

Integrated Community Energy Solutions and the Residential Construction Industry

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1.0 Executive Summary

Beyond improving the energy efficiency of individual homes and buildings, considerable additional efficiency potential exists through applying integrated approaches at the neighbourhood and community level. *Integrated Community Energy Solutions* (ICES) refers to an number of technologies and development approaches that aim at capturing this potential.

The array of potential ICES energy applications ranges from district heating, to on-site combined heat and power production, to integration of site-based renewable energy sources with grid-provided energy. ICES can also encompass integration of other services, such a water, sewage, storm water management and transportation to reduce the level of infrastructure and energy use required. Higher density urban development is likely best suited to ICES deployment, but integration of energy and other services may also be practical, in different ways, at a variety of scales and densities.

Many ICES approaches represent conventional practice elsewhere in the developed world, particularly in Europe. While some ICES examples exist in Canada, the concept is somewhat novel and has seen limited commercial application to date.

Governments, utilities and energy services providers have expressed interest in seeing ICES deployed in Canada. Recent years have seen ICES-related research and development projects, and some “showcase” projects of greater commercial relevance. The federal government’s EQUilibrium – Communities initiative will, hopefully, provide additional commercially-relevant demonstrations of ICES concepts and technology.

For the last number of years, the Canadian Home Builders’ Association has participated in forums examining the potential for ICES deployment in Canada. The Association’s policies on the environment and community development recognize the potential for ICES to move into broader commercial use in Canada.

As with most significant housing innovations, initial interest in ICES has centred on the technologies involved, and their potential environmental and energy efficiency benefits. This dialogue is well advanced, and was the focus of a recent report by the Canadian Council of Energy Ministers (CCEM).

Moving forward, it will become critical to address issues related to the “business case” for ICES, and a greater focus in this area appears to represent the next important step towards commercial deployment of ICES.

In order to examine the current state of the ICES business case, and contribute a residential development perspective to the broader dialogue on ICES, the CHBA convened a Task Group on Integrated Community Energy Solutions. This group of new home builders and developers from across Canada met in May, 2010. This paper represents a synthesis of the Task Group’s discussions, with a policy overlay reflecting CHBA policy positions in relevant areas.

Overall, the Task Group expressed considerable interest in seeing ICES move towards broader commercial deployment. They noted that deployment of ICES within new developments will require new business practices and arrangements, and the participation of new interests in creating viable business opportunities.

The Task Group recognized that, in a number of key areas, the knowledge and information required to support the ICES business case is lacking currently, and that these “gaps” will need to be recognized and addressed by all interested parties, working together.

The Task Group noted that, as is the case with commercial adoption of any significant housing innovation, deployment of ICES within new developments will require solutions to challenges concerning costs, risk, and impacts on housing affordability and choice.

The Task Group also expressed some concern that current practices by governments, particularly those that impose escalating costs on new development, must be addressed for ICES deployment to come about.

The Task Group also pointed to a range of regulatory questions that require examination and resolution, to ensure that existing regulatory barriers to ICES deployment are removed.

Finally, the Task Group provided concrete suggestions to government as to how it can contribute to addressing unresolved business issues and remove potential barriers to commercialization of ICES in residential developments in Canada.

2.0 Background on ICES and the Context of this Paper

To date, most efforts towards the “greening” of the residential sector have focused on individual homes and buildings. A number of voluntary, market-driven initiatives including R-2000, ENERGY STAR, Built Green, GreenHouse and the various LEED standards are being used currently by new home builders and developers in their projects.

At the same time, researchers, utilities and energy efficiency experts point to considerable additional potential for energy efficiency gains through integrating energy and infrastructure systems at the **neighbourhood or community level**. This has given rise to the concept of *integrated community energy solutions* (ICES).

One of the better-known ICES approaches is district heating, but the potential for integration is much broader than this. Other technologies, such as combined heat and power systems (CHP), offer greater flexibility to meet both homeowners’ space conditioning and electricity needs. “Cascading” or the utilization of industrial/commercial waste heat for low temperature applications such as space heating can achieve extraordinary levels of energy efficiency. On-site renewable energy generation can also be integrated with grid-based services to provide more robust and flexible energy services.

Beyond more efficient provision of energy services to homeowners, the deployment of ICES approaches in denser urban development has potential to integrate buildings with community infrastructure, such as water and waste water systems, in more efficient ways. As well, ICES aims to improve integration of public transit and non-car based transportation in the community development process.

While ICES “works on paper”, and many ICES approaches represent established practice in other countries, (particularly within the European Union) their applicability and commercial viability for the residential development industry in Canada is less clear.

