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Government's Efforts in Developing Charging Infrastructures

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Government's Efforts in Developing Charging Infrastructures

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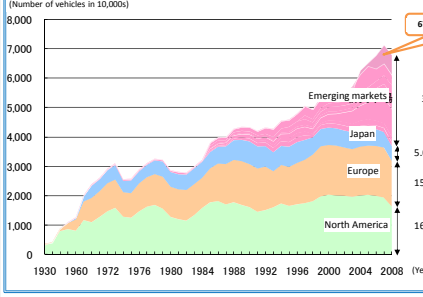
Next-Generation Vehicle Plan 2010 (Outline)

Structural change in the auto market

- Rapid growth of emerging markets and trends toward green vehicles in developed markets



(2) Emerging markets
- Increase in the vehicle-buying population, along with economic development

(1) Developed markets
- Mature, stable markets
- Diversifying users and social needs

Emergence of ultra-low-price vehicles

Trends toward greater fuel efficiency
Potential need to use different-power trains for different markets

External factors affecting the auto industry

Great changes in the competition environment
- Alliance based on environmental technology

Energy constraints
- High oil prices in the medium-to-long term

Global warming prevention
- Target of reducing GHG by 25% from the 1990 level by 2020

New industry
- Making EVs and batteries the growth driver

Six Plans

	Overall plan	Batteries	Rare metals	Infrastructure	Systems	International standards
Targets	next-gen. vehicle development and production	Secure battery R&D and technology	Secure rare metals and build resource recycling systems	Install 2 mil. normal chargers & 5,000 quick chargers	vehicles with systems (smart grid, etc.)	strategic international standardization
Action plan	• Set diffusion targets (for 2020/2030) - Next-generation vehicles account for up to 50% in 2020 - Advanced eco-friendly - vehicles (next-generation vehicles + eco-friendly conventional vehicles) account for up to 80% in 2020 • Diversify fuels • Higher-value-added parts • Promote the siting of low-carbon industries	• Improve performance of lithium-ion batteries • Develop post-lithium-ion batteries • Achieve economies of mass production by promoting EVs • Create an environment for secondary use of batteries	(Upstream) • Strategically secure rare metals (Middle course) • Develop batteries and motors free of rare metals (Downstream) • Establish battery recycling systems	• Build infrastructure intensively and systematically during the market preparation phase - Mainly in EV/PHV towns • Pave the way for full-scale diffusion - Compile EV/PHV town best practice handbook - Collaborate with the private sector (CHAdeMO Association)	• Create new business models in EV/PHV towns. • Verify systems through the Next-Generation Energy and Social System Demonstration program. • Promote international standardization and business development based on the verification results	• Establish international standards for battery performance and safety evaluation methods. • Establish international standards for charging connectors/systems. • Enhance public-private organization for standardization. • Develop human resources for standardization
	Battery R&D Target (set in 2006)		Resource Strategy Roadmap	Infrastructure Development Roadmap	International Standardization Roadmap	

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What is a " Next Generation Vehicle "?

○Next generation vehicles have various models with different powertrains.

<Electric vehicle>

Stella by Fuji Heavy Industries (July '09) | i MiEV by Mitsubishi Motors (July '09) | LEAF by Nissan (Dec. '10)

◇**On sale**

・Mileage from over 100 km to 200 km with no CO_2 emission
・Can charge with household electric outlets (100V 15A)

<Plug-in Hybrid vehicle>

Prius Plug-in Hybrid by Toyota

◇**On sale**

・A hybrid vehicle that can be charged with household electric outlets
・Electric mileage is over 10 km with no CO_2 emission

<Fuel Cell vehicle>

FCHV by Toyota | Clarity by Honda

◇**Available for lease (Toyota, Honda, and Nissan)**

・Mileage is 600 km with no CO_2 emission

<Hybrid vehicle>

Petrol-electric hybrid

Prius by Toyota | Insight by Honda

◇**On sale**
(Number of units in Japan: approx. 1M units, 90% global share) (as of April '10)

・The CO_2 emission during driving is -50% compared to petrol-run vehicles

Hydrogen hybrid

Premacy Hydrogen RE Hybrid by Mazda

◇**Available by lease**

・Zero CO_2 emission when driving on hydrogen (can switch to petrol)
・Mileage for hydrogen is 200 km

<Clean Diesel Vehicles *>

CX-5 by Mazda | X-Trail by Nissan

◇**On sale**
(Mazda, Nissan, Mitsubishi, Mercedes Benz, BMW)

・The CO2 emission during driving is -20% to -30% compared to petrol-driven vehicles
・The mileage is 1,000 km
*Subject to 2009 Regulations on Emission (post new long term regulations)

<CNG (Natural gas) vehicles>

Elf by Isuzu

◇**On sale**

・The CO2 emission during driving is less than petrol-driven vehicles
・UD trucks are also on sale

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Targets of EV Charger installation: How we deploy the charging infrastructure?

