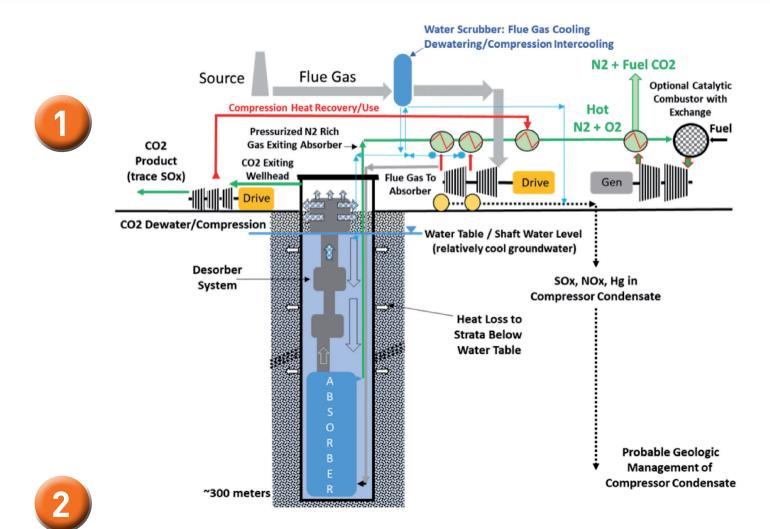
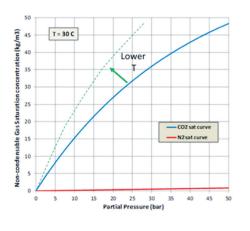
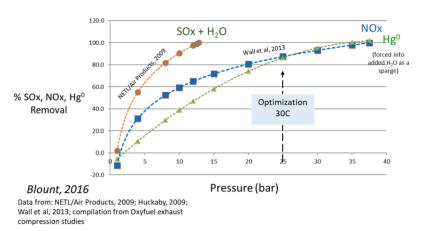
# Pi-CO<sub>2</sub> Aqueous CO<sub>2</sub> Capture Process



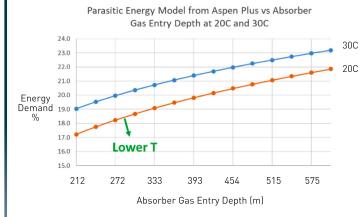
### A • Increased solubility in water of CO<sub>2</sub> relative to N<sub>2</sub> under hydrostatic pressure and lower temperature



### B • H<sub>2</sub>O, SOx, NOx, Hg<sup>0</sup> removal during compression



#### C • Energy recovery



- **1.** Capture =  $\sim 0.20$  MWe /metric ton  $CO_2$
- **2.** Capture + Product Compression = ~0.25 MWe / metric ton CO<sub>2</sub>
- **3.** With internal combustion of fuel with residual  $O_2 = \sim 0.10$  MWe /metric ton  $CO_2$

Example of a coal fired power plant for reference:
~1 MWe of electricity produced = ~1 metric ton of CO<sub>2</sub>

## π PI-INNOVATION Partnering in Innovation, Inc.

### **1** An innovative CO<sub>2</sub> capture system:

- Post-Combustion CO<sub>2</sub> Capture
- In-Process Pre-Treatment removal of S0x, N0x, and vaporized mercury (Hg)
- Heat and Compression Energy Recovery
- Use of Hydrostatic Pressure of a Water Column - to increase the solubility of CO<sub>2</sub>
- Simple Closed Loop System maximized CO<sub>2</sub>
   mass-transfer in an absorber/desorber, CO<sub>2</sub> enrichment and water circulation supported by pressure swing
- Low Risk no specialty materials, no moving parts subsurface, ease in testing & process scaling.

### Innovations:

**A** Solubility difference between  $CO_2$  and  $N_2$  in water maximized in a water column, water is the only physical solvent used for  $CO_2$  capture;

 $\mathbf{B}$  H<sub>2</sub>O, SOx, NOx, Hg<sup>0</sup> removal during compression, no flue gas pretreatment is required;

**C** Energy recovery from pressurized  $N_2$  rich stream combined with compression heat and optional internal combustion using residual  $O_2$ ;

**D** Down-flow counter-current cascading absorber (over 90% capture with 8 stages);

**E** Desorber with CO<sub>2</sub> enrichment and gas lift/density pumping;

**F** Lower cost and energy demand compared to other technologies: no pretreatment of flue gas (SOx, NOx, Hg removed by process), no expensive chemicals, and no chemical degradation waste.

#### D • 8 Stage Absorber

