

8th Annual UC, CSU, CCC Sustainability Conference

Demonstrated Energy Efficient
Lighting and HVAC Technologies

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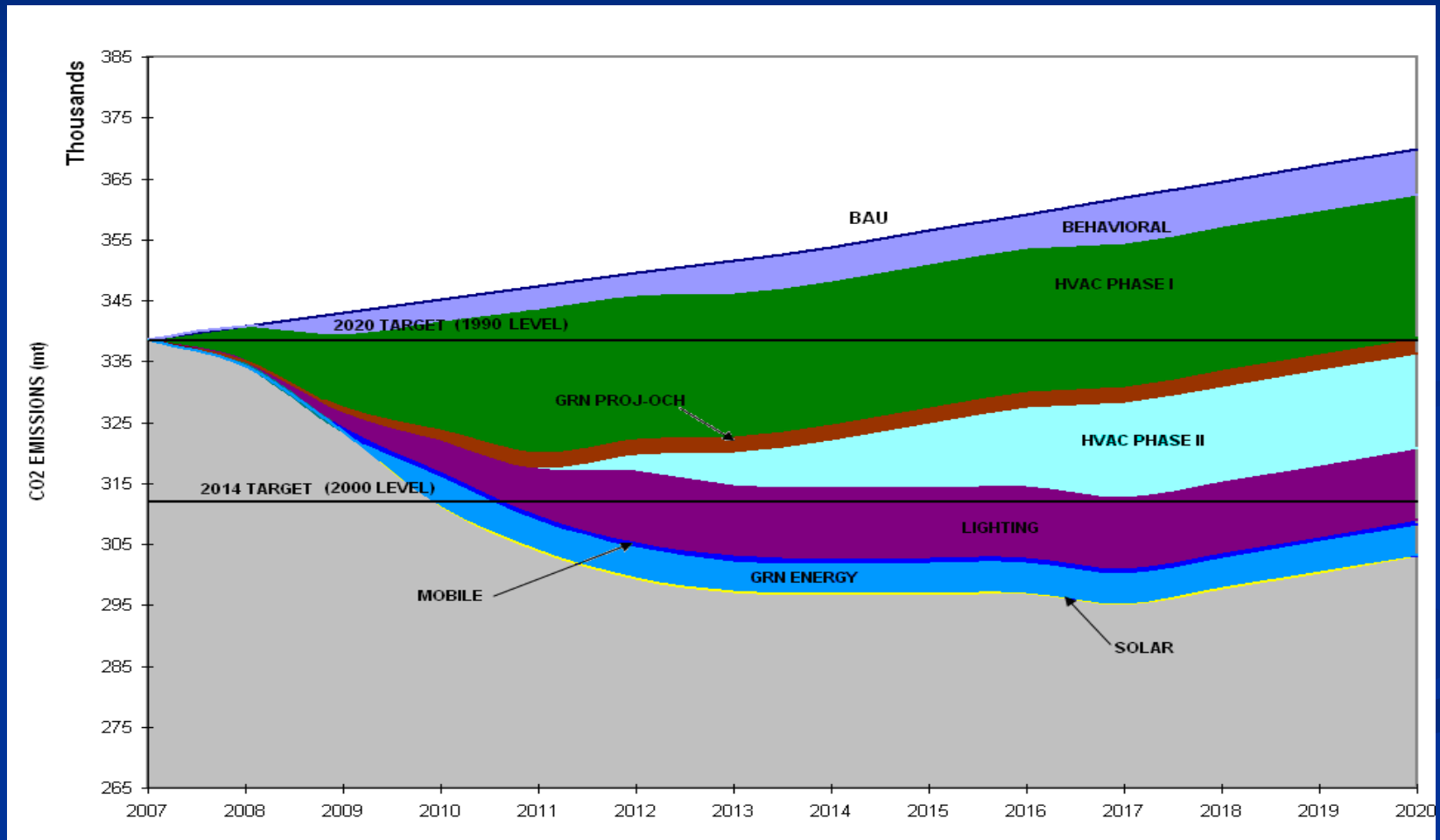
UCLA's Climate Action Plan

