ENERGY PERFORMANCE CONTRACTS
Taking the Risks Out of Energy Efficiency Building Retrofits in Hospitals

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CHES: POWERING INTO THE FUTURE
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TOPICS TO BE COVERED

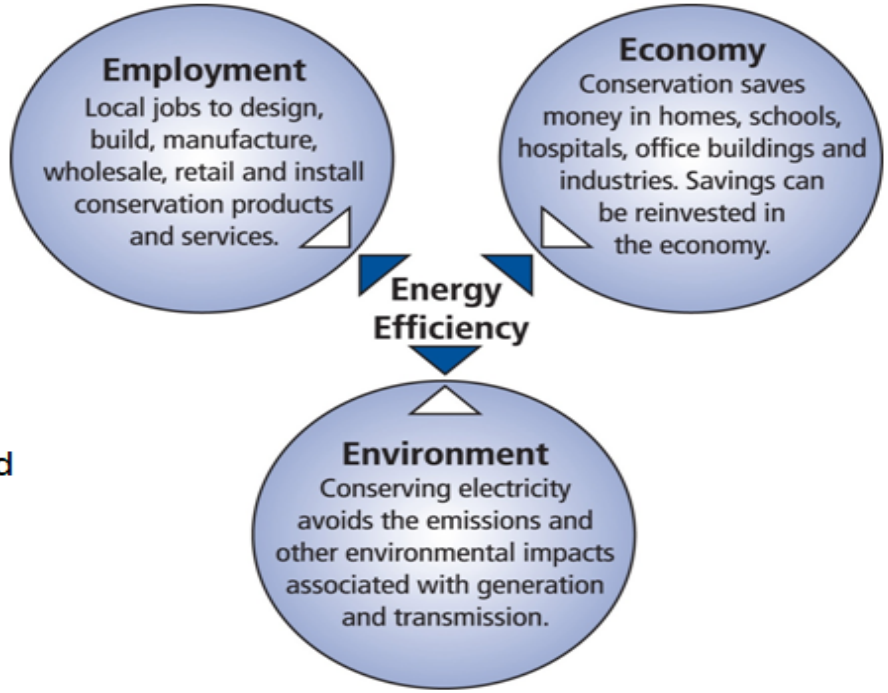
- Importance of Energy Efficiency
- Background on ESA Canada
- Energy Performance Contracts
- Role of Energy Service Companies
- Two Case Studies
  - Nabil Khalil, Baycrest Hospital
  - Allan McLuskie, Kingston General Hospital
- Discussion

BENEFITS OF ENERGY CONSERVATION

Benefits of Conservation

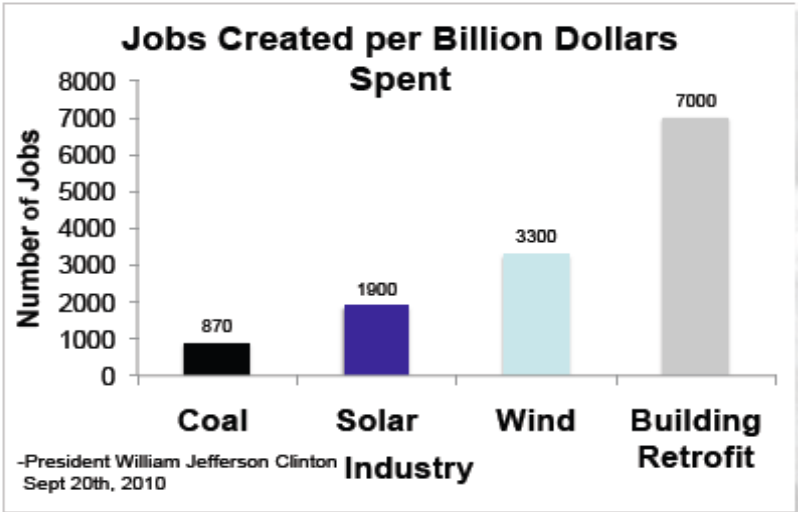
The Three "Es":

