

# Updates to Direct Air Capture Sorbent Case Studies

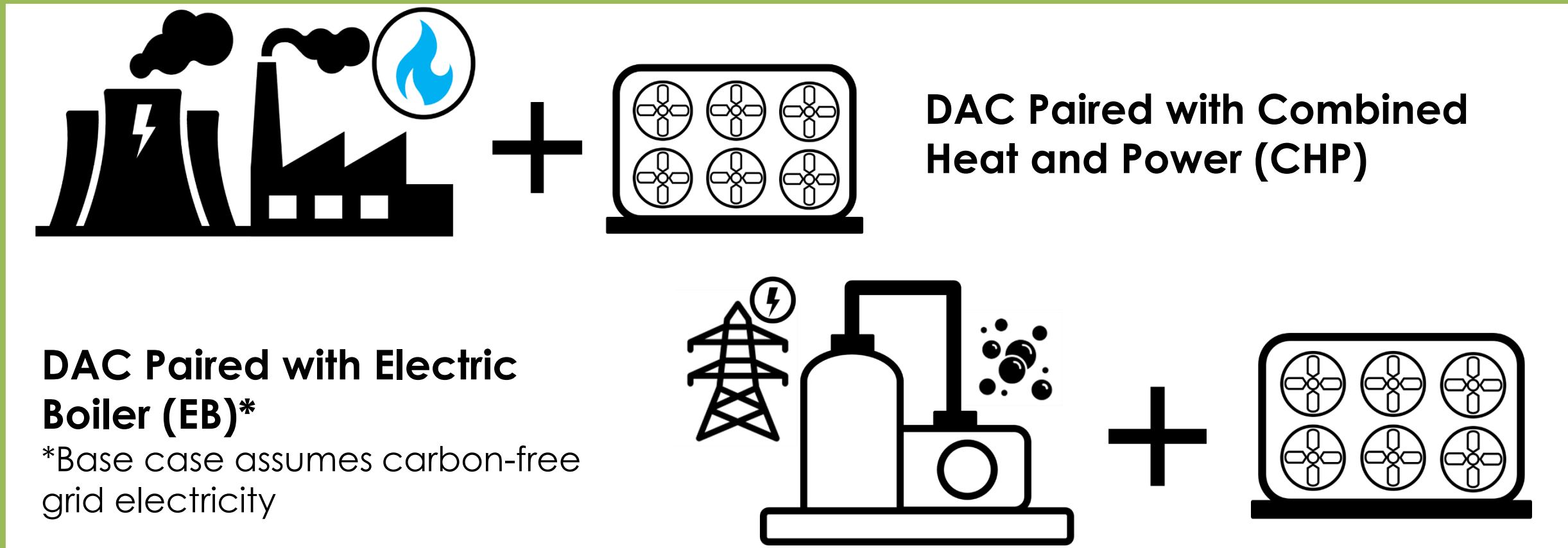
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## Background