Over the last decade, the federal government has supported a range of ICES and ICES-related research, development and demonstration projects. The most recent example being the joint Canada Mortgage and Housing Corporation (CMHC)/Natural Resources Canada (NRCan) *Equilibrium Communities* initiative.

As well, both federal and provincial governments have expressed growing interest in the broader use of ICES, principally through the work of the Canadian Council of Energy Ministers (CCEM).

An integrated approach to land-use, energy, transport, water and waste management puts a greater emphasis upon achieving overall efficiency. It features:

- *Higher density, mixed use developments of energy efficient housing, commercial space and industry.*
- *Smaller scale distributed urban energy systems, integrated with other infrastructure systems.*
- *Increased contribution from multiple local energy sources: solar; geothermal; energy from waste; wind; hydro; supplemented by the electricity and gas grids.*

- QUEST, April 2008

The QUEST¹ organization (**Quality Urban Energy Systems of Tomorrow**), an industry-led forum that is focused on ICES, continues to be an important contributor to the Canadian dialogue on ICES. The CHBA has participated in the annual QUEST conferences for the last three years.

The residential development industry in Canada has considerable interest in how ICES might be integrated into the development process at the neighbourhood and community levels. Understandably, many developers will remain “firmly on the fence” in terms of adopting ICES approaches until many of the issues raised in this report have been addressed and resolved, thereby providing greater assurance of commercial viability.

As with any significant innovation affecting residential development, ICES raises a wide range of questions for developers. To understand better these questions, and as a contribution to the broader dialogue on ICES, the CHBA (with support from Natural Resources Canada) convened a *Task Group on Integrated Community Energy Solutions* in May, 2010.

This group of new home builders and developers from across Canada conducted a day-long facilitated discussion of ICES under the theme “Examining the Business Case”. This report is a synthesis of their discussions, presented in the context of the CHBA’s existing policy position on development of environmentally responsible communities.

¹ QUEST is a network encompassing the energy industry, environmental groups, governments, academia and the consulting communities that shares information and experience on integrated approaches to providing energy services in communities.

3.0 ICES and CHBA Policy on Environmentally Responsible Community Development.

In relation to ICES, the CHBA has adopted a number of policy positions that have relevance.

The *CHBA Member Builder's Statement of Business Values and Commitments*, approved by members in February, 2006, included the following commitments to protecting the environment:

"We acknowledge that the development of new communities, and the construction and renovation of homes, has a range of impacts on the environment, both today and in the future. We work with governments and others to develop environmentally responsible housing solutions.

We are committed to developing communities, and to building and renovating homes, in an environmentally responsible manner through utilizing appropriate technologies, materials, building practices and techniques.

We pursue continuous improvement and innovation in our processes, practices and products, in order to meet our environmental responsibilities."

In December 2007, the CHBA released its policy position entitled *Guidelines for the Development of Environmentally Responsible Communities* which was subsequently approved by the Association's membership.

The *Guidelines* focus on neighbourhood and community-level development, as CHBA members had already adopted guidelines pertaining to individual buildings. Factors related to the adoption of ICES are both explicitly referenced and more broadly compatible with many provisions in the *Guidelines*. As part of the rationale for the *Guidelines* it was noted that their application:

"May make co-generation and district heating systems environmentally and economically viable in the short and long term. One of the factors in a decision on these systems is the prospect of switching energy source in district heating systems in the future if that will reduce energy consumption."

More generally, the *Guidelines* set out a framework for environmentally responsible community development that is consistent with the broad requirements for ICES, including:

Community form

- *Develop compact communities; intensify land use.*
- *Develop mixed use, compact projects/communities.*

Site location and type

- *Develop projects proximate to existing communities, and planned water and wastewater infrastructure; also within the service areas of public transportation systems.*
- *Develop infill sites.*
- *Develop brownfield sites.*
- *Avoid developments in floodplains.*

Infrastructure

- *Develop transportation systems that reduce car dependence and use, and make alternative modes of transport more feasible and attractive.*
- *Manage stormwater.*
- *Minimize the use of fresh water and maximize the reuse or recycling of water.*

Site development

- *Minimize soil and vegetation disturbance, and soil erosion during project development.*
- *Plan for the shared use of some functions and facilities.*
- *Use surfaces that allow stormwater infiltration and avoid heat build-up.*
- *Orient buildings to maximize solar heating and cooling.*
- *Use recycled materials in site surfaces.*

In summary, existing CHBA policy positions related to residential development and the environment are fully compatible with deployment of ICES. Reflecting this, the policy discussion put forward in this paper serves to explore questions of how broader adoption of ICES can best be supported.