- **Employment** benefits: labour-intensive, local jobs
- **Economic** benefits: cost-effective for households and makes private sector more competitive
- **Environmental**/health benefits: reduced GHGs, acid rain, smog



OPA
Ontario Power Authority

EMPLOYMENT BENEFITS



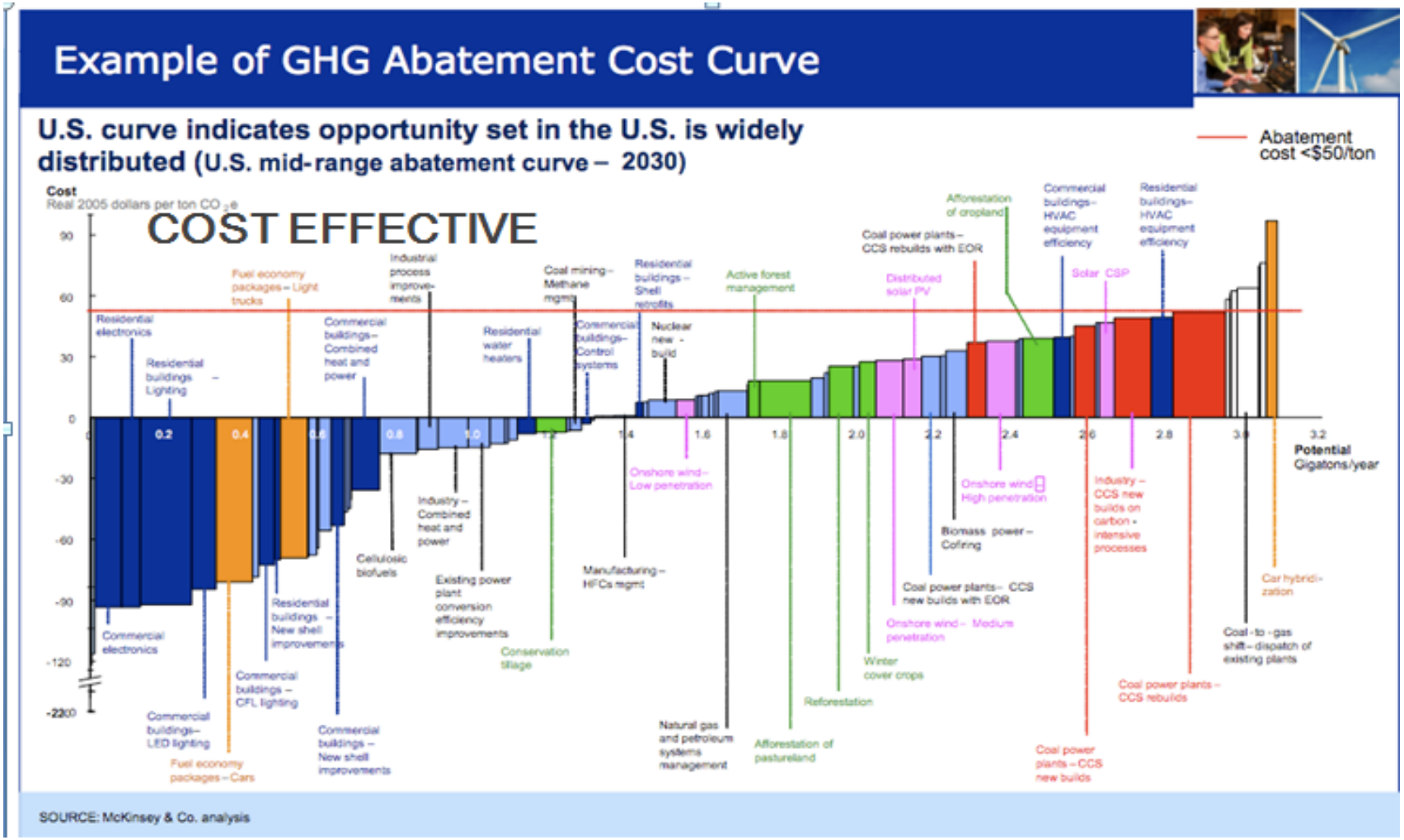
-President William Jefferson Clinton
Sept 20th, 2010

