

Making it Happen - Then Transition to a Sustainable Society

Backgrounder 3

Barriers to sustainability

As noted throughout the Making it Happen project, the technologies needed to reduce the impact of human beings on the environment already exist. We listed at least 160 technologies which are proven in the marketplace and that if deployed throughout the Canadian economy would reduce greenhouse gas emissions by 60% by the year 2030. At present however they are far from being deployed to their full potential. This backgrounder focuses on the reasons for this.

Starting with the description of a methodology for identifying barriers and challenges, this document looks at two examples: deploying wind energy, and constructing energy efficient commercial buildings, the latter based on the work of the National Round Table on the Economy and the Environment.

Two areas were selected for more detailed examination: the residential sector and sustainable communities. Based on the result of workshops with experts and practitioners, many barriers were identified and then presented graphically on a challenge map. These two challenge maps can form the basis for future analysis of policy interventions. There is also some discussion of the most likely champions and stakeholders that could address and remove these barriers.

Table of Contents

Approach to identifying barriers.....	3
Approach to identifying challenges and barriers: using techniques of applied creativity.....	3
Barriers to the deployment of wind power: an example.....	4
Barriers to making commercial buildings green	4
Key barriers explored in Geared for Change.....	5
Barriers to a green residential sector	6
Analysis of barriers to green residential and identification of champions: who should do what?.....	7
Awareness.....	7
Affordability	8
Barriers to building sustainable communities	11
The last barrier: consumer attitudes	12

Approach to identifying barriers

The challenge of innovation is not just to have a good idea but to implement and commercialize it as well. In their desire to address climate change and environmental degradation society has certainly done the former, but it has paid less attention to the latter. This section explores in some detail the management side of environmental change. It looks not at the technology which is available, but rather at the barriers to its deployment and the means of overcoming them. Such barriers include tradition, inconvenience, financial constraints, and institutional inertia, to name but a few.

In focusing on barriers to the deployment of innovation, this section starts with the example of wind energy and the obstacles facing the deployment of windmills and wind farms. It then probes more deeply into specific studies undertaken during the Making it Happen project, specifically the barriers to making the building sector totally green in Canada, and the legal and institutional barriers to building sustainable communities. These were the topics of two project workshops.

Early in the project, John Robinson of the University of British Columbia raised the case of the Centre for Interactive Research on Sustainability. It has been described as “among the most innovative and high performance sustainable buildings in North America, demonstrating leading edge research on sustainable design practices, products, systems and policies.”¹ In this case designers applied a whole systems approach. They spent a lot of time with all the trades involved in the building early on in the project, to ensure that the different systems, HVAC, lighting, water, etc. were perfectly integrated and optimized for energy and water efficiency. This approach, however, resulted in unusually high billings from the different contractors at the front-end of the building phase, and that distorted overall project cash flow. Not surprisingly, the accountants in the project administration found that distortion difficult to accept, providing a quick illustration of a financial and institutional barrier to the deployment of innovation.

Approach to identifying challenges and barriers: using techniques of applied creativity

In teasing out and identifying the different barriers to innovation and change, the *Making it Happen* project applied the principles of creative problem-solving first developed by Prof. Min Basadur at McMaster University. A key element of the Basadur Applied Creativity² approach is to take a problem or obstacle and rephrase it as a challenge question, using the phrase “how might we...?”. For example, if a product or commodity is too expensive, then this is rephrased as a challenge question in the form of “how might we make this product less expensive?” The power of this approach is that it invites the participants to look for a solution rather than simply focus on the obstacle.

In subsequent stages, to define truly the “problematique” or full problem definition, these “how might we...?” statements are mapped in a hierarchical way. Asking the question “why?” leads to a higher level or broader “how might we”, while asking the question “what's stopping us...?” helps us drill down to a narrower, more specific challenge.

