Presentation Outline

- What is green building
- Why build green
- ESC carbon calculator
- Residential benefits of natural gas
- Green home building
- Green home programs in Canada
  - LEED Canada for homes
  - Energy Star in Canada
  - Canada R-2000 Standard
  - EnerGuide Canada
  - HERS
  - Future ERS
- Other Green Information & Resources

What is **Green** Building?

- Sustainable or "green building" design and construction is the opportunity to use our resources more efficiently, while creating healthier and more energy-efficient homes.
- It includes protecting and restoring human health and the environment throughout the building life-cycle: siting, design, construction, operation, maintenance, renovation and deconstruction.

Why a Green Home?

- Market differentiation and long-term increased resale value
- Savings on monthly utility bills
- Healthier place to live
- Sustainability
- Potential rebate and incentive programs.
- Potential province and/or local tax credits
- Potential for "Green loans" for purchasing energy-efficient homes or making energy-saving upgrades

5

How We Build Affects our "Green"

- Typical home causes twice the pollution of typical car
- Residential sector accounts for 20% of CO_2 emissions from fossil fuel combustion
- Construction of a 2,000 ft^2 home generates 4 tons of waste

Source: ENERGY STAR, EPA, NAHB

6

Natural Gas Blue can Make You "Green"

- Environmental benefits
- Homeowner Benefits
- Promotes green home-building standards throughout the world
- Efficient natural gas products are important to residential green building
- Green is growing and the growth is expected to continue

7

The Environmental Benefits of Natural Gas

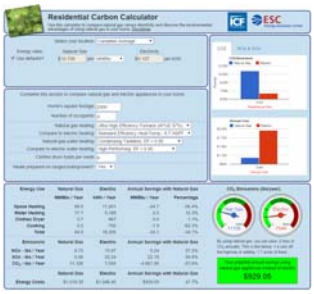
- Cleanest burning fossil fuel
- Produces no sulfur dioxide or particulate emissions
- Much lower levels of carbon dioxide and nitrogen oxides than oil or coal
- Delivered to the customer at about 90% efficiency, compared to electricity which is about 30%
- Unlike oil, coal and nuclear, the natural gas process produces no solid waste

Source: American Gas Association

 8

ESC's On-Line Carbon Calculator

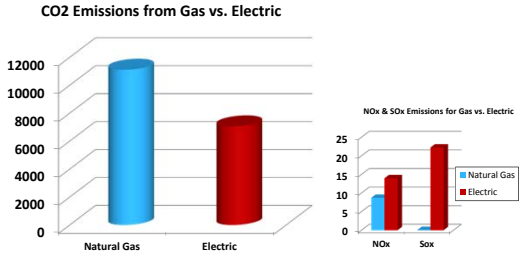
- Simple User Inputs
  - Home Size
  - Family Size
  - Loads of laundry per week
  - Cook or not cook
- Various heating and water heating appliances and efficiencies can be selected
- Example to follow:
  - 2000 foot^2 home, average heater efficiencies
  - Family of 3, average water heater efficiencies
  - 7 loads of laundry dried per week



http://uat.energydepot.com/rccalc/

 9

ESC's Carbon Calculator



 10

The Residential Benefits of Natural Gas

- **Cost Effective** – operate at up to half the cost of non-gas appliances
- **Reliable** – delivered via underground pipes so it is there when you need it
- **Comfortable** – natural gas heat is delivered at temperatures between 43.3°C and 48.8°C
- **Safe** – excellent safety record due to the physical characteristics of gas
- **Abundant** - 99% of natural gas is produced in North America, with enough supplies to last 100+ years

 11

Green Home Building

- Green homes comprised 17% of the overall residential construction market in 2011, up from 2% in 2005.
- McGraw Hill Construction anticipates that the Green market share will continue to increase, resulting in an opportunity worth well over $110 billion.
- Per the EPA, green buildings often cost only a few percentage points or no more to build than conventional designs.
- 77% of home buyers agree that it is important to know projected utility costs.
- 73% of home buyers agree that utility costs would affect their buying decision.
- On average, home buyers would pay an additional $7,100 up front in order to save $1,000 per year on utility bills.

