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Making low carbon cities and communities through Light Rail Transit (LRT) – a case of Japan

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Goal 11 : Make cities and human settlements inclusive, safe resilient and sustainable

11 SUSTAINABLE CITIES AND COMMUNITIES



LRT powered by electricity can contribute to the reduction of GHG emissions of the transport system and make it more sustainable.

Transport is more than just moving people or goods from one place to another place. It is about providing a catalyst for the sustainable development of *safe, smart, efficient, affordable, inclusive, resilient environment and people friendly and sustainable transportation options for all citizens*, connecting key destination points, stimulating economic growth and improving livability of the city and the community.

Light Rai Transit (LRT) is an environment and people friendly transport system with no emissions from the vehicle. As a result, the environment pollution -air and noise pollution and greenhouse gases emission rescue significantly, which can contribute to achieve Clean/ Green/ Low-Carbon cities and communities.

LRT

Light Rail Transit

Streetcar

Tramways

Tram

Light Rail

Light Rapid Transit

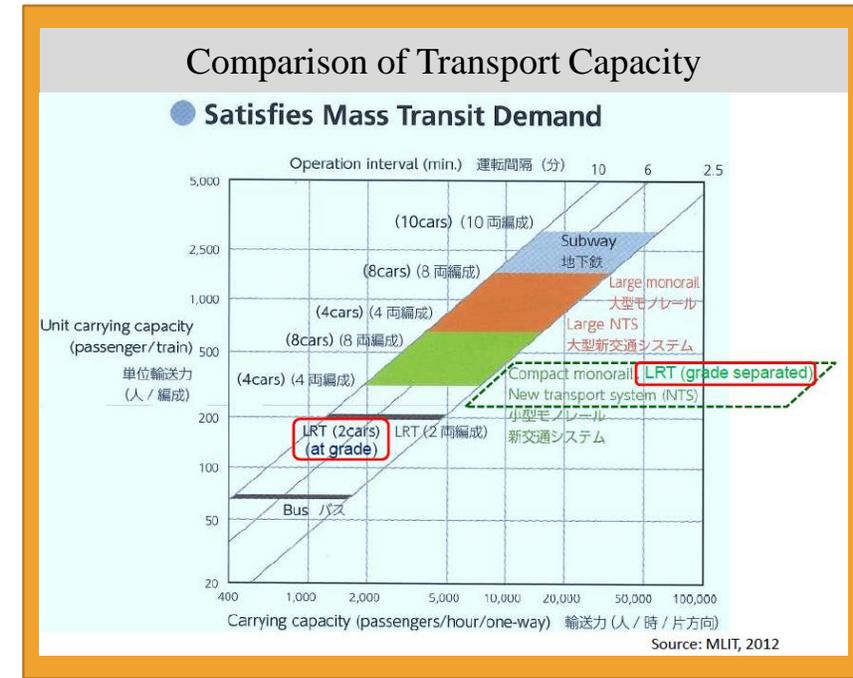


Source: Kansai Explorer / wikipedia

“Running partially or fully segregated right-of-way”, “Running underground, at-grade or elevated”, “Single or connected vehicles”, “Intermediate role between conventional Bus and MRT (Metro)”.



Source: foreign.info-toyama.com



“Light Rail Transit (LRT) is an electric rail-borne form of transport which can be developed in stages from a tramway to a rapid transit system operated partially on its own right-of-way.” - International Association of Public Transport (UITP)

LRT systems around the world

Hong Kong



Kuala Lumpur



Kansas City



TOYAMA JAPAN

Manchester city centre



Toyama emerges as a successful LRT-based transit system in Japan .