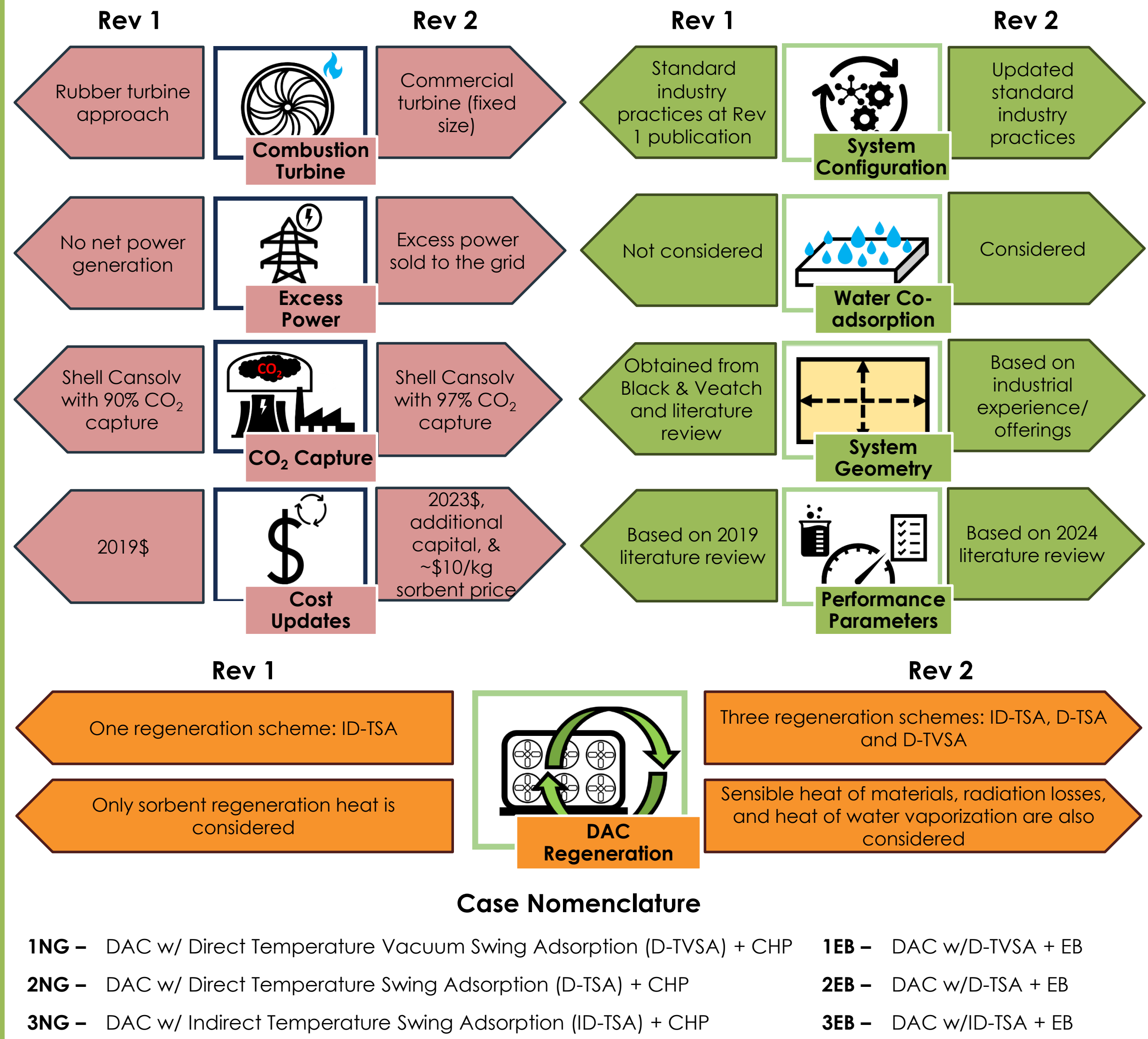
This poster reports **preliminary results** from an update to NETL's 2022 "**Direct Air Capture [DAC] Case Studies: Sorbent System**" (Rev1). This series aims to present an independent assessment of the performance and cost of generic sorbent-based DAC case studies and can serve as a guideline for DAC techno-economic analysis development. The cost estimate methodology used is the same one employed by NETL for mature technology and does not fully account for the unique cost premiums associated with the initial, complex integrations of established and emerging technologies in a commercial application.

