



## Active Performance Management

Basanth Kumar – Sales Director, India and South Asia





## What makes us qualified? Armstrong's legacy of innovation



MAKING  
ENERGY  
MAKE  
SENSE

3

## Innovation



1971

Introduces the world's first Vertical In-Line pumps

1994

Introduces the first integrated parallel multi-head pump, the dualArm

2005

Introduces the first ever Intelligent Variable Speed (ivs) Pump with flow detection

2005

First pump company to introduce integrated central plant control

2013

First in the HVAC industry, Armstrong introduces Parallel Sensorless pump control

2016

First in the HVAC industry, Armstrong introduces a pump with built in wireless connectivity, vibration detection and integrated touchscreen

## Awards

2014

Armstrong wins Frost & Sullivan's award for Customer Value Leadership (won again in 2016)

CIPHEX West: New product award

2015

The Armstrong Parallel Sensorless Pump Controller (PSPC) was voted the Gold Level Product of the Year for 2015!!

2016

Frost and Sullivan Global Intelligent Fluid - Flow equipment product line strategy leadership award

2017

The Armstrong Design Envelope Vertical In-Line Retrofit pump wins CSE's Gold Level Product of the Year for 2017

2018

The Armstrong Design Envelope Tango pump wins CSE's coveted 2018 Product of the Year Award in the BAS, Controls, Energy Management category

Canada's  
Best Managed  
Companies

2002-2005 &  
2007-2018



## The Armstrong commitment

Reduce annual global GHG emissions by 2 million metric tons of CO<sub>2</sub> by 2022 through Energy Upgrades of existing equipment

Equivalent of taking 600,000 cars off the road or offsetting the average annual CO<sub>2</sub> emissions generated by 100,000 people

Make HVAC Energy Upgrades **cash flow positive** for building owners from the very beginning

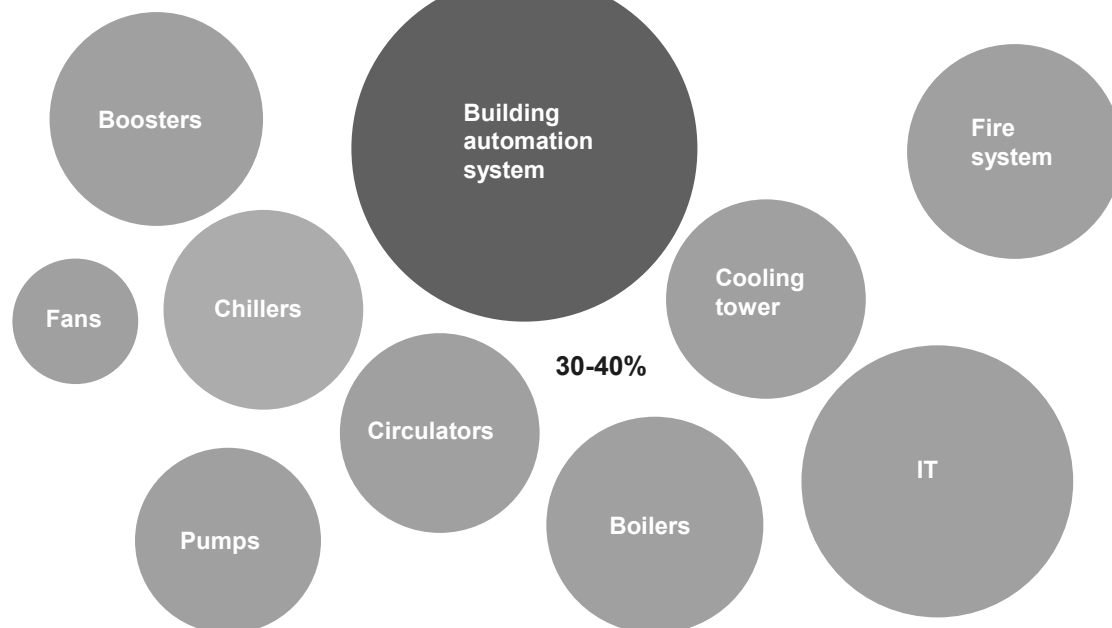
ADVANCING NET  
**ZERO**

 **SUSTAINABLE DEVELOPMENT GOALS**



Source (WP-NFCC#4)

MAKING  
ENERGY  
MAKE  
SENSE



MAKING  
ENERGY  
MAKE  
SENSE



# LET'S START BY UNDERSTANDING FLOW

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## Opportunities in Fluid Flow – 6 key innovations by Armstrong