Benefits of LRT systems – working towards low-carbon cities and communities

Economic

- Suitable for *medium size cities* – patronage sufficient for LRT systems
- **Lower construction cost** compared to subways – can also use existing suburban tracks
- **Frequent services and faster speeds** – boarding and embarking from low floors are fairly smooth
- Reduce congestion

Social

- Street level barrier-free **accessibility** for elderly and disabled
- Improved **road safety**
- Better **integration and connectivity** with existing public transport system

Environmental

- Encourage people to **shift from private vehicles to public** transit -
- **Improved urban areas and centers** – livable communities
- **Improved air quality** and reduced noise pollution

Reduced carbon emissions

LOW CARBON CITIES

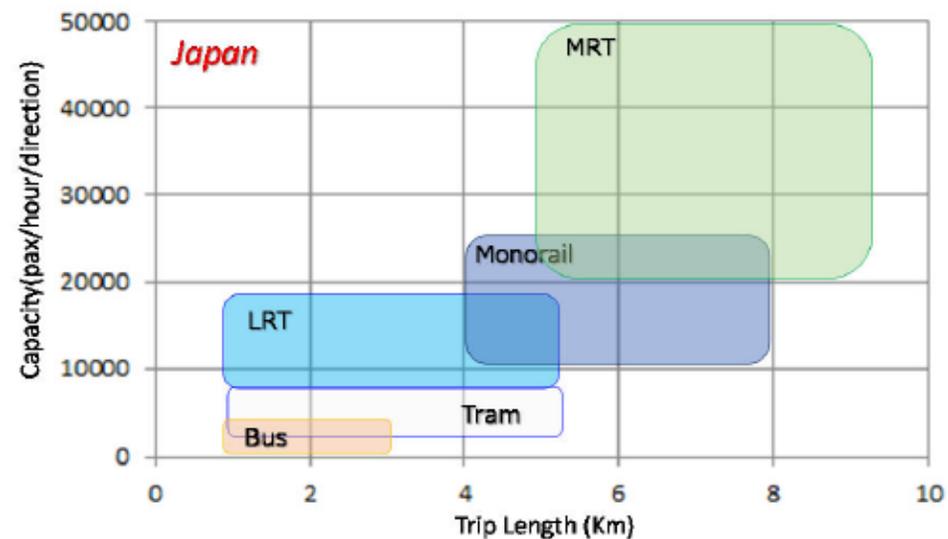


- Investments in urban transit systems essential for low carbon cities
- **LRT is a suitable low carbon transport strategy**

Japanese LRT systems

“**LRT** is a highly advanced and **sophisticated tramway** system. It employs a **low-floor** vehicle with **universal design** and sophisticated exterior, and it **runs at-grade, underground and elevated** sections. It also enables to be **inter-operability** between LRT and urban railway. LRT, therefore, can well-utilize existing urban space and **provide high quality public transport service**”. - *Ministry of Land, Infrastructure, Transport and Tourism, Japan*