Targets for 2020

Normal Chargers (NC): 2 Million
Quick Chargers (QC): 5,000

- EVs should basically be charged by NC at night.
- A certain number of QC should also be installed as a "safety net".

How do we start?

At the Market Preparation Stage, we build infrastructure intensively and systematically mainly in EV/PHV towns

- Establish infrastructure development guidelines
- Compile EV/PHV town best practice handbook (including business models)

→ **Pave the way for the Diffusion Stage**

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Outline of the EV&PHV Town Concept

Outline

○The "EV&PHV Town Concept" is a model project for a demonstration experiment toward full-fledged dissmilation of EV/PHV, which is formulated in the "Action Plan for Achieving a Low-Carbon Society".

○Creating initial demand for EV/PHV requires the intensive development of charging infrastructure and public awareness activities. Thus, under the concept, local government that are taking the lead in the penetration of EV/PHV were selected as model regions ("EV&PHV Town").

○In each EV&PHV Town, intensive development of environmental infrastructure will be pursued for the introduction of EV/PHV in cooperation with local enterprises. From this, penetration models that take regional characteristics into account will be established and then applied to all areas of Japan.

Arrival point at 2011

○ Within the EV / PHV town planning, each EV and PHV town will carry out plan specification, plan execution, and result-sharing information to achieve each aim and objective.
○ Officially issue *Best Practices Handbook Volumes 1 and 2* as a deliverable of the EV / PHV configuration

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Aims of EV&PHV Towns (examples)

○The following are examples of objectives behind EV&PHV Towns' efforts to promote EV/PHV.

・Environmental improvement	 	To prevent global warming and Emissions by promoting EV/PHV
・Development of regional manufacturing	 	To develop regional manufacturing as a benefit of EV/PHV promotion
・Development of regional tourism	 	To create new added value in the tourism field by promoting use of EV/PHV as rental cars and taxis.
・Services for local residents	 	To improve living and transport conditions by establishing a regional environment that facilitates purchase and use of EV/PHV.

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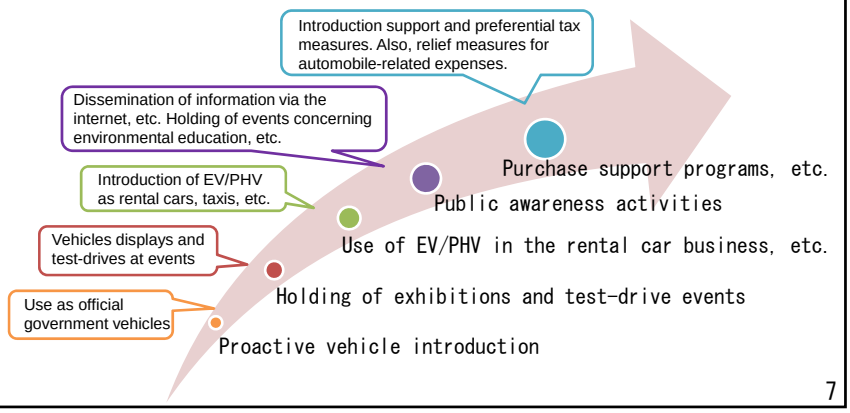
Measures for generating initial demand listed in Best Practices Handbook

【Measures for generating initial demand】

- Proactive introduction of EV/PHV
- Test-drive events and exhibitions
- EV car-sharing, rental cars, taxis
- Public awareness activities based on use of logo, website, etc.
- Introduction subsidies / preferential tax treatment
- Other preferential measures（parking discounts, expressway discounts, etc.）



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Initiatives in semi-mountainous regions

○ In increasingly isolated regions, the number of gas stations is declining, which forces residents to drive long distances for gas. Here, EV/PHV, which can be charged at home, could be a suitable alternative.
○ Efforts are also underway to electrify light trucks that are in high demand in rural regions.

