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UPSTREAM AND DONWNSTREAM ISSUES IN SUSTAINABLE URBAN TRANSPORTATION

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Résumé

L'article pose la question du défi du transport durable dans les grandes villes du monde, au moment où se posent en même temps les questions reliées au transport durable et au meilleur contrôle des émissions des gaz à effet de serre.

Parmi les grands secteurs producteurs de gaz à effet de serre, le transport semble être celui où il y a eu le moins de progrès. En fait, la production de GES, provenant du transport, augmente régulièrement sans qu'il y ait réellement de plan international de réduction qui soit valable et accepté. Cette absence de progrès fait en sorte d'exiger plus encore des autres secteurs.

Dans les questions de politique publique reliées au transport durable, surtout dans les grandes villes du monde, on peut diviser l'analyse en deux grandes catégories, soit ce que nous avons appelé les 'Upstream issues', c'est à dire les questions plus larges qui ont un effet indirect sur le transport dans les grandes villes, et, deuxièmement, les'Downstream issues', les questions de politiques publiques qui ont des liens directs avec le transport durable dans les grandes villes.

Dans le cadre des 'Upstream issues', on peut mentionner l'importance du 'choix' dans les sociétés développés, intimement lié à l'idée de liberté et de mobilité, ce qui a un effet important sur le transport urbain. On peut référer aussi à une notion que nous appellerons 'division de la consommation', qui fait en sorte qu'on se meut de plus en plus en dehors de son milieu immédiat pour effectuer ses choix de consommation.

Dans le cas des 'Downstream issue's', nous examinons les difficultés, mais aussi les succès, dans les tentatives de produire des politiques publiques concrètes qui favoriseront le transport durable dans les grandes villes du monde. Nous tentons aussi de poser des paramètres conceptuels pour tenter de calculer le coût total de l'utilisation de l'automobile individuelle, par rapport à d'autres options.

Nous terminons par des questions éthiques de partage des efforts entre les pays développés et les pays en développement, ainsi que par une proposition de scénarios sur les années à venir dans le domaine du transport durable dans les grandes villes du monde.

This article poses the question of durable transportation in the world's large cities, as the questions of sustainable development and of a better control of greenhouse gases are increasingly put into the public agenda.

Among the large sectors of the economy, there are few signs of progress in this sector, as greenhouses gases coming from transportation continue to increase steadiliy. This lack of progress has the result of imposing still greater reduction challenges for other sectors of the economy.

We have divided our topic into 'Upstream issues', covering topics not directly related to durable transportation in large cities, but still having an effect on them, on the one hand, and 'Downstream issues', which are the public policies having a direct effect on transportation in large cities, on the other hand.

Within the 'Upstream issues, we consider the question of 'choice' and its links with lifestyles in developed countries, and we also introduce the concept of 'division of consumption', which is the tendency for persons in large cities to consume services and products more and more distant from their immediate surroundings.

Within 'Downstream issues', we look at specific policies aimed at more durable transportation in large cities, and also at the success stories in this quest. This is followed by the conceptual challenge of calculating the total environmental cost of the private automobile, as compared to other transportation modes.

The article concludes on ethical questions regarding the sharing of the task , between developing and developed countries, of attaining more durable transportation in large cities of the world, and with some scenarios representing how the future could play out in this regard.

UPSTREAM AND DONWNSTREAM ISSUES IN SUSTAINABLE URBAN TRANSPORTATION

Sustainable mobility in large urban areas is one of the most important and sensitive issues concerning the reduction of greenhouse gases and global warming. Officially, greenhouse gases emitted by the transportation sector represent globally about twenty percent of the total GHG (greenhouse gases) emissions, but some estimates put that percentage substantially higher when all transport related GHG emissions are taken into consideration, including the total GHG emitted through the consequences and implications of transportation-lifestyle choices, such as the multidimensional consequences of urban sprawl.

There are few, if any, real national plans to reduce the contribution of transportation to the production of GHG. In Europe, North America and Australia, "emissions from the transport sector are "excused" the rigours of reduction strategies" (Whitelegg and Haq, 2003, p.290). In practice, this means that the burden of achieving GHG reduction is made even more difficult for the other sectors of the economy, and, in consequence, the prospects for reaching the targets of the Kyoto Accords are greatly diminished, if not completely impossible for the great majority of the countries that signed. As Whitelegg and Haq remark, "(s)ustainability can never be achieved on the basis of driving, trucking and flying 6 percent more kilometres year on year without limit and without thought" (p.294). These authors argue that "(i)n many ways, transport is a metaphor for the generality of environmental and pollution (including land take) problems" … and "(it) brings most, if not all, of the issues around sustainability (and)… environmental impacts into a very sharp focus (p.293).

The implication of their reasoning is that if we cannot get transportation right, nothing else of great importance can really be right either. Neither developed nor developing countries seem to be making real progress in controlling the growth of transportation' environmental impacts, especially in large urban areas, and one very structural problem is that , while economic development improves the prospects of developing countries in sanitation, health, education and employment, "transport problems tend to worsen" (Penalosa, 2003, xx). The problem is particularly acute in large and very large developing countries' urban areas, where most of the increase in motorized transportation will take place in the following decades, and this includes not only traditional developing countries, but also the relatively prosperous regions of Asia and Central and Eastern Europe.

Although there have been several interesting experiences and undeniable achievements in transportation innovations in several urban areas (Cervero, 1998), when the scale of the problem is contemplated, we have to recognize that little has been really done that has sizeable impacts on the worldwide problem as a whole.

The goal of this paper is to try to help clarify some of the conceptual issues involved in this complex policy domain, by clarifying goals, "untangling" issues, uncovering paradoxes and unintended consequences, and hopefully pointing to some fruitful research avenues. In a first attempt to untangle issues, we have drawn a distinction between what we have called "upstream issues", those issues (including international issues) that precede any conscious effort at rationalizing transportation policies, and "downstream issues", those that are involved in the conscious attempt at improving the situation in concrete, local situations. We will begin by looking at the ethical issues involved in sharing a worldwide transportation policy that would address the respective roles of developing and developed nations in such an endeavour, and we will consider this topic an upstream issue. We have referred to this section as "International ethics as upstream issues". We will address this topic first.

INTERNATIONAL ETHICS AS UPSTREAM ISSUES

Because greenhouses gases affect all corners of the planet, once released, albeit at different degrees, their control and reduction pose some ethical problems not always encountered in many other environmental issues. The first question that arises is to what extent should rich countries contribute proportionately more to GHG reduction, since they contribute more to the origin of the problem. This has been answered, at least in principle, by the Kyoto Protocol, which directs its obligations essentially towards developed countries. However, to the extent that the Kyoto targets will not be achieved in the years 2008-2012, the question of equity has not been resolved in practice. Although many will not agree with the United States Senate's refusal to even consider GHG reductions unless developing countries are included in the effort, this refusal at least has the merit of asking what we are to do with the sizeable increases that are forecasted in the energy consumption of developing countries, particularly in urban transportation.

On the other hand, from an equity point of view, the differences in energy spent in transportation, per capita, between, let us say, Asia and North America, is nothing

short of monumental: while North America has less that 10% of the world population, it consumes 40% of the world energy in transportation, while Asia, representing more than 50% of the world population, consumes less than 15% of the world's energy in transportation (O'Meara Sheehan, 2001, p.109). Even though, here again, we might not agree with another known critic of the Kyoto Protocol, Bjorn Lomborg, it is an inescapable fact that trading GHG emission rights only between rich countries, excluding developing ones, would have only a marginal effect on restraining increases in temperature, a very modest 0.15 centigrade degrees difference in worldwide temperature in 2100, according to Lomborg (2001, p.318).

Before looking a how bargains can be worked out between richer and poorer countries, it is necessary to look at some of the differences between these two groups of countries in relation to transportation, and especially in transportation in urban areas.

