



University of Virginia: Optimizing Chiller Efficiencies Via Innovative Tube Fouling Prevention

Presented by:

Justin Callihan – UVA

Michael Crocker – Innovas Technologies

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Defining the Problem

- Chillers represent >15% of building's energy use during warm months
- Vast majority of chillers are not operated at optimal efficiency
- >\$1.5 Billion wasted every year in USA due to chiller inefficiency



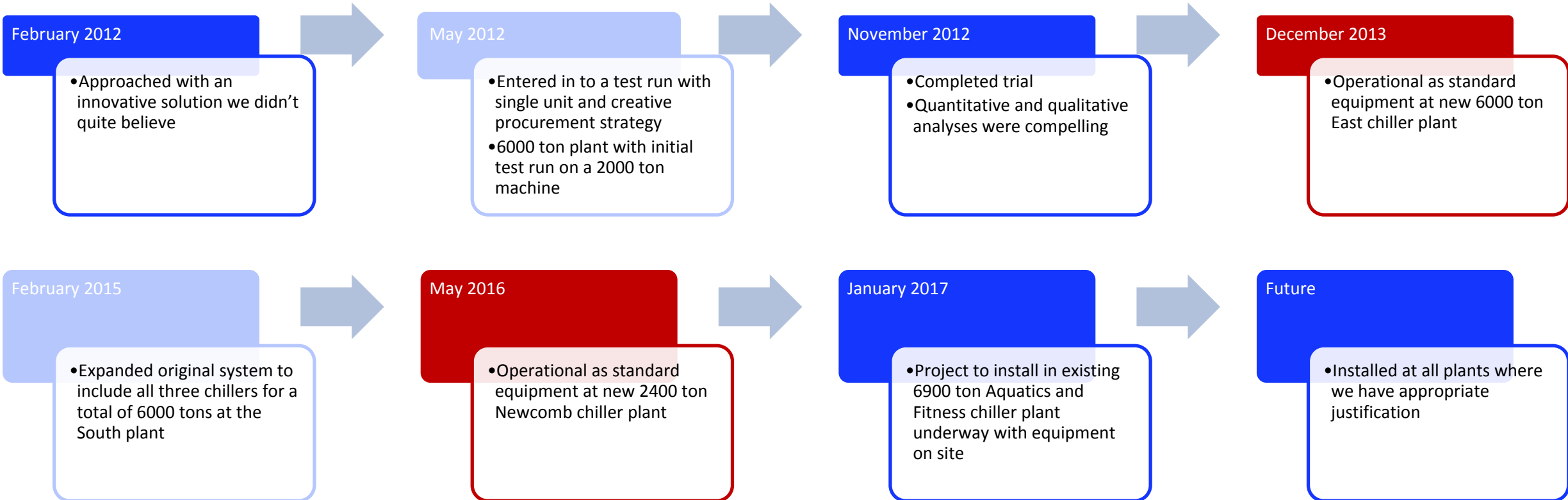
ATCS Technology: Multiple Dimensions of Value



