

# Case Studies

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## 1. Comprehensive mobility management for Walkable City “Kyoto”

Urban-scale activities  
by big cities

Project Name	Comprehensive Mobility Management for Walkable City “Kyoto”
Location (city, country)	Kyoto, Japan
Key Agencies	Managing Authority for Walkable City Kyoto
Project Period	2008 -
Keywords	walking; transport operator; radio program; travel feedback program; school; resident; workplace; tourist; workshop; app; area map; modal share; stakeholder

### Project Outline

#### (1) Background and Objectives

Kyoto City is one of the major cities in Kansai region (where Osaka is located) and has a population of about 1.5 million. The city is also well-known as an ancient city with much historical architecture, attracting many visitors. Due to its commercially active city center where many visitors move around, the city has a well-developed urban transport system with multiple railway lines and plenty of bus services, making the city center very lively. However, due to motorization that occurred in many developed countries in the world, the city had also experienced traffic congestion, making the city center unfavorable for pedestrians. This issue had been raised in the 2008 mayoral election by a candidate, and he won the election.

Under the mayor’s initiative, the Transport Policy Division of the city then was reorganized as the Managing Authority for Walkable City Kyoto for the purpose of prioritizing the agenda. In 2009, the city developed a transport master plan, aiming for to create a more walkable city by improving public transport and other measures. It clearly set a goal to reduce the modal split of private vehicles from 28% to 20%. In addition to the development and improvement of public transport and the pedestrian environment, the main agenda of this master plan was on communication measures to promote a modal shift from private vehicles to other modes such as public transport and walking, an approach that developed later on as mobility management.



Figure 1 Left: Railway map, Upper right: Pedestrian environment around major tourism spot, Lower right: Traffic congestion in the city center

## (2) Institutional Scheme

A management committee for the master plan established by the Transport Policy Division was responsible for following up on the policies. The committee also took the lead to develop a charter for a walkable city, taking advantage of various members consisting of academics, transport operators, local media, and citizens. Furthermore, there was a higher level of MM committee consisting of Kyoto prefecture, Kyoto City, police, national road authorities, and academe which plays a vital role for collaboration activities and information sharing. Moreover, a committee for public transport service improvement was also set up by Kyoto City where different public transport operators work together.

Table 1 Actors and their roles in MM

Actor	Role
Government	Securing budget and setting a priority for transport policy
Transport Department/Division	Developing the transport mater plan and managing the committee
Public Transport Operator (Private)	Improving timetable in coordination with other operators, improving bus facilities, and introducing new bus line
Academics	Conducting research and advisory on MM
Consultants	Developing MM activities
Local Media	Promoting public transport and providing useful information
The Citizens	Participating in surveys and giving ideas/opinions in workshops

## (3) Contents of the MM

## A) Communication measures

- Promotion through a local radio program
  - A celebrity was invited in a radio program that aired a discussion about the impacts of using private vehicles and useful information about public transport.
- One-shot TFP
  - Aiming to change people's mindset and behavior, a survey about walkable city and private vehicle usage was performed to 15,000 citizens.
  - Separate TFP was carried out by conducting a survey to 14,000 people living along metro and bus corridors.
  - Another TFP was conducted with the aim of alleviating traffic congestion in corridors along arterial roads, targeting up to ten thousand individuals, especially residents and office workers, who might be able to use public transport instead of private vehicles.

Table 2 Examples of the questions in the survey

1	Do you think that Kyoto’s landscape of historical architecture can be more attractive with walking people rather than moving vehicles?
2	Kyoto City thinks that less frequent use of private vehicles can be an effective countermeasure to global warming. What do you think about that idea?
3	By using public transport, you burn calories due to the time spent in walking. What do you think about it?
4	Do you think you should use private vehicles less frequently?

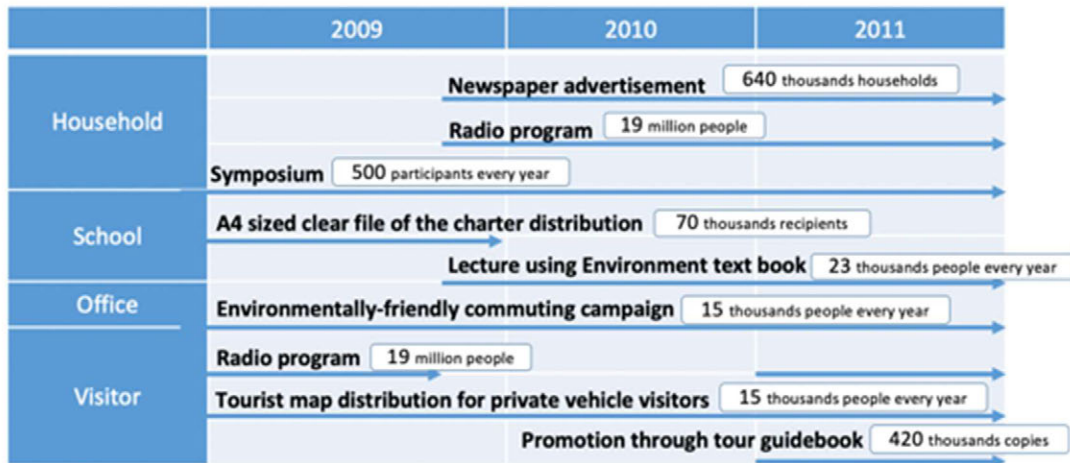


Figure 2 Timeline of communication measure and its input volume

- MM education at schools  
MM policy “How to use a private vehicle in a smart way” was introduced in a textbook for the environment and used in 166 schools. Lectures by a university professor were also given to students.
- Workshops for new bus lines  
Workshops for people living in an area where new bus line had been planned were carried out, distributing a map and a timetable.
- Information to new residents and tourists using private vehicles  
At a parking lot near a tourist area, a public transport map was provided for new residents visiting the city hall to register their residency and for tourists.



Figure 3 Information service to private vehicle tourists

B) Other measures

- A charter for walkable city  
The charter for walkable city was developed by various stakeholders, including some citizens, and widely shared among the residents through school curriculum and media such as newspapers and posters.

- Improvement of public transport services
  - Timetable format for different bus operators was standardized and operation schedules were improved for coordination purposes.
  - One-day passport application for railway and bus passengers in the region was established.
  - The information hub for public transport opened online and its office was set in front of Kyoto Station run by a nonprofit organization. Its operation was supported partly by public transport operator and Kyoto City.
  - App for public transport was developed.
- Introducing new bus lines
  - Area map along the new line was created after collecting ideas from the citizens.
  - Trial free tickets were distributed.
  - One-shot TFPs were conducted for employees of 30 companies located along the line.

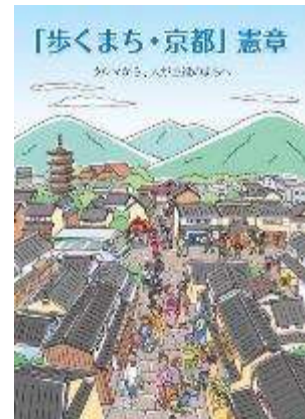


Figure 4 Brochure of the charter

#### (4) Outputs of the MM (as of 2013)

- The frequency of visits in the city center by those in private vehicles were reported to have been reduced by half according to a follow-up survey for One-shot TFP
- 190,000 of the citizens newly reported an intention to reduce the frequency of private vehicle use.
- The modal share of private vehicles declined from 28.4% to 24.3%.
- Surplus of bus operators improved from 600 million JPY (5.450 million USD\*) in 2008 to 2,900 million JPY (26.36 million USD\*) in 2011.

#### (5) Major Inputs

- 20 million JPY (0.182 million USD\*) every year only for MM activities in Kyoto City
- 300,000 JPY (2,700 USD\*) for each workshop done by district-level organization (about 5 workshops performed each year ) in Kyoto City
- 30,000 to 100,000 JPY (300 to 900 USD\*) from each public transport operator and 2 million JPY (18,000 USD\*) from Kyoto City for the operation of the information hub
- 100 million JPY ( 0.910 million USD\*) for app development for Kyoto City

#### (6) Reasons for Success and Lessons Learned

- The participation of different stakeholders was encouraged by the charter shared widely among the citizens.
- Academics and consultants in the city had vital role in gaining knowledge about MM.

#### (7) References

FUJII Satoshi, TANIGUCHI Ayako, and MATSUMURA Nobuhiko, Managing

Mobility. Tokyo: Gakugei Shuppansha, 2015 (in Japanese)

Kyoto City(2012). Slow-life Kyoto Project for “Walkable City, Kyoto” (in Japanese)  
(<https://www.jcomm.or.jp/app/download/12824996490/H24O14.pdf?t=1512384909>)

Kyoto City(2010) Comprehensive Transportation Strategy “Walkable City Kyoto” (in Japanese)  
(<https://www.city.kyoto.lg.jp/tokei/cmsfiles/contents/0000094/94578/sennryaku2.pdf> )

\* Exchange Rate: 1 USD = 110.035 JPY (as of Feb. 2020)

## 2. Public transport promotion as a powerful tool to develop a compact city

Project Name	Promotion of the Use of Railway Line and Bus Services
Location (city, country)	Toyama, Japan
Key Agencies	Toyama City
Project Period	2016 -
Keywords	travel feedback program; door-to-door; radio program; school; tram; master plan; bus map; transport operator; motivational information

### Project Outline

#### (1) Background and Objectives

Toyama City is the capital city of Toyama prefecture, with a population of about 400,000, located in the central main island, facing the Sea of Japan. Toyama City has a spread out city center and the structure of the city had been built to for traveling by car. This structure caused an increase in city management costs and was an inconvenience for residents who did not have a private vehicle. Meanwhile, the population was shrinking and aging rapidly. Therefore, Toyama City had started to change the city into a compact city. To achieve the development of a compact city, Toyama City implemented various projects under three different pillars: Revitalizing public transport, Encouraging residents to relocate to zones along public transport lines, and Revitalizing the city center. Based on the first pillar, Toyama City set a clear strategy to strengthen public transport and integrate urban functions alongside public transport, aiming for less use of private vehicles. The infrastructure policies included a new tram line, station facility development, bus network rearrangement, and so on. To increase the effect of these efforts, mobility management was implemented. It was also set as part of the Master Plan of Toyama City.



Figure 1 "Compact city" strategy of Toyama

#### (2) Institutional Scheme

City of Toyama

Toyamachiho Railroad Co., Ltd.

Research Institute of City Planning and Communication (local consultant)

#### (3) Contents of the MM

##### A) Communication measure

The city carried out a travel feedback program where staff visited each household asking for more use of public transport

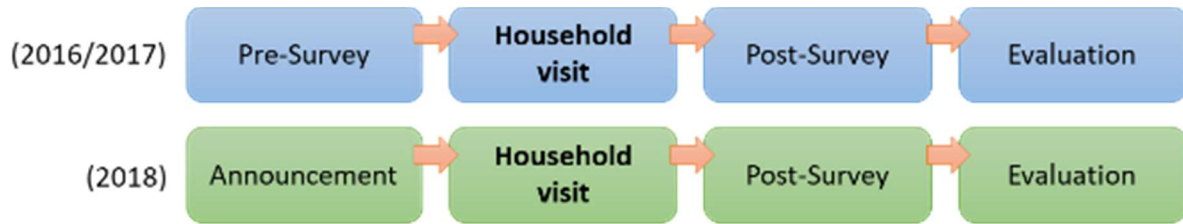


Figure 2 Four step MM procedure

## B) MM education at elementary schools

This project introduces public transport in Toyama and benefits of using public transport to elementary school students, and it improved their awareness of public transport.

## C) Promotion through radio program

A 5-min weekly radio program was broadcast for 4 months encouraging residents to reduce the use of private car and promoting public transport.

## D) Other measures.

- Development of LRT

A full-fledged LRT (Toyama Light Rail) was developed in 2006.

The existing tramway was extended to create the tram loop line in the city center in 2009.

- Reconstruction of an elevated railway station

By constructing an elevated railway station, north-south division by station was eliminated, and the north-side tram (Toyama Light Rail) and the south-side railway (Toyama Chihou Railway) were connected.

- Expansion of IC card usage

The IC card can be used to pay parking fees or to use bus lines operated by another company.

- Introduction of community buses

By operating community buses in locations without existing public transport, the service level of public transport was improved.



Figure 3 Door step interview



Figure 4 MM class at elementary school





Figure 5 Bus map and timetable

(4) Output of MM

The number of IC card users for the bus service at the target area increased at most by 34% depending on the stops, while the number of passengers for the railway service increased by 27% at a station.

(5) Major inputs

Year	Survey Distribution	Response	Household Visit (successfully interviewed)
2016	4,500 households	914 households	205 households
2017	4,996 households	1,479 households	368 households
Year	Target	Household Visit	Household Visit (successfully interviewed)
2018	2,000 households	1,032 households	341 households

Figure 6 Survey input and output

(6) References

Urban Policy Division. Urban Development Department (n.d.) *Sustainable compact city strategy responding to the declining and super-ageing population: Compact city planning through the renovation of public transportation* (<http://www.clair.or.jp/e/2016-4-1Toyama%20City.pdf>)

Toyama City, TOYAMACHIHO RAILROAD CO.,LTD., and Research Institute of City Planning and Communication Co.,Ltd(2019). *Promotion of public transport use by home visit* (in Japanese)

([https://www.dropbox.com/s/9fkfair3drgg1di/14thAWARD\\_Toyama.pdf?dl=0](https://www.dropbox.com/s/9fkfair3drgg1di/14thAWARD_Toyama.pdf?dl=0))

Toyama City(2013). *Comprehensive transportation strategy of Toyama City* (in Japanese)

(<https://www.mlit.go.jp/common/000207562.pdf>)

Toyama City(2014). *Educational promotion support project for Mobility Management in Toyama City* (in Japanese) ([http://mm-education.jp/pdf/toyama\\_25.pdf](http://mm-education.jp/pdf/toyama_25.pdf))

**(1) Current Situation of the public transport**

はじめに、富山県内の路線バスの現状についてお知らせします。

**①過度な自動車依存**

- 富山県の世帯当たりの自動車保有数は約1.7台と、全国で2番目に高く、日頃の移動手段としても自動車が増え、他都市と比べても、過度な自動車依存の状況となっています。

**②路線バスの系統数の減少**

- 自動車ばかりに頼った生活スタイルは公共交通の衰退をもたらします。
- 平成元年からの25年間で、路線バスの利用者は7割減少し、系統数は4割減少しています。身近な公共交通であるバスは、衰退している状況です。

**③自動車は確かに便利。一方で、65歳以上の4割が自動車を利用できない**

- 高齢化や核家族化が進む中、自動車以外の交通手段を確保することは、住み慣れた地域で暮らし続けるための重要な課題となっています。

**④バスは運賃が高いから… 自動車は安上がって本当？**

- 2000ccの自動車の維持費を試算したところ、燃料・保険・税金・駐車場などで、1日あたり約1,300円の維持費がかかります。車庫の購入費を含めると1日約2,000円以上かかります。

**(利用者数 人/日) (系統数)**

The bus ridership is in decline

**(65歳以上)**

People who has no access to cars

**(2) Transport & Environment**

- 環境に優しい行動にはいろいろありますが、その中でも、「自動車利用を控える」という行動が大変効果的です。
- 節電やクールビズ等の何十倍、何百倍ものCO<sub>2</sub>削減効果があるといわれています。

【参考】環境配慮行動における省エネルギー削減効果に関する研究(2006) 文部科学省・環境省、国土交通省・国土院、pp.497-504

照明をこまめに消す  
テレビを40分減らす  
冷蔵庫を整理する  
冷蔵庫を1℃調整する  
日30分自転車をかえり

Environmental benefit made by driving less

**(3) Transport & Health**

- 歩くことは健康づくりに効果的な運動とされていますが、自動車に頼った生活では、歩く機会が減ってしまいます。
- 実際、バスや鉄道、徒歩、自転車で通勤している人は、自動車通勤している人よりも、肥満になる確率が、3割程度も低いことが知られています。

【参考】歩行の運動量が健康状態に与える影響に関する研究(2006) 財団法人の運動文化行動が健康状態に与える影響に関する研究(2006) 財団法人・運動文化、国土交通省・国土院、pp.497-504

肥満者の割合

Obesity rate by mode of transport

Figure 7 Brochure for motivational information

### 3. Metro and bus network for everybody to reach the city center within 30 mins

Project Name	Sendai SMART
Location (city, country)	Japan, City of Sendai
Key Agencies	Sendai City, Transportation Bureau City of Sendai
Project Period	July 2013 –
Keywords	compact city; metro; resident; school; university; bus map; curriculum; workshop; park and ride; motivational information

#### Project Outline

##### (1) Background and Objectives

The City of Sendai is the largest city in the Tohoku region, located in the northeastern area of the main island of Japan, with a population of more than 1 million. In response to the challenges posed by social and economic trends, (such as an aging population, economic stagnation, and environmental concerns); there was a need to develop a compact city where major urban functions are densely located. The city planned to develop and improve public transportation to and within the city center in particular. In 2010, the city developed an urban transport plan, considering a new subway line planned to be open in five years, to move toward this direction. The urban transport plan involved not only infrastructure projects such as restructuring the bus network and terminal developments, but also various soft measures such as bus fee adjustment and IC card introduction to promote public transport. "Sendai SMART" is one of those soft measures that carries out various MM activities.