Participatory demonstration of next-generation vehicles in a semi-mountainous regions: Gifu Prefecture

1) The semi-mountainous areas of Takayama City, Gero City, and Nakatsugawa City were selected as demonstration regions

Three elements that characterize semi-mountainous regions were defined: **"cold region," "large elevation differences,"** and **"few gas stations."**

2) Three participants were recruited and selected from each region (total of 9 participants) using the Internet and other means. The participants were lent EV/PHV for one month periods during the spring, summer, autumn, and winter.

3) From results obtained from the spring demonstration, no obvious disadvantages attributable to semi-mountainous characteristics were seen, while the vehicles' advantage as a means of overcoming the problem of increasingly sparse gas stations by reducing fuel costs was clearly evident. In the future, further testing will determine the effect of air conditioner/heating use during the winter.

The average total distance driven by all participants during the demonstration was large at 1,140 km per month. At the same time, the average amount that fuel costs were reduced was 9,000 yen per month (indicating the vehicles' large effect in reducing fuel costs).

An improved EV light truck: Tottori Prefecture

A light truck owned by the prefecture that was modified into an EV

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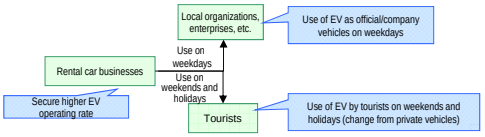
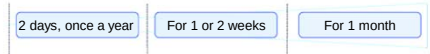
ＥＶ tourism ： Aomori Oirase Gorge Park & EV Ride

○Oirase Gorge in Aomori Prefecture is the only area of Japan's 29 national parks where a national highway passes through the middle (along the gorge) of a specially protected area. This makes expanding restrictions on the passage of private vehicles in the gorge essential to ensuring its appropriate use. However, a delay in the construction of a bypass route presents a problem here.
○Consequently, Aomori Prefecture is studying a system ("park & EV ride") that will encourage people to change to electric vehicles when restrictions on private vehicles are in place.

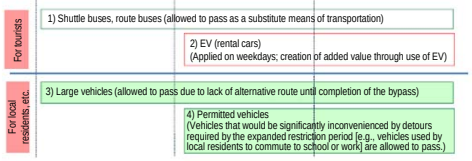
Proposed model for a "park & EV ride" system



■ Expanded frequency of restriction application (conceptual image)

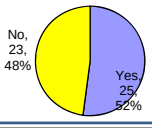


■ Expanded scope of restrictions on private vehicles (vehicles allowed to pass)



Questionnaire survey of participants in a test-drive event held during restrictions on private vehicles

Question: Would exemption of EV from private vehicle restrictions motivate you to purchase an EV?



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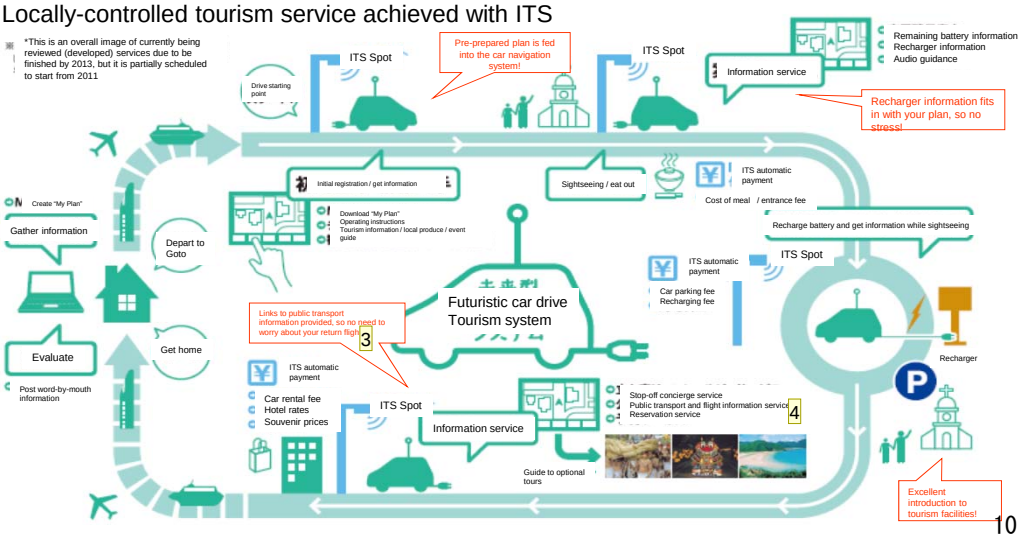
Futuristic Car Drive Tourism System: Car navigation system of the future in Goto, Nagasaki