Empire State Building Retrofit:

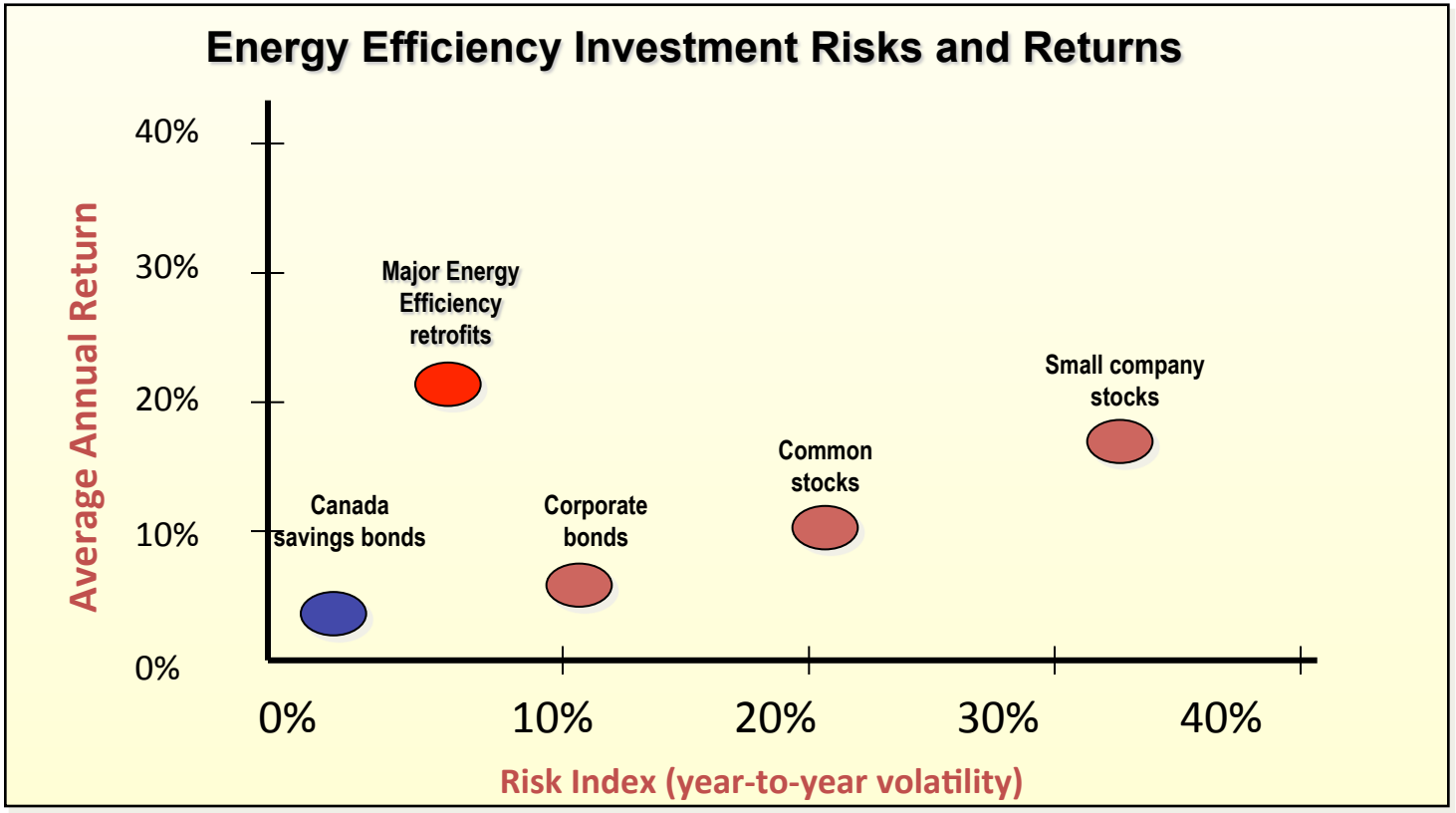
- 8 month design phase, 60 ideas considered, 8 projects (financial and environmental ROI).
- 3.1 year payback
- Initial $20 million, 38% energy reduction, $4.4 million savings annually.
- Creation of hundreds of jobs

- www.esbnyc.com

ECONOMIC BENEFITS



ENERGY EFFICIENCY RETROFITS ARE GOOD INVETSMENTS



Source: adapted from Ehrardt-Martinez, Karen and John 'Skip' Laitner: « The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture ». Washington, D.C., American Council for an Energy Efficient Economy, May 2008, page 29.

