The Seminar Credo
“The majority will attend because they are truly interested or simply curious.”
C. W. Thomas

We can’t predict the future….we can only decide to be an observer, follower or leader in its development.

The Greatest Opportunity
Objective
Spark an Idea (or Two) which if acted upon generates new revenues and profits for your business whilst improving housing for older adults.

How boats were invented
Men’s Island

Women’s Island

The Greatest Opportunity
Housekeeping
Day Schedule
Fire Exits, Washrooms, Cell Phones
Nominalizations and Generalizations
Commercial Free Content
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The Greatest Opportunity
Aging of America into Rising Fuel Costs and Declines in Available Skilled Labor

Data and Slide Credits
National Institute on Aging, Aging in the Americas, Slide 9
Stats Canada, Slide 9, 22, 23, 27, 29, 49, 50, 51, 57, 82
seniors source & or.CMHC, Slides 64-70
HS Den Corporation, Slide 40
Paine Webber, Slide 28
Canadian Standards Association, Slide 9, 116, 126, 127
U.S. Department of Energy, Slide 9, 42, 43
North American Home Builders Association, Slide 9
American Society of Heating, Refrigeration, Air Conditioning Engineers., Slide 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 106, 107, 110, 112, 117, 118
Building Science Corporation, Slide 121, 122
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The Greatest Opportunity
• Questions to Ask
  • How did we get here?
  • What do we want?
  • How do we define it?
  • How do we specify it?
  • How do we build it?

Purpose
Deeper Understanding
and Appreciation
for this Unique Period of Time
The Treasure Chest!

Job Ready Assessment List – Competency for HVAC

- Electricity
- Soldering, Brazing and Welding
- Air Conditioning
- Forced Air, Gas and Oil Units
- Hydronic Systems
- Refrigerant Recovery
- Heat Pumps and Electric Heat
- Heat Transfer
- Humidity and Air Movement
- Controls
- Installation and Service
- General Safety
- Related Math and Science
- Sheet Metal and Ductwork
- Computer Literacy

The two most sensitive and judgmental measuring instruments of assessment which are not taught are:

- Human Physiology & Human Psychology
- Environmental Ergonomists
- Beyond the Rails

The plumber or tinsmith is no more of a health, wellness and comfort contractor than a framer is a cabinet maker.

There is a difference!

Failure to Communicate!
The construction industry thinks a health, wellness and comfort is a tinsmith or plumber...

Consumers equates plumber to someone who unplugs toilets and fixes leaks. Does Tin Bashing sound soothing?

HVAC Systems can be threatening or therapeutic towards the aging process...

- HVAC MUST be repositioned in the minds of consumers as a health, wellness and comfort issue.

Aging of America in Rising Fuel Cost

Chapter 1

How Did We Get Here?
What's the difference between 1904 and 2004?
comchair, gumbo, heavychevy, hayseed, buckwheat, drylander, moonsihine, foolishfarmer, seedstop, plowhammer, farmerswife, wheatwomn
Nicknames at the general store in 1904 and email address in 2004 “Electronic Immigration”

The year!
2003

In the next decade, as the baby boomers move through their 50s and 60s, more Canadians than ever before will be poised to make the transition to retirement.

Aging of America in Rising Fuel Cost...declines in fertility and mortality and the older portion of the population will increase.

Canada

What Year?
“Govt. of Saskatchewan opens Immigrant Nominee Program to bring more people to the province (to farm)”

Greater Than 40.0%
35.0% - 40.0%
30.0% - 34.9%
Less Than 30.0%

Aging of America in Rising Fuel Cost
Later Working Years (by Census Division): Ages Between 35 and 64
- Less Than 30.0%
- 30.0% - 34.9%
- 35.0% - 40.0%
- Greater Than 40.0%

In the next decade, as the baby boomers move through their 50s and 60s, more Canadians than ever before will be poised to make the transition to retirement.
A quick overview of the N.A. HVAC Business

- Industry Overview
- Business Distribution

Canada

Retirement & Energy Costs

The energy index climbed 7.3% between February 2004 and February 2005, mainly as a result of higher gasoline prices (+21.1%), electricity (+3.4%) and natural gas (+6.2%), as well as for fuel, parts and supplies of recreational vehicles (+6.7%), also contributed to pushing up the energy index.

