

## Speech to Calgary Chamber of Commerce – June 29, 2004

### Technology: Alberta's Future is Today

Good Afternoon. It is a great pleasure for me to be here to speak before the members of the Calgary Chamber of Commerce. I trust you are not suffering from “election hangover.”

No matter your party affiliation, it was certainly an exciting day yesterday, and uniquely Canadian.

It is a good feeling as well to be hosted by the Van Horne Institute and I thank Peter Wallis very much for that honour. I have always felt a connection to the great visionary Sir William Cornelius Van Horne.

He and I both came from other countries and made Canada our home.

He and I both share a vision of a country dominated by the best in rail travel. You know, it is interesting that at his times there were doubters who thought the CPR rail lines would never be completed. But you can never stop a true visionary.

#### slide: R&D spending ranking

I welcome this opportunity to talk to you about my favorite topic – technology. Whereby Technology per sé is such an abused word I have to be more specific. When I say Technology I mean electrical and electronic technologies in the broadest sense. Since 1846 they are the business of Siemens.

Our current portfolio comprises about 450 different technology fields breeding in excess of 1 million different products. 80% of our sales is based upon products which are less than five years old.

With 8.4 billion \$ R&D spending we are the largest private sector research and development company in the world, outspending even IBM, generating in average some 28 patents a day. All of that plus the talents of our 417,000 employees in 190 countries let us become the second largest electrical engineering and electronics company in the world – if I may discount the financial services from General Electrics revenues.

#### Slide: sales ranking

I have worked for only one company for the past 43 years. That by itself may not sound exciting. However the exciting piece is: it was only one company, a company which is comprised out of a global network of innovation that picks the best of the best from 190 countries around the world, being partner to the most aggressive and innovative industries, most demanding governments and nations and subsequently leading the industrial world with its investment in research and development.

While we are a some 3 billion \$ company in Canada, with 7,000 technology-driven employees and export out of Canada of some 2 billion \$, we want to do better in penetrating the Alberta market.

That is why Siemens is now making a conscious effort to profile our global capabilities and increase our local presence here in this province, like in our support for your great hockey team, the Flames.

It would have been even better to have the Stanley Cup presented to the captain of the Flames in game 6 in front of our Siemens logo on the visitor's bench, but it was still a wonderful season!

We have already established relationships with many leading organizations here in Calgary. We have had a long and fruitful partnership with the Calgary Regional Health Authority, where our MRI's help diagnose diseases and help determine treatment plans. We are developing our relationship with the University of Calgary.

We have supplied equipment to the Calpine facility, a state of the art 501 Combustion Turbine Power Plant that continues the Siemens strategy of safe, reliable and environmentally compliant power for the masses.

And of course, people in Calgary and Edmonton have been using Siemens technology while riding our light-rail transit systems – your C-Train - for over 25 years. So in many ways we are already touching lives of Calgerians every day in various components and much more to come.

In Transportation, Oil & Gas, Energy and Health Care, we see the challenges and opportunities the people of Alberta are being faced with. We have successfully consolidated our activities here and are becoming more recognized for our strength in the electrical engineering, oil and gas, and power generation applications.

**So what is the bigger picture, what paradigms do we need to challenge and how does technology blend into this?**

Many fellow Canadians may not have recognized it but: the future is today, is now, is here and we are already living in it. As you may know, Canada ranks some 35th in the world population, whereby we have attracted the 7th largest economy among G7 countries.

A report in 2000 listed Canada as the 3<sup>rd</sup> industrialized nation in terms of emission of greenhouse gases per capita, which in turn unfortunately makes us among the world leaders. Wow, a world leader, unfortunately for the wrong reason.

The Kyoto Accord is the recognition that we are living at the expense of the future. We eat up non-renewable resources which means many more generations of our children behind us may be in dire needs. At the same time we recognize that we want to maintain same standard of living and even improve on that. Is that a contradiction?