Integration of Components –  
Not Variable Speed Drives on Wall

Parallel Sensorless Pumping

Redundancy – Not Duty Standby

Feed Forward

Automation & Optimization

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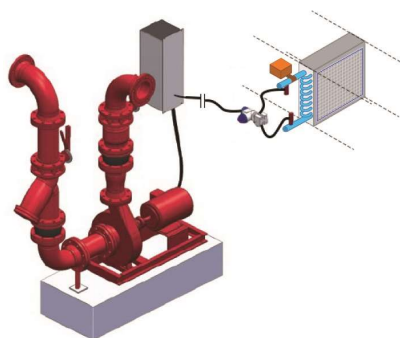
**Automation & Optimization**

**Active Performance Management**

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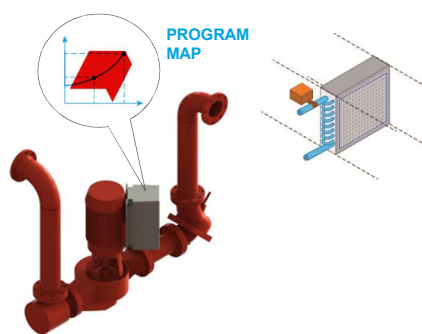


## Control with sensor vs sensorless control



### Control with Sensor

- Changes in system read by DP sensor
- Sensor converts to signal (4-20mA)
- VFD reads signal and modulates speed



### Sensorless control

- Changes in system = motor amp draw change
- DE pump compares amp draw to its Sensorless program map
- DE pump slows down or speeds up based on program map

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## Wall-mounted drives



increased costs  
decrease energy savings  
leaves up to 65% savings  
hidden "behind the wall"  
 Flow-derived insights also  
 "behind the wall"

60% of the ideal energy savings is frequently missed  
 - 2015 study by ACEEE.org concluded

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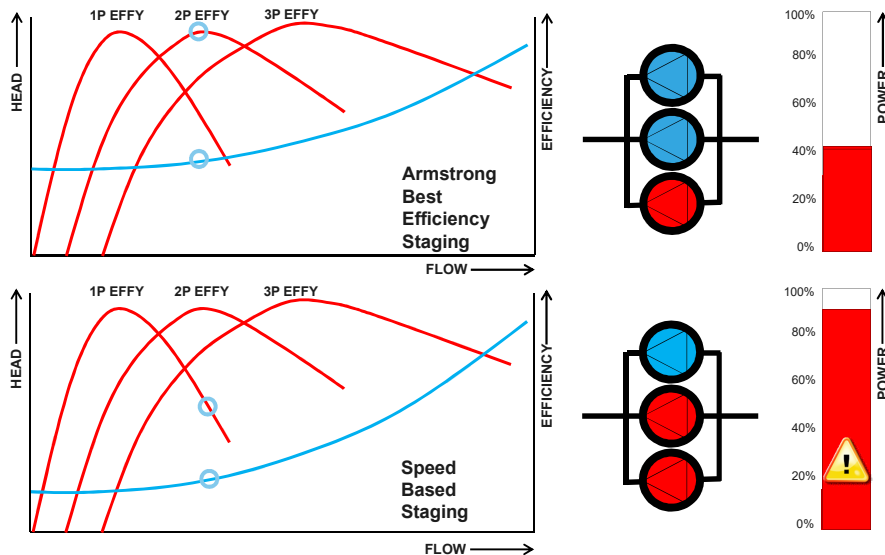
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## An integrated approach to reducing system cost

### Parallel Sensorless Pump Control – staging methodology



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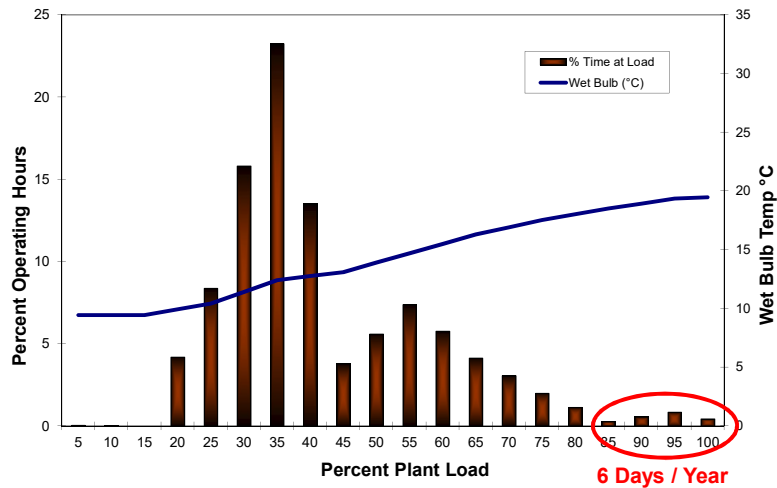
Feed Forward