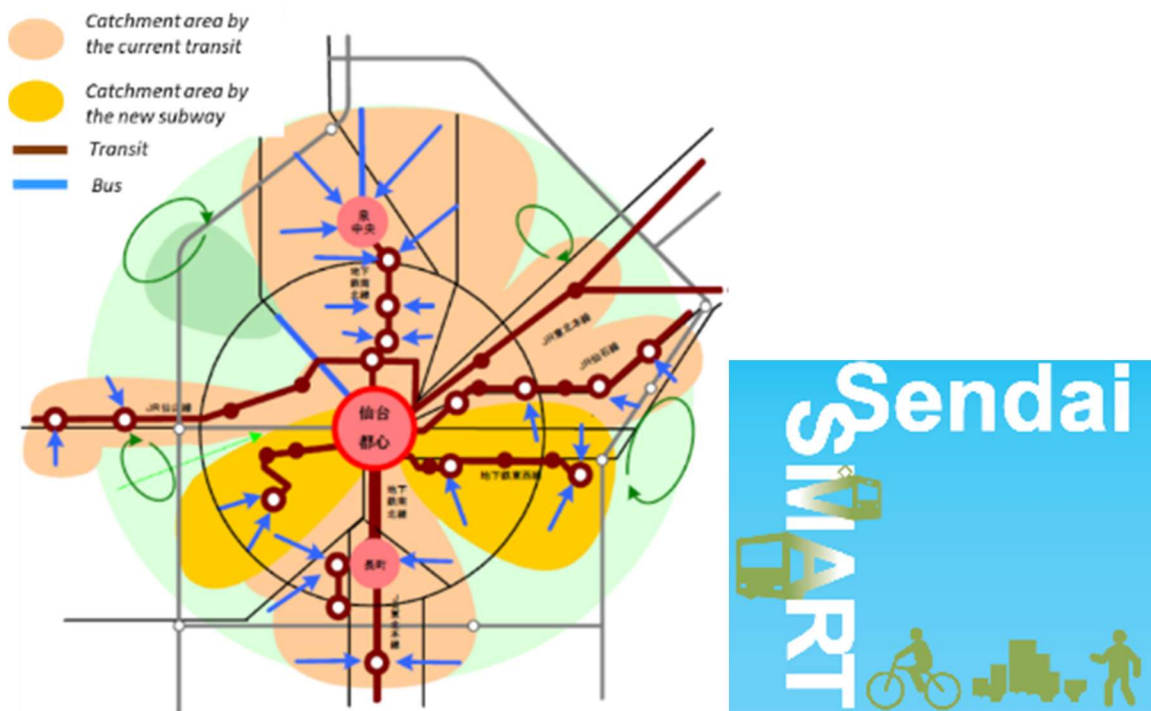


Figure 1 "Compact city" strategy of Sendai (left) and SMART Sendai logo (right)

(2) Institutional Scheme

Sendai City

Transportation Bureau City of Sendai

(3) Contents of the MM

A) Communication measures

For people moving in the city, the city provided brochures about use of public transport such as information on how to ride buses and transits and benefits of using public transport. Curriculums about MM for primary education were also developed, setting a step-by-step achievement plan over a six year period. In response to the city's initiative, eight universities located in the city worked together to create maps around their campuses by collecting inputs from the students. 5,700 copies of the maps were distributed to first-year students.

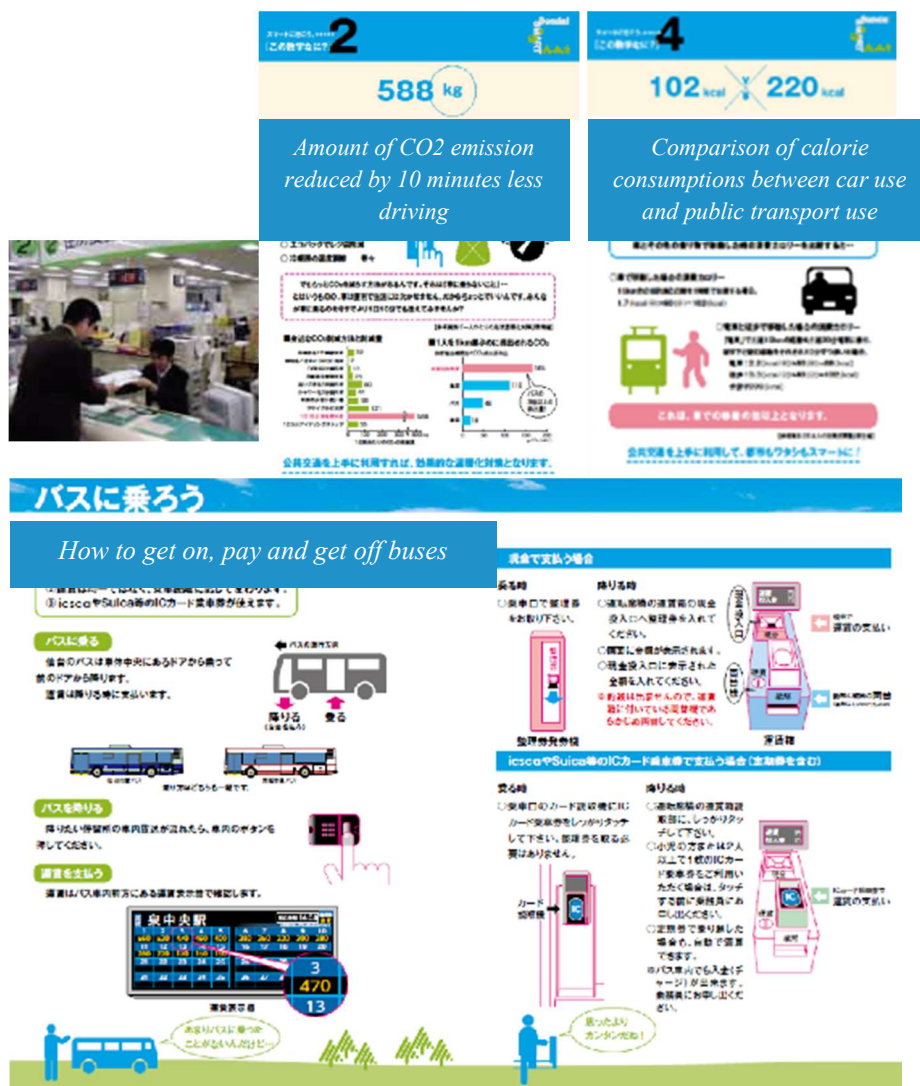


Figure 2 Brochures distributed to the new residence



Figure 3 Education material for use of public transport

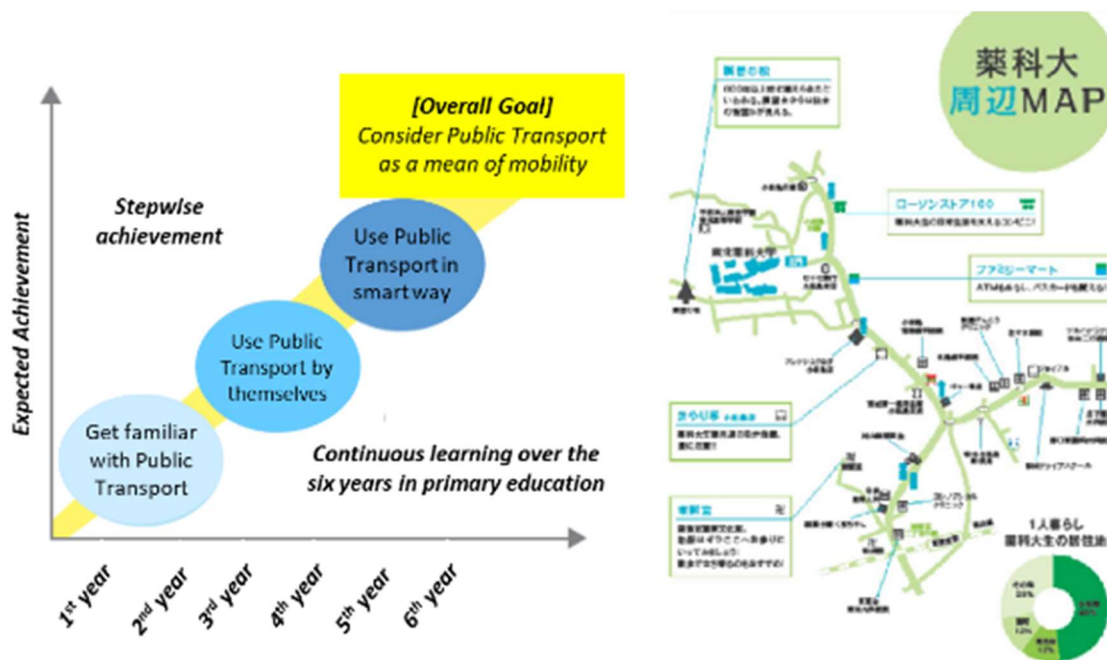


Figure 4 Stepwise achievement plan of MM education (left) and bus map developed by universities.

Workshops were held to discuss scheduled bus services with citizens. It gave them the opportunity to consider how to improve bus operations, and encouraged them to change the transportation mode from private vehicles to public transportation.

B) Other measure

- Park and ride

To avoid traffic congestion in the city center, this measure promotes to park private cars in suburban areas and to use public transport. Malls in suburban areas provide parking space for this measure.

(4) Output of MM

Surveys suggest that the students who saw the map were more likely to consider accessibility to public transport when choosing a place to live and to use public transport than those who did not see the map. Additionally, another survey showed that 94% of respondents think the items provided to new residents of the city to promote use of public transport are useful for living.

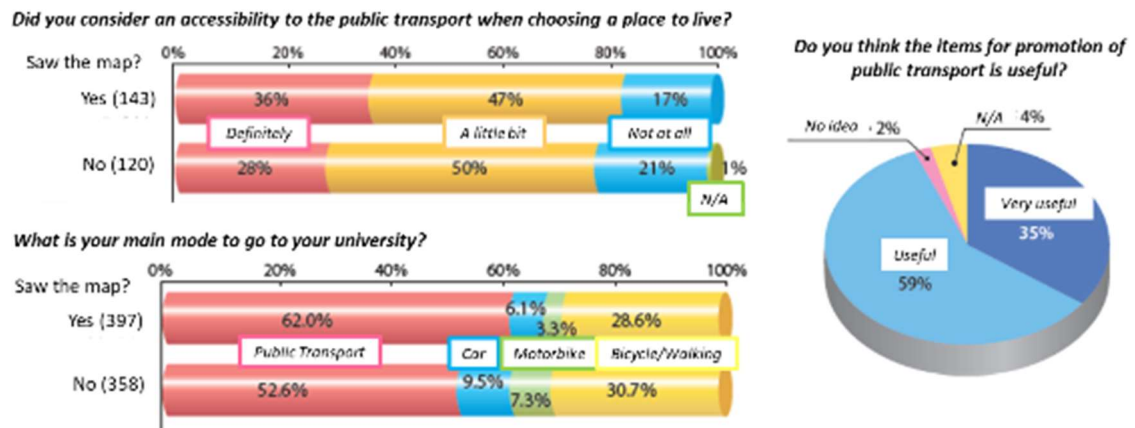


Figure 5 Survey results

(5) References

Sendai City(2010). *Sendai Urban Transportation Plan* (in Japanese) (<http://www.city.sendai.jp/kotsu-kekaku/kurashi/machi/kotsu/kekakunado/documents/plna-all1.pdf>)

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Urban-scale activities by big cities

#### 4. Travel behavior change plan defined in a long-term transport strategy

**Project Name** Travel Behaviour Change Plan 2017-2022  
**Location (city, country)** Gold Coast, Australia  
**Key Agencies** City of Gold Coast  
**Project Period** 2017 –  
**Keywords** walking; cycling; awareness; attitude; trip demand growth; workplace; school; resident; event; transport authority; area map

### Project Outline

#### (1) Background and Objectives

Gold Coast is Australia’s sixth largest city with a population of more than 555,000, and it attracts approximately 12 million visitors annually. Despite the fact that the population is projected to grow by 800,000 and the number of daily travel trips is expected to exceed 4 million, nearly 90% of trips by residents and around 50% of trips by visitors are made by private car. This situation was addressed by the Transport Strategy 2031, a transport initiative launched in 2013 by the City of Gold Coast. In the strategy, various implementation plans were developed to reduce car dependency and to increase levels of walking, cycling, carpooling, and public transport use, aiming for a significant change in the modal share by 2031. One of the focus areas for the strategy was changing people’s travel behavior to create awareness and changes in attitude through the delivery of four targeted program areas, namely: community; workplaces; schools and tertiary education centers; and events.

Motor Vehicle	Public Transport	Cycling	Walking
Baseline 2011 <b>87.9%</b>	Baseline 2011 <b>3.1%</b>	Baseline 2011 <b>1.9%</b>	Baseline 2011 <b>7.1%</b>
Checkpoint 2021 <b>81%</b>	Checkpoint 2021 <b>7.5%</b>	Checkpoint 2021 <b>4%</b>	Checkpoint 2021 <b>7.5%</b>
Target 2031 <b>74%</b>	Target 2031 <b>12%</b>	Target 2031 <b>6%</b>	Target 2031 <b>8%</b>

Figure 1 Modal share goal by 2031

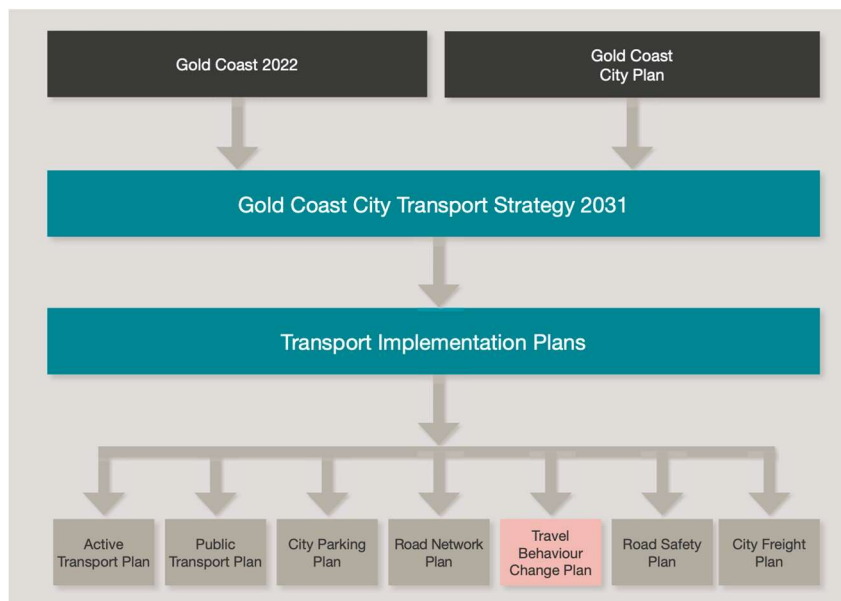


Figure 2 Policy structure leading to the travel behavior change plan

(2) Institutional Scheme

City of Gold Coast, Queensland Department of Transport and Main Roads (TMR), TransLink (transport authority)

(3) Contents of the MM

Various programs were developed, taking into account the stage of change, such as developing travel plan for schools and workplaces, supporting active travel events, and providing relevant travel behavior change information.

Stage of change	Individual's perception	Proposed actions
<b>Pre-contemplation</b>	People in this stage are not thinking seriously about changing and tend to defend their current travel behaviour patterns.	Raise awareness of alternative travel modes that would equally or better meet the needs for a particular journey.
<b>Contemplation</b>	People in this stage are able to consider the possibility of changing travel behaviour but feel ambivalent about taking the next step.	
<b>Preparing</b>	People have usually made a recent attempt to change travel behaviour in the last year. They have identified the benefits of continuing and are less ambivalent about taking the next step.	Provide the skills, tools and motivation to try to use sustainable travel.
<b>Action</b>	People are actively involved in taking steps to change their travel behaviour and are taking greater steps towards significant change.	Provide the opportunity to easily and safely try a different mode of travel, even for just one journey.
<b>Maintaining</b>	People are able to successfully change and maintain travel behaviour.	Provide encouragement and positive reinforcement of their use of sustainable travel.

Figure 3 Stage of behavior change and its actions

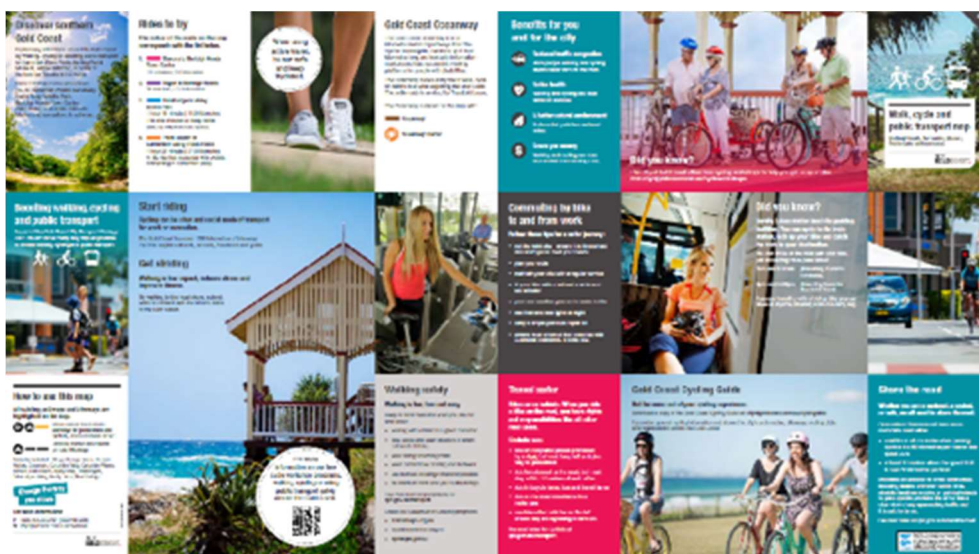


Figure 4 Map for active transport in individual communities



(4) References

- City of Gold Coast (2013). *Gold Coast City Transport Strategy 2031*  
<https://www.goldcoast.qld.gov.au/documents/bf/GC-transport-strategy-2031.pdf>
- City of Gold Coast(2017).*Travel Behaviour Change Plan 2017-2022*  
<https://www.goldcoast.qld.gov.au/documents/ps/travel-behaviour-change-plan.pdf>
- City of Gold Coast (2018). *Walk, cycle, and public transport map*  
<https://www.goldcoast.qld.gov.au/sustainable-travel-maps-and-guides-49266.html>)