The aim of this project is to achieve a tourist service system that is kind to the environment and makes full use of the attractiveness of the region through a combination of electric vehicles (EV) and an intelligent transport system (ITS).
It helps to provide tourism information more efficiently and easily at remote islands with many barriers to information by offering an excellent service using a car navigation system and other media to deliver information from the region.
It is hoped that constant improvement of this service will promote repeated use by customers.

Locally-controlled tourism service achieved with ITS



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Slide 10

3 この「return flight」は「帰りの便」の訳です。「便」を「飛行機の便」と解釈して翻訳しましたが、ご確認ください。
Stuart Healey, 1/2/2013

4 この「Public tansport and flight information service」は「公共交通運航情報サービス」の訳です。「公共交通」と「運航」を別々にして「運航」は飛行機の便と解釈して翻訳しましたが、ご確認ください。
Stuart Healey, 1/2/2013

RURUB
Special Edition

Let' Take an EV and Let's go out
s go out

Eco-drive on EV!

North Tohoku welcomes you with the great nature and gourmet foods.
Aomori

Enjoy fully the extensive area at the foot of Mt. Fuji
Shizuoka

You can locate every power charging station in popular tourist spots EV power power charging station MAP attached

Environmental-friendly

EV fast power power charging station

Gorge yourself, and play hard!
Osaka and Wakayama

Center of Kyushu preserves historic sites and the great nature
Kumamoto

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Challenges in Promoting Battery Charger Infrastructures

Issue 1: Must be carried out systematically and efficiently (establish an organized method)

- ○ There is no efficient organized method
- ○ There are no agencies such as the local authorities that are taking part in a systematic development

Issue 2: Areas to set up normal battery chargers

- ○ Difficult to set up in housing complexes such as condominiums
- ○ Is important to promote normal battery chargers that users can use safely and are compatible to vehicles

Issue 3: Secure convenience for users

- ○ Information is cluttered and is confusing for the users
- ○ Billing business

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Subsidy for EVSE Development

FY2012 Supplementary Budget US$1.14 billion.
(1 USD = 88.1 JPY equiv.)

Objective

Purpose

Government will make this subsidy in order to encourage development of charging stations for EV and PHEV, so as to promote expansion of EV market , which contribute to further economic growth of Japan.

In particular, by subsidizing a part of expenses for purchasing and installment, Government will support further development of EVSEs in areas below:

- Pathway (gas station, convenience sore, roadside rest area.)
- Destination (shopping center, office building, amusement park)
- Home/Office (parking of condominium or apartment building)

Scheme

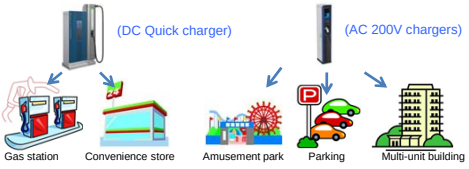
Set up a fund → Govt. → Private sector institution

Subsidize (2/3 or 1/2) → Private companies

Methods and Criteria

In order to coordinate region-wide development, encourage efficient deployment and ensure availability to public, developments based on criteria below will be favored in terms of subsidy rates.

1. Development based on “Deployment Plans” made by municipalities or Highway Public Corporations: subsidized **2/3 of purchasing cost and installation cost.**
2. Development open to public but not based on “Deployment Plans”: subsidized **1/2 of purchasing cost and installation cost.**
3. Installation to parking of multi-unit buildings: subsidized **1/2 of purchasing cost and installation cost.**
4. Other deployment: subsidized **1/2 of purchasing cost.**



Surveys Leading to Development of Model Plan

1. Basic Concept

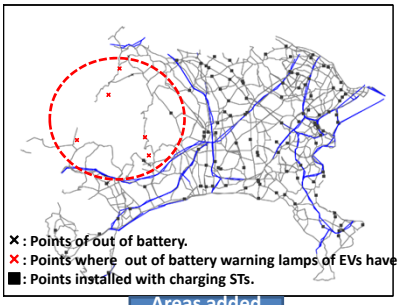
Through traffic simulation, have EVs run in a certain district, and install charging facilities at the locations where the probability of electrical shortage is the lowest.
Taking into account situations where the probability of electrical shortage falls under 1%, verify where charging facilities are set up.