No. Technology is the answer. Technology of the future, which may not necessarily be the technology of the past. Kyoto has directed our awareness to the issue that we currently employ in our economy technologies and processes which are based on fossile energies burning carbon hydrates thereby depleting unrenueable resources and as a byproduct emitting CO<sub>2</sub> and other greenhouse gases.

Actually over the last decades our greenhouse emissions correlated tightly with and even grew slightly faster than our economical growth. At 31% of CO<sub>2</sub> emissions, transportation is the highest contributor.

Using the transportation scenario I would like to explain our technology option in the before mentioned context. Apparently transportation is one of if not even the largest Achilles heel of our economy. Challenged by sheer size, shape and topology of the country, transportation must be a challenge.

Just by comparison with Singapore, does transportation create jobs in Canada over Singapore? Yes! Does it provide productivity advantages over Singapore? No! Do productivity gains rank higher than jobs? Yes! Because productivity advantages will create jobs in different sectors after and once infrastructure enable more productive industries.

Economic growth is very dependent on infrastructure, which is in place to support the settlement. This is the chicken-and-egg syndrome in fostering economic development. Without adequate infrastructure growth rates are slow. Economic welfare is in turn a result of healthy growth. So, infrastructure comes first, then success follows.

As the first railroad across our wonderful nation launched an unparalleled growth and success story, we also learned that infrastructure *is* technology.

When Mr van Horne planned the CPR going through Alberta the mindset at the time was, that Alberta was unfit for human habitat. Who did he ask for ridership forecasts to justify the investment? He knew that infrastructure comes first, than economic development. Challenges did not stop Sir William Cornelius Van Horne. He considered the railway as more than just a train – it was an integrated communications and transport system, that would create jobs in many different sectors and boost the economy.

Virtually all sectors of transportation are based upon fossil fuel burning technologies. Fuel was cheap and available almost in abundance. Now Kyoto made us realize the flip side of those technologies. Electricity, an incredible flexible and powerful form of energy, by definition does not emit CO2 ..... if it is for instance being generated by falling waters. This is why we call it Hydro.

So the Kyoto challenge is not to go back wards in our quality of life or cost of life **but it is a technology challenge** to come up with technologies which allow us to master our economy and our lives even better, more productive without the down sides of historical technologies. Kyoto is about technology choices without giving up on standard of living actually asking for an improvement.

Knowing that **using** electricity does not emit any gas, and thereby is fully Kyoto compliant. In my vision we are being challenged to convert existing processes or technologies into electrical technologies or as I may phrase it: to "hydro-ize our future".

This however has two components: the use of hydro and the generation of Hydro. Using hydriized technologies is kyoto compliant whereas generating electricity may not if it is not using regenerative forms.

### **Staying in the transportation scenario: Do we have "hydro-ized" technologies to convert our transportation structures using electrical technologies?**

Flying an aircraft with an electrical umbilical cable is not a sound technical proposal. Electrical cars? Well perhaps, but not within the Kyoto commitment. Trucks, a major part of the transportation fleet? Well, very unlikely feasible in the foreseeable future. Trains and other forms of public mass transportation? As Calgary demonstrates with the C-Train daily: Definitely yes and within reach! Opportunity? Great!

With little exceptions (Calgary C-Train) all of our railroads are Diesel-driven and can be futurized - or shall I say hydro-ized - rather quickly. The technologies are there - perhaps not here - and ready to be deployed.

Please allow me to illustrate the order of magnitude of the impact. Most railroad operators in Alberta for example using diesel driven engines, burning many hundreds of millions of dollars worth of fuel a year and that means automatically emitting proportionally greenhouse gases. About 35% of all freight-kilometers are within borders between Calgary and Vancouver traveling in British Columbia, a province with Hydro-Hydro in abundance.

Technically all fossil fuel driven locomotives whether diesel or turbo are actually already being electrical by having electrical traction motors, since the characteristics of an electric traction motor is best suitable as propulsion of the locomotive. The only use for on board-diesel engine or turbine is to drive an electrical generator and thereby constitutes nothing but a little mobile electrical powerplant providing electricity to the traction motors.

