



**CLIMATE
CHALLENGE
NETWORK**

Mayors' Megawatt Challenge

Practical Pathways to Net-Zero Buildings

A presentation to the CAP Corporate Energy Managers Community of Practice Workshop

October 10th, 2019

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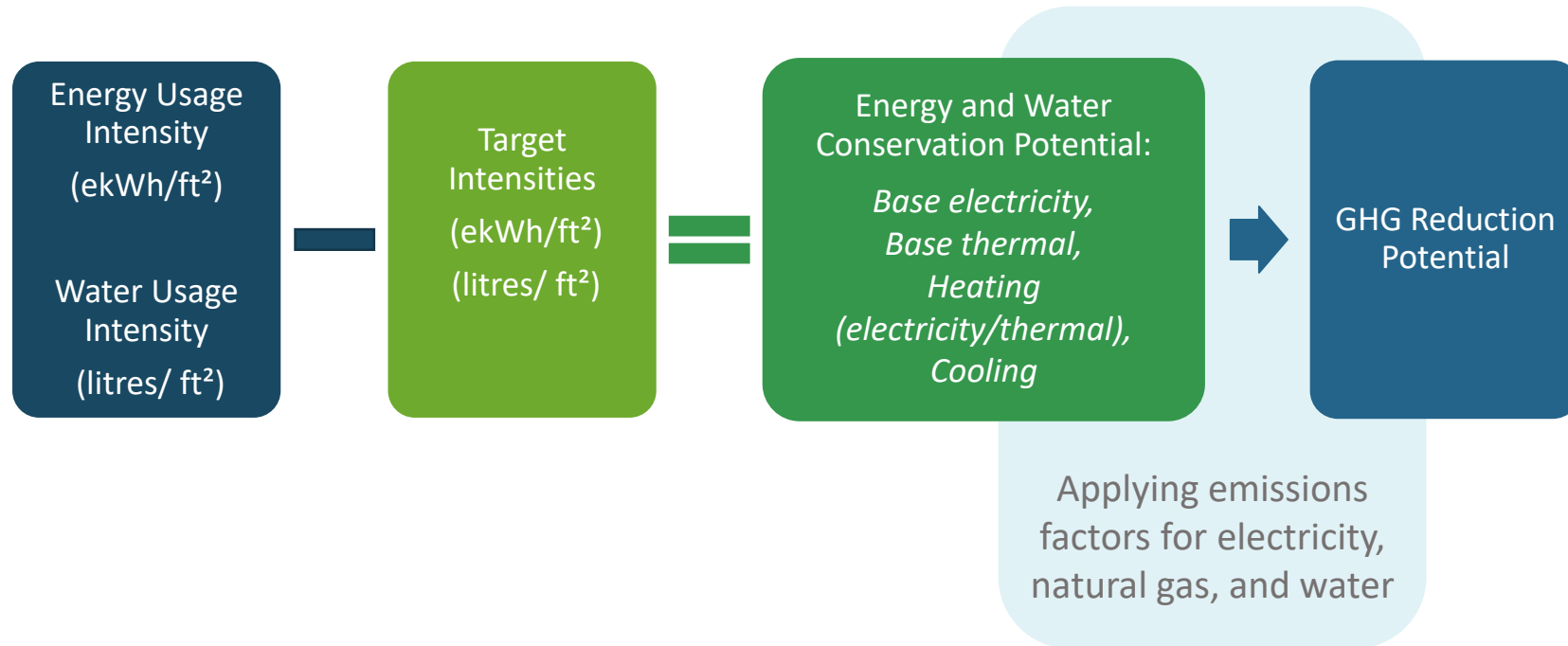


Mayors' Megawatt Challenge (MMC) – Leadership by Example

- 2003 – MMC launch in the City of Mississauga
 - *A program of Toronto & Region Conservation's Living City*
- 2019 – a program of Climate_Challenge_Network
 - *Rapid scaling up of reductions in emissions caused by buildings*
 - *"The Big Tent" – collaboration among municipalities, industry, academia and utility companies*
- Core principles:
 - *Data-driven identification of savings potential and high-potential buildings*
 - *Evidence-based determination of best practices*
 - *Networking between like-minded organizations*
 - *Recognition and celebration of leadership by example*



Climate Challenge Network: Performance-Based Conservation Programs



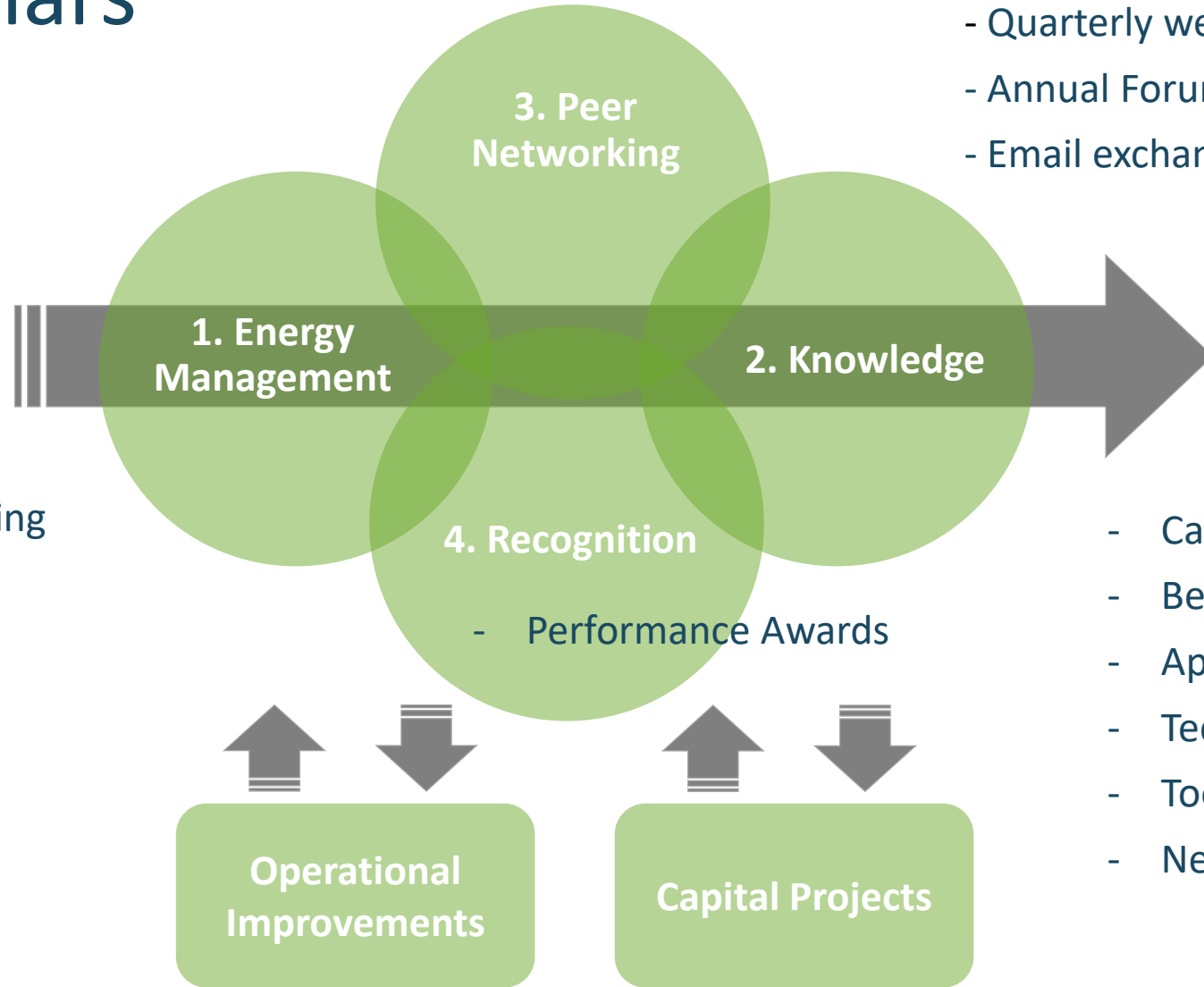
Leveraging a proven data-based approach:
Performance-Based Conservation