¹ <http://www.cirs.ubc.ca/>

² <http://www.basadur.com/>

Barriers to the deployment of wind power: an example

Much press coverage have been devoted to deploying wind power and wind turbines to generate "clean" electricity. There have also been media reports^{3,4} on resistance to this deployment, including some strong objections from people living next to wind farms. As far as this issue goes, these are some of the main barriers or objections to wind power:

- NIMBY - not in my backyard - the resistance from consumers who don't like the noise or cluttered horizon from wind turbines, and are worried about danger to birds and possible negative impact on bird flight paths;
- Wind power costs relative to the yo-yo price of oil (oscillating between a high of \$140 per barrel in mid 2008 to around \$50 a barrel in mid 2009);
- Hidden tax subsidies to other forms of energy such as oil sands;
- Dependence on subsidies makes the wind power industry vulnerable to sudden cut-off (at least until some form of carbon tax is in place): this was observed in the abrupt halt of California's wind industry when subsidies were cut in the mid-1980s;
- The variability and unpredictability of electricity produced from wind, and the need for better transmission lines to integrate wind power into the grid and improve the capacity to absorb fluctuations.

Here are the same barriers, but restated in the form of a challenge statement, using the "how might we...?" phrase:

- How might we address the noise and aesthetic concerns of consumers?
- How might we minimize the negative effects of wind turbines on birds and bird flight paths?
- How might we stabilize the cost of wind power relative to volatile price of oil?
- How might we create a fair level playing field between renewables and fossil fuel energy sources?
- How might we protect the emerging wind industry from sudden and unpredictable cuts in subsidies?
- How might we improve the design of transmission lines and power grids to absorb the unpredictable fluctuations from wind energy?

Cast in this form, these challenges are an invitation to develop innovative and constructive policies that will address these barriers.

Barriers to making commercial buildings green

The [National Round Table on the Environment and the Economy](#) recently published a report on energy efficiency in commercial buildings. Titled "[Geared for Change](#)" the report is the result of a partnership with [Sustainable Technology Development Canada](#). It presents a comprehensive analysis of the energy used by Canada's commercial building sector as well as its CO₂ emissions. Mindful of its fragmentation and complexity, the report performs a particularly thorough

³ Globe and Mail, Margaret Wentz, "[Who could object to wind power?](#)", November 24, 2008

⁴ The Economist, [December 6 2008 "Technology Quarterly"](#)

analysis of barriers to the adoption of energy-efficient technologies in that sector. The following is a summary of its key findings:

Key barriers explored in Geared for Change⁵

Risk Management

- Market, technical, and financial risk
- Level of positive external/personal recognition for “doing the right thing” by installing the efficiency measure(s)
- Level of perceived risk that the efficient product may not perform as promised

Information Gaps

- Lack of complete data and information
- Lack of public understanding of infrastructure needs and resource constraints, i.e. the functionality, cost, drivers and challenges are unknown to the public
- Skills and labour shortage in the construction industry
- Lack of training resources (time, available education, funding) for building operators, inspectors, and trades
- Lack of interdisciplinary programs to promote integrated design processes between universities and colleges
- Low awareness of available products and services
- Availability of installation and inspection services
- Low awareness of benefits: cost and co-benefit
- Required technical ability to assess the options
- Consumer preferences that do not value energy efficiency
- Existence of a viable infrastructure of trade allies

Value Chain and Principal-agent Relationship

- Level to which the incentives of the agent charged with purchasing the efficiency measures align with those of the person(s) that would benefit

First-mover Disadvantage

- Lack of enabling tools and techniques to facilitate market adoption of sustainable energy solutions
- Need to foster acceleration of advanced technologies
- Lack of performance monitoring of technology systems
- Access to appropriate financing
- Size of required energy efficiency investment vs. asset base
Payback ratio – actual vs. required
- Level of effort/hassle required to become informed, select products, choose contractor(s), and install

Market Price Signals

- Energy pricing at levels that do not integrate externalities associated with the whole lifecycle (full-cost accounting)
- Energy pricing signals that do not reflect real-time costs

⁵ "[Geared for Change](#)", Table 4 on page 29 and 30.

