

Calculated Cost Breakdown \$/kWh Parameters for a U.S. Li-ion Standalone Storage System for Different Durations

Energy Storage Required and Potential Price June 18, 2018
Astoria GT

Energy Storage Required & Potential Price 6/18/18
Gowanus

Energy Storage Required and Potential Price June 18, 2018
Narrows

| Total (MWhr) | | 1,680 | 200 | Total | Storage | | 96 | 676 | 15 | 0 | Total | Storage | | 153 | 136 | 136 | 136 | 204 | 816 | |
|-----------------|-------|-------|-----|---------|---------|------|----|-----|----|---|---------|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| Capacity (MW) | | 280 | 200 | Storage | Margin | | 16 | 169 | 15 | | Storage | Margin | | 17 | 17 | 17 | 17 | 34 | 102 | |
| Duration (Hr) | | 6 | 1 | Used | (MW) | | 6 | 7 | 1 | | Used | (MW) | | 8 | 8 | 8 | 8 | 6 | 8 | |
| Date Time (EDT) | MWhr | | | | | MWhr | | | | | MWhr | | | | | | | | | |
| 9 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 17 | 17 | | | | | | |
| 10 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 17 | 17 | | | | | | |
| 11 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 17 | 17 | | | | | | |
| 12 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 34 | 17 | 17 | | | | | |
| 13 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 136 | 17 | | | 17 | | | 102 |
| 14 | 280 | 280 | | 280 | 560 | 16 | 16 | | | | 16 | 0 | 187 | 17 | | | | | | 102 |
| 15 | 480 | 280 | 200 | 480 | 960 | 16 | 16 | | | | 16 | 0 | 221 | 17 | | | | | 34 | 102 |
| 16 | 280 | 280 | | 280 | 560 | 185 | 16 | 169 | | | 185 | 0 | 272 | 17 | | 17 | 17 | 34 | 102 | |
| 17 | 280 | 280 | | 280 | 560 | 185 | 16 | 169 | | | 185 | 0 | 272 | | 17 | 17 | 17 | 34 | 102 | |
| 18 | 280 | 280 | | 280 | 560 | 200 | 16 | 169 | 15 | | 200 | 0 | 272 | | 17 | 17 | 17 | 34 | 102 | |
| 19 | 280 | 280 | | 280 | 560 | 185 | 16 | 169 | | | 185 | 0 | 272 | | 17 | 17 | 17 | 34 | 102 | |
| 20 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 170 | 17 | 17 | 17 | 17 | | 102 | |
| 21 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 153 | | 17 | 17 | 17 | 34 | | |
| 22 | 0 | | | 0 | 0 | 0 | | | | | 0 | 0 | 51 | | 17 | 17 | 17 | | | |
| 23 | 0 | | | 0 | 0 | 16 | | | | | 0 | 16 | 34 | | 17 | 17 | | | | |
| Total | 1,880 | | | | | 803 | | | | | 2,125 | | | | | | | | | |

NREL Energy Storage Benchmark Prices (\$millions)

| | | |
|---------------|----------|--------|
| \$/KWhr | \$ 357 | \$ 580 |
| Battery Total | \$ 599 | \$ 116 |
| Grand total | \$ 1,797 | |

| | | |
|--------|--------|--------|
| \$ 385 | \$ 357 | \$ 731 |
| \$ 37 | \$ 241 | \$ 11 |

| | | | | | |
|--------|--------|--------|--------|--------|--------|
| \$ 374 | \$ 375 | \$ 376 | \$ 377 | \$ 383 | \$ 364 |
| \$ 57 | \$ 51 | \$ 51 | \$ 51 | \$ 78 | \$ 297 |

Energy Storage Capacity and Cost With Storage Discharge Limitation 54%

| | | |
|---------------|-------|-----|
| Total (MWhr) | 3,111 | 370 |
| Capacity (MW) | 519 | 370 |
| Duration (Hr) | 6 | 1 |

| | | |
|-----|-------|----|
| 178 | 2,191 | 28 |
| 30 | 313 | 28 |
| 6 | 7 | 1 |

| | | | | | |
|-----|-----|-----|-----|-----|-------|
| 252 | 252 | 252 | 252 | 378 | 1,511 |
| 31 | 31 | 31 | 31 | 63 | 189 |
| 8 | 8 | 8 | 8 | 6 | 8 |

| NREL Energy Storage Benchmark Prices (\$millions) | | | | | |
|---|-----------------|--------|--------|--------|--------|
| \$/KWhr | \$ 357 | \$ 580 | \$ 385 | \$ 357 | \$ 731 |
| Battery Total | \$ 1,109 | \$ 215 | \$ 68 | \$ 782 | \$ 20 |
| Total | \$ 3,651 | | | | |

| | | | | | |
|--------|--------|--------|--------|--------|--------|
| \$ 374 | \$ 375 | \$ 376 | \$ 377 | \$ 383 | \$ 364 |
| \$ 94 | \$ 94 | \$ 95 | \$ 95 | \$ 145 | \$ 551 |

| | | | |
|-----|----|----------------|----------------|
| 476 | 68 | Total | Storage |
| 68 | 17 | Storage | Margin |
| 7 | 4 | Used | (MW) |

| | | | |
|----|----|-----|---|
| | | 17 | 0 |
| | | 17 | 0 |
| | | 17 | 0 |
| | | 34 | 0 |
| | | 136 | 0 |
| 68 | | 187 | 0 |
| 68 | | 221 | 0 |
| 68 | 17 | 272 | 0 |
| 68 | 17 | 272 | 0 |
| 68 | 17 | 272 | 0 |
| 68 | 17 | 272 | 0 |
| | | 170 | 0 |
| 68 | | 153 | 0 |
| | | 51 | 0 |
| | | 34 | 0 |

| | |
|--------|--------|
| \$ 372 | \$ 430 |
| \$ 177 | \$ 29 |

| | |
|-----|-----|
| 881 | 126 |
| 126 | 31 |
| 7 | 4 |

| | |
|--------|--------|
| \$ 372 | \$ 430 |
| \$ 328 | \$ 54 |