Four Pillars

- Benchmarking
- Targets
- Savings potential
- Performance monitoring



- Quarterly webinars
- Annual Forum
- Email exchange

- Case studies
- Best practices guides
- Applied Research
- Technical panels
- Tools
- New technology evaluation



Member Municipalities 2019

- City of Barrie
- City of Brampton
- City of Markham
- City of Mississauga
- City of Oshawa
- City of Toronto
- City of Vaughan
- Region of Peel
- Town of Caledon
- Town of Richmond Hill
- Township of King

a network of municipalities working
together since 2003 to achieve
exceptional energy performance in their
own buildings

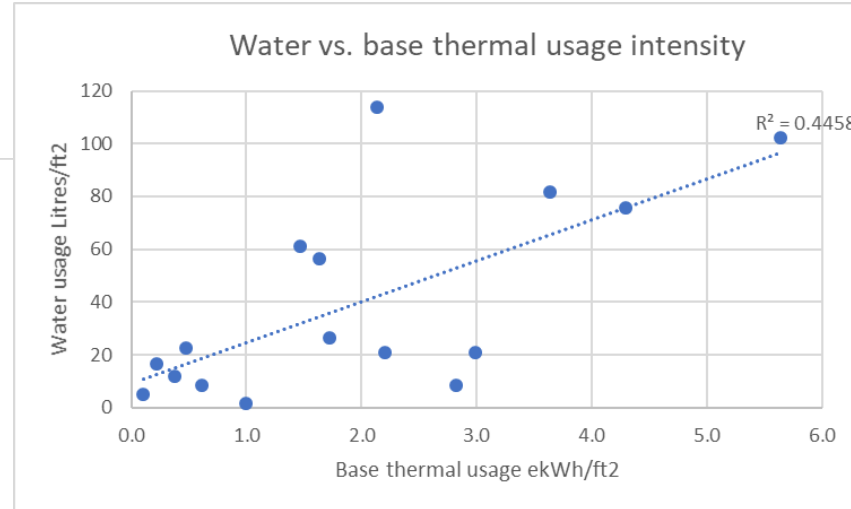
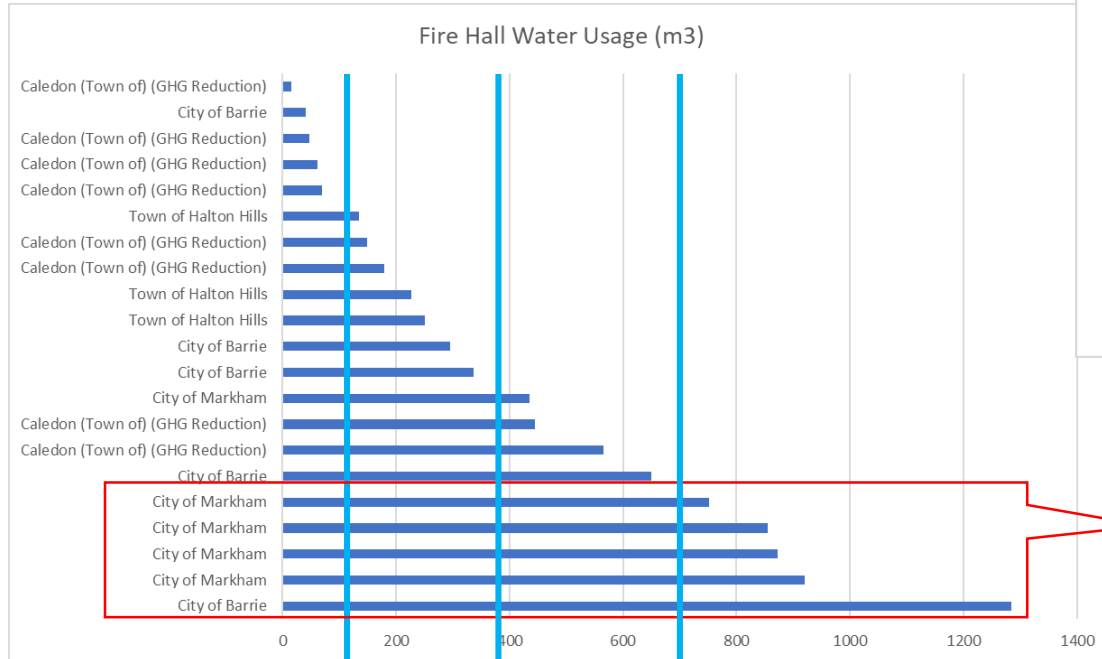


Municipal Building Types

- City/Town Halls and Administration Buildings
- Community Centres
- Cultural Facilities
- Fire Halls
- Libraries
- Police Stations
- Works Yards
- Transit Facilities



Water Benchmarking and Analysis – Fire Hall example



Where is the excess water going?