Firstly, a good part of the transport infrastructure in developing countries' cities has yet to be built, as it is in many respects a work in progress, opening the door, at least theoretically, to creative planning opportunities (IPCC, 2001, p.99). There, the transformations in urban transportation will be, in all probability, more sudden and more massive, and changes that took several decades in the developed countries might occur much more rapidly in the developing ones. Land is less plentiful in most developing nations, which intensifies the problems of the tradeoffs between land used for agriculture and land used for transportation infrastructure, since land dedicated for one function cannot be used for another. Referring to the possibility that a country like China should require the road space that its predicted car fleet would demand in 2030, estimated at 13 million acres of land for a fleet of 640 million cars, if there were one car per two persons, Whitelegg and Haq conclude that "(this land) will be removed from food production and laid down for the final crop, which is tarmac and concrete (Whitelegg and Haq, 2003c, p.294; also Whitelegg and Haq, 2003b, p. 11). This surface of land would be equivalent to half of China's current rice production. This would lead one to favour, at least in the case of China and in similar countries, transportation which would be more space efficient than the automobile mode. On the other hand, greater density in urban areas in developing countries can be seen as both a problem and an opportunity, since, on the one hand, it increases congestion, but on the other hand, it can make public transit more efficient and less costly, as more people use it on a limited surface.

Before addressing the larger question of equity between developing and developed countries, it is useful here to point out that transportation dilemmas also pose questions of equity within developing countries. An essential and fundamental question is whether developing countries have the financial resources to construct and operate both efficient public transit and the necessary road infrastructure for growing automobile use. And if resources do not permit to do both in an efficient manner, what are the choices, and who will gain and/or loose? The question is all the more important as resources are rare and outside help, limited. Much in the same pattern that we can find in developed countries, some transportation modes favour the middle class and upper middle class, like the automobile and possibly light rail transit, while poorer elements of society find more use in improved transit of all kinds. But the conflict is taken to a much higher degree in developing nations, because fewer people can presently use expensive personalized transportation modes, and consequently they are even more at risk of being left out from adequate transportation than in developed countries, where most people can afford an automobile (which is not to say that certain segments of society, such as the elderly and children, cannot feel left out in developed countries themselves). Unfortunately, as is the case for Russia today, strong income differentiation often translates into individual solutions in the face of environmental stress (Strukova et al., 2003, p.3-4), and strong income differentiation is quite prevalent in most developing countries, leading us to believe that public transportation schemes might be undervalued by decision makers in many developing countries, in part because decision makers identify with the more prosperous elements of society. What is less clear is if strong development of the automobile in an (already) very unequal society exacerbates the existing strong cleavages, as may be the case in the growing car-jacking incidents in countries like Brazil, Columbia and Mexico.

Let us now come back to the question of the ethical bases for developed countries' involvement in the transportation choices that developing countries will make in the following years and decades. Of course, this is not a hypothetical question since, through international financing, involvement is already present. But in the future, this influence might be more constraining, if rich countries want to steer development away from their own wasteful paths, and end up saying "don't do what we did", or worse still, "don't do what we do". Western films and television series all over the world are relentless in showing lifestyles that are no doubt very attractive for everyone (IPCC, 2001, p.369). The strong and attractive symbolic value of the private automobile, in terms of sexuality, social success, and mastery, are well known and are exploited in a

sustained way by very high levels of advertisements, to the tune of about twenty billion dollars a year worldwide. In a somewhat abstract way, among several environmentalists, there has been a plea for developing countries to develop "differently", or in an "alternative" lifestyle, but what would that mean, concretely, in terms of urban transport? Could alternative paths to development "bypass", so to speak, sustainable urban transportation patterns, and still be successful and presumably different, or is sustainable transportation an essential ingredient?

At least some effort at transportation rationalization would have to be realized in rich countries themselves, in order that their advice and coaxing be seen as credible and, to a certain extent at least, equitable. If, under future GHG reduction protocols and agreements, there is a move towards "contraction and convergence", that is to say that rich and poor countries would be scheduled to reach the same per capita GHG production over a certain number of years or decades, these transportation rationalization will have to be implemented also in rich countries, unless a country accepted to place itself completely outside the international community, which no country really wants to do, at least in the long term. There are mechanism for "easing the pain" presently under the Kyoto Protocol, such as the Clean Development Mechanisms, but over the long term these techniques would have to become instruments, and not goals in themselves as they have tended to be considered under the Kyoto Protocol up to now.

Of course , another basis for intervention is self-interest, and that is not to be underestimated as a rational course of action, as it lessens the intractable and unspoken problem of the "selfish gene", the tendency to limit one's help to one's "own kind". Another basis is derived from the obligation to provide assistance to someone in danger, which one finds in certain legal traditions; it could be equivalent to stopping someone from crashing into a brick wall, if that person is unaware of that eventuality. Some would fear that this attitude would transform itself into a "big brother" syndrome, international style, but one also has to consider the alternative. As the situation presently stands, most poor developing countries cannot afford the most costly alternatives in urban transport, but if the world's productive capacity is as great as is portrayed in some passages of Bjorn Lomborg's *The Skeptical Environmentalist* (2001), then there may be room, if deemed important enough, to equip developing countries' major cities not only with public transit, but with quality public transit, which would become part of the broader urban international package deal in transportation.

There remains, of course, many related questions which we have not addressed here , such as how to constitute and nurture a constituency for sustainable urban transportation in developing countries, how transportation energy costs can dampen economic competitiveness, or, finally, how to share the rest of the world's oil supply among international players, but these are questions that are addressed in other forums, where they receive the attention they deserve. In this section on international ethics as upstream issues, we have tried to "untangle" certain upstream dimensions of issues and policies relating to worldwide urban transportation, especially in relation to the sharing of future reductions, as we believe this will inevitably take place except in the worse nihilistic scenarios.

GENERAL UPSTREAM ISSUES

Leaving aside for the moment the ethical and international dimensions of sustainable urban transportation issues, we will address here other "upstream" issues of worldwide urban transportation challenges. These issues precede the conscious attempts at rationalizing transportation modes in urban settings, and they are often powerful economic and sociological forces that are not under the control of planning institutions involved in urban transportation management. Policies can succeed or fail because of different combinations of upstream and downstream factors, and it is not impossible that good downstream policies fail because of the sheer power of upstream forces. Within this section devoted to upstream factors, let us start with the challenge of understanding the worldwide quest for increased mobility. We have identified this quest for increased mobility as an "upstream" issue, as it precedes the questions of assuring adequate transportation in large urban areas. What, indeed, fuels this seemingly insatiable and growing need for transportation in large urban areas, worldwide?

There are firstly the larger socio-economic and technological trends which affect all of us, such as: the globalization of world economies, the increase in the division of labour, evidenced in the "just in time" mode of production in transportation, "dematerialization" and the increasing importance of services, as distinguished from goods, increases in communication capabilities, and changing lifestyles, sometimes referred to as "post modern" or "post industrial". There are authors and studies which have looked at these trends, but there has not been, to our knowledge, a systematic attempt at understanding how these trends interact with one another to affect the worldwide quest for more mobility in large urban areas. One could argue that one of these trends, dematerialization,

the tendency for advanced economies to increase the consumption of services, particularly information, which do not require the physical moving of goods or people, would seem to lessen the need for mobility, not increase it. In reality however, dematerialization has not really reduced transportation.

What is also difficult to understand is how the urban economies, worldwide, are following much the same patterns, while at very different phases of development. Another line of inquiry is to better understand how the increased division of labour between nations or large economic blocs has an effect on the division of labour at the local, urbanized level, bringing people to produce less and less of goods and services themselves, relying more and more on others, which of course requires more and more transportation, both internationally and locally.

To the notion of division of labour, we could add the notion of "division of consumption", which tries to capture the fact that, given the choice, we seem to prefer products made outside the household, or even outside our surroundings. And, of course, an increase in the division of consumption brings about more and more of it, since the cleaner who works on our clothes has less and less time, himself, to produce the objects and services he needs, and the fact we go out for entertainment brings about the need for the babysitter to come to our home, and of course to go back to his or hers. Some could argue that the division of consumption is just a dimension of the division of labour, but in urban settings it has had the added characteristic that people seem to travel further and further away in order to consume these services or products. The link between worldwide globalization and local increases in mobility are of course enormously complex issues that we will not attempt to treat fully here. However, we will propose to use a notion that could help us understand some of the processes involved. This notion, derived from institutional economics, is the notion of "transaction costs".