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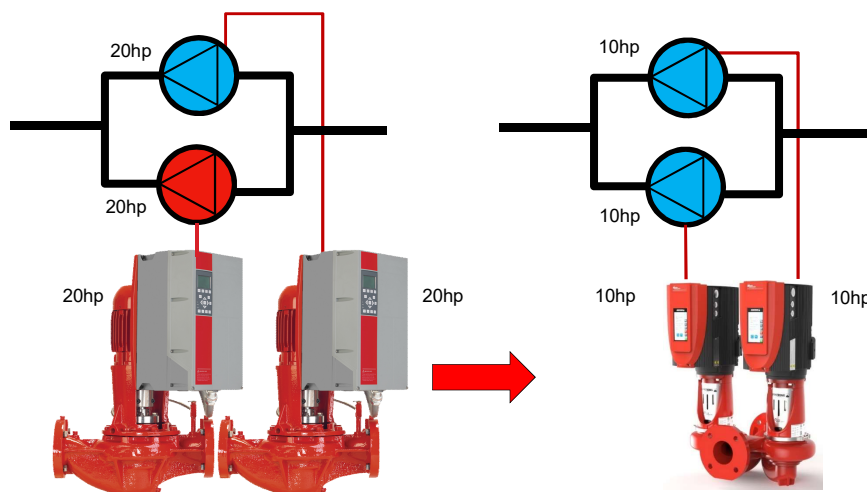
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## Example commercial building profile



## Cost / Carbon footprint – sizing for 100% duty/standby vs 2 x 50% in parallel



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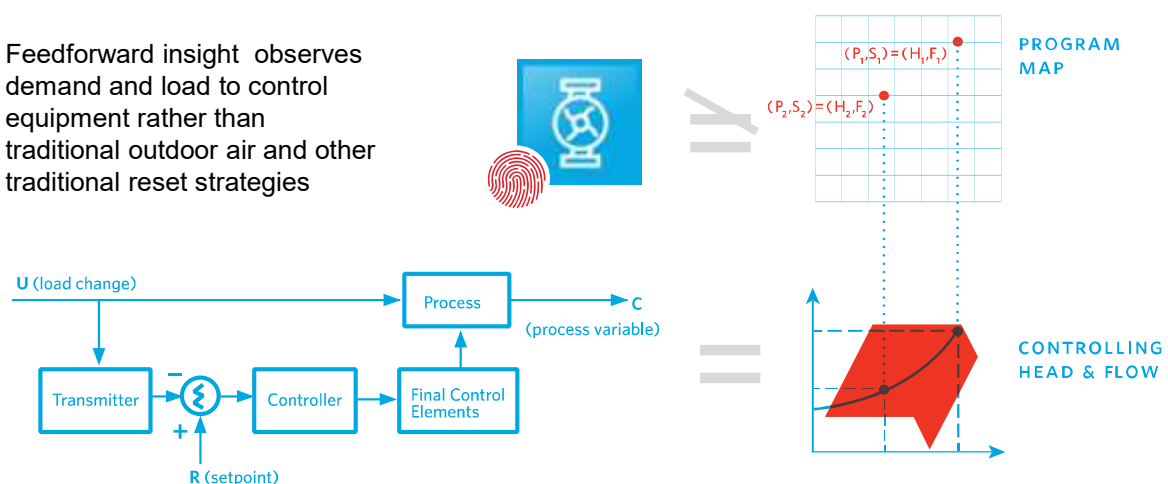
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## Demand-based flow control

Feedforward insight observes demand and load to control equipment rather than traditional outdoor air and other traditional reset strategies



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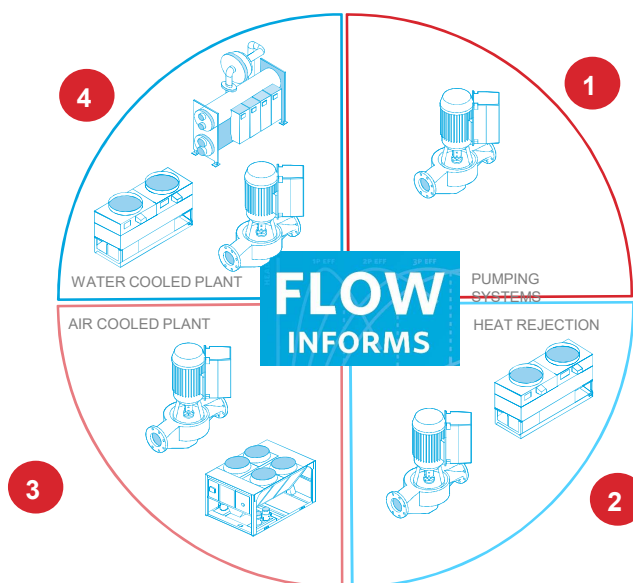
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## Built on Design Envelope technology