- Looking for leaks and losses

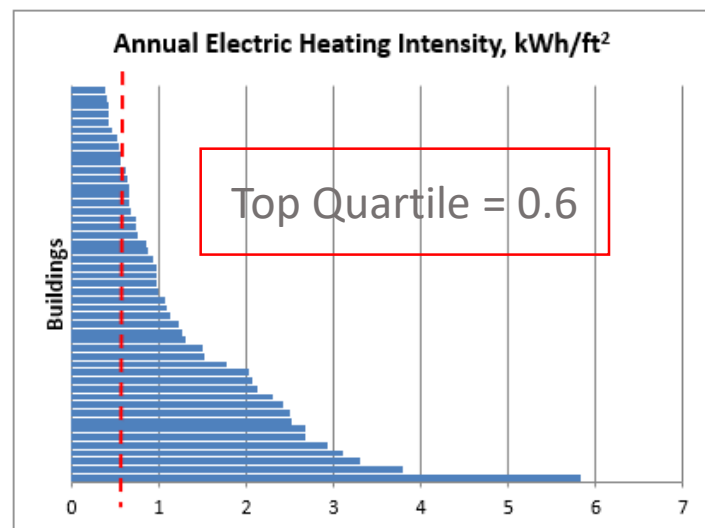
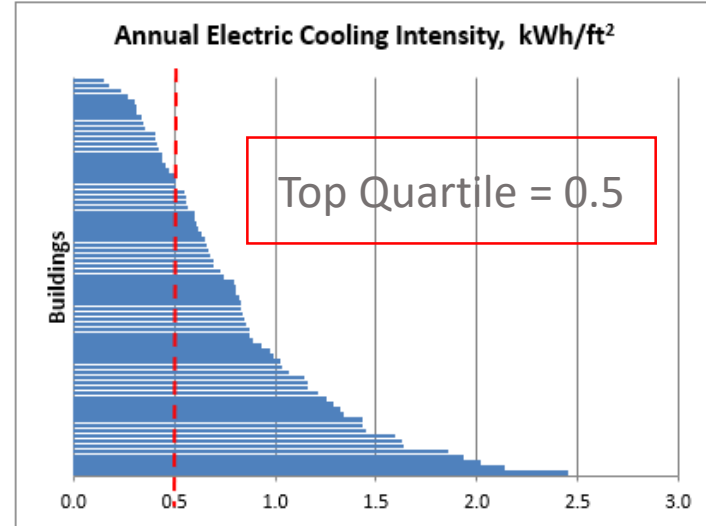
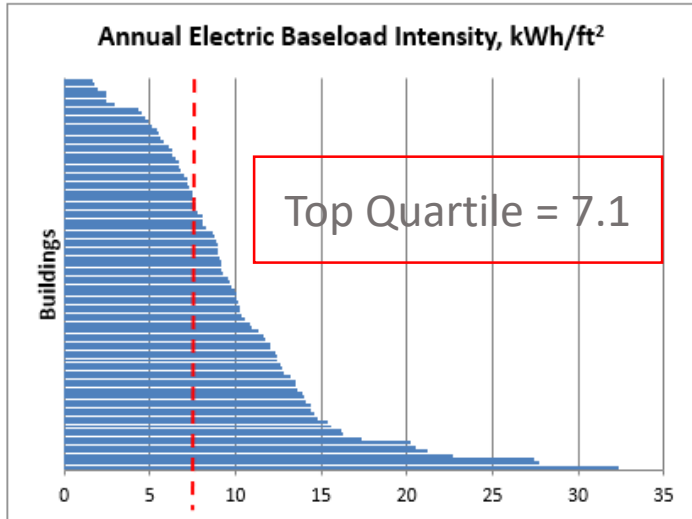
Showers/day	3	5	15
Truck wash/week	1	5	7
m3/year	169	369	689

Adjusting for variables:

- Occupancy
- Number of calls
- Heating system type

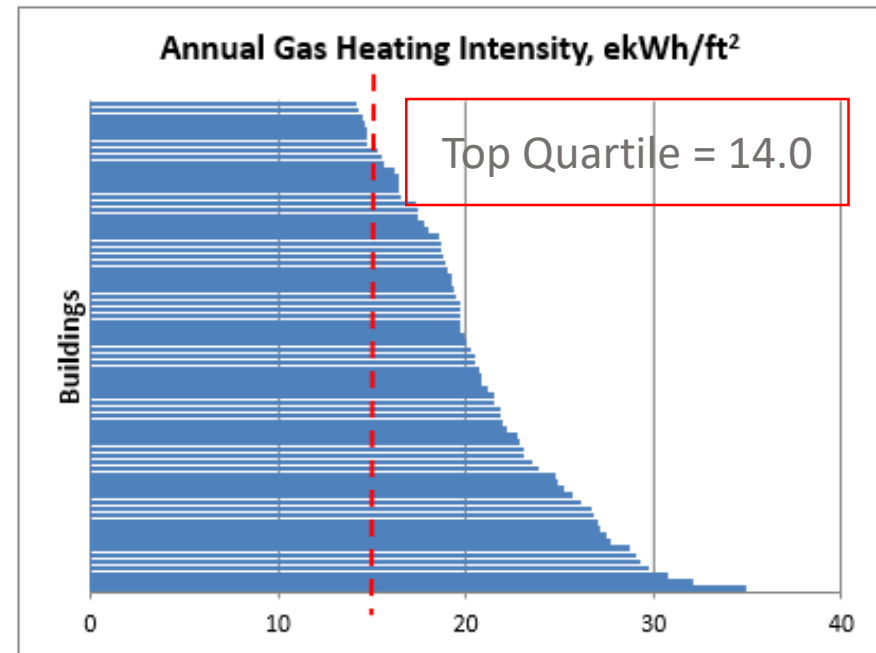
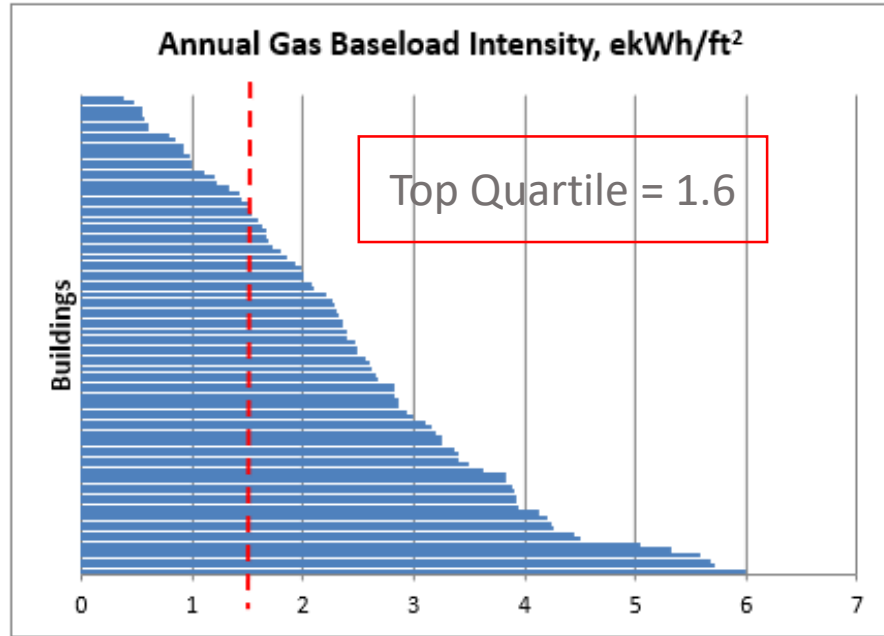