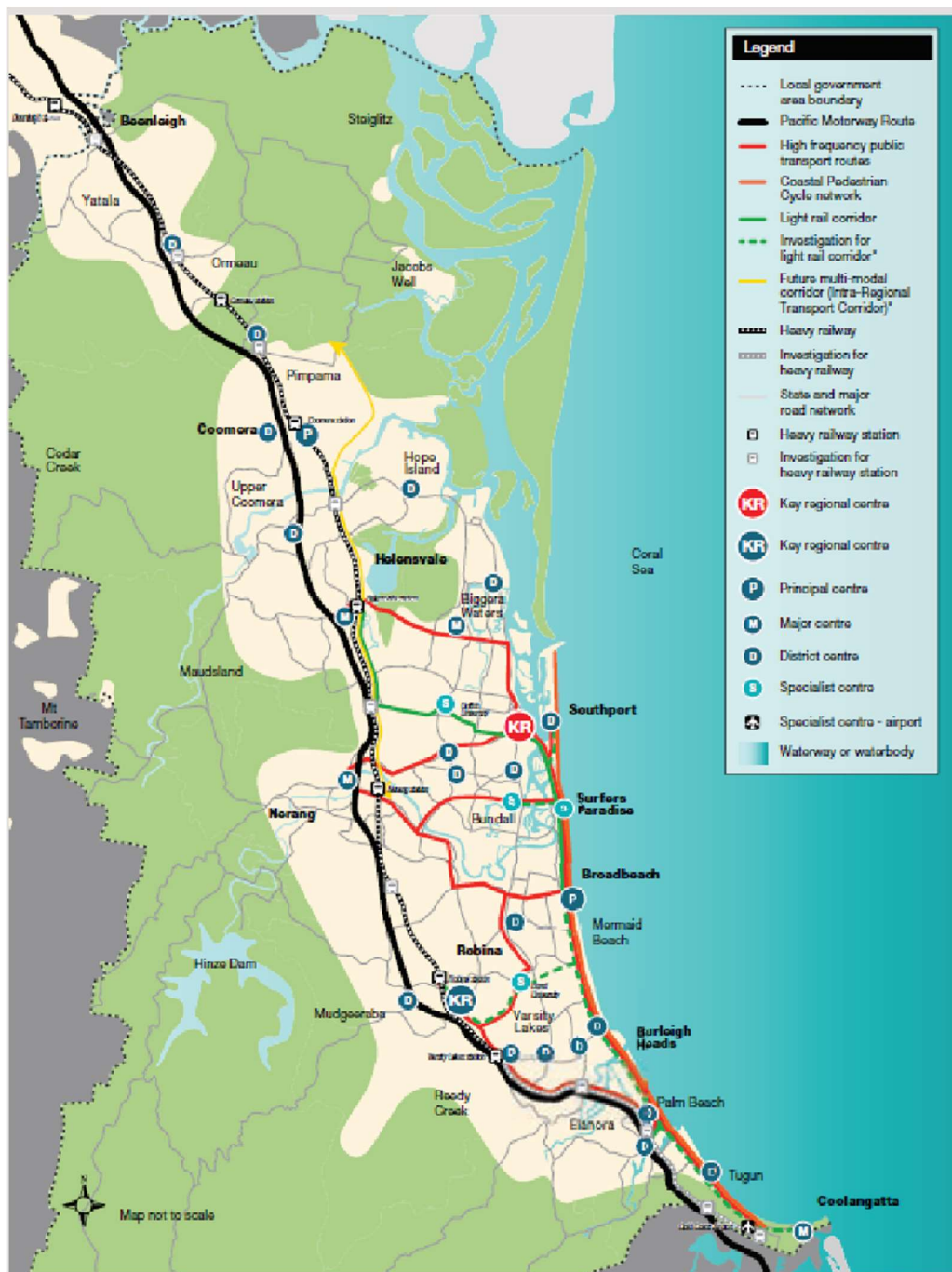


Figure 5 Sustainable travel map for the region

Urban-scale activities by big cities

### 5. Marketing-based approach to promote safe and respectful travel behavior

Project Name	ACTIVE TRANSPORTATION Promotion and Enabling Plan (ATPEP)
Location (city, country)	Canada, Vancouver
Key Agencies	City of Vancouver
Project Period	2013 –
Keywords	modal share; marketing; walking; cycling; safety; planning; stakeholder; cycling map; education; training; school; event

## Project Outline

### (1) Background and Objectives

In accordance with the “Greenest City” vision, the city developed the transportation planning strategy “Transportation 2040”, which set an ambitious goal for the modal share of walking, cycling, and public transport. Whereas TransLink, a statutory authority of the city, is responsible for the regional transportation network and has their own transportation strategy, the city itself developed a marketing campaign oriented action plan to promote walking and cycling, exploring a soft or non-infrastructure based approach. This approach is in line with the policies set in “Transportation 2040”, where Education, Encouragement, and Enforcement have been addressed to promote safe and respectful behavior. A Working Group for the program set a conceptual framework and a planning process to discuss and develop strategies that could change people’s behavior.

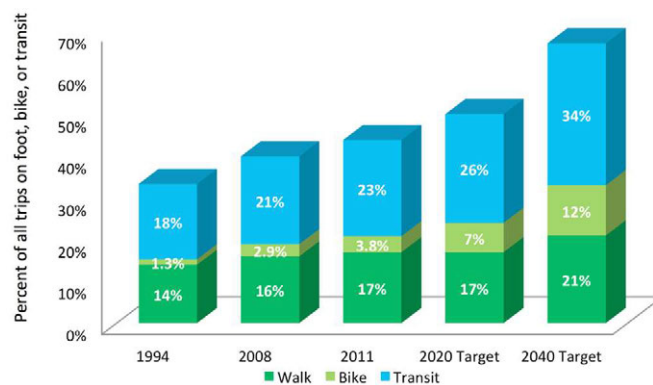


Figure 1 Modal share goal in Transportation 2040



Figure 2 Conceptual framework (left) and Working Group (right)

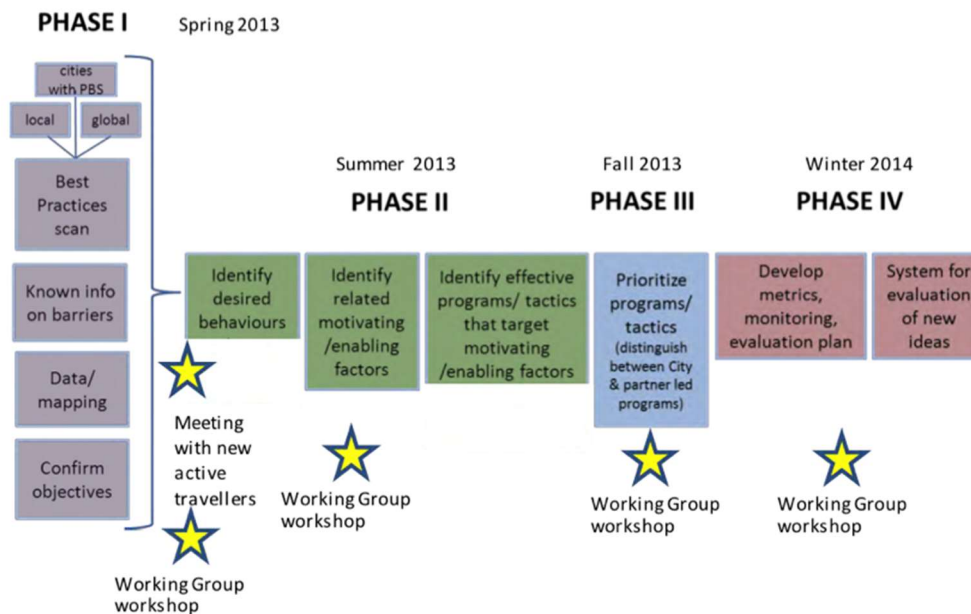


Figure 3 Planning process

## (2) Institutional Scheme

The Working Group included a mix of City of Vancouver staff from various departments, Parks Board, Vancouver Police Department, TransLink, Insurance Corporation of British Columbia, immigrant services groups, Vancouver Coastal Health, The University of British Columbia, Langara College, transportation-related NGOs, and community groups.

## (3) Contents of the MM

### ➤ Communication measures

- Produce and regularly update a citywide cycling map;
- Expand and maintain a pedestrian wayfinding system;
- Educate all road users on the proper use of crosswalks (marked and unmarked), sidewalks, lane crossings, driveways, signals, traffic calming circles, and other infrastructure;
- Develop and implement a long-term strategy to support cycling education and skills development; and
- Advocate for making cycling skills training a core part of the school curriculum or widely available to youth through other means.

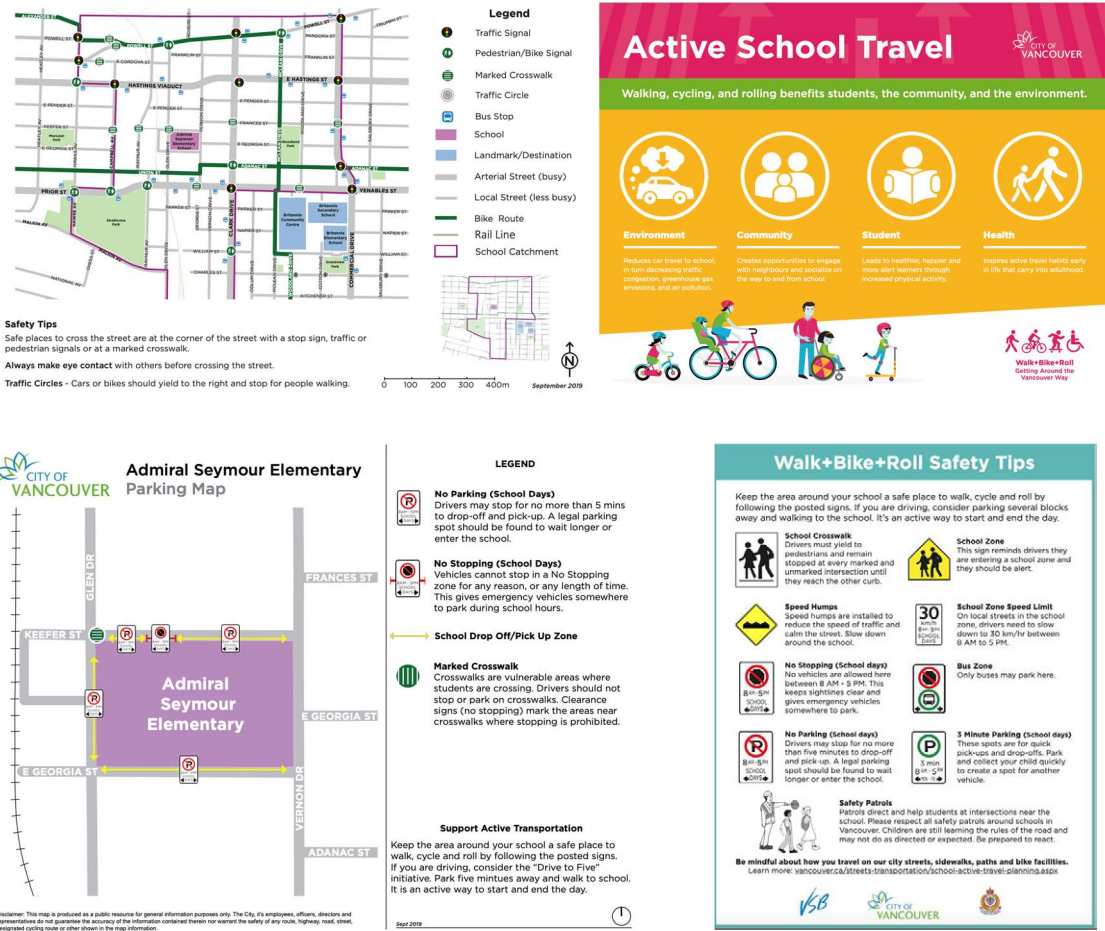


Figure 4 Active School Travel kit



Figure 5 Community involvement for policy development

(4) Output of MM

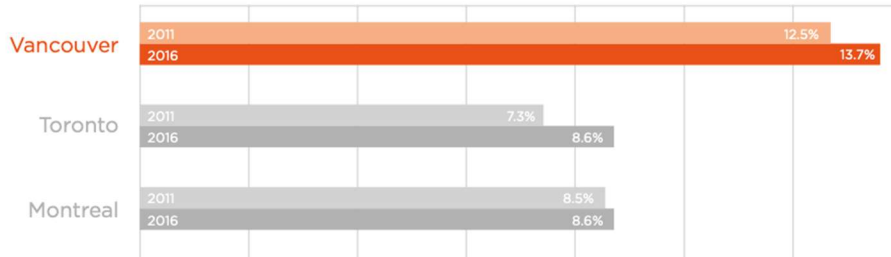


Figure 6 Modal share for walk, bike, transit improvement between 2006 to 2016

**TRAFFIC RELATED FATALITIES 1996-2017**  
Per 100,000 (Vancouver Residents)

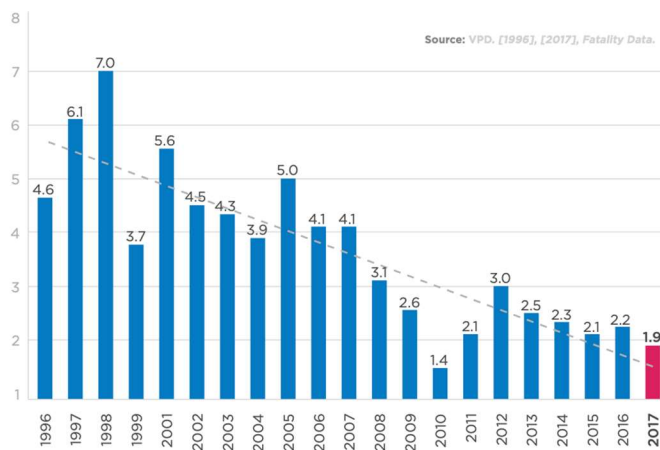


Figure 7 Traffic safety improvement between 1996 and 2017

**CYCLING TO WORK**

Source: Statistics Canada, [2011], [2016], Census.

2011 → 2016



**INTEREST IN CYCLING MORE**

2014 → 2017

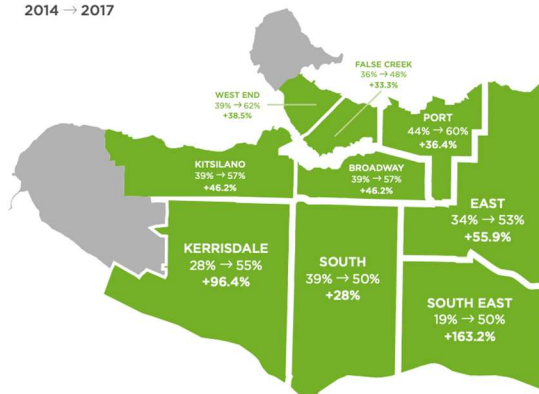


Figure 8 Modal share improvement for cycling to work (left) and increase in interest to cycle more often(right)

(5) Major inputs

150,000 CAD a year (109,000 USD as of March 2020)

## (6) References

- City of Vancouver (2015). *GREENEST CITY 2020 ACTION PLAN*  
(<https://vancouver.ca/files/cov/greenest-city-2020-action-plan-2015-2020.pdf>)
- City of Vancouver (2012). *Transportation 2040*  
([https://vancouver.ca/files/cov/Transportation\\_2040\\_Plan\\_as\\_adopted\\_by\\_Council.pdf](https://vancouver.ca/files/cov/Transportation_2040_Plan_as_adopted_by_Council.pdf))
- City of Vancouver (n.d.). *Active Transportation Promotion & Enabling Plan*  
(<https://vancouver.ca/files/cov/active-transportation-promotion-and-enabling-full-plan.pdf>)
- City of Vancouver (2017). *Walking + Cycling in Vancouver 2017 Report Card*  
(<https://vancouver.ca/files/cov/walking-cycling-in-vancouver-2017-report-card.pdf>)
- City of Vancouver (2019). *Active School Travel*  
(<https://vancouver.ca/files/cov/admiral-seymour-elementary-map%20resource.pdf>)

Unique approach to change travel behavior

**6. Innovative way to promote sustainable mobility for expected growth of population**

Project Name	Your Move
Location (city, country)	City of Cockburn, in Western Australia
Key Agencies	Department of Transport / Department of Sport and Recreation
Project Period	July 2013 –
Key Words	door-to-door; transportation demand management; sports and recreation; transport authority; methodology; campaign item; walking; cycling; resident

**Project Outline**

(1) Background and Objectives

The Perth and Peel regions are situated in the south of the state of Western Australia with a population of 2 million. Despite its geographically stretched territory from north to south, the area shares a city vision for the future in a planning document, “Perth and Peel@3.5 million”, which shows that the population in the area is estimated to increase by 3.5 million in 2050. Regarding transport planning, various transport policies have been recommended to cope with this increase, such as railway and bus development. As part of this project, Transportation Demand Management (TDM) had been developed to encourage more sustainable transport use such as walking, cycling, and public transport. One of the TDM policies was MM named “Travel behavior change programs.” The area had been well-known for a long time as a city where MM activities were actively carried out. The Travel Smart Program launched in 1997 was the first attempt on MM, involving 640,000 people for various TFP<sup>1</sup>. In 2013 and 2014, a single large-scale community based MM program called “Your Move” was conducted in the City of Cockburn with a population of 110,000, which was so successful that other cities in the region also implemented the same program later on.

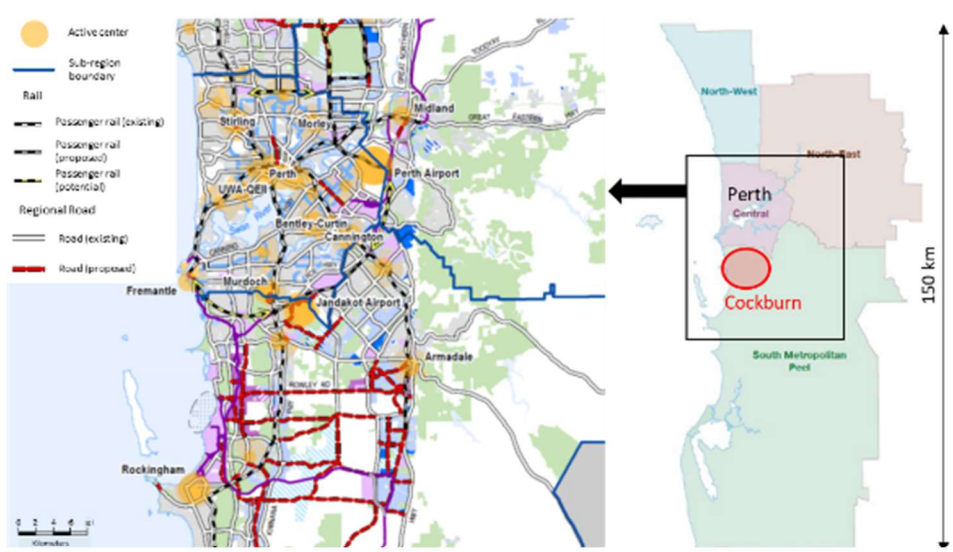


Figure 1 Geography and transport network

(2) Institutional Scheme

The program can be characterized by an institutional scheme where two state-level departments, Department of Transport (DoT) and Department of Sports and Recreation (DSR), were involved in addition to the City of Cockburn. This was because the aim of the program was to decrease trips made by car as well as to increase physical activity levels, which can be achieved not only through active transport and public transport use, but also by sports and exercise participation. Also, the program was funded partially by the Public Transport Authority (HBF) and the Roadside Assistance and Insurance company (RAC).

(3) Contents of the MM

A) Communication measures

The program established a three-step methodology to approach people who were interested in changing their travel behavior: (1) Brochures were first distributed to people in the city to inform them about the program; (2) Phone calls were made to ask residents whether they were interested in the program; and (3) Home visits were carried out for those interested in giving more detailed information. Campaign items were delivered, including information that helped people figure out what was the best way to use more active modes including public transport.

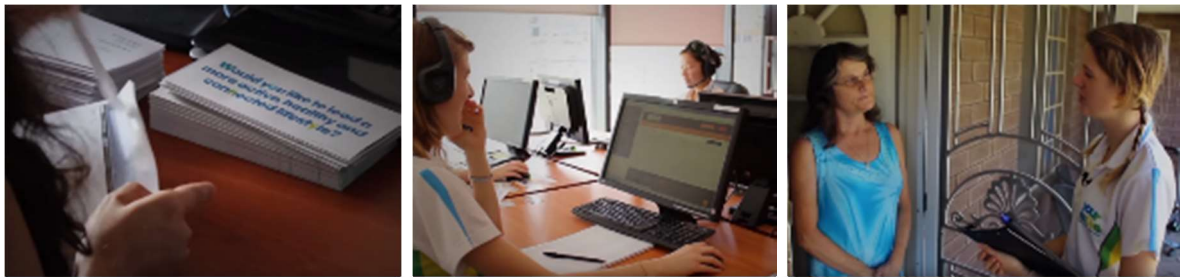


Figure 2 Three step methodology



Figure 3 Campaign brochure, items, and maps for the program on changing behavior



B) Other measures

Other measures were also put in place with regards to infrastructure that promoted travel by active mode and public transport. The following were placed/installed throughout the city: 526 wayfinding signs, 32 bike racks and repair stations, and 54 bus information modules.