Now casting aside the questions of efficiency of small mobile vs large stationary powerplants, this auxilliary powerplant plus the big tank for the fuel is "only" the substitute for an overhead electrical wire which could provide the needed electrical energy for the traction motors. This additional weight needs to be moved and cet. par. thereby leads to higher fuel consumption than the electrical sibling.

This additional load makes the diesel-locomotives much heavier than the pure-electrical european siblings. However this additional load slows them down but give more traction and let them pull longer, albeit heavier trains which in turns slows them down as well. All of that does not go along very well with passenger traffic. This picture does not change significantly if you employ a turbine instead of a diesel as recently being suggested.

**Why would we still use or even expand non-Kyoto compliant trains and actually attempt to design new ones when we have Kyoto compliant technologies at hand which perform better and have more suitable parameters to meet contemporary constraints?**

An electrical or hydro-ized railroad would comply with my initial statement on meeting the challenge and at the same time improving structural productivity. It would mean some 50-70 million \$ savings in the energy bill for the operator at todays fuel prices. We all know that the cost for fuel only goes up, while we continue to deplete our non-renewable cache of fossile energy resources.

When you talk about trains, the future technology is indeed ready today. Transrapid Magnetic Levitation trains, or Maglev, are running today and are supported, guided and propelled by electro-magnetic forces alone. There is no physical contact with the tracks. No exhaust, little noise. They are capable of reaching speeds at a comfortable level of 500 kilometres an hour.

#### [Transrapid Video](#)

The design of these vehicles ensures comfortable, safe and reliable operation. The last published values in 2001 estimate that it has carried more than 350,000 paying passengers and has logged more than 750,000 train kilometres since the beginning of revenue operations in 1997 at the Transrapid Facility in Emsland, Germany.

A corridor between Las Vegas and metropolitan Southern California is now being studied, which would enable passengers to get from Los Angeles to Las Vegas, by train, in less than 90 minutes.

We expect to take you from Calgary to Edmonton in 52 minutes from downtown to downtown; in less than an hour! Imagine the "West Edmonton Mall" as head station in Edmonton.

At energy needs much less than what we had in the past with technologies of the past century namely cars and diesel trains or their recent siblings like turbine driven trains.

The beauty of the Transrapid technology is that it provides fast, comfortable public transportation. The implication of the speed is that at 500 kmh, you want the guide ways - this is how we call the rails since they provide guidance without any mechanical contact - to be elevated and resting on pylons, as you have just seen in the video.

The implication is that **the land can continue to be used** by farmers. No protection fences for high speed as historical trains presently cut into communities. Overpasses, underpasses and fences are being required for historical trains to avoid accidents on at-grade-tracks whereby inversely it is rather unlikely that a cow will be climbing onto the guideway of a transrapid.

The most powerful implication of the elevated track is that we can put the alignment on pylons into the median of Highway 2 and the provincial government can use their existing right of way of Highway 2.

This implies that the time consuming process of environmental assessments, which are being required to put a new "footprint" into the ground for railbound trains, disregard diesel or turbine driven, which amounts nowadays up to 12 years – or in political language, requires more than 2 complete terms of the same government to rule and to stick to the same plan, now can be shortened immensely.

As the Transrapid Joint Venture between Thyssen-Krupp and Siemens implemented the train in Shanghai within 22 months, I do not see any reason why a determined province and government cannot complete this project within one political term. In simple terms, it takes a number of Albertan construction companies simultaneously to erect pylons in the median of Highway 2, and the guideway elements will be offsite prefinished and craned into position onto the pylons.

The operation of the train would be an attractive business proposition for a P3, a public-private-partnership in particular given the comparable low operating cost and the even lower maintenance cost due to the non-contact technology and the absence of heavy-duty moving parts.

The Transrapid mag-lev train now runs in places like Shanghai, China move at those speeds. And if you are able to do this, you can then live in Calgary and work in Edmonton, or vice-versa. The entire province will change in it's socio economics and will prosper immensely.