## System Configuration (100,000 tonnes CO<sub>2</sub> net/yr)



## Updates for Rev 2

- Process configuration, system performance, and sorbent cost are updated to reflect learnings from recent literature and align with current industry practices
- Two new regeneration schemes are included in the analysis
- The sensitivity analysis is updated and expanded
- Financial parameters are updated in alignment with recent NETL publications

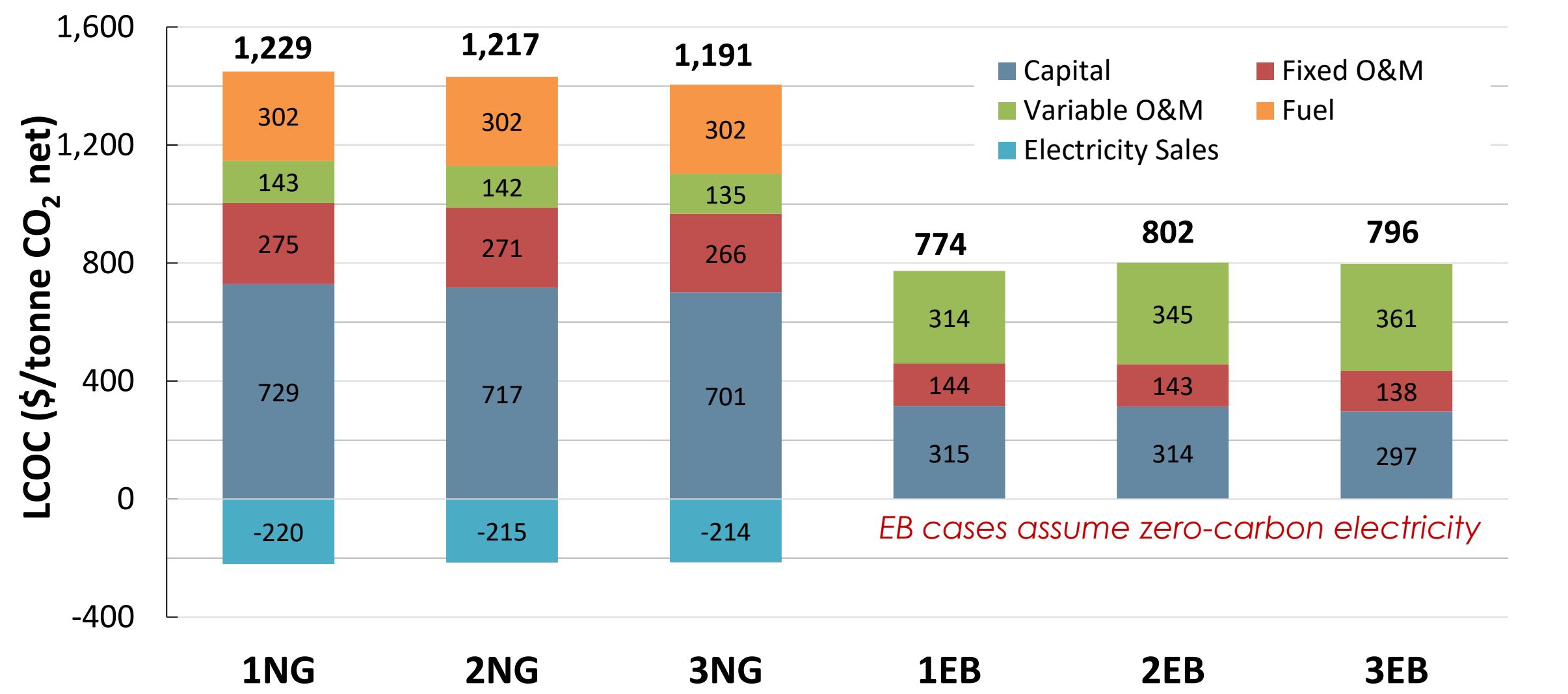


## Performance & Cost Results

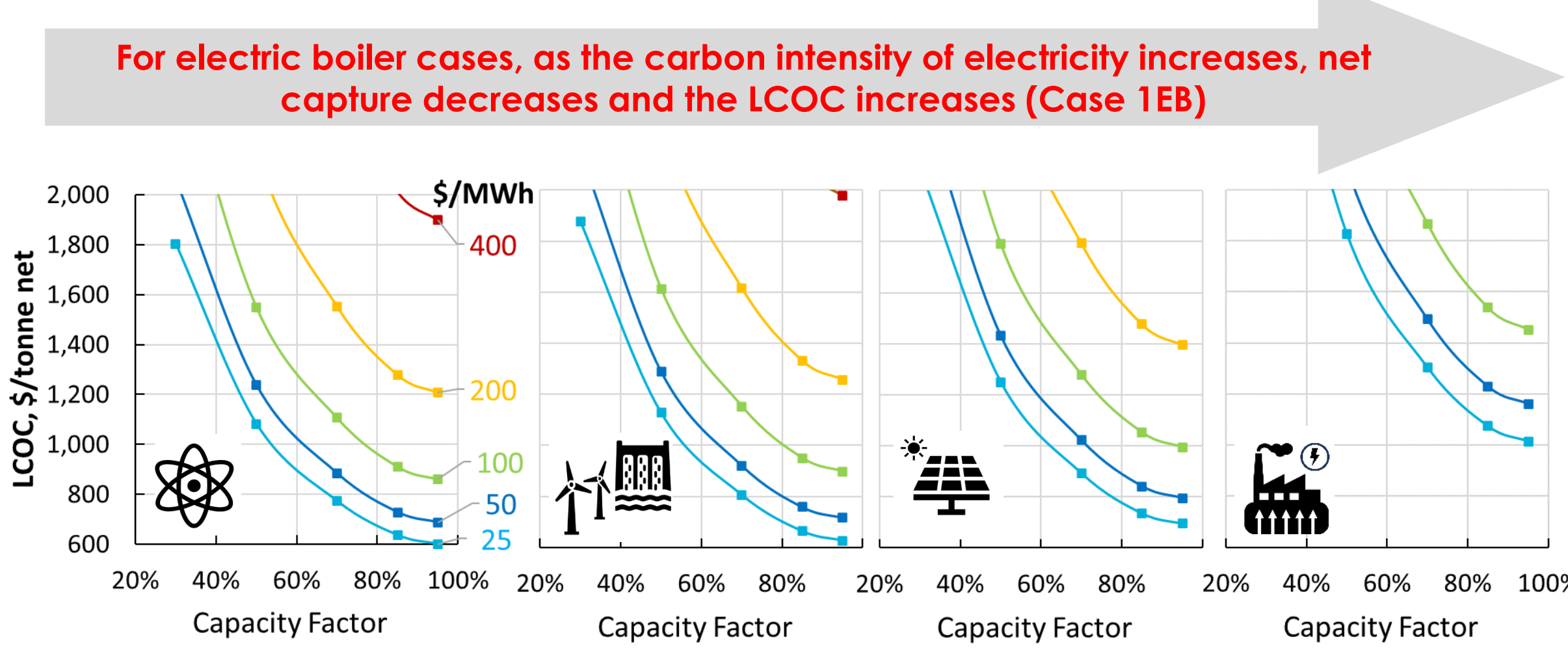
### Performance Summary

| Case →                                                | 1NG  | 2NG  | 3NG  | 1EB  | 2EB  | 3EB  |
|-------------------------------------------------------|------|------|------|------|------|------|
| Auxiliary Load (in MWe) ↓                             |      |      |      |      |      |      |
| DAC CO <sub>2</sub> Compressor                        | 1.7  | 1.8  | 1.7  | 1.5  | 1.6  | 1.6  |
| DAC Fan                                               | 19.4 | 19.4 | 19.4 | 17.6 | 18.1 | 18.1 |
| CO <sub>2</sub> Capture + Compression (Only NG cases) | 6.6  | 6.6  | 6.6  | -    | -    | -    |
| Vacuum Compressor                                     | 0.4  | -    | -    | 0.4  | -    | -    |
| Electric Boiler (Only EB cases)                       | -    | -    | -    | 27.8 | 33.5 | 38.3 |
| Balance of Plant                                      | 2.0  | 2.0  | 1.6  | 0.6  | 0.6  | 0.2  |
| Total                                                 | 30.1 | 29.8 | 29.3 | 47.9 | 53.8 | 58.2 |
| NG Input Energy (Only NG cases) (in MWth)             | 260  | 260  | 260  |      |      |      |