Figure 4 Infrastructure measurements

(4) Output of MM

The total number of participants of the program reached over 10,000 people, consisting of various age groups. As a result of 96% of the participants agreeing to receive phone calls and 60% remaining engaged even after the program ended, the behavior change result was significant in reducing the number of car trips per participant by 5%. Furthermore, despite the minor infrastructure improvement, the satisfaction level of transport facilities had improved.

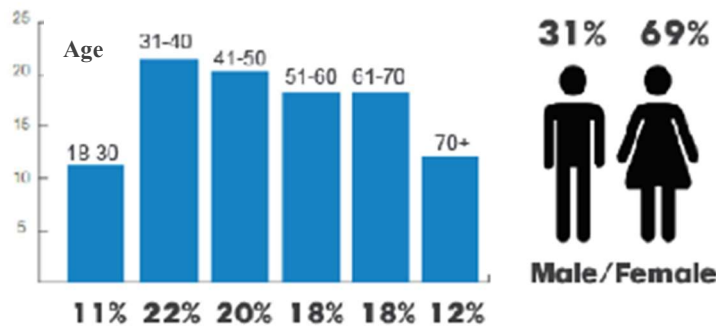


Figure 5 Statistics of program participants

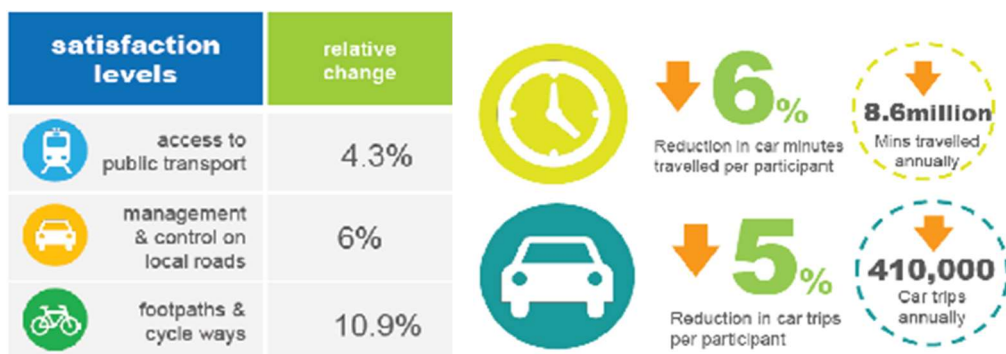


Figure 6 Outcomes of the program

## (5) Major inputs

4 million AUD ( 2.65 million USD as of March 2020)

## (6) References

Department of Planning, Lands and Heritage. Government of Western Australia (2018). *Perth and Peel @ 3.5 million*. ([https://www.dplh.wa.gov.au/getmedia/404a6895-f6ec-4829-87df-8de5b80075b8/FUT-PP-Perth\\_and\\_Peel\\_Sub\\_Region\\_March2018\\_v2](https://www.dplh.wa.gov.au/getmedia/404a6895-f6ec-4829-87df-8de5b80075b8/FUT-PP-Perth_and_Peel_Sub_Region_March2018_v2))

Western Australian Planning Commission. Government of Western Australia (2018). *The transport network*. ([https://www.transport.wa.gov.au/mediaFiles/projects/PROJ\\_P\\_Perth\\_Peel\\_3.5million\\_TransportNetwork.pdf](https://www.transport.wa.gov.au/mediaFiles/projects/PROJ_P_Perth_Peel_3.5million_TransportNetwork.pdf))

Department of Transport. Government of Western Australia (2014) *Discover more ways to get around your city*. (<https://yourmove.org.au/>)



Figure 7 Your Move website

Unique approach to change travel behavior

**7. Accreditation system for students to go to school sustainably, actively, responsibly and safely**

Project Name	STARS – Sustainable Travel: Active, Responsible, Safe
Location (city, country)	London, England
Key Agencies	Transport for London, Mayor of London
Project Period	2007 –
Keywords	school; accreditation system; transport operator; tool; walking; cycling; trip demand growth

**Project Outline**

(1) Background and Objectives

One of the most competitive and busiest city in the world, London is projected to grow further to 10.8 million by 2041, posing challenges in handling about 6 million additional trips each day by then. Given the social and environmental benefits of reducing car dependency in favor of increased walking, cycling and public transport use, the city has taken an approach named “HEALTHY STREETS”, consisting of ten indicators that focus on the quality of the experience of using London’s streets no matter what mode of transport people use. One of the indicators is “People choose to walk, cycle, and use public transport” as public transport use also relies on good street access to stations. In line with this approach, Transport for London (TfL) developed an innovative scheme to inspire young people to travel to schools and nurseries sustainably, actively, responsibly and safely. The program, STARS, is TfL's accreditation scheme where three level of accreditation - bronze, silver and gold - are given to schools depending on each school's achievement.

(2) Institutional Scheme



Figure 1 Ten indicators of "HEALTHY STREETS"

Transport for London, schools and nurseries, and London’s 32 boroughs














(3) Contents of the MM


The STARS activities considered for TfL's accreditation include various programs targeting walking, cycling, public transport. What TfL does is provide a platform with tools and information that help schools and nurseries get started on activities while getting a support from the local boroughs.


STARS provides tools by school activity, which encourages students to ride the London Underground for collecting information, which gets them more familiar with the public transport. The program also provides templates for travel planning where schools identify issues and find solutions for setting an action plan to achieve a goal on their own.





Figure 2 Three level of accreditation


	Bronze 	Silver 	Gold 
<b>Timeframe</b>	Current academic year	Current plus 1 previous academic year	Current plus 2 previous academic years
<b>Hands up survey</b>	Pupil survey, staff recommended	Pupil and staff survey	Pupil and staff survey
<b>Working group</b>	Staff, pupils recommended	Pupils and staff	Pupils and staff
<b>Targets</b>	2 targets set	2 targets set	2 targets set
<b>Consultation</b>	Recommended	5 	8 
<b>Travel activities</b>	10	20	25
<b>Supporting activities</b>	6 of which 2  , 3  , 1  or 	10 of which 4  , 4  , 2  or 	15 of any category
<b>Evidence uploaded</b>	Recommended	Yes	Yes
<b>Modal Shift</b>	n/a	Modal shift from car demonstrated	Modal shift from car of >/6 or 90% travel by non-car modes


  
Walking


  
Scooting


  
Cycling


  
Public Transport


  
Smarter Driving


  
Independent Travel

  
Road Safety

  
Consultation

  
Promotion

  
Curriculum

  
Funding


  
Partnership

Figure 3 Accreditation condition for each level

# My Local Station

Name:

Put a tick next to the line/lines that go through your station

<input type="checkbox"/> Bakerloo line	<input type="checkbox"/> Hammersmith & City line	<input type="checkbox"/> Piccadilly line
<input type="checkbox"/> Circle line	<input type="checkbox"/> Jubilee line	<input type="checkbox"/> Victoria line
<input type="checkbox"/> Central line	<input type="checkbox"/> Northern line	<input type="checkbox"/> Waterloo & City line
<input type="checkbox"/> District line	<input type="checkbox"/> Metropolitan line	

Circle the number of platforms at the station  
**1 2 3 4 5 6 7 8 9 10**

Circle the number of entrances/exits at the station  
**1 2 3 4 5 6 7 8 9 10**

What do you use the station for?

Nearby places of interest (e.g. an art gallery or local hospital):

What do you like best about your local station?

## Sketch a Labyrinth

Find and sketch the Labyrinth at your local station

Labyrinth Number: \_\_\_\_/270

## Quiz a staff member

Ask a member of station staff the following questions:

When is the station busiest?  
 .....

Who uses your local station – commuters or tourists?  
 .....

What is their favourite feature or part of the station?  
 .....

## Sketch some of the interesting art or design features

Can you find any beautiful tiles or interesting signs at your local station?

Figure 4 Tool for school students to be familiar with local public transport

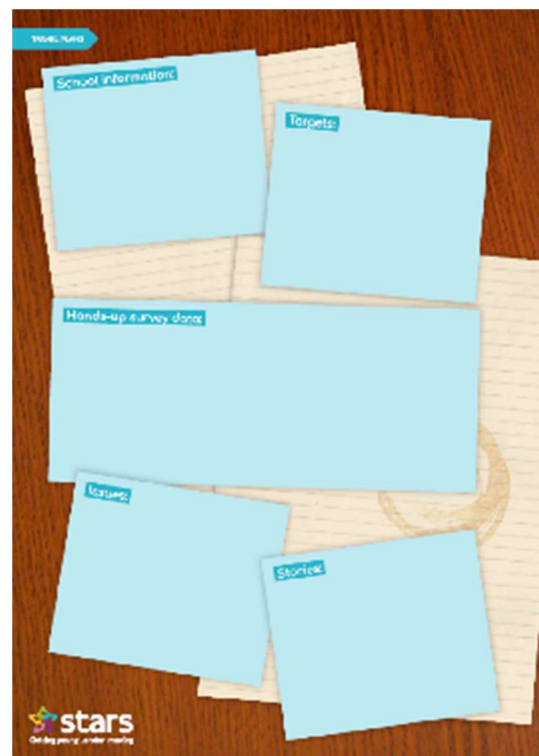


Figure 5 Planning tool for school to take actions

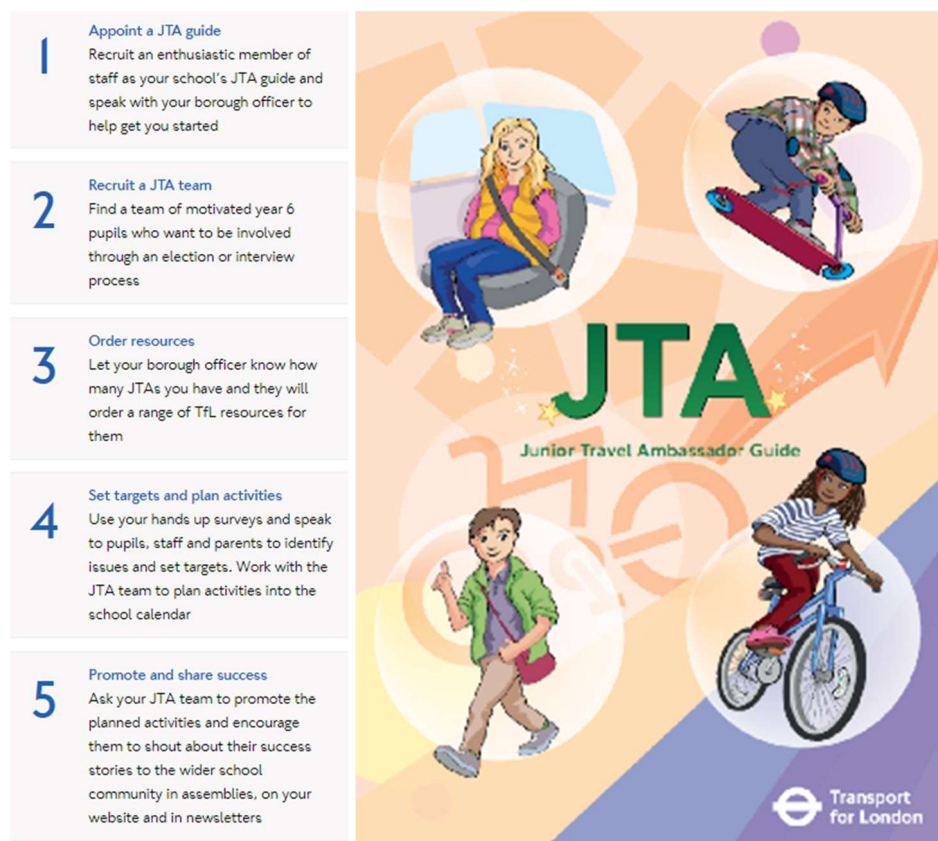


Figure 6 Junior Travel Ambassador Guide

#### (4) Output of MM

Since the accreditation scheme started in 2007, STARS schools' pupils, parents and staff have replaced over 22 million kilometers of car journeys with active travel. As a STARS school, one can expect to see an average 6% reduction in the number of trips made by car to school.

#### (5) References

- Mayor of London (2018). *Mayor's Transport Strategy* (<https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf>)
- Mayor of London and Transport for London (2017). *Healthy Streets for London* (<http://content.tfl.gov.uk/healthy-streets-for-london.pdf>)
- Transport for London (n.d.). *Learning Resources* (<https://tfl.gov.uk/info-for/schools-and-young-people/safety-and-citizenship/lesson-plans>)
- Mayor of London and Transport for London (n.d.). *Tools for Schools* (<https://s3-eu-west-1.amazonaws.com/media.stars.tfl.gov.uk/stars/aeb1f3be-6bd0-4b7d-9dbd-420c8211cf65/ToolsforSchools.pdf>)
- STARS (n.d.). *Templates for travel plan* (<https://stars.tfl.gov.uk/explore/idea/details/56>)
- Transport for London (n.d.). *Junior Travel Ambassador Guide* (<https://s3-eu-west-1.amazonaws.com/media.stars.tfl.gov.uk/stars/19aa1c84-4110-4944-828f-ed9145df1147/JTA%20guide.pdf>)

## 8. Post-disaster transportation management by effective information provision

Project Name	Traffic Management After Landslide Disaster
Location (city, country)	Kure City, Hiroshima, Japan
Key Agencies	Post-Disaster Transportation Management Committee in Hiroshima, Kure, and Higashi-Hiroshima
Project Period	2018
Keywords	disaster management; congestion; BRT; workplace; commuting bus; detour; web-site; SNS;

### Project Outline

#### (1) Background and Objectives

Kure City has approximately 200,000 residents and is located 50 minutes (by car) from Hiroshima City, the capital of the prefecture. About 6,000 of the residents commute daily to Hiroshima City. A heavy rainfall disaster occurred on July 6, 2018 that destroyed the railway and highway connecting the two cities. This infrastructure was closed for a few months. However, the travel demand between these cities were kept at a certain level, and heavy traffic congestion occurred on the national road, the only connection between these cities at that time. This severely impacted local life and business activities. Under these circumstances, there was a need to reduce the traffic volume, so as not to impede emergency vehicle access or the recovery effort.



Figure 1 Affected area

#### (2) Institutional Scheme

There was no time to prepare some of the measures because of the sudden disaster. The Chugoku Regional Development Bureau, Hiroshima Prefecture, Hiroshima City, Kure City, NEXCO West, police, and university professors immediately cooperated to overcome the situation.

#### (3) Contents of the MM

- Disaster period BRT

On July 17, disaster BRT started its operation going through the closed section of the highway. Then from July 26, the BRT used the empty lane due to the emergency condition. From August 8, a lane only for BRT vehicles during commuting hours was implemented along the national road. These measures made the travel time of the BRT short and stable, and the number of BRT users had increased.



Figure 2 BRT lane (left side lane)

- Workplace MM

Right after the disaster, the government encouraged its residents to share their vehicles with colleagues when they commute. And on August 2, after their applications were approved by the government, private companies started operating commuting buses between Hiroshima City and Kure City using the BRT lane.

- Promotion to use detour

On July 17, the highway toll was cut in half for drivers using the detour of the national road. It was then discovered that there was no time difference between using the national road and the highway, and motorists/drivers were encouraged not to use the national road.

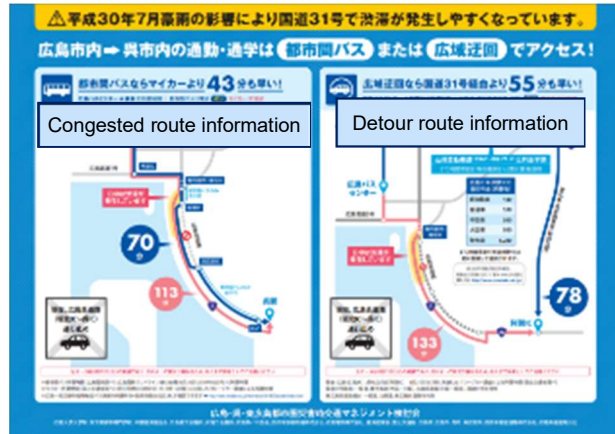


Figure 3 Poster promoting the use of detour

- Providing information

Because of the disaster, public transport was not operated on their scheduled timetable and route. This therefore made it difficult for the residents to know exact operation information, so some of them shifted to driving private vehicles. Then, the government started to share the operation information via its website and SNS, and even promoted the use of BRT.

(4) Output of MM

The drive from Kure City to Hiroshima City took almost 3 hours by driving, and having the BRT shortened the travel time. After some improvement of the BRT, the travel time became stable and was cut to less than half of the initial travel time. Additionally, after sharing BRT operation information, the number of BRT users doubled.

