

Definition: Net Zero Energy

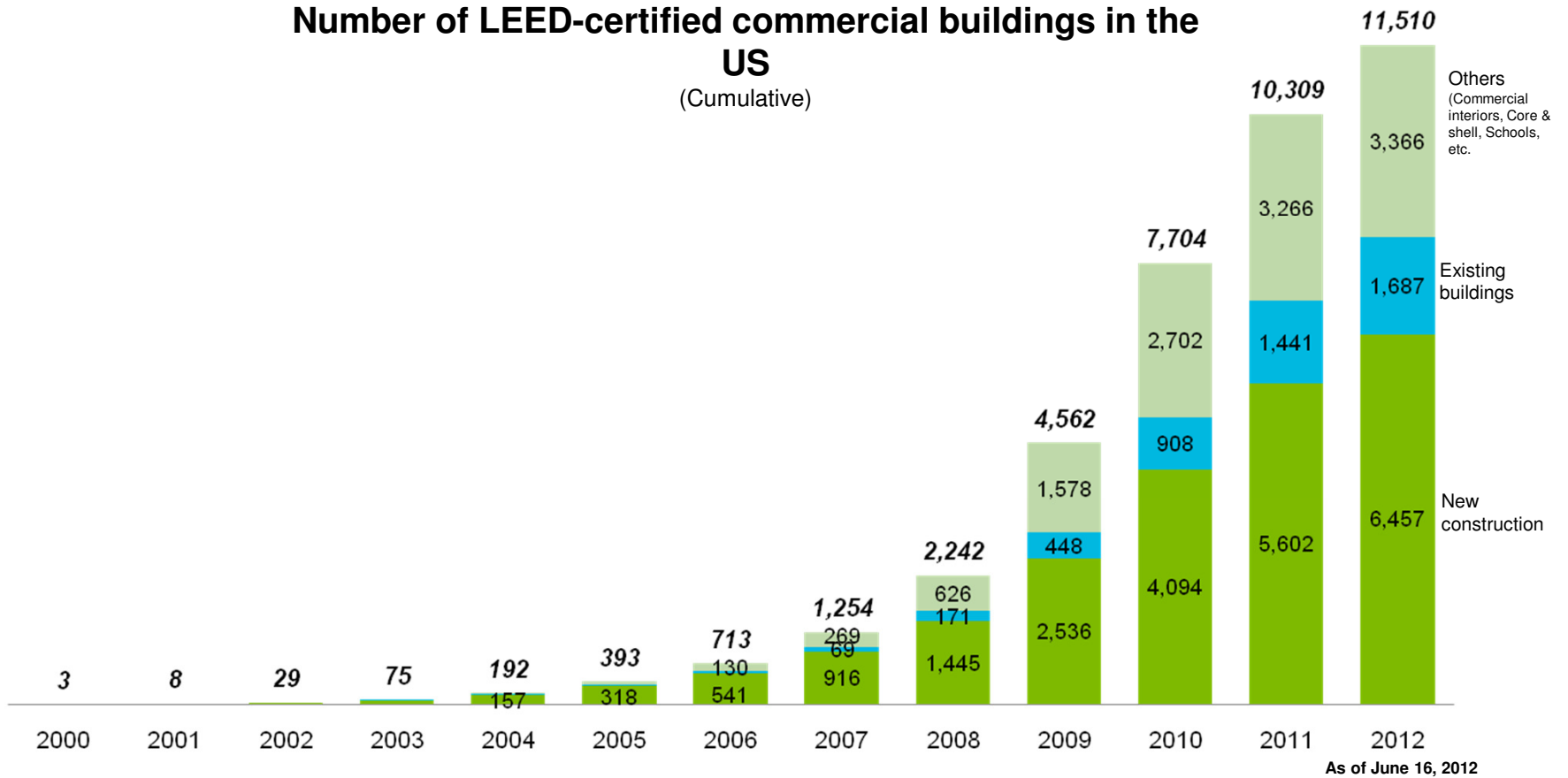
- Maximize energy efficiency opportunities, then use renewable energy to meet remaining energy needs.