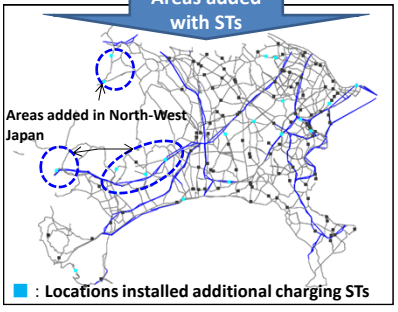
2. Main Preconditions of Traffic Simulation

○At the point where the remaining battery becomes 8kWh, determine if the EVs can get to the destination or not.
If able to reach destination, head for destination.
If not able, head for the nearest charging facility.
(Electrical shortage is the situation where EVs could not reach the nearest charging facility where they headed for.)
○ As for the running quality of EVs, use the running data of about 500 cars.

○Take also into account road grades, state of traffic congestion, and whether any equipments are used.

○Charging facilities can be used for 24 hours, without no waiting time for charging.





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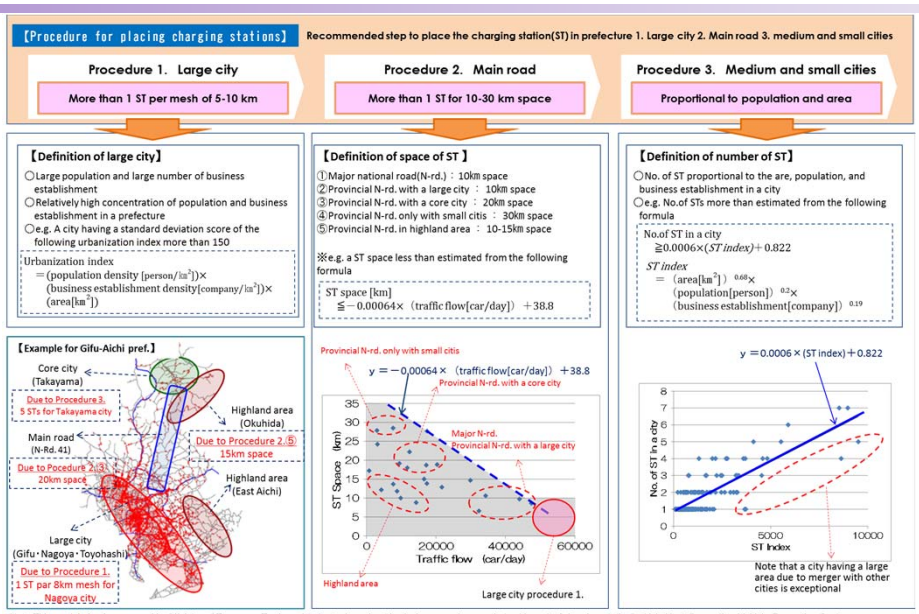
Model Plan for Development of Charging Infrastructures



Note:This model plan is proposed by Ministry of Economy, Trade and Industry based on"Analysis research on optimized layout of charging station" which Next Generation Vehicle Promotion Center commissioned Central Research Institute of Electric Power Industry in the framework of the clean energy vehicle promotion program. This analysis research is based on a simulation result to minimize the No.of EVs running out of electric power under an assumption. Hence, this model plan dose not always ensure the charging station layout enough to keep EVs from running out of electric power. Other strategy for developing charging infrastructure is also acceptable, because this model plan is based on just one simulation result.

