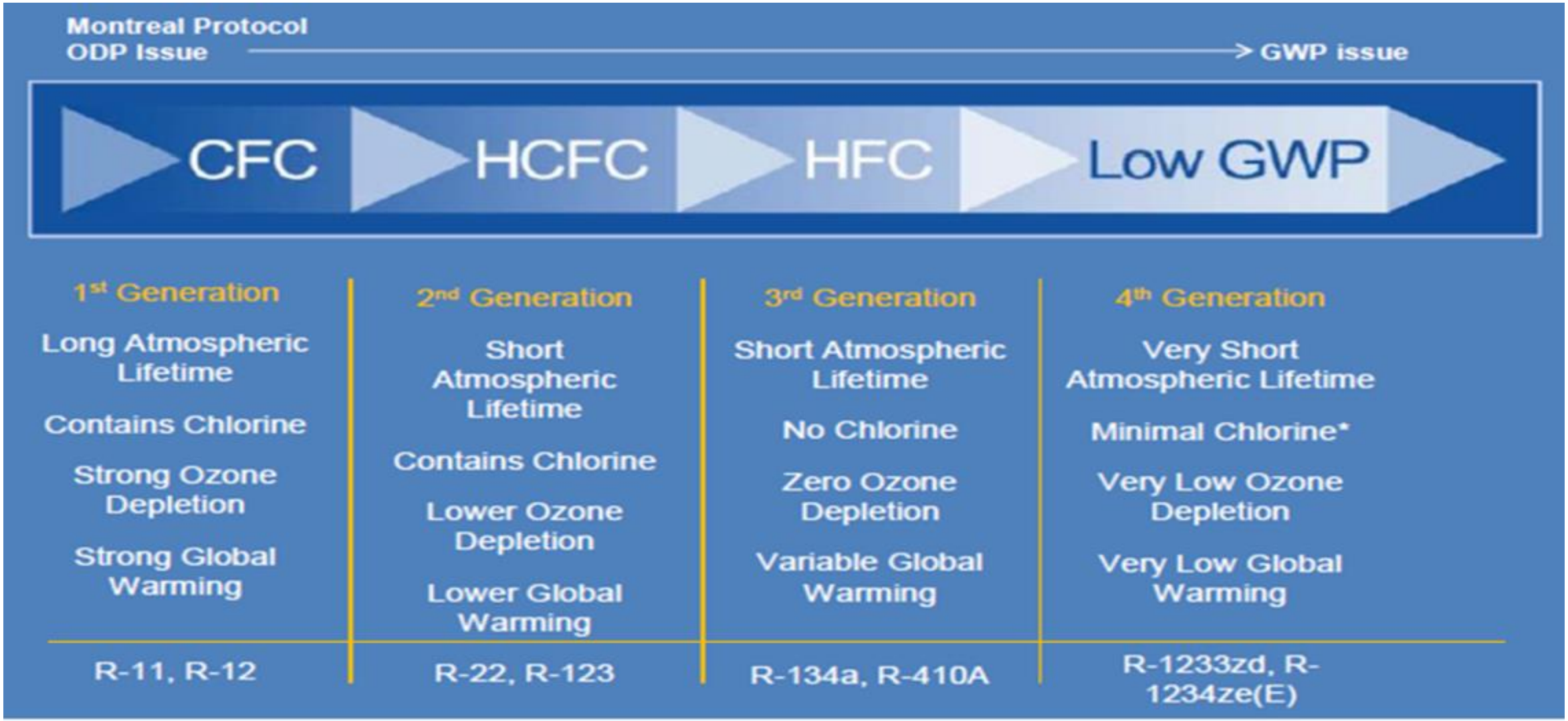


Presentation Deck for Consultants

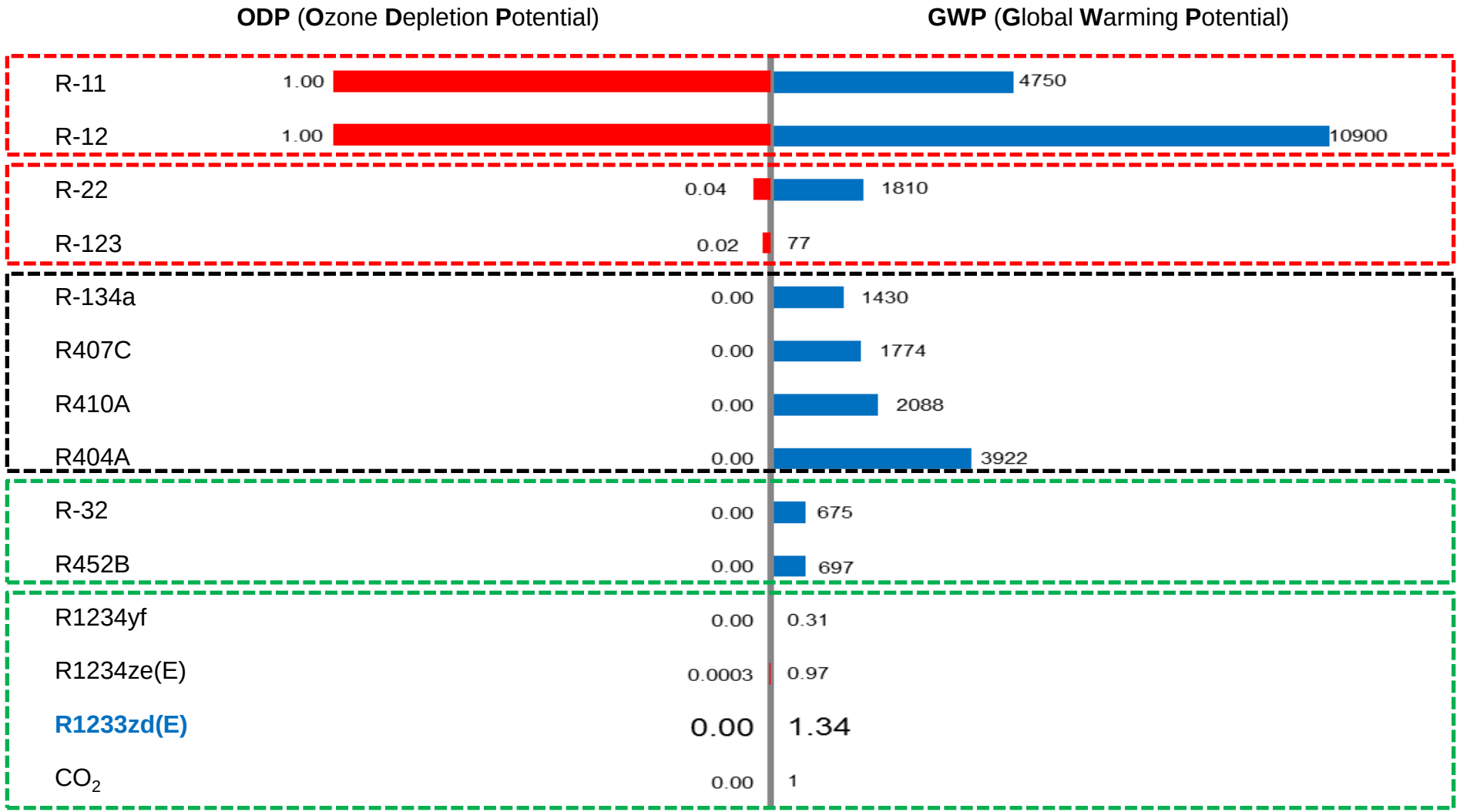
March 2017

REFRIGERANT DEVELOPMENT



REFRIGERANT CLASSIFICATION

ODP / GWP



REFRIGERANT CLASSIFICATION

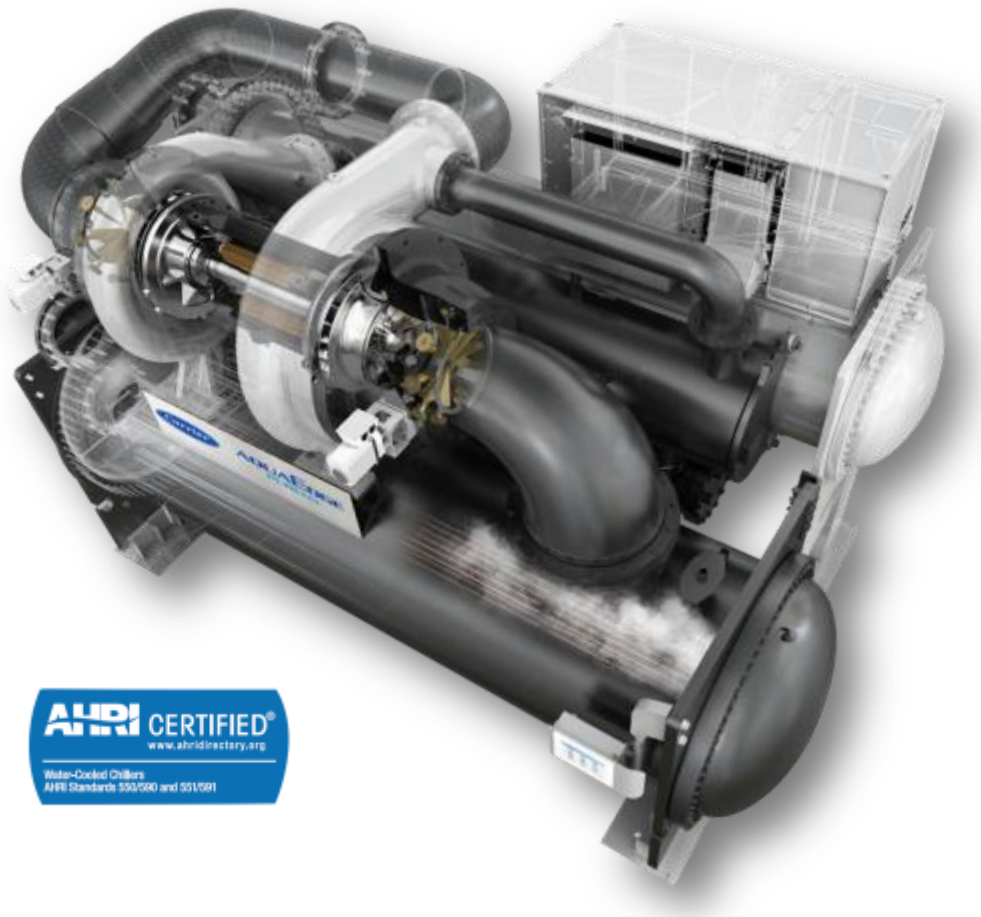
Flammability / Toxicity

- In the past and currently most products use non-flammable, non toxic refrigerants(A1)
- High GWP phase-down likely will require in many HVAC&R applications the use of semi-flammable and flammable refrigerants
- This has resulted in the creation of a new semi-flammable 2L category
- It has also resulted in work to modify safety standards and building code developed for the application

