Disconnect between DCS Provider & User:
Need for an Equitable & Sustainable Solution

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Synopsis

The technical and economic advantages of DCS should be beyond doubt albeit when designed and implemented properly

Unfortunately, more often than not, the DCS providers, in protecting their financial returns, tend to impose impractical and unilateral performance conditions for the users to meet

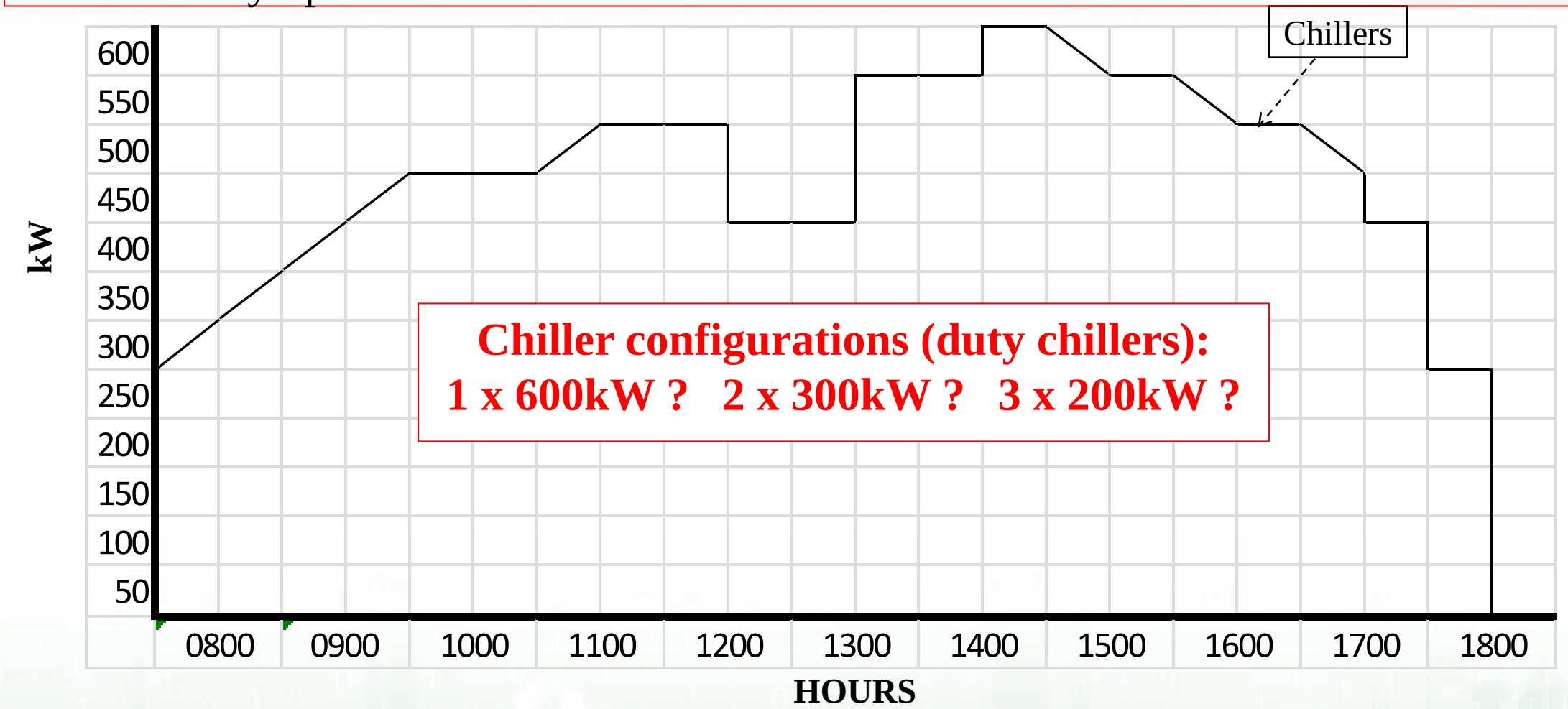
Such inequitable terms and conditions have been simmering over the years with no serious solution in sight and are known to have discouraged implementation of energy efficiency and innovative technological advances on the users' end

This presentation will discuss this 'disconnect' and hopefully bridge this divide to realize a more equitable and sustainable solution.