**Extending the track to Ft. McMurray**, you may live in Edmonton and daily commute to work in Fort McMurray. The never-ending issues on recruiting, needed skilled workforce, infrastructural bottlenecks in Ft. McMurray might just be eliminated. Edmonton is only an hour away.

The tracks, or guideways that are used for this technology integrates with other land uses. Spaced support structures minimize environmental impacts, leaving drainage and animal migration patterns virtually undisturbed. Now think of the developmental possibilities.

You can build commercial and residential developments all along the Calgary-Edmonton corridor. You can stop at Red Deer for shopping or dining, or stay at a fine Van Horne designed hotel.

Rail ridership will grow when attractive growth is supported by the infrastructure. Today, we have 20,000 cars travelling every day between Calgary and Edmonton. This makes this corridor the most heavily travelled stretch in Alberta.

Recent reports suggest the Province spends 120 million \$ on healthcare costs related to traffic accidents. Although not explicitly stated, one can assume that Highway 2, due to the high volume of use and length of travel, contributes notably to this total. Based on this information, it is easy to imagine the number of cars increasing by 50% in the next 10 years.

This will require significant expansion in capital investment in Highway 2 with the doubling of lane capacities, if cannot source alternative transporation to cars. For example, the cost of the Deerfoot Trails extension project is reported at approximately 100 million \$ for a 11km stretch from Hwy 22 to Hwy 2. Applying this cost to the length of the Highway 2 corridor would generate a cost of 1.5 billion \$ for one set of bi-directional lanes.

Talking of prosperity, 20,000 cars daily times 2 passengers per car, in average times of 4 hours per trip 365 days a year means a loss of approximately 60 million productive hours or 6 billion \$ for the Alberta economy, assuming a worker costing rate of 100\$ per hour.

I should also not forget mentioning the 365 million \$ in fossile fuel consumption at today's pump prices, which translates into 128.000 metric tonnes of Co2 emission per year or enough to fill all the homes in Calgary plus 25% of the homes in Edmonton with emissions. We can also expect the pump prices to go up significantly. As much as Alberta is enjoying the returns from our rich oil reserves as the price increases, it is a major deterrent for economic prosperity for those who are in need of fossil energy.

Another aspect is that with the proven light rail systems in Edmonton and Calgary, provided by Siemens, we have the benefits of feeder lines to bring travellers to the head stations of the Transrapid. Thus, our vision of offering the passengers a seamless public transportation system can become true.

The technology challenge is to attract travellers away from using their cars. Only significant travel time gains, decoupled from ever rising fuel costs, enhanced safety and better independence from adverse weather conditions will have the desired and appropriate impact. Imagine you drive your car 4 hours and the Transrapid flies by every 10 minutes. That will be the last time you took your car.

For traditional rail bound transportation, the faster the speed has to go the need for straighter tracks leads to a high degree of rebuilding of the alignment, and more solid railbeds – which also suggests heavy investment in the rebuilding of existing right of ways.

So, in essence if we talk about fast historical trains, it means basically building it anew. So why would you invest in old technologies when you could have the technology of the future today? Speed advantages? Perhaps a costly illusion when you compare with the Transrapid.

Because of the heavy weight of the traditional trains, the tracks are usually at grade. The Railway Institute of Canada does not allow any train to go faster than 150 kmh and even this top speed requires the highest grade of track which limits, among other things, elevation change and track curvature.

This speed limit was imposed due to the safety implications of level crossings, and was selected to permit adequate stopping distance in the event of a track obstruction. This means peak speeds, not average. The train, because of its weight and the limits of the traction physics, can only accelerate to the top speed within a distance of 50 km, which is indicative that the average speed will be way below the top speed.

This time performance will not give travellers an attractive enough time advantage to attract him to leave the car at home. To increase the speed beyond the legal speed, we have to eliminate all grade crossings. All those have to be turned into underpasses or overpasses, which sounds like a very heavy investment however still into historical technology not achieving the required speed and not a hydro-ized technology.