- BAU vs Emission Reduction Initiatives
- Stationary Source Initiatives

Energy Conservation Program

- Process
- Scope & Organization
- Challenges
- Lessons Learned

Business as Usual vs. Potential Emission Reduction Initiatives



Stationary Source Initiatives

Initiative	Comp. Date	CO2e Reduction (mt CO2e)	% of Total Reduction
HVAC – Phase I	2012	23,500	40%
HVAC – Phase II	2016	15,600	27%
T8 Lamps	2012	5,869	10%
Green Energy	NA	4,800	8%
Induction Lighting	2012	3,705	6%
OCH – Projects	2012	2,600	4%
Occ. Sensors	2012	2,120	4%
Solar	TBD	300	<1%
TOTAL		58,494	100%

Stationary Source Initiatives Cost Factors

Initiative	Cost (After rebate)	Annual Reduction (mt CO ₂ e)	Factor \$/CO ₂ e (mt CO ₂ e)
HVAC Phase I	\$13,600,000	23,500	\$579
HVAC Phase II	\$9,600,000	15,600	\$615
T8 Replacement	\$360,000	5,870	\$61
Occ. Sensors	\$1,630,000	2,120	\$769
Induction Lighting	\$3,842,000	3,700	\$1,037
OCH Initiatives	\$2,030,000	2,600	\$781
Green Power	\$2,628,000	4,800	\$548
Solar	\$1,826,000	300	\$6,086

Campus approach to carbon reduction initiatives

- Conventional wisdom would suggest targeting buildings with the highest energy use first.

“However these buildings are often complex in design and usually have many regulations and codes to adhere to. At UCLA, our largest energy users are typically hospitals, medical support centers, science laboratory (100% OSA system) buildings.”

Campus approach to carbon reduction initiatives

- UCLA decided to take a different approach.

“Target non-complex buildings that are approximately 20+ years old and replace their ventilation systems with the most energy efficient and economical systems possible”

Energy Conservation Program

- In 06-07, UCLA began its first MBCx project at the Louis Factor Building. Over 70% of the mixing boxes failed the performance test causing us to change to a retrofit project.
- Prior to starting UCLA's first LEED EB certification, functional tests were performed on selected fan systems to assess condition. Over 80% of the mixing boxes failed to control temperature in either a heating or cooling mode.
- Trouble call history/trends
- Building operator feedback

Energy Conservation Program

Project Overview:

- Cost: 16 million (internally financed)
- Four year project (180 fan system conversions)
- Savings: 4 million/yr
- 26 state funded buildings
- 1 non-state funded entity

ECP Project Scope

Campus Level

- Two new campus weather stations – to provide control input to building management systems.

Building Level

Chilled Water System

- Replace CHW pump motors with high efficiency motors designed for VFD applications
- Replace CHW control valves with pressure independent, positive shutoff, 2 way valves
- Replace CHW control systems with electronic controls connected to the BMS
- Install bypass around CHW pumps to allow operation on Cogen supply only