Source: 2011-2012 McGraw-Hill Construction Green Home Builders and Remodelers Survey
2013 NAHB study "What Home Buyers Really Want".

 12

Residential Green Building Practices

- Homes today are designed and constructed to use energy, building materials and water more efficiently
- Designed to reduce impact on the physical environment
- Promote a healthy indoor environment.
- Use an integrated design approach that sees the house as a system.

 13

Green Home Programs in Canada

- Canada Green Building Council and LEED Canada
- ENERGY STAR
- Canada R-2000
- EnerGuide
- HERS
- Future ERS

 14

Canada and LEED

- The Canada Green Building Council (CaGBC) is a not-for-profit, national organization that has been working since 2002 to advance green building and sustainable community development practices in Canada.
- In July 2003 CaGBC obtained executive license from USGBC to adapt LEED to Canadian circumstances.

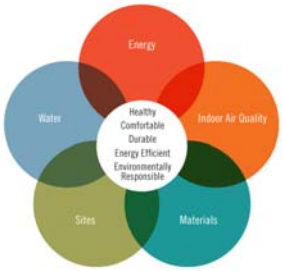
 15

LEED Canada for Homes

LEED Canada for Homes adaptation of the USGBC program, tailored specifically for Canadian climates, construction practices and regulations

 16

How Does LEED Define a Green Home



 17

LEED Certification Levels and Points

Total number of points available: 136

- Certified: 45-59 points
- Silver: 60-74 points
- Gold: 75-89 points
- Platinum: 90-136 points

 18

LEED Homes are Rated in 8 Categories

1) Innovation and design process
2) Location and linkages
3) Sustainable sites
4) Water efficiency
5) Energy and atmosphere
6) Materials and resources
7) Indoor environmental quality
8) Awareness and education

 19

LEED Canada Rating Information

- The number of points for each certification level is adjusted based on home size, using the Home Size Adjustment tool
- 35 topic areas, each with unique intent or goal
- Rating system guarantees minimum levels of sustainable practice through 19 prerequisites in 8 categories
- Credit Interpretation Requests available to projects that need clarification or special consideration
- Requires third-party verification as part of certification

 20

Mandatory and Optional Points

Credit Category	Prerequisites – Mandatory Measures	Minimum Point Requirements	Maximum Point Requirements
Innovation & Design Process	3	0	11
Location and Linkages	0	0	10
Sustainable Sites	2	5	22
Water Efficiency	1	3	15
Energy & Atmosphere	2	0	38
Materials & Resources	3	2	16
Indoor Air Quality	7	6	21
Awareness & Educ.	1	0	3
Total	**19**	**16**	**136**

 21

Energy and Atmosphere Prerequisites

- Design and size HVAC equipment properly using CAN/CSA-F280-M90 (R2004):
- Climate zones A & B: Gas Furnaces ≥ 90 AFUE; Gas Boilers ≥ 85 AFUE
- Climate zones C & D: Gas Furnaces ≥ 92 AFUE; Gas Boilers ≥ 87 AFUE
- Install ENERGY STAR rated HVAC equipment.
- Install a programmable thermostat (except heat pumps and hydronic systems).
- Performance achieving EnerGuide Rating System (ERS) 76 or HERS 80

 22

Natural Gas Points Available for Energy and Atmosphere – HVAC

1. High Efficiency HVAC (2 points) if ≥ efficiency standard for climate zone.
   - Zones A & B: Gas Furnaces ≥ 92 AFUE; Gas Boilers ≥ 87 AFUE
   - Zones C & D: Gas Furnaces ≥ 94 AFUE; Gas Boilers ≥ 89 AFUE
2. Very High Efficiency HVAC (3 points) if ≥ efficiency standard for climate zone.
   - Zones A & B: Gas Furnaces ≥ 94 AFUE; Gas Boilers ≥ 89 AFUE
   - Zones C & D: Gas Furnaces ≥ 96 AFUE; Gas Boilers ≥ 91 AFUE

