Vancouver Energy Roundtable

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Professor Stephen J. Toope
President and Vice-Chancellor
The University of British Columbia

Thank you, Jonathan, for that warm introduction. And thank you, Jon and Wal for your illuminating overview on the clean tech sector

I'm delighted to be able to take part in this roundtable today and to speak a bit about UBC and the Living Laboratory that it is becoming. I know that this subject was part of your discussion during the last roundtable in December, so I hope to build upon what you already know. More than anything I hope that we can engage in a continuing dialogue for the benefit of our respective organizations, our province, our economy, and our world.

Let me begin by proposing that we all share a common purpose and that is simply this: *to change the world for the better*. That may not be the way you always think of what you do, but I believe it's true. I believe that we want to make a difference, and that we want that difference to be positive. As businesses, municipalities and academic

institutions, we approach this purpose differently and we are rewarded differently for our endeavors; but success, however any of us defines it, necessarily changes the world. And one of the key measures of that change is reflected in our economy.

Once upon a time a university president might have been able to make fine statements about changing the world through teaching and research on campus, and that would be enough. Today I know better and I know *you* better so I will back up my statement with numbers. Of course, universities create and preserve knowledge; we foster talent. But there is more than an intangible social and cultural effect - - as important as that effect still is.

Perhaps you have seen some of these figures before. If not, it has not been through lack of effort on my part. The University of British Columbia is a $2-billion-dollar-a-year organization. We receive, annually, a bit more than half a billion dollars in research funds. Economist Walter Sudmant has determined, after rigorous external peer review, that the value to the economy of new knowledge and technology transfer from our university, annually, is $5 billion dollars. As a return on that half billion dollar investment that is a factor of 10.

A full order of magnitude. Another $2.6 billion dollars is added to the economy as a result of increased income earned by our alumni.

Some of you, I am sure, have benefited directly from new knowledge generated and research conducted at our universities. Many of you also benefit from increased income due to your education. I certainly hope so. All of us profit indirectly.

Taking into account direct spending and other factors, UBC accounts for some $10 billion dollars annually. This is UBC alone, not counting our province's three other research-intensive universities. $10 billion dollars is about 5% of the provincial economy, more than Mining and Oil and Gas Extraction.

Yes, UBC and all our research-intensive universities are major players in the BC economy. But we can do more, and that is where the Living Laboratory comes in.

The concept of the University as a Living Laboratory adds another level of value to the economy, and in particular to the clean-technology sector. As you may already know, the University as a

Living Laboratory is providing more than knowledge and more than education, more than researchers and more than well-educated graduates.

We are offering up, for the first time, our campus itself and our considerable infrastructure as a test bed and demonstration site for your ideas and your technology.

The Laboratory in question comprises some 500 buildings on more than 1,000 acres. About 50,000 people live, work and study in it. We are the sole owner-occupiers of what amounts to a small city, with a population between that of Port Coquitlam and West Vancouver. Our "city" owns and operates all our own utilities: water, electrical, heat and waste.

Since 1998 this small city has achieved remarkable results in energy efficiency and carbon reduction. We hit our 2012 Kyoto targets five years early in spite of growing our building base by 35 per cent and our enrollment by 48 per cent. Energy savings through programs such as EcoTrek – a retrofitting of electrical and water infrastructure

in over 250 buildings – not only provided carbon reductions, but also returned savings, $2.6 million annually for EcoTrek.

But all of our sustainability accomplishments *on campus* were achieved using proven, safe, technologies. Meanwhile, as if in another world, you, and our academic researchers, were advancing newer ideas and innovative solutions.

The idea behind the Living Laboratory is to remove the firewall that has traditionally existed between academics and operations—*academics* being the ones who illuminate our world and *operations* who are tasked with keeping the lights on. One group has been researching sustainability and the other has been deftly working to be sustainable.