3.0 Innovation in a Residential Development Context

An understanding of the innovation process within the residential development industry is fundamental to any consideration of how ICES approaches might be taken up more broadly by new home builders and developers.

The residential development industry is highly entrepreneurial and adoption of innovations in all aspects of the business is recognized as a key strategy for creating market differentiation and success. At the same time, new home builders and developers are highly oriented towards risk management.

By its nature, residential development involves a host of unavoidable business risks, ranging from changing market conditions, uncertainties in the planning and land-use approval processes, escalating government-imposed costs, the cost and availability of project financing, the complexities of managing the construction process itself, and the changing preferences of new home buyers. The industry is highly competitive, but is also subject to a formidable range of regulations and uncertainties affecting every aspect of its business.

Given the range of business risks that new home builders and developers cannot avoid, it is not surprising that they are often reluctant to take on additional discretionary risks – this is simply prudent business management.

Innovations, and “new ways of doing things” will be examined carefully in terms of the risks and uncertainties they pose. Only when these factors are well-understood, and addressed, can commercial viability emerge. This is the context within which innovation takes place in the industry, as evidenced by the impressive improvement in the energy performance of new homes over the last two decades. Innovations succeed and are adopted broadly by the industry when they stand on a strong business case.

Reflecting this, proponents of new technology and new development approaches, including ICES, have to tackle the challenge of presenting a sound and thorough business case for any proposed innovation. Enumeration of the benefits of an innovative concept are of little value if the costs and risks involved are not analyzed properly and dealt with.

Given that the residential development industry is comprised of small and medium-sized enterprises, (SMEs) research, development and demonstration activity is rarely internal to the industry. Most often, this critical function takes place through collaboration involving the industry, governments, utilities and product/material manufacturers. Noteworthy initiatives such as R-2000, which led to broad-based and significant improvement to how new homes are built in Canada, followed this model. Current initiatives, such as *Equilibrium for Communities*, may contribute to future deployment of ICES.

Much has been written about how innovation takes place in the residential development industry, and about the range of barriers and challenges that can thwart technically viable innovations. In the context of this paper and its focus on the potential adoption of ICES in residential development, some of these findings have relevance.

In general, for an innovation to prove successful, a number of conditions must be met:

- Adoption of the innovation needs to be compatible with the planning, design, regulatory, financing and development practices in place. The successful innovation should not be a “special case” requiring special treatment – all those involved in the supply, installation/construction, financing and regulation of residential development must be “on side” and supportive.
- The innovation must be widely available, from many service/product suppliers – there should be both price predictability and service competition within the marketplace.
- The business risks of adopting the innovation need to be well understood, predictable and commercially acceptable.
- The regulatory system must facilitate the use of the innovation, rather than imposing additional uncertainty, costs and delay.
- There must be no unknown or exceptional liability or warranty concerns associated with the use of the innovation, and those that exist need to be solvable.
- The use of the innovation must either provide benefits that are desirable to consumers and which they are willing and able to pay for, or pose little or no additional costs. Consumers must see the innovation as beneficial to them, and of value. Incentives are no substitute for real market demand.

Simply put, innovations that can satisfy these criteria can move quickly to being conventional practice – the true benchmark for success. Much of the discussion that took place during the *Task Group on Integrated Community Energy Solutions* focused on how ICES can move towards such an outcome.

4.0 Industry Perspective on Key Issues That Will Impact ICES Adoption

A significant portion of the Task Group's discussions focused on a number of key issues that members see as linked directly to whether, and how, ICES will move towards broader commercial adoption in residential development.

It should be noted that the Task Group members recognized that the deployment of ICES could deliver significant environmental benefits, especially in relation to energy use and infrastructure efficiency. They expressed considerable interest in seeing ICES become a more "mainstream" option for new community and neighbourhood development. As well, the trend towards more compact, higher-density communities in urban areas, which is compatible with ICES deployment, is viewed as a current reality in many cities across Canada, and not as something new.

From a development perspective, the central challenges surrounding ICES relate to a number of "unknowns", ranging from cost and performance data, to regulatory uncertainty, to fundamental questions about how such systems can be financed and by whom. In short, the Task Force identified issues linked directly to the business case for ICES.

For the most part, existing literature on ICES in the Canadian context does not address these issues. It focuses primarily on the potential environmental and societal benefits to be gained, but is mute on the business case needed to underpin adoption of such systems. This is not surprising. The evolution of major housing innovations, from initial concept to application, tends to focus on technological aspects before addressing the business case required to support commercial adoption.

Central to the Task Group's discussion was the reality that ICES will require new ways of doing business for new home builders and developers, and that relatively little is known about how this could work.