 23

Natural Gas Points Available for Energy and Atmosphere – Water Heaters

Water heater type and efficiency	Description	Points
EF ≥ 0.53 (300 litres / 80 gallons)	High-efficiency storage water heater	1
EF ≥ 0.57 (230 litres / 60 gallons)	High-efficiency storage water heater	1
EF ≥ 0.61 (150 litres / 40 gallons)	High-efficiency storage water heater	1
EF ≥ 0.8	Storage or tankless water heaters	2
CAE ≥ 0.8	Combination water and space heaters	2

 24

LEED Rating and Certifying

- Providers are local and regional organizations chosen by CaGBC
- A Provider is under contract with the CaGBC to perform the following functions:
  - Recruit and register projects for Leed Canada for Homes
  - Coordinate and oversee Green Raters
  - Submittal of documents
  - Provide quality assurance for the certification

 25

Steps to Participate in LEED

- Contact a LEED Canada for Homes Provider and join the program – they provide up-front technical support if needed
- Identify the project team – this step includes:
  - Performance testing of typical example of builder's home design
  - Completion of a preliminary project checklist
  - Preliminary estimate of a LEED Canada for Homes score and certification level

CONTINUED

 26

Steps to Participate in LEED

- Build the home – this includes on-site performance tests as well as visual inspections
- Certify the home which includes the following:
  - Completed and signed LEED Canada for Homes checklist
  - Completed and signed Accountability Forms
  - Completed and signed Durability Risk Form and durability inspection checklist
- Market and sell the home

 27

Costs Associated with LEED-Single Family Housing

	Registration	Certification
Member	**$215**	**$255**
Non-Member	**$260**	**$305**

 28

Energy Star® in Canada

- Canada is an international partner in the U.S. ENERGY STAR program
- The Office of Energy Efficiency (OEE) of Natural Resources Canada has promoted the international ENERGY STAR® symbol in Canada and monitored its use since 2001
- Every ENERGY STAR home is:
  - Constructed by trained builders who are licensed by the Government of Canada
  - Awarded an ENERGY STAR label approved by the Government of Canada
  - Issued a certificate by the Government of Canada

CONTINUED

 29

Energy Star® in Canada

An ENERGY STAR® qualified new home is on average 20 percent more energy efficient than a home built to code. Typical features include:

- Efficient heating and cooling systems that use less energy, reduce indoor humidity and improve the overall comfort of your home
- High-performance ENERGY STAR® windows, patio doors, and skylights keep the heat in during the winter and out during the summer
- Walls and ceilings insulated beyond what is required by the building code

CONTINUED

 30

Energy Star® in Canada

- A variety of ENERGY STAR® products which use less electricity by meeting strict technical specifications.
- A heat or energy recovery ventilation system (HRV or ERV) ensures the home has controlled ventilation.

- It is similar to the US program

 31

Energy Star® in Canada (cont'd)

Key changes made with Canada's Version 12.3 for homes enrolled after December 1, 2012.

- ***Using a building code reference house as the baseline***. A reference house is based on minimum requirements under the applicable building code. It forms the baseline for determination of the energy target. This ensures that ESNH is complementary to building codes that include energy requirements.
- ***Making the energy target more stringent***. An ENERGY STAR® qualified home is approximately 20 percent more efficient than a reference house. This level strikes a balance between the premium level of energy efficiency associated with the ENERGY STAR® label and an acceptable incremental cost (relative to a house built to minimum building code requirements).
- ***Mandating minimum insulation requirements***. All ENERGY STAR® qualified homes, regardless of compliance approach, have minimum prescribed levels of insulation. This ensures a certain level of emphasis is placed on the envelope which reinforces good building science principles as well as provides consistent messaging for all ENERGY STAR® qualified homes.