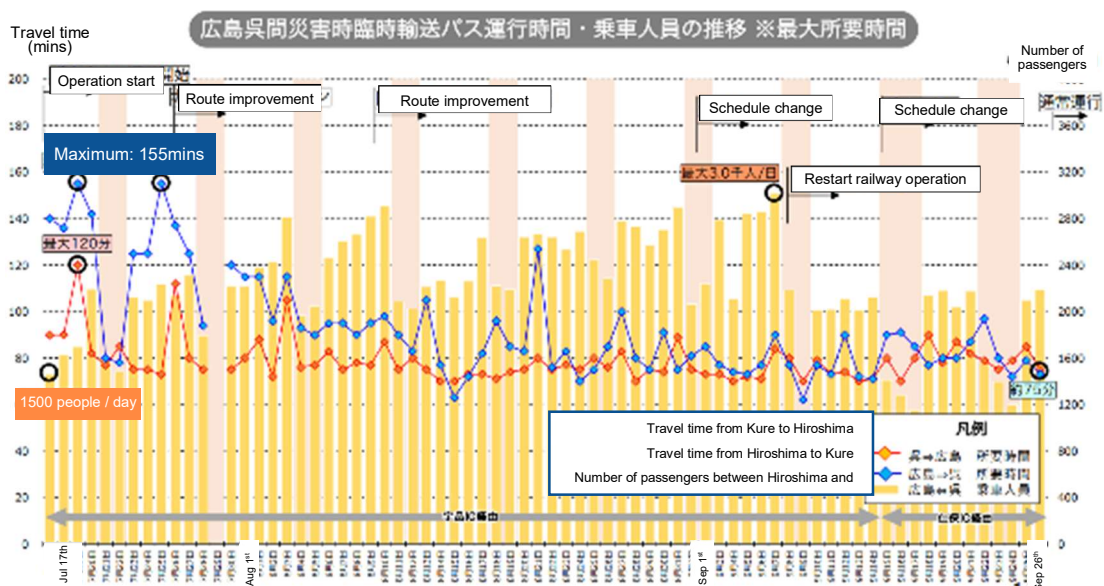


Figure 4 Changes in travel time and number of passengers



## (5) References

- Yusuke Kanda(2019). *Public Transport service resilient for large-scale disaster* (in Japanese)  
(<https://www.tb.mlit.go.jp/chugoku/content/000093821.pdf>)
- Yusuke Kanda(2018). *The trend and the future for Mobility Management* (in Japanese)  
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([http://okayama.kensokkyo.or.jp/doc/event\\_r011001/event\\_r011001\\_fujiwara.pdf](http://okayama.kensokkyo.or.jp/doc/event_r011001/event_r011001_fujiwara.pdf))
- Hiroshima Prefecture(2018). *New vision for Hiroshima prefecture by creative reconstruction* (in Japanese)  
(<https://www.chusho.meti.go.jp/koukai/shingikai/syoukibokihon/2018/download/181130syokibokihon03.pdf>)

## 9. More people should take the bus for a new city to be sustainable

Project Name	The Project for Enhancing Management Capacity of Transport System Focused on Public Transport in Binh Duong Province
Location (city, country)	Bình Dương, Vietnam
Key Agencies	Department of Transport of Binh Dương Province and JICA
Project Period	March 2015 – July 2018
Keywords	bus; master plan; modal share; metro; capacity development; bus map; travel plan; workplace; university; resident; park & ride

### Project Outline

#### (1) Background and Objectives

Bình Dương is a province adjacent to the northern part of Ho Chi Minh City and has a population of 1.7 million. Due to the proximity of the southern part of the province to Ho Chi Minh City, the capital city of Thủ Dầu Một became a commuting area to Ho Chi Minh City. The population of the province is projected to increase to 2.5 million by 2020. Meanwhile, the government of the province is aiming to be promoted to become the sixth municipality of the country, and has been working on the establishment of a new provincial capital city in an area 10 km away from the current capital, Thủ Dầu Một. In 2014, the city hall was moved to the new area and a bus service between there and Thủ Dầu Một began operations, developing the city supported by public transport which was in line with the 2014 transport master plan. However, the modal share in the area has been dominated by private modes, such as vehicles and motorcycles, causing traffic congestion and accidents and holding the modal share for public transport down to merely 1%. Furthermore, there is a pressing need to promote public transport in order to gain higher ridership for Ho Chi Minh City Metro planned to reach the area. Therefore, a project to enhance the management capacity of transport systems, focusing on public transport, was called for by the government to JICA; in which mobility management was one of the main areas that the government should be capacitated.



Figure 1 Location of Binh Dương and future image

#### (2) Institutional Scheme

The People's Committee of Bình Dương Province assigned the Department of Transport as the main counterpart and other institutions as supporting organizations, including the Department of Finance, Department of Construction, Department of

Planning Investment, Management and Operation Center of Public Transport (MOCPT), and Becamex IDC (a state-owned company). These counterparts are supported by the Japan, side consisting of JICA and its experts. For the technical knowledge of Japan to be successfully transferred to the Vietnam side, Becamex Tokyu Bus funded by Tokyu Railways and Becamex IDC were involved to support pilot projects.

Table 1 Organization involved in the project

	Vietnam side	Japan side
Agreement	DOT (assigned by the people's committee of Binh Duong Province)	JICA
Joint Coordinating Committee	DOT DOF DOC DPI Becamex IDC	JICA Headquarters (if necessary)  JICA Vietnam Office JICA experts
Working Group	Counterpart team (30 people)	JICA expert team (11 people)

\*The table is based on the figure of the project scheme found in the project report

(3) Contents of MM

A) Communication measures

- Travel plans and bus maps were developed and provided in MM events.
- MM workshops, seminars, and events for government employees, university students, residents along bus routes, and schools were held.
- Bus signboards, banners, and a campaign bus were developed.
- An Activity Plan was created.



Figure 2 MM activity for school



Figure 3 MM workshop for employees



Figure 4 MM tools

B) Other measures

- Planning for bus service improvement

Bus route analysis and park and ride (P&R) feasibility analysis based on demand prediction were carried out, including traffic counts and a traffic behavior survey

- Improvement of bus stop facilities
- On-time bus operation of pilot project bus line
- IC card for pilot project bus line  
 Technical guidelines and related laws on IC cards in Vietnam were reviewed as a preparatory study
- A customer service monitoring system by the bus crews (pilot project)
- P & R system using bus service IC card (pilot project)
- Lectures about MM in Japan were provided to the Vietnam team side
- Communication trainings were provided to the Vietnam team side



Figure 5 Bus station



Figure 6 MM training

(4) Output of the MM

The survey done for the project and BTB ridership data showed that the frequency of bus use increased from 5 times a month to 9 times a month.

(5) Major Inputs

- Construction of shelter on Thien Hau Temple bus stop for comfort (120 million VND = 5,170 USD ) by DOT
- Construction cost of P&R facilities on Le Thi Trung Street and Binh Duong Library by DOT
- 50.00 M/M for three years and equipment for P&R and IC card pilot project by JICA

Table 2 Equipment for P&R pilot project

No.	Item	Quantity	Unit
Site1: Becames Tower P&R			
1	Security system	2	set
2	IC card	3,500	cards
3	Illuminated signboard	2	pcs
4	Portable fence	30	set
5	Digital signage	1	set
Site2: Le Thi Trung Street P&R			
1	Security system	1	set
2	IC card	200	cards
3	Illuminated signboard	1	pcs
4	Portable fence	24	set
Site3: Library P&R			
1	Security system	1	set
2	IC card	300	cards
3	Illuminated signboard	1	pcs
4	Portable fence	8	set

(6) Reasons of Success and Lessons Learned

MM appears to be an effective way to encourage people in the area to use more public transport. However, it does not seem highly effective for those who are

persistent in using private mode such as vehicles and motorcycles. Hence, further research about the target could be useful to develop more effective and sustainable MM activities.

Lectures on MM by a professor and communication training in the first year seemed successful for the government employees were able to carry out MM activities on their own.

(7) References

JICA and DOT (2018). *The Project for Enhancing Management Capacity of Transport System Focused on Public Transport in Binh Duong Province* (JICA Project Report) ( <https://openjicareport.jica.go.jp/pdf/12318853.pdf>)

\* Exchange Rate: 1 USD = 23,206.88 VND (as of Feb. 2020)

## 10. A challenge for the new bus authority to achieve modal share increase from 0.2% to 2%

Project Name	The Project for Improvement of Public Bus Operation in Phnom Penh
Location (city, country)	Phnom Penh, Cambodia
Key Agencies	Phnom Penh City Bus Authority
Project Period	Jan. 2017 –
Keywords	bus authority; master plan; modal share; capacity development; congestion; school; workplace; resident; free bus service; event; bus map; campaign item; motivational information; apps

### Project Outline

#### (1) Background and Objectives

Phnom Penh is the capital city of Cambodia with a population of about 2 million as of 2017. The growth of vehicle ownership in the city rose sharply in recent years. This caused severe congestion, lowering the average speed of vehicles driven in the city from 20 km/h to 15 km/h between 2011 and 2012. In response to the transport master plan of the city developed in 2014, the government established a bus authority in order to develop a bus network which could provide safe and convenient service. The bus authority was offered more than 200 buses from multiple institutions, including JICA, between 2016 and 2018. Therefore, the City was in need of capacity development to operate and maintain those buses in an efficient manner. For this reason, the project for improvement of public bus operation was requested by the government to JICA, setting a project goal to increase bus ridership up to 70,000 per day (a modal share of 2%). One of the main policies to achieve this goal is to increase the capacity of the bus authority to be able to promote the public transport through mobility management.



Figure 1 Traffic congestion (left) and a bus given by JICA

#### (2) Contents of the MM

##### A) Communication measures

- Opinion surveys were carried out three times (in 2017, 2018, and 2019) to monitor public awareness and satisfaction of bus services and to identify potential bus users. The survey showed that 40% of non-bus users still do not know how to use buses and 37% of people over 50 years old are not aware of the bus services at all.

- Information dissemination seminars were held at all the city districts in 2018 and 2019.
- Free bus service for factory workers and free shuttle bus service for events were provided.
- A new bus route map, information boards at bus stops, and bus location apps were developed. Brochures and T-shirts for bus promotion have been developed aiming to create positive images of bus services.
- Brochures and T-shirts for bus promotion have been developed aiming to create positive images of bus services.



Figure 2 Opinion survey for bus and non-bus users

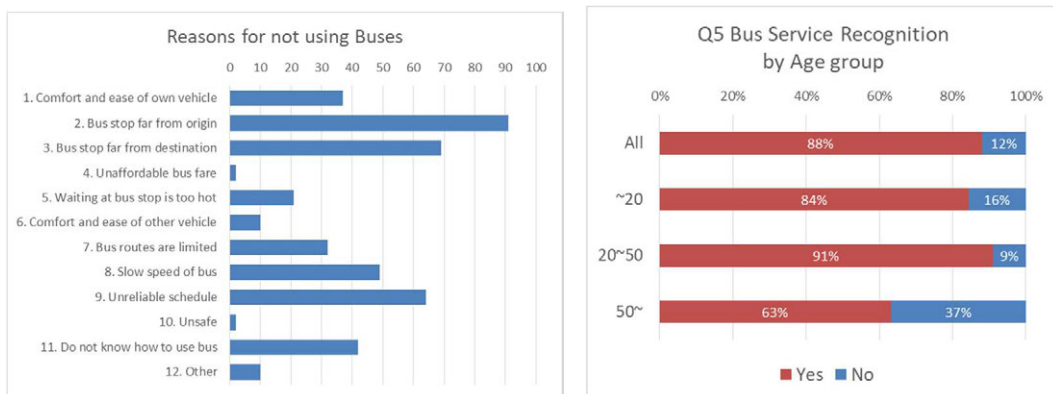


Figure 3 Result of the opinion survey



Figure 4 Dissemination seminar (left) and free bus services (center and right)



Figure 5 Bus route map and information board at bus stops



Phnom Penh City Bus Authority  
JICA Project Team

City Bus contributing for safe, healthy, economic, and sustainable transport

**Using bus is much safer than a car or motorcycle**

**Traffic Accident Risk**

Motorbike	74%
Family Car	6%
Passenger vehicle (Bus)	2%
Pedestrian	10%
Others	5%

Fatality in Accidents: 1852 (in 2016)

Source: Cambodia Road Crash and Victim Information System Annual Report 2016

**Using bus addresses lack of exercise and promote health**

**Calories Consumption**  
(When commuting 15km)

Motorcycle	burn 102kcal
Bus (Public Transport)	burn 220kcal

Source: Hamada, Murotsuchi, The Effect of Built Environment on Walking Behavior and Health Condition, Journal of the City Planning Institute of Japan, 2007, Vol.42.3, No.6, p.925.

**Using bus is less expensive than car or motorcycle.**

**Monthly Commuting Cost(22days)**

Car	100 ~ 180 USD
Motorcycle	35~50 USD
Bus	15~ USD

Travel distance assumed at 5 km per trip.  
Car ownership: 80 USD ~ 160 USD/month, bike ownership: 20 USD ~ 40 USD  
Car gasoline efficiency: 20 km/L, bike gasoline efficiency: 15 km/L.  
Gasoline price: 1.0 USD/L.  
Bus: 1000 Riel per trip

**Using bus gives you more free time**

**Things you can do on bus:**

- Read Book
- Study
- Chat with Friend
- Take Rest
- Use Smart Phone
- Listen to Music

**Using bus contributes to reducing environmental impact**

**CO<sub>2</sub> (grams) per passenger km**

Car	300
Motorcycle	88
Bus	76
Walk	0

Source: Chiffres de la calculate Ademe

**Using bus would help to alleviate traffic jams**

**Usage of road space**

50 cars vs 1 bus

50+ people can share one bus. Save road space and reduce traffic.

Source: [https://www.focus.de/auto/ratgeber/unterwegs/autofahrad-bus-die-ge-bild-wind-ihre-einstellung-zum-automat-ve-random\\_id\\_3844127.html](https://www.focus.de/auto/ratgeber/unterwegs/autofahrad-bus-die-ge-bild-wind-ihre-einstellung-zum-automat-ve-random_id_3844127.html)

វិទ្យុ: [info@phnompenhcitybus.gov.kh](mailto:info@phnompenhcitybus.gov.kh)  
 ទូរស័ព្ទ: [www.phnompenhcitybus.gov.kh](http://www.phnompenhcitybus.gov.kh)  
 ទូរស័ព្ទ: ០៩០០ ០០០ ០០០

ភ្នាក់ងារកម្ពុជាជម្រកស្រុកភ្នំពេញ-City BUS  
<https://www.facebook.com/phnompenhcitybus.gov.kh/>

Figure 6 T-shirts (left) and Brochure (right) for bus promotion



B) Other measures

- The number of bus lines has increased from 8 to 13.
- 170 bus stop facilities with roofs have been installed.
- A new payment system for bus services has been introduced (IC card, QR code types).

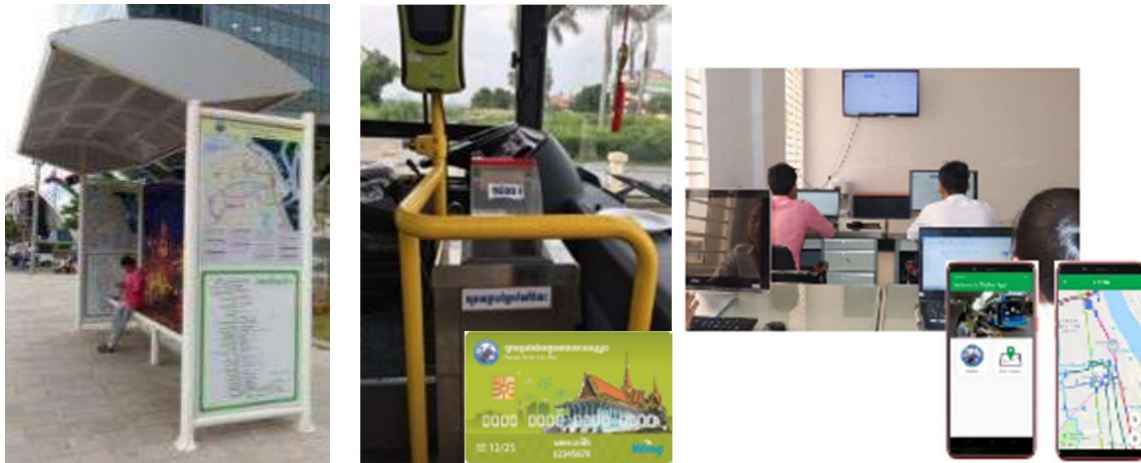


Figure 7 Bus stop facility (left), payment system (center), and bus location apps (right)

3) Output of MM

The number of bus passengers has increased by four times since the project was initiated.

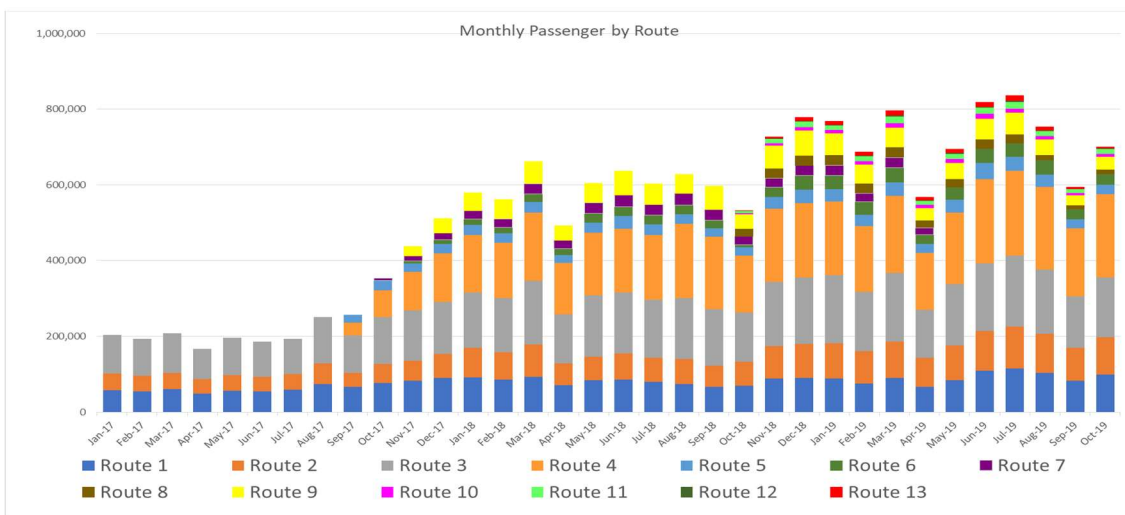


Figure 8 Number of the bus passenger between 2017 and 2019

(4) References

JICA and PiBO(2020). *The current status and issues of Mobility Management activity*

## 11. Cross-border experiment for personalized travel planning for cycling

Project Name	PTP-Cycle (Personalised Travel Planning for Cycling)
Location (city, country)	London Borough of Haringey (UK), Royal Borough of Greenwich (UK), Burgos (Spain), Ljubljana (Slovenia), Antwerp (Belgium), Riga (Latvia)
Key Agencies	London European Partnership for Transport (LEPT)
Project Period	April 2013 – March 2016
Keywords	cycling; workplace; university; resident; event; door-to-door; award system

### Project Outline

#### (1) Background and Objectives

Nowadays, traffic congestion has become a worldwide problem, with the pressing need to shift travel mode to more sustainable ones such as public transport and bicycle. PTP-Cycle (Personalised Travel Planning for Cycling) was a project co-funded by the intelligent Energy-Europe Program granted by the Executive Agency for Small and Medium-sized Enterprises (EASME). The project's aim is to prove that PTP is transferable across a number of sites and audiences, to many different countries, and is a cost-effective way of reducing greenhouse gas emissions and urban congestion whilst improving public health and economic development. Each of the participating municipalities strived to shift travel mode from single occupancy car to cycling, while also promoting other sustainable modes such as walking and public transport.



Figure 1 Location of 6 municipalities

#### (2) Institutional Scheme

This project was coordinated by the London European Partnership for Transport (LEPT) and supported by 6 municipalities and 4 technical experts, London Councils (UK), Sustrans (UK), Traject (Belgium) and Polis (Belgium).

#### (3) Contents of the MM

Each municipality implemented multiple measures as seen below. This report represents one characteristic case from each municipality.