Fig 2-9. The shrinking growth rate of our labor force (Source: PwC, The Renaissance of Growth)

Canada

Can be changed by supply and demand influences.

Earnings Vs. Education

$34,000,000,000 4 FIFI and FIDO

Beware of Dog

...only $24,000,000,000 for Res. HVAC stuff

$43,000,000,000 On Anti aging Products and Treatments

...only $24,000,000,000 for Res. HVAC stuff
A quick overview of the N.A. HVAC Business

- Industry Overview
- Project Size Distribution
  - Ref.: ASHRAE T.C. 6.1

- 1,400 m² (5000 sf)
- 2,400 m² (8000 sf)

- 45%
- 55%

A quick overview of the N.A. HVAC Business

- Industry Overview
- System Distribution (Housing)

- Air
- Water
- Hybrid

Putting it All Together

Aging of America in Rising Fuel Cost

The Opportunity of a Lifetime

20% the population retiring into rising energy cost during a decline of available skilled labor while looking for the last available gift before the die...

Comfort

Is the HVAC Industry Ready, Willing and Able to Step Up To The Plate?

Aging of America in Rising Fuel Cost

"Older adult defined as 45 and older."

Aging of America in Rising Fuel Cost

"Mixed aged and age restricted occupants want to age in place."

Aging of America in Rising Fuel Cost

"HVAC is considered an important feature by older adults and plays a major role in the decision making as is low maintenance"
The Cahners survey found that energy efficiency rated as the most important home feature ranking 4.6 on a scale of 1 to 5. Other features included zoned heating and cooling (3.97), a fireplace (3.71), wiring for high speed data communications (3.62).

Seniors have higher customer service expectations than other age groups.

Anyone born before 1964 wants low maintenance housing.

Features contributing to comfort and convenience.

Changes in patterns of care withdrawal of the formal (public) system, increasing reliance on family care (private) providers (Ward-Griffin and Marshall, 2003). Of the seniors which needed care, 39% of women and 46% of men received all of their care from informal (private) sources.
“...the proportion of older adults who received care from formal sources alone fell from 31% of women to 25% of women, with no change for men.

A rise in informal care + informal care facilities = opportunity for “Environmental Ergonomists”

“it is impossible to examine (informal) care without looking at the living arrangements of the receiver.”

Informal care creates a domino affect on informal care givers and the building environment.

One-half of the family and friends who provided personal care to seniors had to change their social activities (52%) because of their care giving duties.

More than one-third had to alter their holiday plans (39%).

Roughly one-third also suffered disturbances to their sleep (31%) and health (29%).

One out of every two caregivers had to incur extra expenses (55%) related to care giving.

Aging of America in Rising Fuel Cost

Challenges for Caregivers = Our Challenges

Where do the $$$$ go?

This is the arena of competition for the HVAC industry

Our revenues are based on building permits and stealing business from the competitors including from within our own industry.
Buildings for Retirement

Aging of America in Rising Fuel Cost

Continuing Care Retirement Communities
- Active seniors - independent lifestyle
- Private home - regardless of future medical needs.
- May require buy-in, or an up-front annuity purchase followed by monthly payments covering services, amenities and needed medical.
- Availability of multiple levels of care, without the uncertainty of wondering where you will live.

Congregate Housing
- Independent living - private separate apartments
- Opportunity to share activities of daily living with other residents as one chooses.
- They may offer rental or ownership units.

Assisted Living
- Offers help with non-medical aspects of daily activities in an atmosphere of separate, private living units.
- It can be likened to Congregate living for residents less able to function independently in all aspects of their daily lives.

Board and Care
- Board and Care is usually offered in what may appear as a converted home.
- It provides a homelike setting with supervision and care for 4-10 residents.

Skilled Nursing Facilities
- Skilled Nursing Facilities may be freestanding, or part of a seniors community offering any or all of the following:
- Congregate, Assisted Living, Continuum of Care
- It may specialize in Short Term or acute nursing care, intermediate or long term skilled nursing care.

Alzheimer’s Facilities
- Early stage patients - accommodated in a Congregate or Independent wing of a multi-level campus.
- Many Assisted Living Communities will accept and successfully house early stage residents.
- As the disease progresses patients may develop argumentative behavior, “sundowning” and wandering habits.
- Generally the communities best equipped to deal effectively with this middle stage patient are Alzheimer Communities.

