

Development of Businesses Using Smart Grid Technologies in Japan



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My profile

2012 - present: Project Professor, Graduate School of Business Administration,
Keio University (Keio Business School)

2002 - present: **Dream Incubator**

- 2012 – present: Senior Advisor
- 2006 - 2012: Operating Officer
- 2002 - 2006: Senior Manager

2001 - 2002: Research Manager, Nokia Research Center, **Nokia**

1998 - 1999: Senior Engineer, Optical Access R&D Center (Bell Laboratories),
Lucent Technologies

1995 - 1998: Staff Engineer, Semiconductor Sector, **Motorola**

Ph.D. and MS in Materials Science and Engineering from **the University of California, Los Angeles (UCLA)**

BE (Bachelor of Engineering) in Metallurgy from **the University of Tokyo**



Overview of Keio Business School (KBS)

KBS is Japan's oldest business school founded in 1962.

KBS provides programs which offers MBA, EMBA and Ph.D. degrees.

KBS is the only business school in Japan accredited by two major international accreditation organizations, AACSB International and EFMD EQUIS.



History of the smart city project in Japan

- Jan., 2009: My colleague and I proposed the smart city concept to METI (Ministry of Economy, Trade and Industry) when I was working for Dream Incubator (DI) Inc.
- Mar.~Aug., 2009: DI developed public policies for the smart city project with METI.
- Apr., 2009 ~Mar., 2010: DI worked on planning for the projects with Mitsubishi Estate and Toyota Motor.
- Apr., 2010 ~Mar., 2015: The smart city projects were executed in City of Yokohama, Toyota City, Keihanna (Kyoto) and City of Kitakyushu.



Overview of Dream Incubator (DI)

DI was founded in 2000 by the head of Boston Consulting Group Japan, Seoul and Tokyo.

DI went public in 2002 and is now listed on the 1st section of Tokyo Stock Exchange.

DI has offices in Japan, Vietnam, China and India.

DI's current main businesses are strategic consulting for big companies and investment and management support for startup companies.

DI is #1 in the new business development consulting segment in Japan and making various public policies regarding new industries.



Issues in Japan in 2009

Japan has various good element technologies in the energy and environment field but it was difficult to make business models with only element technologies because most element technologies were higher cost technologies.

Thus, the following points seemed to be important.

- To consider business models by combining various element technologies
- To collaborate with public policies

Also, to export Japanese technologies to foreign countries, it is important to lead international standardization.

Policies for smart cities in Japan



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平成22年度 経済産業政策の重点課題の骨子

基本認識 (6つの「落とし穴」)

- ①需要蒸発、需要飽和： 需要が無く、モノが売れない
- ②価格下落： これまで通りのビジネスモデルでは収益を確保できない
- ③内需か外需か： 内需、外需いずれかの片翼飛行では成長戦略は描けない
- ④資源価格の乱高下： 資源価格の乱高下は成長の妨げ
- ⑤将来不安： 「将来への不安」が「現在の活動」を萎縮させ、負のスパイラルに
- ⑥量質・雇用のまだら模様： 企業規模、地域、業種間で量質や雇用にばらつきがあり、自律的な景気回復モードに入れない

危機の後を見据えた取組

足元の危機への対策

I. 第一の柱：「危機の後」を見据えた、新しい需要・雇用創出策

- ✓「次世代社会システム」の実証を行い、課題解決に向けた処方せんの日本型モデルを世界に示すことで、「新しい需要」を創出する。
- ✓「低炭素社会」、「安心・健康長寿社会」、「ジャパン・クリエイティブ」、「農商工連携」の重点4分野において、技術と施策を業中投入して、「新しい需要」を創出する。
- ✓オープンイノベーションによる技術と人材の流動化と、人材の成長の基礎を強化し、産業の競争力強化を図る。
- ✓オープンイノベーションによる技術と人材の流動化と、人材の成長の基礎を強化し、産業の競争力強化を図る。
- ✓単品の製品・部品売り切り主義から卒業し、新興国のインフラ需要を「システムで」、「コラボで」開拓するとともに、ボリュームゾーン市場を獲得する。

II. 第二の柱：「暮らしの安心」、中小企業・地域社会の安心を守る、安心防衛策・危機克服策

- ✓雇用不安の解消、社会保障の持続可能性の確保等により、生活者が抱えている不安を軽減し、消費拡大と経済成長の好循環を生み出す。
- ✓消費拡大を裏打ちする質の高い雇用機会の拡大を図るとともに、必要とされる多様かつ高度な人材を育成する。