Institutional and Regulator

- Codes, standards, and permitting processes that prohibit implementation of innovative energy efficiency technologies
- Constitutional jurisdiction for buildings includes all levels of government and results in different standards across the country
- Lack of long-term policy development due to short-term political agendas
- Limited horizontal cooperation/coordination to integrate policies and implementation
- Disconnect between longevity of infrastructure and short-term horizons on crucial decisions, such as budget allocations for maintenance and rehabilitation and rate structures
- Insurance industry acceptable practice, standards or levels of infrastructure service may lead to liability perceptions for professional designers, municipalities, developers

These examples suggest that barriers are pervasive and many other studies have come to similar conclusions. There is a need, however for a uniform taxonomy of barriers. A useful way of doing this is phrasing each using the "applied creativity" phrase, "how might we...?". Again, this transforms an obstacle into a challenge statement that invites reflection on ways of overcoming the obstacle.

Barriers to a green residential sector

As part of the *Making it Happen* project, a large workshop was held on February 23, 2009 to identify barriers to making the residential sector totally green. It included practitioners, builders, developers, researchers, and policy officials. The workshop reviewed progress in residential energy efficient houses, including net zero energy homes, as well as the latest demonstration program Equilibrium EQ™ organized by CMHC. Participants also reviewed past federal initiatives and programs to promote energy efficiency. The real challenge, however, was to identify the barriers they had experienced in their efforts to make the residential sector green.

The discussion was organized around the five "As" developed some years ago by NRCan – awareness, affordability, availability, adaptability and acceptability. Barriers to a green residential sector were grouped into these five broad categories, using the "How might we" (HMW) challenge question:

1. HMW increase **awareness** of the need for greening the residential sector: consumer information, education, building the basis for a paradigm shift;
2. HMW make green residential houses **affordable**: innovative financial instruments, business models, price ranges;
3. HMW make green houses **available** : reliable, proven, tested, inspected, / supported by standards, codes, training skills;
4. HMW make green houses **adaptable**: convert existing housing stock to different shades of green, maximize potential for upgrading; and
5. HMW make green houses **acceptable**: new regulatory models, standards, codes, by-laws.

Analysis of barriers to green residential and identification of champions: who should do what?

This section performs a preliminary analysis of the barriers to innovations that would make the residential sector green. Overcoming these barriers, however, is no simple matter. For example, a simple change in mortgage structures would require extensive consultations with financial institutions, banks and their regulators around the quantifiable benefits from energy savings, how to redefine acceptable risks, and how best to share benefits among appropriate stakeholders. The following section analyzes two of the five major categories of the challenges identified previously, offering ideas about who might be the most appropriate actors or champions to address the challenge.

Awareness**HMW increase *awareness* of the need for greening the residential sector: consumer information, education, building basis for paradigm shift?**

A market, defined as all of the components of a value chain, will adopt new technologies faster if it is properly educated and aware of the benefits of that technology. To be implemented properly, this challenge involves engaging a number of stakeholders all along the value chain, including designers, builders, realtors, and consumers in a manner that (a) establishes their own awareness of the rationale for these technologies and (b) encourages them to share that awareness with others along the value chain.

HMW educate consumers, skilled trades on energy efficiency and labels, so they become part of common language

A corollary to the first challenge, this one addresses two distinct groups: consumers and the skilled trades. The education of consumers is best carried out by an impartial, highly credible and neutral organization such as a *government department or agency* at the federal or provincial level. An example of this is Natural Resources Canada's successful Energuide program. The education of skilled trades is best carried by *trade schools and colleges, or industry associations* that could offer refresher courses.

HMW demonstrate green value proposition for all stakeholders (builders, banks, realtors, etc.)

This challenge restates the overall challenge in a way that focuses on a specific set of targets in the value chain. The point is to encourage these groups to understand that "green features" have an economic value that can be traded on the market.