Definition of public transport system in Japan



Source: AIDA et al, 2014

Hiroden streetcar, Hiroshima



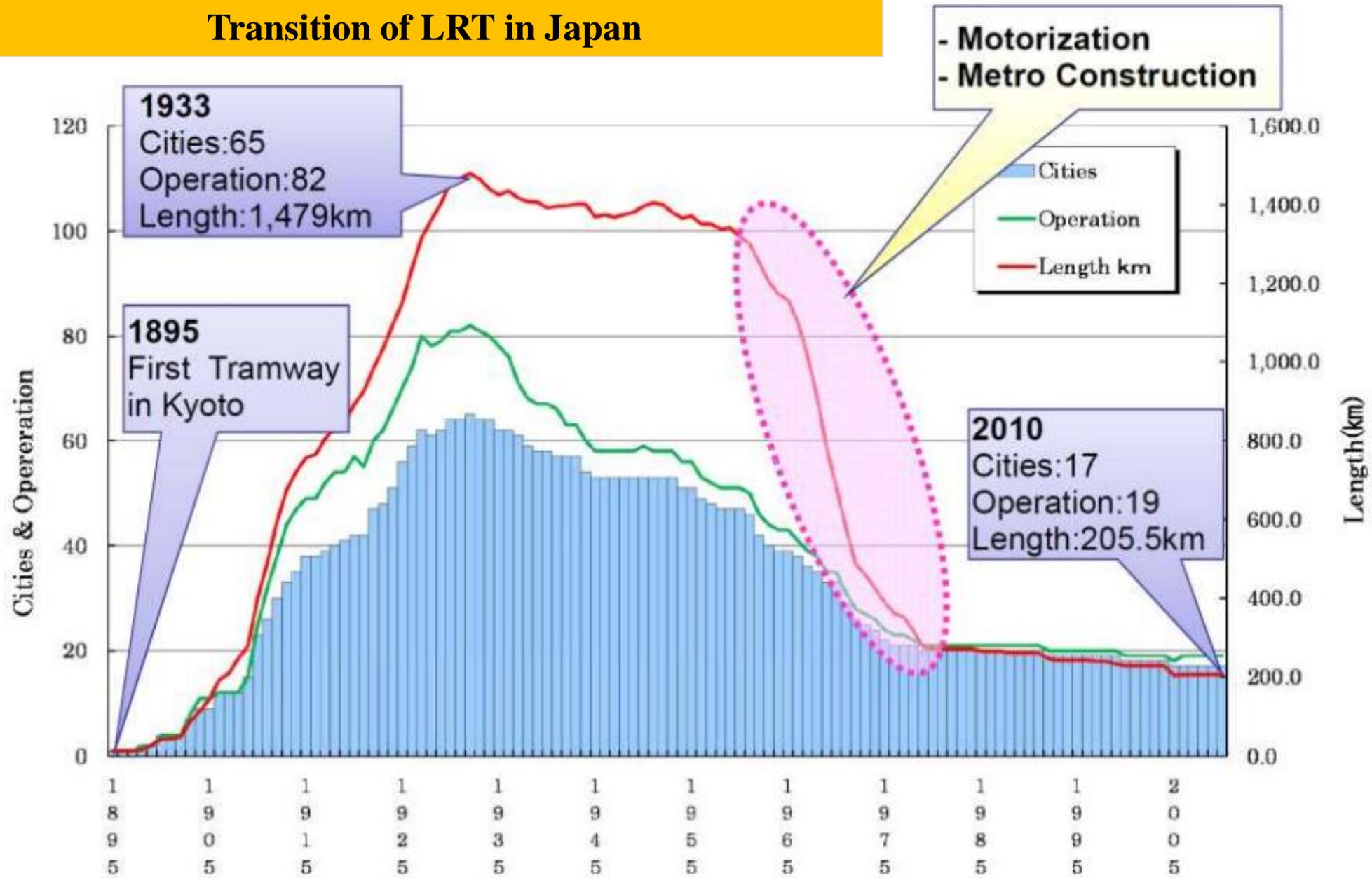
Porttram (Light rail), Toyama



Fukui LRT



Transition of LRT in Japan



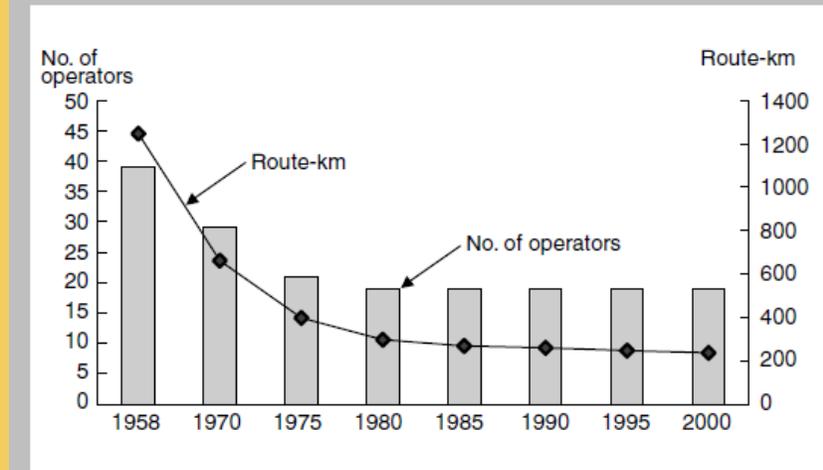
Source: Yuichi AIDA, LRT System in Japan and Its Potential in India, 8 February 2013

History of LRT in Japan

- 1 February 1895: Humble beginnings from Kyoto Electric Railway
- Growth of bus services put some local tramways out of business after WWI
- 1932 – 83 tramways, in 67 cities, operating in 1480 km
- Tramways damaged extensively during WWII
- only 3 tramcars serviceable in Hiroshima, started running in 3 days
- Contributed extensively towards nations reconstruction

Source: Utsunomiya 2014

Tramway trends in Japan



Source: *Tetsudo tokei nempo* (Annual railway statistics), Ministry of Transport.