Setting component targets – electricity





Setting component targets – thermal





2019 energy targets for municipal building types

Energy type	Component	Administration	Community Centres	Fire Stations	Libraries	Works Yards	Cultural	Police	Unit
Electricity	Baseload	10.9	9.2	7.1	10.0	12.6	8.1	12.9	kWh/ft ² /year
	Cooling	0.7	0.8	0.5	1.0	0.5	0.7	1.2	kWh/ft ² /year
	Heating	0.3	0.3	0.6	0.5	2.3	0.4	0.3	kWh/ft ² /year
	Total	12.0	10.2	8.2	11.5	15.4	9.2	14.4	kWh/ft ² /year
Gas	Baseload	1.0	1.8	1.6	0.1	2.1	2.2	1.0	ekWh/ft ² /year
	Heating	7.2	9.7	14.0	7.1	31.3	12.0	7.7	ekWh/ft ² /year
	Total	8.2	11.5	15.6	7.3	33.4	14.2	8.7	ekWh/ft ² /year
Total energy	Total	20.1	21.8	23.8	18.8	48.8	23.4	23.1	ekWh/ft²/year

Targets based on Toronto Pearson 2015 weather



Transparent Methodology

White Papers document the methodology by which site-specific energy targets are determined

Adjustments made for weather, heating sources, energy intensive equipment

Peer review by municipal, energy and industry leaders

Achieving Energy Targets in Community Centres

MAYORS' MEGAWATT CHALLENGE
Leadership by example

Using Good Practice Targets to Achieve the Energy Conservation Potential in Community Centres

Methodology White Paper
Rev 1 September, 2016

Enerlife
consulting

Toronto and Region
Conservation
for The Living City

Rev 1 – Sept 2016

Achieving the Energy Target of 20 ekWh/sq. ft./year by 2015 in Town and City Halls

TOWN HALL CHALLENGE
20 by '15

Achieving the Energy Target of 20 ekWh/sq. ft./year by 2015 in Town and City Halls

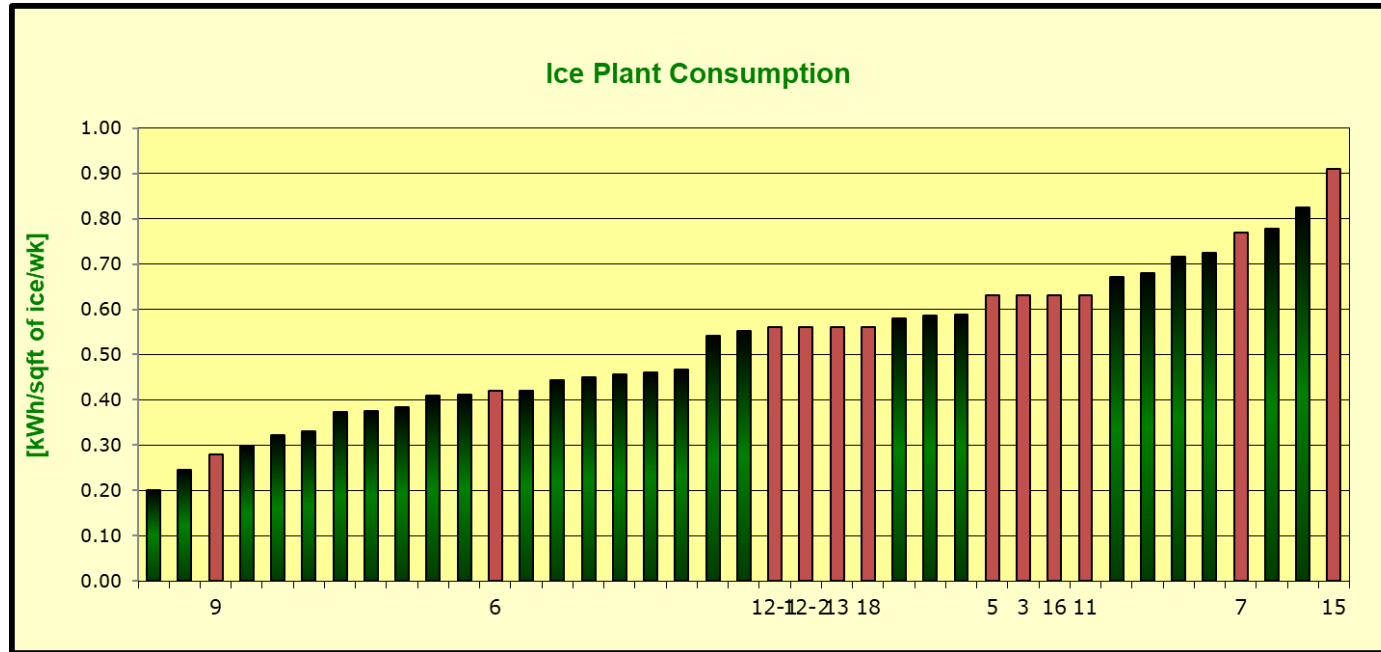
www.trca.on.ca/townhall

Enerlife
consulting

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Target Adjustments Example (Ice Rinks)



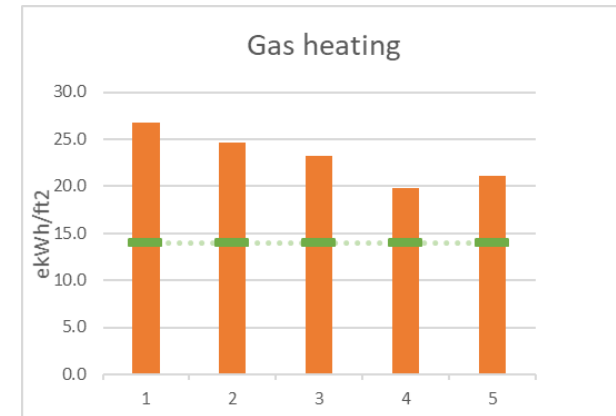
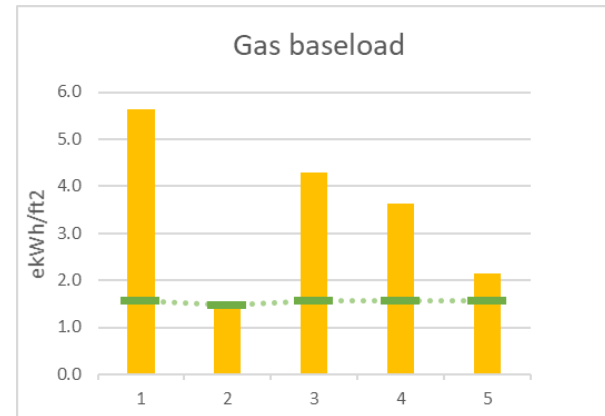
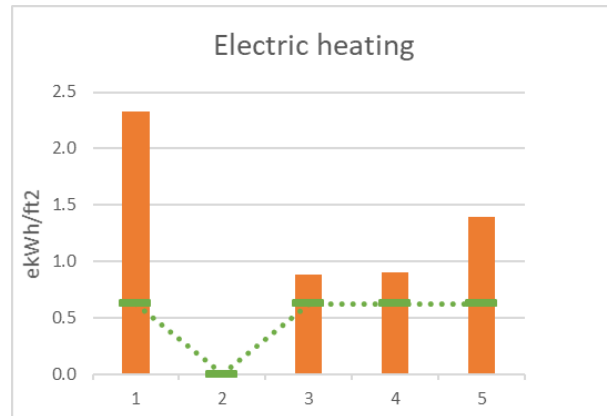
- 0.2 to 0.9 kWh per square foot ice per week (based on actual ice plant consumption from 38 indoor ice rinks)
- The standard used is 0.5 kWh per square foot ice per week
- Results obtained from CaGBC Arena Facilities Pilot - Ice Plant Data Logging results [2011]



