IVHS / MOBILITY

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HIGHWAY USERS FEDERATION

USA

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Taking one Fleet Operation component - toll collection - first, the technology is beyond the experimental stage and is operational on at least seven toll roads and an even larger number of toll bridges and tunnels in the US and in several European countries. These systems are not, however, all compatible and interchangeable. This will obviously become a major problem as such systems are adopted by adjacent toll facilities under different managements.

The toll managers in the New York metropolitan area recognized this concern as early as 1987 and expect to select a common system as early as this year. The selected system will then be installed and extensively tested for reliability and cost-effectiveness for three years before a final standardization agreement among those agencies. Their intent is to have a compatible system in operation on the entire New York regional toll system before year 2000.

The goal enunciated by the IVHS-America organization is to have completely compatible vehicle identification systems in the entire North American continent: this would include toll as well as non-toll applications, and, in fact gets involved in non-motor vehicle identification systems as well: containers, rail cars, etc. The compatibility of these identification systems with the detection needs of Traffic management are another obviously tricky interface.

The systems now in experimental use are not all compatible, and this raises a series of major questions of when and by whom such standards will be adopted; too soon, and development and improvement are stymied; too late, and some expensive retro-fits will be required, or important advances will be foreclosed.

So, although a number of systems hinging on positive vehicle identification are operational, we can look for several years of intense research and development in trying to select the functionally best technology and deciding what elements must be standardized and when.

Rapid IVHS development in the toll field is driven by its potential to improve capacity and service and reduce costs. Experience to date has been most encouraging with accuracy, dependability and cost-effectiveness. Although technical problems are real and further improvements needed, the most significant difficulties have been institutional; getting a number of independent agencies to reach and stick to a common decision.

These same considerations and problems are at the heart of one of the older and certainly one of the geographically largest IVHS experiments in the US: the Highway Electronic License Plate program which crosses six states and a Canadian Province, and stretches over 4500 kilometers from the British Columbia border in the northwest to mid-continent in Texas. This project is sometimes called the HELP/CRESCENT project because of the crescent shape of the major corridor -- Interstate Highways 5 and 10.

This project, from a technical standpoint, includes weigh-in-motion technology, automatic vehicle identification (like the toll card readers) and automatic vehicle classification. It will ultimately include some elements of cargo identification and driver as well as vehicle identification. It's goal is to integrate all safety regulation, weight control and tax collection functions for interstate vehicles into a single administrative system.

In its experimental configuration, HELP/CRESCENT will encompass approximately 40 monitoring sites - about one every 100-125 km -tied together in a single computer network with the intent that a commercial vehicle can enter that corridor at any point and leave it at any point without a stop at an administrative border or weigh station. All of the regulatory and tax supervision will be handled by the central computer. At the current time in the test configuration, about 1500 trucks have identification transponders and about half of the monitoring stations are operational. As a fully operational system, the number of monitoring points and instrumented vehicles would obviously be much greater. This project will reach the final evaluation stage in 1994.

A second Fleet Operation Project has been recently announced which will cover a north-south corridor from Florida to Quebec, Canada along the corridor of Interstate Highway 75. It also covers six states and will be some 2500 kilometers in length. Although the objectives are similar to HELP/CRESCENT the system will be designed with roadway monitoring stations in common but each state jurisdiction maintaining an independent computer central for regulatory and taxation purposes. This project is in the preliminary design stage but the managers hope to be in a position to seek bids for system procurement in 1992.

The truly remarkable aspect of these projects, however, is not technical. It is institutional. In each of the states traversed there are several governmental agencies with some regulatory or taxation responsibility over commercial vehicles. America's Federal system with many governmental functions reserved to the states has advantages; but in an area like this, it has distinct disadvantages: a lot of people have to give up a piece of their autonomy, a little piece of turf to make the system work. As with the toll collection area and, in the future, traffic management and vehicle operations, institutional and legal problems will certainly be as great as technical ones.

But I have no serious reservation that IVHS is, indeed, a blueprint of the future - an idea whose time has come - although the shape and dimension of that idea is only dimly perceived.