ECP Project Scope

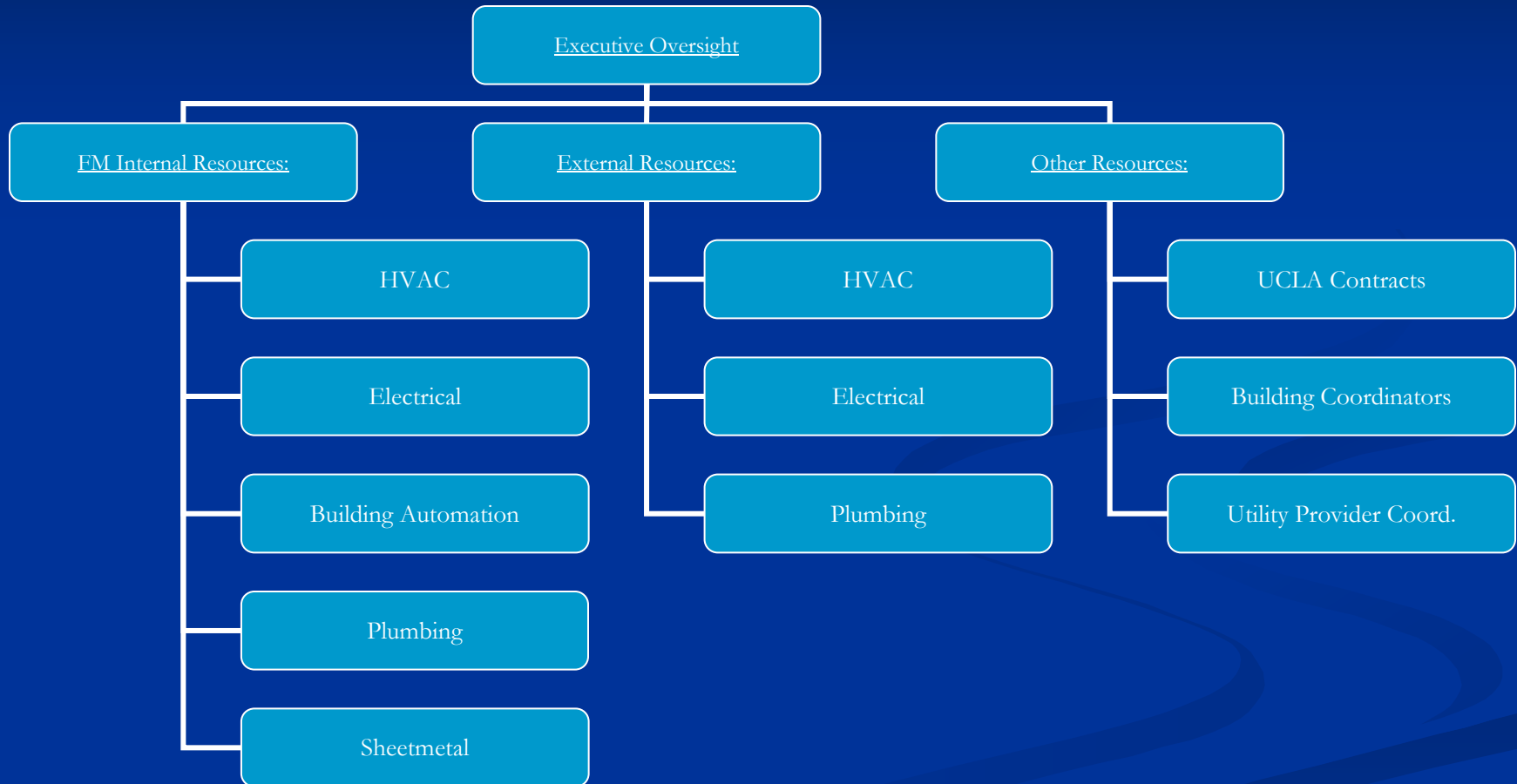
Air Distribution System

- Conversion of constant volume double duct to variable volume double duct mixing boxes
- Add VFD's to Supply and Return/Exhaust fans
- Addition of CO2 sensors to control economizer operation
- Eliminate static pressure control dampers
- Renovate/install hot and cold duct isolation dampers