32

Energy Star® in Canada (cont'd)

- ***Mandating a minimum amount of electrical savings***. All ENERGY STAR® qualified homes, regardless of compliance approach, have a minimum of 400 kilowatt-hours (kWh) of electrical savings relative to houses with non-ENERGY STAR® qualified products.
- ***Changes to the prescriptive and performance methodologies***. For the prescriptive approach, ESNH uses a 'core Builder Option Package (BOP) plus options approach'. To meet compliance, a builder must implement all aspects of the core BOP and then choose a minimum number of items from an options list specified for each BOP. For the performance approach, the builder must meet a prescribed energy target in addition to the minimum requirements.
- ***Flexible integration of ENERGY STAR qualified products***. With the exception for fenestration, there is no longer a blanket requirement for ENERGY STAR® qualified products. Instead, ENERGY STAR® qualified products, such as appliances and lighting, are included on the eligible electrical savings list.

33

Canada R-2000 Standard

- Voluntary energy-efficiency standard for new houses that is continually upgraded
- It has become the benchmark for new home construction since introduction over 25 years ago
- Performance-based; homes designed to perform above building codes
- Ongoing education and training for home builders; plus testing and certification
- More than 20,000* R-2000 homes; 5,000 builders licensed to build R-2000 homes

34

About Canada R-2000

- Builder's license: Builders must complete training (classroom and hands-on experience) and hold R-2000 builder's license
- Energy budget: Typically, need 30 percent less energy to operate than conventional new homes. High-efficiency HVAC systems, additional insulation, airtight envelope
- Whole-house ventilation: Outdoor air to all living areas; designed and tested to meet CSA International Standard CAN/CSA-F326 M91 ("Residential Mechanical Ventilation Systems") – Installers trained by the Heating, Refrigeration and Air Conditioning Institute of Canada or equivalent
- Environmental pick list: options for indoor air quality and environmental features

 35

More About Canada R-2000

- Safer heating: Designed so not susceptible to combustion spillage
- Water conservation: Water-conserving toilets, faucets and shower heads
- Independent inspections: Every home submitted for R-2000 certification must undergo a series of independent inspections and tests to verify that the requirements of the R-2000 Standard have been met

 36

EnerGuide Canada

- Like EnergyGuide in terms of labeling appliances (electrical), heating & cooling equipment, fireplaces to help customers determine efficiency levels
- Managed by Natural Resources Canada and Office of Energy Efficiency
- EnerGuide Canada also includes home audits and ratings of new and existing homes
- Home ratings range from 0 – 100; with a rating of 100 representing a house that is airtight, well insulated, sufficiently ventilated and requires no purchased energy on an annual basis
- For a brand new house, a rating of greater than 80 is very good

Natural Resources Canada Ressources naturelles Canada Canada

 37

EnerGuide Rating Service for New Homes

1. The builder contacts an EnerGuide Rating System Service Organization to get a list of certified energy advisors in their area.
2. The builder then works with an energy advisor to enroll and label houses in the program.
3. The energy advisor undertakes an analysis of the new house plans, noting components that will affect the energy efficiency of the house (i.e. mechanical equipment, windows, building envelope, insulation levels, etc.).
4. The energy advisor inputs this information into NRCan's energy simulation software to determine the estimated annual energy usage and EnerGuide Rating for the house as per the plans.

ENERGUIDE

 38

EnerGuide Rating Service (cont'd) ENERGUIDE

5. The energy advisor also provides variations of the simulation that include energy efficient upgrades which improve the energy performance of the home. The energy advisor ensures that good Building Science principles are maintained.
6. The "as per plans" rating and the optional energy efficient upgrades are provided to the builder for costing analysis.
7. The builder meets with the homeowner to agree on the house specs and energy efficient components that their house will have, and at what cost.
8. When construction is complete, the builder calls the energy advisor to come back to the house to verify the energy efficient upgrades and performs a blower door test.

 39

EnerGuide Rating Service (cont'd) ENERGUIDE

5. After the data has been collected, the homeowner is provided with the evaluation report and official label that shows the EnerGuide rating of the home. This label should then be affixed to the electrical panel.