Savings Potential

Building	Building area, sq.ft.	Electricity Baseload			Electricity heating			Electricity cooling			Gas baseload			Gas heating			Total		
		Actual	Target	%	Actual	Target	%	Actual	Target	%	Actual	Target	%	Actual	Target	%	Actual	Target	%
Fire Dept. 1	8348	9.2	7.1	23%	2.3	0.6	73%	1.6	0.5	0.7	5.6	1.6	72%	26.7	14.0	48%	45.5	23.8	48%
Fire Dept. 4	7142	10.9	7.1	35%	0.0	0.0	0%	0.9	0.5	0.5	1.5	1.5	0%	24.6	14.0	43%	38.0	23.1	39%
Fire Dept. 5	12200	10.8	7.1	34%	0.9	0.6	29%	0.9	0.5	0.4	4.3	1.6	64%	23.2	14.0	40%	40.0	23.8	40%
Fire Dept. 6	9200	5.8	5.8	0%	0.9	0.6	31%	0.5	0.5	0.1	3.6	1.6	57%	19.9	14.0	29%	30.8	22.5	27%
Fire Dept. 7	7669	5.7	5.7	0%	1.4	0.6	55%	0.7	0.5	0.3	2.1	1.6	27%	21.1	14.0	34%	31.0	22.4	28%

Points of interest:





Finding the Savings Opportunities

Energy Components	2016 Use	Target	Savings Potential %	Savings Potential \$/yr
Base Electricity Consumption (kWh/ft2)	13.1	10.6	19%	\$71,992
Electric Cooling Consumption (kWh/ft2)	1.3	1.0	23%	\$8,458
Electric Heating Consumption (kWh/ft2)	0.0	0.0	0%	\$0
Base Thermal (ekWh/ft2)	0.4	0.4	4%	\$100
Heating Thermal (ekWh/ft2)	12.1	7.1	41%	\$31,320
Total Energy (ekWh/ft2)	26.9	19.1	29%	\$111,869

High savings Moderate savings Low savings

Where energy use is higher than target, look for savings in:

- Electric baseload: lighting, fans, pumps, ice plant, equipment
- Electric heating: space heaters
- Electric cooling: air conditioning
- Gas baseload: domestic hot water, dehumidification
- Gas heating: boilers, ventilation, space heating, loading docks



The Climate Challenge

987 governments from 18 countries worldwide

Declared climate emergency



Moving from commitments to action

Focus on **HOW** to achieve our commitments

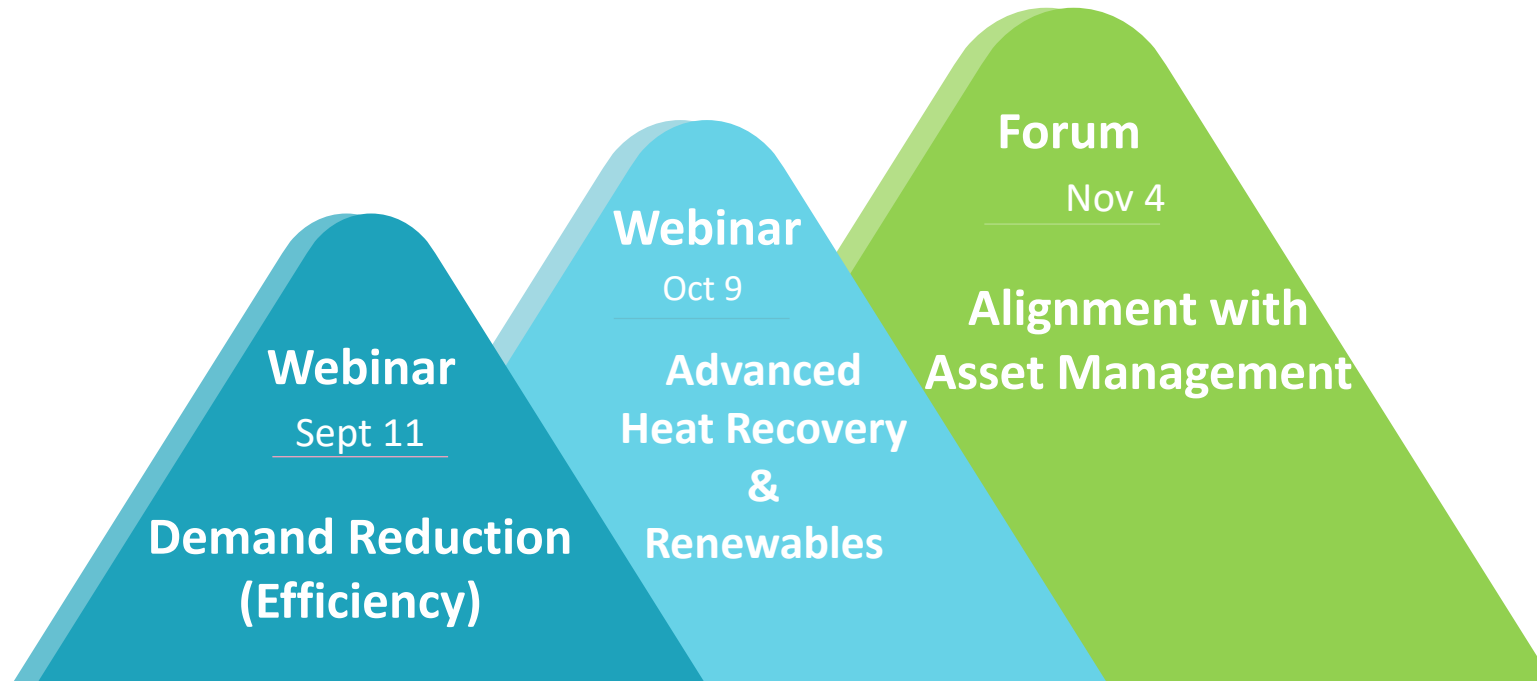


Scaling Up! Effective Response to the Climate Emergency

- The energy and emissions reduction potential of commercial, institutional and multi-residential buildings is far greater than believed
- Performance-Based Conservation is the proven approach to rapid engagement, action and results
- Climate Challenge Network aims to bring together like-minded organizations, owners, governments, industry, utility companies and academia in collaborative, data-driven action
- The goal is to bridge the gap between well-intentioned policies and resolutions and real, verified, deep emissions reductions