ENVIRONMENTAL BENEFITS

- IPCC – Most of the observed increase in the globally-average temperature since the mid 20th Century is *very likely (*i.e. > 90% likelihood) due to the observed increase in anthropogenic (i.e. man made) GHG concentrations
- IEA -rising fossil-fuel energy use will lead to irreversible and potentially catastrophic climate change
- Ban Ki-moon - slowing or even reversing the existing trends of global warming is the defining challenge of our ages.
- World Economic Forum's - climate change has the highest combined perceived impact and likelihood
- **82% of Canada's man-made green house gas emissions come from the production and use of energy**

OTHER BENEFITS OF GOING GREEN

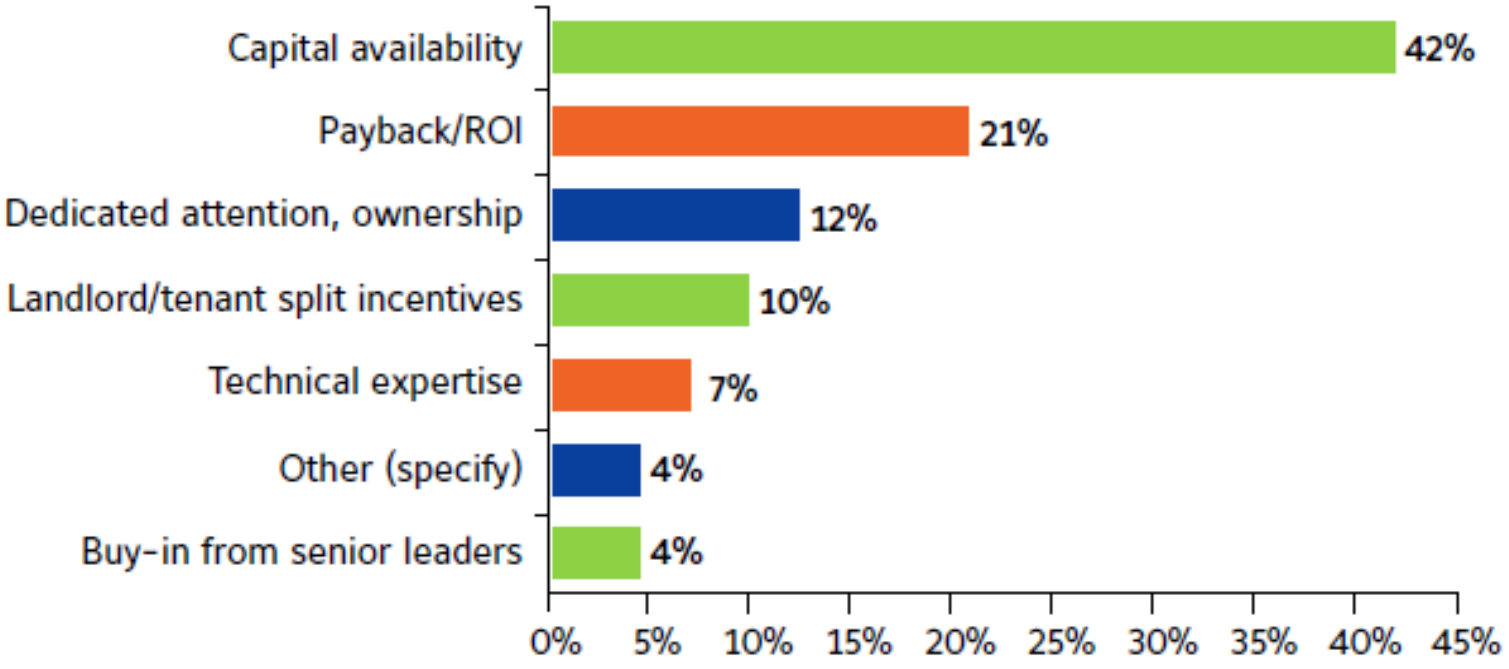
- 93% reported greater ability to attract talent
- 81% saw greater employee retention
- 87% experienced improved workforce productivity
- 75% reported improvement in employee health
- 100% experienced increase in goodwill/brand equity

Source: McGraw Hill “Business Benefits of Green Buildings”.