ASHRAE 34 and EN378

	Lower Toxicity (OEL of 400ppm or greater)	**Higher Toxicity** (OEL of less than 400ppm)
Higher Flammability	**A3** R-429A, R-430A, R-435A Propane, Butane, Butene, Butvne	**B3**
Lower Flammability	**A2** R-153a, R-413A, R439A, R-440A	**B2**
Lower Flammability	Maximum burning velocity of ≤10m/s **A2L** R-1234yf, R-1234ze(E), R-32, R-452B New	**B2L** R717 (Ammonia)
No Flam Prorogation	**A1** R-22, R-410A, R-407C, R-404A, R-134a, **R-1233zd(E)**, R-448A, R-450A	**B1** R123

OEL: Occupational exposure limit
A/B indicates toxicity level and 1/2/2L indicates flammability level



greenspeed

AQUAEDGE PUREtec

Full load 7.0 COP

IPLV rating 11.7

30s swift restart

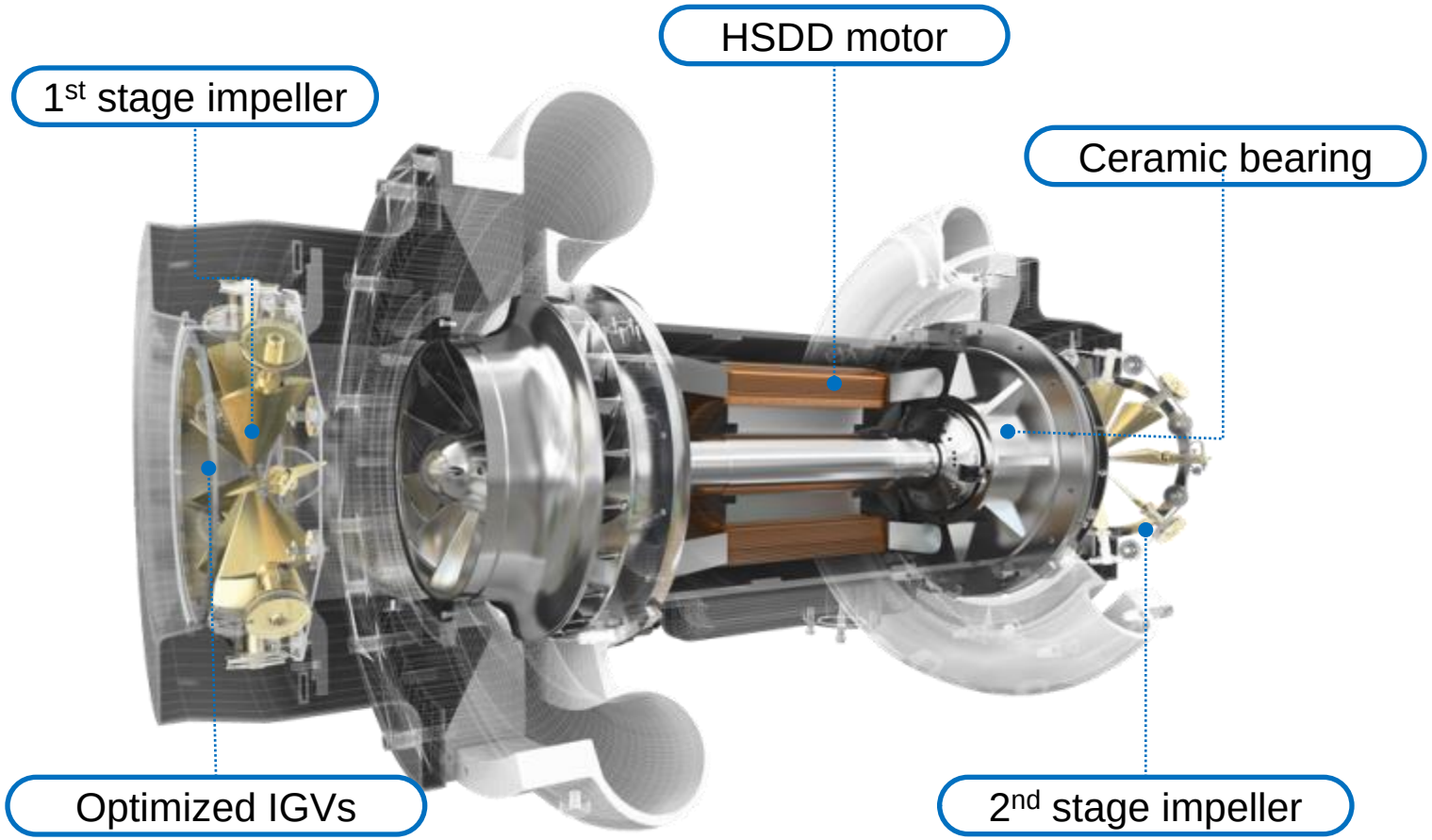
15% low load

Capacity Range: 600-800RT

with PUREtec™ refrigerant and Greenspeed™ intelligence

BACK TO BACK 2 STAGE COMPRESSOR

Higher efficiency and more reliable operation with broader range

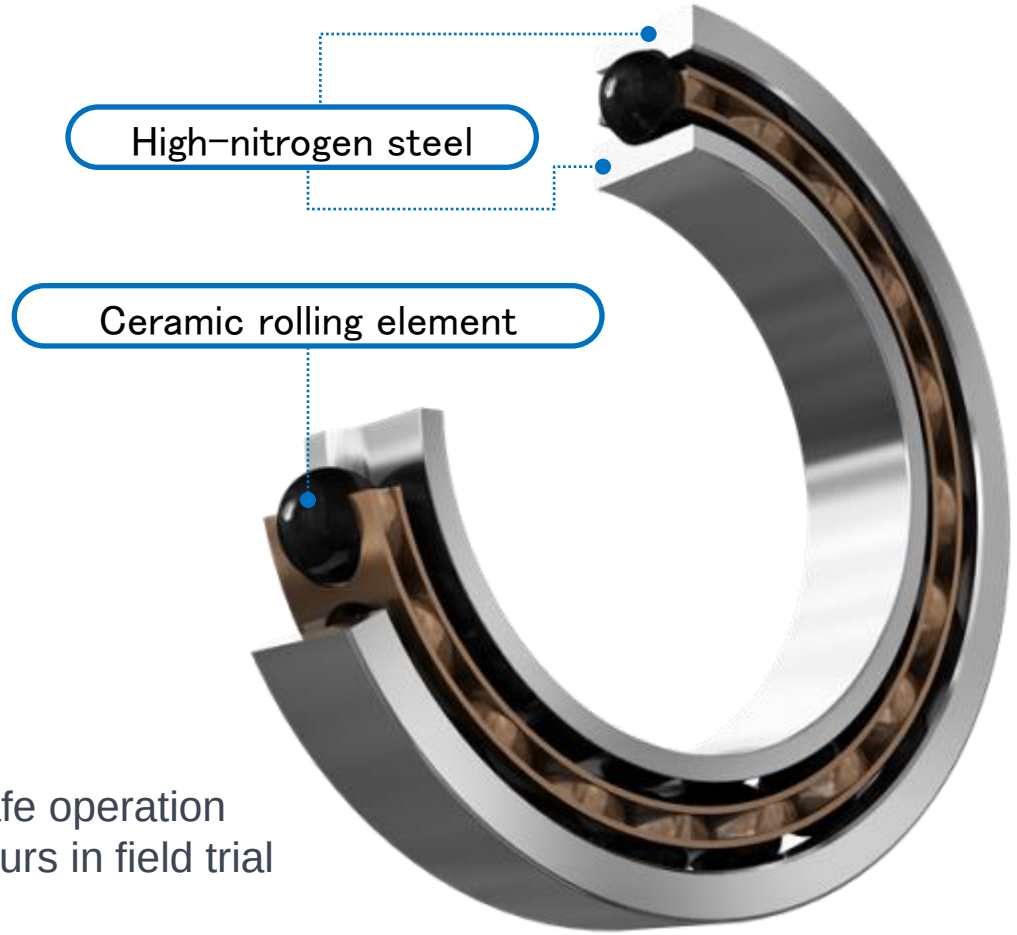


Two-stage design

- Balanced axial and radial thrust on shafts
- 30% less aero parts
- Motor supported at both ends for higher rotor dynamics robustness