The Focus – Practical Pathways to Net Zero



Working together through a 3-step series to map out the **practical/financially feasible** pathway to net zero municipal buildings



MMC Annual Forum 2019



Alex Blue

PRINCIPAL, BUILDING ENERGY
PRACTICE LEAD,
MORRISON HERSHFIELD

**DATA-DRIVEN POLICY
FOR NEW BUILDINGS**



Matt Junglaus

MANAGER,
ROCKY MOUNTAIN
INSTITUTE

**ZERO-OVER-TIME
FOR EXISTING BUILDINGS**



Alexander Hay

FOUNDER AND
PRINCIPAL,
SOUTHERN HARBOUR

**CLIMATE RESILIENCE – GETTING
READY FOR THE FUTURE**



Dharmen Dhaliah

CORPORATE ASSET MANAGER,
TOWN OF
HALTON HILLS

**ASSET MANAGEMENT:
AN INTEGRATED APPROACH**



Russell Unger

Principal, Russell Unger
Consulting LLC

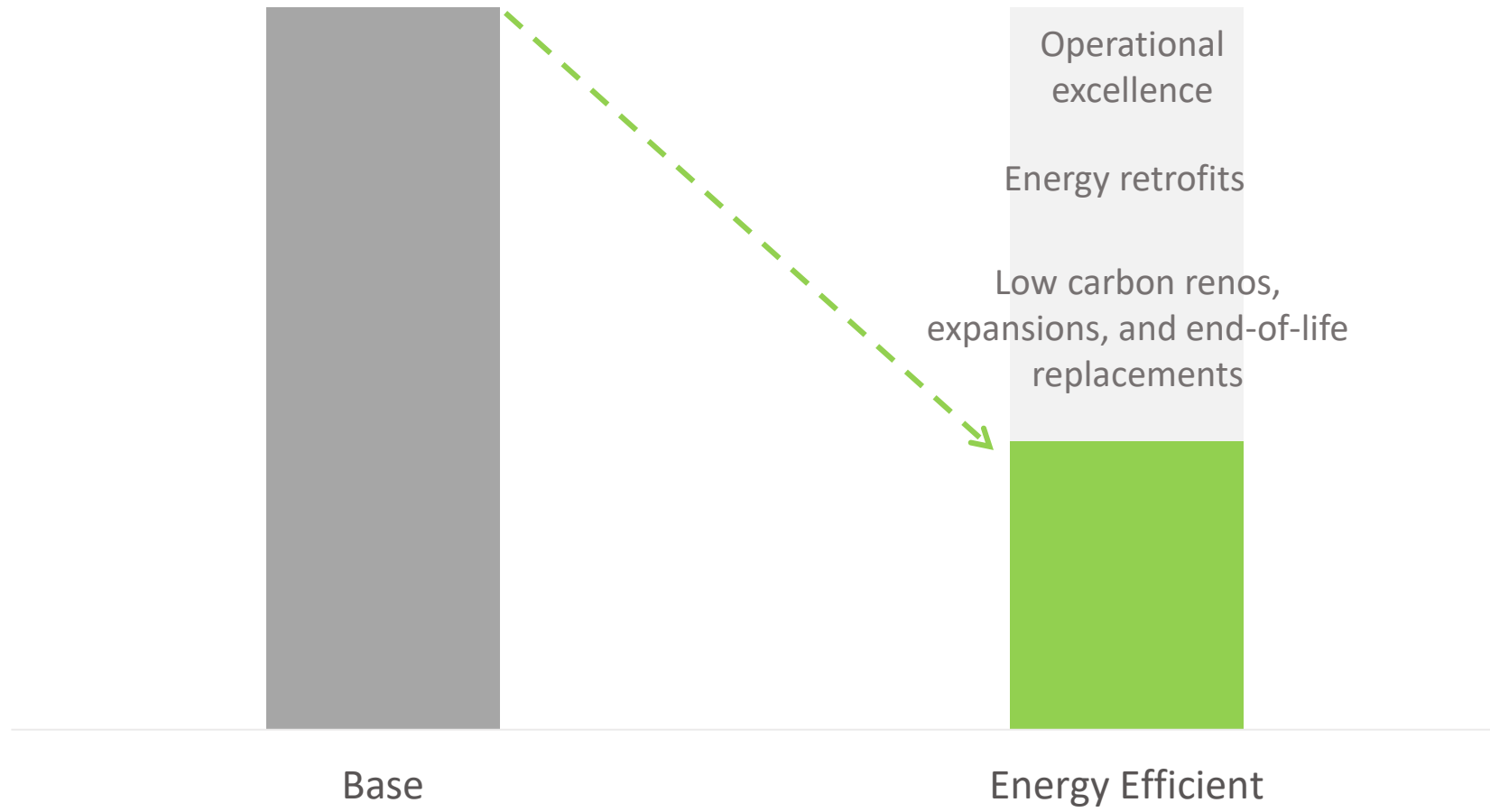


Jeff Ranson

Regional Director,
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Council

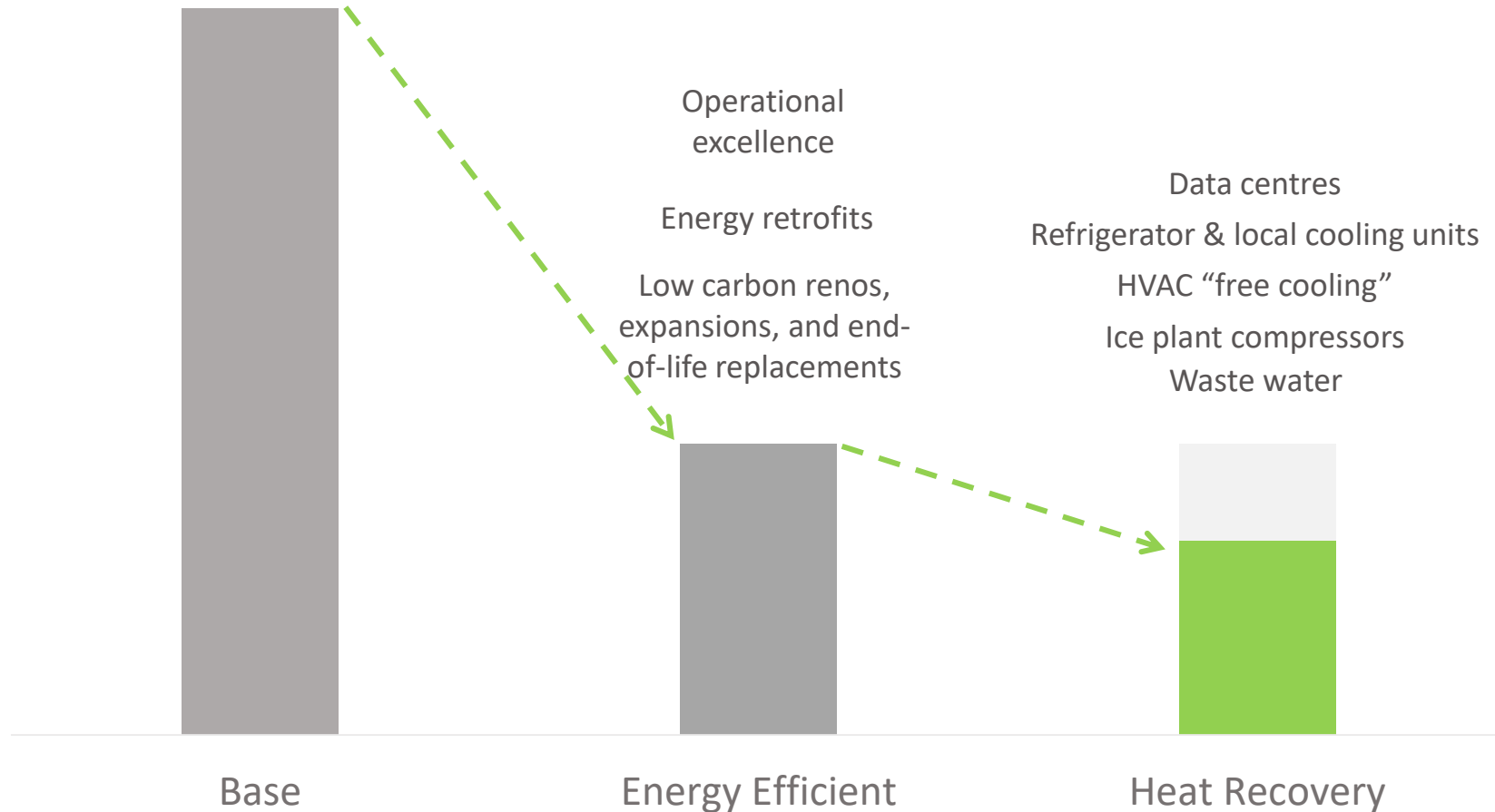


Step 1 – Demand Reduction



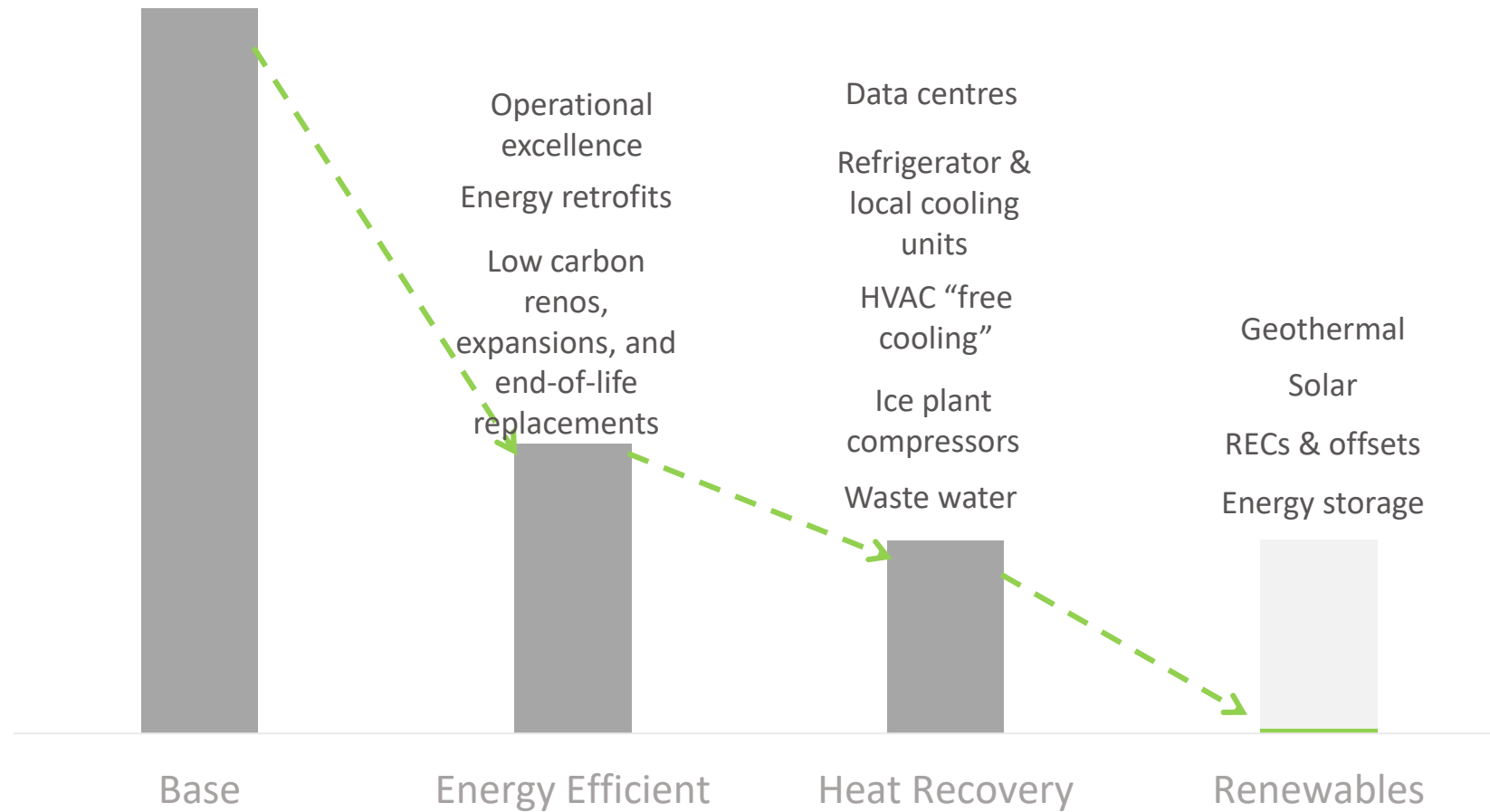


Step 2 – Advanced Heat Recovery



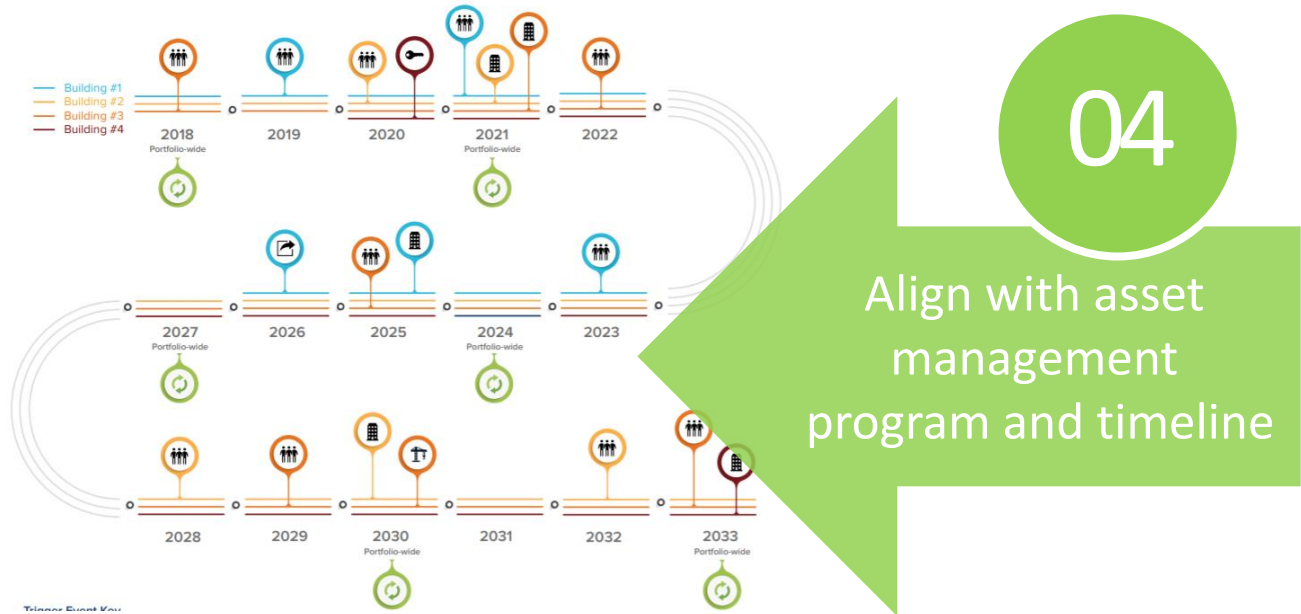


Step 3 - Renewables





Step 4 – Align with Asset Management



01

Load Reduction (Efficiency)

02

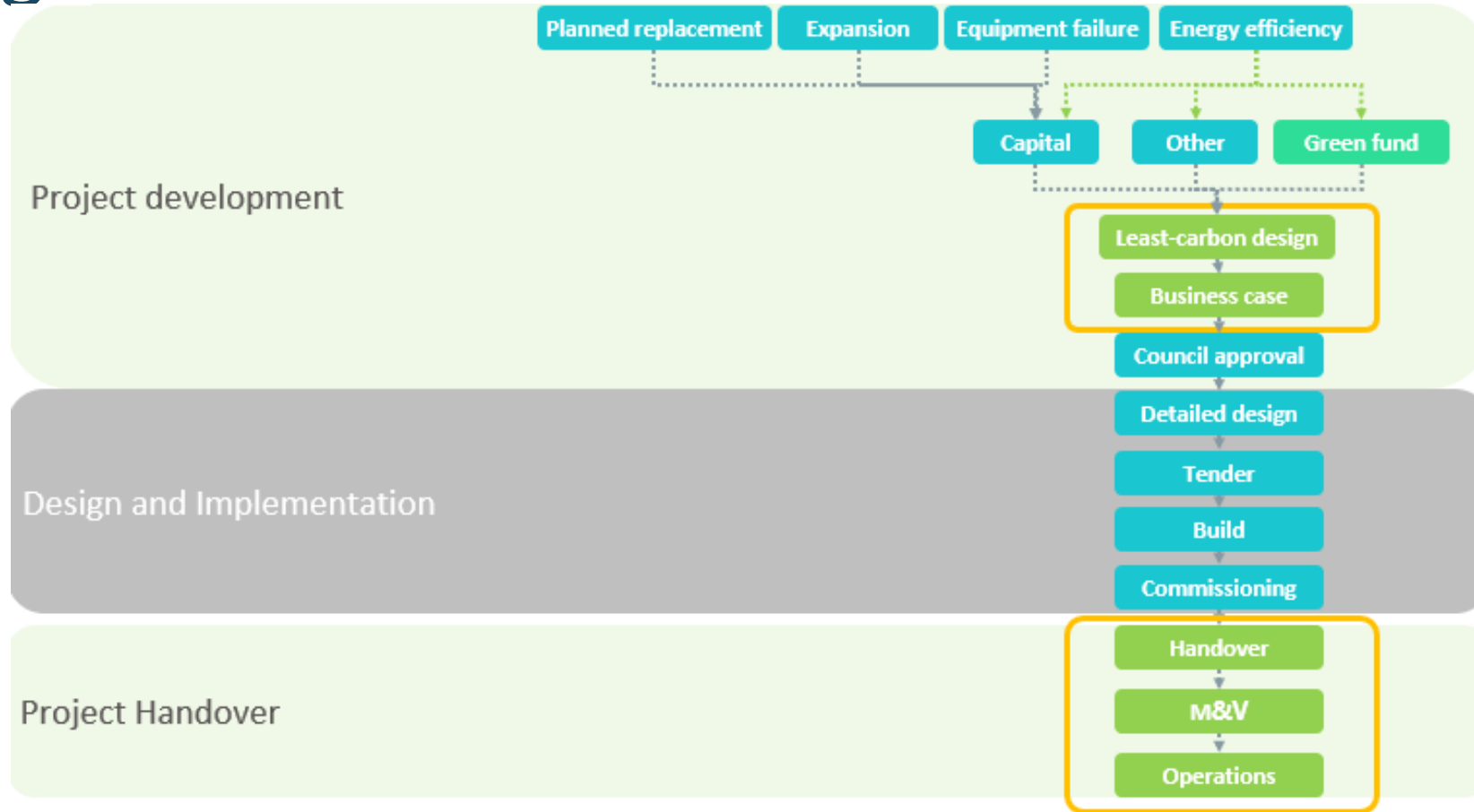
Advanced Heat Recovery

03

Renewables



Closing in on the “how”



- It's not about the “what” but the “how”
- Digging deeper into stories, experiences and lessons learned to derive insight
- Focusing on the initial **project development** and final **handover** stages are critically important



Leveraging Collective Learning



The importance of day-to-day decision-making has traditionally been overlooked. We are working with members to develop:

- Accessible **training modules**, test-driven with building operators
- Relevant **knowledge** on first principles
- **Applied research** and best practices guides
- **In-depth case studies** to document and scale lessons learned

Thank you!

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