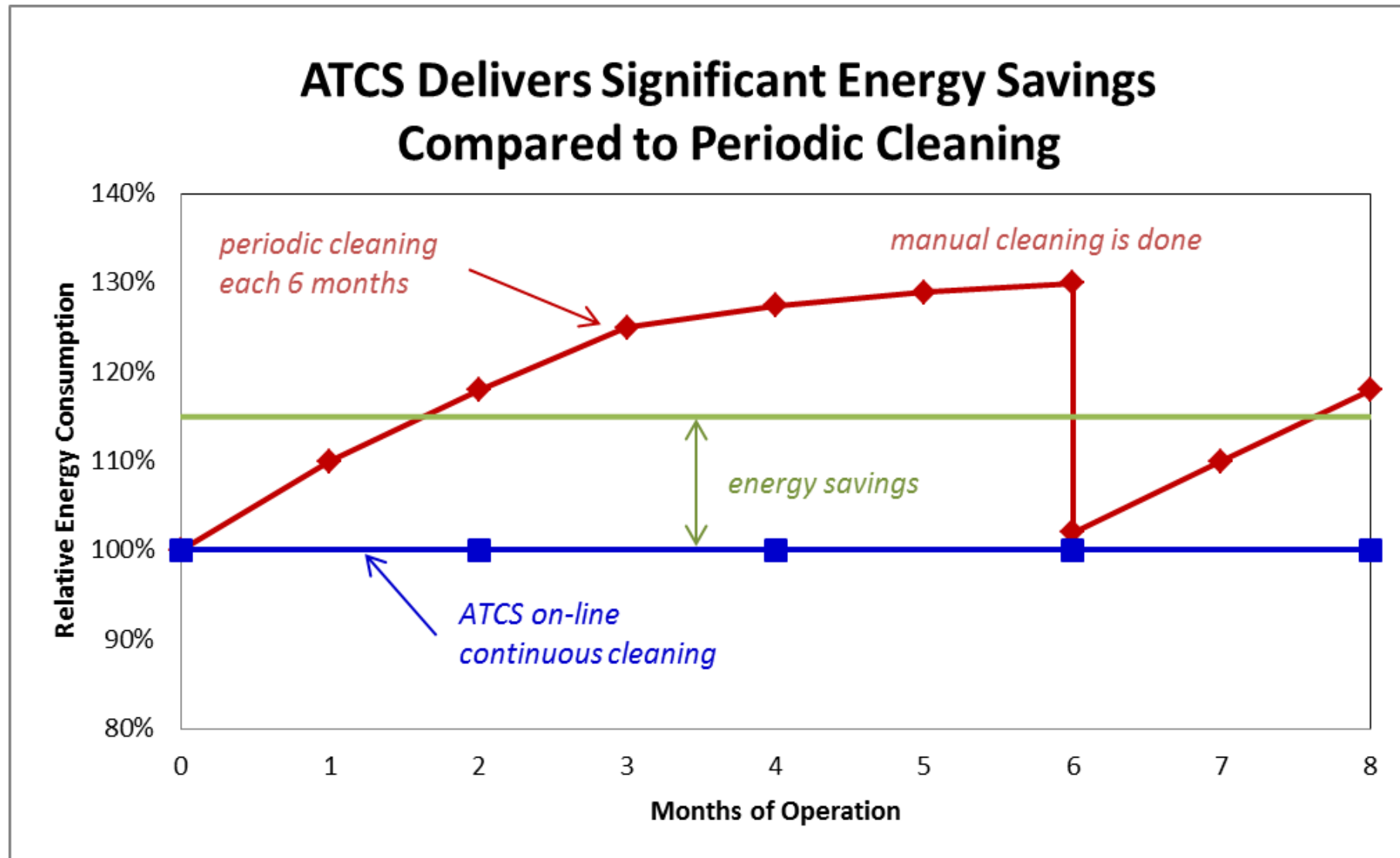
- Chiller energy efficiency improves 5-15%
- Reduce or eliminate manual tube brushing & chemical cleaning
- Improves chiller plant safety
- Reduce GHG emissions and environmental impact