- Optimized IGV for better part load efficiency
- One IGV for each of stage improves reliability and efficiency at part load

CERAMIC BEARING DESIGN

Refrigerant lubricated bearing system



Proven safe operation
>150,000 hours in field trial

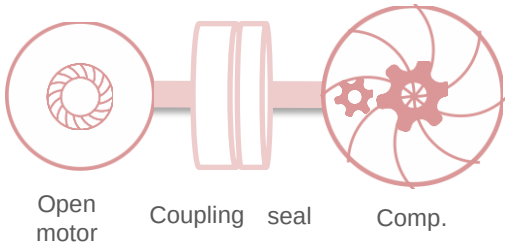
Ceramic bearings

- No risk of oil leakage
- No oil related maintenance
- Simpler insulation method

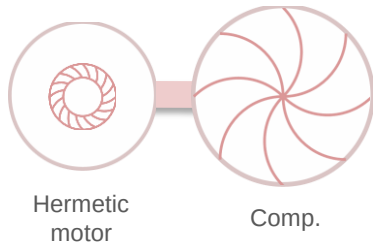
HERMETIC HSDD MOTOR DESIGN

Higher efficiency & lower maintenance cost

Open type compressor



Semi-hermetic compressor



Expensive	Maintenance cost	None
$10,000 / set, every 5 years	Shaft seal/Coupling replacement	$0
Year by year	Supplement of refrigerant & oil	$0

Replacement
Leakage problem

None

Hermetic HSDD motor

- No gear transmission
- No refrigerant leakage risk
- Longer operation life
- Lower inrush current
- Reduced maintenance cost

FALLING FILM EVAPORATOR



Flooded

Falling film

Better heat transfer efficiency

- Easy escape for vapor bubbles
- Unique structure minimizes aero losses
- Avoiding the use of deep pool of refrigerant in the evaporator