UC Davis West
Village
Davis, CA

LEED began small ... now, 12 years later, a major movement

Number of LEED-certified commercial buildings in the US
(Cumulative)



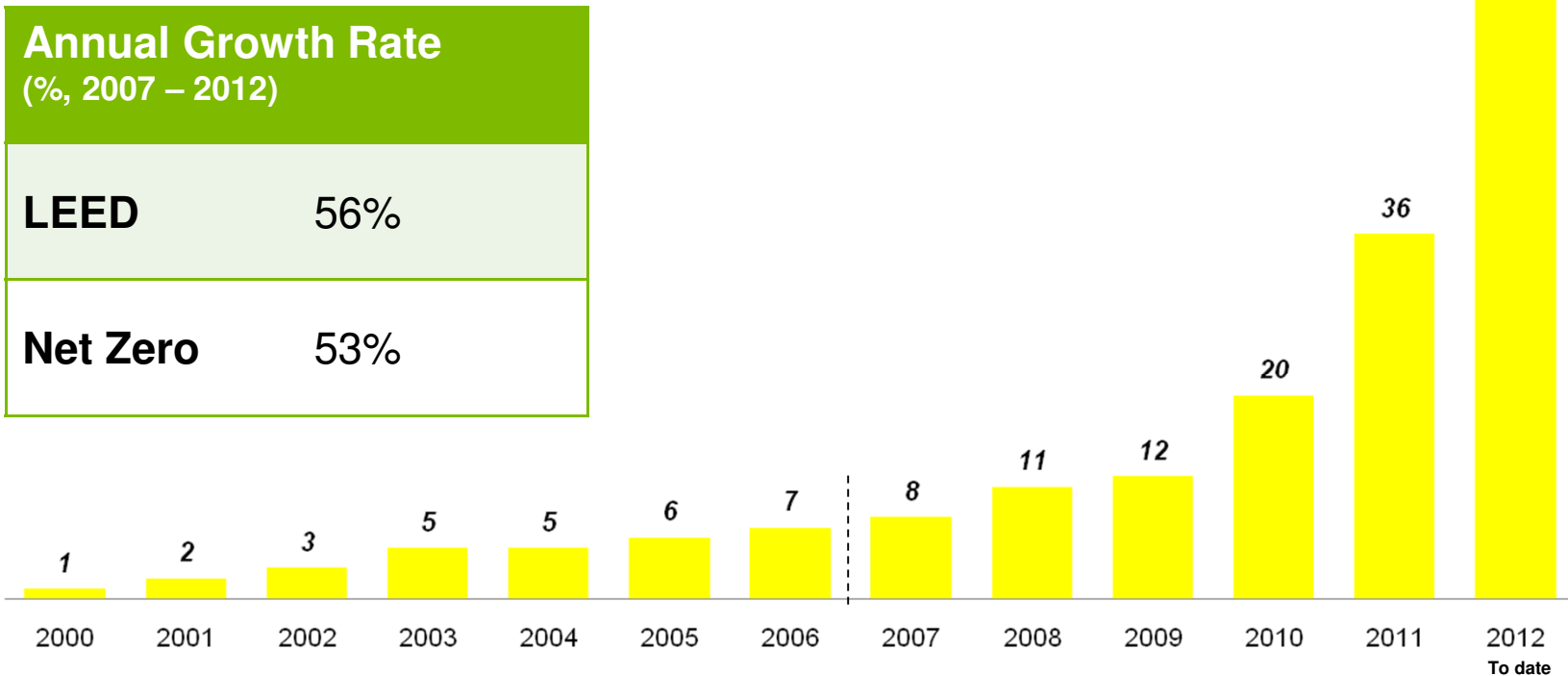
One in every three US commercial construction starts gets LEED certified