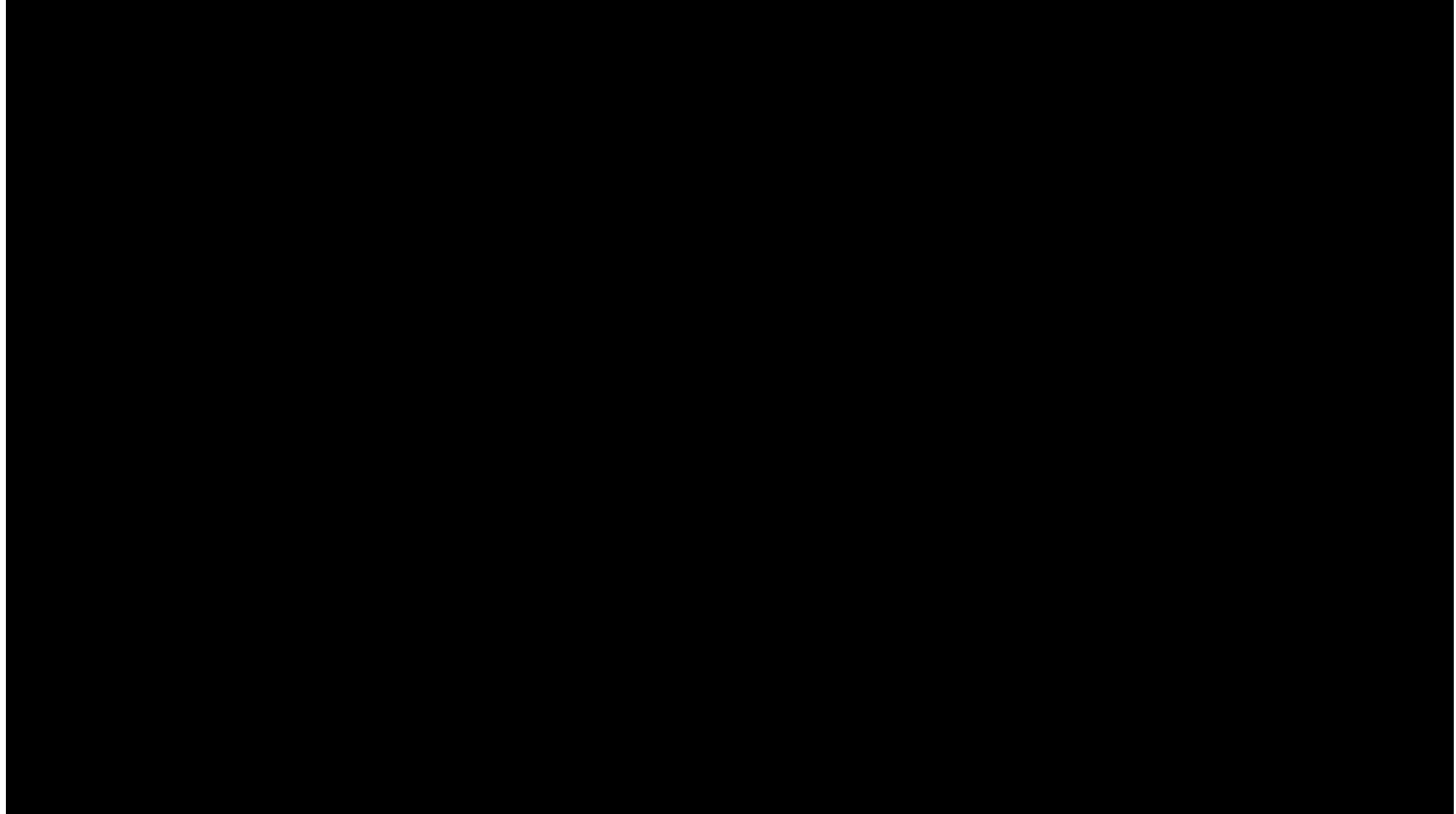
University of Virginia's Path To ATCS



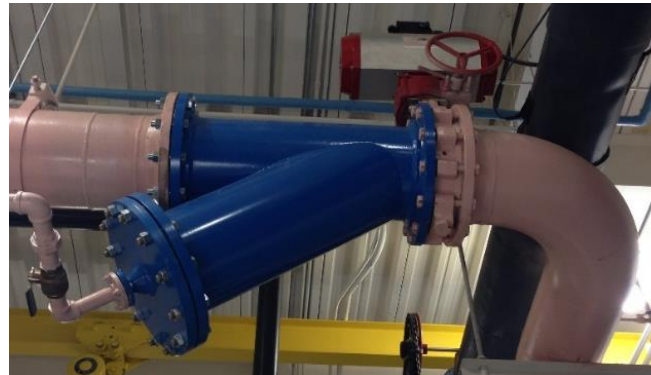