User's primary reasons for considering alternatives

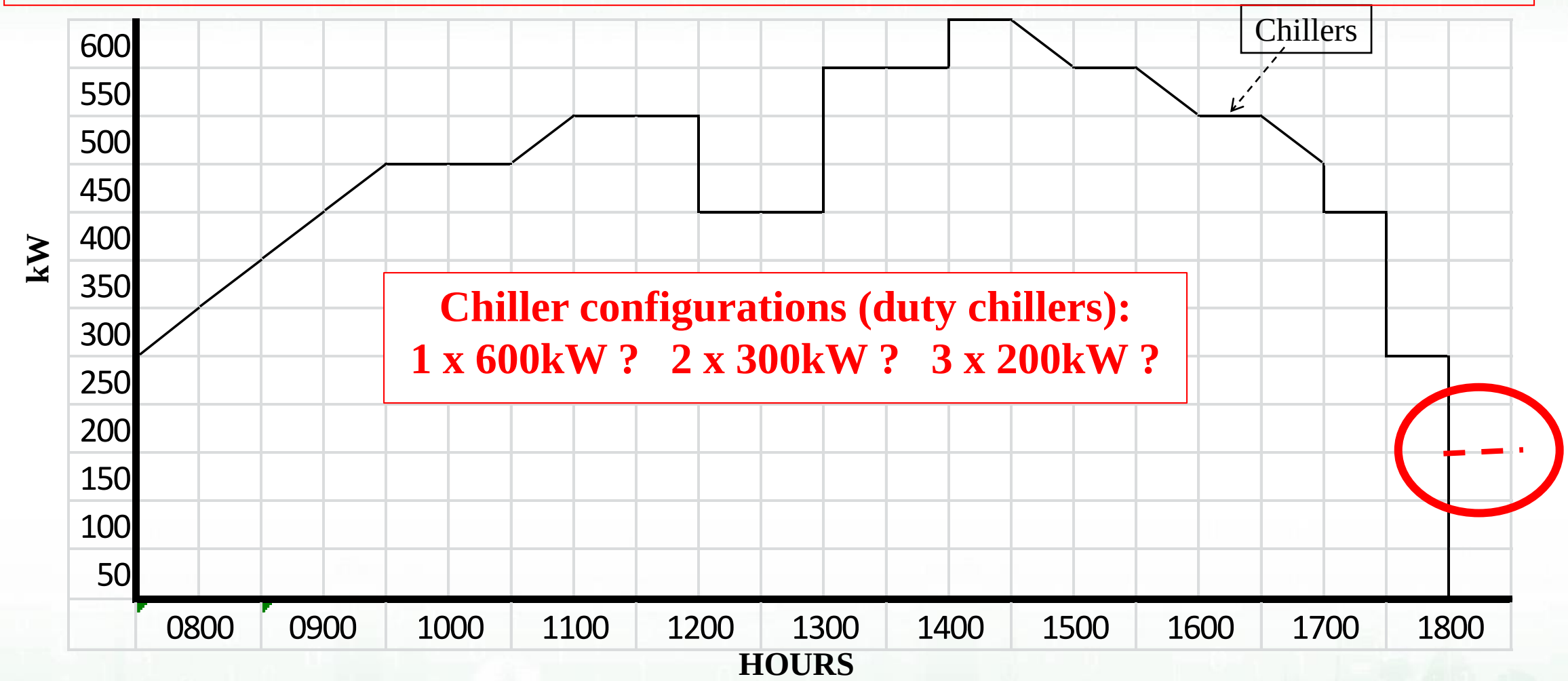
1. Difficulty in selecting ideal chiller configurations to achieve optimal energy efficiency operation at all times
2. Difficulty in catering for after hours loads at 'acceptable' rates
3. Provision of N+1 or even N+2 redundancy
4. Hassle of operation and sustainable maintenance
5. Plantroom space savings