Table 1 Implemented scheme

City	Target Groups			
	Workplaces	Universities	Residential	Public Events
Burgos			•	•
Ljubljana	•	•		•
Antwerp	•	•	•	•
Riga		•	•	•
London Borough of Haringey			•	•
Royal Borough of Greenwich			•	•

## A) Residential MM

### • Haringey

Of the 7,193 residents who received doorstep PTPs, 16.7% changed their travel behavior to more sustainable modes of travel. Key successes of the Hangrey PTP-Cycle project were the innovative use of tablets and the popularity of the discount card. The use of the tablet made it easy to track individual travel patterns, and allowed travel advisers to provide appropriate guidance. The municipality agreed with a local bike shop to offer 10% discounts during the program, which directly led to some individuals purchasing a new bike. As a result of this program, a 10% increase of walking trips was recorded.



Figure 2 Incentive goods

### • Greenwich

3,500 citizens were contacted on the doorstep, of which 2,175 received travel advice and customized travel information. The key success in Greenwich was the popularity of the Local Travel Map (LTM), and the availability of various resources and information to residents through direct conversation. As a result, participants' walking trips increased from 32% to 46%, with their car trips being reduced from 13% to 9%. In retrospect, it might have been better to consider introducing a commitment for residents to change their travel behavior.



Figure 3 Doorstep interview

### • Burgos

Burgos City used a range of social media tools to promote the project. One popular action was the "Selfie on a Bike" competition, where residents took photos and submitted them to the competition; The prize for the winner was a bicycle. The travel adviser visited each household to introduce this competition. By implementation of this measure, cycling trips increased by 11% for everyday general trips, and cycling trips from work-to-home were increased by 24%. This became a powerful medium through which to announce related events and messaging. Reexamining this project, it was difficult for travel advisers to contact every doorstep for security reasons in some cases. Advanced notification like developing a poster and leaflet, might have helped.



Figure 4 Advanced notification of doorstep interview

## A) Workplace MM

- **Antwerp**

Antwerp is encouraging as many commuters as possible to leave their car at home during an infrastructure works period. The city conducted one-on-one conversations at selected workplaces. 18 workplaces successfully participated reaching over 6,700 employees, and nearly 4,700 PTPs were delivered. This program delivered a 4% increase in the number of cycling trips from work to home. The key reason for successfully engaging workplaces was that PTP helped to solve a lot of staff's commuting problems by mapping out alternative routes, especially by bike, to avoid traffic jams. Providing a toolbox with all the equipment to maintain a bike to all workplaces was also warmly received.



Figure 5 Instruction at workplace

## B) Universities MM

- **Ljubljana**

The city is home to a university where a large number of faculty commute daily from surrounding regions. The city started to promote walking, cycling and public transport as alternatives of driving to faculty. The students were open to testing new ways of travel, yet the faculty employers did not allow their employees to provide any personal data to third parties. Moreover, Faculty Management did not permit direct interviewing, so only indirect methods such as e-mail or phone call to employees was possible; This made it difficult to implement the measure. In spite of this, the implementation still produced numerous positive outcomes. Cycling trips from home to work were increased by 2%, and car trips were also reduced from 51% to 42% from home to work. In reflecting on this case, the approach provoked good results once a personal conversation was initiated, and most of university employees were satisfied with the provided information materials. This showed that having the opportunity to provide relevant information is most important.

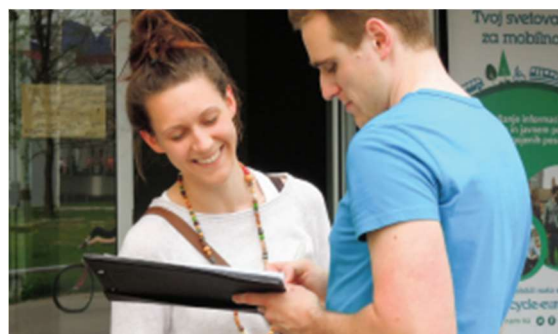


Figure 6 Interview at university

## C) Public Events MM

- **Riga**

In Riga, direct communication with residents on their doorstep is not common practice, and it was otherwise difficult to collect household information due to data protection laws. Public events were much more practical to converse about their

mobility habits and provide new information. In order to raise awareness of the PTP programs, a famous cyclist was invited to the project as a guest. At the event, the guest shared his knowledge about the barriers of cycling, and resulting in increasing the participants' awareness about cycling. As a result, Riga has seen a 2% increase in cycling trips for general everyday journeys, and a 4% increase for cycling trips from home to work. This case showed that the communication method that is familiar with the residents is important.



Figure 7 Promotion event

#### (4) Lessons learned

This project proved that PTP is a successful transferable methodology to different countries or cities. Positive feedback and results led further investment to implement a second phase of the project. In other words, the first step of introducing PTP might be the most difficult. For successful PTP, communication is the most important. However, direct communication with residents on their doorstep may not always be common or possible because of their culture or local laws. To remedy this problem, holding events is an alternative measure as shown in the Riga case. Selecting suitable ways for each place to have conversations about mobility habits is the most important element to success Mobility Management.

#### (5) References

PTP-Cycle (2016) *Delivering Personalized Travel Planning across Europe* ([https://www.polisnetwork.eu/wp-content/uploads/2019/06/ptp-cycle\\_final-report\\_march2016.pdf](https://www.polisnetwork.eu/wp-content/uploads/2019/06/ptp-cycle_final-report_march2016.pdf))

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## References

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Tool 1,2,3,4,5,6,7,8,13,14,15,16,18	Satoshi Fuji, Nobuhiko Matsumura, Ayako Taniguchi, Mamoru Taniguchi. (2005). <i>Mobility Management guidebook</i> . Japan Society of Civil Engineers
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Tool 23	STARS. (n.d.). STARS Planning tool. Accessed: 2020/06/18, Available: <a href="https://s3-eu-west-1.amazonaws.com/media.stars.tfl.gov.uk/stars/446602f1-0cea-4bbe-9545-b48e8c32e23f/STARS%20planning%20tool.pdf">https://s3-eu-west-1.amazonaws.com/media.stars.tfl.gov.uk/stars/446602f1-0cea-4bbe-9545-b48e8c32e23f/STARS%20planning%20tool.pdf</a>
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## Your Travel Record

Name ( \_\_\_\_\_ )

### STEP 1

Fill in with data from your trips for the last 3 days.

Transport Mode		Your Answer			Total for 3 days		
		Date	Date	Date	Total number of Trips	CO <sub>2</sub> emission for this mode (kg) and time	Calorie consumption for this mode (kcal) and time
Eco car (Driver)	-15 mins						
	15-45 mins						
	45 mins -						
Eco car (Passenger)	-15 mins						
	15-45 mins						
	45 mins -						
Diesel car (Driver)	-15 mins						
	15-45 mins						
	45 mins -						
Diesel car (Passenger)	-15 mins						
	15-45 mins						
	45 mins -						
Taxi							
Motorbike							
Bicycle							
Walking							
Bus							
Train							
Others (boat, etc.)							

### STEP 3

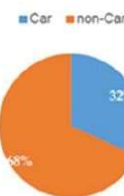
Your 3-day summary is ...

■ Your vehicle's **CO<sub>2</sub> emission** is ...

Total amount is \_\_\_\_\_ kg.

Car-based is \_\_\_\_\_ kg.

CO<sub>2</sub> EMISSIONS

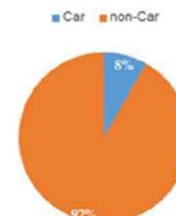


■ Your **Calorie Consumption** is ...

Total amount is \_\_\_\_\_ kcal.

Car-based is \_\_\_\_\_ kcal.

CALORIE CONSUMPTION



### STEP 2

Calculate the total value of CO<sub>2</sub> emission and calorie consumption.

### STEP 4

If you use public transport instead of car, you can get merits for the environment and for your health.

#### CO<sub>2</sub> emission from driving a car

For a car whose fuel efficiency is 8 km/liter, driving it emits 290 g of CO<sub>2</sub>.

20 km of driving it emits the same amount of CO<sub>2</sub> emitted when using electric lighting for 1.5 and months.

#### Calorie consumption by walking

When you use public transport, walking distance becomes longer. 10-minute walking consumes 48 kcal.

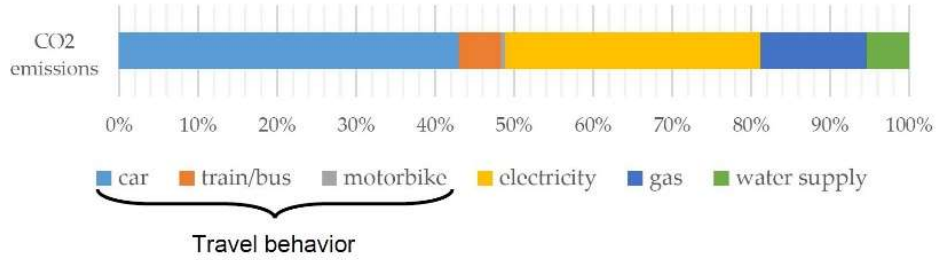
Would you like to use public transport or bicycle instead of a car when your **luggage is small** on **sunny day** once a week?

## Tool 1 Travel Behavior Record

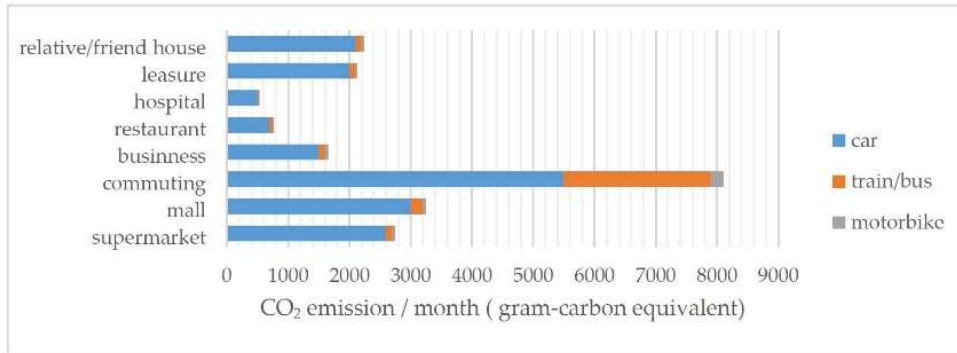


## Average from all data

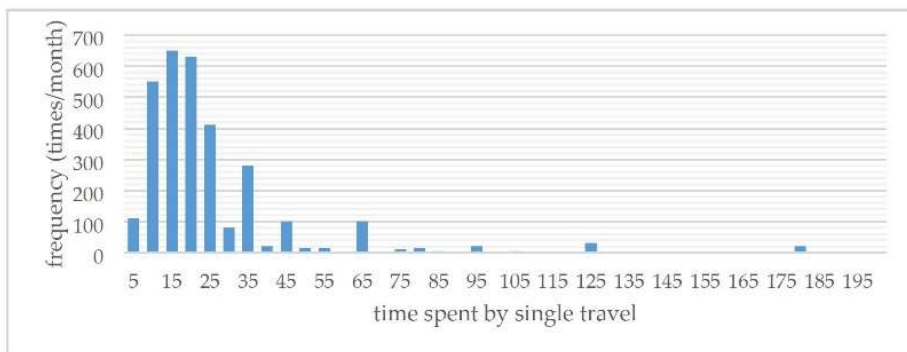
1. Transportation accounts for \_\_\_\_\_ % of CO<sub>2</sub> emissions in the participants' daily life  
 \_\_\_\_\_ % of all participants' travels are done using cars.



2. The average CO<sub>2</sub> emissions from travels of all participants during the month are as follows:



3. The relationship between time spent and frequency of car usage by the participants is shown below.



### Tool 2 Travel Behavior Record summary











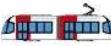

### Household Survey for Travel Behavior

(Please discuss with your family and answer this.)

How many people are there in your household?	How many people are there in your household?	How many of them have driver's license?
Please answer about your nearest train station and bus stop	Train station: _____ Bus stop: _____ (If there is no train station or bus stop, please keep this box empty.)	
How often do you and other household members drive your own car? (Please answer one by one.) Example: <i>Father</i> drives the car <u>2</u> time/times per <input type="checkbox"/> Day <input checked="" type="checkbox"/> Week	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day
	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day
	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day
How often do you, with a driver's license, use public transport? Example: <i>Jack</i> drives the car <u>6</u> time/times per <input checked="" type="checkbox"/> Week	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day
	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day
	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day	_____ uses _____ time/times per <input type="checkbox"/> Month <input type="checkbox"/> Week <input type="checkbox"/> Day
How many cars does your household have, and for how long does your household drive the car in a month?	Number of cars _____ Total driving distance in 1 month _____	
	Please indicate your opinion about car usage.	
It is not good for your health to often use a car. 		
It is not good for the environment to often use a car. 		
It is better to refrain from using a car. 		
I try to refrain from using a car. 		

### Tool 3 Travel Behavior Survey

Your mode of transport and the number of times that you use it in the last 3 days from \_\_\_\_\_ to \_\_\_\_\_? Please fill in this sheet every night

			Day 1	Day 2	Day 3
Please write down the time for each mode.	Eco car (Driver) 	Less than 15 mins	___ time/times	___ time/times	___ time/times
		15 – 45 mins	___ time/times	___ time/times	___ time/times
		More than 45 mins	___ time/times	___ time/times	___ time/times
	Eco car (Passenger) 	Less than 15 mins	___ time/times	___ time/times	___ time/times
		15 – 45 mins	___ time/times	___ time/times	___ time/times
		More than 45 mins	___ time/times	___ time/times	___ time/times
	Diesel car (Driver) 	Less than 15 mins	___ time/times	___ time/times	___ time/times
		15 – 45 mins	___ time/times	___ time/times	___ time/times
		More than 45 mins	___ time/times	___ time/times	___ time/times
	Diesel car (Passenger) 	Less than 15 mins	___ time/times	___ time/times	___ time/times
		15 – 45 mins	___ time/times	___ time/times	___ time/times
		More than 45 mins	___ time/times	___ time/times	___ time/times
Truck		___ time/times	___ time/times	___ time/times	
Taxi		___ time/times	___ time/times	___ time/times	
Walking		___ time/times	___ time/times	___ time/times	
Bicycle		___ time/times	___ time/times	___ time/times	
Motorbike		___ time/times	___ time/times	___ time/times	
Bus		___ time/times	___ time/times	___ time/times	
Tram		___ time/times	___ time/times	___ time/times	
Railway		___ time/times	___ time/times	___ time/times	
Others (ship, boat, etc.)		___ time/times	___ time/times	___ time/times	

### Tool 4 Travel Frequency Survey

Action Plan Sheet
-------------------

Q1. Is it possible to change your family's travel mode by car to public transport?

- |                                                                                                                     |   |                                                       |
|---------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------------------|
| <input type="checkbox"/> Possible<br><input type="checkbox"/> Maybe possible<br><input type="checkbox"/> Impossible | } | To what extent can you "change" your travel behavior? |
|---------------------------------------------------------------------------------------------------------------------|---|-------------------------------------------------------|



We can reduce the car usage by about \_\_\_\_\_ %.

Q2. Please answer the questions about your commuting behavior.

1) In your family, is there anyone who can change the travel behavior of using car to public transport?	<input type="checkbox"/> Nobody <input type="checkbox"/> Somebody → Who is that? (_____ )			
2) If you use public transport, how exactly do you commute?				
3) Would you like to try commuting the way it is identified above?	<table style="border: none;"> <tr> <td style="vertical-align: middle;"> <input type="checkbox"/> Yes.  <input type="checkbox"/> Maybe yes.  <input type="checkbox"/> No.         </td> <td style="font-size: 3em; vertical-align: middle; padding: 0 10px;">}</td> <td style="vertical-align: middle;">           When can you try this?            (Day after tomorrow, next Tuesday, etc.)         </td> </tr> </table>	<input type="checkbox"/> Yes. <input type="checkbox"/> Maybe yes. <input type="checkbox"/> No.	}	When can you try this? (Day after tomorrow, next Tuesday, etc.)
<input type="checkbox"/> Yes. <input type="checkbox"/> Maybe yes. <input type="checkbox"/> No.	}	When can you try this? (Day after tomorrow, next Tuesday, etc.)		

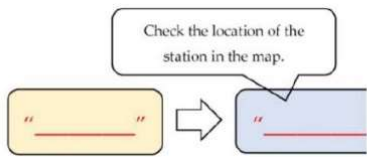
**Tool 5 Action Plan sheet**

**How to Use the Bus**  
 " \_\_\_\_\_ " Bus Stop Guide

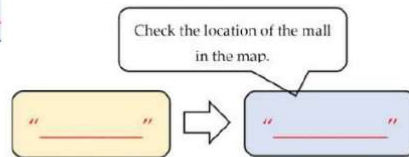
\* Please refer to this when you go out.

This sheet is posted for people living near " \_\_\_\_\_ " Bus Stop.  
 From where you live, you can go to various places by bus. Here are some sample routes. Please refer to this guide when you go out.

➤ When you are going to " \_\_\_\_\_ " Station...



➤ When you are going to " \_\_\_\_\_ " (Mall)



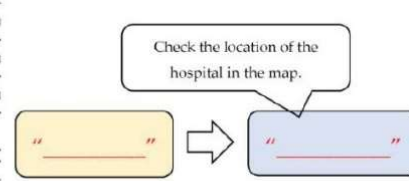
Available line for this trip is,  
 Line \_\_\_\_\_  
 The fare is \$ \_\_\_\_\_ / person  
 The estimated travel time is \_\_\_\_\_ min.

➤ Bus Time Table

_____ Bus Stop			
Line _____ : _____ → _____			
	Weekday	Saturday	Holiday
7			
8-10			
11-16			
17-19			
20			

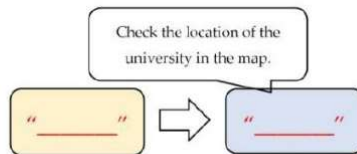
Please ref

➤ When you are going to " \_\_\_\_\_ " (Hospital)



Available line for this trip is,  
 Line \_\_\_\_\_  
 The fare is \$ \_\_\_\_\_ / person  
 The estimated travel time is \_\_\_\_\_ min.

➤ When you are going to " \_\_\_\_\_ " (University)



Available line for this trip is,  
 Line \_\_\_\_\_  
 The fare is \$ \_\_\_\_\_ / person  
 The estimated travel time is \_\_\_\_\_ min.

**Tool 6 How to Use Bus sheet**

## My car usage

- Please give details of your three recent travels by car.
- Please fill in the blanks if you drive a car.