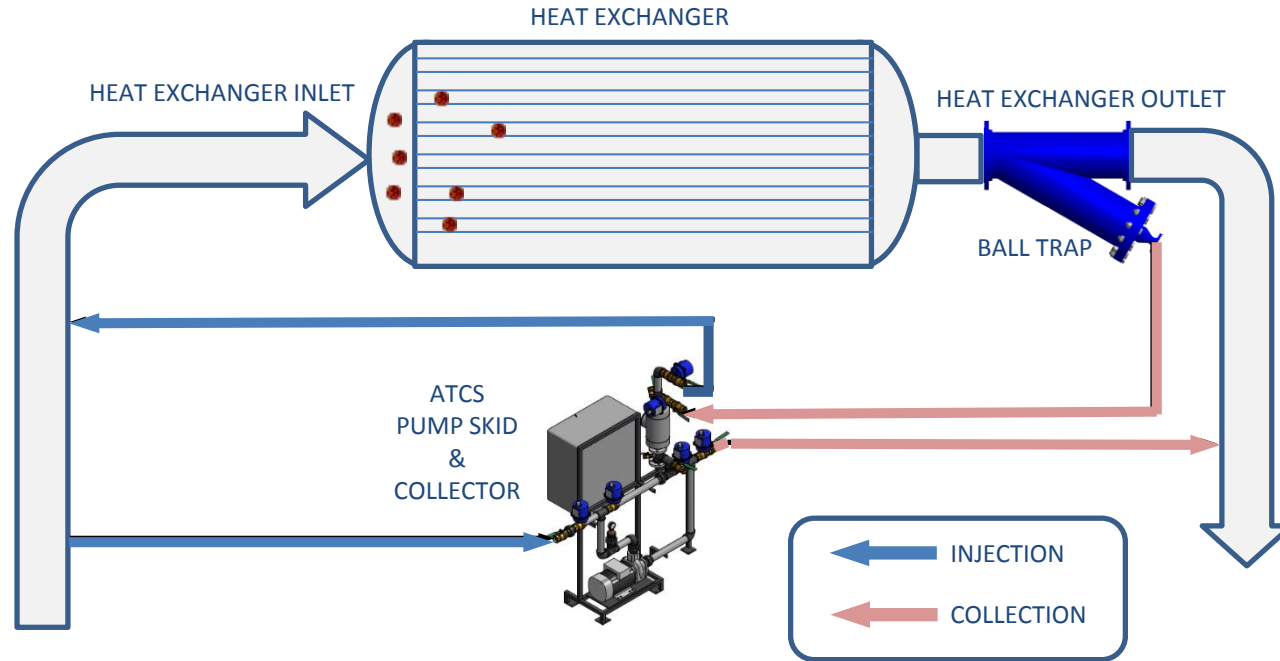
Chiller Energy Consumption: ATCS vs. Annual Tube Cleaning



