

# Achieving High Volume Carpooling by Eliminating the Need for Pre-Arrangement: A Case for Research Funding

**“it isn’t what you don’t know that gets you in trouble, it’s what you know for sure that isn’t so”**

**Mark Twain**

## Introduction

Casual carpooling is a system that operates in San Francisco, and is estimated to save Bay Area residents and businesses in the order of \$30 million per year, between reduced gasoline, reduced public transport subsidies, and reduced time wasted in congested traffic. The benefit is felt by the participants as well as the wider traveling public and the broader community. This amount is saved in the morning commute: a similar amount could be saved in the evening if it was encouraged as a two way system. This valuation doesn’t include reduced greenhouse gases, local pollution, and improved safety that also results from less traffic.

Each morning an estimated 3,000 three person carpools are formed between people who did not previously know each other, and with no pre-arrangement. There are about 23 pick-up points in the East Bay, and two drop-off points in downtown San Francisco where all the rides terminate. By participating in this system some of the traffic that would otherwise be in the general use lanes on the freeways of the east side of the Bay Bridge is able to go in the HOV lanes, allowing all the traffic to move a little more freely. The carpool formation happens at curb-side pick-up points that are like ‘taxi stands for carpoolers’.

This is high volume carpooling that has no need for pre-arrangement. It is in stark contrast to all other carpooling systems, in its million plus trips per year, it’s thirty plus years of resilient operation, it’s incredibly low cost, and the distinct fact that all other carpooling is established with pre-arrangement as its core feature. Transport planners and travel demand professionals work to a paradigm that says all carpooling should be pre-arranged.

This paper calls for public funding of a research effort to capture the essence of casual carpooling to enable it to be implemented in new locations. Using savings in San Francisco as a guide, if 100 cities implemented high volume carpooling with similar uptake to San Francisco, the benefits on a national basis could be as much as \$6 billion, with a five million tonne reduction in green house gas emissions.

## Background

In response to the need stated in many cities’ and regions’ transportation strategies for reduction in single occupant vehicle driving, Trip Convergence Ltd<sup>1</sup> is researching a high volume route based ‘flexible’<sup>2</sup> carpooling solution that could provide a realistic daily choice for commuters who would share rides but for whom traditional pre-arranged carpooling does not work due to varying working hours and changing travel needs.

There are three informal flexible carpooling systems in operation in US cities:

- Casual carpooling in San Francisco, 9,000 participants daily (3,000 carpools) (1998)
- Slug lines in Washington DC, 10,500 participants daily (3,500 carpools) (2006)
- Slug lines in Houston, 900 participants daily (300 carpools) (2007)

The first two of these systems have been in operation for over thirty years. The systems cost almost nothing in operational terms. Until recently they have been perceived as non-beneficial to the transport system, largely because it has been thought that it would be better if the participants took a bus. Over 80% of riders in San Francisco would take the bus if casual carpooling was not available, and the majority of them take the bus for the evening journey.

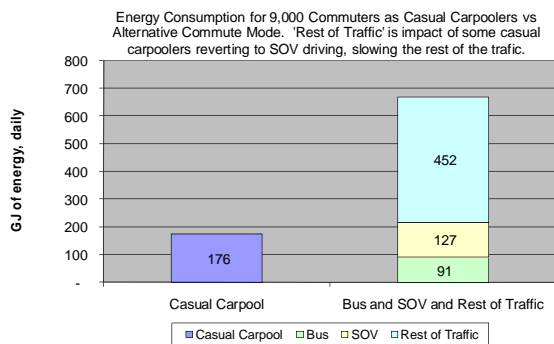
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<sup>1</sup> Trip Convergence Ltd is a New Zealand company owned by John Pearce and Paul Minett.

<sup>2</sup> We use the term ‘flexible carpooling’ to refer to the casual carpooling, slug-lines, and any adaptations of these systems.

However in a recent paper<sup>3</sup> prepared by Paul Minett and John Pearce for submission to the international Energy Policy journal, it was calculated that the casual carpool alternative uses about 500 gigajoules less energy daily (see chart) to move the 9,000 participants than would be used if a bus alternative was created.

The reason for this is that it would take many buses, together with their operating costs and 'dead-head miles' to serve these commuters, and many of the casual carpooling drivers would continue to drive (putting them back into the mixed use lanes, further slowing traffic in those lanes).