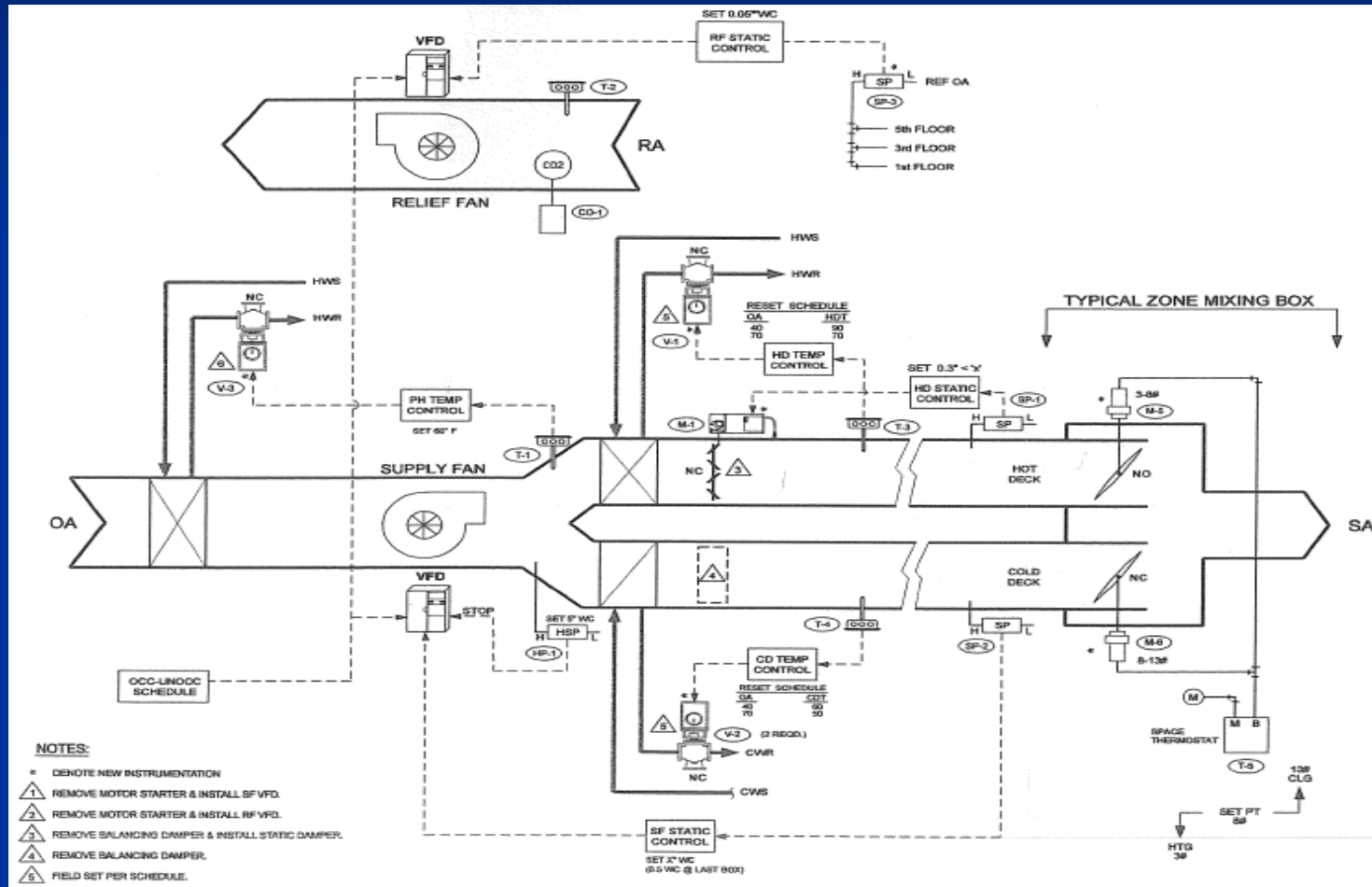
Control System

- Install building level metering
- Add electronic controls

Project Team



Typical Schematic



Lessons Learned

- Let previous experience be your guide
- Scheduling outside workforce support
- Scheduling in-house resources
- Advanced asbestos abatement

Challenges

- Equipment Ordering Lead Times
- Building Mgr. & Occupant Coordination
- Division of Work
 - In-house resources vs. contractor support



UCLA

Thank You

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