SIGNIFICANCE OF BARRIERS

Figure 1. Barriers to Energy Efficiency Retrofits

What is the top barrier to capturing potential energy savings for your organization?



Source: Johnson Controls and IFMA (2009) "Energy Efficiency Indicator" survey results.

ENERGY SERVICES ASSOCIATION OF CANADA

- Incorporated August 2010
- 8 founding independent energy service companies

AMERESCO Green • Clean • Sustainable

Honeywell

SIEMENS

AINSWORTH

Johnson Controls

TRANE

MCW Custom Energy Solutions Ltd.

Direct Energy

- Represent >90% $450 million/year market for guaranteed Energy Performance Contracts (EPC)

WHAT IS AN ENERGY PERFORMANCE CONTRACT

- Involves: a building owner and energy service company (ESCO)
- Savings financing: comprehensive measures with guarantees that the energy savings will be sufficient to finance the cost of the project
- Performance guarantee: Transfers technical and financial risk to ESCO
- Used since mid 80's; Canadian government created Federal Building Initiative in 1992

BENEFITS OF ENERGY PERFORMANCE CONTRACTS

- Turnkey – one contract managing many activities
- Releases pressure on capital funding allocations
- Tried and true approach – used by organizations across Canada since 1993
- **Not more expensive than alternatives when all staff/management costs included**

EPC NOT MORE EXPENSIVE THAN TRADITIONAL PROCESS

EPC Procurement	Traditional "Piecemeal" Procurement
Performance Guarantee Fee	**Additional Procurement Processes**
Financing Charges	**Additional Human Resources**
	Opportunity costs for differed projects
	Less Energy Savings resulting from: • Lost time • Fragmented Approach • No Monitoring and Verification • No Savings Guarantee

ROLE OF ESCOs

- Think of an ESCO as an extension of building owners/operators resources
  - Carries out feasibility studies / energy audits
  - Puts together a plan of action –design, implementation plan, purchase, installation, commissioning and measurement/verification of savings. Let's not forget training and awareness.
  - Arranges for financing
  - Reports to facility manager on an on-going basis

ADDRESSING DEFERRED MAINTENANCE

- Projects or facilities can be bundled to increase scope and energy savings
- Guaranteed energy savings from EPC can also be used to fund non-energy deferred maintenance priorities
- Typically achieved by extending the term of the EPC contract

HOSPITALCASE STUDIES

- Baycrest Hospital
- Kingston General Hospital

BAYCREST HOSPITAL – BACKGROUND

- Headquartered on a 22-acre campus in Toronto Ontario
- Fully affiliated with the University of Toronto
- Global leader in developing and providing innovations in aging and brain
- One of the world's top research institutes in cognitive neuroscience
- Dedicated centres focused on mitigating the impact of age-related illness and impairment

BAYCREST HOSPITAL - CHALLENGES

- Reduced Operating Costs
- Reduce Energy Consumption
- Reduce Greenhouse Gas Emissions
- Address Deferred Maintenance
- Address Infrastructure Renewal Requirements
- Expand Environmental Stewardship Initiative
- Develop & Implement Sustainable Solutions to address the above
- Address & Implement the above in a fully occupied Health Care Facility

BAYCREST HOSPITAL ESCO PROJECT

Process Utilized

Steps in the Process
✓ Review implementation models available to develop & implement sustainable solutions to address identified challenges
✓ Receive board approval to move forward with ESCO model
✓ Develop and then issue RFP
✓ Evaluate submissions & short list qualified proponents
✓ Conduct short list interviews
✓ Select project partner
✓ Initiate Investment Grade Audit
✓ Collaborate with project partner and select improvement measures
✓ Move forward with Implementation of selected improvement measures

