivalent of 0.8 MWe at an operating coal-fired power plant.



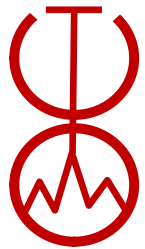
ION Project Team Structure

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Project Participants

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ION Engineering
Bold Science for Clean Energy



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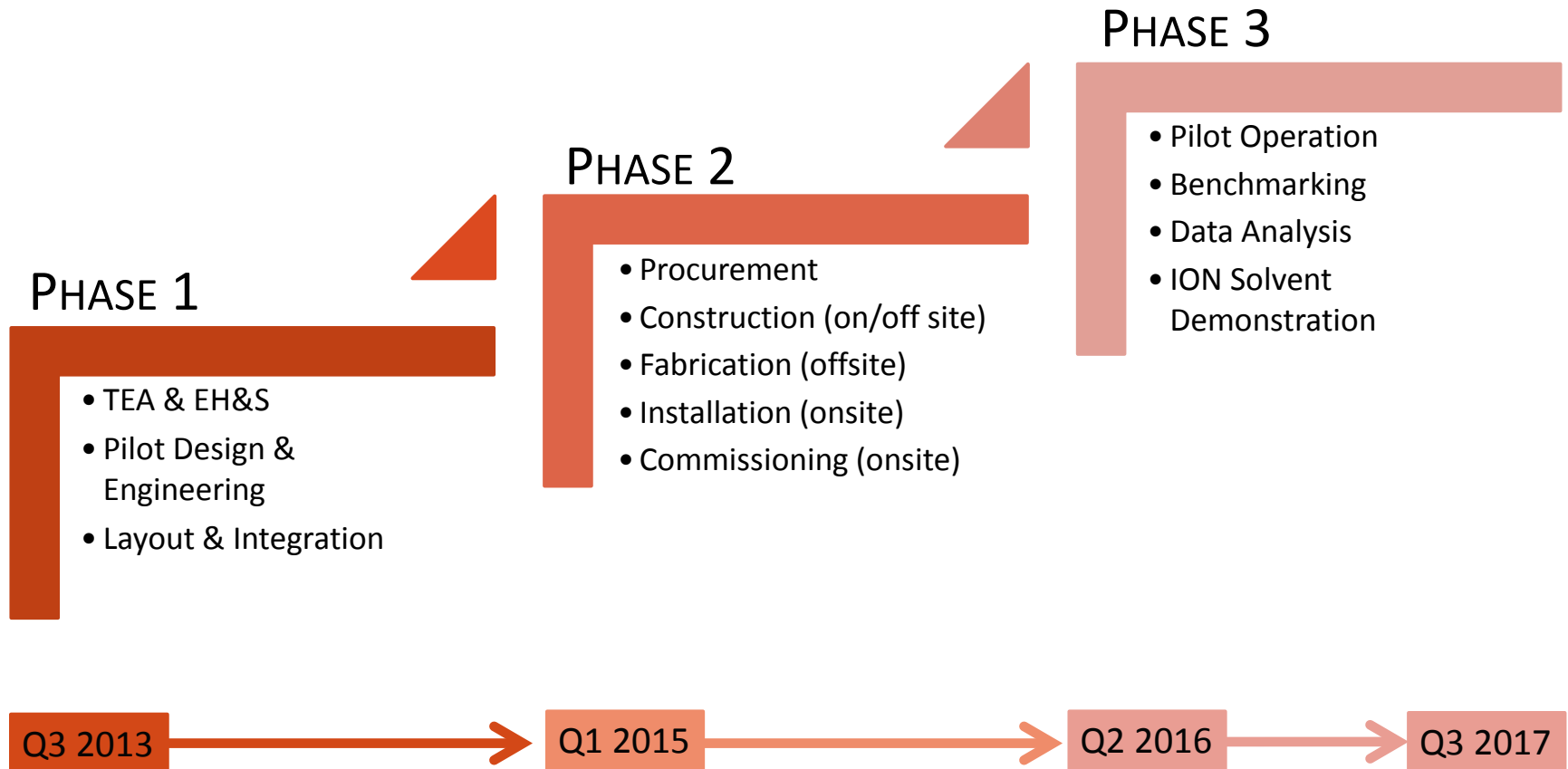
Sulzer Chemtech USA
1 Sulzer Way, Tulsa, OK

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Optimized Gas Treating, Inc.
ProTreat

