

# Deep Retrofits / Net Zero

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# The Net Zero Paradigm Shift

- Net Zero Energy is achieved when a facility uses zero purchased / imported power on an annual average
- Net Zero Energy initiatives require holistic solutions, including energy conservation measures that would have historically been thrown out due to excessive paybacks
- Interaction of all building components and systems is key to creating the most energy efficient facility, for example:
  - Envelope improvements are viewed not only as energy savings measures, but also key to reducing HVAC system loads allowing those systems to be downsized prior to replacement with more efficient systems
  - Lighting system impacts, occupancy trends (especially with so many people working remotely for part or all of the workweek), appliance and room equipment efficiency upgrades, etc. are all part of the interacted energy picture
- Once energy efficiency is maximized, renewable energy comes into play - the more energy efficient you make the facility the less “expensive” renewable assets you need – Reduce, Reuse, then Renewable

# Deep Retrofits

- Deep Building Retrofits follow the same path as Net Zero with a similar end-state target, short of the use of renewable energy resources
- In a Deep Building Retrofit facilities generally aim for 30% to 50% energy savings, sometimes more
- Saving of 30% and more requires the holistic approach to optimizing facility operation and performance
- Complicated and costly due to inherent limitations of the original construction

# Federal Government Actions

- Directives and Executive Orders - reduce energy intensity 30% from 2003 through 2015, increase renewable energy to generate 7.5% by 2013, reduce potable water intensity 26% from 2007 through 2020, reduce industrial and other water intensity 20% from 2010 through 2020, divert 50% of waste product through recycling and reduction programs by 2015, ensure 15% of building stock meet sustainability principles by 2015 (HPSB), new facilities to reach net-zero energy use by 2030
- Army chose 6 facilities to achieve Net Zero Energy, 6 facilities to achieve Net Zero Water, 6 facilities to achieve Net Zero Waste and 2 Facilities were assigned all three Net Zero goals - all by 2020
- Commandant of the Marines committed to an increase in energy efficiency of 50% by 2025
- Secretary of the Navy committed to 50% alternative energy (1 GW) by 2020, 50% of installations Net Zero by 2020 and 50% reduction in vehicle petroleum use by 2015

# Federal Government Actions

- GSA envisions Deep Retrofit as an 80% reduction in facility energy use followed by implementation of renewable energy technologies and is contracting with ESCOs to develop and implement deep building retrofits to approach Net Zero operation
- DOE / NREL built a Net Zero Energy office / data center in Golden, Colorado selecting the design/build contractor on a performance spec competition
  - 222,000 SF facility with a staff of 800
  - LEED Platinum
  - Uses 50% less energy than ASHRAE 90.1 2004 standard – 35,000 kBtu/SF/Yr
  - The facility was build for a cost comparable with normal construction - \$57.4 Million
  - Features – Optimum building orientation, labyrinth thermal storage, transpired solar collectors, day lighting, triple glazed operable windows with sunshades, precast concrete insulated panels, radiant heating and cooling, under floor ventilation, energy efficient data center and workstations, 1.6 MW roof mounted solar PV

# Why Now?

- Energy Security / Mission Assurance
- Budget Constraints
- Technology Advances
- Address Deferred Maintenance
- Public Relations