**DESIGN  
ENVELOPE**

Control strategies that can  
stand alone or layered on  
and work with existing  
BAS



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# DESIGN ENVELOPE



**HIGHEST**  
ENERGY  
EFFICIENCY



**LOWEST**  
INSTALLED  
COST



**LOWEST**  
OPERATING  
COST




**LOWEST**  
CARBON  
FOOTPRINT



**LOWEST**  
PROJECT &  
OPERATING  
RISK

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## Opportunities in Fluid Flow – 6 key innovations by Armstrong

- Integration of Components –  
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- Parallel Sensorless Pumping
- Redundancy – Not Duty Standby
- Feed Forward
- Automation & Optimization
- Active Performance Management**

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## Active Performance Management

### DESIGN ENVELOPE



Offerings provide  
the platform and  
embedded software



Enable the Connectivity  
and Diagnostic Analytics

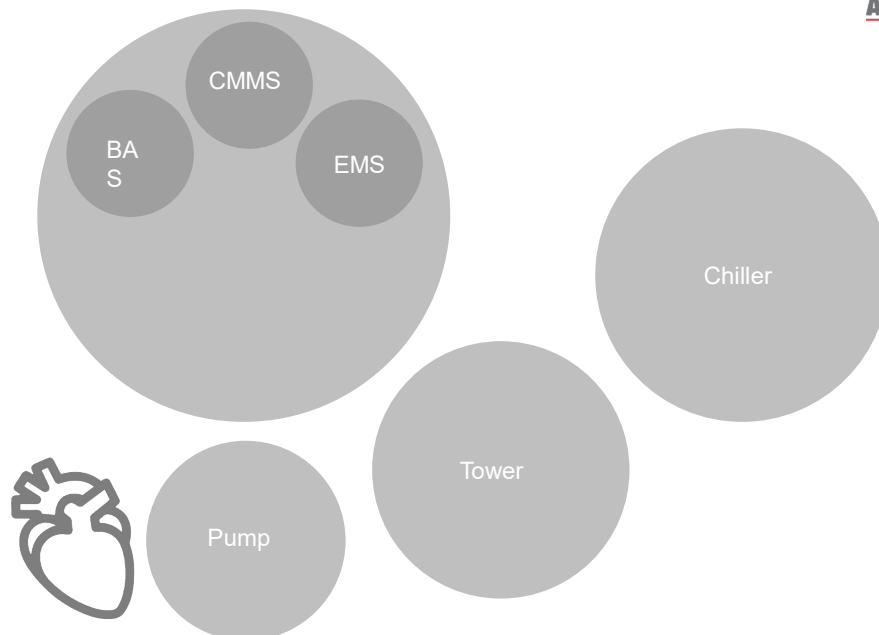
TOGETHER  
ACTIVATE



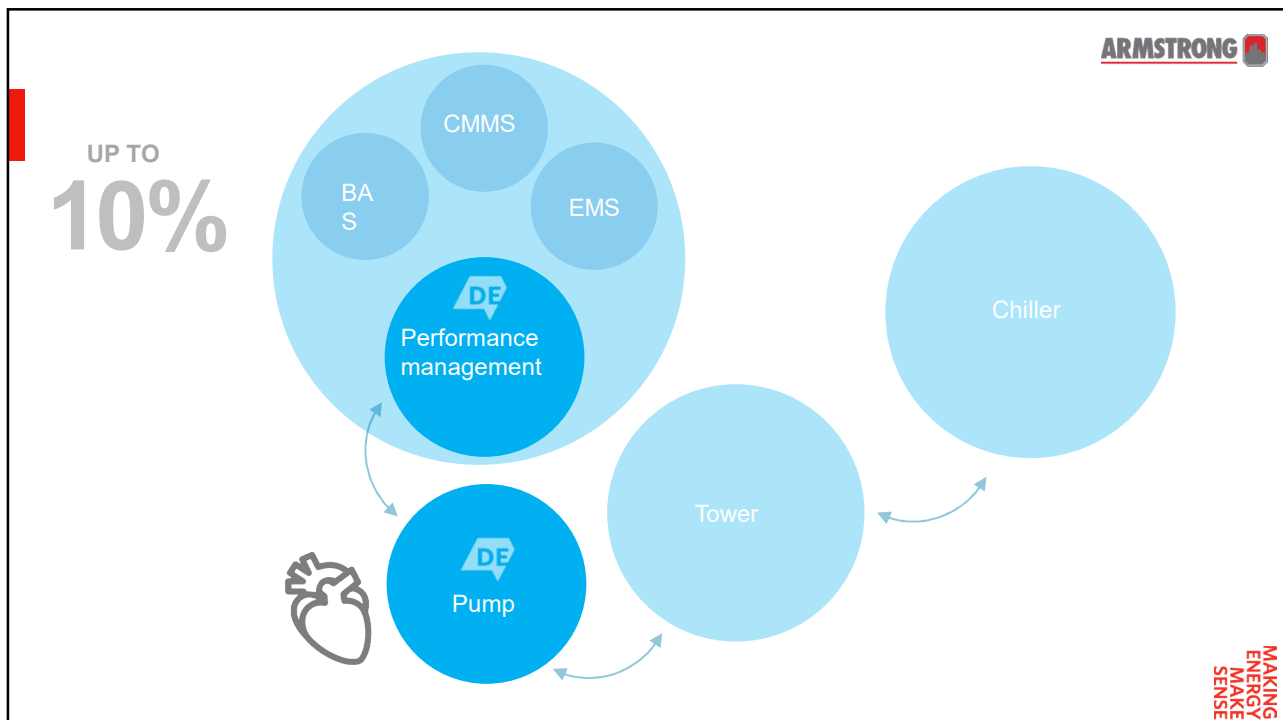
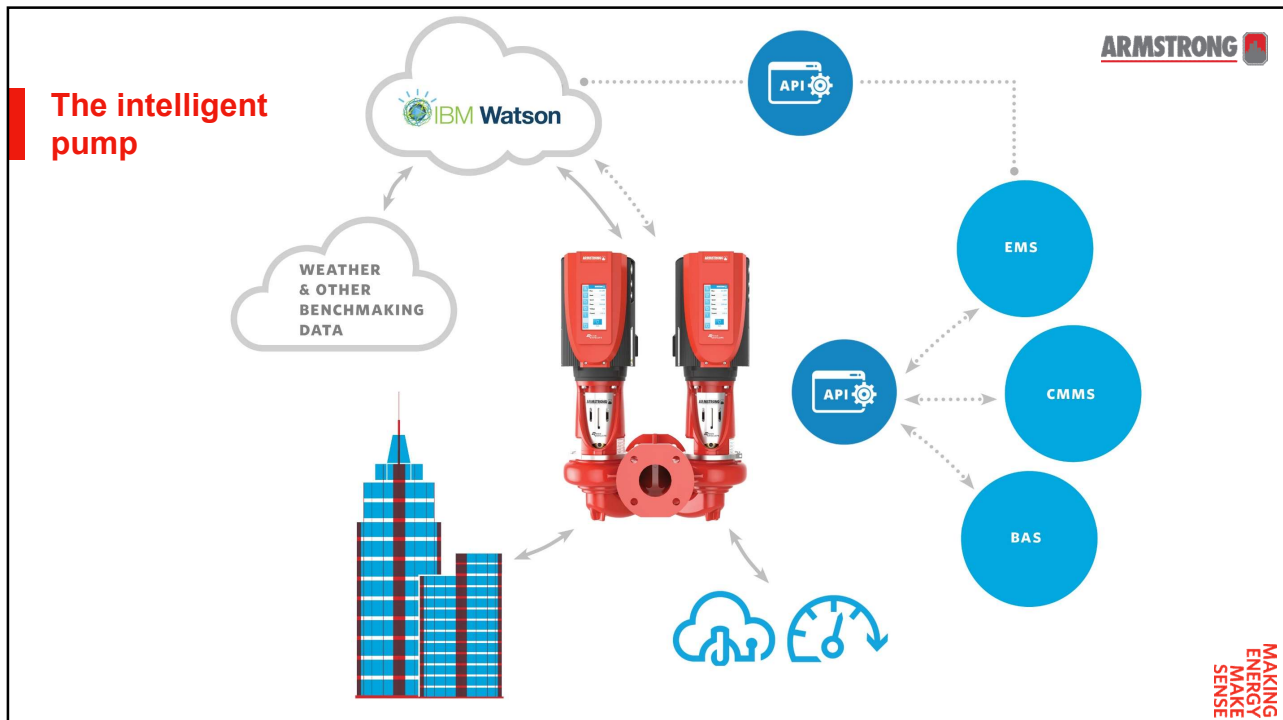
ACTIVE  
PERFORMANCE  
MANAGEMENT