If banks had a proper valuation of green elements in a residential unit, and what that could save in terms of heating and utility costs, they could reflect those future savings in improved mortgage ratios for consumers. Similarly, real estate agents could use energy-saving features to make a house more attractive to potential buyers. And builders skilled in the implementation of energy-saving measures would have a marketing edge over the competition.

The underlying challenge is to show that a green feature "X", for a specific house, translates to "\$Y" of savings per year, compared to the same house without feature "X".

The actors best qualified to address this would be agencies such as *Natural Resources Canada* and the *National Research Council* which could develop tools for making such calculations, and *builders/renovators* and *contractors* who could apply these tools to specific houses.

HMW celebrate the government and industry successes, get the news out, and demonstrate that it works

A key element of any change management strategy is to demonstrate past successes in the direction of change because those past successes are concrete and real to stakeholders. There is nothing like a working demonstration project to show that the technology works and has real economic and environmental advantages. Such successes contribute immensely to increased awareness and lowered resistance to change.

The responsibility for such publicity and public education falls with *the government agencies* (e.g. *CMHC*) that sponsor projects as well as the designers and builders that implement them.

HMW bring home the operating costs of the location

This challenge focuses on demonstrating the value proposition of an energy saving feature. Consumers of residential and commercial buildings need to have real-time and easily understandable indicators of how much it costs to operate their building/house. They also need to see in an equally simple, immediate and convenient way how specific measures and changes in behavior help lower their energy and water usage. Immediate feedback can positively reinforce behavior change that would lead to reduced demand.

The actors who can best implement such a feedback would be *utilities* who could offer improved meters that would provide this kind of easy to understand real-time information, and *private manufacturers* who would design and produce them.

HMW move to time of use meters

This challenge would address the need to price electricity according to its availability with regards to the daily peak usage. Electricity during peak times would be priced higher than that used during off-peak hours, to encourage a reduction in peak demand. To do that, consumers need to know how their use coincides with the peak so they can schedule more tasks during off-peak hours.

Implementation of "time of use" meters would require intervention by the *electrical utilities*, approval by the *Ontario Energy Board*, and provision of appropriate meters by *manufacturing companies*.

Affordability

HMW make green residential houses *affordable* (new innovative financial instruments, business models, price ranges)

This challenge addresses the issue that energy efficient and net zero energy houses are typically more expensive than ordinary houses, carrying a premium of \$100,000 to \$150,000. It addresses

the need to reduce the cost to the consumer of the green infrastructure associated with energy-efficient houses.

HMW design innovative models of ownership for green/shared infrastructure (e.g. using solar water heaters), keeping mortgage costs low, and shifting risk away from homeowners so that utilities can accept more of the risks.

This challenge can best be implemented by the following actors: *utilities* which keep ownership of specific equipment such as solar photovoltaic panels but rent it to consumers, or *private companies* like energy service companies or *ESCOs*, which sell heating services but own the actual equipment.

HMW bring forward truer costs of energy to increase the value of green home investment?

This challenge can be implemented in a narrow sense by *utilities*, such as hydro-electric generators, which pass on to consumers the real cost of generating electricity. A move in this direction is "time of day" pricing, where electricity produced close to peak hours is more expensive than off-peak power. At the broadest level, some form of carbon pricing will reflect the true environmental cost of producing fossil fuel based energy, but that can only be implemented by the *provinces or the federal government*.

HMW assign and quantify the \$ benefits so that the cost of sustainable home ownership is affordable to the consumer and the costs shared among the beneficiaries?

These are two separate challenges: quantifying the benefits of a sustainable home and assigning the benefits to different stakeholders. Quantifying the energy-saving benefits, either from an environmental or financial perspective, is best done by a neutral and technically competent third-party such as *Natural Resources Canada* through a labeling program such as *Energuide*.