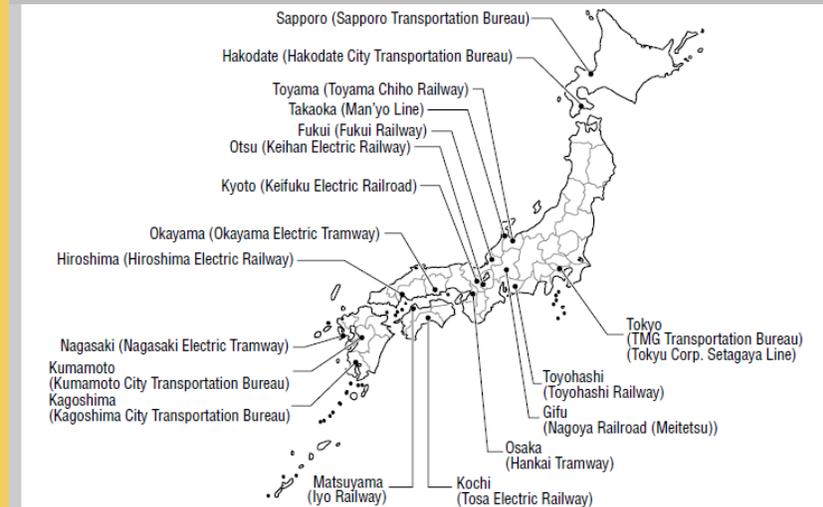
Existing LRTS in Asian Countries (2010)



Source: AIDA et al, 2014

Currently,
-19 tramway systems
-17 Japanese cities

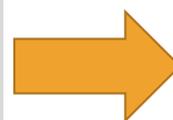
Japanese cities with tramways



Source: Utsunomiya 2014

LRT Network Chosen as Best Practice for Building Low-Carbon City : a Case of Toyama

Grand prize for **Best Practices for Low-Carbon City Creation** in 2011 by **The Promotion Council for the Low-Carbon Cities (PCLCC)**



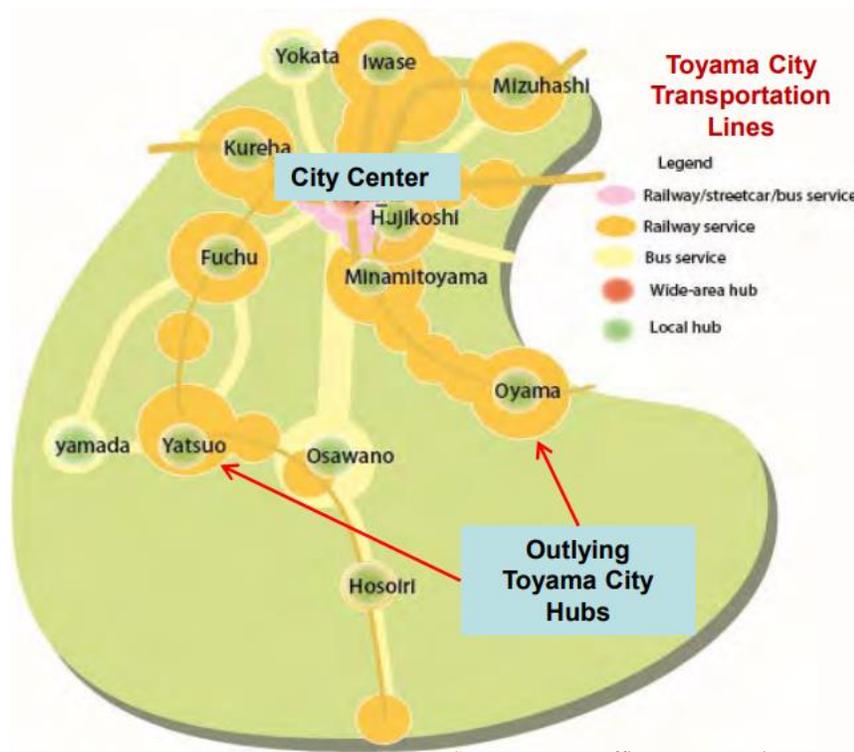
**"Light Rail Transit (LRT) Network Establishment",
Toyama City**