IVHS-America, the public-private group chartered last year to coordinate the US and North American effort, has been working hard to develop a conceptual plan for orderly development of IVHS. Although still sketchy, and subject to much change and expansion, that group has established a list of near-term priorities that suggest the magnitude of the task:

1. Develop a reliable source of funding for research, development and testing IVHS components.

2. Accelerate deployment of traffic management centers in major US cities for early pay-off in congestion reduction.

3. Test and deploy information service applications.

4. Continue operational tests of fleet management applications.

5. Establish procedures and sites for operational tests of other IVHS components.

6. Develop an overreaching system architecture.

7. Agree on standards and protocols.

8. Determine and reserve needed radio frequency allocations.

9. Encourage a university-based education and research support structure.

10. Identify and resolve legal and institutional problems.

11. Provide public information on progress.

12. Continue international coordination with developments beyond North America.

This is a very ambitious task; there is probably a hidden bomb in every category. I wont try to describe them all, but here are a few:

Funding. This is a major effort. Our Congress has put up $660 million for a part of the public R&D expenses, but total costs to test and deploy these systems could easily run to $40 billion in public and much more in private expenditures over, say 25 years. As a portion of total national surface transportation expenditures over that time period, $40 billion may not be large -- 1 to 2% -- but a good many hard decisions are ahead on cost-effectiveness and the public/private split of costs.

Traffic Management Centers. The goals here are realistic: control centers operational in up to 15 cities and rural corridors in 5 years, 150 in ten years and all large metropolitan areas and all rural Interstate routes in 20 years.

An over-riding technical problem is the ability to reliably and accurately identify vehicles and their motion and, perhaps their desired destination.

Information Services. The market-place will dominate this area. We are not sure what information drivers really want, what format they may want the information, and what they will pay to get it.

Fleet Operations. I'm sure that this will continue to be the leading edge of IVHS in the near-term. The economics are good. However, automatic vehicle identification systems, inexpensive weighing devices and electronic information systems open the possibility of various taxation

or toll systems that some academic and governmental folks welcome, and some users view with considerable concern. Weight-distance taxes for trucks and punitive peak hour tolls for automobiles are two common specters.

Test Sites. The ability to test new technologies in something like the real world with acceptable levels of safety has to be developed. In a contentious, litigation strewn society as exists in the US, this is a major problem.

System architecture, and the next heading, standards and protocols, are the heart of the matter: when will we lock into common standards, what elements must be standardized and who makes what decision. I doubt that we can afford the VHS/BETA controversy in a public/private endeavor of this scale.

Radio frequencies. This is a great concern right now, but emerging technologies might provide solutions. Radio spectrums are scarce, however, and have been probably wastefully assigned to entertainment uses in too many cases.

A university research and education system can be built, but that obviously takes time. In some immediate cases, the needed research capabilities can be borrowed from declining defense areas, but in the long run, a whole new educational/research plant will have to be created.

Legal and institutional time bombs litter the landscape. Product liability, privacy, jurisdictions, anti-trust concerns are just a few examples.

Public information is obvious -- the public is the ultimate customer who, finally buys in or rejects whatever is offered.

Finally, last but not least, are the international aspects of IVHS development. Our sights have been primarily limited to the North American continent, since it is self-contained as far as surface vehicle movements are concerned. But the motor vehicle market is a world market and incompatible development such as the electric distribution differences now extant world-wide should be minimized -- they penalize everyone. There are limited international devices to address these problems now and more will have to be created. I can say, categorically on behalf of US leaders that there is no desire or belief that we can go it alone in this, the most important civilian development area of the century.

Thank you for your kind attention and the privilege of being with you today. Thank you.

IVHS - A BLUEPRINT OF THE FUTURE

IVHS - A TECHNOLOGY DESPERATELY TRYING TO CATCH UP WITH ITS PUBLIC RELATIONS DEPARTMENT

MAJOR IVHS ACTIVITIES
or What's in a name?