Theoretically, a transaction cost is incurred when an individual or an organization contracts out a section of its own operation to an outside agent for its production, and Oliver E.Williamson , one of the first to develop this notion, along with fellow economist Ronald Coase, notes that transaction costs occur "when a good or service is transferred across a technologically separable interface" (Williamson, 1985, p.1), which simply means that the main producer of a product will not contract out those phases of production that are tied closely together, such as the production of a self contained, specific component, but that he might contract out the component itself, before it is integrated with another one, or then again, he might contract out the transportation of these different components, since the transportation element is, in itself, between "technologically separable surfaces". Of course, these processes are closely linked to the just in time mode of production, and this has increased the intensity of transportation, worldwide. Of course, if transportation costs truly reflected social and environmental costs, there would be an increase in the transaction costs, and it can be presumed that there would be less transportation of components and products over long distances.

The same would hold true for transaction costs coming from the increased division of consumption: an increase in their transaction costs, in the form of higher energy costs for example, would translate into more local or at home consumption, and thus less travel, across wide portions of a city for example. There are already ways to decrease transaction costs in our urbanized settings, and, in a sense, the shopping mall is an attempt at decreasing transaction costs, since we can find in a single area many of the objects we need, lessening the obligation to go to different locations for consumption purposes. But the shopping mall, in another sense, also increases transaction costs because it requires us to reach its usually outlying location, at a substantial distance from our home.

The notion of transaction costs can thus help us study mobility in urban areas, but it also can help us formulate policy. For example, if our goal is to decrease automobile use, then we can "create" additional transaction costs for its use, by increasing parking fees, by putting parking areas further from buildings, thus creating "seamfull" arrangements instead of seamless ones. And we could do the opposite for preferred modes, thus creating seamless arrangements, by holding down their prices and by facilitating transfers between two different types of transit, for example, so that in a long term policy to increase transit use, the transaction costs of the automobile will come closer to those of public transit. Robert Cervero has referred to some of these policies as "auto equalizers" (1998, p. 98). This is of course presently done in the most successful transit cities such as Singapore and Stockholm, and the notion of transaction costs is essentially an invitation to look at these policies in a more systematic and comparative fashion.

The automobile has a sizeable head start in terms of reducing transaction costs, however, since through all the traffic congestion and the related frustration, the passenger is in the same vehicle, virtually eliminating the transactions costs that come from transferring from one vehicle to another, a huge advantage, one that helps to explain the great popularity of the automobile. Transaction costs would also include geographical constraints, such as cold weather, which would increase the transaction costs involved if there

is an outside waiting period between two different transit transport modes. They would also include topographical elements, such as flat, uneven or hilly land structure. A flat terrain would reduce transaction costs, if only because it permits a greater variety of transportation modes, such as the possibility to cycle in Beijing or Amsterdam. A very limited terrain can bring about creative transportation solutions, as in the case of Singapore, possibly because, in a sense, a limited terrain complicates but also reduces transaction costs.

Looking now at the broader picture, we can conclude that, overall, the transaction costs involved in moving from one location to another have not been sufficient to discourage mobility, since mobility is increasing everywhere. And if some contemporary patterns may reduce the need for travel, such as information rich occupations in a dense downtown area (Schiller and Kenworthy, 2003, p. 226), most urban form tendencies have moved places, services, products and people further and further away from one another, except in successful transit cities who have consciously planned for transaction costs decreases in the form of multifunctional and densified land use.

Increases in the division of consumption mesh with increases in the division of labour, as people commute further and further away between jobs and consumption, and if public authorities try to locate jobs nearer to shops and living areas, there is no guarantee that people for whom it was intended will not move to another job in the meantime, nor that the people using more densified mixed use areas will be the ones necessarily living and working close by. Even in the case of the very successful transit city of Stockholm, the planning of self sufficient communities, where people would work within the same community where they have their residence, did not play out exactly as planned, and one of these self sufficient communities turned out to be the less planned, auto-centered community of Taby (Cervero, 1998, p.122).

The Question of Choice

Underpinning several of the dynamics of travel patterns in large urban areas all over the world, and nullifying to a certain extent the calming influence of transaction costs on the quest for mobility, is the all important and very upstream question of choice. Let us now briefly look at some of the implications of choice for urban transportation patterns.

The theme of individual choice is, we believe, central to the patterns of increased mobility in the large urban areas of the world. Choice is a multidimensional and heavily charged question which needs to be untangled. In a sense, no one can be against individual choice, and history can even be interpreted as a great march of individuals freeing themselves from different constraints, local and cultural, in order to make choices. There is also a strong biological base for individual choices, since in some biological, fundamental way, all social life reverts back to the individual, who is the ultimate evaluator of what he or she really wants, and what brings satisfaction or not. There is also, for some, a strong ideological element in the individual and in choice, as individual choice can be seen as the ultimate goal of all political action. No doubt, some modes of transportation better represent this ideal, as is evidenced when reference is made to Mrs. Thatcher's "car owning democracy" (Vigar, 2002, p. 51), and in that sense, "decision over whether to make journeys is a matter for individuals and it is not the business of government to intervene in such decisions" (reported by Vigar, p.73). So strong is this theme of individual choice that even the arguments used to defend public transit in Britain had to be couched in terms of individual freedom and choice, as it was argued that a total reliance on the automobile, partly as a result from privatization and deregulation, was in fact reducing choices for consumers, and increased public transit would in effect offer a greater variety of choices (Vigar, p. 81, 89).

There is no doubt that it is the automobile that is winning the hearts and minds of individuals almost everywhere, especially as revenue increases, as a sobering (sobering for any public transit enthusiasts) graphic from Sperling and Salon shows: at a certain level of income, let us say beyond a per capita yearly income of 15,000 dollars US, their graphic shows that the private automobile simply blows away most if not all competition, with few exceptions indeed (Sperling and Salon, 2002, p.12, on the general idea, not on the specific amount).

The only logical step left for partisans of public transit and other alternatives to the private automobile is to question, in one way or another, choice or individual choice, which of course is no easy endeavour. There are known ways to go around the absoluteness of individual choice, by way of economic notions such as market failures, externalities, social costs, and pollution costs. These are well known. These arguments concentrate on the effects of individual choices.

Other arguments aimed at questioning individual choice concentrate on the embeddedness of choice, looking at choice not as an absolute element, but as the end result of a chain of elements not always controlled by the end user, the individual making a choice. Referring to what

we said earlier, regarding the "division of consumption", in an economy where less and less is produced by the individual, himself for himself, we are all "forced" to choose and consume products and services produced by others, typically further and further from our own location, often in another part of town, as the city expands in offering more and more choices. Some would go further still in their interpretation, and defend the idea that these choices are somewhat artificial, embedded as they are in lifestyles imposed to individuals by forces beyond them, like the more or less imposed lifestyles of modernity (Vigar, 2002, p.7, 194) and a "short-termism" view brought about by living in a globalized society (Vigar, p. 196).

This latter point may seem somewhat abstract or theoretical, but there are reasons to believe that the current socio-economic context of Russia, where "opinion polls show (that) 67 percent (of the population) build only short-term plans for their lives" (Pravda, 2003), is not conducive to long term sustainable urban transportation planning. In long term urban transit planning, five years is not a long time. Another closely related line of argument has been to underline the limits of choice itself, in that it must be seen in the more general context of information overload, which eventually obscures the choices that we eventually make, based on less than satisfactory and digestible information.

Technological Determinism

13of South America? Turning to rail, are terrorist attacks less likely in a rail network than in a road network?

According to Elaine Fletcher, "(b)uses have…become a favourite target of terror attack in Israel…rail systems are not immune to terror attacks either… But …train cabins operating on a fixed track cannot easily be turned into a human-guided missile" (Fletcher, 2003, p.244). Still on the question of rail, why is it that transit in the form of rail seems necessary to attract the middle class and upper middle class ridership onto public transit (Kenworthy, 2003, p.72), almost all over the world?

If this is true, and if it is structural, that is to say intimately related to the nature of the medium itself, and if we can predict a worldwide increase in the middle and upper middle class, then it becomes an essential ingredient for future planning to be conscious of this intractable fact. (There are however recent indications that well run bus transit, with the latest technology- often similar to rail- can succeed in attracting the middle and upper middle class, but still fixed rail has the overwhelming favour of more affluent commuters). Are urban forms in the long term almost completely determined by the use of transportation media, and if so, where lies the point where substantially changing the modal mix of urban transportation becomes impossible and too costly, as the case may already be in most of North America? If this is the case, and if even well planned and innovative policies cannot really reduce GHG emissions, then the participation of countries past that threshold might be reduced to offering financial help for developing countries to develop alternative ways of doing things. There are of course more questions asked than answered here, and this is inevitable to a large extent with questions of media determinism, since we are dealing with large historic experiences not easily amenable to limited experiments. Yet technological determinism has contributed its part in questioning the absoluteness of individual choice, in showing how individual choice can be shaped by forces well beyond the individual itself.