FACILITY IMPROVEMENT MEASURES

Energy Measures

Lighting Retrofit And Redesign
- Facility lighting retrofit and redesign

Water Conservation
- Upgrade throughout Facilities

Building Controls
- Upgrade existing systems
- Repair, replace and Recommisioning
- Demand Ventilation on Kitchen Hoods

Infrastructure Priorities

Central Boiler Plant
- Boiler replacement - Replace (3) Dominion Bridge Boilers - (6) Fulton
- Steam Traps
- Boiler Controls
- Boiler plant optimization strategies

Central Chiller Plant
- (2) New 750 Ton VFD Chiller - Replace Carrier
- New Cooling Tower With VFD Fans - Increase Capacity
- Variable Flow Pumping
- Summer Boiler Operation for Reheat

Additional Measures
- Pneumatic Repair and Recommisioning – Thermostats, Valves, Apotex 'Wax' Valves

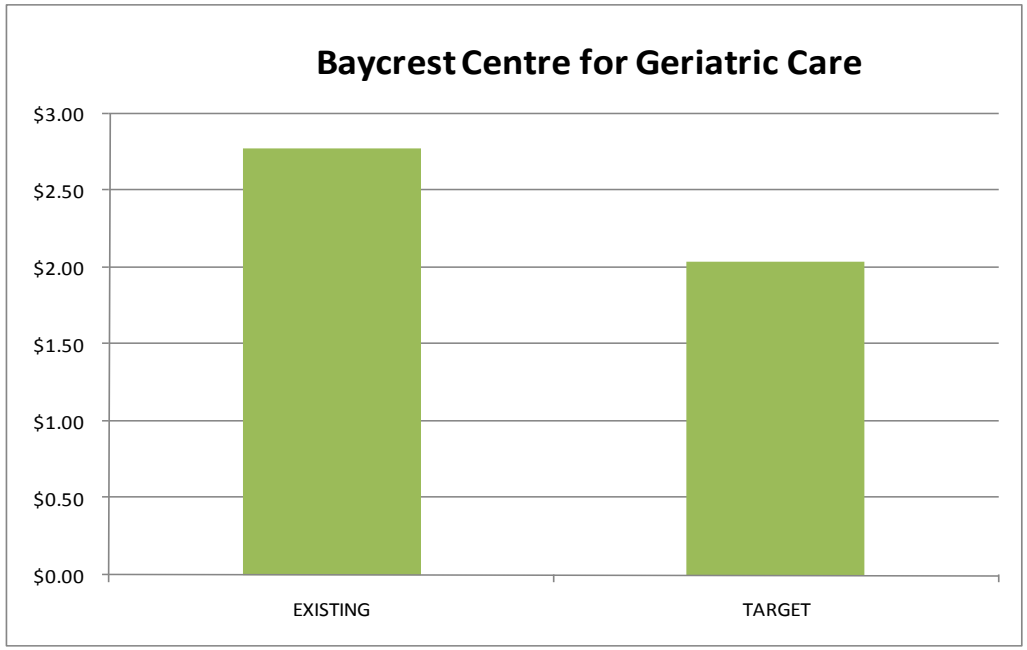
Infrastructure Priorities

Extended Measures (10 yr+ payback):

Lighting Retrofit And Redesign
- Lighting Exterior

Terraces, Wagman and Esther Exton
- Replace 550 Ton Chiller
- VFD on Chilled Water Pump - Valve Conversions
- Replace Atmospheric Boilers
- Transformer Replacement - Wagman Centre

PROGRAM OUTCOMES



- ✓ **26%** reduction in energy costs
- ✓ **$1,196,460** in annual savings
- ✓ **$908,353** in incentives available
- ✓ **3,365** Tonnes in annual Green House Gas reduction