Create a more **compact city** with **public transportation at its core** – one of **Three Pillars of Toyama's Compact City Strategy**



- Implementations of LRT for the Toyama-ko (Toyama Port) Line and local train operations in a loop route,
- A plan to connect streetcar routes north and south of Toyama station



Source: Mayor office, Toyama city

LRT - Toyama city

- The local Japan Railways Port Line - declining numbers of passengers
- Revitalized as **“Portram”** - Japan’s first complete LRT - 7.6km
- **“Centram”** - City Tram Loop Line Project to improve downtown area and attractive urban areas - 3.4km
- Combined effort of public sector (constructs the track) and private sector (operates the business)

Features

- Low floor cars/ barrier-free stations
- Light Rail Attendants
- Vibration-dampened, lawn-covered track
- Unified design

An integrated planning approach & last mile connectivity

- Integration with Shinkansen (bullet train system)
- Integration with city **bicycle sharing system** -**“Cyclocity”**
- Encouraging residential development along transit lines
- Community development and urban renewal



“Portram”



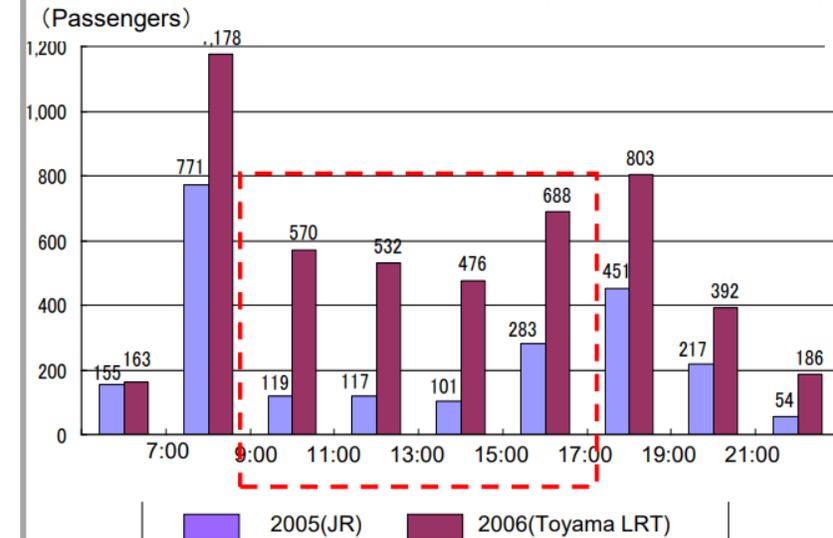
“Centram”



Effects of LRT - Toyama city

- Toyama LRT has *increased the number of daily users by 2.2 times* during weekdays and by *5.3 times in weekend*
- Significant increase in number of aged people using the system – *3.5 times increase during weekdays and by 7.4 times in weekend*
- *20% of weekday users are new user* - Encouraging modal shift to transit
- *13 % of all bus users and 11% of all private car users shift to Tram users*

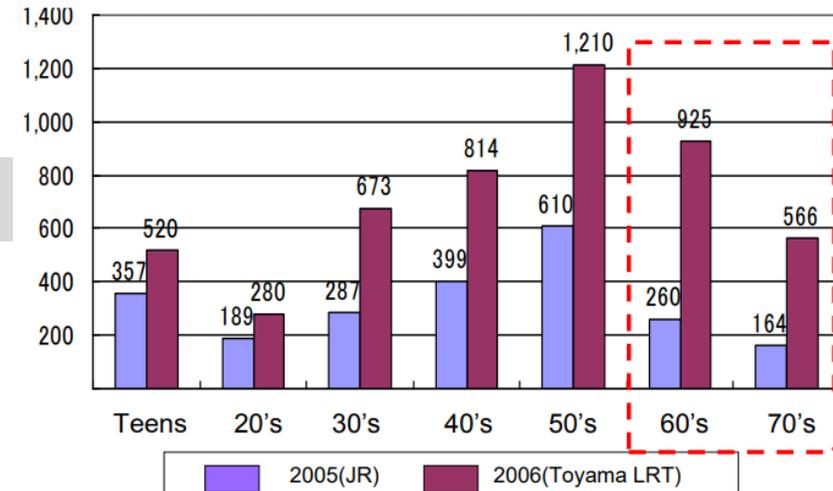
Number of passengers by time zone (weekday)