PIC5+ CONTROL

Enhanced user experience & flexible installation

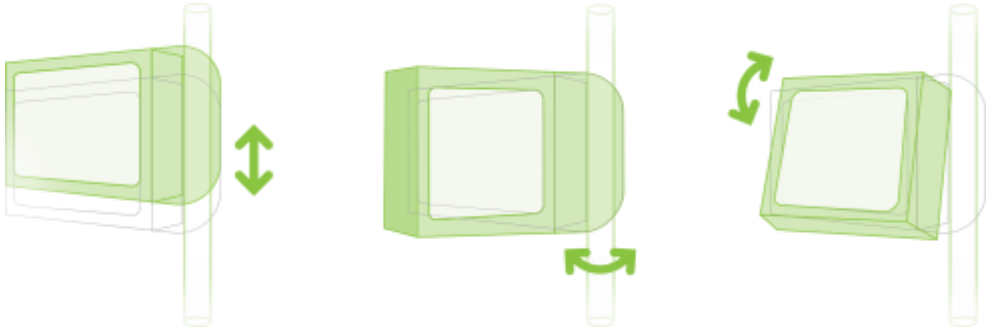


User-friendly interface

- 10.4” color touch screen
- Easy-to-access menu design
- 10 languages for choice
- Real-time graphic trending of performance
- Quick connectivity with BAS
- Auto alarm and black box
- Diverse communication protocols