1. Difficulty in selecting ideal chiller configurations to achieve optimal energy efficiency operation at all times



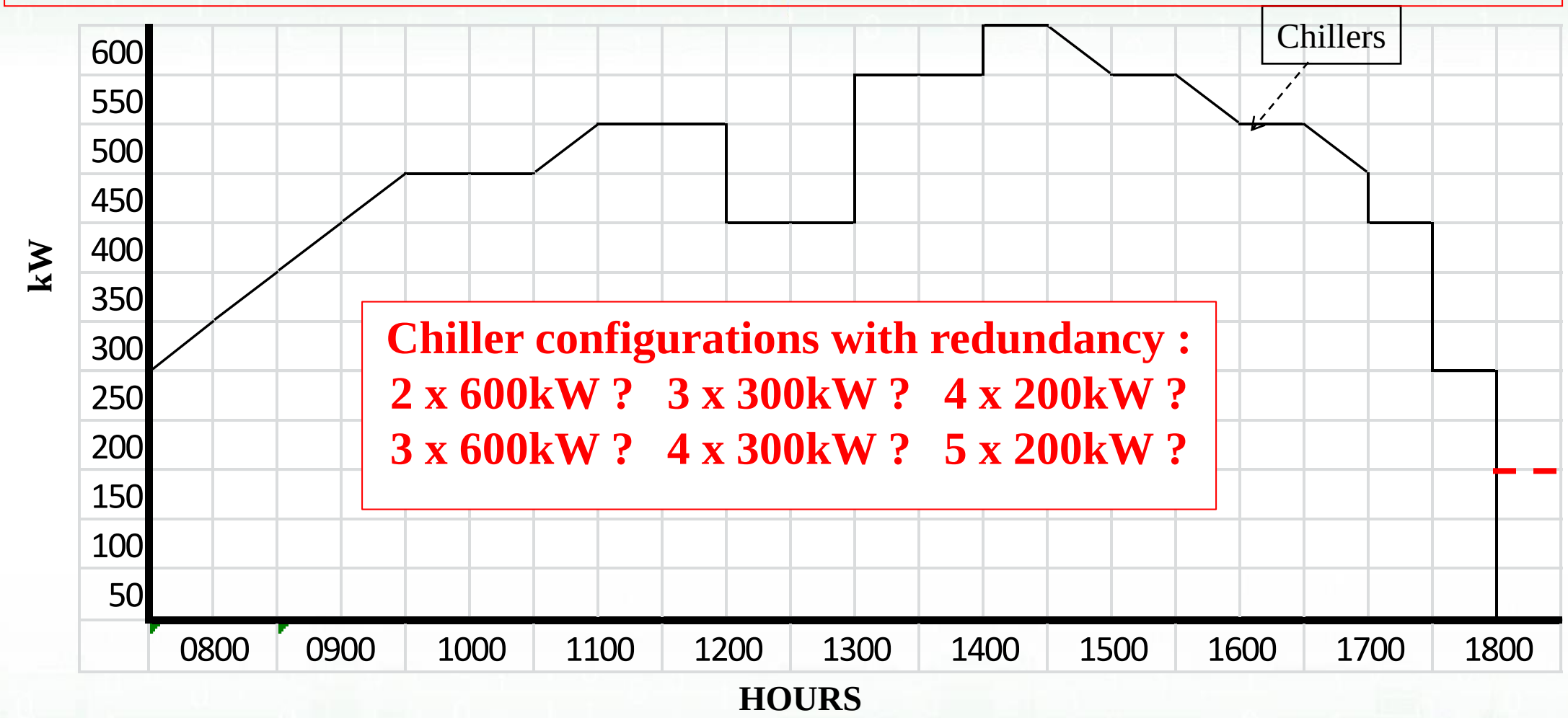
MDL with Chillers

