# **SUSTAINABLE BUILDING PRACTICE**

"Green" present for brighter future

## What makes buildings "Green"?

### **Standard buildings:**

- There is approximately 81 million buildings only in the United States
- They use energy inefficiently,
- Generate large amounts of waste in their construction and operation, and
- Emit large quantities of pollutants and greenhouse gases

### **"Green buildings" seek to:**

- Use land and energy efficiently,
- Conserve water and other resources,
- Improve indoor and outdoor air quality,
- Increase the use of recycled and renewable materials.

## **Definition of "green building"**

#### Office of the Federal Environmental Executive

"The practice of increasing the efficiency with which buildings and their sites use energy, water, and materials, and reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal the complete building life cycle."

#### **Environmental Protection Agency** (EPA)

"The practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort."

#### U.S. GREEN BUILDING COUNCIL (USGBC) CREATORS OF LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

- November 2006 623 buildings had achieved some level of LEED certification
- December 2009 2,400 some level of LEED and 35,000 was in the process of acquiring some level of LEED
- October 2016 More than 200,000 LEED credentials are held only in U.S.

## What is **LEED** certification?

#### **Definition:**

LEED (Leadership in Energy and Environmental Design) is an ecology-oriented building certification program run under the auspices of the U.S. Green Building Council (USGBC)

LEED concentrates its efforts on improving performance across six key areas of environmental and human health

#### Key areas:

- 1. Sustainable site development
- 2. Water efficiency
- 3. Energy and atmosphere
- 4. Materials and resources
- 5. Indoor environmental quality-(IEQ)
- 6. Innovation and design process-(IN)

#### **LEED** defines:

"A nationally accepted benchmark for the design, construction and operation of high-performance green buildings" and "provides building owners and operators with the tools they need to have an immediate and measurable impact on their buildings' performance." Mandatory - "Prerequisites" Optional - "Credits"

### LEED v2.2 (2009)

- 26-32 points LEED Certified (non-innovation points)
- 33-38 points LEED Silver
- 39-51 points LEED Gold
- 52-69 points LEED Platinum

### LEED v4 (2016)

- 40 points LEED Certified
- 50 points LEED Silver
- 60 points LEED Gold
- 80 points LEED Platinum



### Benefits of LEED certification

LEED certification is a third-party validation of a building's performance and all LEED certified projects:

- Blend environmental, economic, and occupantoriented performance,
- Healthier and safer for occupants, energy and water efficient, cost less to operate and maintain,
- Demonstrating the values of the organizations that own and occupy them.

### **THE MOST IMPORTANT ELEMENT**

### The Efficient Use of Energy

- A "High-performance building" is a building whose energy efficiency and environmental performance is substantially better than standard practice.
- If a building is not energy-efficient, it cannot be said to be green.

## The reality of the built environment: the problem of existing buildings

LEED for Existing Buildings: Operations & Maintenance

• Certifies the completed and operated building as it functions on an **ongoing** basis.

LEED for New Construction

• The <u>one-time</u> act of renovating, constructing or tenant fit-out is certified.

## Impacts of conventional buildings that green buildings seek to rectify

### The environmental impacts

- Greenhouse gas (GHG) emissions
- Large amounts of construction and demolition (C&D) waste
- Buildings are responsible for 35% of total GHG emissions in NA
- Greenhouse effect

### Energy Use in Buildings

- The United Nations Environment Programme has reported that 30–40 percent of all primary energy produced worldwide is used in buildings.
- Electric lighting consumes about onequarter to one-third of the energy in a typical commercial building.

## **LED** Lights

Energy Efficiency &		
	)Dicdes	
	hours50,000	hours1,200
	<td>.Whvyr.3285</td>	.Whvyr.3285

hours8,000	
KWhvyr.767	

Contains the TOXIC			
	da/year451	ls/yesr4500	ls/year1051

Light Emitting 5)Dicdes				
CN		න් - may not worl under F10 -සියි0		
CN				
EffectiNo		Yes - can reduce callylifespan		
		onuerreds		
bleVery - LEDs can handle jarring and	viztyNot - glass or filament can easilybreak	itsiaNot Italiass		
btu3.4 b	btu85 bl	biu30 bi		

typicalNot «S acaritat

## **LED** Lights

### LED T8

- Up to 84,000 hours
- Up to 10 years warranty
- LED T8 4' 15W
- Approx. 10\$/ea.
- Mercury free
- Directional lighting
- Quality light
- Works well with the controls
- Shatterproof
- Dimmable

### Fluorescent T8

- Up to 30,000
- 1 to 2 years warranty
- FL T8 4' 32W
- Approx. 4\$/ea.