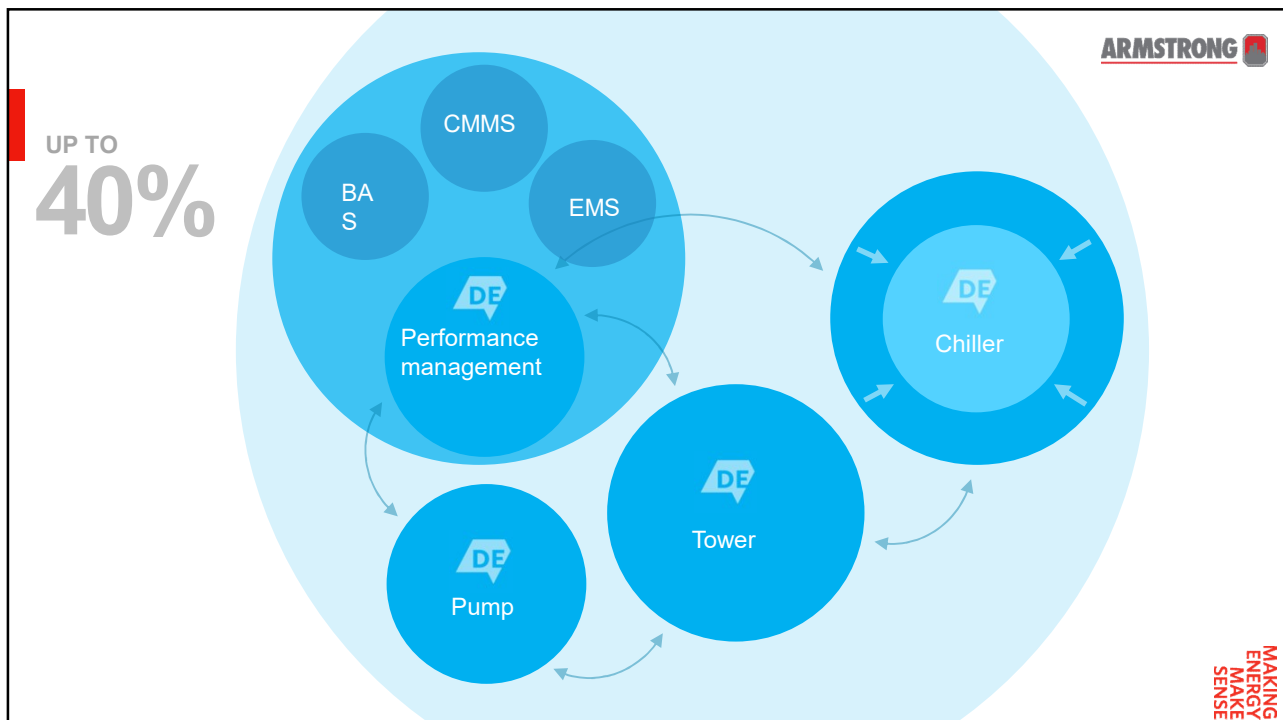
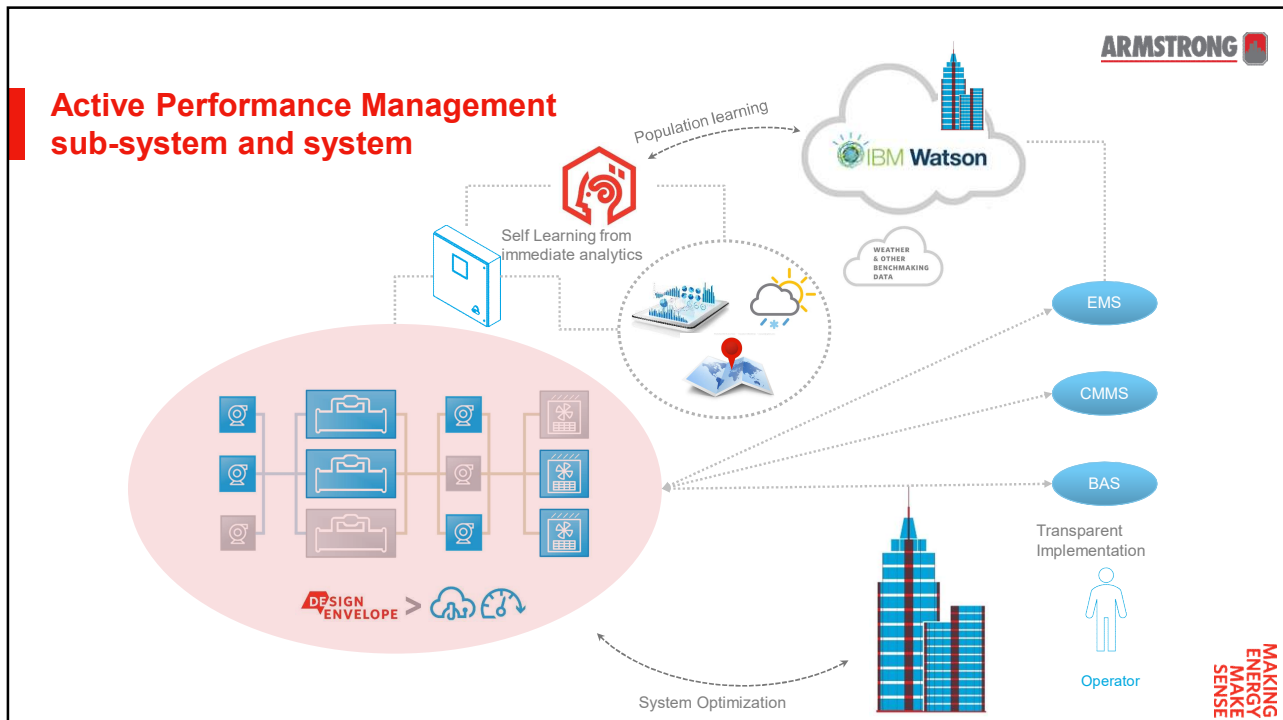
LEARNS.  
PREDICTS.  
OPTIMIZES