The questioning of the absoluteness of individual choice is a necessary logical step for those who want to plan urban transportation schemes that go beyond responding to short term individual demands. Indeed, it is more acceptable for planners to shape future urban transportation demand when it is accepted that present demand is already shaped beyond the individuals' conscious choices. Conceptually, this sets the stage to go beyond the supply-side response of "predict and provide" road construction (Vigar, 2002, p.61), and towards policies that rely more on demand management (p.108).

In addition to the elements surveyed above, there are also powerful sociological forces influencing individual choices, forces that are more difficult to grasp as they can vary widely between cultures. One important element in urban transportation is the question of how ready we are to be close, in some cases very close (as in Tokyo), to our fellow citizens for transportation purposes. A related element is whether there is relative homogeneity in the population, as in Scandinavian countries, or whether the people we encounter are thought to be law abiding citizens, and in both of theses cases the transaction costs are low, as we know what to expect from our fellow citizens. The level of confidence between individuals is an important ingredient in whether we are ready for car sharing, for example, and it will be revealing to see where this urban innovation actually occurs in the following years. Among other powerful sociological elements are the extent to which we are ready to accept constraints, and whether the acceptance of such constraints is conditional upon wide public discussion or whether public authorities can expect the adhesion of the population after having simply made the case of the "better argument". In the case of some

successful transit cities, the public transit scheme seems to be only a continuation of a whole string of policies that are already geared towards social sharing, in housing and education for example.

Still on the question of choice and its relativity, let us keep in mind that several public transit schemes require to be constructed before they are really experienced, and that there are many examples of citizens opposing high density housing arrangements, who have nevertheless adopted them and declared themselves satisfied by them, once they were built.

We will now turn to the more downstream issues related to sustainable urban mobility, looking at how conscious and deliberate sustainable urban transportation policies are imbedded in political and institutional constraints.

DOWNSTREAM ISSUES

We will now look at policies aimed at attaining sustainable mobility in urban areas, trying, as we have attempted to do earlier on previous themes, to clarify goals and concepts, to untangle issues, and to uncover some paradoxes, while identifying research questions which may have been overlooked.

In the field of transport research generally, there has been, according to Geoff Vigar, a lack of "joined-up thinking" (Vigar, 2002, p.112). The overall result, with some notable exceptions, has been described as transport policies that are "either non-existent or cast in the general context of reducing road traffic congestion, reducing road traffic accidents…and increasing levels of economic activity" (Whitelegg and Haq, 2003b, p.3). Already a complex matter, urban transportation becomes of course even more complex if environmental considerations are added to the equation, as we have done here. The sticky question of "problem definition" (Vigar, p.198) is an all important one that needs to be addressed.

Indeed, what are the goals here? Going from the more traditional to the more radical, let us identify explicitly a few of the possible goals for urban transportation. One of the more traditional goals is to move people and goods efficiently, in a context of economic growth. But although we are almost all favourable to economic growth, there is less unanimity on the kind of economic growth we want or what part of it has to occur in already large urban areas. There was, after all, within classic Greece, the notion that the ideal city was limited in size, and that a real democratic city could only accommodate a few hundred people. Of course, this type of upper limit is unrealistic today, but the idea that there could be an upper limit is not to be rejected altogether. Moving a bit further along our continuum, when we first want to take into consideration strategies to reduce pollution, we might think of "end of pipe" policies aimed at encouraging a reduction of what emissions come out of our vehicles. Increasing concerns about the environment would lead us to actually try to impose GHG emissions reduction, by setting limits in their production in urban transportation.

A more aggressive policy would be to set limits on different types of transport modes. In several cities, there have been concerted attempts at shifting modes of transportation, from more polluting to less, without increasing overall distance, but the scale of these successes have not affected the worldwide trend of substantial yearly growth in GHG coming from transportation. Moving now out of the more traditional policies, and moving into the decidedly more radical ones, there is the suggestion that we should distinguish between "mobility" and "accessibility", and if it is the responsibility of city governments to provide everyone with the possibility of accessing goods, services and jobs, there may be some limits in providing unlimited mobility. Entering now the still more radical side of the spectrum, there is the Ivan Illich idea that any form of motorized transportation in a city environment, especially those that consume large quantities of energy, are by their very nature to be avoided, leaving people to travel by foot or by bicycle.

As radical as Ivan Illich's proposal might seem, there is another one that is, possibly, even more radical, if only because it runs contrary to everything we are presently doing economically and organizationally: it is the apparently benign but revolutionary idea that we move decidedly to replace far for near, that is to say that there be a deliberate policy of substituting far away production and consumption in favour of local production for local needs, when possible. In terms of the city, this would mean a deliberate policy of favouring local consumption, at the very local level, which ties in of course with other policies such as mixed use and increased urban density, a policy already applied in the most successful transit cities. The proposition would push that policy further and in a more systematic way. Of course, simply increasing the price of energy would produce a good chunk or this apparently abstract proposition in urban settings. This larger economic idea of substituting near for far has been advanced by the IPCC (Intergovernmental Panel on Climate Change), in its 2001 report (p.100-102). This suggestion of the IPCC has been criticized by Bjorn Lomborg, among others, as going way beyond its responsibilities in surveying climate change and climate change policies.

This "macro-policy" suggestion is often associated with city sociologists such as Jane Jacobs and more recently with the "New Urbanism" movement and with all those that are defending a certain ideal of urban quality of life. It is interesting to note that the IPCC report that suggest a near for far general policy also mentions non material satisfactions (p. 102). Much in the same spirit, Jane Jacobs maintains that the automobile, in particular, has done much to erode a sense of cohesion and of community well being (see also Cervero, 1998, p. 49,78), with all sorts of far reaching consequences. In this view, a good portion of urban living should derive from the pleasure of simply interacting with our fellow human beings in a community, local setting. Again, this is to a certain extent already the case in the most successful transit oriented cities.

Let us now turn to the different policy packages which have been proposed to implement innovative views of transportation in the city.

Policy Packages to Reduce Car Use

A good proportion of the concrete policy suggestions have been under the general policy goal of transforming the modal split between the private automobile and public transit, to increase the use of the latter and decrease the use of the former. In some cases, the modal split is intended to also increase the use of walking and cycling, but often these two latter modes are seen as complementary to motorized transit, and they are less viable in certain settings than in others, in part due to climate or terrain constraints. Underlying the modification of modal splits is the idea that there should be a hierarchy of users (Vigar, 2002, p. 99), favouring public transit and non motorized forms. There is a wide selection of policy instruments to realize the transformation of modal splits, and we will attend to some of those questions a little further. Let us now briefly turn to some of the dimensions of the "great car debate", since it is really the private automobile that is mostly targeted in these proposed changes in modal splits.

Of course, the private automobile is not without its critics, as we will see, but it would be wrong to think that environmental considerations have, from an intellectual point of view, completely knocked out the automobile, if only because, in reality, people are voting for the automobile with their feet, or, should we say, with their wheels. Even from a strictly argumentative point of view, it is difficult to dismiss a transportation mode that is chosen, and increasingly so, by a large number of individuals all over the world.

Even though there are many defenders of the private automobile, with their arguments, defending the automobile has generally retreated from the basic engineering position of simply constructing more roads to accommodate more drivers. We have somewhat shied away, in other words, from what has been called the "predict and provide" policy to urban transportation, although road construction can be justified under other considerations, even environmental ones, since it is true that a car sitting in a congested freeway is polluting more that if it was moving along swiftly towards its destination, and so more road construction can be argued on the basis of reducing smog, even greenhouse gases (Vigar, 2002, p.72). Also, even under policies to reduce car use, there will be, maybe always, that bypass to finish, that bridge to construct, that one last new road to lay down before really getting serious about changing the way we operate.