Source: US Green Buildings Council



Net Zero has a long way to go but is gaining momentum

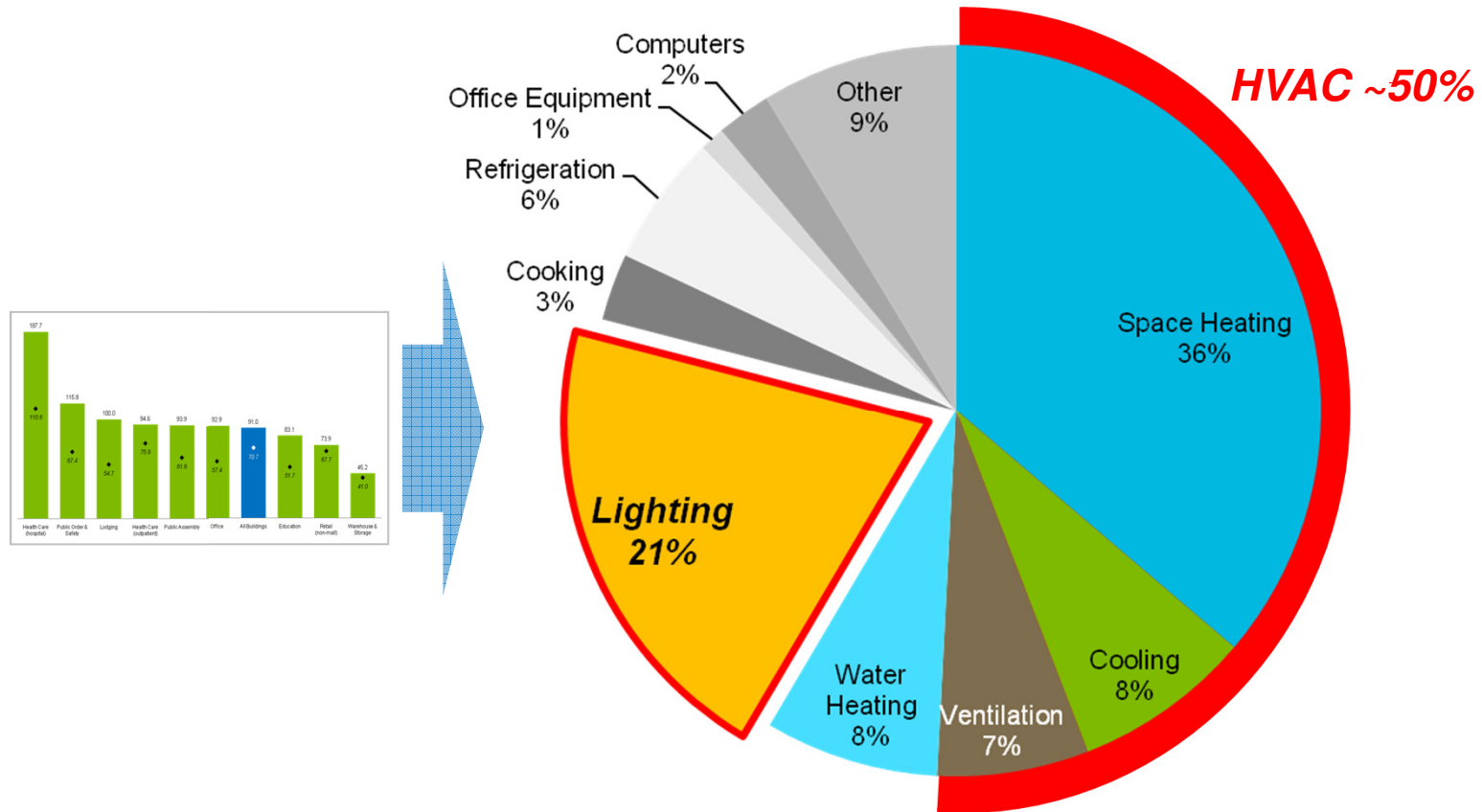
Number of Net Zero commercial buildings in the US
(Cumulative)



New Net Zero buildings growing at the same rate as LEED

70% of commercial building energy goes for HVAC and lighting ...

Average US Commercial Building Energy Use



Tempting to focus efforts here ... Might we miss bigger levers for Net Zero?

Source: US Energy Information Administration (EIA) Commercial Buildings Energy Consumption Survey survey 2003 (CBECS 2003). All building types combined

Note: Data reflects existing buildings. 100% = 91.1 kBtu/sf-yr

Many levers for reducing net energy consumption besides HVAC



Examples:

- Optimized use of day lighting
- Natural ventilation
- Highly insulated building envelope
- High performance windows
- Expanded use of heat pumps
- Radiant heating & cooling systems
- High performance packaged systems
- Dedicated outdoor air systems w/energy recovery
- Demand control ventilation
- Low density ambient lighting w/electronic dimming
- High efficiency task lighting w/occupancy controls
- On-going commissioning
- Optimal use of resources, operation & maintenance
- Solar PV
- Solar thermal
- Wind
- Biomass

1st reduce energy demand ... 2nd employ efficient systems ... 3rd supply renewable energy