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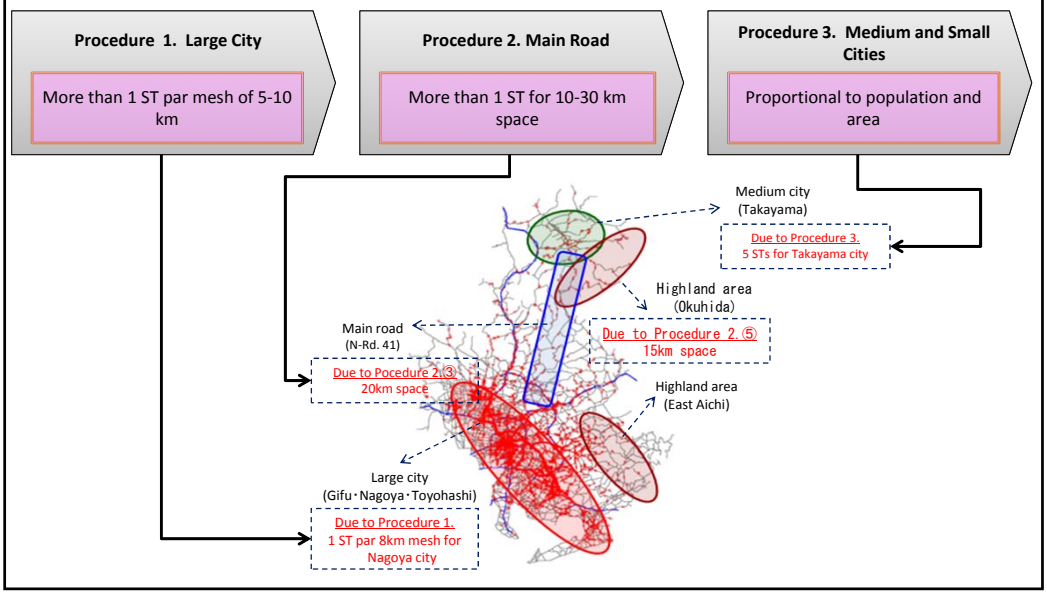
Outline of Model Plan

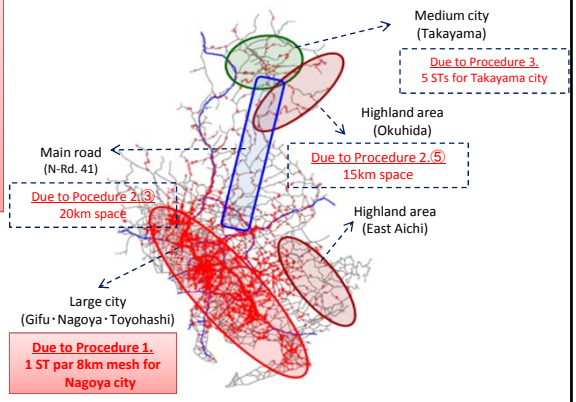


Procedure 1. Large Cities

【Definition of large city】

○Large population and large number of business establishment
○Relatively high concentration of population and business establishment in a prefecture
○e.g. A city having a standard deviation score of the following urbanization index more than 150

Urbanization index
＝(population density [person/km^2])×
(business establishment density[company/km^2])×
(area[km^2])



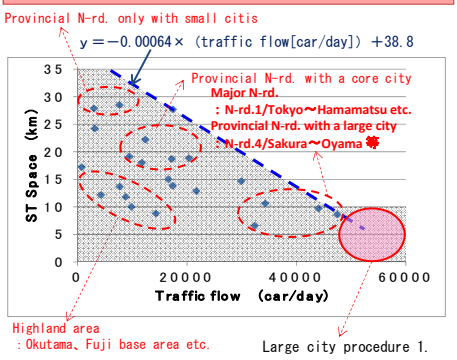
Procedure 2. Main Roads

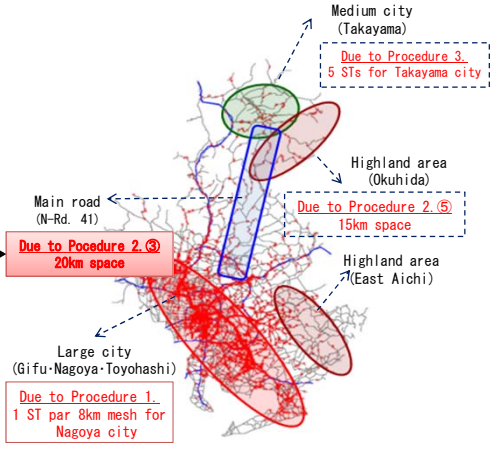
【Definition of space of ST】

①Major national road(N-rd.) : 10km space
②Provincial N-rd. with a large city:10km space
③Provincial N-rd. with a core city :20km space
④Provincial N-rd. only with small citis:30km space
⑤Provincial N-rd. in highland area:10-15km space