Example
<p>• When did you use your car?  <small>1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday 8. Can't remember</small></p> <p>• Who drove the car? <input checked="" type="radio"/> Father 2. Mother 3. Other (_____)</p> <p>• Where did you go? (please describe the purpose, destination and time)</p>
Please fill in for the car usage you came up with <i>first</i>
<p>• When did you use your car?  <small>1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday 8. Can't remember</small></p> <p>• Who drove the car? 1. Father 2. Mother 3. Other (_____)</p> <p>• Where did you go? (please describe the purpose, destination and time)</p>

Please fill in the car usage you came up with <i>second</i>
<p>• When did you use your car?  <small>1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday 8. Can't remember</small></p> <p>• Who drove the car? 1. Father 2. Mother 3. Other (_____)</p> <p>• Where did you go? (please describe the purpose, destination and time)</p>
Please fill in the car usage you came up with <i>third</i>
<p>• When did you use your car?  <small>1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday 8. Can't remember</small></p> <p>• Who drove the car? 1. Father 2. Mother 3. Other (_____)</p> <p>• Where did you go? (please describe the purpose, destination and time)</p>

## Tool 7 My Car Usage sheet

### "Think about travel behavior" Sheet

- Let's think about how to travel in an environmentally friendly way. Fill in the table below with the needed information. The first row has been done as example. Form a group and discuss your answers with the other members.
- When considering a concrete action, please refer to the table below and think about how to change your travel behaviour by combining words or phrases.

Distance (Long or Short)	Purpose	Current Transport Mode	Change in Transport Mode	How often? What occasion?
Short distance	Going to supermarket	Car	Change to bus/train	Once for every three trips / sunny day

Example:

I will change the travel mode for short trips like going to supermarket from car to bus once for every three trips

## Tool 8 Think about Travel Behavior sheet

## How to play the Travel Sugoroku game

Travel Sugoroku: Through a simulated experience of traveling by bus, train, or car, people learn to relate the excessive use of vehicles to emergence of various problems such as congestion and environmental concerns. The goal is for people to think of a better behaviour for the benefit of society. Participants are divided into groups of about 6 to play the game

### Preparation

- Game board (Origin and destinations are shown.)
- Vehicle cards (combination of car and train/bus cards), 10 cards for each player
- Pins (prepare different colors for each player)

### 1<sup>st</sup> Round

- The players present a car or train/bus card all at once.
- Players with the car card move up to 6 stops. If there are many players who present car cards, the number of stops to move decreases due to traffic congestion. Players with train/bus cards surely move for 3 stops in any case.
- Record the number of cards.
- Repeat the steps until all players reach the goal.
- Finally, count the number of cards given by the entire group.

<Table for the number of stops to move>

		Number of players who present "Car" card					
		1 person	2 people	3 people	4 people	5 people	6 people
Number of stops to move	Car	6	5	4	3	2	1
	Train/bus	3	3	3	3	3	3

### 2<sup>nd</sup> Round

- Another scenario (example)
  - If train/bus users are low, the operator may reduce the frequency of operation to manage the business. This can apply to the rule, and the number of stops to move by those with train/bus cards is decreased from 3 to 2, depending on the number of players with car cards.
  - The opposite can be also applied, and the number of stops to move by those with train/bus

### Summarize the result

- Calculate the percentage of car cards against the total number of cards and plot it in a graph for each game and group (Horizontal axis shows the percentage of cars, and the vertical axis is for the total number of cards.)
- In the graph, there must be a positive relationship between the ratio of car cards and the total number of cards. This indicates that higher percentage of using a car leads to an inefficient society.
- By showing the CO<sub>2</sub> emissions for each mode, it can be observed that more cars are used,

## Tool 9 Travel Sugoroku game

No. \_\_\_\_\_

Door-to-Door Survey Record Sheet

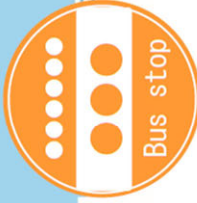
Date		_____ (YY/MM/DD) (Mon / Tue / Wed / Thu / Fri / Sat / Sun) _____ : _____ ~ _____ : _____
Target	District	_____
	Address	_____
	Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female
	Age	<input type="checkbox"/> 10's <input type="checkbox"/> 20's <input type="checkbox"/> 30's <input type="checkbox"/> 40's <input type="checkbox"/> 50's <input type="checkbox"/> 60's <input type="checkbox"/> over 70
	Name	Mr./Mrs. _____
Interviewer		_____
Opinion (public transport usage, request for improvement, etc.)		
Provided materials		

Tool 10 Home Visit record sheet



# Public Transport information

This sheet summarizes information about the bus stops near your home.  
Why don't you take a bus to go out?




Bus stop

Bus  
Timetable

Weekends mean Saturday, Sunday and Holidays.

※The fare from ●●●● to ●●●● is \$\_\_\_.



Going

Line	Weekdays	Weekends
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)

Returning

系統	Weekdays	Weekends
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)

Going

Line	Weekdays	Weekends
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
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20		
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22		
23		

Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)

Returning

系統	Weekdays	Weekends
5		
6		
7		
8		
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10		
11		
12		
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Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)  
Line●● : To ●●●● (via ●●●●)

Contact Information

Issued in (MM/YY)

Tool 11 Time Table format (bus)



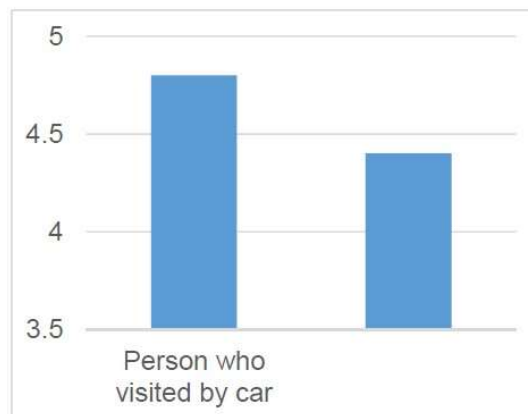
## Frustrations from Driving on Holidays

Traveling by a car on holidays

may not be so enjoyable due to traffic congestion.

“Would you like to come to Kyoto again?”

(Evaluate with a scale of 5)



Survey by Kyoto city revealed that...

People who visited Kyoto by car wouldn't have enough time to sightsee.

People who visited by train or bus would want to visit Kyoto again

### Tool 13 Motivational message 1

## Car Usage and Road Space

Traveling by car is very convenient and comfortable. But the road space taken up by cars is much larger than the space taken up by a bus or by bicycles used to transport the same number of people as in the cars.



50 cars



1 bus

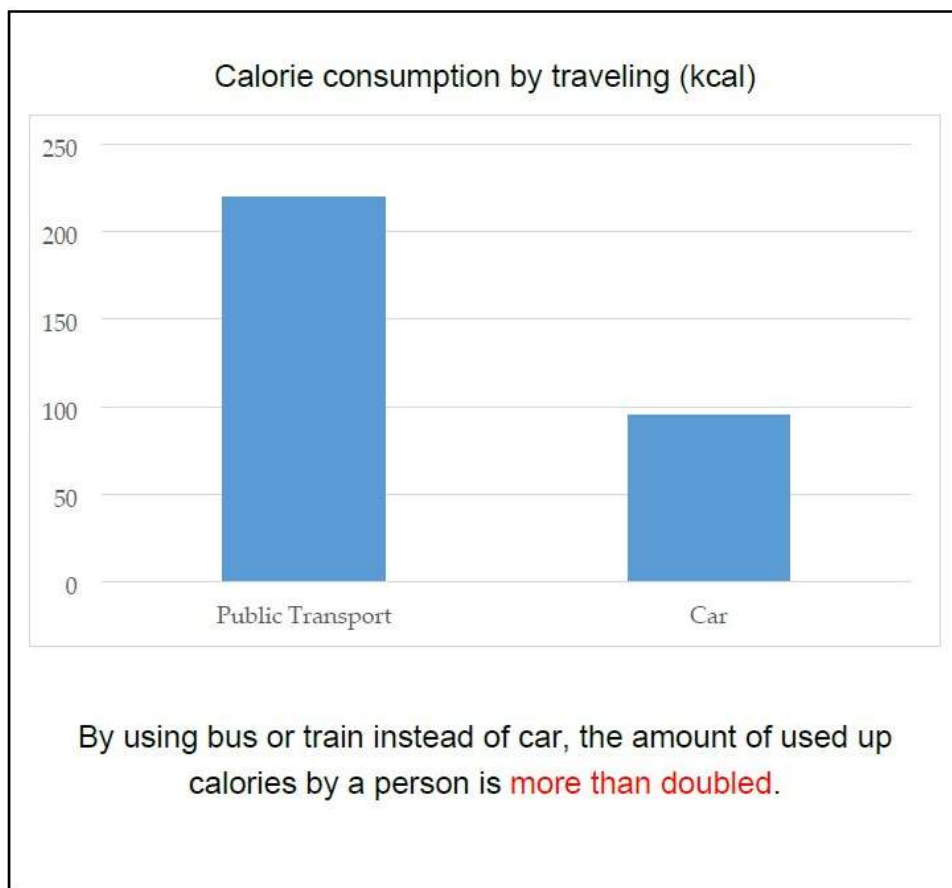


72 bicycle

**Tool 14 Motivational message 2**

## Car Usage and Health

You can sit all the way to your destination in the car.  
That is why using the car is convenient,  
but that is also why car is not good for your health.



### Tool 15 Motivational message 3

Example of how to calculate the calorie consumption  
when traveling by train and by car

1. When traveling by train

(In this case, it should include travel by waling as using train involves walking in access and egress trip)

$$= \frac{\text{distance}}{\text{speed}} \times (\text{calorie consumption by taking train/hour}) + \text{walking trip}$$

2. When traveling by car

$$= \frac{\text{distance}}{\text{speed}} \times (\text{calorie consumption by driving car/hour})$$

Example (in case of Japan)

➤ Calculation condition

Distance: 30km (round trip)

Speed: Train = 40km/h

Car = 30km/h

Calorie consumption by modes of transportation:

Train: 2.2 kcal/minute

Car: 1.7 kcal/minute

Walking: 3.3 kcal/minute

Walking time: 40 minutes (round trip)

1. When traveling by train

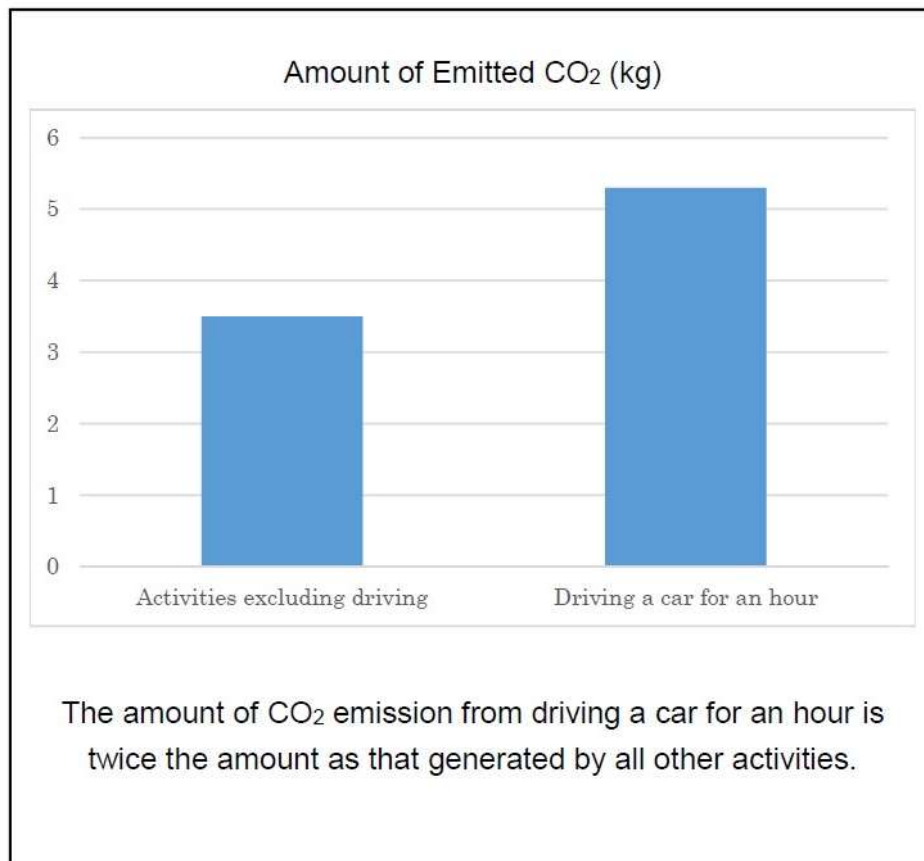
$$= \frac{30}{40} \times 2.2 \times 60 + \frac{40}{60} \times 3.3 \times 60 = 99 + 132 = 231 \text{ kcal}$$

2. When traveling by car

$$= \frac{30}{30} \times 1.7 \times 60 = 102 \text{ kcal}$$

## Car Usage and the Environment

Driving a car even for a short distance causes the emission of larger amount of CO<sub>2</sub> compared to that from other daily activities.



### Tool 16 Motivational message 4

## How to calculate the amount of CO<sub>2</sub> emission

### 1. In case of non-car user

$$= \frac{(\text{Annual CO}_2 \text{ emission by a household}) \times (\text{CO}_2 \text{ emission rate by other activities})}{(\text{Average number of persons in a household}) \times (\text{Number of days in a year})}$$

### 2. In case of car user

$$= \left( \frac{(\text{Amount of CO}_2 \text{ emission by driving a car})}{1 \text{ km}} \right) \times (\text{Average usage time of car in a day}) \\ \times (\text{average driving speed})$$

#### Example (case in Japan)

##### 1. Non-car user

###### ➤ Calculation condition

Annual CO<sub>2</sub> emission by a household:

5,900 kg/household/year

Emission rate by other activities:

65%

Average number of persons in a household:

3.3 people

$$= \frac{5,900 \times 0.65}{3.3 \times 365} \approx 3.2 \text{ kg}$$

##### 2. Car user

###### ➤ Calculation condition

Amount of CO<sub>2</sub> emission from driving a car for 1 km:

0.172 kg/km/person/day

Average usage time of car per day:

1 hour

Speed: 30 km/h

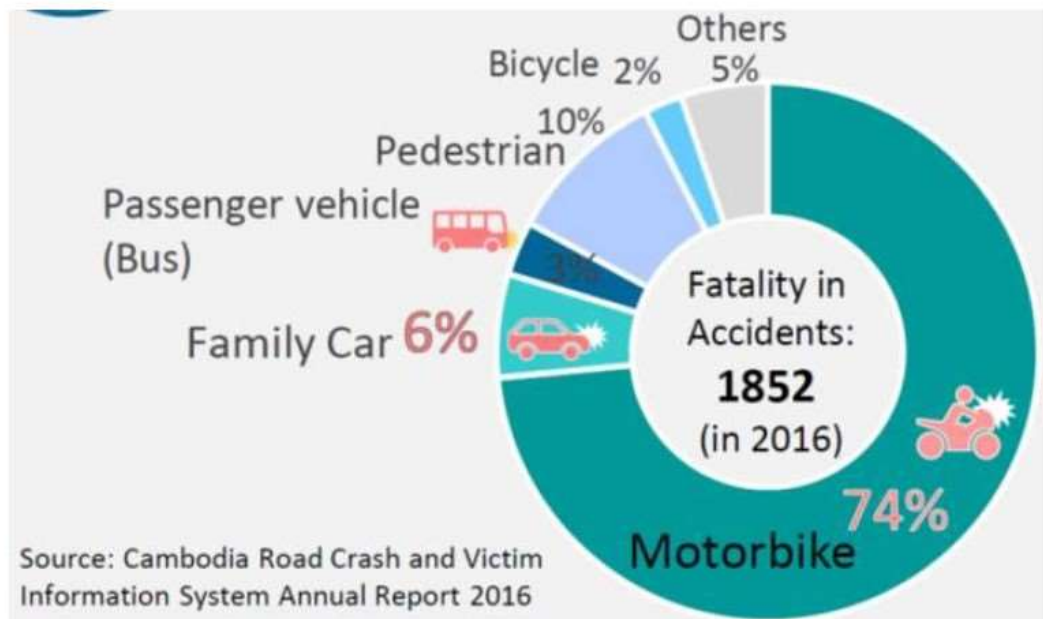
$$= 0.172 \times 1 \times 30 \approx 5.2 \text{ kg}$$



## Car Usage and Accident

When driving, you may not have thought of meeting an accident, getting injured, or injuring someone.

Worst, a car accident can be fatal. Check the number of accidents and the accident risk in your country or city.



The percentage of fatal accident cases by by travel modes in Cambodia

### Tool 17 Motivational message 5

How to calculate the index  
of risk of a traffic accident due to car usage

1. Probability that a driver may get injured if he/she continues to drive a car for life

$$= 1 - \left( 1 - \frac{\text{number of accidents causing injury per year}}{\text{car population}} \right)^{(\text{driving years})}$$

2. Probability that a driver would die from accident if he/she continues to drive a car for life

$$= 1 - \left( 1 - \frac{\text{annual traffic fatalities}}{\text{car population}} \right)^{(\text{driving years})}$$

3. Probability that lifelong driving would cause death due to accident to the driver himself/herself?

$$= \left( \frac{\text{annual traffic fatalities} \times \text{percentage of drivers in traffic fatalities}}{\text{car population}} \right) \times (\text{driving years})$$

4. Probability that lifelong driving would kill a pedestrian or biker”

$$= \left( \frac{\text{annual traffic fatalities} \times \text{percentage of pedestrians or bikers in traffic fatalities}}{\text{car population}} \right) \times (\text{driving years})$$

**Example (case in Japan)**

Calculation conditions

Number of accidents causing injury per year: 1 million

Car population: 50 million

Annual traffic fatalities: 10,000

Percentage of drivers in traffic fatalities: 33.3%

Percentage of pedestrians or bike in traffic fatalities: 40%

Driving years: 50 years

$$1. \quad 1 - \left( 1 - \frac{1 \text{ million}}{50 \text{ million}} \right)^{50} \cong 64\% \qquad 3. \quad \frac{10,000 \times 33.3\% \times 50}{50 \text{ million}} \cong 0.33\%$$

$$2. \quad 1 - \left( 1 - \frac{10,000}{50 \text{ million}} \right)^{50} \cong 1\% \qquad 4. \quad \frac{10,000 \times 40\% \times 50}{50 \text{ million}} = 0.4\%$$

## Car usage and the cost

Traveling by car is convenient and comfortable, but do you know the annual cost of using and maintaining a car? Compare it with the cost of traveling by public transport for a year.