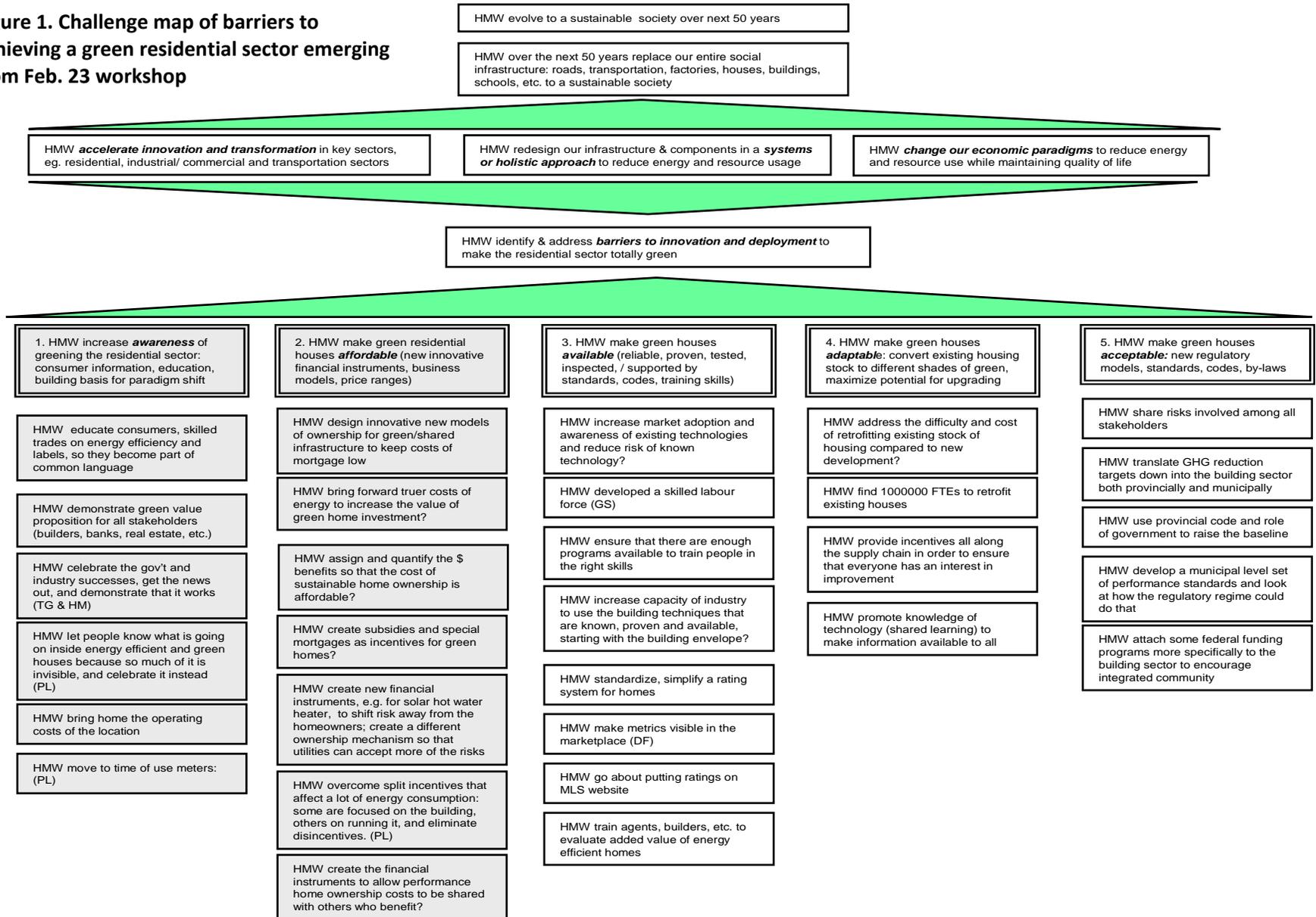
Assigning benefits is a political process, though it might include *electrical and gas utilities*, which may benefit from energy savings by not having to build additional generating capacity, or *municipalities* which also benefit by not having to build additional capacity for water purification or water treatment. Implicit in this argument is the notion that the beneficiary should share in the cost of the installation.