- NG cases have higher steam demand (2.2-2.6x) than corresponding EB cases.** The steam requirement of the 97% capture system accounts for 50% to 60% of the steam requirement with the remainder due to uncaptured CHP emissions that must be made up for via larger gross DAC CO<sub>2</sub> removal

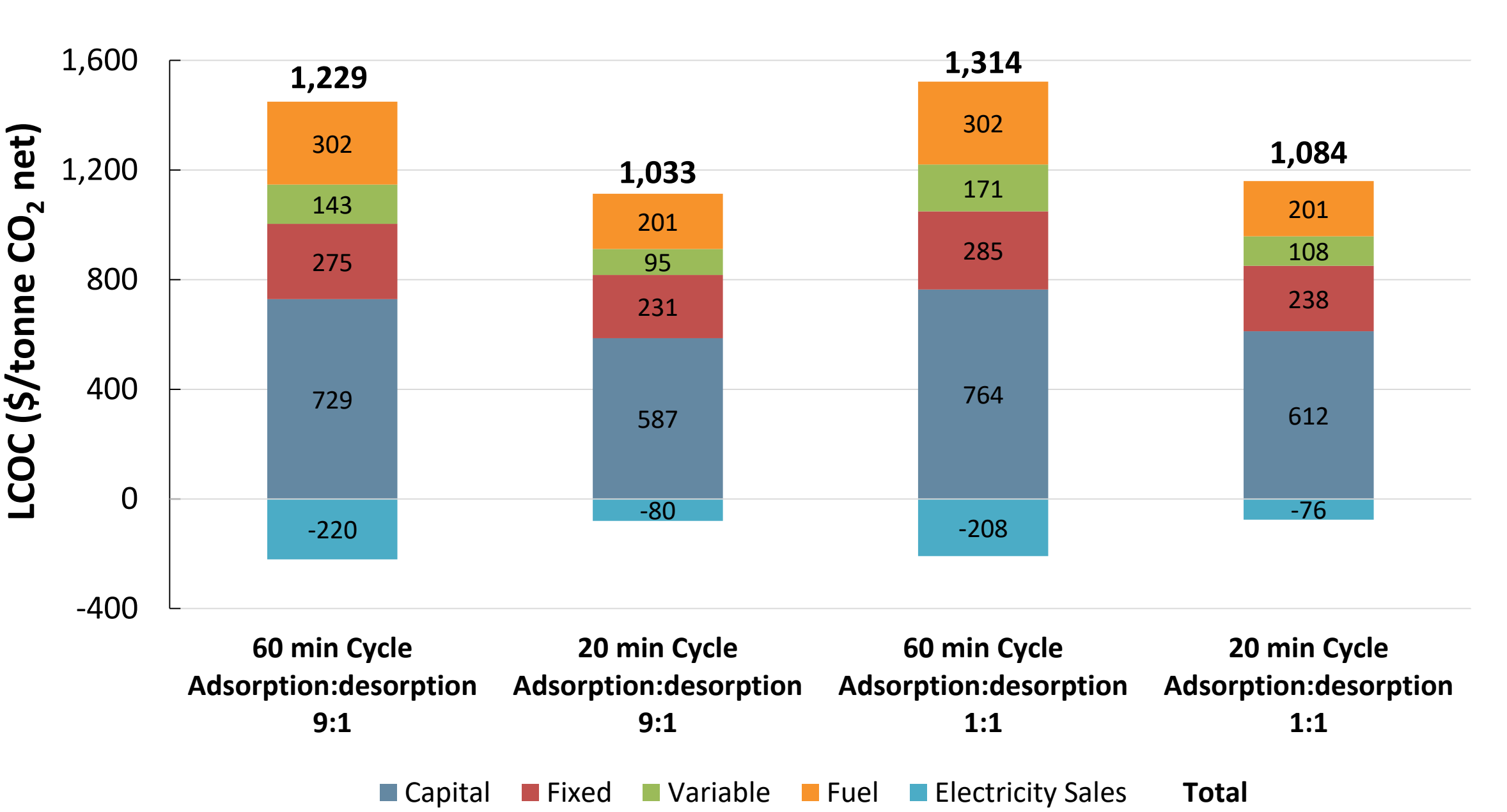
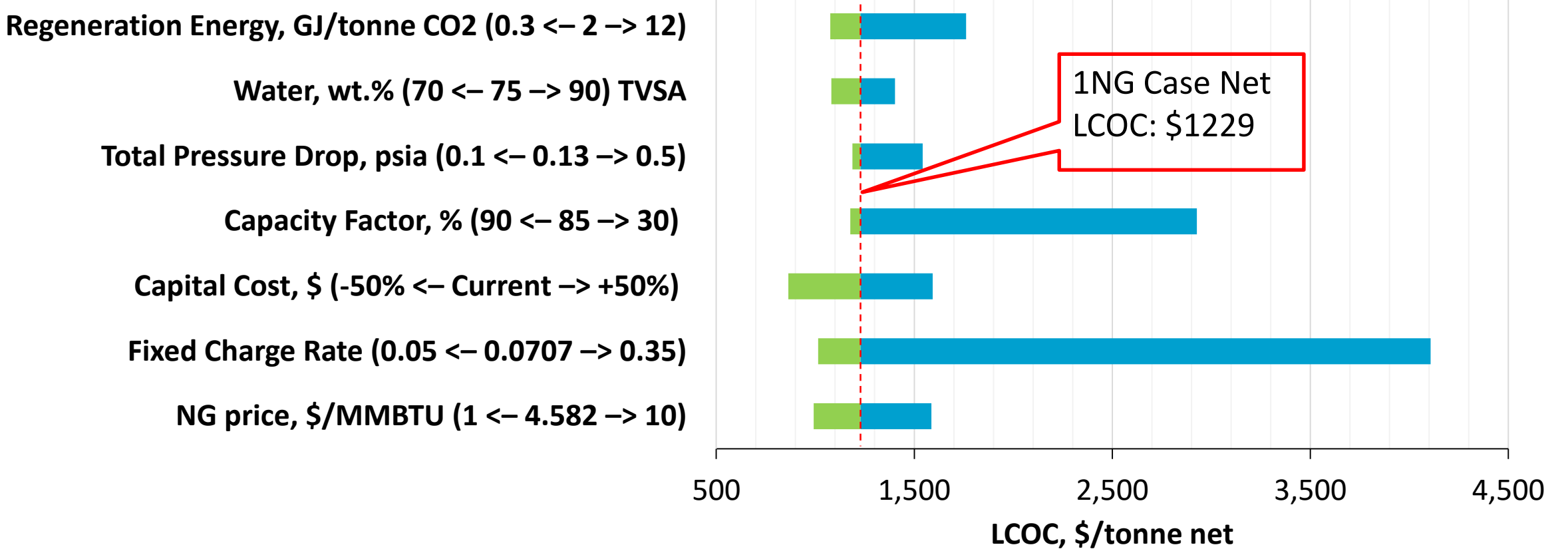


- NG cases**
- Capital cost is the largest contributor to net levelized cost of capture (LCOC)
  - Comparison across cases shows that **TVSA will result in a higher COC** due to higher capital expenditures
- EB cases**
- Variable operation and maintenance (O&M) accounts for **40–45% of net LCOC**
  - Comparison across cases shows that **TVSA will result in lower LCOC** due to reduced variable O&M

