Closing the Gap - Electricity Solutions Toolbox

Multiple studies commissioned by the Independent Electricity System Operator (IESO) show that energy efficiency and local-scale resources (formally labelled as Distributed Energy Resources, or DERs) hold incredible potential. Tapping into both of these solutions at scale can significantly offset total energy and capacity (i.e. the ability for the system to meet peak demand) needs, and limit or defer investments in transmission, distribution, and large-scale supply.

Listed below are the options available to help meet upcoming local and system-wide needs, with local costs from reputable sources listed where available.

- **Energy Efficiency**
  Better equipment (motors, lighting, etc.) and other measures to allow buildings and industrial facilities to use less energy and lower operating costs to complete the same (or better) functions and performance.
  - **Annual Average Incentive Cost (2023 to 2038):** 2.7 to 3.9 ¢/kWh (avoided)[1]
  - **Energy Potential (2038):** 23.8 TWh[1]
  - **Capacity Potential (2038):** 2,980 MW[1]

- **DERs - Demand Flexibility**
  Flexible loads using control technologies (e.g. smart thermostats), and demand response programs to lower and/or shift peak demand.
  - **Capacity Potential (2032):** 2,830 to 3,480 MW[2]

- **DERs - Local-scale Solar and Storage**
  Medium and small-scale solar generation can be installed at residential and commercial sites ‘behind the meter’ to offset draw from the grid. Can also be connected help power local grids. When paired with storage, these resources can shift demand from peak periods while providing residents, businesses, and the local grid with backup power in emergency events of high demand or grid outages.
  - **Energy Potential (2032):** 19.7 TWh[2]
  - **Capacity Potential (2032):** 4,000 – 4,720 MW[2]

- **Utility-Scale Renewables (Wind and Solar)**
  Building large-scale renewable generation within municipalities to offset or eliminate the need for fossil fuel generation and/or outside power. While the lowest cost sources of new generation, solar and wind may need to be paired with other solutions to ensure grid reliability.
  - **Cost (2023):** 5.0 to 8.3 ¢/kWh[3]
  - **Cost (2035):** 2.9 to 7.0 ¢/kWh[3]

- **Utility-Scale Renewables + Storage**
  Pairing large-scale renewables with storage to provide the grid with on-demand power and build grid resiliency, taking advantage of the low cost of wind and solar generation while addressing intermittency issues (i.e. when wind and solar power is unavailable)
  - **Cost (2023):** 10.8 to 21.2 ¢/kWh[3]
  - **Cost (2035):** 6.3 to 14.3 ¢/kWh[3]

- **Medium and Large-Scale Storage**
  Various technologies available, with batteries being most common. Electricity is stored (e.g. a battery is charged) when demand on the grid is low and cheap and discharged when demand is high or backup power is needed.
  - **Cost (2023):** 27.5 ¢/kWh[3]
  - **Cost (2035):** 16.4 ¢/kWh[3]

- **Natural Gas for Peaking**
  Building or expanding fossil fuel plants, typically called upon only when grid demand necessitates it due to high marginal costs.
  - **Cost (2023):** 15.0 to 23.5 ¢/kWh[3]

Notes

[1] Estimated cumulative energy and summer capacity potential, and average levelized incentive costs, as of 2038 under the maximum achievable scenario from Navigant's 2019 Achievable Potential Study.

[2] Estimated summer and winter peak capacity and energy economic potential modelled in the BAU+ scenario from Dunsky Energy + Climate's DER Potential Study.

[3] Estimated levelized energy costs for Ontario-based projects built in 2023 and 2035 from Clean Energy Canada's A Renewables Powerhouse report