HMW create subsidies and special mortgages as incentives for green homes

There are two challenges here: subsidies and mortgages. Subsidies are generally the purview of *governments* and take on many forms ranging from cash grants to tax rebates. Mortgages are designed by *banks and financial institutions*, which have the capacity to include calculations of the cost benefits of features that lower the operating cost of a house or building.

This partial analysis of innovation barriers and the champions who could address them shows that barriers are broadly distributed across a large number of jurisdictions and separate administrative silos. There is no obvious centre of power that could assume sole responsibility for driving this transformation.

Figure 1. Challenge map of barriers to achieving a green residential sector emerging from Feb. 23 workshop



Barriers to building sustainable communities

The last workshop of the *Making it Happen* project addressed barriers to the deployment of innovations that could build sustainable communities. Held on April 14, 2009, it used as a starting point a number of definitions and descriptions of what a sustainable community should be, focusing on energy such as in the QUEST design, or on the vision included in the Canadian Council of Energy Ministers.

Participants included a former provincial premier, a city councillor, a former senior policy adviser to the Canadian Prime Minister and leading environmentalists. Participants were asked to identify what laws, bylaws, regulations and fiscal frameworks should be changed to help in the transition to sustainable communities. Participants identified more than 35 challenges in the form of “how may we?” which were reduced to 25 unique challenge statements, mapped in Figure 1.

In contrast to the challenge map generated from the green buildings workshop discussed in a previous section, the challenges that were identified here cannot be easily ascribed to one single set of stakeholders, with some specific exceptions such as leveraging the federal tax system to encourage sustainable communities. Clearly, this action can be easily carried out by the *Federal Department of Finance*, and the *Canadian Revenue Agency*.

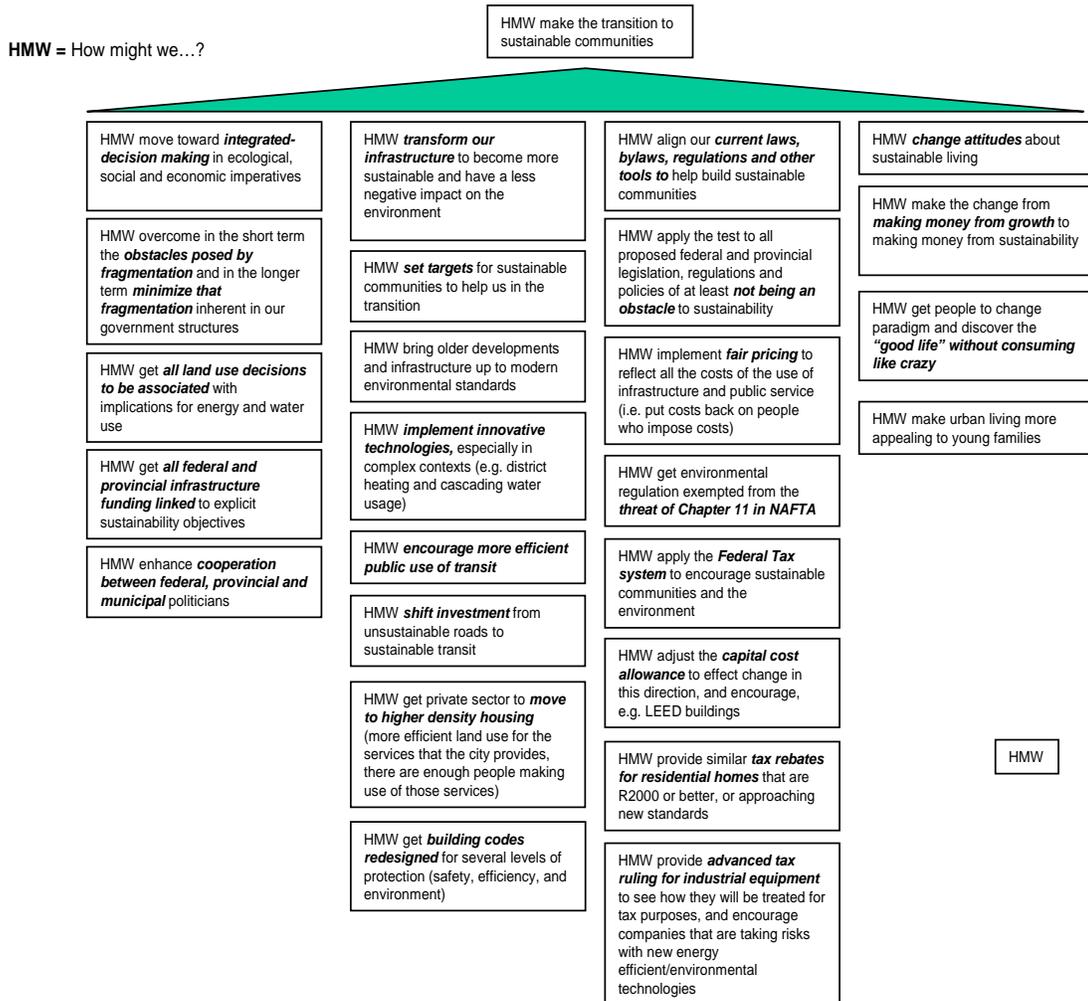
Other measures involve a much broader range of stakeholders. For example, encouraging more efficient public use of transit involves the *province* which needs to allow more funds to the buildup of transit, the *municipalities* which need to choose transit over roads, and *consumers* who need to be willing to change their lifestyle is transit rather than cars.