Let's put these two capabilities together and let us then develop partnerships with businesses such as yours, and cities such as Vancouver. Let us research, test and model sustainable solutions. Let us go even one step further and *demonstrate* them at *sufficient scale* to make them easily *transferable* to the marketplace. This is the Living Laboratory.

What's in it for you? According to the Carbon Governance Project, there is a crying need in the BC clean-tech sector for large-scale demonstration capabilities. Well, we are pleased to tell you that UBC is offering large-scale demonstration capabilities within our research mandate.

We have been pleased to work with you in R&D. With the Living Laboratory we enter the R, D &D business. Research, Development and *Demonstration*. We believe that this will be of great benefit to you, to our university, and to the world as a whole.

We think the Living Laboratory will enable you to break through to full acceptance of your solutions in Canada and in export markets. For our part we expect to reap the benefits of energy savings. We will leverage your assistance in meeting our own and the government's emission targets. We see valuable opportunities for our students and faculty to participate in cutting edge research. And we believe that what we demonstrate with you on our campus will help change the world for the better

These then are the basic elements of our Living Laboratory:

- Partnerships among researcher, students, businesses, organizations and the public sector…
- …conducted within our core academic mandate…
- …asking sound financial use of our substantial operational infrastructure…
- …with the prospect of not only addressing the world's toughest challenges but of actually changing the world for the better.

We say that UBC is a Place of Mind. Until recently our contributions to new knowledge and technology transfer were primarily of the "mind" variety. Now we are also providing our Place.

Let me illustrate with one of our flagship Living Laboratory projects.

In British Columbia there is a company called Nexterra that is developing systems that convert biomass such as wood waste into a synthetic gas—or syngas as it is commonly referred to. This syngas is used by a General Electric Janbacher engine to produce electricity. It also produces waste heat in the form of steam and hot water.

Clearly, this combined heat and power system is ideal for our province, as we live in a heavily forested part of the world.

The city of Vancouver has a great deal of urban wood waste that has limited uses and in some cases was going directly to landfills. Coincidentally, UBC has aging heating and electrical infrastructure in need of maintenance and upgrading. Furthermore, a member of our own faculty—Professor John Grace in the department of Applied Science—is a world-leading researcher in the area of bioenergy.

Putting all these things and people together—integrating our operations and our research with business partnerships—resulted in a proposal for what we call the **Bioenergy Research and Demonstration Project**. It will be the first steam heat and electrical generating utility with this technology of its size and scale. And it will be incorporated directly into our existing campus infrastructure to be tried and tested.

This demonstration project will reduce greenhouse gas emissions by an amount comparable to removing 1,100 automobiles from the road while generating enough electricity to power 1,500 homes plus steam

heat for some of our buildings. It will get us roughly one third of the way to our 2015 goal of a 33% greenhouse gas reduction from 2007 levels. Because nothing like it had been done at this scale before, it could serve as a model for comparable systems in cities around the world.

Funding the project was an interesting and complex endeavor. We could access money from the Clean Energy Fund, Western Diversification, BC's Innovative Clean Energy Fund, Sustainable Development Technology Canada, the BC Bioenergy Network, and private sector support from FP Innovations and Nexterra itself. This covered about three quarters of the total cost. The rest, and the single largest contribution, came from UBC itself, a capital investment, or mortgage, if you will, based on our operations office determining that we would save between $10 and $15 million dollars in energy costs over the next 15 years.

The commercial benefits of the project, including the intellectual property, would stay with the commercial partners. The research benefits would stay with the academic partners, and the energy savings and carbon reductions would contribute to our campus

achieving our 2015 commitments of 33% reductions from 2007.

Win. Win. Win.

As I describe the project in this simple straightforward manner I imagine my colleagues James Tansey and Steve Cockcroft and Jon Rhone smiling to themselves. If you get a chance today, ask them to share with you some of their "war stories" about arriving at this straightforward solution. It was a good thing to do. It was the right thing to do. But it was not always an easy thing to do.

