ELECTROCELL SYSTEMS

Side-Stream Condenser Precipitator
Saves Energy, Water & Equipment

Why Electrocell?

Four patents + 20 years experience reducing total dissolved solids in cooling towers, chillers and boilers saving 12%-15% energy, 20%-30% water and lower HVAC maintenance costs.

Saving millions in energy & water costs at *Sanofi, J&J, Frito-Lay, Mercedes-Benz, Honda, Bristol-Myer Squibb, Lockheed-Martin, Verizon, AT&T*, and 100+ customers.

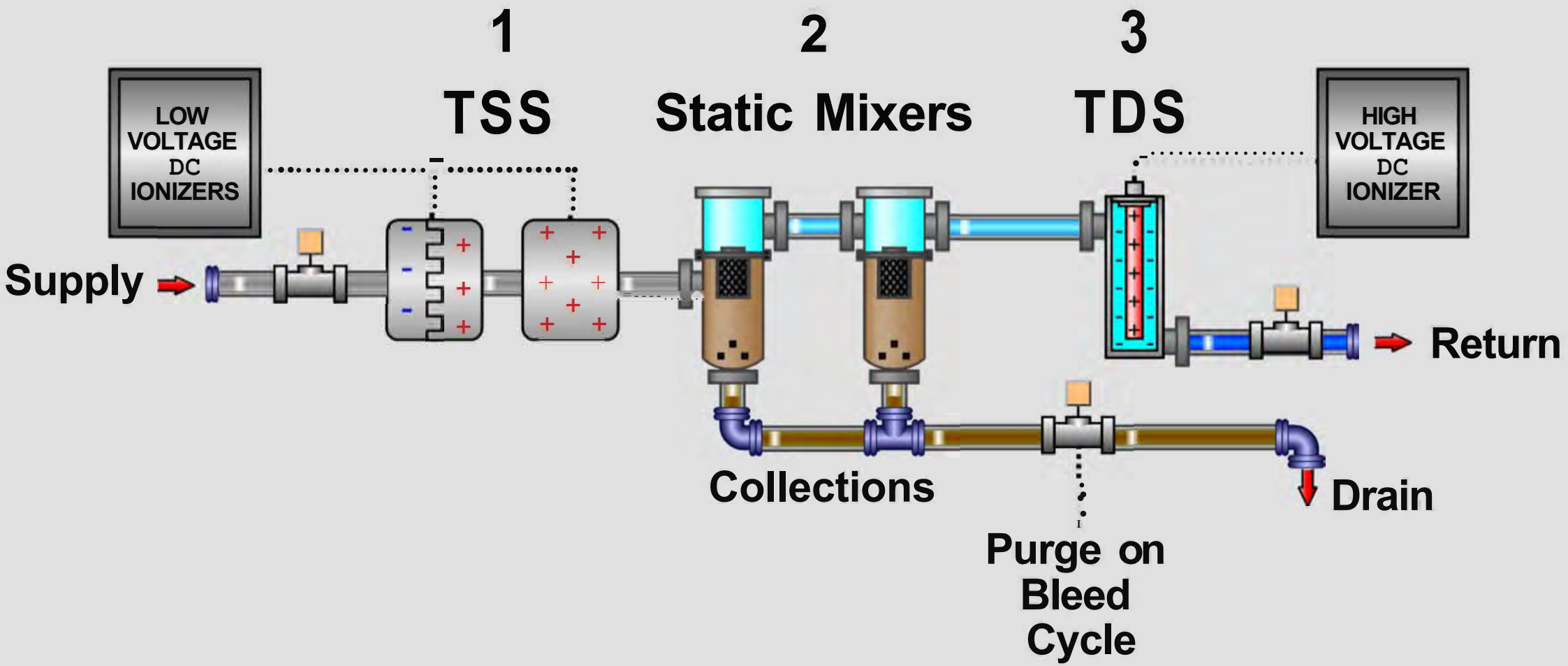
Last year 20% of sales were 2nd generation systems to existing customers satisfied with our exclusive particle precipitator units.