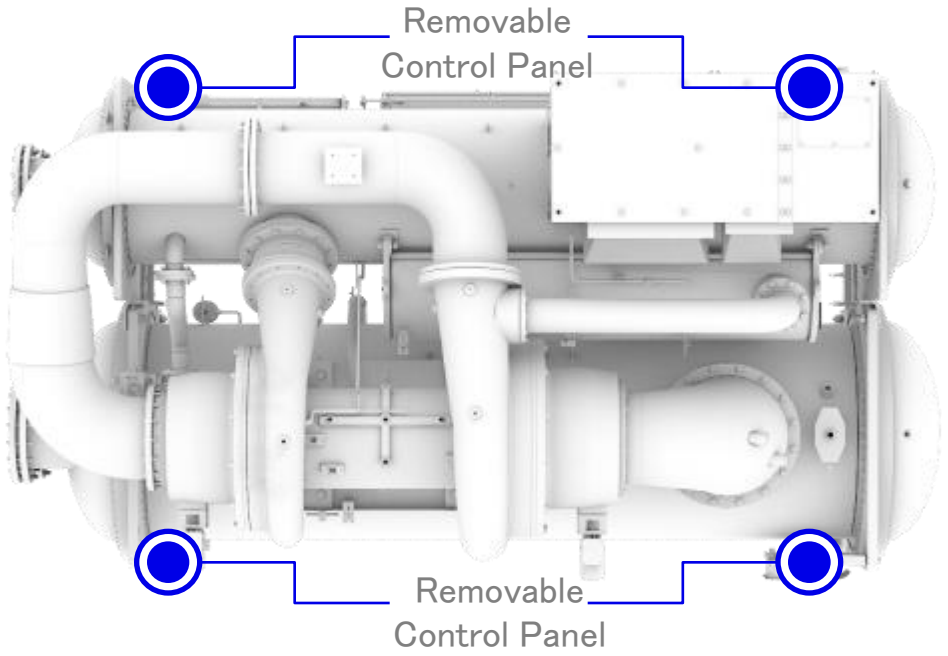
PIC5+ CONTROL

Enhanced user experience & flexible installation



Fully adjustable
in 3 dimensions of motion

Custom-positioned panel



Flexibility to attach in
any of the 4 corners

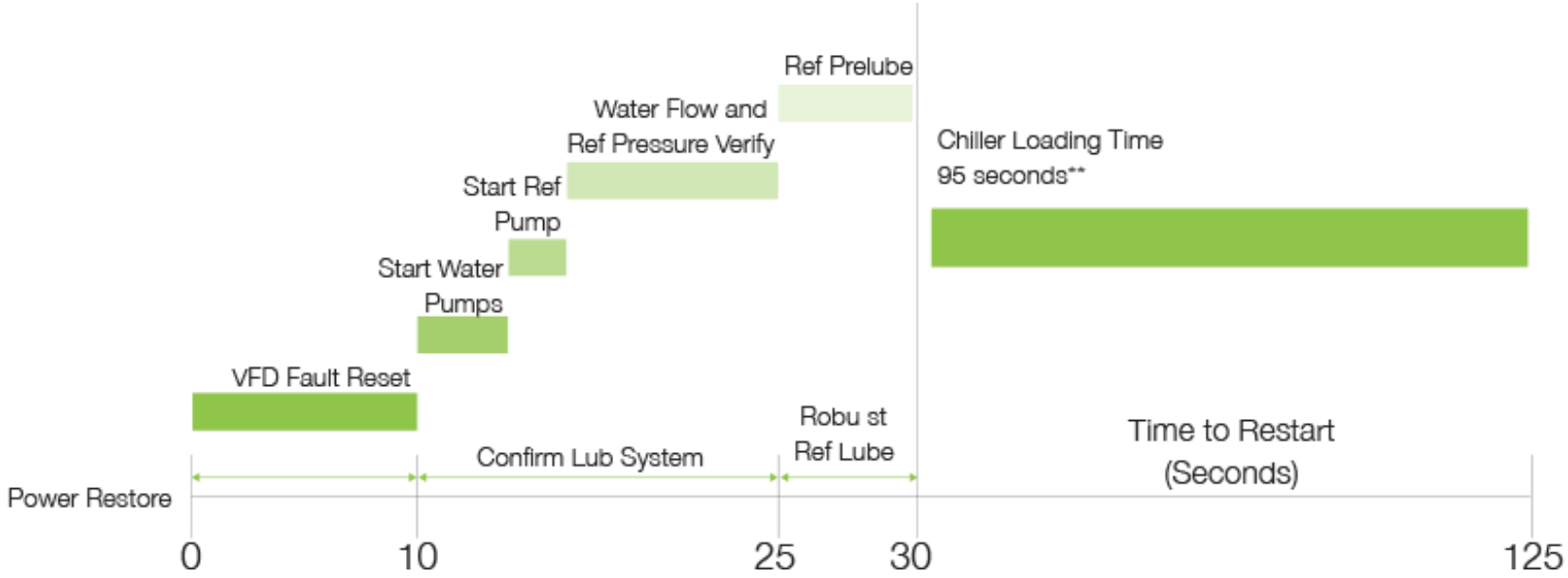
SWIFT RESTART OPERATION

30s

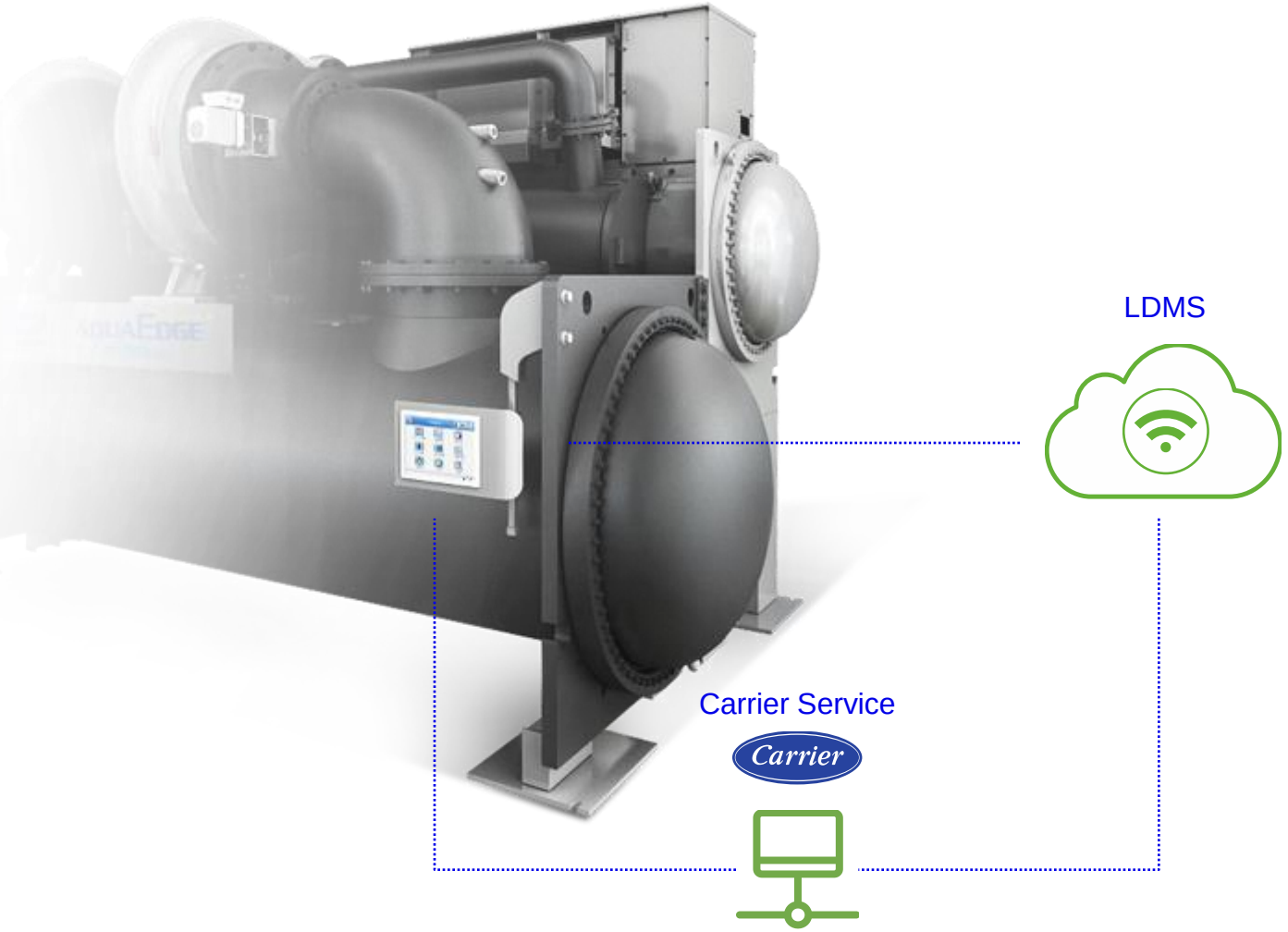
Swift restart

30s swift restart

- Swift restart of data center application to improve the system reliability
- 30s compressor restart and quick capacity recovery



CHILLER DATA MANAGEMENT SYSTEM



Support continuous HVAC system upgrade

Carrier Lifecycle Data Management System

- Cloud storage
- Big data management
- Historic data analysis
- More specific diagnosis