In order for the Living Laboratory to come to fruition, very different people and very different organizations had to learn to communicate and work together in completely new ways.

In order to succeed, our operations people had to agree to experiment on a system whose efficient, reliable operation they are completely accountable for.

Our Board of Governors had to be convinced that the project was a responsible use of taxpayers', donors', and students' money, and that

the project fit within the university's academic mandate.

Intellectual property agreements had to be re-thought and re-written, because IP was in danger of inhibiting innovation, not advancing it.

Academics, who are famously independent and cynical, had to be satisfied that their academic integrity and freedom would be preserved.

And, finally, time itself had to change. You entrepreneurs move *fast*. Governments and large organizations, not so much. At UBC, we're getting up to speed. We're maybe twice as nimble as we were two years ago.

The journey was awkward but interesting. None of the challenges were insurmountable, but I think it is important to note just how hard innovation can be – not because the solutions are difficult, but because *humans simply tend to be attached to the way they usually do things.* This is an issue that runs through every aspect of sustainability.

Forty years ago, the cartoonist Walt Kelly coined a famous phrase at the very dawn of the sustainability movement. He had Pogo say "We have met the enemy and he is us." Well, forty years on we are fighting the good fight, and I'm happy to say that while changing people and institutions is still hard, we're learning how to do it.

I'm happy to announce that our Living Laboratory is open for business and well under way. We at UBC are currently investing some $150 million dollars in clean technology Living Laboratory projects. In addition to our Bioenergy project with Nexterra and GE, there is the Centre for Interactive Research in Sustainability which will open this fall. There is one of the largest steam to hot water conversions in North America. There is a continuous building optimization program, and we are close to concluding agreements on a major Smartgrid program.

Our partners in our living laboratory include BC Hydro, Modern Green from Beijing, Honeywell, Haworth, FP Innovations, CST Innovations, Pulse Energy, McFarland Marceau Architects Ltd, Equilibrium Consulting Inc., Cooledge Lighting Inc.; Fisher Scientific and Fortis (along with Nexterra and GE). We are also working closely with Cisco

and Honeywell. We have active frameworks for collaboration in memoranda of understanding with the City of Vancouver, the City of Kelowna, BC Hydro, the National Research Council; the Climate Action Secretariat and we are inviting others. In fact, *I am inviting you*.

We have a great opportunity in British Columbia. Our provincial government has created powerful incentives to innovate in a low-carbon economy. Our natural abundance of relatively cheap hydroelectric power challenges us to do this with unparalleled efficiency.

Our research-intensive universities such as UBC have over the decades cultivated a large, highly educated and passionately motivated workforce dedicated to sustainability. This environment has spawned a strong, energetic community of clean tech companies – you in this room. BC is a leader for Canada in this sector. We may not be of the sheer size of Germany or China in our ability to invest in this sector, but we have, I believe, many of the components in place to catalyze further growth. But we need to make better use of what we have. UBC's Living Laboratory makes better use of our minds, our

place, and your innovations.

For our part, we make these commitments as part of our

Sustainability Initiative:

- We will work with you to explore and exemplify innovative techniques and solutions
- We will promote, teach and further advance best practices
- We will leverage federal and provincial funding
- We will create opportunities to bring you together with our academic community and our operational staff
- We will work to connect you with a broad network of local, national and international partners
- And we will acknowledge and value your intellectual property.

In return, we ask that you challenge us:

- Bring us your problems
- Collaborate with us on research, development and demonstration
- Help us reach our own Green House Gas targets
- And share with us our long term vision for the advancement of a civil and sustainable society.

Ladies and gentlemen, we are engaged in a deep and complex conversation about the world in which we are all going to live. We *are* going to change the world for the better. But we can only do it together.

We must not only change the way we use energy, we must change the way we think about our lives in this world, and we must change the way we work with one another. This is what the Living laboratory is for. I hope you will join me in making good use of it.

And please—let's please keep the conversation going. Thank you.