ELECTROCELL SYSTEMS

- **Side-Stream Condenser Precipitator**
  Not a traditional media filter
- **Continuous Micro-Cleansing System Enhances Chemical Water Treatment**
  Does not replace chemical program
- **Removes 98-99% of Suspended Particles Down to One Micron**
  With no media or backwash

OPEN HVAC LOOPS

Patented Technologies Working Together



PATENT US 9850156 B2

BACnet Protocol Integrates With Building Automation Systems

How Electrocell Works

Suspended solids are reduced by two pre-treatment electrodes placing equal amounts of positive-negative charges on particles. This combines particles together adding weight. Steel vessels force water downward at high velocity.

Heavy particles are caught in collection area; lighter ones go through a static mixer fusing tiny particles, that get heavy and drop out. A positive electrode disperses dissolved solids, silicas, minerals, magnesium, calcium, and chemicals. Water surface tension is relaxed, further increasing system efficiency.

To remove collected debris, chemical conductivity meter signals are monitored by the processor. During bleed cycles, that water is used to purge the system, water that is normally discarded.

ELECTROCELL SYSTEMS

PRODUCT DESCRIPTION

XCell SYSTEM	APPLICATION	CHILLER SIZE (TONS)	FOOTPRINT (L x W x H)
200-PP	Open/Closed CHW/HW Loops	< 500	48"x32"x60"
2000	Open Condenser Loop	2000	72"x32"x66"
4000	Open Condenser Loop	4000	96"x32"x66"
6000	Open Condenser Loop	6000	144"x32"x66" *

* (constructed in two 72"x32"x66" sections)

Electrocell Goes Beyond Filters

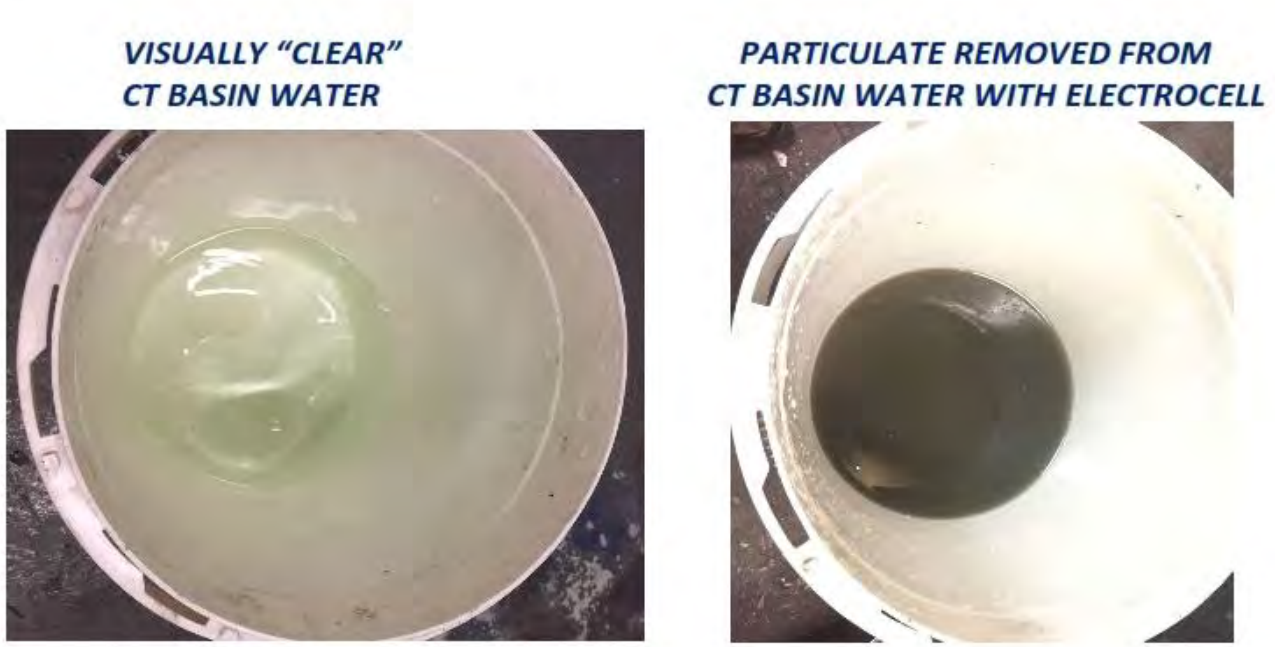
Our exclusive side-stream precipitator operates 24/7 removing suspended particles without the media, backwash water use and maintenance required in traditional systems.