 40

Finding a Provider for R-2000 and EnerGuide

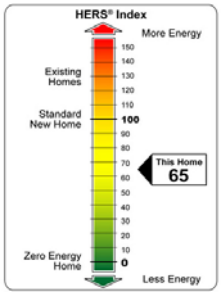
Natural Resources Canada (NRCan) licenses service providers across Canada to deliver its EnerGuide Rating System, ENERGY STAR® for New Homes and R-2000 initiatives promoting energy-efficient homes

- Single point of contact to locate providers online.
- Listed by Region
- www.nrcan.gc.ca

Natural Resources Canada
www.nrcan.gc.ca

41

What is The HERS Index?



RESNET

- Created HERS index to rate homes for US Mortgage Industry
- Based on a home built to IECC standards
- Lower is better
- Every number change = 1% change in efficiency
- Not widely used on Canada

42

Future New Program in Canada

- Energy Rating System – ERS
- Will generate a 0 – 100 rating but will not be directly comparable to current scales
- Basic
  - Based on energy consumption in GJ/yr using new version of Hot2000 software
  - Geometry of the reference house is individual to a province as well as the specific house being rated
  - Will express improvement and targets in straight percentages
  - Will also provide energy intensity as $GJ/m^2/yr$

43

More on ERS

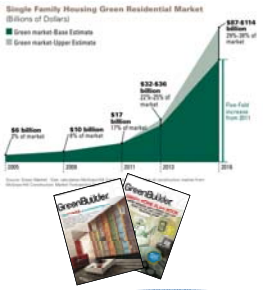
- Scheduled for launch by NRCan starting in 2015 on a province by province basis
- NRCan to provide training materials to delivery network providers
- A sufficient provincial delivery capacity must be in place for launch. This means all evaluators, auditors and service providers must pass new exams based on the new criteria and software.

ERS Labels

- Will be more informative for homeowner
  - Basic will provide the rating and a multi-page report including input info
  - Reno Upgrade will also provide recommendations to homeowners interested in upgrading the energy efficiency
  - This consumption based scale can be used to set a target for incentive programs, i.e.,
    - a home must be x% better than the ERS Reference house to be eligible
    - a certain level of energy intensity (EI) must be met

Trendy Green

- The residential green building movement has exploded and is projected to continue to grow
- Green Builder Magazine- print and digital circulation of over 200,000
- "The nation's leading publication focused on green building and sustainable living"



Do Green Homes Really Deliver?

Results of national survey of current green homeowners:

- 94% would recommend a green home to a friend.
- 92% would purchase another green home
- 71% of respondents believe that green homes are, overall, of higher quality
- 55% knew their home may have cost more than a non-green home, but believed the benefits outweighed the cost
- 90% were satisfied knowing they "did the right thing" in buying a green home

47

How to Market Green

Selling Points for Consumers

- A healthier home environment through improved indoor air quality
- A more comfortable home due to fewer temperature variations
- A return on investment through energy savings and lower maintenance costs
- A positive environmental impact
- A reduction in the use of natural resources

48

Hurdles to Building Green Homes

- Higher perceived first cost of a green home
- Lack of consumer education about green building
- Finding certified, knowledgeable builders
- Certification costs
- Communication among the team – from design to installation

49

Remember: Natural Gas is the Green/Energy Efficient Choice

- The cleanest burning fossil fuel
- Virtually no emissions of sulfur dioxide or particulate matter and far lower levels of "greenhouse" gases when burned
- Produces virtually no solid waste
- Delivered to the customer with around 90 % efficiency
- Almost 100% of natural gas is produced in North America

 50

Resources

Energy Solutions Center
www.energysolutionscenter.org
www.naturalgasefficiency.com

ENERGY STAR
www.energystar.gov

Canadian Gas Association
www.cga.ca

AGA
www.aga.org

Canada Office of Energy
www.nrcan.gc.ca

Canada GBC
www.cagbc.org

 51

Rebates, Incentives, Tax Credits

 52