“Environmental Ergonomists”
Chapter 3
How Do We Define It?

Aging of America in Rising Fuel Cost

Defective or cluttered heating units contribute to 19% of all deaths and 13% of all injuries.

What environmental condition influences our aging process more than any other aspect of our lives?

comfort & health...

“...the careful regulation of body temperature is critical to comfort and health.”

ASHRAE Fundamentals 2001

the mind & body interface...

"...the judgment of comfort is a cognitive process involving many inputs influenced by physical, physiological, psychological, and other processes.”

Factors...

thermal perception factors

demographics (gender, age, economic status)

context (building design, building function, season, climate, semantics, social conditioning)

cognition (cultural, preference, and expectation)

The Good News...

Every thing you need to know about your health and wellness in your home environment you experienced before grade school...

The Motivation...

“...characteristically, people seek to be comfortable, and take actions to secure thermal comfort; the motivation to do so is powerful”

The Challenge...

“We do not seem to recognize that our real customer is the occupant, not the building.”

H.F. Levy, P.E.
The Benchmark...
...the sad truth according to Decisions Analysts Home Comfort Survey™ is only 50% of occupants are actually satisfied...

The Opportunity...
"...the percentage of physical measurements of indoor climates actually meeting the recommendations of ASHRAE Standard 55 was remarkably low... ranging from an average of 6% in summer to 21% in winter."

The Standard...
"The purpose of this standard is to specify the combinations of indoor thermal environmental factors and personal factors that will produce the most environmental conditions acceptable to a majority of the occupants within the space."

First seek to understand...
Understanding human physiology is the first step in gaining control.

What are our sensors connected to?
Our thalamus is responsible for letting our brain know what’s happening outside our body.

Where are our external comfort sensors located?

The mind filters and assigns labels to what the body experiences

What to do with 400 btu’s?

How & when we shed the 400 Btu/hr...
You feel comfortable when...

Predicted Percent Dissatisfied

Predicted Mean Vote

Floor Temperatures

Design from the inside out

The Golden Rules...

Metabolic Rates

Aging of America in Rising Fuel Cost

Heath, Wellness and Comfort – Designed from the inside out

Floor Surface Temperatures, °F

North America’s silent (secret) environmental challenge

Design for People

Design for Simplicity

Design for Familiarity
Getting in touch with your sole

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textiles (rugs)</td>
<td>70 to 82°F</td>
</tr>
<tr>
<td>Pine floor</td>
<td>72.5 to 82°F</td>
</tr>
<tr>
<td>Oak floor</td>
<td>76 to 82°F</td>
</tr>
<tr>
<td>Hard linoleum</td>
<td>75 to 82°F</td>
</tr>
<tr>
<td>Concrete</td>
<td>79 to 83°F</td>
</tr>
</tbody>
</table>

Heath, Wellness and Comfort - Designed from the inside out

- Radiant Asymmetry
- Humidity
- Air Speed (Draft)
- Thermal Stratification
- Temperature Drifts

Radiant Asymmetry or - Meet your other half...

Recommended Ranges for Typical Floor Materials

- Concrete: 75 to 82°F
- Hard linoleum: 76 to 82°F
- Oak floor: 72.5 to 82°F
- Pine floor: 70 to 82°F
- Textiles (rugs): 70 to 82°F

Humidity & The Health, Wellness, & Comfort Target Zone

- Relative Humidity: 40% to 60%
- Winter Design Range: 20% RH
- Summer Design Range: 60% RH

Humidity & The Health, Wellness, & Comfort - Designed from the inside out

- Allowable air speed as a function of air temperature and turbulence
- Turbulence Intensity
- Drafts
- Air Temperature, °F
- Mean Air Speed, fpm
Aging of America in Rising Fuel Cost

Chapter 4
How Do We Specify It?

Heath, Wellness and Comfort – Designed from the inside out

Thermal Stratification

Typical Profile for Forced Air Heating
Typical Profile for Radiant Floor Heating

Cooler
Warmer

Aging of America in Rising Fuel Cost

Three Standards
CSA Z317.2
CSA F326
ASHRAE 62.1 / 2
"The objective of this Standard is to address the special requirements of HVAC systems pertinent to the design, construction, operation, and maintenance of health care facilities."