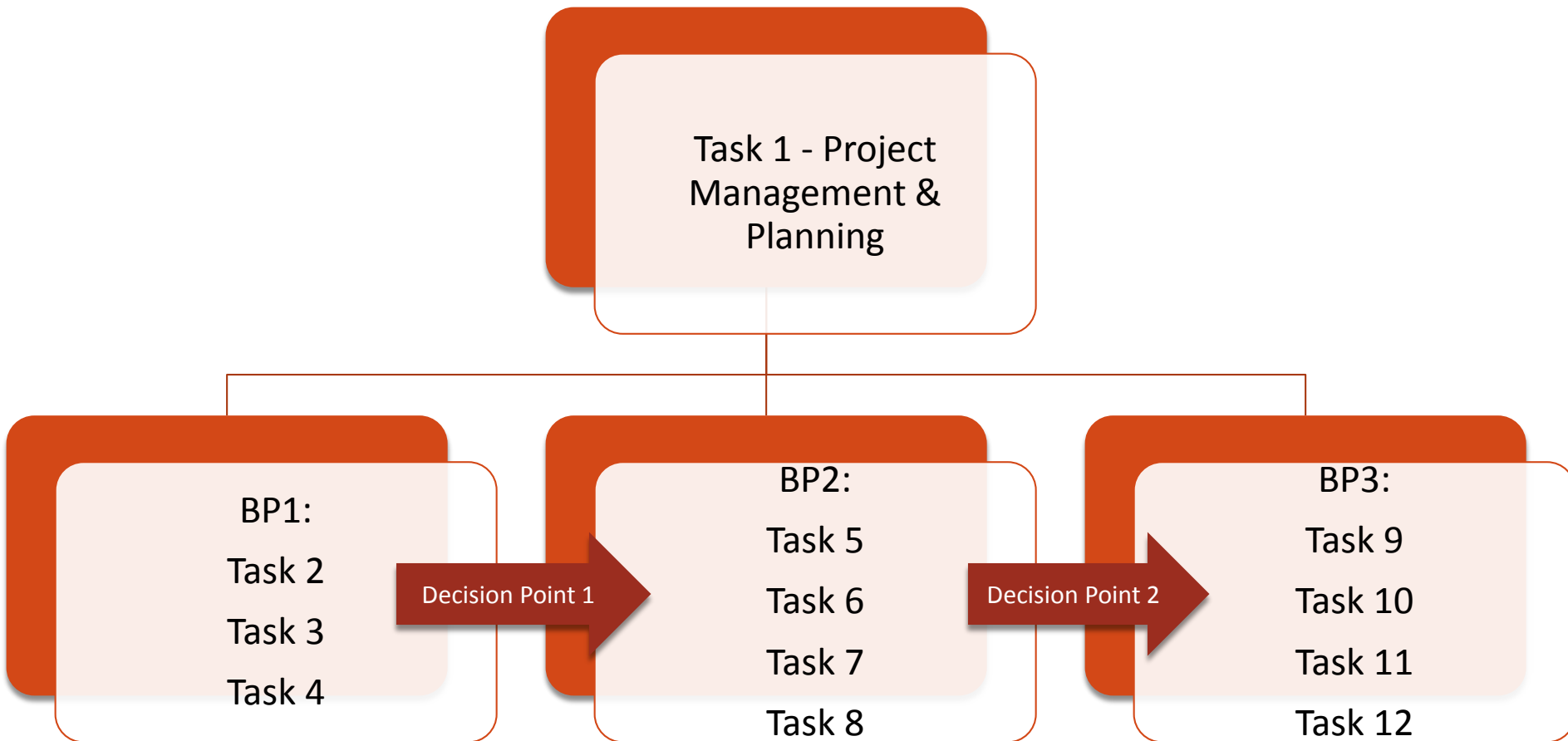
Project Overview

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Project Structure Task and BP Structure

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Tasks by Budget Period

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ION Engineering CO ₂ Capture Slipstream Project Resource Loaded Schedule		Budget Period 1															Budget Period 2															Budget Period 3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Project Management

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- **Task 1 – Project Management and Planning**
 - 1.1 – Monitor, Control, and Communicate Project Status
 - 1.2 – Financial Management
 - 1.3 – Technical
 - 1.4 – Administrative
 - 1.5 – Legal
 - 1.6 – Maintenance and Revision of the PMP

Task 2 – Initial Slip Stream Project Reviews

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- **Task 2 – Initial Slipstream Project Reviews**
 - 2.1 – Initial Techno-Economic Analysis (TEA)
 - 2.2 – Initial Technology EH&S Assessment (EH&S)

Task 3 – Site Selection and Permitting

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- **Task 3 – Site Selection and Permitting**

- 3.1 – Final Host Site Selection
- 3.2 – Pilot Permitting

Task 4 – Final Pilot System Design

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- **Task 4 – Final Pilot System Design**

- 4.1 – Updated Modeling Effort for ION Solvent
- 4.2 – Updated Modeling Effort for Advanced Equipment
- 4.3 – Preliminary Design Assessment
- 4.4 – Final Process Control Design
- 4.5 – Mobile Lab Design
- 4.6 – Final Pilot System Design and Cost
- 4.7 – Prepare Final Pilot System Design Package

BP 2 & BP 3 Tasks

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Budget Period 2

- Task 5 Procure Pilot Equipment
- Task 6 Pilot Construction
- Task 7 Pilot Plant Shakedown
- Task 8 Final Test Plan Development & Material Procurement

Budget Period 3

- Task 9 Baseline Solvent and ION Solvent Testing
- Task 10 Data Reduction and Analysis
- Task 11 Final Systems Engineering Analysis
- Task 12 Pilot Decommissioning and Dismantle

BP1 Deliverable Update & Discussion

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- TEA and EH&S
 - Sourcing and evaluating vendors
 - Evaluating if we can tap into other information sources
- PMP
 - Project Structure
 - Project Communication – Flow
 - Project Responsibilities
 - Updated Deliverables & Milestones
 - Updated Budgets

Acknowledgements

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Partners



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