But there are also substantive arguments for the use of the private automobile. If land uses and environmental considerations are left aside, it can be argued that, in North America, "the transportation system can be considered very effective from some perspectives". Indeed, "(m)otorists can travel nearly anywhere with reasonable convenience, comfort and safety…Fuel prices are low, allowing even lower income people to drive…Parking is generally abundant and free…(Litman, 2003, p. 207). Some new, more complete, cost-benefit analysis on the use of the automobile in the United States, including environmental costs and GHG emissions (Cervero, 1998, p.51), conclude that while it is true that the automobile is no doubt heavily subsidized, "motor vehicle use provides enormous social benefits…(which) greatly exceeds the social costs" (study by Mark DeLucchi, reported in Cervero, p.51-52). But whether or not the rational arguments favouring the car can really win the day in the long run, there are strong cultural and personal factors which are underpinning the use of the automobile, and these foundations are in many ways more difficult to displace than logical arguments.

There is indeed a strong "culture of automobility" (Vigar, p. 190, referring to Sheller and Urry), one that is intimately tied to social, cultural, technological and political factors, as suggested earlier. Also propelling the use of the private automobile are unspoken factors, those which would only be expressed in a successful full length interview, when barriers start to fall, and when people speak about public transit experiences they want to avoid, odours, excessive heat, crowding, lack of comfort or simply of a seat, lack of civility, meeting people or groups we would prefer to avoid, possibly violence. (There are reasons to believe that this kind of element is preventing some American cities

from attaining respectful proportions of transit commuters, even in quality public transportation schemes). These are powerful motives indeed, not always mentioned at first. To really progress beyond the small numbers it is saddled with in many areas of the world, public transit will have to compete with the automobile by eliminating most if not all of these irritants, especially if it is to capture the growing middle class in all urban areas of the world (Kenworthy, 2003, p. 72).

The problems with automobile use, especially in urban areas, are quite well known, and we will simply list here what they are, as described as the eight "deadly sins of the automobile": safety problems, air pollution, spatial issues, congestion/access, hulks, noise, Co2 emissions, and energy use (Murphy, 2000, p.86, drawing from Schipper and Eriksson). There is no doubt that automobile users are quite heavily subsidized, in a variety of ways, and consequently, the total costs of using the automobile is not entirely borne by the user, although the total amount of the subsidy is open to debate. Consequently, a first obvious policy to restrain car use, according to its opponents, would simply to internalize all its externalized costs, including environmental ones, to the user (Whitelegg and Haq, 2003c, p. 282, 285, 286). To achieve this, there is a wide variety of financial and fiscal measures, such as taxes on gasoline, parking fees, user fees, registration fees (sometimes related to the size or the vehicle), and many more. If the goal is to impute the total costs of automobile use to the user, away from the general citizens generally, such a policy would be more effective in countries where a substantial number of people are not using the automobile than in countries like the United States, Canada or Australia, where a very large proportion of adults are regular users of private automobiles.

Three more questions need to be addressed here, and the first is whether the automobile is more or less subsidized than urban public transit is, and that obviously depends on public transit's ridership figures. The second one is whether total costs, environmental and others, which would include costs involved in road construction and the expensive land use that it entails, are counterbalanced by its advantages, such as the intrinsic pleasure of travelling in one's own private automobile and the freedom and lifestyle it brings. We have mentioned earlier that there are different calculations and conclusions to this question. The third one, somewhat a consequence of the second, is whether all of the environmental costs can be recovered through financial or technological compensation; if not, if in other words the environmental damages are permanent or irreparable, then these environmental costs are not reducible to simple cost-benefit analysis, and must be treated in a separate category, which gives them much more weight. Of course, irreversible or difficult to reverse damage involved in long term climate change qualifies as such an environmental cost. The automobile is a particular target of such scrutiny since "vehicle ownership statistically explains 90 percent of the difference in carbon emissions per capita" in the transportation sector (Sperling and Salon, 2002, p.14).

The eventual greening of the automobile, which is now being engineered, would not address all of the environmental problems stemming from automobile use, particularly land and resource use (Vigar, 2002, p.220), possibly its two most damaging aspects. Some more radical critics argue that "(t)ransport has now become one of the most significant ethical problems in the world today… The daily damage to children, the elderly, the sick and local communities is routinely accepted everywhere as a price worth paying for a car trip for any purpose over any distance, terrorizing local neighbourhoods with anti-social driving behaviour…(Whitelegg and Haq, 2003c, p.277). Without necessarily agreeing with these two authors, we can predict that the issues that they raise, which only a few years ago would never be brought up, may now be on the public agenda, spurred by the increasing total size of cities and more information about all the consequences of our transportation choices. Because a very large amount of the changes in our urban transportation modes involves a transfer from the private automobile to public transit, we will try to untangle some of the issues involved in the question of public transit which have not already been addressed here.

Much competent work has been done on the complex policy of increasing public transit ridership in large urban areas, either as one of a package of policies for city transportation (Sperling and Salon, 2002, p. 22) or as specific policy related to reurbanization (Newman and Kenworthy, 1991, p. 134). Conceptually, the clarifying of the types of policies involved, and their interrelationships, realized by Robert Cervero, has become a classic in the field (Cervero, 1998). Cervero shows how the policies that are aimed at increasing public transit ridership can be divided into two large policy orientations, a first aimed at controlling and-or managing demand in some form or another, by setting the price of automobile use closer to its real total costs for example, and a second group aimed at better transit outcomes through transit improvements and better urban design, by densifying transit corridors, and making for more dense and diversified land uses for example.

One of the interesting elements of his book is that spread out, fragmented landscapes need not signal the end

of public transit, only it requires imagination, innovation and the use of new technology in what is however a less than ideal situation for public transit. Three of the points that Cervero addresses need to be highlighted here. The first is that, for all its transportation rationale, density is not a lifestyle choice that everyone is ready to make, as many people express preference for low density lifestyles (p.79). The second is that land use initiatives are not cure-alls in and of themselves (p. 80), as they must be embedded with other changes, some of which have to do with amenities but also with personal security. The third point, and one which will lead us directly to our next topic, is the fact that the need to resort to the policy of better orchestrating supply of public transit and land use comes in large part from the "barriers to social-cost pricing of the automobile" (p.68).

Strong resistance to total costing, or total pricing, of automobile use introduces us to some of the interesting paradoxes between market and state in how to achieve the policy goal of improved transportation in large urban area. As we have seen, a great proportion of these policies are directed towards lessening the use of the car and increasing the use of public transit, and we will take that as a given for the following remarks. The strong resistance to the total costing of the automobile is somewhat paradoxical since it is seen as a market type of measure, defended by the same general argument that perceives the use of the automobile as an expression of freedom. And so the freedom of movement here, paradoxically, collides with some of the consequences of the freedom of a true, full cost market. (The setting of a price that would include all automobile costs would in all probability be set by a public authority, however).

Another twist and turn between market and state involves the question of choosing between what is going to be an eventual replacement for fossil fuels and be the main answer to our future energy needs for automobiles. Indeed, it is increasingly seen as necessary that "a choice be made between potential options (propane, natural gas, methanol, ethanol, electric, hydrogen)…so that a certain availability threshold is reached, requiring massive investments in infrastructure over a short time frame... (and this) virtually eliminates the option of successfully promoting more that one alternative" (Murphy, 2000, p. 88). This will require, in all probability, that the American federal government make a very "governmental", somewhat unilateral, choice as to what will become the true market competitor of fossil fuels in the decades ahead. But the paradoxes and apparent contradictions are not limited to the ones involved in the state versus the market. Technology also provides some interesting paradoxes of its own. Advanced computerized information systems can help suburban transit system adapt their services to outlying clientele, but they can also provide more free flowing automobile traffic, leaving still more room for its users, thus increasing car use (Cervero, p.69).

Public transit problems have often suffered from "scale problems", in other words much resources and efforts expended for results that are well below the scale of the efforts made, and well below the overall size of the problem. A successful transit initiatives is often one that aims at capturing a modest ten or fifteen percent of rush hour commuters. This is not so much a paradox as it is simply disproportionate in terms of return for the investment.

Unintended consequences are another way of referring to paradoxes. Unintended consequences have often annulled a policy's intent, by bringing car pool or bus clientele to new rail facilities, and not the intended automobile users (Murphy, 2000, p. 86, 87), or by diverting traffic from a main street, only to see it reappear in a smaller residential roads used by children. Some collective measures which aim at lowering rent and encouraging density near urban rail stations leave citizens with more discretionary income to buy automobiles, even in the face of stiff registration fees, as in Singapore (Cervero, 1998, p. 171). The overall urban transportation system is indeed made up of a huge number of individual micro-decisions which are not always easy to predict or channel. Human motivation often remains difficult to evaluate, and we are not really knowledgeable about how the sociological makeup of a city or of a country has an impact on individual choices, although there are some indications that a culturally more homogeneous country such as Norway may provide a better social soil for certain transportation measures (Cervero, p. 68), as suggested earlier, while societies which have attempted to segregate themselves from one sub group to another historically (Cervero, p. 75) may have more efforts to make at accepting measures that would encourage them to, quite literally, ride together. Urban transportation is embedded in historical patterns and it is, quite literally, path dependant.