"This standard defines the roles of and minimum requirements for mechanical and natural ventilation systems and the building envelope intended to provide acceptable indoor air quality in low-rise residential facilities."

"The active process of supplying or removing air to or from an indoor space by powered equipment such as motor-driven fans and blowers but not by devices such as wind-driven turbine ventilators and mechanically operated windows."

"Ventilation occurring as a result of only natural forces such as wind pressure or differences in air density, through intentional openings such as open windows and doors."

"The following classification of ventilation type is used for building type classification:"

**Class A**
- Air with low contaminant concentration, low sensory-irritation intensity, and inoffensive odor.

**Class B**
- Air with moderate contaminant concentration, mild sensory-irritation intensity, or mildly offensive odor. Class B includes air that is not necessarily harmful or objectionable but that is inappropriate for transfer or recirculation in spaces used for different purposes.

**Class C**
- Air with significant contaminant concentration, significant sensory-irritation intensity, or offensive odor.

**Class D**
- Air with highly objectionable fumes or gases or with potentially dangerous particles, bioaerosols, or gases at concentrations high enough to be considered harmful.

Temperature Zones

- Extreme
- High
- Moderate
- Low

Humidity Zones

- Class A
- Class B
- Class C
- Class D
Class 1
Air with low contaminant concentration, low sensory-irritation intensity, and inoffensive odor.

Class 2
Air with moderate contaminant concentration, mild sensory-irritation intensity, or mildly offensive odor. This class includes air that is not necessarily harmful or objectionable but that is inappropriate for transfer or recirculation to spaces used for different purposes.

Class 3
Air with significant contaminant concentration, significant sensory-irritation intensity, or offensive odor.

Class 4
Air with highly objectionable fumes or gases or with potentially dangerous particles, bioaerosols, or gases, at concentrations high enough to be considered harmful.

“Aging of America in Rising Fuel Cost

CSA Z317.2 Systems Criteria

HVAC systems shall be designed to contribute to a healthy environment by suitable control of the following factors:
(a) temperature;
(b) relative humidity;
(c) ventilation rate;
(d) ventilation effectiveness;
(e) air movement;
(f) mean radiant temperature;
(g) effective air temperature difference;
(h) heat storage and recovery efficiency.

Heat, Wellness and Comfort - Ideal Environmental Conditions

Effective Temperature = Humidity and Operative Temperature, OT

 Sarasota, Florida - May 7-11, 2004

Heat recovery and reclaim, economizers, thermal storage, and reduced pumping requirements. Control strategies and sequences of operation should maximize energy conservation.

“Design for Failure”
Heating
Failure of the primary fuel and power cannot shut down the facility.
Standby system (equipment, fuel and power) capable of providing a minimum of two-thirds performance of the design load.

“Design for Failure”
Cooling
Failure of the primary fuel and power cannot shut down the facility.
Standby system (equipment, fuel and power) capable of providing a minimum of 50% performance of the design load 100% for Class I Facilities.
Steam humidification shall be injected into the supply air.

Spray, evaporative media, or pan-type humidifiers shall not be permitted.

Incorporate outside air free cooling to operate without refrigeration when outside air conditions allow.

100% outside air systems, heat recovery devices, reduced airflow during unoccupied periods, or a combination of both, shall be provided.

Finned heating/cooling elements shall not be located within Class I rooms and are not recommended for Class II areas.

Local recirculating units shall not be used in Class I and Class II areas.

The design criteria
2. The system capacities
3. The system limitations
4. The system authority
5. Items which may affect indoor comfort
6. Areas which lie outside the comfort control areas.

1. Inconsistent temperature (between rooms, levels, or different times of day)
2. Dust, pet hair and allergens
3. High utility bills
4. Dry air
5. Window condensation
6. Odors in the house
7. Unsealed kitchen
8. Houses not secure from break-ins
9. Stuffy rooms / Inefficient floor plan (tie)
10. Damp basement

Radiant w/ DOAS
Thank You for Attending!
Contact Us for Seminar Details and Arrangements
www.healthyheating.com