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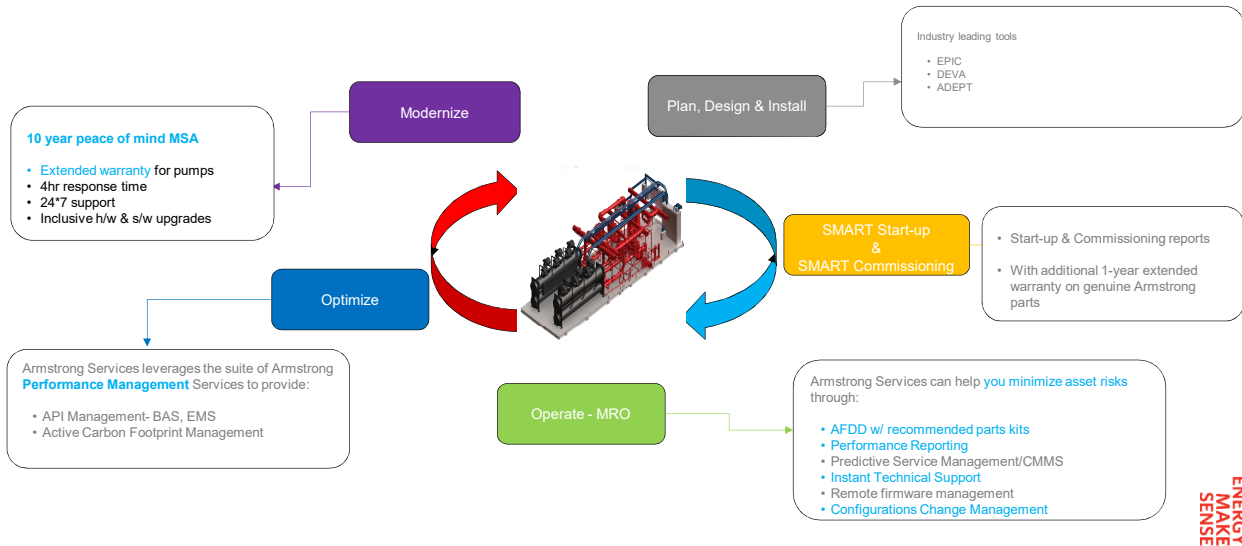




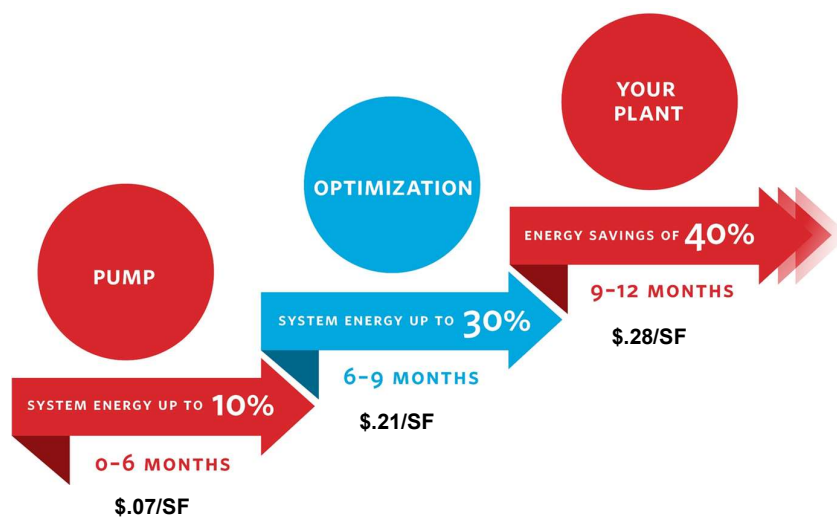
## Performance Management Services



Integrated services for a complete lifecycle management of the equipment.