EC units process 1-2% of the flow at a time and within a few days clean all the water. The patented system has been proven to clean closed chilled water loops, boiler/steam loops, and boiler hot water loops.

Yes, it will replace media filters.

TSS: Total Suspended Solids

- Cooling towers collect dirt, dust, silt, sand, pollen, bio-film, bugs, bacteria, other solids & particles.
- Typical 1,000-ton towers collect some 3,000+ lbs. of solids annually.
- Reduce suspended & dissolved solids to increase efficiency saving electricity, makeup water, and lowering maintenance costs.



Particulate removed within 24 hours

We do not replace chemicals.

Electrocell For Cleaner, Healthier HVAC Systems

- **Payback average 2-3 years or less**
- **Increase life cycles on equipment**
- **Reduce maintenance, repair & service**
- **Enhances chemical programs**
- **24/7 continuous operation**

- **System Performance Indicators (before & after)**
  - ❖ Particle measurement testing by 3rd party lab
  - ❖ Kw per ton
  - ❖ Make-up water use
- **Reduce energy cost 12%15%**
-
- **Reduce condenser make-up water 15%-20%**
- **Increased equipment life cycle, less maintenance costs**
- **Enhance chemical program & lower carbon footprint**

Model Shown

ElectroCell XCell-4000 Stainless Steel Particle Precipitator Skid

ELECTROCELL SYSTEMS

PARTICLE ANALYSIS REPORT

PSU Hershey Medical Center
WEST TOWER

Sampling Source: Cooling Tower Basin Water

Electro Cell System: ***XCell-6000 Particle Precipitator***

99.4% particle reduction in 3 weeks

TEST METHOD:	All tests completed by independent third-party laboratory. Samples analyzed by electro-optical particle analyzer employing the light scattering principle of operation with filtered water and particle data corrected Stirring was continuous.

BASELINE SAMPLE - Prior to ElectroCell Start-up - 2-July-2019			**AFTER 3 WEEKS with ElectroCell System - 23-July-2019**		
PARTICLE COUNTS PER 100mL TEST PORTION			**PARTICLE COUNTS PER 100mL TEST PORTION**		
1 - 3 micron:	1,227,320		1 - 3 micron:	42,039	
3 - 5 micron:	553,720		3 - 5 micron:	5,480	
5 - 10 micron:	138,100		5 - 10 micron:	4,864	
10 - 15 micron:	57,920		10 - 15 micron:	1,273	
15 - 25 micron:	102,240		15 - 25 micron:	1,258	
Over 25 micron:	241,700		Over 25 micron:	1,529	
TOTAL / 100mL:	**2,321,000**		**TOTAL / 100mL:**	**56,443**	
SOLIDS PER 100 LITERS OF SYSTEM VOLUME (mm^3)			**SOLIDS PER 100 LITERS OF SYSTEM VOLUME (mm^3)**		
1 - 5 micron:	45.26		1 - 5 micron:	0.69	
5 - 10 micron:	58.28		5 - 10 micron:	2.05	
Over 10 micron:	162,749.38		Over 10 micron:	1,034.62	
TOTAL / 100 Liters:	**162,852.92**	1629 ppm	**TOTAL / 100 Liters:**	**1,037.36**	10 ppm