Source: Mayor office, Toyama city

Source: Utsunomiya 2016 and <http://www.mlit.go.jp>

Number of passengers by age (weekday)



Source: Mayor office, Toyama city



Environment friendly public transit system

Improved accessibility

Inclusive transport – aged passengers, differently abled passengers



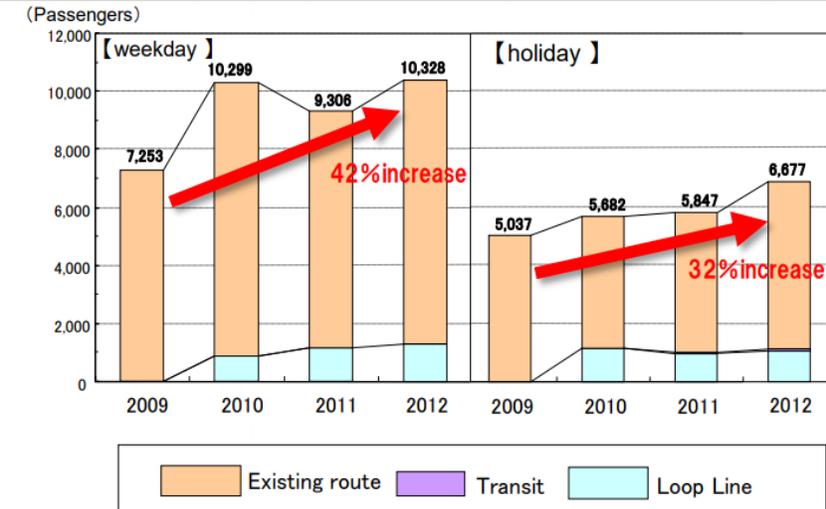
LOW CARBON CITY

<http://www.toyamashi-kankoukyoukai.jp>

Effects of “Centram” - LRT - Toyama city

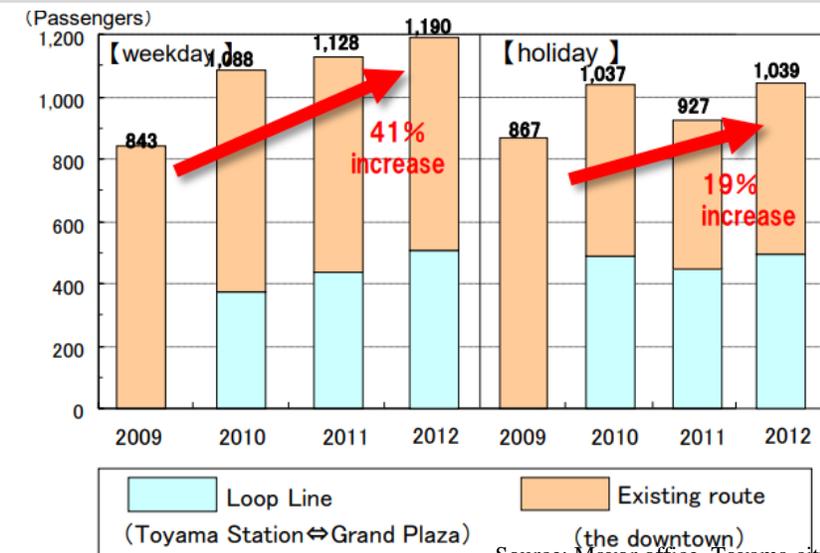
- Significant increase in *transit ridership* as shown in figure
- *Increase in city businesses*
- Number of *pedestrians increased* in 2012 by 32% compared to 2006
- *Increased Economic Activity* : City centre revitalisation – number of empty shops dropped from 20.9% in 2009 to 19.4%

City tram ridership



Source: Mayor office, Toyama city

Change in ridership between Toyama station and the downtown



Source: Mayor office, Toyama city



Source: foreign.info-toyama.com



Thank You!