※e.g. a ST space less than estimated from the following formula

ST space [km]
≦－0.00064×（traffic flow[car/day]）＋38.8





Procedure 3. Small and Medium Cities

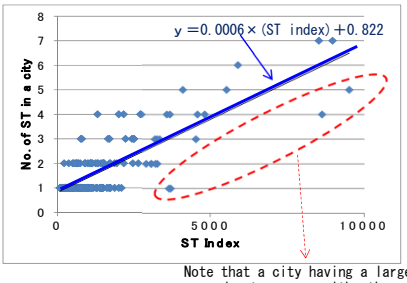
【Definition of number of ST】

○No. of ST proportional to the are, population, and business establishment in a city

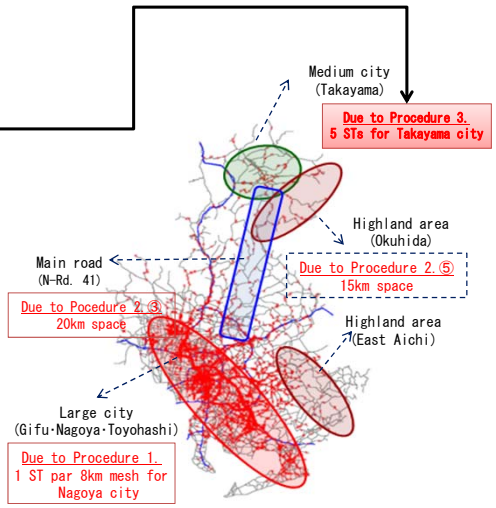
○e.g. No.of STs more than estimated from the following formula

No.of ST in a city
≧0.0006×(*ST index*)+0.822

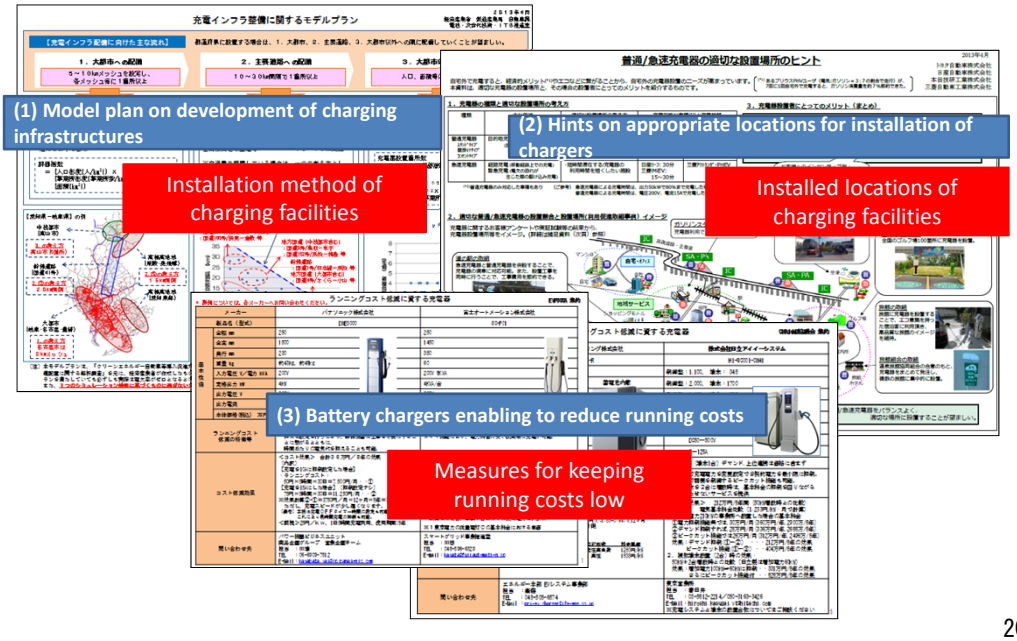
ST index
＝ (area[km^2]) $^{0.68}$×
(population[person]) $^{0.2}$×
(business establishment[company]) $^{0.19}$



Note that a city having a large area due to merger with other cities is exceptional



Information Provided by METI to Municipals, etc.



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