ELECTROCELL SYSTEMS

PARTICLE ANALYSIS REPORT

PSU Hershey Medical Center CLOSED LOOP

Electro Cell System: ***XCell-6000 Particle Precipitator (Insulated)***

98% particle reduction in 8 weeks

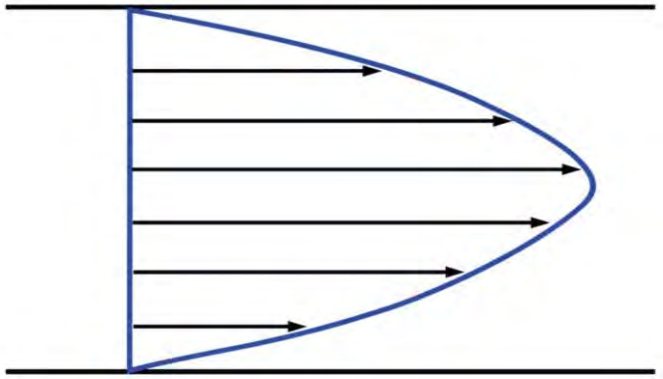
Baseline Sample

TEST METHOD:	All tests completed by independent third-party laboratory. Samples analyzed by electro-optical particle analyzer employing the light scattering principle of operation with filtered water and particle data corrected Stirring was continuous.

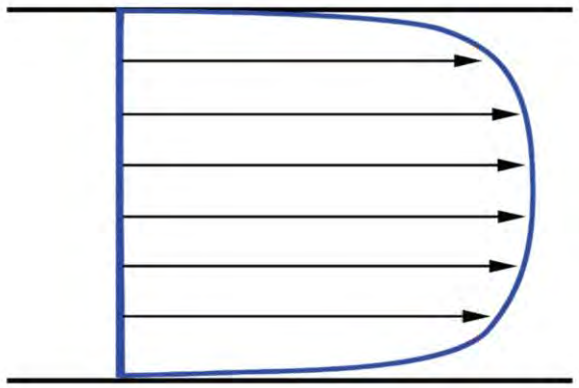
BASELINE SAMPLE - Prior to ElectroCell Start-up - 2-July-2019			**AFTER 8 WEEKS with ElectroCell System - 28-Aug-2019**		
PARTICLE COUNTS PER 100mL TEST PORTION			**PARTICLE COUNTS PER 100mL TEST PORTION**		
1 - 3 micron:	81,323,200		1 - 3 micron:	2,935,808	
3 - 5 micron:	11,877,600		3 - 5 micron:	379,968	
5 - 10 micron:	7,653,600		5 - 10 micron:	158,496	
10 - 15 micron:	2,180,800		10 - 15 micron:	40,112	
15 - 25 micron:	1,948,000		15 - 25 micron:	31,200	
Over 25 micron:	599,200		Over 25 micron:	11,904	
TOTAL / 100mL:	**105,582,400**		**TOTAL / 100mL:**	**3,557,488**	
SOLIDS PER 100 LITERS OF SYSTEM VOLUME (mm^3)			**SOLIDS PER 100 LITERS OF SYSTEM VOLUME (mm^3)**		
1 - 5 micron:	1,410.75		1 - 5 micron:	47.80	
5 - 10 micron:	3,229.82		5 - 10 micron:	66.89	
Over 10 micron:	417,427.17		Over 10 micron:	8,232.19	
TOTAL / 100 Liters:	**422,067.74**	**4221 ppm**	**TOTAL / 100 Liters:**	**8,346.88**	**83 ppm**

Reduced Corrosion By Improved Thermo Transfer

Most condensers exchange heat with shell refrigerant and condenser water flowing through tubes. Water at rest and in motion has surface tension due to existing weak static charges causing attraction, dispersion resistance, and water in pipes to develop laminar flow. By dissipating dissolved solids, relaxing water and placing cleanest possible water against cleanest possible surfaces, Electrocell removes more heat than before. The fitting on the right shows the other benefit. The sheer force of water over 60 to 90 days, removes any existing buildup or scale pipe walls throughout the entire system.



Laminar Flow



Electrocell Improves Thermo Transfer

Contaminants build up when laminar boundary is intact but when collapsed, they're removed by sheer force of the water.