2. Difficulty in catering for after hours loads at ‘acceptable’ billing rates



MDL with Chillers

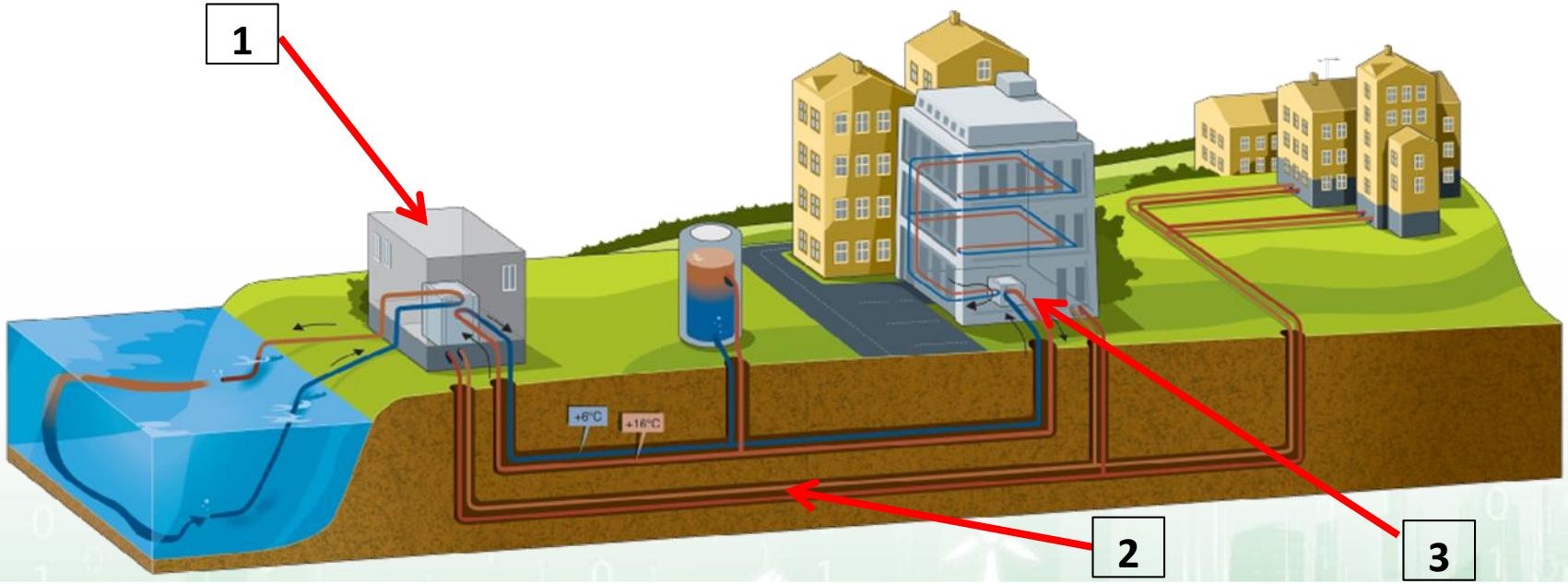
3. Provision of N+1 or even N+2 redundancy