PROMETHEUS	Program for European Traffic with Highest Efficiency and Unprecedented Safety - Europe, 1987
FAST-TRAC	Forum for Advanced Safe Travel through Traffic Routing and Advanced Control - Michigan, 1993
ADVANCE	Advanced Driver and Vehicle Advisory Navigation Concept - Illinois, 1992
TRAVTEK	Travel Technology - Florida, 1990
INFORM	Information for Motorists - New York, mid-1980's
AMTICS	Advanced Mobile Traffic Information and Comunication System - Japan, 1987
DIRECT	Driver Information Radio Experimenting with Communication Technology - Michigan, 1993
SCOOT	Split, Cycle and Offset Optimization Technique - UK, 1970
SMART	Freeway and arterial traffic management demonstration - Los Angeles 1990
ERGS	Electronic Route Guidance System - US, 1960's
RACS	Road/Automobile Communication System - Japan, 1984
FAME	Freeway and Arterial Management Effort - Washington, 1992
PATH	Program on Advanced Technology for Highways - California, 1986
HELP	Highway Electronic License Plate - Western US, 1984

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SCOOT	Split, Cycle and Offset Optimization Technique - UK, **1970**
SMART	Freeway and arterial traffic management demonstration - Los Angeles, 1990
ERGS	Electronic Route Guidance System - US, **1960**
RACS	Road Automobile Communication System - Japan, 1984
FAME	Freeway and Arterial Management Effort - Washington, 1992
PATH	Program on Advanced Technology for Highways - California, 1986
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BRANCHES OF IVHS