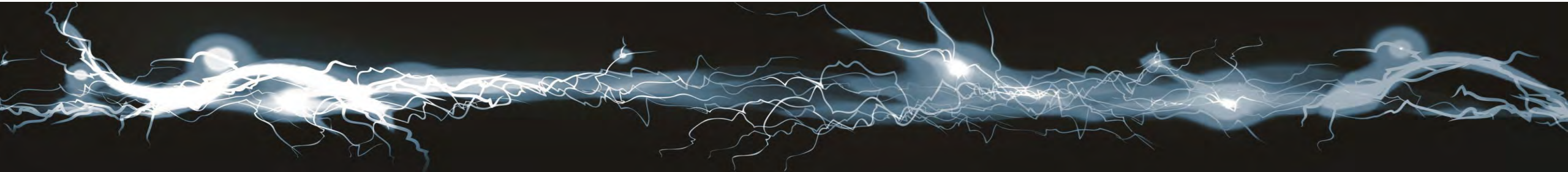
ASHRAE FOULING FACTORS

Electrocell advantages include micro-cleaning Total Suspended Solids & reducing laminar boundaries

Fouling Factors

- **Total suspended solids**
- **Total dissolved solids**
- **Bio-film, other materials**

Condenser Fouling Factor	Thickness (Inches)	Additional Power Required
0.00000	0.000	0.0%
0.00010	0.001	1.1%
0.00025	0.003	2.8%
0.00050	0.006	5.5%
0.00075	0.009	8.3%
0.00100	0.012	11.0%
0.00125	0.015	13.8%
0.00150	0.018	16.5%
0.00175	0.021	19.3%



Electrocell Customers

ASCENSION HEALTH CARE – 9 Locations

OFFICE OF THE CHIEF MEDICAL EXAMINER – New York City

PENN STATE HERSHEY MEDICAL CENTER – Hershey, PA

TRUMAN MEDICAL CENTERS (2 Locations) – Kansas City, MO

SOUTHERN NEW HAMPSHIRE HEALTH – Nashua, NH

MT. SINAI EYE & EAR – New York City

BRISTOL-MYERS SQUIBB – New Brunswick, NJ

CBRE – JANSSEN PHARMA – Raritan, NJ

ROBERT WOOD JOHNSON FOUNDATION – Princeton, NJ

SANOFI (2 Locations) – Framingham, MA

J&J CORPORATE HQ – New Brunswick, NJ

JOHNSON & JOHNNSON – New Brunswick, NJ

LOCKHEED MARTIN AEROSPACE – Troy, AL

MORGAN STANLEY – Purchase, NY

METROPOLITAN MUSEUM OF ART – New York City

UNIVERSITY OF NORTH CAROLINA – Chapel Hill, NC

AT&T CITY CENTER – Birmingham, AL

NAVY FEDERAL CREDIT UNION – Pensacola, FL

MSNBC – Englewood Cliffs, NJ

FRITO LAY – National Account

PPL (PA Power & Light) – Allentown, PA

SOUTHERN COMPANY – Birmingham, AL

THE NEW YORK BOTANICAL GARDEN – Bronx, NY

HONDA MANUFACTURING – Lincoln, AL

MERCEDES-BENZ – Vance, AL

NISSAN NORTH AMERICA – Canton, MS

TOYOTA MOTORS MANUFACTURING – Tupelo, MS

UNIVERSITY OF MISSOURI KANSAS CITY – Kansas City, MO

PENN STATE UNIVERSITY – Harrisburg, PA

WIND CREEK HOTEL-CASINO – Atmore, AL

WIND CREEK HOTEL-CASINO – Wetumpka, AL

FEDERAL RESERVE BANK – Kansas City, MO

Navy Federal Credit Union Pensacola, FL

Total Cooling: 6,000-tons

XCell-6000 Precipitator (Open Loop)

Seton Medical Center

Austin, Tx

Total Cooling Tonnage: 3,600-tons

XCell-6000 Precipitator (on Open Loop) paired with the XCell-200-PP (on Closed Loop)

Hershey Medical Center

Hershey, PA

Total Cooling Tonnage: 13,300-tons

XCell-6000 Precipitators

(front & back)

(2 of a 5 systems installed)

XCell-4000 Precipitator
serving three 800-ton chillers

Hirsch Center

Office of the Chief Medical Examiner

New York City

(2,400 total tons)

Merck & Co 5-years using Electrocell, shown from top exit tube of condenser the tubes have never been punched.