It turns out that it is not a foregone conclusion that the bus is more environmentally friendly than a car. If the car is HOV4, the bus needs to be more than 40% full, on average, every mile that it operates to achieve the same fuel and emission efficiencies on a per passenger mile basis.

Trip Convergence's research effort has led to the specification of a prototype for a more formalized flexible carpooling system. It would be low cost compared with the alternatives of new public transport and road building. It involves

- more formal establishment of origin and destination facilities and definition of routes,
- membership with pre-screening, and
- the use of technologies for membership identification and tracking participation.
- the use of 'ride credits', an alternative currency that enables the 'give-a-ride/get-a-ride' aspect of carpooling to exist in a system where each person each day may not know the identity of the people they share a ride with.

Testing and refining of this prototype are central to this proposal for funding.

## The payback from flexible carpooling

Estimates prepared by Trip Convergence suggest that flexible carpooling could provide the equivalent of a passenger transport service at a net public cost of about \$0.69 per boarding. This would compare favorably with bus systems that have a net public cost of well over \$2.50 per boarding, and train systems that are even more expensive.

However, it is the congestion beating potential of flexible carpooling that should make it an even more attractive option. By attracting single occupant vehicle drivers to form fuller cars, the system could reduce vehicle counts in a way that has proven elusive for bus systems. Reducing vehicle counts is the only way to reduce congestion and its deleterious impacts. As congestion is reduced and the traffic speeds up, the amount of fuel used (and the carbon emission) per unit of distance is reduced, and the amount of personal non-productive time is also reduced.

Case Example: In Auckland, New Zealand, the Auckland Regional Council applied estimated take-up rates on a route by route basis (provided by Trip Convergence), against the traffic model for Auckland. The analysis showed that the time savings alone (not including fuel and greenhouse gases) for Auckland, (a city of 1 million), would range between \$120 and \$220 million per year, at an estimated one-off cost of \$200 million (for technology and park and pool facilities on the periphery of the city), plus operating costs of less than \$1.00 per boarding, an estimated net present value of well over \$1 billion.

## Flexible carpooling will work

There is doubt amongst some transportation professionals about whether flexible carpooling will work. They have observed (or even participated in) attempts to make traditional carpooling work and have seen those efforts fail. They have discounted the examples from San Francisco, Washington DC/Northern Virginia and Houston TX as being successful only due to local conditions (in particular 3+ HOV lanes), and not applicable elsewhere.

There are no records of attempts to emulate these informal systems in other locations, to test theories about why they work where other initiatives have failed. It is likely that there has been no evaluation of these systems because they were never part of an initiative themselves, they were established by

<sup>3</sup> See <http://www.flexiblecarpooling.org/NERI20080407d.pdf>

commuters during interruptions of normal transport, and managed to sustain themselves.

Trip Convergence hypothesizes that the key feature that enables casual carpooling and slug lines to work (compared with traditional carpooling, for example) is its flexibility: the fact that there is no need for daily pre-arrangement or making of any commitment. People show up and they get a ride. Hence the use of the generic term 'flexible carpooling' to describe these examples and the proposed adaptation.

In all other carpooling examples pre-arrangement is the standard paradigm. The need for 'pre-arrangement' seems to define the way by which such systems are designed and operated.

In an internal report about flexible carpooling (which went on to recommend against funding the system because it had not yet been proven to work) the Auckland Regional Transport Authority's Anna Percy said:

*In summary, the practical concept behind flexible carpooling is basically sound and could work. To find out whether it will work, and whether the actual benefits exceed the costs, the next step would be to undertake a trial involving a single convergence point where parking would be provided, and a system of encouraging ridesharing introduced which would need to include a CBD system and/or facility to enable ridesharing for the return journey.*

While there is little question that flexible carpooling will work to some extent, there are uncertainties regarding the steps needed to implement the system on a new route, (it has never been done before) and it is possible that several attempts will be necessary with different features and benefits before a definitive implementation manual can be published.

Uncertainties exist that need to be resolved. These include:

- understanding whether a public authority would attract liability through supporting a flexible carpooling initiative (preliminary work by researchers at UC Davis suggest not), and whether insurance could be secured to deal with any such liability.
- determining whether users of the system will be prepared to pay for the service, and if so how much (and therefore how much the net subsidy would need to be)
- learning what proportion of a potential SOV market would use the system once it

was available, and what the uptake pattern looks like under different circumstances

- determining the extent to which public transport users would switch and become flexible carpoolers, and the extent to which this would damage public transport or create space for additional passengers
- learning what impact external influences such as weather or holidays have on the operation of the system
- learning if the system can be implemented where there are no HOV benefits such as HOV lane or dedicated parking
- learning how difficult the system is to manage, and what ongoing costs would be incurred to keep it operating over time

## **How flexible carpooling research and development should be funded**

Assuming that the business case exists for further research and development of flexible carpooling, how should it be funded?