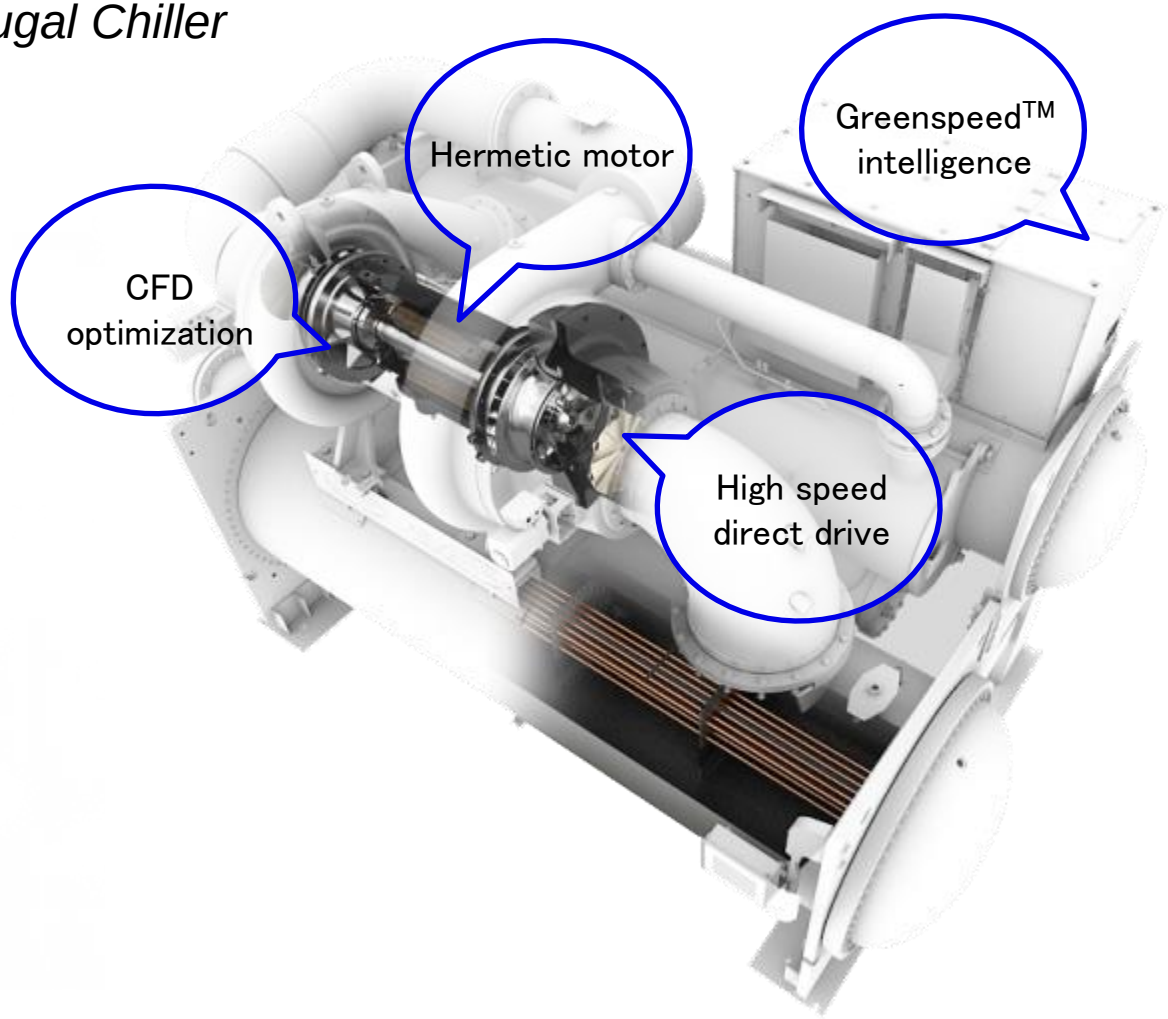
LOWER SOUND LEVEL

-8
dB(A)*

**Against Conventional Centrifugal Chiller*



- Advanced aerodynamic design
- Optimized compressor design
- Improved part load operation noise