GBE Asset Management – Energy Efficiency & Sustainability
Validated Results of Installed Electrocell Units in Framingham (55 & 70 NYA)

Summary of Savings

Chiller Plant	Compressor Demand Reduction (kW/ton)	Compressor Demand Reduction (percent)	Avg Monthly Reduction (kW)	Annual Electric Savings (MWh)	Annual Energy Savings (USD)	Water savings (kGal)	Annual Water Savings (USD)	Total Savings
55 NYA	0.08[a]	**13.9%**	65	569	$76k	1275	$21k	$97k
70 NYA	0.12[b]	**14.6%**	126	1100	$148k	2061	$34k	$181k
		Total	**191**	**1673**	**$224k**	**3336**	**$55k**	**$279k**

Not included are chemical water treatment and reduced maintenance savings.

Utility Rates

	Water	Energy	Demand
Oct -May	$16.38/kGal	$0.086/kWh	$29/kW
June-Sept	$16.38/kGal	$0.086/kWh	$39/kW

a – compressor demand reduction analysis completed by Cimetrics, kWh and water savings by EMA.
b – compressor demand reduction, kWh, and water savings completed by EMA.

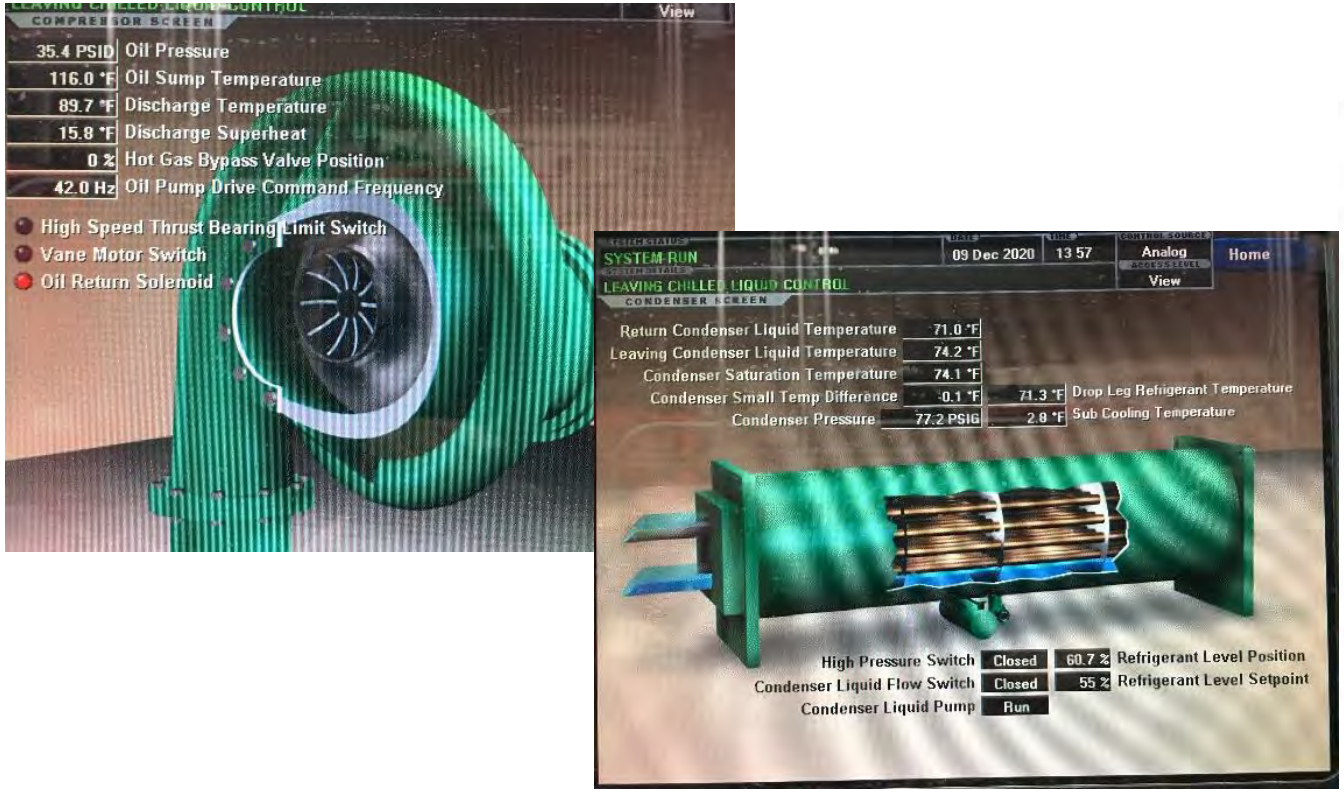
Local utility incentive potential up to 50% of the project cost
Annual savings of $279k includes 1,673 MwH electric reduction,
3,336 k-gallons water, and 375 MTCO$_2$ carbon