How Auto Tube Cleaning Systems (ATCS) Work



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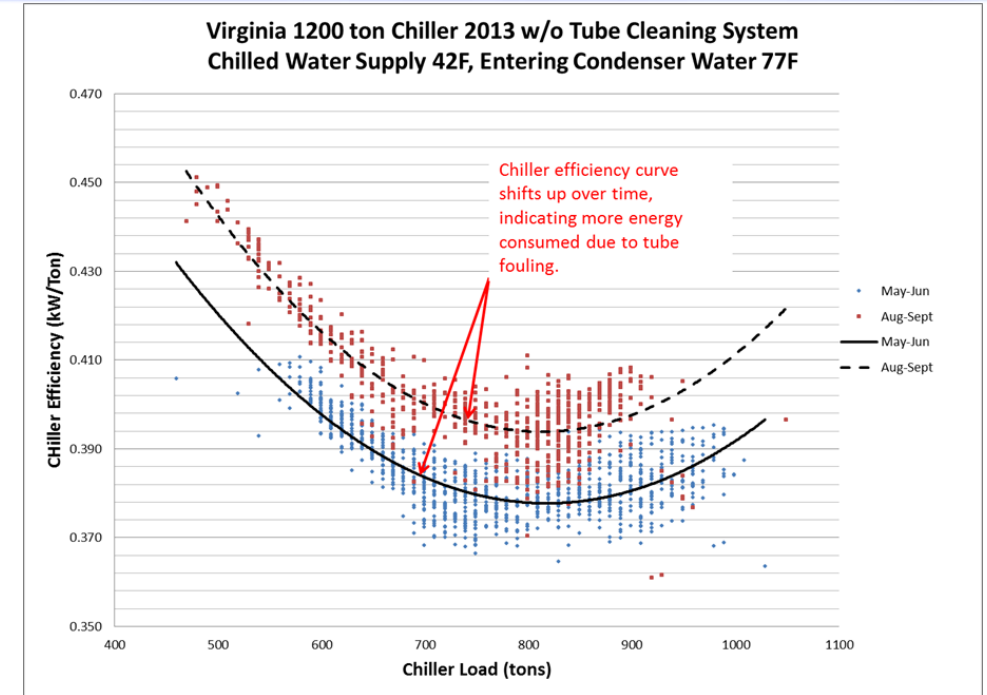
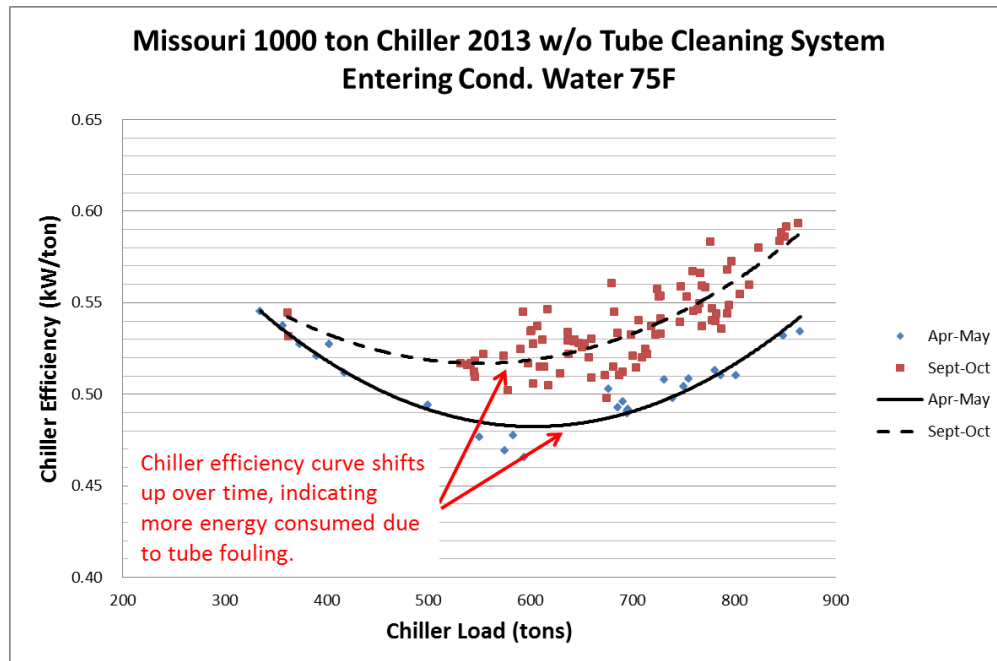