INFORMATION SYSTEMS

TRAFFIC MANAGEMENT

VEHICLE CONTROL

FLEET OPERATIONS

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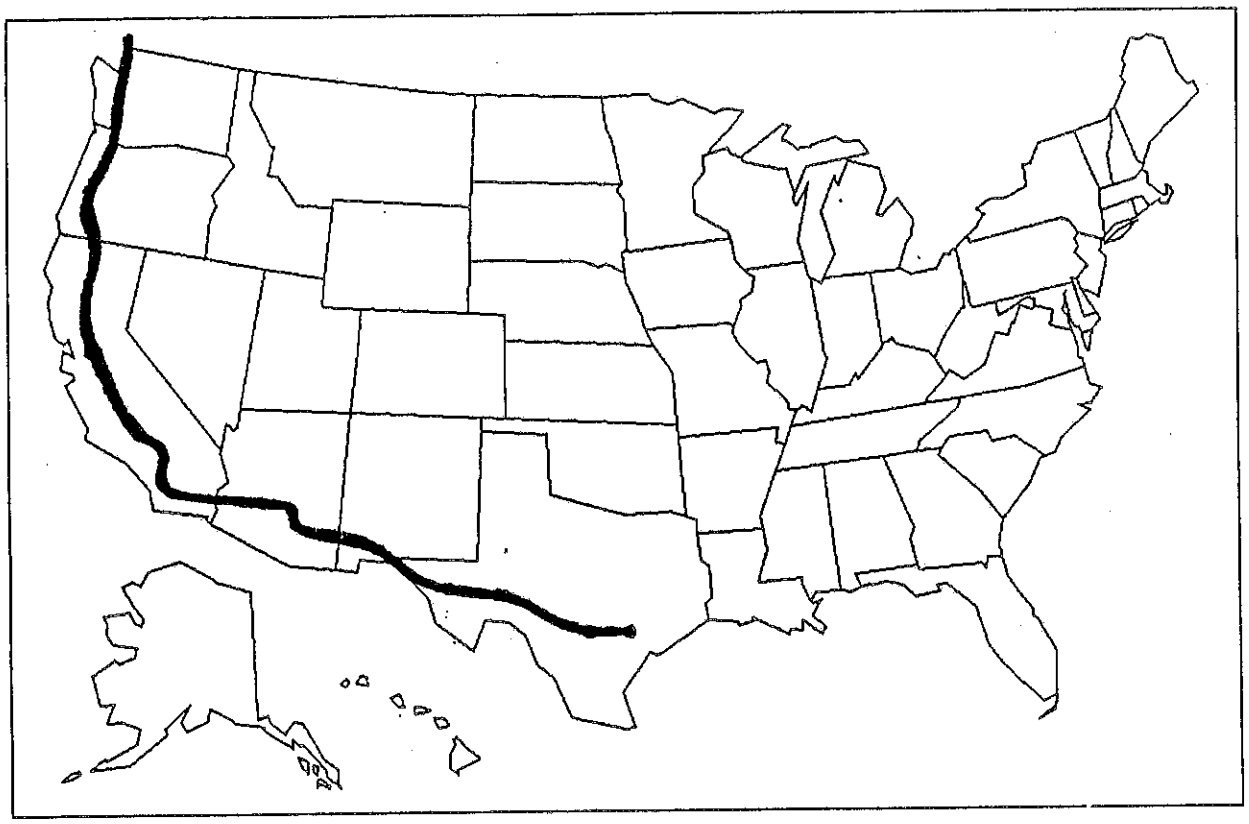
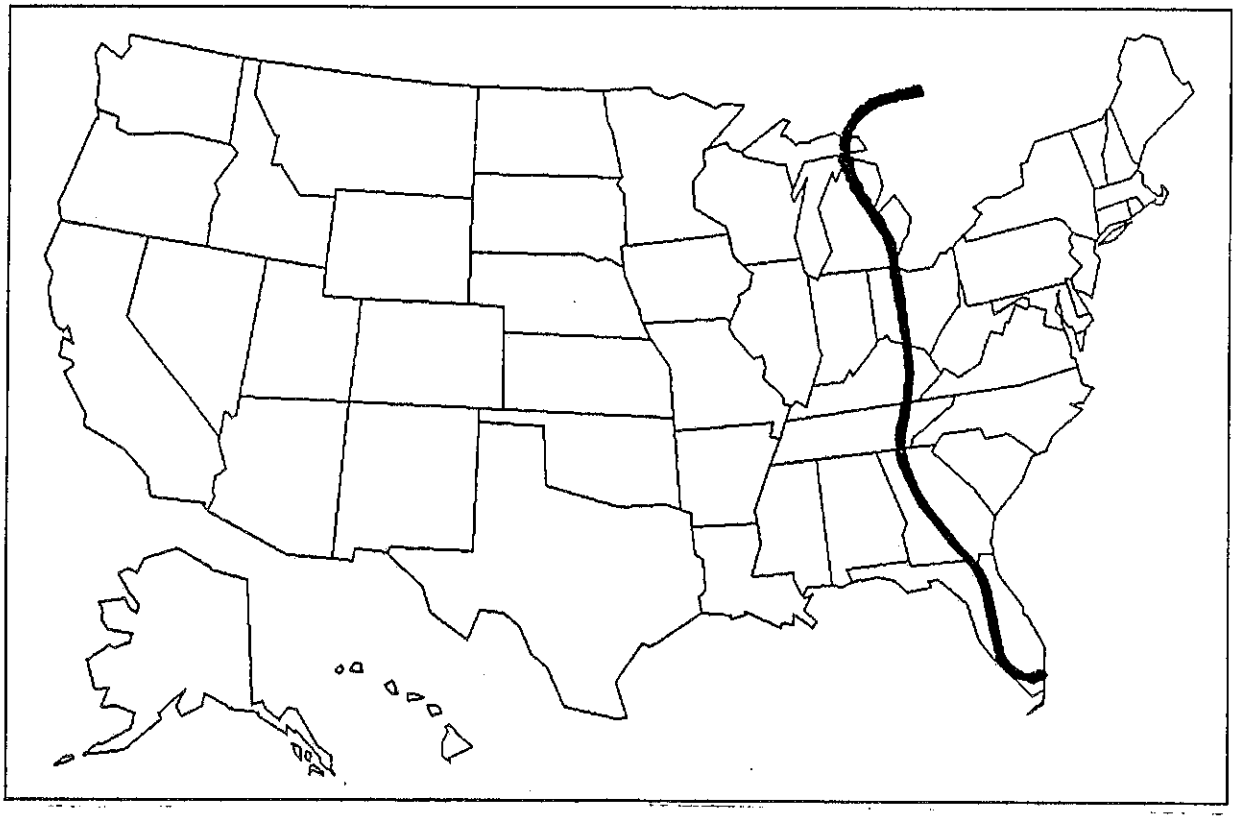
HELP/CRESCENT PROJECT