Integration of energy and infrastructure systems at the community scale necessarily involves new complexities, and increased reliance on other parties to contribute to viable project outcomes. Devolving control over key aspects of a development project to other parties raises obvious and substantive business issues.

The following subsection examines these issues in more detail.

4.1 Issues related to costs, benefits and risks

As indicated in the previous section on innovation, solid business information is essential if a housing innovation is to succeed. Uncertainty involves risk, and it is a strong disincentive for business investment by new home builders and developers.

In the context of Canadian residential development, ICES is a new and somewhat unproven concept. Uncertainties exist in a number of important areas:

- **Technical and commercial maturity, and long-term performance** Many of the technologies that can be deployed within an ICES system are fairly novel in a Canadian context – in short, they lack "track record". While these systems may be technically mature and in use in other jurisdictions, they

have not been demonstrated widely in Canada in a purely commercial context. Given that ICES systems would comprise an essential component of a new development, one that would be both difficult and very expensive to replace if a failure occurred, capital costs and performance outcomes must be predictable and proven.

- **Counterparty risk** Many ICES configurations would involve the new home builder/developer in novel counterparty agreements with other entities, requiring contractual mechanisms that are significantly different than current commercial practice. For instance, a development that relied on a district energy system utilizing industrial waste heat could involve entities responsible for the operation of the system, and other entities responsible for energizing it. In the event that one counterparty failed to meet its obligations, property owners could pursue liability claims against all other parties “still standing”. There are obvious long-term risks involved in such agreements, and no clear method for addressing these risks.
- **Regulatory uncertainty** Development proposals are subject to a wide array of government approvals and permitting processes. Industry experience when taking leadership in proposing development innovations has often not been positive – this can result in delays, requirements for additional research and documentation, and escalating costs, without a predictable end-point or outcome. Adoption of ICES will add additional regulatory uncertainty to the development process, both in relation to conventional approvals processes, and potentially in new areas such as utility regulation. It may also require a review of Building Code requirements to ensure that these are also consistent with ICES deployment. All too often, developers bear all the risks related to development innovations, even when they make such proposals in response to public policy. Regulatory uncertainty is a strong disincentive to innovation.
- **Maturity of ICES service capacity** For new home builders and developers, the availability of a competitive service capacity in specialized technical areas is of considerable importance. In part, a competitive marketplace helps insure competitive pricing of such services. Perhaps more importantly, it provides the developer with back-up service options, ensuring that they will not become dependent on a sole provider of services. The level of market maturity and capacity in the specialized technical services required for ICES deployment is unclear.
- **Warranty risk** Long after a new home or building is completed and ownership transferred, builders and developers have responsibilities for its ongoing performance. Warranty systems underpin this responsibility, but in the event of a major system failure, courts can extend this responsibility as they see fit. As ICES-based development will involve new systems and innovations, it will necessarily involve more complex warranty risks, including some potential need to “future-proof” systems (i.e., should a source of waste heat required to energize a system cease operations). It is not yet clear how such risks can be quantified or covered.
- **Scope of ICES applicability** While the potential application of ICES in higher-density urban development is fairly clear, the range and nature of ICES potential for other development forms is less so. As the industry is involved in neighbourhood and community development at a variety of scales and densities, it would be useful to have greater understanding of ICES options for lower density and suburban environments, and the practical issues involved. Clearly, some systems will not “translate” well from high to medium or low density, but others may. At present, the full “ICES menu” is not clear.

4.2 Issues related to the business case for commercial viability

While all of the issues raised in 4.1 are tied to establishing the “business case” for ICES, three specific issues were raised that are more specifically linked to the question of commercial viability. These are as follows.

- **Financing mechanisms** While the capital and operating cost profile of ICES systems will vary with the specific technologies and configurations involved, it is generally expected that such systems will involve higher capital costs which may be off-set by lower operating costs.

In the absence of strong evidence that the market will accept this, and pay more for new homes in an ICES development, project financing becomes a critical issue. Policy makers can mistakenly believe that higher incremental costs can somehow be absorbed by the developer, either through cost offsets in other areas, or as a philanthropic gesture. There is also an unfortunate trend towards the use of coercive methods by jurisdictions to overcome imposed costs, through such things as “density bonuses”. Such practices do not support the business case, quite the opposite. In order to advance the business case, the financial viability of an ICES project should not be dependent on artificial subsidies.

To the extent that ICES projects involve a different cost profile than conventional projects, financing issues will need to be solved. The absence of such a disciplined approach will only serve to undermine the credibility of ICES as a commercially relevant option.