MDL with Chillers

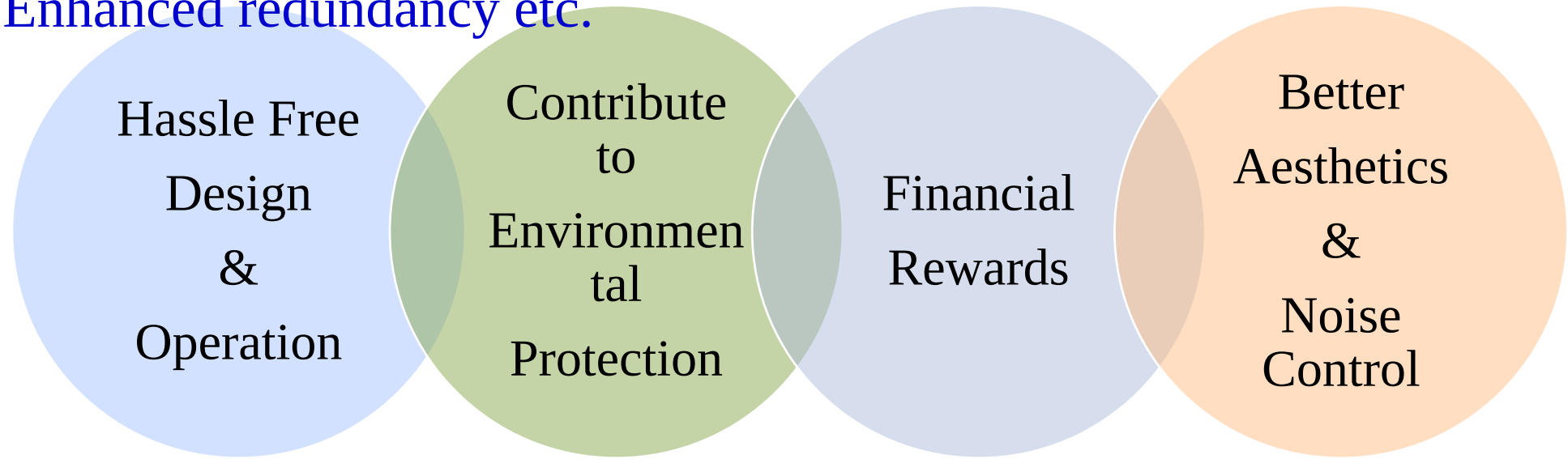
What the DCS provides

1. A thermal generating plant
2. A distribution system (piping)
3. Energy transfer stations (meters, valves, pumps, etc)



What the user gets

1. Savings in building space for plants – and better aesthetics (e.g. unsightly cooling towers)
2. Relief from operation and maintenance (for main plants)
3. Reduced first cost and expected reduction in life-cycle costs
4. Enhanced redundancy etc.



District Cooling Benefits

What the Provider wants in return

ROI :

Which is to be derived from Utility Charge with built-in capital cost charge …….. through …….

Typical pricing methodology to end-users

- ✓ Connection Fee
- ✓ Fixed Capacity Charge
- ✓ Energy Charge
  - Maximum Demand Charge
  - Variable Energy Charge

Variants of DCS Charges (2010 Malaysia)

DCS	MD MYR/RT	VC MYs/RTh	VC Off Peak MYs	Single Rate MYs	CC MYR/RT
A	105.00	25.00			
B	88.28	19.20			
C	75.68	33.44			230.00
D	36.36	44.00	26.40		950.00
E		15.00			
F		80.96			
G	62.92	24.60		46.20	
*H**	129.32	37.30			

Peak hours: 0800 to 2200 hrs; Off Peak hours: 2201 to 0759 hrs
MD: Maximum Demand; VC: Variable Charge; CC: Connection Charge
MYR: Malaysia Ringgit; MYs: Malaysia sen
RT: Refrigeration Ton; RTh: Refrigeration Ton hours; * 2013 rate

What the User expects

1. ROI - Favourable Life Cycle Costing
2. Fair charges reflecting market norm
3. Real space savings of ‘total plantrooms’
4. No effect to normal design for connected airside plant which may impact cost (higher maintenance costs and space)
5. Reward and not penalise User’s good EE practice
6. Familiar with (and expect similarity with) Electricity provider’s terms and conditions

Electricity Tariff vs DCS Tariff (Malaysia)

Tariff	MD MYR/kW		VC MYs/kWh		VC Off Peak
E-C1	25.90	1.2%	31.20		
E-C2	38.60	0.8%	31.20	61.5%	19.20
DCS*	MYR/kWr		MYs/kWhr		MYs/kWhr
C1e	29.83	0.23%	7.10		
C1e	17.88	0.39%	6.99		
C2e	10.34	1.06%	11.00	60.0%	6.60

+150%

-42%

For electricity tariff, MD can be re-declared after 12 months or prescribed period.
No such re-declaration is allowed for DCS?!?