GBE Asset Management – Energy Efficiency & Sustainability
Third-Party Energy Savings Measurement & Validation for Utility (55 & 70 NYA)

General M&V Methodology

Tonnage across chiller evaporator, concurrent kW of compressor, and concurrent condenser water temperature entering condenser bundle was evaluated before and after installation of Electrocell. Before and after kW/ton values for similar tons and condenser water temperatures were used to determined overall kW/ton reduction for each plant. kW/ton reduction was applied to chilled water load profiles (average ton versus month) to determine monthly kW reduction and kWh savings (see below for details). Final electric demand reductions and energy savings includes turning off sand pumps and netted against Electrocell electric load. Water savings was calculated based on a 3 gpm/ton, 1% evaporation rate, applying kW/ton demand reduction percentage that was determined for each plant.

Weekly reading of chiller performance and chilled water and condenser pumps through all seasons



M&V Details - 70 NYA

This variable primary chilled water plant is not connected to Cimetrics, pre and post retrofit data was collected manually. Compressor kW was calculated from recorded amps, recorded voltage, and an assumed (constant) PF. *Pre-retrofit* tonnage was determined by measuring delta T across the evaporator and apply it to an assumed pump-speed of 48 Hz (based on observations and discussions with plant supervisor) using the chiller-specific table (below) to determine flow (gpm). *Post-retrofit* tonnage was determined by dT and measured and recorded Pump Hz using the below table. 70 NYA Chiller compressor monthly kW reductions and kWh savings were determined using a 70 NYA chilled water Tonnage versus real-time load profile curve developed by Kevin Gregory PE in 2012.

Cox TAB Report

70 NYA Chiller	40 Hz (TAB)	GPM/Hz
90101	1864	46.60
90102	1820	45.50
90103	1840	46.00
90104	1619	40.48
90105	1849	46.23

M&V Details - 55 NYA

This chilled water plant had data pulled from Cimetrics which provided significant amounts of pre and post retrofit data. Compressor kW was calculated from recorded amps, assumed 460 volts, and an assumed PF vs. load curve used to convert calculated KVA to kW at all loads. Tonnage was determined by measuring delta T across the evaporator at an assumed flow of 1900 gpm. 55 NYA kW reductions and kWh savings were determined using the same load profile curve, applying a 65% multiplier to account for reduced plant size.

Next steps

(i) Since induction motor PF (power factor) is much lower at low loads, we should obtain motor curve or table of motor amp, KW, PF in order to more accurately estimated PF at low loads.

(ii) EMA to prepare Mass Save application, share data with Eversource for analysis and rebate incentive remittance determination

Energy Management Associates, Inc.

Sanofi Pharma Electrocell Validated Savings

	(5) 1000 Ton York Centrifugal Chillers	(4) 750 Ton York Centrifugal Chillers	Total
Financial Impact			
Annual Energy savings	$148K	$76K	$224K
Annual Water savings	*ll4.lS*	*li11S*	i§§.JS
Total Savings First Year	$182 K	$97K	$279K
Simple Payback Period	Installed Cost $463 K; resulting SPP of <1.7 years.		

Oct-May	16.38kGal	$.086/kWH	$29kW
Jun- Sept	16.38kGal	$.086/kWH	$39kW

Electrocell is saving Sanofi Pharma $279,000 in energy and water costs per year. An independent engineering firm conducted a peer review of the company's study and found more savings than those shown here. A copy of the study is available.

Let us calculate your monthly savings on energy, water costs, chemicals and maintenance.

Authorized Sales Agents

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