BENEFITS OF ESCO PROCESS

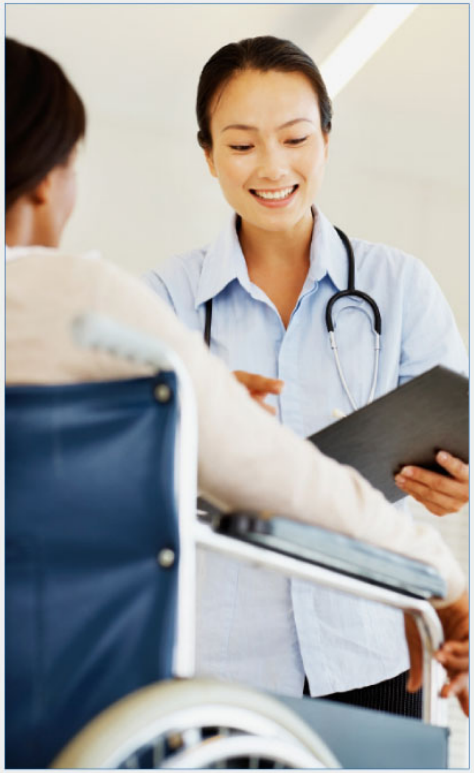
Lessons Learned

- Holistic implementation
- Single point of responsibility
- Avoiding the costs of delay
- Improvements without sacrificing services
- Real, verifiable cost savings
- Access to expertise…extension of staff
- Project cost and savings certainty GUARANTEED

Case Study

Kingston General Hospital

Outstanding care, always™



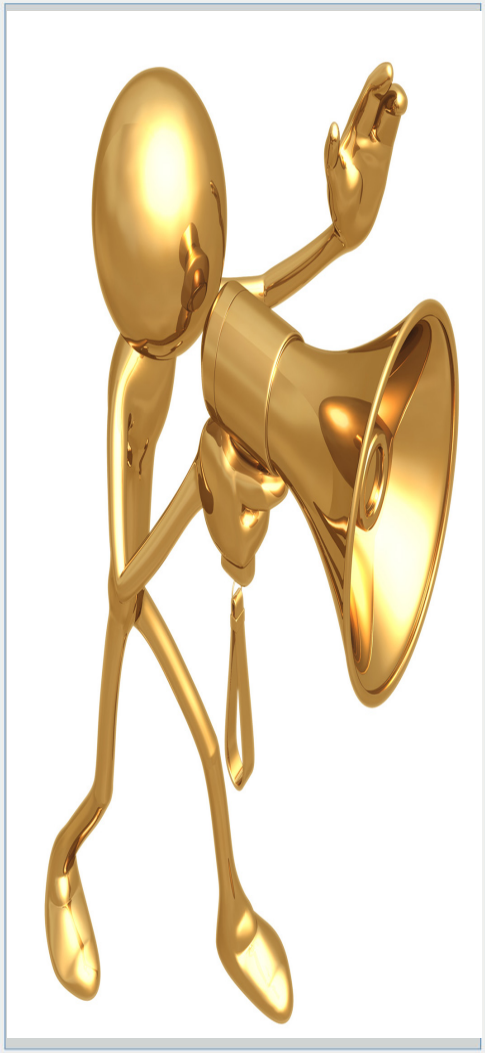
Kingston General Hospital

Outstanding care, always™

Save on Energy Testimonial

Acknowledgements

- Chris Mackey, Director Facilities Management, KGH, 2007 to 2012
- Chris Rousseau, Manager Maintenance Planning, Infrastructure Projects & Quality Assurance, KGH
- Honeywell



Background

- 1.39 Million Square Feet
- 2008-9 annual consumption:
  - 27 million kwh
  - 127,000 Giga Joules steam (purchased)
  - 29,000 M3 natural gas
  - 298,000 M3 water
  - 13,000 tonnes GHG emissions
  - $4.7 million utilities annually

Process Used

Kingston General Hospital

- Request for Qualifications - 2009
- 5 ESCo's applied, 2 were shortlisted
- Presentations received
- Honeywell selected
- Numerous meetings to nail down scope
- Contract negotiated - $7.6M
- Energy & Facility Renewal Report - September 2010
- Construction - January 2011
- Substantial completion - August 2013