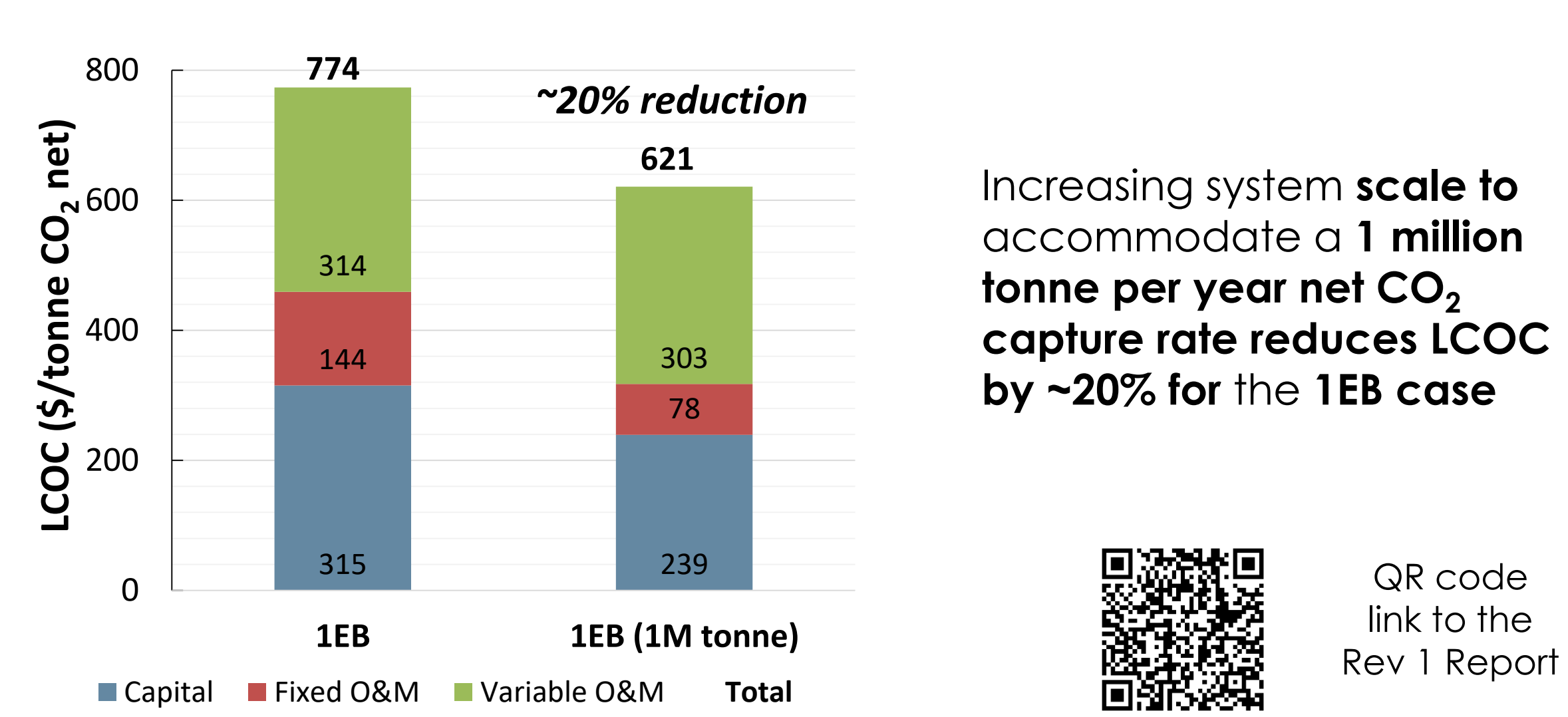


Preliminary Results, Do Not Cite

## Sensitivity Analysis



Reducing cycle time from 1 hour to 20 minutes has the potential to reduce LCOC by ~20 to 30%



## Disclaimer

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