And so, urban transportation policy cannot avoid the question of human agency, it cannot be implemented without the micro-decisions of countless individuals, who want different and sometimes contradictory outcomes, more green spaces but also more parking , to take just one example (Vigar, 2002, p. 152), which partly explains the present "value-action gap" in contemporary transport planning (Vigar, p. 184). More rational transportation modes are typically "for the other guy". Even though this may sound somewhat abstract, it may be necessary that, before more structural changes be implemented in urban transportation, prior changes must take place,

changes of a more cultural nature (Vigar, p.187,193). The somewhat diffuse nature of the benefits of more rational urban transportation modes will inevitably be weighed against all the "here and now" advantages of more wasteful but personally more gratifying modes of mobility. The challenge of more rational urban transport is much like the challenges of dieting, the urge for more short term energy (in the form of refined sugar, in the case of dieting) is ever present. Like dieting, rationalized urban transportation is no doubt an uphill battle. Defenders of public transit, once the environmental considerations have weighed in, might very well have what Jurgen Habermas has called "the force of the better argument" (Vigar, p.153, 167), but the force of the better argument does not always win, when powerful interests are also in contention for public decisions affecting urban mobility. After these sobering thoughts, we will now turn, in a more optimistic spirit, to a better understanding of the surprisingly numerous battles that public transit and other more environmentally friendly mobility modes have won in recent years in several parts of the world. While trying to be optimistic in terms of more rational urban mobility, we must keep in mind that all these success stories, put together, do not change the overall worldwide transportation picture of steadily increasing transportation needs and increasing GHG emissions coming from transportation. In consequence, they will appear to some as no more than niche possibilities or heuristic examples.

Some Sustainable Mobility Successes

The best way to further the advancement of more sustainable mobility in large urban areas is to better understand the reasons behind the success stories that are known to us. Whitelegg and Haq draw up a list of many of these successes, several of their examples coming from Europe (Whitelegg and Haq, 2003c, p. 285-286). Robert Cervero has gathered several of the most important of these and other success stories in his classic book *The Transit Metropolis, a global inquiry* (1998), to which we have referred to in this paper. He has neatly divided the success stories between the Adaptive Cities, those that built important sections of a city along a transit configuration, the Adaptive Transit, those cities that have adapted transit along existing, usually spread out, built environments, the Hybrids, succeeding in doing both, and finally the Strong Core cities, those that concentrated their efforts on strengthening and consolidating an already strong central city. What is interesting in his approach is that it suggests that there are different ways of succeeding at urban transit, it lauds creativity and it turns us away from the dogmatic, one size fits all approach, and for these reasons it constitutes an important synthesis of the state of the art in the field of sustainable urban mobility. Among the success stories, those that Cervero mentions and others, there are those that have only relatively recently caught our attention, such as Ottawa, Canada, and there are also those that have "been at it" for decades, such as Tokyo, Copenhagen and Stockholm. But even among the relatively recent successes, there seems to have been an effort that extended over decades, which already teaches us something about the time frame involved in the success stories.

There are different ways to draw lessons from success stories in urban sustainable mobility. One is to plot variables one against another and try to see if there are some regularities. Another is to look at case studies. A further step is to group case studies along large categories, which Cervero has done, and which goes a long way to clarify important elements of successes in a conceptual way. There are also other possible methods. One way to proceed is to look at urban transit innovation cases as being imbedded in larger political and institutional frameworks, which in part determine their success. We will sketch some of the elements of this approach here. In using the term "political", we will include policy processes and electoral dimensions, and in the term "institutional framework", we will include some organizational dimensions.

Let us now turn to the political dimensions, and let us start, more specifically with the policy process.

A first question we can ask is whether substantial changes in sustainable urban transportation require, at the outset, an important, even radical, change in thinking, often called "paradigm change". There is substantial evidence that it does, and that, without it, the forces of the status quo and simple inertia will inevitably win the day. This is essentially what Lewis Mumford had argued almost four decades ago in a congressional testimony to the U.S. congress when he stated that the changes needed in urban transportation reform would require "prior changes in morals and values" (quoted in Miller, 1989, p. 497). Because of the complexity of urban transport, and all the unintended consequences, there also needs to be a crucial element to eventual success, and that is what we referred to earlier as "joined- up thinking". It is interesting to note that in his classic article "Environmental degradation and the tyranny of small decisions" (1982), William E. Odum specifically identified transportation issues as those often suffering from excessively disjointed and incremental decision-making. Joined up thinking implies some specific institutional requirements, and we will attend to those later. This does not mean that the implementation of an eventual plan cannot be realized incrementally, however, as is often the case, for all sorts of practical and financial reasons.

The next question is how open the decision process for

change must be. This is a quite complex matter. Of course, in theory, in a democratic setting, every citizen is invited to participate. In practice, we all have our occupations, and there are different formulas of participation. In some of the environmental policy literature, relying partly on public choice theories, there is the idea that environmental interests are "diffuse", while immediate and financial interests are "compact", here and now interests, and, theoretically, compact interests usually win out over diffuse interests, and that would lead those wanting more environmentally transportation to actively seek the participation of diffuse interests in one way or another. This usually means enlarging participation, and encouraging it, since it is assumed that those with strong and immediate interests, usually business interests, will be present in any case, to defend their stake. Sometimes the members of diffuse groups are an odd coalition of environmental, business interests and other stakeholders, and it can be difficult to keep these interests together for the long haul.

When you invite everyone to dinner, you are never really sure of who is going to show up. In a context where almost everyone owns a car, such as in North America, the use of a car is seen as a democratic right, and a wider participation in such a context can mean defending automobile use, which can partly explain some or the difficulties in achieving more transit development in the Portland, Oregon urban environment in the more recent years (Schiller and Kenworthy, 2003, p.230-232). There is also anecdotal evidence than in certain contexts, in certain South American cities for example, the process took people somewhat by surprise, and structural changes may not have been possible with more lengthy and more participatory procedures, which poses the classic question of whether the ends justify the means. If the opening up of the policy process can prove to be a two edged sword, then keeping the process closed can also lead to contrasted results. If the bureaucracy is dominated by engineers under the "predict and provide" paradigm, spurred by closeness to construction and other road interests, then there is usually little chance for transportation modal shift. Some analysts will add at this point, especially those looking at highly differentiated revenue countries, such as many of those in South America, that a centralized process will only perpetuate the influence of the middle class and upper middle class, of which the closed bureaucracy is of course integral partner (Vasconcellos, 2003, b) p. 190, 191, 193). This will lead to a restricted technical view that will inevitably lead to a "predict and provide" scenario of more road building. Vasconcellos argues that there is a symbiosis between the middle class and the automobile, and that the middle class will pursue this type of mobility "fiercely", at least as South America is concerned.

Sustainable Transportation and Institutional Context

Another policy question which seems worth pursuing is how do different business and other interests organize themselves in trying to influence government action or inaction. Generally speaking, analysts have opposed the "corporatist state model", found essentially in some European countries, where very large interest groups, business but also labour and other groups, sit with government officials and formulate policies, on the one hand, and the more fragmented configuration found in the United States. The question is how these different configurations can influence different policies and in what way, in the field of transportation. Newman and Kenworthy have argued, for example, that the American model lends itself more to the influence or the road lobby (1999, p. 137). Although criticized on several grounds, the corporatist model has been described by some as better equipped for long term policy, which would include long term sustainable transportation issues. Another question is how these national configurations translate into policy at the more local, metropolitan or regional level. There are reasons to believe that more micro level policies, at the metropolitan or regional level for example, have a kind of "life of their own", or in more academic terms, "relative autonomy". This would explain why we see so many different policies of urban transportation in the same country.