Usually we do not talk about the other cost associated with a technology choice, neither do we talk about the other savings, for example health care costs through reduced accidents, loss of productive times, and much more.

If air travel would have been an option, we would have a flourishing air travel industry. Air transport between Edmonton and Calgary is time consuming, due to wait times and unpredictability of the weather. Airlines are hard to keep profitable, and airports have security risks.

Couple these factors with both the instability of fuel prices and our national carrier situation, and it makes air travel far less attractive to the end consumer for such a relatively short distance. It is interesting to note that Air Canada's highest frequency of flights is between Calgary and Edmonton.

With the 9/11 experience, we had to learn that the hi flexibility of aircraft makes them unfortunately a powerful weapon if diverted away from their intended use. A train could never be used the way planes were used on September 11.

Projections are for Calgary and Edmonton to each have approximately 1.5 million residents in a couple of decades. Why not 2 million or more people in the same timeframe, considering population growth rates are among the highest in Canada in these two cities? With this type of technology, the possibilities are endless.

To make mass transit more convenient, we have developed a system featuring electronic tickets that passengers carry with them when traveling by bus or train. Sensors located above the vehicle doorways register when and where passengers board and exit, and the appropriate fare is then calculated. This system has been in use in Hong Kong since 1997.

In addition to networked means of transport, an integrated transportation system such as the one that would serve Alberta requires leading-edge vehicles and control systems. Siemens provides systems for mass transit, regional and main line services. The trains in these systems, some of which employ driverless vehicles, are capable of running at extremely short intervals. In Athens, for example, Siemens is providing the signaling technology for a metro line that will serve the sites of the Olympic Games in 2004.

As I mentioned before, hydro-izing our future means not only looking at the demand side it means as well that we have to have a hard look to generate electricity in a Kyoto compliant fashion even using fossile fuels, for instance coal which Alberta has in abundance. Clean coal technologies are not way out, they are becoming reality. Siemens is working on clean coal technologies of CO2 recovery and many other vital technologies for the future.

By that example, for us at Siemens, it means always taking a hard look at what drives the 21st century. More than ever before, this century will be Hydro-ized, will be driven by electrical and electronic technologies. It is not technology for technology sake.

And as someone who heads an engineering-driven company – I believe that both engineers and technology play a key role in our future. For most of us, we don't worry about technology, we embrace it.

All around the world, cities are being called on to transform themselves - not just because of growing populations, but also as a result of lasting changes in the nature of economic relationships and daily life. City planners, municipal authorities, architects, infrastructure experts and leading industrial companies will all have to work closely together to meet these complex new challenges. For Alberta, you have a unique opportunity to rise to the challenges now before you, paving the way to the future with innovative solutions that will benefit the city far beyond this decade.

Ladies and Gentlemen,

As business leaders, we must all play an active role in making Alberta a benchmark for advanced technology, and a future that will be based on a profitable business model, an inspiring vision and a common objective. So I'm convinced that the vision of high-speed, first class rapid transit will come true. And I sincerely hope that the cooperation between Alberta and Siemens will make a vital contribution to this bold and inspiring endeavor.

My last message centers around the need to be a good corporate citizen and adopt social responsibility. Companies do not operate in a vacuum: they are citizens of the countries where they operate. They are integral parts of communities.

They bear internal responsibility for their employees. And they bear social responsibilities. Siemens has created the Siemens Network of Caring, a platform to support designated charitable organizations. Siemens in Canada is a Regional Company, and our intent is to be part of the fabric of each and every region we represent.

So there you have it. I know that the breadth of Siemens capabilities, both global and local, are still seen as incomplete perceptions in this part of Canada. When Sir William wanted to build what is now the Fairmont Banff Springs Hotel, he recognized what the attraction was. He said, "If we can't export the scenery, we will import the tourists." Whatever it took to realize a vision.

I hope I have stirred your imaginations and opened a door that lets you into the global network of innovation.

Thank you.