If Our True Goal is to Optimize Chiller Efficiency...

Chemical Treatment Alone

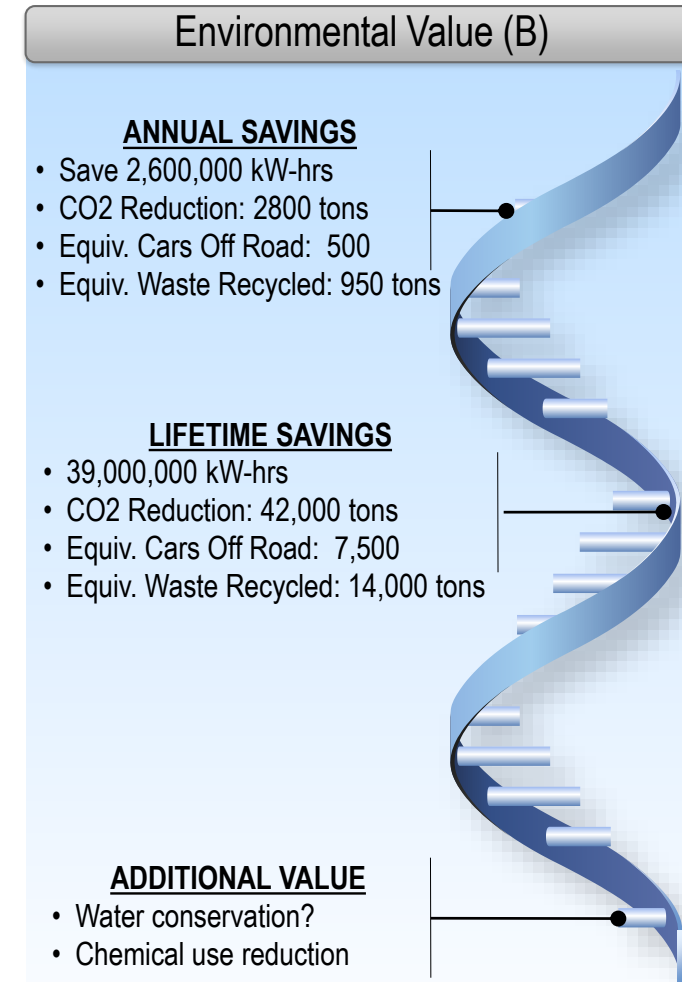
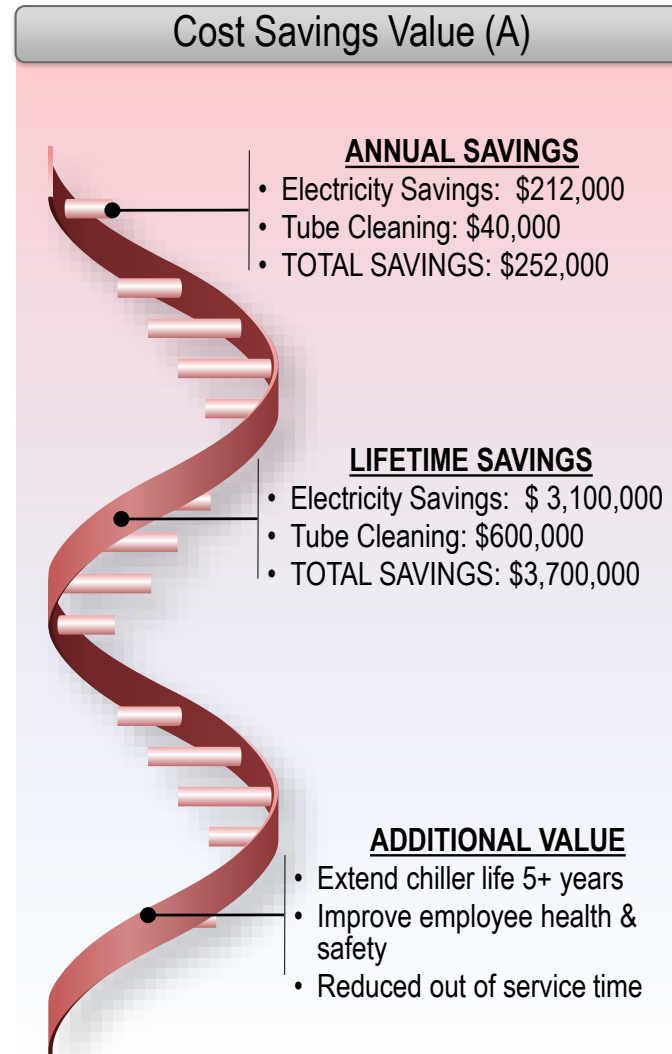
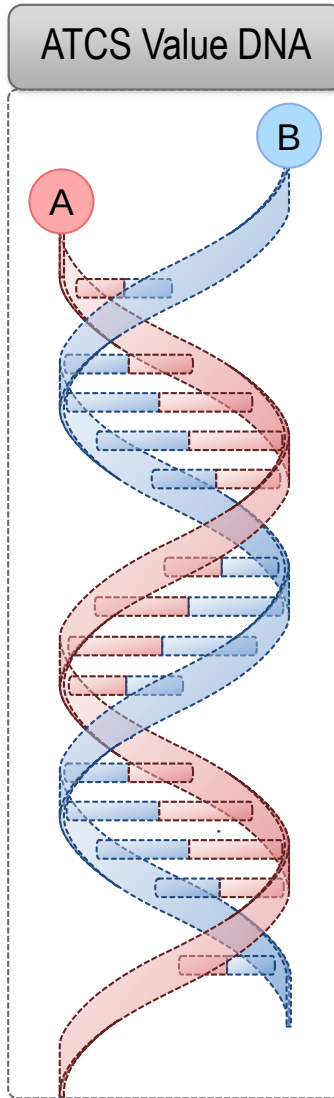
Is NOT