Similarly, the challenges of breaking silos, moving towards integrated decision-making, and getting all federal and provincial infrastructure funding linked to sustainability, require a broad level collaboration between the *federal government*, and the *various departments* in the *provincial governments*.

Even a simple challenge like getting the private sector to move to higher density housing involves a willingness on the part of the *private sector* to invest in this kind of development, some incentives on the part of the *municipal and provincial governments* to make this type of housing more attractive, investments in ancillary amenities such as community centres, sports complexes, and schools, and a change in the preferences of *consumers* including young families which need to become more oriented toward urban living.

What becomes apparent in this analysis is that the actors who have the power and resources to remove these barriers are broadly dispersed across jurisdictions and departmental silos.

Figure 2. Challenge map of barriers to achieving sustainable communities emerging from April 14 workshop



The last barrier: consumer attitudes

At the end of the day, one of the more fundamental barriers is associated with the attitudes of consumers and their willingness to change their lifestyle to live more sustainably. Specifically, the challenge is to find a more meaningful life that is not based on the consumption of goods and materials. Alternatively, we can reaffirm the principles of the Conserver Society, "doing more with less" and reducing waste.

There is no single stakeholder group that can bring about this change. There is a broad range of pressure points including: growing public awareness of the challenges posed by global warming; ongoing educational efforts by NGOs and environmental groups; and government efforts to promote energy conservation and renewable energy technologies.

One area of possible investigation is how to use the current economic recession as an opportunity to rethink the basic principles of economic growth and to look at alternative ways

of satisfying basic consumer needs. Peter Victor^{6,7} is an author who recently had promoted this concept. He proposes a model of the Canadian economy that would no longer rely on economic growth and that would still maintain full employment without poverty, but with much reduced green house gas emissions and the maintenance of fiscal balance. “In such an economy” he says, “success would not be judged by the rate of economic growth, but by more meaningful measures of personal and community well-being”⁸

⁶ “Managing without Growth: Slower by Design, Not Disaster”, Peter A. Victor, Baker & Taylor, November 30, 2008.

⁷ “Bigger isn’t Better”, Peter A. Victor, The Ottawa Citizen, Wednesday May 13, 2009, p. A15.

⁸ Ottawa Citizen, *ibid.*