The question of policy choices also responds to the more specifically political question of how urban mobility policies play out against electoral politics. "All politics are local", as the saying goes, and at least some of it is also short term. There is always the danger that transportation plans geared for the long term won't show their positive results locally, during the elected official's mandate, and that is a fairly well established observation. Improved bus service or better cycling paths do not seem as visible as other contributions may be (Vigar, 2002, p.174) Many politicians fear for example, and with good reason, that more rational transportation policies, while good for the long haul and for the larger public, may irritate their own constituency in the immediate term. Some politicians, mayors for example, have been run out of office after substantial urban transportation revamping. In political institutions where party discipline is weak, there is always the temptation to log-roll road projects between elected officials, since road construction is a political asset that can be easily traded as

a commodity. At the local level in particular, politicians are hesitant to abandon a road construction or road completion project, for fear of loosing funds to other, competing localities, in effect loosing one's turn at financial help from central authorities (Vigar, p. 110-111).

If local politics always count, transportation policies are also embedded in wider political and social contexts. Even before looking at solutions, we can hypothesize that urban mobility problems are often generated by social and political contexts. Tensions between Israel and the Palestinians have contributed to complicated bypasses that try to avoid unfriendly territories, bypasses which may have been superfluous otherwise (Fletcher, 2003, p.230). Wanting to avoid certain territories is a powerful incentive to waste transportation resources, as was the case for South Africa, and to a certain extent for the United States. Paradoxically, it may be useful to separate people in order to have them riding together, as in the case or the separation between first class and second class cars in the quite successful French subway system. Elsewhere, in Eastern Europe, the often unrestrained embracing of capitalist and western values has had the effect of starving public transit urban systems, while turning out substantial sums for road construction, often with the help of European and international funding agencies. Public transit became identified with the old way of doing things. In the worst cases, as in parts of Russia, a criminalized economy , where the shadow economy is important, there will be a strong tendency for the wealthier elements to rely on the automobile, because a reduced tax base (you cannot tax what is not supposed to happen) leaves little in the way of quality public transportations. This pattern may at least partially explain why the region-city of Kalilingrad is, according to official figures, one of the poorest regions of the Russian Federation, while at the same time holding the second position, out or 89 regions, with regard to the purchase of private motor vehicles (Samson and Eliseeva, 2003; Lamande and Vinokurov, 2003).

Even in developed countries, the twenty year move towards privatization has not been without its effects in public transportation systems, particularly in fragmenting these systems beyond the institutional capacity for coordinated management (Vigar, 2002, p. 79, 219). But here again, political and social embeddedness is important, and while a formula can be found wanting in one country, it can succeed in another. There is much success in the largely privatized urban rail system in Japan, once it is understood that there are powerful informal pressures to bow to public policies and that rail transit companies have a kind of holistic interest in the overall policy success, since they are also holders of part of the land adjoining transit lines. There might be a lesson here, and that may be that some element, private or public, must have a strong take in the "success of the whole". In other contexts, there also may have been some degree of confusion between the idea that the implementation of public transit, its operation, can in many cases be more efficiently realized by the private sector, with adequate supervisions and safeguards, on the one hand, and the planning of the whole of the urban system, on the other hand, which can only remain a public responsibility in most countries, and we are reminded here of the classic distinction Karl Mannheim introduced to decision theory, decades ago, between substantial rationality, the stuff of deciding what we are to do, as societies or cities, and functional rationality, the stuff of the better ways of doing it. The second type of rationality can be parcelled out, not the first. Unfortunately for more rational urban transportation systems, there is a decline in trust in government institutions, at the same time considerable, up front, sums of money would be required to move away from thinking in small modal pots pieces.

Leaving aside the larger questions of policy, and entering now the more mundane question of organizational and administrative arrangements, certain of our conclusions reached in the larger sphere of public policies can, however, be also applied to the more operational levels of urban transportation. There is also, at this more local level, the need for "joined-up" thinking, which often means looking at more that one thing at the same time. We already know that in urban transportation schemes, land use must be looked at, at the same time as transportation, and that is one of the reasons European cities have done a better job on the whole than American cities. Even within North America, the larger powers of Canadian cities, which can intervene in ways their American counterparts cannot, go a long way in explaining Canadian large cities' relative successes in urban transit, in Robert Cervero's analysis. More specifically, Canadian cities or metropolitan governments can more easily acquire land for public purposes and, generally, have more power to implement a city or regional plan.

At the national Canadian level, institutional arrangements also have some effect, and there are no tax deductions for mortgages and property taxes, nor is there an equivalent to the American freeway program (Cervero, 1998, p.83-90), both of which help the development of the automobile and suburbs in the US. As Robert Cervero notes, however, it is not certain whether a city like Toronto will be able to maintain its trajectory, since it has recently been merged administratively with its surrounding smaller

cities, less committed to public transit, which may explain why there are already signs that Toronto may be pursuing, quite literally, another route.

At the national level, it seems important to have the ministry or department of the environment and those responsible for urban affairs in some form of regular conversation with each other, and not isolated from the transportation concerns. For a time, in the UK, transportation and the environment were merged, but this ideal situation was short-lived, as there was not really a "merger of the minds", and the two entities remained in different buildings, which is always a telling sign. When environmental portfolios are merged with natural resources portfolio, it usually means that the environmental considerations will be sacrificed for development, and in the case of Russia, this has almost always been the case, with a brief exception in the Gorbatchev era when the environment portfolio briefly had a place of its own. But the usual Russian (and Soviet) arrangement of integrating the environment with natural resources is a less than ideal situation, especially looking at the results in large cities, both now and in the Soviet era. It is not clear at the moment whether the separate operational agencies put into place under the influence of the New Public Management movement, in many areas of the world, will have a positive or negative effect on more rational urban transportation planning (Vigar, 2002, p. 163). But, already, there are several successful examples of a good fit between a strong public body, supervising the whole urban transportation scheme, helped by a written, explicit, and enduring overall plan, including oversight powers, on the one hand, and smaller, innovative carriers that cut costs while improving service.

The best level of integration of the joined up thinking we referred to earlier seems to be at the metropolitan level, not necessarily at the larger regional level (Vasconcellos, 2003, b), p. 192), but this can vary from country to country, and in some cases the national level is also the metropolitan level, such as Singapore. A more general rule may be that the administrative entities having the most stake in the solution be also the ones guiding it. In a surprisingly frequent number of cases, the real force behind a large and successful transit scheme can be traced back to an individual who mapped out a large plan of what was to be done, and why, and had a big influence in sticking to the plan in place until its realization, as seems to have been the case for certain South American city mayors and also public officials in Sweden. In some cases, credible intellectual figures, sometimes citizens from a different country, such as Jane Jacobs for Toronto, or Lewis Mumford for Cambridge, England, played an important role at a crucial juncture of a city's moment of choice. It is pretty well established that fragmentation at the local level, between small, nominal cities, or between different levels of government, is not conducive to successful policies in urban transportation, although even here, there seems to be some exceptions, as may be the case for successful transit city Copenhagen, where several levels of public authority have a say in what is to be done. In some cases, veto power vested in the larger metropolitan or regional authority, or then again in the local, smaller entities has had some positive effects, maybe because it keeps everyone in line. In Mexico, the active implication of many administrative decision makers, coming from different levels of government, seems to have traditionally produced less positive results (Vasconcellos, 2003, a), p. 166), although the situation there might not be as bad as it first appears, at least for expert eyes.

Looking essentially at developing countries, Sperling and Salon have listed the institutional characteristics of the most successful urban transportation schemes, and these include: a certain degree of centralization of authority, policy and investment precedents, existing land use patterns and topographical constraints, group oriented cultural norms in the society, strong policy enforcement capabilities of local institutions, local commitment to related policy goals such as air quality improvement, economic and political influence of local interest groups, and strength of local public interest non-governmental organizations (2003, p. 25). We can see this list as one which describes the embeddedness of the most successful urban transit policies, whether in developing or developed countries.

One last point, regarding institutional arrangements, is the overall question of general institutional capacity per se. It is pretty much a consensus now that the task of better equipping large urban areas with more sustainable mobility is a huge task that requires enormous institutional capacities. No doubt, the successes of several Japanese, German and Scandinavian cities are a testimony to their strong institutional capacity, and, in a sense, they succeed at sustainable transportation just as they succeed in all sorts of demanding collective endeavours.

It must be recognized, however, that almost everywhere this institutional capacity is not in sufficient supply to respond adequately to the demand (Sperling and Salon, 2002, p.30), especially in developing countries, where the demands are the greatest, with some notable exceptions such as Singapore (a developing country only a few decades ago), Curitiba (Brazil) and Shangai (p. 24).