## Building water use

#### North American household water use



- Traditional urinals 1< gal. (3,7L)
- Ultra-low urinals 0.125 gal. (0.5L)
- Traditional toilets 2,5-3,5g al. (9.5-13L)
- High efficiency toilets 1.2-1.6 gal. (4.5-6L)
- Ultra-high efficiency toilets 0.8 gal. (3L)

## Criteria for Identifying Green Products



## Case study: WCRI 268 Phillip St. Property (CCK)

#### Water Audit Summary

- Total number of suites: 93
- Current water usage m3: 23,731
- Current water/sewer charge: \$3.76
- Current yearly water cost: \$89,228
- Current monthly water cost: \$7,436
- Current yearly cost per suite: \$959

### Equipment to be installed

- 93 Ultra High Efficiency Toilets H & H 3 Litre Proficiency N7717
- 93 Toilet Seats Colour matched to toilet
- 93 Braided Stainless Steel Supply Lines 3/8" X 1/2"
- 93 Showerheads 1.5 gpm vandal resistant
- 93 Kitchen Faucet Aerators 1.5 gpm vandal resistant
- 93 Lavatory Faucet Aerators 1.0 gpm vandal resistant

### Water conservation program budget cost & estimated savings

Building	Annual Water Use in m3	Estimated Domestic Water %	Project cost	Water Savings m3	Water savings \$	Projected Percent Savings	Return on Investment (RoI)
268 Phillip Street	23731	80%	\$25,575	4749	\$18,389	20%	16.7 Months

Total project cost excluding H.S.T. \$ 25,575.00 Total cost per unit excluding H.S.T. \$ 275.00

## PROFICIENCY Ultra-high efficiency toilet N7717



- Ultra high efficiency flush
- Soft-close seat
- Life-time warranty on china
- 10 years warranty on air transfer system
- 1 year warranty on flush valve
- Flush handle free

### Results:

#### Invoice for May 26 to July 28, 2015 Invoice for May 27 to July 28, 2016

Revenue Services 100 Regina St. S., PO BOX 337 STN WATERLOO Waterloo, Ontario N2J 4A8 Tel. 519-747-8718 Fax 519-747-8760 TTY: 1-866-786-3941 www.waterloo.ca/water	AC.R.I	ISSUE DATE DUE DATE: AMOUNT DUE: AFTER DUE DATE	AUG. 13, 2015 SEP. 08, 2015 \$12,625.64 \$12,815.02		Avenue Services 0 Regina St. S., PO BOX 337 STN WATERLOO aterloo, Ontario N2J 4A8 1, 519-747-8718 Fax 519-747-8760 TY: 1-866-786-3941 ww.waterloo.ca/water		ISSUE DATE DUE DATE: AMOUNT DUE: AFTER DUE DA	AUG. 12, 20 SEP. 07, 2016 \$6,637.83 TE: \$6,737.40	16 RECEIVED
Previous Balance\$11508.92Adjustments\$.00Payments Received\$-11508.92Balance Forward\$.00		ACCOUNT # METER # SERVICE ADDRES	3072550 73339205 SS: 268 PHILLIP ST		Previous Balance \$9214.62 Adjustments \$.01 Payments Received \$-9214.00 Balance Forward \$.63		ACCOUNT # METER # SERVICE ADDR	3072550 7 <del>333</del> 9205 268 PH/LLIP ST	AUG 1 9 2016
METER NUMBER	METER	READ	CONSUMPTION	BILLING	METER NUMBER	METER	READ	CONSUMPTION	BILLING
	PREVIOUS	CURRENT		DAYS		PREVIOUS	CURRENT		DAYS
73339205	7804	11000	3196	63	73339205	25783	27303	1520	62
Balance Forward .00   Water, Sewage & Storm Water (SW) Charges for MAY. 26, 2015 to JUL. 28, 2015   Water Consumption 3196M3 x 1.66   Sewage Charge 3196M3 x 2.10   50mm Water Meter Charge 26.90   SW FEE (Multi-Res Lrg)1 581.78					Balance Forward Water, Sewage & Storm Water (SW) Charges for MAY. 27, 2016 to JUL. 28, 2016 Water Consumption 1520M3 x 1.70 Sewage Charge 1520M3 x 2.17 50mm Water Meter Charge SW FEE (Multi-Res Lrg)1 63 62082-828 34025 84.00 CREDIT UNION LIMITED 27.58 AUG 3 1 2016 \$6,637.83 WE CHARGE CHARGE STREET WEST, UNIT 1				

### Gray water and Gray water Systems

## KNOW YOUR WATER

CLEAR WATER
GRAY WATER
BLACK WATER

Image: Comparison of the state of the state

## WCRI Fenwick building Grey water system



## QUESTIONS AND DISCUSSION