Example of expenses when using a car in Japan	
Expense (car)	Cost (yen/year)
Insurance	180,000
Tax	70,000
Parking	120,000
Inspection	50,000
Fuel/Gas	100,000
Fee-charging facilities	30,000

**Tool 18 Motivational message 6**

## Sample calculations of expenses related to owning and using a car

1. Expense items if you own a car  
Insurance fee, automobile tax, parking fee, vehicle inspection fee
2. Expense items if you use a car  
Fuel costs, toll road/facility usage fees

Sample calculation (case in Japan)

Calculation conditions

Insurance fee: 180,000JPY/year

Automobile tax: 70,000JPY/year

Parking fee: 20,000JPY year

Vehicle inspection fee: 50,000JPY/year

Fuel cost: 100,000JPY /year

Toll road/facility usage fee: 30,000 JPY /year

Exchange rate: 1 USD = 108 JPY

1. Cost per day if you own a car

$$= \frac{180,000 + 70,000 + 120,000 + 10,000 + 50,000}{365} \cong 1,178 \text{ JPY/day}$$

2. Cost per day if you own and use a car

$$= 1,178 + \frac{100,000 + 30,000}{365} \cong 1,534 \text{ JPY/day}$$

### Sendai SMART

## 公共交通deスマートに 行こう 公共交通あんない

### Public Transport Information

TEL:022-220-1111 (通話料なし) 11時～19時、土曜・日・祭日を除く  
 送達部 市民生活課 公共交通課 仙台駅前 仙台駅前 仙台駅前  
 858-9112-220 仙台駅前交差点交差点 仙台駅前 仙台駅前

### Sendai SMART

## スマートに公共交通 行こう

車はともかく便利な車でも、私たちが生活に欠かせない乗り物です。しかし、事故、環境、健康など多くの問題を抱えています。スマートな公共交通は、事故、環境、健康など多くの問題を抱えています。スマートな公共交通は、事故、環境、健康など多くの問題を抱えています。

1

事故

2

環境

3

健康

### Sendai SMART

## スマートに公共交通 行こう

### Sendai SMART

## Transport Vision

仙台市では、公共交通の利便性を高めることと、環境に優しい交通手段の普及を推進しています。

### Sendai SMART

## Decline in public transport ridership

乗客数は年々減少傾向にあり、2020年には約1億2千万人から約1億1千万人に減少しています。

### Sendai SMART

## Calorie consumption of driving a car

車での移動は、1人あたり約220kcalのエネルギーを消費します。これは、徒歩（約100kcal）と比較すると約2.2倍です。

### Sendai SMART

## Accident risk of driving a car

ドライバーは約10,000人、乗客は約100万人。交通事故による死者は約100人、重傷者は約1,000人、軽傷者は約10万人です。

### Sendai SMART

## Environmental impact of driving a car

1人あたり1日あたり約410kgのCO2を排出します。これは、徒歩（約100g）と比較すると約4.1倍です。

### Sendai SMART

## Calorie consumption of driving a car

車での移動は、1人あたり約220kcalのエネルギーを消費します。これは、徒歩（約100kcal）と比較すると約2.2倍です。

### Sendai SMART

## Smart to Public Transport

### Sendai SMART

## Decline in public transport ridership

### Sendai SMART

## Calorie consumption of driving a car

### Sendai SMART

## Accident risk of driving a car

### Sendai SMART

## Environmental impact of driving a car

### Sendai SMART

## Calorie consumption of driving a car

Tool 19 Motivational brochure 1/2 (Sendai City)

# スマートに通勤通学しよう

マイカーなどで通勤すると渋滞や燃費の面で大変な思いをする方も多いのではないでしょうか。スマートな通勤通学方法を知りたいという方は、ぜひこの冊子をご覧ください。

仙台市内では、マイカー通勤による多岐にわたる渋滞や燃費の問題が顕著です。通勤や通学に際しては、公共交通機関の利用が最も経済的で、かつ環境にも優しい方法です。

## パークアンドライド

公共交通機関の駅やバス停付近に車を駐車し、公共交通機関を利用して通勤・通学する方法です。



詳しくは「パークアンドライド」の専用ページをご覧ください。  
URL: <https://www.city.sendai.jp/kumiyoko/kotaku/jidosha/0441.html>

# How to ride the metro

仙台市地下鉄は、仙台市内を走る公共交通機関です。利用料金は2019年4月1日より改定されています。



## 乗車方法

乗車料金は乗車券機で支払います。ICカードは専用機で使えます。

乗車区間	乗車料 (円)
1区間 (1.0km以下)	200
2区間 (2.0km以下)	250
3区間 (3.0km以下)	300

# バスに乗ろう

仙台市内には「乗車券機」が設置されています。ICカードは専用機で使えます。



## バスに乗る

乗車料金は乗車券機で支払います。ICカードは専用機で使えます。



# バス・地下鉄にお得に乗ろう

## How to save money when using the bus and metro

- バスで支払う**  
仙台市内を走るバスは、乗車料金が150円です。ICカードは専用機で使えます。
- 地下鉄で支払う**  
仙台市地下鉄は、乗車料金が200円です。ICカードは専用機で使えます。
- 乗車券機**  
乗車券機で乗車料金を支払うと、ICカードは専用機で使えます。



# バスに乗ろう

仙台市内には「乗車券機」が設置されています。ICカードは専用機で使えます。



## バスに乗る

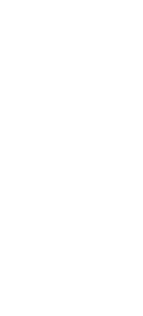
乗車料金は乗車券機で支払います。ICカードは専用機で使えます。



# バス・地下鉄にお得に乗ろう

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- 乗車券機**  
乗車券機で乗車料金を支払うと、ICカードは専用機で使えます。



これが私の  
**HAPPY HOUR!**  
ハッピーアワー

*This is my Happy Hour*

**エコ通勤?**  
よく知らないね…けど  
豊橋駅に18時から飲みに行くよ!  
みんなついて来て! 電車に乗るよ!

飲み会はいつも19時スタートかな。  
車でいちど家に帰ってから、  
家族に送ってもらっているよ。  
だけど今、電車通勤してみたんだ。  
電車通勤のメリットは、  
前もって  
みこ  
こハ

*Suggesting to take public transport for commutation by mentioning its advantage that*

**これも立派な エコ通勤! エコ通勤とは**

「エコ通勤」は環境によいだけでなく、自分の時間を有効に使えるかもしれません。例えば飲食店が行うハッピーアワー(酒類の割引時間帯)を楽しむこともできるかもしれません。また、渋滞のストレスからも解放され、事故のリスクも低くなるので安心して通勤することができます。

しかしながら県境地域の事業所で働く皆さんは、夜勤などの勤務もあり毎日の「エコ通勤」の実施は難しいかもしれません。ですが、できるときに実践してみることも「エコ通勤」ですので、飲み会の日など、職場の皆さんと一緒にやってみるのはいかがでしょうか。

いつもの通勤を少し変えることで、何か新しい発見があるかもしれませんよ。

**COOL CHOICE** 地球温暖化対策のための国民運動「COOL CHOICE」

2015年、すべての国が参加する形で、2020年以降の温暖化対策の国際的枠組み「パリ協定」が採択されました。世界共通の目標として、世界の平均気温上昇を2度未満にする(さらに、1.5度に抑える努力をする)こと、今世紀後半に温室効果ガスの排出を実質ゼロにすることが打ち出されました。日本は、2030年に向けて、温室効果ガス排出量を26%削減(2013年度比)を掲げています。「COOL CHOICE」は、この目標達成のために、省エネ低炭素型の製品・サービス・行動など、温暖化対策に資する、また快適な暮らしにもつながるあらゆる「賢い選択」をしていこうという取り組みです。

県境地域通勤環境改善推進協議会・豊橋市 お問い合わせ 豊橋市都市交通課 TEL.51-2463

Tool 20 MM Poster 1 (Toyohashi City)

**健康のために少しは歩かなきゃ、と思っ**  
**て**

**い**

**め**

**な**

**た**

**に**

**か**

**ぎ**

**っ**

**て**

**使**

**す**

**い**

**ま**

**る**

**車**

**を**

Those who think you have to walk for the health are more likely to end up using the car “unfortunately”

自家用車で通勤している皆さまにお知らせです。  
**エコ通勤モニター募集!**  
【にいがた基幹バス（リカーとリンク）への利用促進と】  
対象としたエコ通勤モニターを募集します。  
対象者として、通勤距離、公共交通の利便性  
が優れています。

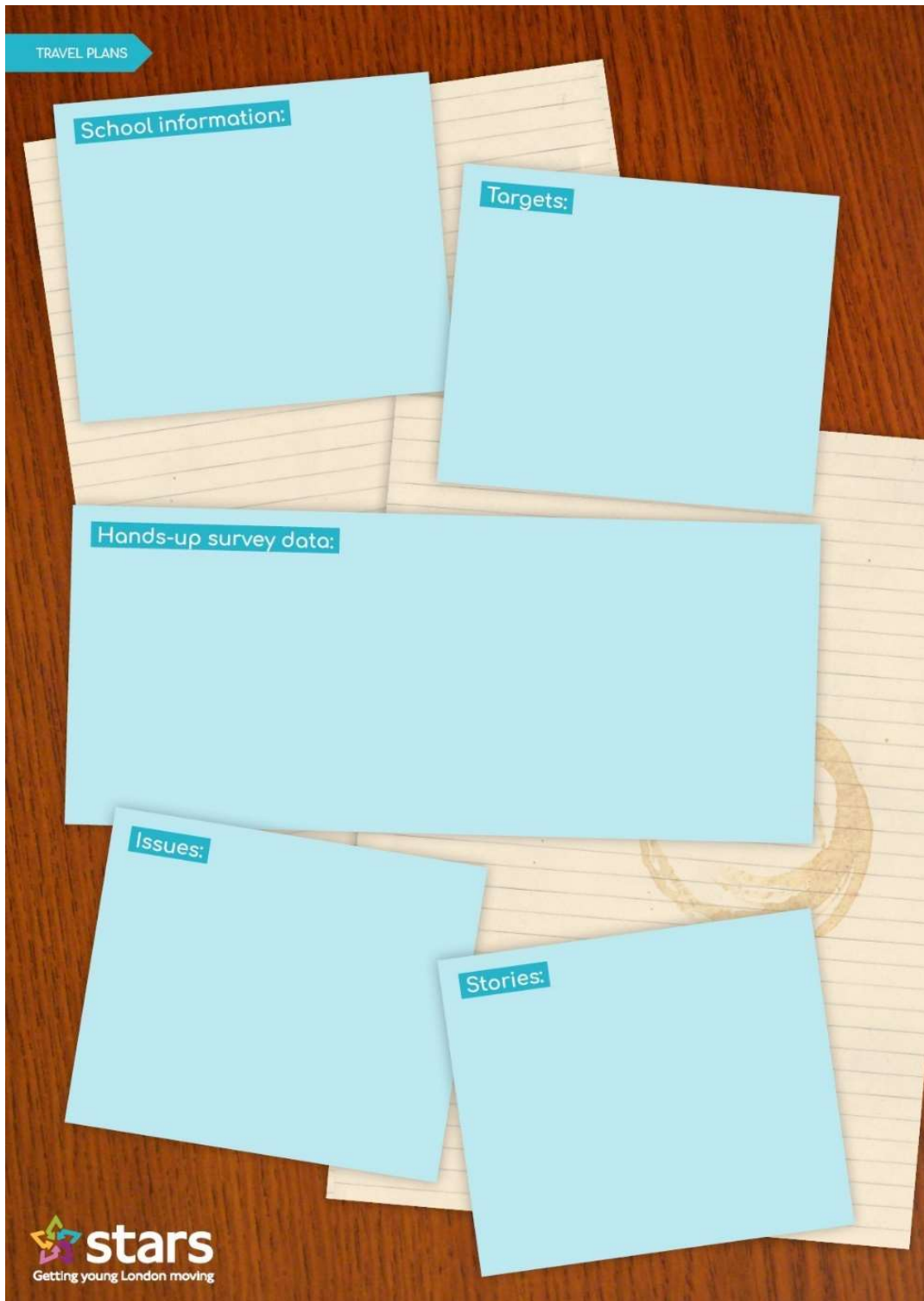
MM implicit message with a good sense of humor

ギョ

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Tool 21 MM Poster 2 (Niigata City)





**Tool 22 Travel Plan sheet (Transport for London)**  
Tool for students to identify transport issues around the school



**Tool 23 Action Plan sheet (Transport for London)**  
Tool for students to make monthly action plan for behavioral change

# My Local Station

Name:

Put a tick next to the line/lines that go through your station

- |                                        |                                                  |                                               |
|----------------------------------------|--------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Bakerloo line | <input type="checkbox"/> Hammersmith & City line | <input type="checkbox"/> Piccadilly line      |
| <input type="checkbox"/> Circle line   | <input type="checkbox"/> Jubilee line            | <input type="checkbox"/> Victoria line        |
| <input type="checkbox"/> Central line  | <input type="checkbox"/> Northern line           | <input type="checkbox"/> Waterloo & City line |
| <input type="checkbox"/> District line | <input type="checkbox"/> Metropolitan line       |                                               |

What do you use the station for?

Circle the number of platforms at the station

1 2 3 4 5 6 7 8 9 10

Circle the number of entrances/exits at the station

1 2 3 4 5 6 7 8 9 10

Nearby places of interest (e.g. an art gallery or local hospital):

What do you like best about your local station?

MAYOR OF LONDON



## Tool 24 Activity sheet for public transport (Transport for London)

Tool for students to be more familiar with transport system  
In the communities through the enjoyable activity

Practical example of utilizing on-site examination in practical learning in collaboration with subject learning

Outline of project in Osaka

<u>Grade</u>	5 <sup>th</sup> grade	<u># of class</u>	2 class	<u># of student</u>	46
<u>Theme</u>	♦ Consider smarter usage of car				
<u>Subject</u>	Social studies (society and life with cars)		<u>Class charge</u>	Homeroom teacher	
<u>Duration</u>	2005, Oct – 2005, Nov (1 month)		<u># of class</u>	7 classes	
<u>Target</u>	<ul style="list-style-type: none"> <li>♦ Learn effects of using a car on the community so that students are more interested in transport and the environment.</li> <li>♦ Check actual car usage.</li> <li>♦ Experience the “feel of the future” with environmentally friendly cars and eco-friendly cars by touching various models of such cars.</li> <li>♦ Foster the joy of working with family to reduce impact of car usage on the environment.</li> </ul>				


Composition of initiatives in Osaka

class	Children’s learning activities	Guidance/Support by teacher
-	Social studies: Our life and industry, automotive industry	<ul style="list-style-type: none"> <li>♦ Industry supporting rich living</li> <li>♦ Cars that are essential for convenient and comfortable living</li> </ul>
1	Life with car, merits and demerits	♦ Let them list down the merits and demerits, and evaluate them.
2	Home study: Weekly behavior survey	♦ Ask family members to cooperate
3	Current day-to-day life with car	<ul style="list-style-type: none"> <li>♦ Support the calculation of CO2 emission</li> <li>♦ Suggest a comparative perspective</li> </ul>
4,5	Delivery lecture	♦ Show the future utilization of environmentally friendly cars and eco-friendly cars
6	Action plan formulation	<ul style="list-style-type: none"> <li>♦ How can use a car in a smart way?</li> <li>♦ Suggest to do action items with family</li> <li>♦ Let them set action items and goals.</li> </ul>
7	Home study: Weekly behavior survey	♦ Ask family members to cooperate
8	Summary of action results	<ul style="list-style-type: none"> <li>♦ Support the calculation of the action result worksheet. Aggregate the results of action by everyone.</li> <li>♦ Make them understand that there will be a great result if actioned together.</li> <li>♦ Foster the joy of achievement.</li> </ul>

**Tool 25 MM School curriculum 1/3**

9	Recital	<ul style="list-style-type: none"> <li>♦ What should we do to maintain my lifestyle to improve the environment?</li> <li>♦ What is needed to address future environmental and public issues?</li> </ul>
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Learning action

Learning process	Children's efforts and reactions	Guidance/Support by teacher
Problem awareness ♦ Consider a society and life with cars	Consider the merits and demerits of society and life with cars ↓ Convenient and comfortable Congestion, accidents, etc. (long-term problems) ↓ Check the usage of car in your household	<ul style="list-style-type: none"> <li>♦ Industry aims to produce cars that are friendly to people and the environment.</li> <li>♦ Advise about the social problems in the long run, instead of personal benefits in the short run.</li> <li>♦ Suggest to check how often you use and what kind of effect it has.</li> </ul>
Current status of car usage ♦ Organizing and evaluating the results of vehicle usage surveys	Aggregate the results of vehicle usage survey ↓ Conversion of results in terms of CO <sub>2</sub> emissions	<ul style="list-style-type: none"> <li>♦ Tabulation of survey results; teaching CO<sub>2</sub> emission intensity by means and calculation method.</li> <li>♦ Propose a delivery lecture to learn about the existence of various vehicles, how they are actually impacted, and how the industry is working to improve the environment.</li> </ul>
Delivery lecture	Tour to an eco-car Investigate the emission of gas from various vehicles (eco-car emits clear air; diesel car emits dirty air.) 	<ul style="list-style-type: none"> <li>♦ Teach measuring methods for NO<sub>x</sub>, CO<sub>2</sub>, PM.</li> <li>♦ Examine the emission of gas from various cars and the issues for the car usage</li> </ul>
How do cars affect	Let's organize the impacts of cars on the	<ul style="list-style-type: none"> <li>♦ Present an example to explain</li> </ul>

**MM School curriculum 2/3**

<p>the environment?</p> <ul style="list-style-type: none"> <li>Let's organize the impacts of cars on the environment.</li> </ul> <p>Action plan</p> <ul style="list-style-type: none"> <li>Action plan for environmentally friendly car usage</li> </ul>	<p>environment</p> <p>↓</p> <p>Organize into a worksheet for presentation</p> <p>What should we do to reduce CO<sub>2</sub> or NO<sub>x</sub> emission?</p> <p>↓</p> <p>Let's think within current condition of car usage</p> <p>Develop an action plan for considering the smarter usage of cars"</p> <p>↓</p> <p>Share plans and goals</p>	<p>about a smarter way of using a car.</p> <ul style="list-style-type: none"> <li>Suggest to involve the parents for action to take.</li> <li>Explain how important it is to involve the parents for the activity to continue</li> </ul>
<p>Aggregation of action results</p> <ul style="list-style-type: none"> <li>Action for a week based on the action plan.</li> </ul>	<p>Calculate the amount of CO<sub>2</sub> emissions. Record your impressions.</p> <p>↓</p> <p>Compare 1<sup>st</sup> sheet and 2<sup>nd</sup> sheet. Confirm that the aggregated score of classmate make big reduction.</p>	<ul style="list-style-type: none"> <li>Prepare: calculator, CO<sub>2</sub> emission intensity.</li> <li>Prepare Excel sheet.</li> <li>Convert to an easy-to-understand index.</li> <li>Let them realize the joy of achievement is proportional to the difficulty of action.</li> <li>Confirm effects on family members</li> </ul>
<p>Recital</p>	<p>Share the effects of learning</p> <p>Make recommendations for your future life</p> <p>↓</p> <p>Share with other students</p>	<ul style="list-style-type: none"> <li>Ask what you can do to maintain the lifestyle needed to improve the environment.</li> <li>Ask what is needed to address future environmental and public issues.</li> <li>Help prepare for sharing.</li> </ul>

### MM School curriculum 3/3

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