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# White Paper: Comprehensive HVAC Air-Side Optimization Projects for Telco Central Offices - An Overview

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## Onsite Energy Comprehensive Air-Side Optimization Projects

# TELCO Comprehensive Air-Side Optimization Projects Overview

Onsite's air-side optimization projects save energy and reduce cost of operation. We have been implementing these projects since 2015. They have achieved 15%-20% overall facility energy reductions, and 35%-40% reductions in energy used for cooling. These projects focus on the air-side of the CO's Telecommunications Equipment (TE) Process Cooling System (PCS). Projects are comprehensive and address the PCS in a holistic manner. This approach is superior to piecemeal projects because the interdependencies between the components of the PCS require that all components are working properly to ensure that the system as a whole is working in an optimized manner.

## Project Process

The Onsite approach consists of a 5-step process:

<b>Energy Audit (no cost)</b>	The audit consists of a site survey to inspect current PCS condition. CO energy loads are estimated and reconciled to utility meter information to develop baseline energy use. The baseline and project scope are modelled into an energy modelling software to estimate project savings. Installation cost and payback are estimated. High opportunity projects are identified and submitted to Regional Energy and Property Managers to select projects for Business Case submission.
<b>Project Scoping and Proposal</b>	Onsite coordinates with TELCO mechanical and controls contractors to conduct site walks and develop firm bid cost estimates for the selected projects. Onsite develops and submits proposals for submission to Business Case.
<b>Project Installation</b>	For funded Business Case projects, Onsite gathers two additional subcontractor bids for the projects and submits final proposal based on a 3-bid project cost analysis. Upon contract award, Onsite supervises project installation and commissioning. Onsite does not release contractors from project until the optimization phase is complete to insure all subcontractors are held to meeting performance specification as defined in Onsite's subcontracts.
<b>Savings and Operations Optimization</b>	Onsite utilizes upgraded building automation system (BAS) trending information to analyze and confirm that project is operating to specification and that savings are optimized.
<b>Rebate and Incentive Administration</b>	Upon selection of projects selected from the audit phase, Onsite files incentive applications with applicable utilities for energy rebates and incentives. Onsite performs all phases of compliance including M&V as required.

## Project Scope

The project scope comprises 4 basic efforts: Controls Upgrade, Air Distribution Retrofit, Optimization and Incentives. However, a fifth basic effort is necessary to ensure that savings and operational goals are met. The



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fifth effort addresses defective operating components in the PCS. Without correction of these defective components, overall system operation cannot be optimized and hence, the project will likely not meet savings objectives. Some defective components can be identified during the audit and proposal development process so installation cost can be included in the proposal cost. However, many defective components are not revealed until the installation or optimization phases have commenced. For this reason, Onsite includes “not to exceed” allowances in its proposals to address this matter. Allowances are provided such that overall cost keeps the project within target TELCO payback goals. The allowance is billed “at cost” to TELCO. TELCO is not required to pay for any unspent allowance.

The table below lists most of the types of scope items considered and included (if necessary) in a typical project:

System	Description	Energy Benefit	Operational Benefit
<b>Controls</b>	Replace or upgrade DDC to latest generation technology	Improves PCS control and data management	Improves control, data collection capability Establishes online monitoring and remote control capability
	Install temp sensors in all critical TE cold aisles	Enables even temperature distribution and eliminates overcooling	Provides pinpoint temperature and hot spot identification capability
	Reprogram controls	Maximize use of outside air cooling Minimize fan speed to maintain aisle temp	Ensures operations to TELCO specification Minimizes fan/chiller operation to reduce maintenance
	Connect to central server via IP link	Provides online status and energy performance data trending	Provides online monitoring for performance verification, trouble response and exception reporting
<b>Air Distribution</b>	Add supply register drops to critical TE cold aisles	Reduces duct static pressure requirement to provide adequate cooling air and lowers fan power requirement	Provides adequate cooling in critical TE locations
	Remove supply registers from TE hot aisles and low/no heat load areas	Reduces required fan power by reducing air volume requirement Reduces unnecessary pressure drops in supply air ducting	Improves operating environment
	Pan off and seal high supply registers and leaks in supply air ducting	Reduces require fan power by reducing air volume requirement Reduces unnecessary pressure drops in supply air ducting	Improves operating environment
	Replace restrictive return air registers where needed	Mitigates heat traps to minimize overcooling	Reduces high temp trouble calls



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	Join complementary AHU ducting where applicable	Allows excess fan capacity to be converted from continuous use to back-up only use	Reduces AHU operating hours and maintenance
	Upgrade/install fan VFD's	Optimizes fan control capability	Reduces fan motor maintenance
	Supply air balance	Mitigates overcooling through even heat distribution	Improves operating environment
<b>Project Optimization</b>	Perform full data trending and energy optimization after commissioning	Verifies energy savings and ensures savings has been optimized	Establishes baseline performance for exception reporting and ongoing performance evaluation
	Provide final performance trending report at completion of project	Verifies energy savings and ensures savings has been optimized	Establishes baseline performance for exception reporting and ongoing performance evaluation
<b>Energy Incentives and Rebates</b>	Provide full administration to procure energy incentives from available energy efficiency programs	Reduces net cost of project implementation	Reduces net cost of project implementation
<b>PCS Component Correction (as needed)</b>	Replace defective BAS sensors	Ensures optimal controls system operation to minimize energy use	Reduces failure rates and maintenance
	Repair/replace/install air control dampers	Ensures optimal air flow control to minimize energy use	Reduces overall system workload and fan/chiller maintenance
	Repair/replace defective control actuators	Ensures proper operation of valves and dampers to minimize energy use	Reduces failure rates and maintenance
	Repair/replace defective valves	Ensures optimal water flow to minimize energy use	Reduces failure rates and maintenance
	Install heat collection ducting in high heat density hot spots	Removes trapped heat to minimize overall air flow and chiller operation	Reduces network TE high temp vulnerability
	Resize pressure relief dampers	Removes trapped heat to minimize overall air flow and chiller operation	Reduces high temp and overall system workload and fan/chiller maintenance
	Re-shive fan pulleys to optimal ratio	Ensures optimal operation of AHU VFD's	Improves operating environment reduces fan motor maintenance
	Replace fouled air filters	Reduces fan power to meet air flow requirements	Improves operating environment reduces fan motor maintenance



## Onsite Energy Comprehensive Air-Side Optimization Projects

### Getting Started

Meet with your Property Managers and D&C Project Managers to identify CO's for audit. CO's that typically have the most potential for savings are CO's that have the most serious operational problems. This is a synergistic process in that the projects usually yield both energy savings while reducing overall operating cost. The best time to start is early in the year so that audits can be completed and selection proposals can be ready for Business Case submission by mid-year. CALL US! WE WILL HELP YOU GET THE PROCESS ROLLING!