4500 km - SIX STATES

ADVANTAGE - 75 PROJECT



2500 km - SIX STATES

NEAR TERM PRIORITIES

RELIABLE FUNDING

TRAFFIC MANAGEMENT CENTERS

INFORMATION SERVICE APPLICATIONS

FLEET MANAGEMENT APPLICATIONS

OPERATIONAL TEST SITES

SYSTEM ARCHITECTURE

STANDARDS AND PROTOCOLS

RADIO FREQUENCIES

UNIVERSITY SUPPORT

LEGAL AND INSTITUTIONAL

PUBLIC INFORMATION

INTERNATIONAL COORDINATION

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HELP/CRESCENT
ADVANTAGE-75

RUSHNZ92

RECENT U.S. HIGHWAY DEVELOPMENTS

Remarks by Carlton C. Robinson
Highway Users Federation
Washington, DC

Before the
Institute of Road Transport Engineers of New Zealand
March 4, 1992

1991 was a watershed year for highway and surface transportation policy in the United States. For over 35 years, the central theme of our national policy was creation of the Interstate Highway System, a 73,000 km system of modern freeways to and through all cities of over 50,000 population. A New Zealand system of about the same geographic coverage would be about 2100 kilometers in length.

That system is complete -- or, within a few hundred kilometers of being complete -- and the policy question before us was: "what do we do now? The system is complete, but society has changed, per capita travel has grown, many sections suffer from peak hour congestion, and a number of bridge and roadway sections -- after 40 years of service -- need major reconditioning."

The debate was keen, and in some respects is not over, because a hallmark of the program finally adopted by Congress at the end of 1991 was to permit much more local latitude in use of Federally provided transportation funds, regardless of the taxation source.

The central feature of the debate was whether the present or higher levels of mobility at current or higher standards of comfort and convenience was sustainable and socially desirable or whether that mobility imposed costs and other burdens on society that exceeded its benefits. Some leaders in the United States feel sincerely that urban life would be more desirable without the automobile. I suspect that similar debate could be taking place here and in other modern urban societies.

Certainly, greater automotive travel for persons and goods is not without external costs in space, energy consumption, air quality, and safety as well as internal costs which may foreclose other uses of the resources. Americans devote about 11% of their personal consumption expenditures to auto transportation. Some social observers think that that could and should be reduced.

A little background is probably in order, but I promise not to load you down with figures. In 1956, when the Interstate System was begun, total US population was 165 million; now it is 255 million, half again as large.

There was a major migration to the city. Overall US population density is certainly not high (72 persons per square mile compared to New Zealand's 32.) However, that 72/square mile is made up of a lot of pretty empty miles and 39 large urban areas of one million or more population where half the US population now lives at population densities of about 2200/square mile. This move to big cities was a fundamental change over the 35 years.

We also have a good many more people employed - about double the 1956 figure, and a good many more, smaller households owning quite a few more private automobiles; about 1 1/2 automobiles per household and just over one privately or commercially owned automobile per employed person. These figures, incidentally, don't seem to be too much different from New Zealand's. You are slightly more urban with 84% in cities of all sizes against our 76% and .4 private cars per person against our .5. I suspect that passenger vehicles per employed person may be quite comparable.

In any event, the Interstate System, which was designed essentially to provide rural connectivity, could not keep up with the rapid urbanization and increased per capita use of cars. A defeatist attitude took root; a notion that every new road would fill to overflowing as soon as opened. The catch phrase was, "we can't build our way out of this problem!" And it is vaguely possible that we couldn't - but we never really tried. The rate of US national investment in new road construction shrank over the 1965-1985 period, on a per-vehicle-mile basis, roughly in half.

Adding to the problems created by not investing enough to keep up with demand, were concerns with air quality, with the finite dimension of fossil fuels (although the world's proven reserves of petroleum have never been higher), with the problems and disruptions that come with change (frequently labeled in the states as the "Not In My Back Yard" syndrome,) and with a social concern that we were spending so much time and money on getting around that other values were being short-changed.

This was the atmosphere in which our Congress addressed a new national transportation policy. We in the private sector had spent four years in seeking public input and building consensus for a strong program. The US Department of Transportation added a series of their own and developed a pro-transportation agenda.