“Best In Class” Efficiency

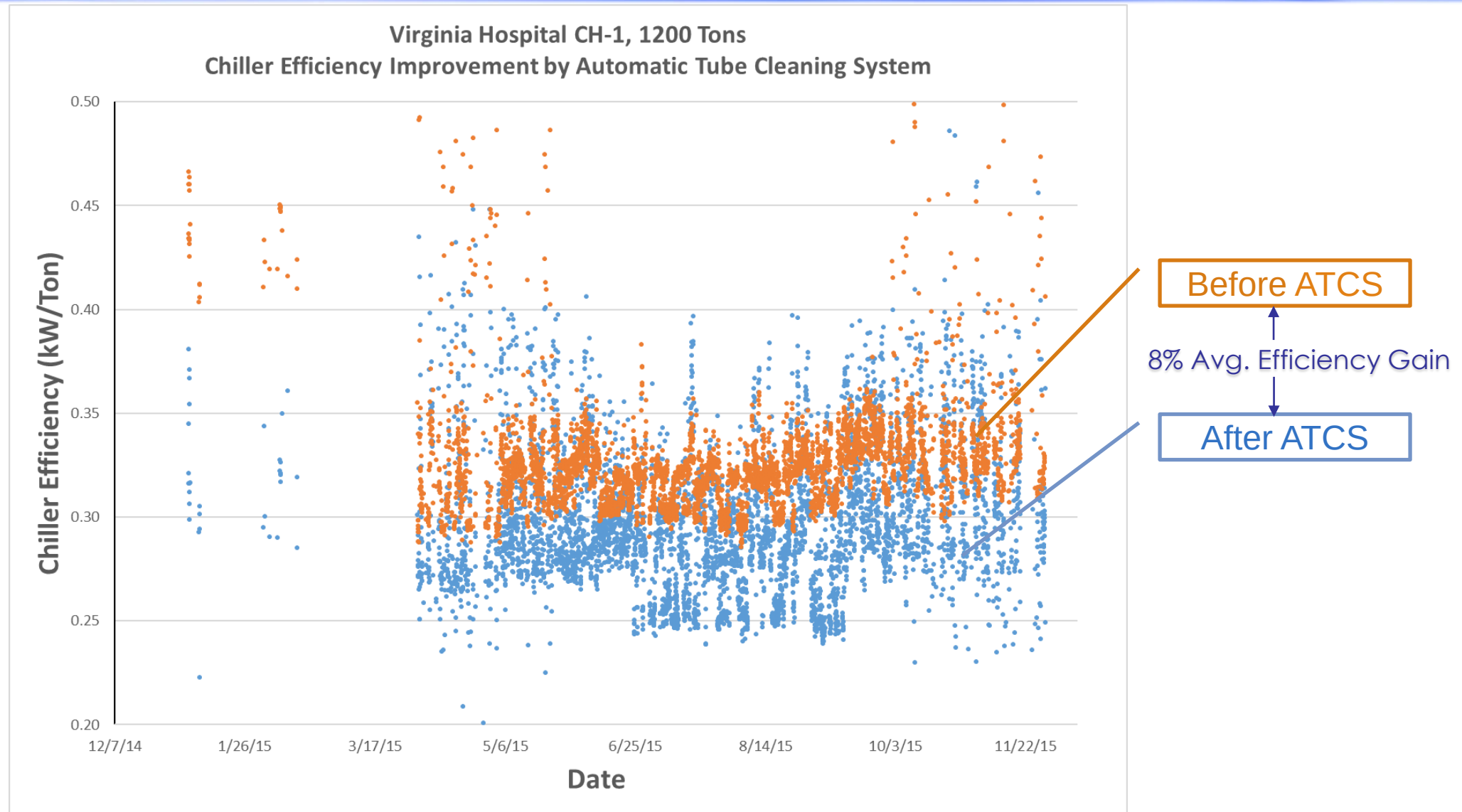


Water Treatment +
Continuous Tube Cleaning
= True Optimized Efficiency

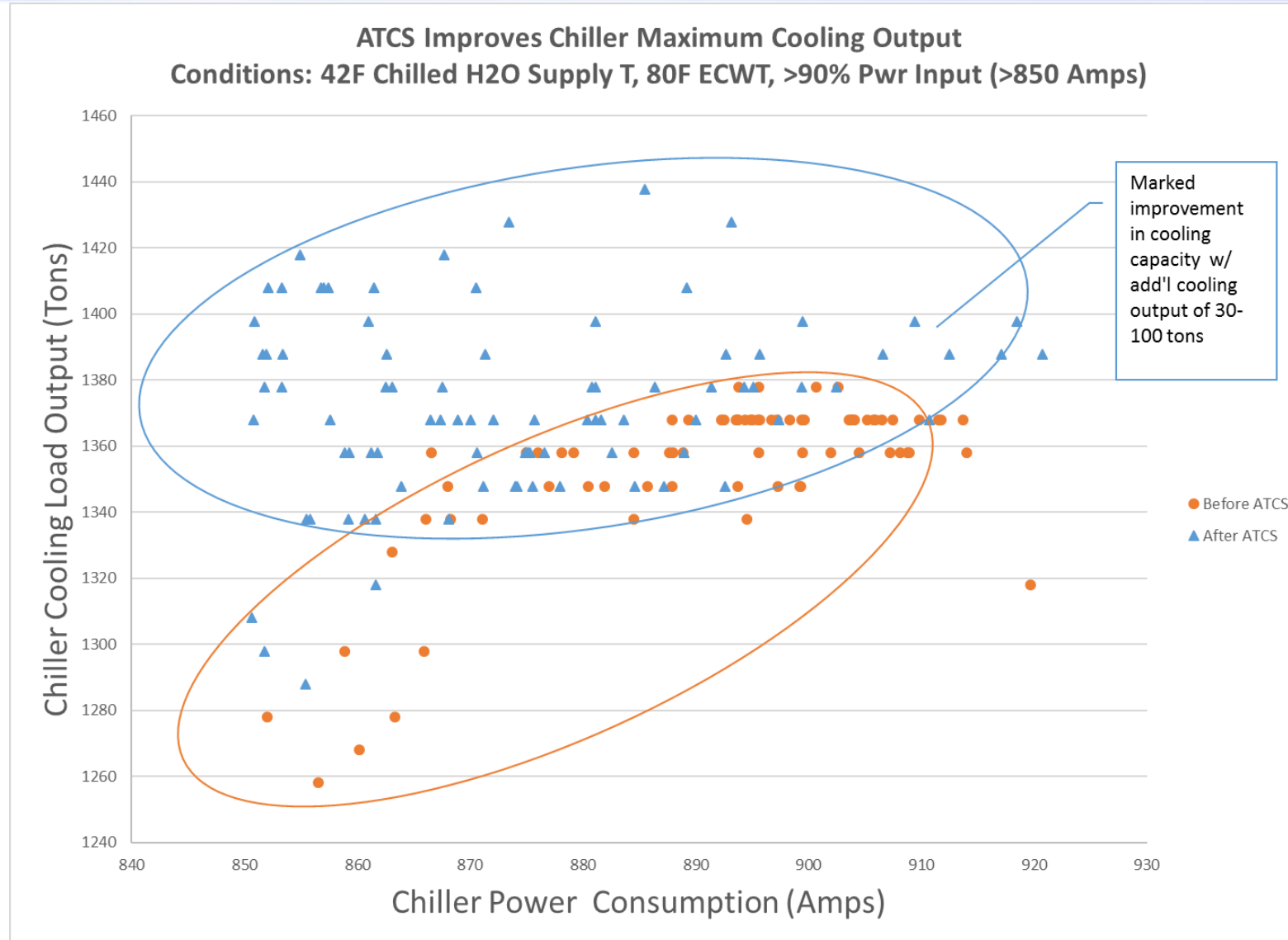
What Does 3% Efficiency Gain On Campus Chillers Mean to a University?



VA Hospital Case Study: Improved Chiller Energy Efficiency by 8%



VA Hospital Case Study: Increased Chiller Capacity by 30-100 Tons



VA Hospital Case Study: Project Savings Results

1200 Ton Centrifugal Chiller

ANNUAL PERFORMANCE RESULTS	Avg. Efficiency (Kw/Ton)	Energy Consumption (kW-hrs)	Energy Costs (\$)
Without Tube Cleaning System	0.33	1,768,300	\$141,465
With Tube Cleaning System	0.30	1,627,000	\$130,160
Annual Savings (% Savings)	0.03 (10%)	141,300 (8%)	\$11,304 (8%)



15-YR PERFORMANCE RESULTS	Energy Consumption (kW-hrs)	GHG Emissions (tons)	Energy Costs (\$)
Without Tube Cleaning System	26,524,500	20,160	\$2,122,000
With Tube Cleaning System	24,405,000	18,550	\$1,952,000
Savings	2,119,500	1,610	\$170,000



Case Study: Oregon Hospital

“...We have not cleaned the chiller tubes in four years since the tube cleaning system was installed. With ATCS approach temps run between .5 and 2 degrees throughout the year...Before ATCS with constant cleaning we had double digit approach temps. Chillers needed several acid cleanings as well as brushed.”

--Pat Lamb, Central Utility Plant Director

Annual Savings		Total Project Savings To Date	
Electricity Cost Savings	\$62,000/yr	Electricity Cost Savings	\$210,000
Energy Conserved	765,000 kW-hrs/yr	Energy Conserved	2.6 Million kW-hrs
GHG Emission Reduction	582 tons/yr	GHG Emission Reduction	2,000 tons
Equivalent Cars Removed	103/yr	Equivalent Cars Removed	350
Equivalent Trees Planted	13,000/yr	Equivalent Trees Planted	46,000

Key ATCS Technology Application Concepts



- Supplements water treatment
- Applies to chiller condenser or evaporator
- Upper temperature limit of 280 F
- Effective coarse straining of inlet cooling water is critical





Questions?

Justin Callihan, UVA
jhc4h@virginia.edu

Michael Crocker, Innovas Technologies
mcrocker@innovastechnologies.com