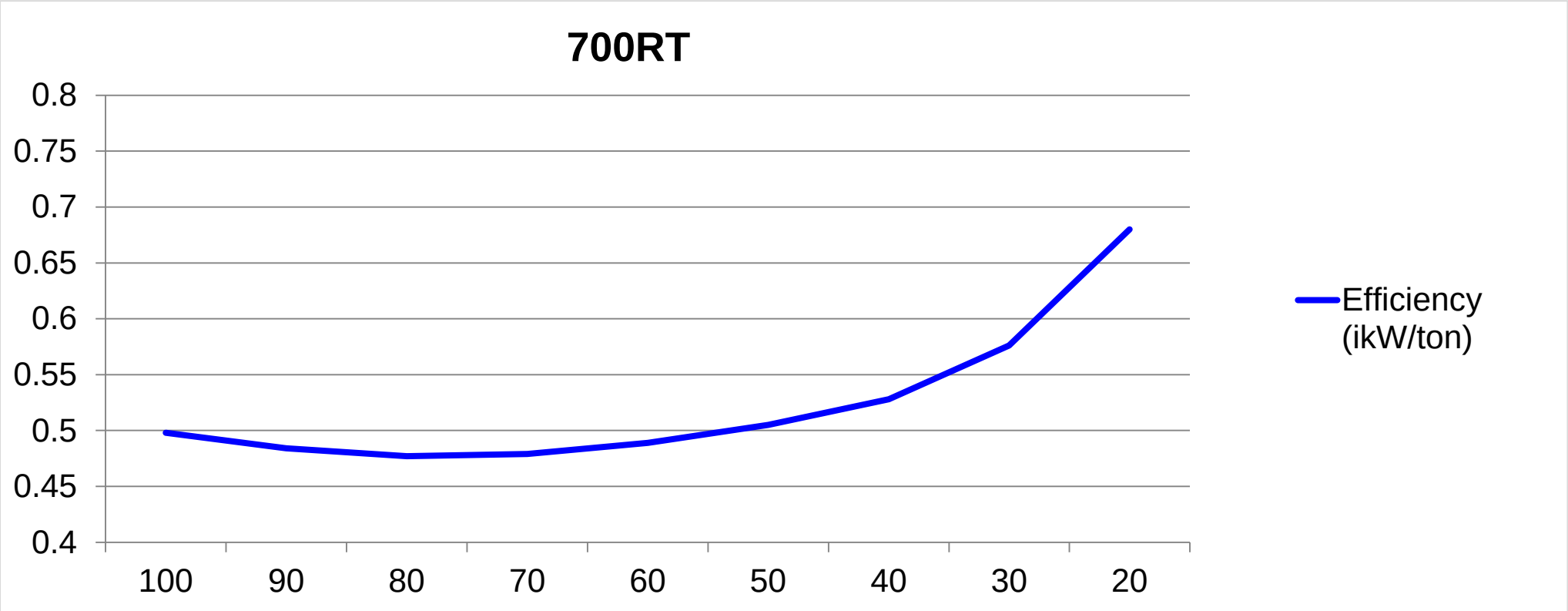


19DV PROJECT REFERENCE

VERTICALS			
Hospital	**Hospitality**	**Industrial**	**Data Centers**
			
Raffles Hospital	**Atrium @ Havelock Road**	**JTC Animal Poultry @ Jalan Buroh**	**Data Center @ Ang Mo Kio**
3 nos. 19DV @ 650RT	**2 nos. 19DV @ 650RT**	**2 nos. 19DV @ 500RT**	**4 nos. 19DV @ 700RT**

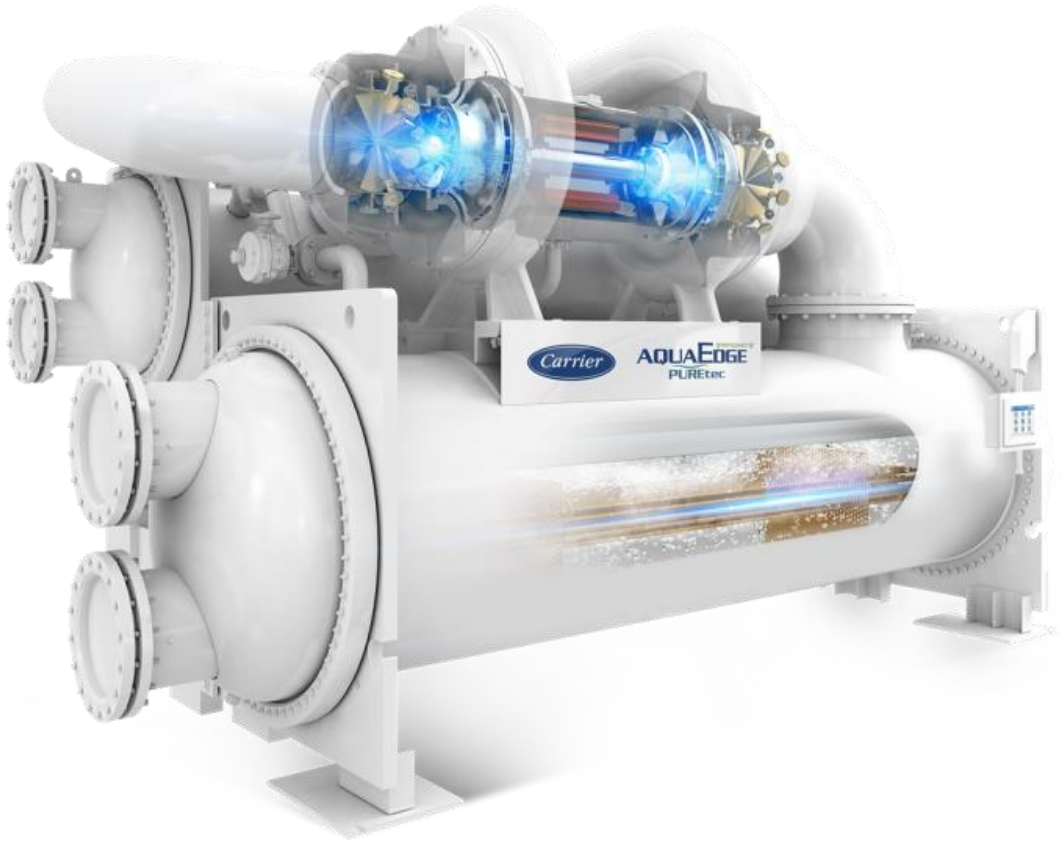
19DV Performance Curve (700RT)

CHW temp **6.7/12.2degC**, CDW temperature: **29.5degC, 3gpm/ton**
50% variable CHW flow, **constant** CDW flow



Cooling Load %	100	90	80	70	60	50	40	30	20
Efficiency (ikW/ton)	0.498	0.484	0.477	0.479	0.489	0.505	0.528	0.576	0.68

greenspeed AQUAEDGE PUREtec



ALL IN ONE

Reliable

Efficient

Smart

Flexible

Quiet

Sustainable