- **Demonstrated profitability** This point flows from the previous issue. The primary risk management methodology within the residential development industry involves “building on success” – basing development decisions on previous experience and accumulated knowledge. Innovations, by definition, face a challenge in this regard. Means by which to address this reality in relation to ICES is required. Showcase and other commercial demonstration initiatives may help to fill the gap. Counterparty willingness to share in commercial risks would also be beneficial. As ICES are deployed, and gain a “track record” for commercial success and profitability, this issue will dissipate. In the short-term, proponents will have to work with developers to ensure that projects are commercially successful, and that normal profit margins are generated.
- **Consumer demand and acceptability** Given the market-driven nature of residential development, new home buyers are the final arbiter of what gets built. In this context, value, satisfaction and affordability are of paramount importance. While much is said concerning consumers’ willingness to “pay more to be green”, industry experience is quite cautionary. Most consumers are more than willing to accept green features in their new home, provided there is little or no cost involved, and that they are not required to make trade-offs of other amenities in order to obtain a “green” outcome. At the same time, consumer awareness and knowledge of the linkages between how they live and the environment have never been stronger.

Given that many ICES approaches aim to deliver a conventional service (e.g., heat, cooling, water, waste management) in a novel way, they should have little impact on the livability of new homes. If communities are well designed and aligned with the lifestyle preferences and aspirations of consumers, the incorporation of ICES approaches should be quite compatible with commercial requirements. The

primary caveat being the question of costs – it is very unclear that consumers will be willing to pay a price premium to obtain the same basic services delivered via novel technologies. All those interested in seeing ICES deployed will need to consider this quite soberly.

To the extent that the market has seen demonstrations of consumer willingness to pay a premium for equivalent greener services, the costs involved have tended to be quite modest, and the commitment level required less than permanent (i.e., “green” electricity, green consumer products). Based on industry experience to date, the much greater level of investment involved in a new home purchase, and the long-term nature of this investment, change the equation for most consumers.

4.3 Cost sharing vs. cost imposition

Not surprisingly, from the perspective of the residential development industry, the issues of cost, affordability and financing emerge as a component of most issues related to ICES deployment. The importance of these issues gave rise to some detailed discussion by the Task Group, and many of the points raised are also tied to other development issues of ongoing concern to the industry. These can be summarized as follows:

- **Market-driven change vs regulation** Particularly in relation to environmental matters, there exists a sharp division between those who favour incremental, market-driven change that is inherently voluntary, and those who believe such change must be forced through regulation.

Recent years have seen a disturbing pattern of “aspirational” leadership in many jurisdictions on matters affecting the environmental performance of housing. Too often, such a leadership commitment takes place in the absence of any detailed or disciplined analysis, proper consultation with affected parties, or due consideration of non-regulatory alternatives. In an era where the principles of “smart regulation” are widely supported by governments, such ad hoc policy formulation seems quite inappropriate. Experience is showing that it may also deliver far less than expected, at a much higher cost to society.

Proponents of ICES will have to consider where they stand in terms of the use of regulation. The Task Force noted the importance of addressing existing regulatory barriers to ICES deployment – ensuring that current regulatory systems do not stand in the way. However, based on recent experience in many jurisdictions across the country, there is understandable concern that governments may go much further than this, aiming to create regulatory mechanisms that will force ICES deployment, regardless of its commercial viability. From the industry’s perspective, this would be a serious mistake and counter-productive, because it would fail. If regulated costs render a project non-viable commercially, it will not be built.

Regulation is an appropriate policy mechanism where governments are confronted by a compelling public policy requirement for which there is no market solution, or where all concerned parties agree that regulation is essential to market stability. In relation to ICES, neither of these conditions exist.

ICES is an emerging set of technologies and design approaches – one that is generating a great deal of interest, including within the residential development industry. For ICES to mature, and become

viable, considerable work is needed in a number of areas, including issues tied to the business case and addressed in this paper. Ad hoc regulation aimed at accelerating ICES deployment is most likely to derail this development process, to the detriment of all involved. It will impose higher costs, reduce housing affordability and choice, create unnecessary risks, and impose broad economic penalties on communities. Ill-considered regulation would simply mean that innovation would be thwarted.

- **Competing agendas and a “silo” approach to costs** Given that housing is fundamental to society, a broad range of interests, including governments, view residential construction as a tool to advance their particular agenda.

Since many of these interests are solely focused on their own particular goals and priorities, little consideration may be given to the collective impact on the affordability, functionality, and market viability of new homes. The dispersed responsibilities that exist within governments are particularly prone to such “silo” thinking. These competing agendas pose a significant barrier to innovation, and can have a major impact on affordability.