The Disconnect

1. Inter-dependency between Provider & User is unavoidable but tends to veer towards being unilateral
2. Expectation by Provider that ALL User's designers are of 'similar and adequate' capability
3. Provider's reps tend to behave like authority rather than a service provider ('patronising' syndrome?)
4. Provider's one rule for all – unable to comprehend cutting edge thoughts
5. Non transparency from one side begets same from the other side

Learning from ‘other’ Utility

- Dispense with ‘perpetual’ maximum demand charge that
  - ➢ *discourages EE practice*
  - ➢ *stifle innovation*
  - ➢ *brew animosity and bad publicity*
- Formulate meaningful ‘sustainable’ off-peak tariff charges
- Formulate alternative tariffs to suit increasingly different building typologies – and with room for special cases
- Have regular and transparent discourse with users and professionals (designers) – and be up-to-date

Examples of Disconnect

Case 1 – Design & Specification disconnect

- User compelled to pay for a very high pressure rated Hex of 400 psi on primary chw side due to inherent system design ‘decision’ by Provider
- User compelled to follow Provider’s specs of unnecessary high pressure rating of Hex for secondary chw side when there is no need for a low rise building
- User compelled to grossly oversize Hex due to unrealistic low allowable ΔP of primary chw side
- User compelled to pay for pipes and fittings of unwarranted ‘O&G’ industry grade

Examples of Disconnect

CASE 2 – Design & Penalty disconnect

- Imposing penalty for not achieving high chw ΔT compliance for a building using fan coil units (e.g. serviced apartments and condominiums)
- Unilateral penalty for low chw ΔT but no reverse penalty for high chw supply T, which affects User's indoor RH

Examples of Disconnect

CASE 3 – Discourage Adoption of EE and Cutting Edge Technologies

- Imposing rigid and perpetual MD charge coupled with very low Variable charge serves to discourage any attempt to carry out EE improvements
- Refusal to understand (and share financial) advantages to be gained from User's Cutting Edge Technologies such as;
  - ➢ UFAD, Chilled Beams - higher chw supply T
  - ➢ Slab cooling - Off-peak charging rates, Shifting peak load demand, Savings on costly Thermal Storage plants, etc.

Proposed Sustainable Solution

Maximum Demand Charge:

1. Dispense with pepectual MD charge
2. Allow for re-declaration of Maximum Demand after initial 2 to 3 years to recover “capital cost”
3. Thereafter, to further encourage continuous Energy Efficiency practice, bill for actual MD use. However, to safeguard change or under-utilisation for whatever subsequent reasons, the minimum MD charge can be pegged at 70% to 80% of the re-declared MD
4. Allow for MD to be re-declared with at least 12-month notice

Proposed Sustainable Solution

Maximum Demand Charge:

5. To prevent under re-declared MD, where MD use exceeds the re-declared value, a surcharge penalty is applied on the full MD for that month. On top of that, any additional MD requirement is at the discretion of the provider subject to availability.

Proposed Sustainable Solution

Variable Energy Charge - ΔT resolution:

1. Address low ΔT syndrome to safeguard the operating cost of the provider
2. Provide design-installation options for end-users in response to provider's requirement for high ΔT
3. Encourage optimal ΔT for Energy Efficiency practice by the end users
4. Introduce a reward-penalty factor for ΔT in the Variable Energy charge
5. ΔT factor shall be derived from the Affinity Laws relating to increased chw flowrate due to low ΔT

Proposed Sustainable Solution

Variable Energy Charge - ΔT Factor:

Affinity Law	$P = k\,Q^3 = k\,\Delta T^3$						
Q (lps)	**0.55996**	**0.41997**	**0.33598**	**0.27998**	**0.23998**	**0.20999**	**0.18665**
ΔT (⁰C)	1.50	2.00	2.50	3.00	3.50	4.00	4.50
P increment	101.63	42.88	21.95	12.70	8.00	5.36	3.76
Pumping Energy (%)	12.0	12.0	12.0	12.0	12.0	12.0	12.0
VCn factor	13.08	6.03	3.51	2.40	1.84	1.52	1.33
Q (lps)	**0.16799**	**0.15272**	**0.13999**	**0.12922**	**0.11999**	**0.11199**	**0.10499**
ΔT (⁰C)	5.00	5.50	6.00	6.50	**7.00**	7.50	8.00
P increment	2.74	2.06	1.59	1.25	**1.00**	0.81	0.67
Pumping Energy (%)	12.0	12.0	12.0	12.0	**12.0**	12.0	12.0
VCn factor	1.21	1.13	1.07	1.03	**1.00**	0.98	0.96

the end

THANK YOU

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Malaysia
Chapter