Energy Retrofit Project - Phase 1

Kingston General Hospital

- Upgrading lighting system to energy efficient alternatives
- Building automation system expansion
- Chiller plant upgrade
- Weather-sealing of all buildings
- Replacement of more than 250 windows in historic building
- Upgrading mechanical systems
- Replacement of air handling system
- Installation of hot water condensing boiler
- Replacement of 10 oil-fired boilers with new high-efficiency gas-fired models
- Thermal insulation on piping
- Installation of low-flow toilets, sinks and other water fixtures
- Communication and awareness component

Savings

Kingston General Hospital

Utility	Quantities saved	$ Guaranteed	$ Achieved
Electricity Usage	2,308,011 kwh/yr	$196,543	$177,776
Electricity Demand	265 kw per year		
Steam	24,419 GJ/yr	$428,132	$428,304
Gas	-329,798 m3/ yr	($130,535)	($115,780)
Fuel Oil	96,892 L/yr	$84,372	$85,265
water	75,960 m3/yr	$88,556	$92,759
Operational	-40 hours labour	($2,676)	($2,676)
		$664,392	**$665,648**

Energy Retrofit Project - Phase 2

Kingston General Hospital

- Improvements to air handlers Burr Wing (zone dampers, scheduling to match occupancy)
- Computer sleep mode on 1252 computers
- Install new windows Watkins building

Kingston General Hospital

Watkins Wing

Window Upgrade Project (North Facade)

Phase 2 Savings

Kingston General Hospital

Utility	Quantities saved	$ Guaranteed	$ Achieved
Electricity Usage	1,128,194 Kwh	$98,717	
Electricity Demand			
Steam	5,196 GJ/yr	$78,808	
Gas			
Fuel Oil			
water			
Operational			
		$177,525	

Challenges

Kingston General Hospital

- OR shutdowns to complete the ESM's on air handlers
- Heritage committee approval for Watkins windows (1832 vintage)
- Computer sleep mode
- Concurrent $300 million dollar expansion and renovation during Phase 1
  - Caused facilities and maintenance staff to be stretched to the limit coordinating and carrying out shut downs for both projects
- Maintenance activities and PMs falling behind

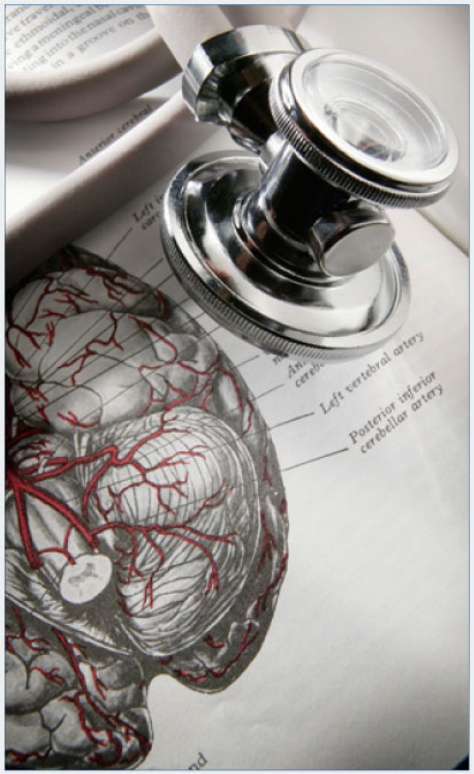
Particular Learnings

Kingston General Hospital

- Working with Board at all stages is key
- ESCo working with facilities operational staff at all stages is essential
  - Suggest a key experienced maintenance staff who know the building be assigned and work along with the project
  - Backfill the maintenance position to keep up with the regular maintenance activities
- Obtain buy in from affected departments especially OR's
- Communication plan is critical

Kingston General Hospital

Outstanding care, always™



Thank you!

OTHER HOSPITAL PROJECTS

- Hamilton Health Science
- London Health Sciences Centre
- Ottawa Hospital
- St. Michael's Hospital
- Sunnybrook Hospital
- Timmins and District Hospital
- Info on each available at ESAC booth # 801

DISCUSSION

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