In relation to ICES, it will be important to keep discussions, and project planning, focused on clear objectives. A project that takes on a wide array of objectives, some environmental, others social, will be much more likely to fail on a commercial basis. ICES is not a solution for all of societies housing-related problems.

- **Availability of financial partnerships that match capital requirements and investment horizons** Assuming that, in most cases, ICES communities will involve higher capital costs and lower operating costs, the question of how best to finance such projects is obvious.

The Task Force spent some time discussing this issue, and a number of interesting concepts emerged.

Residential development involves a fairly “fast” financial cycle: capital is required to secure land and finance construction, much of this is borrowed on margin, and repaid as buyers take possession of their properties. In many cases, the profitability of the project is closely tied to completing this “cycle” within a relatively short and predictable time frame. Delays can quickly erode profits. In residential development, capital is impatient.

In an ICES community, many components of the built environment will be quite conventional in nature, and workable in relation to the industry’s normal capital cycle. However other components, such as energy systems, may be a poor fit, in that their higher initial costs can only be offset over time through operational energy savings. These components may have a capital cycle much more akin to that found within the utility sector, where a low, assured rate of return on investment allows much more protracted investment horizons. Similarly, infrastructure solutions that yield either operational or capital replacement saving to municipalities may generate an avoided cost stream that can be monetized. While such financial mechanisms are not conventionally available today, they may play a critical role in future ICES deployment. Mechanisms that match the capital requirements of ICES project with the investment horizons of potential development partners need to be developed.

- **Participation of all beneficiaries** This issue follows on the previous one, but from a somewhat different perspective. As envisioned, ICES developments could provide a wide array of benefits to many different parties. Municipalities may benefit through lower capital and operating costs for core

infrastructure, utilities may benefit from access to investment opportunities that move them from being commodity providers to energy services providers, governments may benefit from market-driven change that addresses both economic and environmental policy goals, residents may benefit from more livable and financially sustainable communities, and reduced ongoing costs of home ownership.

If the costs of deploying ICES are to be equitably and effectively met, all those who benefit will have to contribute. Costs must be shared in proportion to the benefit gained. The alternative is cost imposition that could easily render ICES commercially non-viable.

While, in principle, the concept of such participation is simple enough, its achievement may be far more challenging. For municipal governments that have become dependent upon revenue from new development, forgoing short-term revenue in exchange for longer-term benefits will require a fundamental shift in thinking.

In order to begin discussions about fair and effective investment in ICES by all beneficiaries, a clearer understanding of the range, characteristics and magnitude of each benefit stream is needed, and is likely the key to attaining commercial viability. To date, much of the discussion concerning distributed benefits has been anecdotal, or theoretical. More detailed and robust analysis is required for progress to be made in this area.

4.4 Non-financial barriers to ICES adoption: regulation, engineering standards, planning and approvals

Beyond issues of costs and financing, the Task Group discussed a number of non-financial barriers that will have a significant impact on future deployment of ICES. These are as follows:

- **Utility regulation and business constraints** Much of the recent discussion concerning future directions for ICES has involved the assumption of utility involvement. Utilities are to be commended for taking considerable initiative in this area, through their early and ongoing support of the QUEST process.

ICES represents both a challenge and an opportunity for utilities. Development that is far more energy efficient will have a clear, and potentially dramatic, impact on the conventional utility business model. As less and less energy is required, high fixed capital costs cannot be recovered easily through commodity sales without sharp rate increases. In the residential development industry, builders are already forgoing traditional utility hook-ups for some high-performance homes, as the fixed monthly cost of connection makes little sense given the small amount of energy being consumed. For utilities, an energy efficient future demands a new business model. ICES development may offer a partial solution, allowing utilities to be providers of energy services, rather than just energy commodities. As discussed previously, this may also be a good fit for their investment cycle. The profound difference being a switch from an upstream investment focus, to a downstream “end-of-pipe” focus.

The fact that some utilities are already working to make such business activities part of their portfolio suggests that ICES may offer them a compelling opportunity.

The Task Group were concerned that utility regulation may, in some jurisdictions at least, serve as a significant barrier to the development of such innovative business models. Much of the current utility regulation in place reflects very different, and increasingly outmoded, public policy concerns. Historically, as intentional monopolies, utilities required a system of regulatory control and oversight that would ensure appropriate outcomes.

Today, the lines that separate utilities, in terms of both energy forms and the effective level of competition, are less clear. ICES deployment has the potential to blur these lines even further. An example might be a gas-fired CHP unit, producing heat, cooling and electricity, in variable ratios depending on demand, and providing energy services to a number of freehold buildings. At once, this entity can appear to operate as an electric utility, a gas utility, and as a distributed energy provider. In practice, it may well be all three. From a regulatory standpoint, what rules apply? And do the rules in place have any relevance to the business practices being regulated?