In the study of casual carpooling in San Francisco, mentioned above, the benefit to the wider community far exceeds the benefit felt by the participants in the system. In a case study for putting flexible carpooling on a busway on Auckland's north shore, 20% of the benefits would go to the participants, and 80% to the wider community.

To access the potential carbon emission reductions, and improved energy security that would come from successful development of flexible carpooling, there seems little question that it would be a justifiable investment for public funds.

The next question is, which level of government should fund it? The amount, and the quantum of the benefits suggest that government organisations at a state and or national level should take responsibility. The amount of funding required for the system seems to exceed the capability of most local level transportation organisations, especially if they perceive that there is any risk involved in the project. Experience to date seeking funding and support from local transportation organisations is that they are happy to be cheerleaders but have little discretionary time and no discretionary funding to trial an untested mode.

## Research Partners

Trip Convergence Ltd has a single-minded focus on finding ways to make it easier and more rewarding to share rides. We have the drive and interest to carry out research and to commercialize the results. We are the ideal partner to expedite this project. We have several organizations who we would most likely involve, depending on the location of the trials. These include UC Davis, California PATH, SMART (University of Michigan), Commuter Challenge (Seattle), Cascadia Center (Pacific Northwest), Sound Transit (Seattle), King County Metro (Seattle), Puget Sound Regional Council (Seattle), Washington State DOT, and the Urban Age Institute.

## Proposed way forward

The easiest way to improve the energy productivity of private vehicles is to get more people riding in them. There is significant 'low hanging fruit' available, right now, that is being overlooked in the search for ways to reduce dependence on foreign oil and reduce greenhouse gas emissions. Flexible carpooling is available with very little up-front cost.

It is proposed that government organisations at a state and or national level enter into a partnership with Trip Convergence Ltd, and fund up to \$2 million for up to six trials to develop flexible carpooling, in a three year programme. Trip Convergence Ltd has marketing capability and potential funding for commercialization subject to successful trials.

It is further proposed that the funds be advanced to Trip Convergence Ltd in accordance with the following budget.

## Budget

Item	Cost	Cumulative	Advance date
System Devt.	\$350,000	\$ 350,000	On signing
Trial 1	\$275,000	\$ 625,000	after 3 months
Trial 2	\$275,000	\$ 900,000	after 6 months
Trial 3	\$275,000	\$1,175,000	after 9 months
Trial 4	\$275,000	\$1,450,000	after 12 months
Trial 5	\$275,000	\$1,725,000	after 15 months
Trial 6	\$275,000	\$2,000,000	after 18 months

Different conditions to test in the trials:

1. Dense traffic area with HOV lanes and existing public transport running to

employment destination with multiple employers

2. Residential area with focus on carpooling to the transit station, in large urban area, with satellite parking in the residential area
3. As for two but without the residential area parking
4. A rural residential area that is poorly served with existing public transport, or perhaps none exists
5. As for 1 but with the employment destination being a single employer campus (company, university, airport)
6. Reserve for additional trial the same as one of the others in case of a poor result, or to meet needs of partner organisations for variations.

Detailed budget for each trial:

- Technology	75 K
- Parking	60 K
- Project Mgmt	40 K
- Incentives	25 K
- Marketing	25 K
- Misc & Contingencies	<u>50 K</u>
Total	<u>275K</u>

System development and admin costs (as part of first trial only)

• Software	50 K
• Management and reporting (36 months)	175 K
• IP/Legal	40 K
• Insurance	10 K
• Marketing/PR	35 K
• Contingencies	<u>40 K</u>
• Total	<u>350 K</u>

Current opportunities are being explored to carry out the six trials in three or four different jurisdictions, including several USA states, and New Zealand. Funding could therefore come from international, interstate, and state level sources.

If your organisation has access to funds and you would like to explore developing flexible carpooling in your jurisdiction, please contact Paul Minett by email:

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Or call Paul in New Zealand on +64 9 524 9850.