However, in the Senate, the first round went clearly to the nay-sayers. The Senate bill rejected any national program to meet highway needs and actually set up a penalty for increasing highway capacity or for states in which per capita mobility increased over the life of the bill. In the meantime, and as a corollary to the above, it was decided that highway use by truck or auto should bear the cost of mass transportation subsidies, research and development of high speed railroad schemes, hiking trails for wilderness buffs, intermodal facilities to improve the

efficiency of competitive modes, restoration of historic canal and rail facilities, bicycle paths, and about any other use -- whatever its merit -- which would increase the out-of-pocket cost of highway use without benefiting the highway user. The Senate's verdict was that mobility was not good for the people and should be reduced by whatever means available. It was a complete, first round win for the anti-mobility gang!

Things can only get so bad, and, in fact, that was the low point. Over the next six months reason tended to prevail and a program evolved with a sense of direction to face challenges and do something about them. Many of the financial penalties to highway use stayed in the final legislation; auto and truck users will be required to subsidize other transportation forms. But the anti-mobility bias was pretty well erased.

Major elements of the program on which we are now embarked are these:

1. Preservation and re-investment in the existing high level national system -- the Interstate System -- which serves about 20% of all automotive travel, and over half of long distance truck travel on roughly 2% of total urban and rural road miles. A continuing commitment to upkeep of this system was a top priority of highway users.

2. Designation and reasonable funding for a new second level national system -- the National Highway System -- which will encompass an added 3-3.5% of all road mileage and serve up to 50% of all auto travel and 75% of long distance truck traffic. A New Zealand equivalent would be about 7500 kilometers.

This system will not have the rigid geometric standards of the Interstate System, which was all constructed to freeway standards. The National System can consist of two-lane roads as appropriate but high geometric standards and limited access to abutting properties will be encouraged.

The specific roadway sections to be included in this system have not been determined -- a two-year study and report to Congress were prescribed to take some of the heat off of this obviously difficult political process.

Without a specific system designated, it was, of course, impossible to determine what it might cost and how long it might take to bring the system to acceptable standards. $3.5 billion/year was initially authorized, somewhat less than the level of investment in recent years to complete the Interstate program. I predict that that will turn out to be substantially below the needed investment level to make reasonable progress in increasing safety and efficiency on this large system, particularly because significant mileage will be in and around major urban areas where costs are inevitably high. However, a national purpose was recognized and a program begun, and that's half the battle!

3. A national interest and funding was continued to help states and local governments in the rehabilitation or replacement of highway bridges, and provision was made for identifying and procuring rights-of-way to meet future needs.

4. The other major program provision of this legislation is a large annual funding, about $4 billion/year, drawn from highway user taxes, and available to local governments for a very wide variety of transportation improvement programs -- streets, bridges, transit, parking, bicycle and pedestrian improvements, traffic operational activities and safety improvements.

Although there are few specific requirements for eligibility, a strong local planning process is mandated and integration with land-use and air quality improvement plans is required.

In fact, one of the most significant advances in this legislation is a fundamental change in the relationship of Federal to state and local governments. There is less required Federal oversight of specific project design and construction and much more emphasis and requirement of planning and management systems to assure best use of facilities. The legislation requires (and funds) continuing planning processes, congestion management programs, bridge and pavement maintenance management programs, and safety management programs in each state and local jurisdiction as a prerequisite to Federal financial assistance.

Areas of research, such as the Intelligent Vehicle-Highway System programs I discussed yesterday are funded nationally, and implementation projects are made eligible under nearly all of the specific programs.

All-in-all, after a very rocky start, the legislation ended up setting in motion some important initiatives. Importantly, it recognized a continuing Federal responsibility to the highway infrastructure improvement process which makes for efficient, cost-effective movement of people and goods. Federal funding of highway, safety and motor carrier activities was raised to a level of over $20 billion/year -- roughly one cent per vehicle mile. If the traditional ratio of Federal to state and local expenditures continues (and I expect that it will), it means that total annual expenditures will soon be at the level of 4.5 to five cents per vehicle mile. That is still below investment levels in peak past years, but is a substantial increase over the immediate past years when we were clearly re-investing less in the road system than was being consumed each year. The emphasis on better planning and preservation of future options which was emphasized as well as management programs to make best use of existing facilities, should help put these funds where they will produce optimum return..

Only time will tell, of course, whether these new directions and the scale of effort will be adequate to the task, but a direction has been set, funds have been provided, and the chase is on.

I hope that these observations have had some relevance to your situation here in New Zealand, and I appreciate your kind attention.