New home builders and developers are very aware of the impact of regulation, being subject to a great deal of it. If consideration of a CHP unit in a new development will require confronting an array of utility regulations that were never intended to deal with this type of innovation, it is quite unlikely the developer will pursue this option. The uncertainties would be far too great, and the potential for costly delays far too likely.

Similar situations will likely arise with many other aspects of ICES development, from water and sewage infrastructure, to building codes and standards, to land-use approvals, to transit connections. As much as ICES proponents like to talk about ICES as a “game-changer”, in relation to the array of regulatory barriers that could be encountered, the scope of the game should not be underestimated.

At present, the full scope of potential regulatory barriers is not well understood, nor is there a focus within government to address these barriers in an integrated and systematic way. This needs to happen, because for the residential development industry, regulatory uncertainty is a “game-stopper”.

- **Municipal participation to reduce infrastructure costs** Many ICES concepts foresee more compact communities that are transit and non-automobile oriented, requiring fewer and smaller roadways, and which use resources and services, including water and sewage, more efficiently.

In such developments, the capital and operating costs for municipal service infrastructure should be significantly reduced. This needs to be reflected through proportional reductions in the array of taxes, fees, charges and levies placed on new development – a point already raised in 4.3. Such financial relief should not constitute a subsidy, simply a fair attribution of costs.

But such municipal participation should not be viewed only in financial terms, as other municipal processes have an equally profound impact on the costs of development, and on the potential for realizing cost-efficiencies through deployment of ICES. Municipal engineering standards represent a very significant potential barrier to ICES deployment. Even when municipal planners support innovation, city engineers may not allow it. In fairness, there are understandable reasons for the engineering department to take a very conservative approach to infrastructure innovation – if an innovation does not work, the city may be liable for damages. Notwithstanding this concern, there is a pressing need for greater clarity concerning how new development standards can be addressed.

Without a predictable and evidence-informed process, proponents face considerable uncertainty and a high likelihood of delay.

Somewhat the same issue exists in relation to development and planning approvals processes – if a municipality adopts a policy that encourages deployment of ICES-based development, the industry will have a reasonable expectation that this policy will inform the approvals process. In relation to intensification more generally, recent experience in many cities has not met this expectation.

5.0 The Role of Governments and Others in Moving ICES Towards Broader Commercialization

The Task Group raised many substantive issues related to the business case for deployment of ICES in new developments. These were put forward to move the ICES concept forward in a constructive and focused way. As stated previously, the Task Group and the CHBA find the concept of ICES compelling. There are already some examples in the marketplace of developers incorporating ICES components in their projects. ICES deserves and requires serious consideration by all interested parties. Addressing the need for a strong business case is viewed by the CHBA as a necessary and timely “next step” in this process.

This final section of the report lays out some ideas and suggestions on how governments and other interested parties can contribute to moving ICES forward towards broader commercialization in Canada. It is not intended as an exhaustive list of requirements, quite the opposite – it simply reflects the range of issues of most concern and familiarity to our industry.

1.1 Avoid “aspirational” goals: ICES needs to be “reality-based”

As noted previously, in recent years there has been a trend towards the use of “aspirational” goals by policy makers, particularly in relation to the environment. While the concept of “stretch-goals” can be a valid planning tool, this is only true when the requisite “heavy lifting” of problem definition, research, analysis and follow-through is also present. All too often, this is not the case.

ICES represents a “serious” business and environmental opportunity, and deserves to be addressed in a serious manner.

A key part of dealing with ICES in a serious manner will be to address the need for a more defined and detailed business case. It seems highly likely that the major deployment challenges that must be overcome lie in this area, rather than with the technology involved. Addressing the business case needs to become a major focus for future ICES development activities.

1.2 The value of commercial “showcase” initiatives

To date, there have been a limited number of “showcase” ICES projects across Canada. However, the extent to which these projects helped to demonstrate commercial viability is far less clear. Some were research and development efforts and had little direct commercial relevance. Others were somewhat opaque in terms of their commercial underpinnings. And some appear to have been commercial failures.

It is hoped that the current EQUilibrium Communities initiative, sponsored by Natural Resources Canada (NRCan) and Canada Mortgage and Housing Corporation (CMHC) may begin to fill the existing gap in terms of commercial demonstrations. Once all the EQ – Communities projects are announced, this will be clearer. An important criterion included in the EQ – Communities concept is that government funds will not subsidize hard costs. This criterion is extremely important, as it recognizes the critical need for “proof of concept” within a proper commercial context.