Another point, regarding the institutional aspects, needs to be mentioned, and that is that sustainable urban mobility is a quite complex matter, and it requires a certain time in order to grasp all its interrelated dimensions. (Vigar, 2002, p.59, 64). This is why length of time in office, whether for elected officials or unelected ones, is important to master these complexities and be able to act on them. There are no real instant successes in this field. Those cities having success have been relentless in applying sustainable transportation policies for decades, using a variety of instruments that are all geared to push in the same direction. One of the best examples of this is the decades long effort of Munich to "push" people out of cars and "pull" them onto trains and other sustainable transportation modes (Cervero, 1998, p. 230). This is important, if only because the pressures to adopt non sustainable transportation modes are, themselves, relentless and ever present, as is the temptation to eat sugar for the dieter.

How will different urban institutions react to the competing demands of sustainable urban transportation, on the one hand, and the short term demands of important groups of society, including the short term demands of a sizeable part of their citizens, on the other, will be played out in the following years and decades. We have tried to outline some of the political and institutional factors involved, stressing the importance of the embeddedness of these challenges. We have tried to first look at the "upstream" international setting of worldwide transportation challenges, and at the ethical question that they pose. In better understanding some of the origins of transportation problems, we have also looked at other "upstream" elements, such as the strong push for individual freedom everywhere, the "division of consumption", and the necessity to understand some of these upstream elements with the use of concepts such as transactions costs, including their application to "seamless" and "seamfull" transportation modes.

At the "downstream", policy level, we have pointed out certain political and institutional elements, such as the capacity for integrated planning, the institutional position of key actors, the strategy of implementing some of the carrots before putting in place the sticks (the absence of such a formula may explain why so many, if not all, recent attempts at increases in gas prices or CO2 emissions taxing directed towards consumers have been abandoned almost everywhere), the challenge of up front financing for large scale urban transit at the same time there is an unfortunate decline in the esteem for public authority, and some unintended consequences of well intentioned policy and policy instruments. Both upstream and downstream elements are at play in the development of sustainable urban mobility challenges, and public authorities have less control over the upstream ones than over the downstream ones, which can explain why even good sustainable urban mobility schemes, well thought out and applied, do not always succeed to the extent hoped for, as may be the case for urban areas such as Washington, Portland, and St. Louis, in the United States.

GENERAL CONCLUSION

John Whitelegg and Gary Haq have stated that worldwide transportation policy "has become the most significant ethical problem in the world today" (2003c, p. 277), and achieving more sustainable urban mobility will ,according to Geoff Vigar, " likely …be an extremely difficult and resisted transition process" (2002, p. 200). There are socio-economic patterns which are now beginning to take hold in the developing countries, tied to individualism and mass consumption, and we have to consider the development of these patterns as important upstream issues. Because the scale of the problem is so much more important there, and because mobility will develop in a shorter period of time, the future of urban sustainable mobility will essentially be played out in those developing countries.

We know that a period of growth and development is also one of opportunity, because it is so much easier to influence transit patterns in periods of growth (Cervero, 1998, p.83, 95), but this implies economic growth and not only population growth. Looking at developed countries, sustainable mobility also faces great challenges. Taking Canada as an example, Rose Murphy has simulated a model of greenhouse gas reduction from the transportation sector, and concludes that a quite wide variety of policies, including efficiency improvements, fuel switching, mode switching, and overall activity reductions within the sector, and other measures, applied together, would "achieve just over half of the reductions required to meet Canada's Kyoto target as applied to the transportation sector" (Murphy, 2000, p. iii).

Once we will have all realized that the Kyoto goals will not be reached, there will remain the question of how to share future reductions of greenhouse gases in the transportation sector. Inevitably, questions that have been avoided up to now will be put on the agenda. One of the most important of these will be how to share the burden of reduction between developed and developing countries. There will be arguments to limit the burden on developing countries, under the general idea that they are polluting less, per capita, and that they need development to improve their standard of living. Some developed countries will argue that

their transportation infrastructure is already built, and that there is less room to maneuver and do things differently. The economic argument of efficiency ties in to this general argument, in the sense that, for the same effort, results will be more easily achieved in developing countries.

The proposition to "contract and converge", which means that over a period of time, per capita greenhouse gases emissions will reach a similar level in all countries of the world, is a lofty goal, but if only a few major developed players do not get onboard, the whole project could fail before it really begins because "environmental policies could be hampered or even blocked by those who consider them unfair…" (IPCC, 2001, p.78). An argument for limiting the effort of developing countries is that it is incumbent on those having initiated the GHG transportation emissions in the first place, the developed countries, to now initiate the changes that will take us to more sustainable transportation modes, especially in large cities. The combination of all these arguments and ethical considerations, in addition to the problem of financing in the less developed countries, and also in consideration of the fact that GHG emissions have a worldwide effect regardless or where they were first emitted, will point towards massive international financing for sustainable urban transportation modes in developing countries, a financing in which rich countries will play an important role. Even now, there are different international mechanisms to set in motion such a process. There would of course be different opinions on whether this level of international investment is possible or desirable, but the question will inevitably be put on the international agenda.

In addressing these conflictual questions, there will be a great need for simulating and mapping out, sometimes visually, different urban transportation options for large, especially developing cities. Of course, these models exist presently, but there will be a need to reduce, in particular, the widely different estimates of the environmental impacts of the automobile vis-à-vis other urban transportation modes. These simulations will have to better explicit what are the premises used, and this may require a kind of deliberative approach at the outset of the process (Vigar, 2002, p. 183), where there would be comparisons between different approaches which would otherwise pursue each their own assumptions and logic in "splendid isolation". In all fairness to automobile critics, these calculations would have to include not only the its straight economic costs but also its environmental costs, including its emissions coming from its use, but also its construction, the construction of its infrastructure, its disposition, and its social and land use costs. In all fairness to the defenders of the automobile, the costs of the transit alternatives must also include their own environmental and other costs, and they must include realistic estimations of what ridership will be (which have often proved to be too optimistic in the past).

One of the purposes of this article is to show that it is necessary to look at the dynamics of both upstream and downstream elements in order to better understand the challenges of sustainable mobility in large urban areas of the world. Both types of elements play a large role in understanding successful and sustainable transport.

The challenges are so great that it would be quite easy to draw a worse case scenario. At the upstream level, it would be easy to imagine that the world economy, and its concomitant increase in specializations of all kinds, including at the local, urban level, and ever increasing levels of mobility, fuelled in part by the advances of the ideas of choice and freedom , newly acquired for many, would spur ever greater degrees or mobility, not easily satisfied by existing levels of transport infrastructure. A growing middle class in developing countries would take as their model lifestyles that can be seen on different media coming from richer countries, and this emerging middle class would throw its weight behind automobile-suburban types of land development. At the downstream level, the formidable institutional challenge of holding the course for sustainable urban mobility, a challenge in itself, would prove too great in the face of the sustained pressure of the members of road coalitions, a compact group whose advantages in road development are very concrete. The countervailing coalition of the diffuse group of those supporting more transit oriented development would prove insufficient. Still in the downstream end of events, the loss of esteem in the public sector, deserved or not, would have slowly eroded its capacity to finance the important up front costs of costly but necessary transit infrastructure, transforming this loss of esteem into a self-fulfilling prophecy, as the public sector would in effect become less and less able to meet our growing transportation needs in large urban areas. Still within this pessimistic scenario, a few international trends would push the events in the same, unfortunate direction.

All through the first decades of the twenty first century, the advances of the automobile usage would be accepted on the basis that new and improved fuels and sources of motorization would be just around the corner, which would render automobiles benign in terms of the environment. But the same loss of esteem for the public sector, alluded to earlier, would also prevent public organizations from making the first and decisive steps in making the switch happen. Slowly, on the larger scheme of things, the idea that nothing could really be done to prevent climate change

would work its way as an accepted new paradigm, along with the idea that the only recourse left would be to adapt to climate change, and not mitigate it. That idea would signal an end to internationally led efforts at more sustainable transportation in large cities.

To avoid this admittedly pessimistic, though not impossible, scenario, there needs to be a better understanding of both upstream and downstream forces at play in the challenges of planning for more sustainable urban mobility, in the hope that, in the end, the force of better argument will win the day.

- FIN -

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