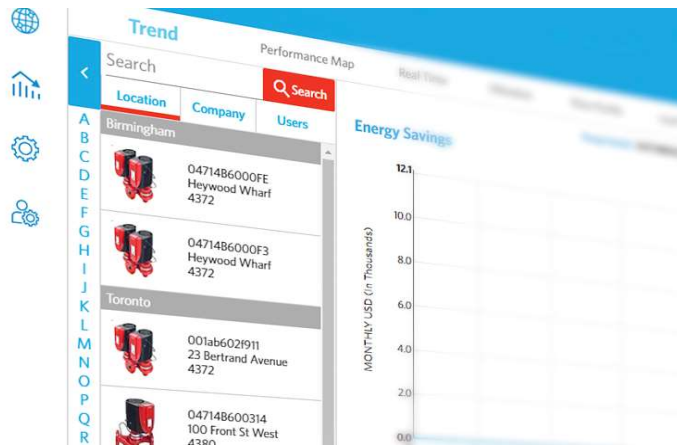


## Upgrade Roadmap Summary





## Pump Manager Demo



\*\*\*Click for Demonstration\*\*\*

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## Success Stories

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## Massive Energy Savings – Retail

Four storey consumer mall

Located in Ghaziabad, India

Design Envelope pumps and control modifications produced:

**41% energy savings**

**603,284 kgCO<sub>2</sub>/annual CO<sub>2</sub> Emissions Reduction**



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## 700,000 sq/ft Commercial Building – 10/20 Carlson Court

360 Heat pumps serviced via two central loops

- Heat pumps reject heat to and take heat from central loops

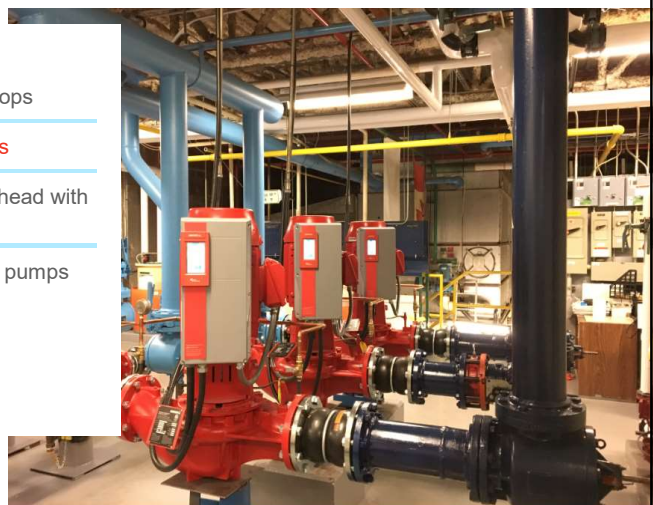
Water circulated in each central loop with **3 x 30 / 40hp pumps**

Loops operating about twice the required flow AND twice the head with constant speed pumps

**3 x 20/30 hp** (same performance capability) Design Envelope pumps and control modifications produced

- 84% energy savings** in one pump bank and **93% energy savings** in the other
- Equating to **812,330 kwhr** annually @ \$.13 / kwhr = **\$115,603 per year.**

**Payback < 1 year**



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## Massive Energy Savings – University

University/Administration Building

Located in Zhengzhou, China

Design Envelope 4300 pumps and control modifications produced

**78% energy savings**

**43,303 kgCO<sub>2</sub> /annual CO<sub>2</sub> Emissions Reduction**



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## Pump and Optimization: Methodist Dallas Hospital

High Level Asset Profile	Prominent Texas Hospital
Equipment Included	3 x 250HP CHWP 5 x 100HP CWP IPC – Plant Optimization
Capital requirement	\$450,000
Focus of opportunity	Save energy in conjunction with capital upgrade
Savings over 5 year period	<b>\$1.6 Million</b>

Year 1



Savings over  
**\$300,000**

Year 2



Savings over  
**\$330,000**

Year 3





Savings over  
**\$330,000**

**Cost recovered within 1.5 years**



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Questions?

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Thank you!

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