A key element in establishing the business case for ICES will be a growing number of successful projects that demonstrate, in a commercial context, the full range in technologies and design approaches that can be deployed. Governments and other interested parties must work with development teams to ensure these “showcase” project take place, and that they are successful. To the extent that non-proprietary financial and business practice data can be generated from such projects, many of the questions and knowledge gaps relating to the ICES business case may be addressed.

A key aspect of any future ICES showcase project is to avoid artificial subsidies – any form of financial consideration or “special treatment” that is not a legitimate and sound investment. Financial involvement or investment by outside parties must be based on a sustainable business model and reflect prudent business principles and practices.

5.3 Quantify ICES costs, impacts and benefits to anchor broader financial participation and regulatory reform

As noted throughout this paper, the business case for ICES will rest, in large measure, on a clearer understanding of the costs, impacts and benefits that flow from such developments. Such analysis will be critical to achieving broader financial participation in ICES developments, and in providing a solid basis for undertaking any required regulatory reforms. For the development industry, housing affordability is critical – there must be willing and able new home buyers for ICES development to occur. Greater clarity in the areas of cost and benefits is essential if ICES are to become more broadly considered by new home builders and developers.

5.4 Overcoming silos: integration within and among levels of government

The residential development industry is subject to a wide array of regulations and imposed costs from all three levels of government. All too often, the policies and actions of governments are inconsistent, or contradictory. This is an issue within each level of government, and a much larger issue amongst the different levels.

The federal government has the least jurisdiction in relation to housing, yet it can and does play a critical role in bringing other levels of government together to discuss common challenges and opportunities. The 2009 paper on ICES produced by the Canadian Council of Energy Ministers² (CCEM) is a constructive example of what can be achieved through such intergovernmental dialogue. It is instructive to note that the CCEM has identified the importance of addressing the role of governments in relation to ICES deployment³:

“Local governments (including municipalities, regional governments and First Nations) are key actors because their zoning, policy and investment decisions have a huge influence on ICES development. They usually approve ICES installations and provide leadership at the community level.

“Provincial and territorial governments are important players because they define the legislative

² *Integrated Community Energy Solutions – A Roadmap for Action*, Canadian Council of Energy Ministers, September 2009

³ *Ibid*, page 8

frameworks under which municipalities operate. They are responsible for much of the regulation of the energy resources sector and can greatly influence the capacity of utilities and energy companies to actively support ICES. They also provide education and training opportunities, undertake research, create decision support tools and make direct investments that can encourage ICES.

“The Government of Canada, through various departments and agencies, can provide information, conduct research and development and play a coordination and facilitation role, helping the jurisdictions collaborate and avoiding duplication.”

The CCEM also recognized the key role of the residential development industry in ICES deployment, and the importance of effective models that support the business case in triggering industry adoption of ICES⁴:

“Developers and other private enterprises are critical implementers of ICES. With governments fostering a positive environment for ICES, developers and industry will find the business models, acquire the capacity and collaborate with local governments to make widespread ICES a reality.”

In relation to developing the business case for ICES, and in the context of intergovernmental cooperation and dialogue suggested by the CCEM, efforts must move beyond the general, to the specific. Particularly in relation to identification of government-imposed regulatory barriers, and how to address these, forums such as the CCEM must play an effective role.

5.5 A strategic and focused approach to addressing ICES barriers

Building on the previous point, as regulatory and other barriers to ICES are identified, and a consensus concerning the need for appropriate action emerges, a great deal of practical work will be required to achieve progress. Most governments across Canada embrace fully the principle of “smart” regulation, and the importance of thorough analysis, open and transparent consultation and consideration of all options, especially non-regulatory outcomes. All interested parties must be involved in such a process, and organizations such as QUEST, which have provided a broad-based forum for exploring ICES potential, can bring much value to the process. The objective should be to develop a focused and strategic plan for addressing barriers, and setting specific, measurable and time-bound goals for achieving progress. Governments, working together, need to commit themselves to such a process, with the participation of industry.

5.6 Practical commitment to sharing risks and benefits

A key component of the business case for ICES will be the emergence of new, well-defined and commercially-relevant models for sharing the risks and benefits involved. As noted previously, ICES deployment necessitates new and novel business arrangements, ones quite outside the practices applied in conventional development. Removing regulatory and other barriers and the uncertainties these create is a prerequisite. More comprehensive and reliable data on all aspects of ICES design and performance is also required. To the extent that governments and other interested parties are successful in addressing

⁴ Ibid.

these requirements, the emergence of new models to support the business case for ICES development can be expected to occur.