日本発「課題解決型社会システム」のモデルを世界へ

「低炭素社会」、「農商工連携」など4つの重点分野で新需要を創出

新興国のインフラ需要やボリュームゾーン市場を開拓

The top priority policy in METI in 2010

150 BJPY was invested in 4 areas to develop smart city business models.

Key points of the policies for the smart city projects

1. Vision

- “Smart city concept”



2. To grow promising technology modules

- (1) To collect
- (2) To select
- (3) To grow intensively



3. Smart city management

- System to grow Japanese strengths largely and continuously

Essences of the smart city concept

Until 2009: Support of local cities

Selection of technologies

Various technologies with small amounts of budget

- Government selects some from bottom-up items.

Scale of experiments

Experiments with single technology

- Connection with the other technologies not considered

Continuation

None

- Activity discontinued as a result

Smart city concept

From now on: Industry producing

Only technologies with which Japan can win businesses in the world

- Government selects technologies proactively.

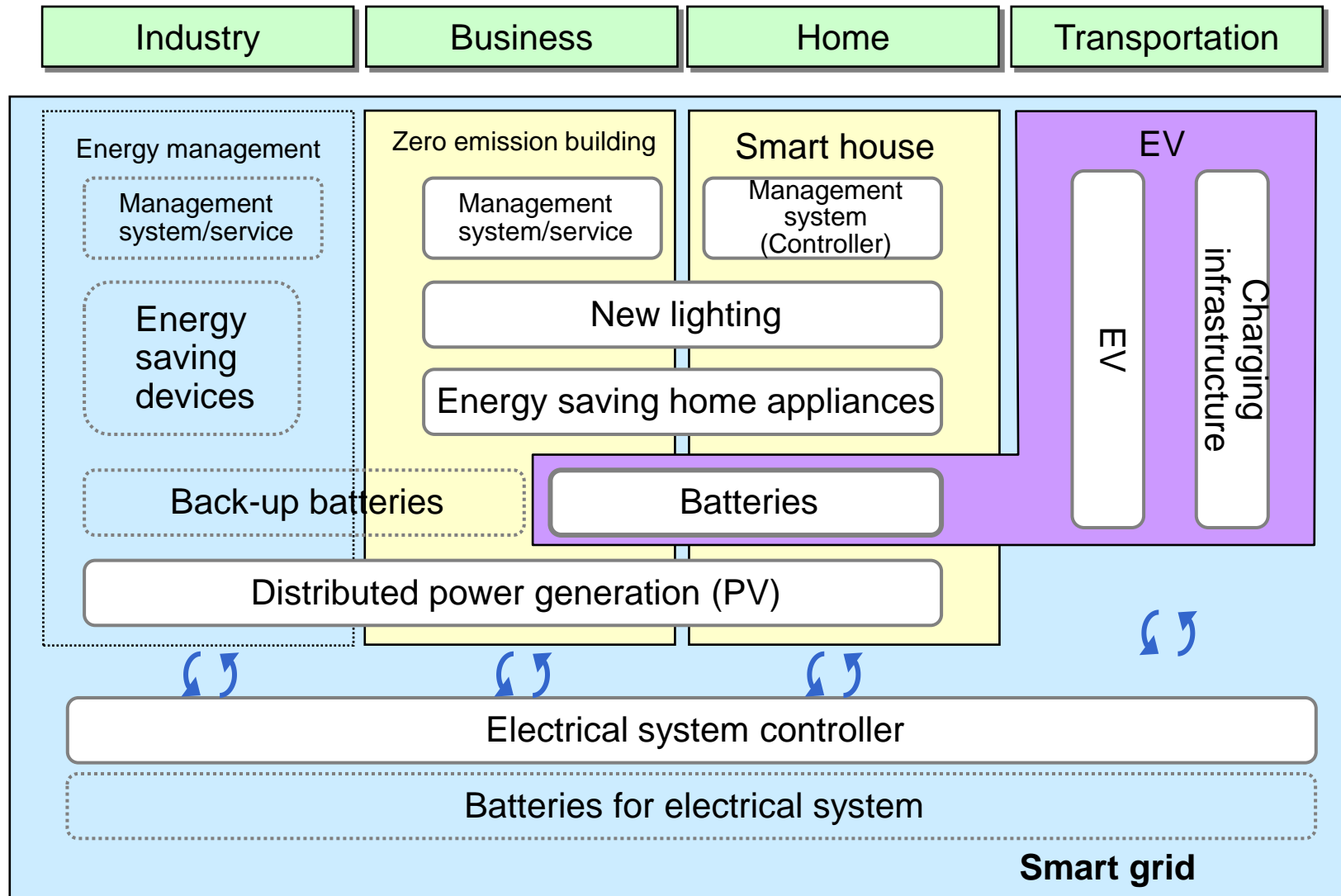
Experiments with combined technologies

- Create a model city

Have smart city management function

- Based on the future business models

Promising technology modules based on the future business models

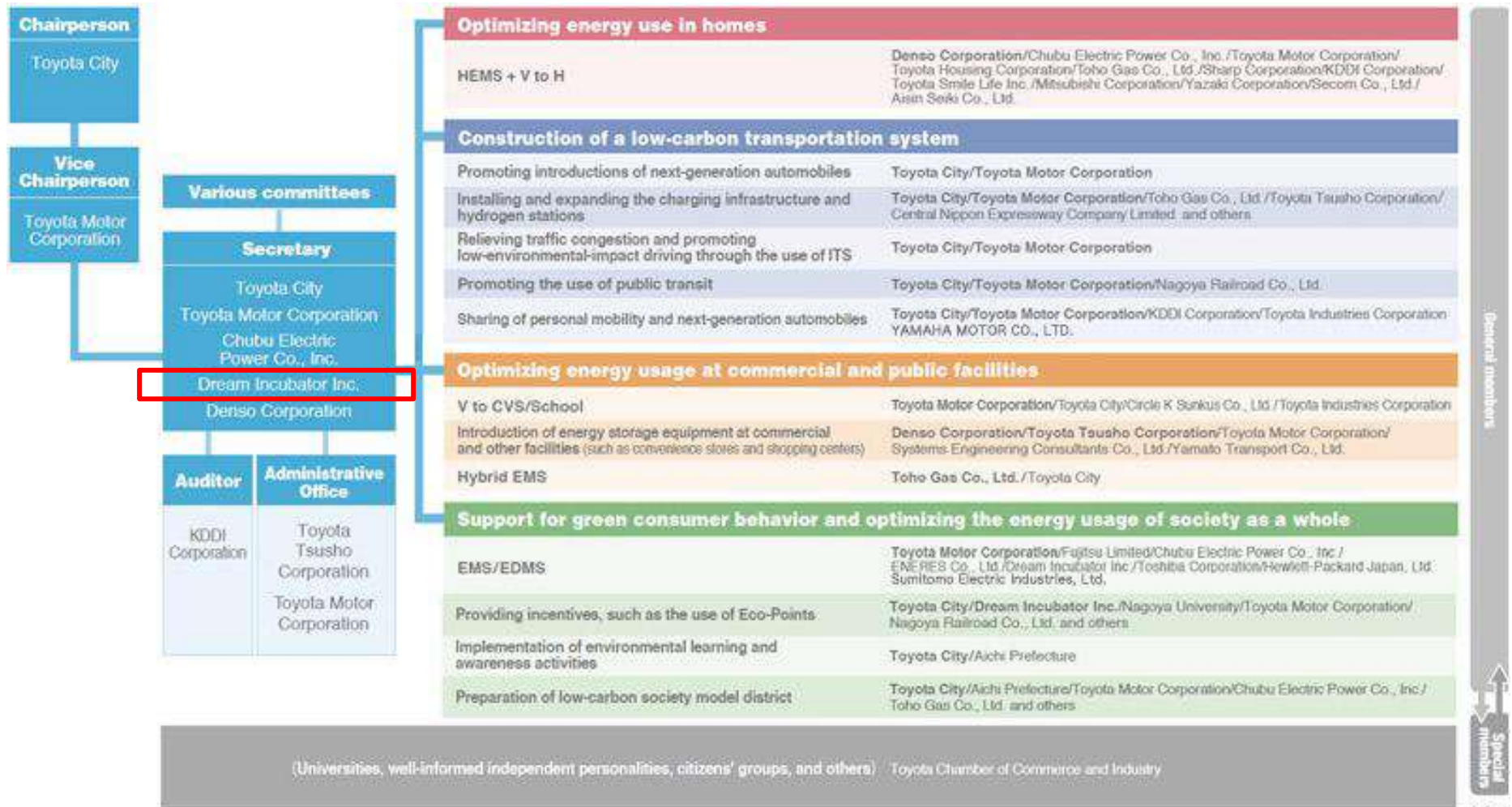




4 areas among 19 areas were selected

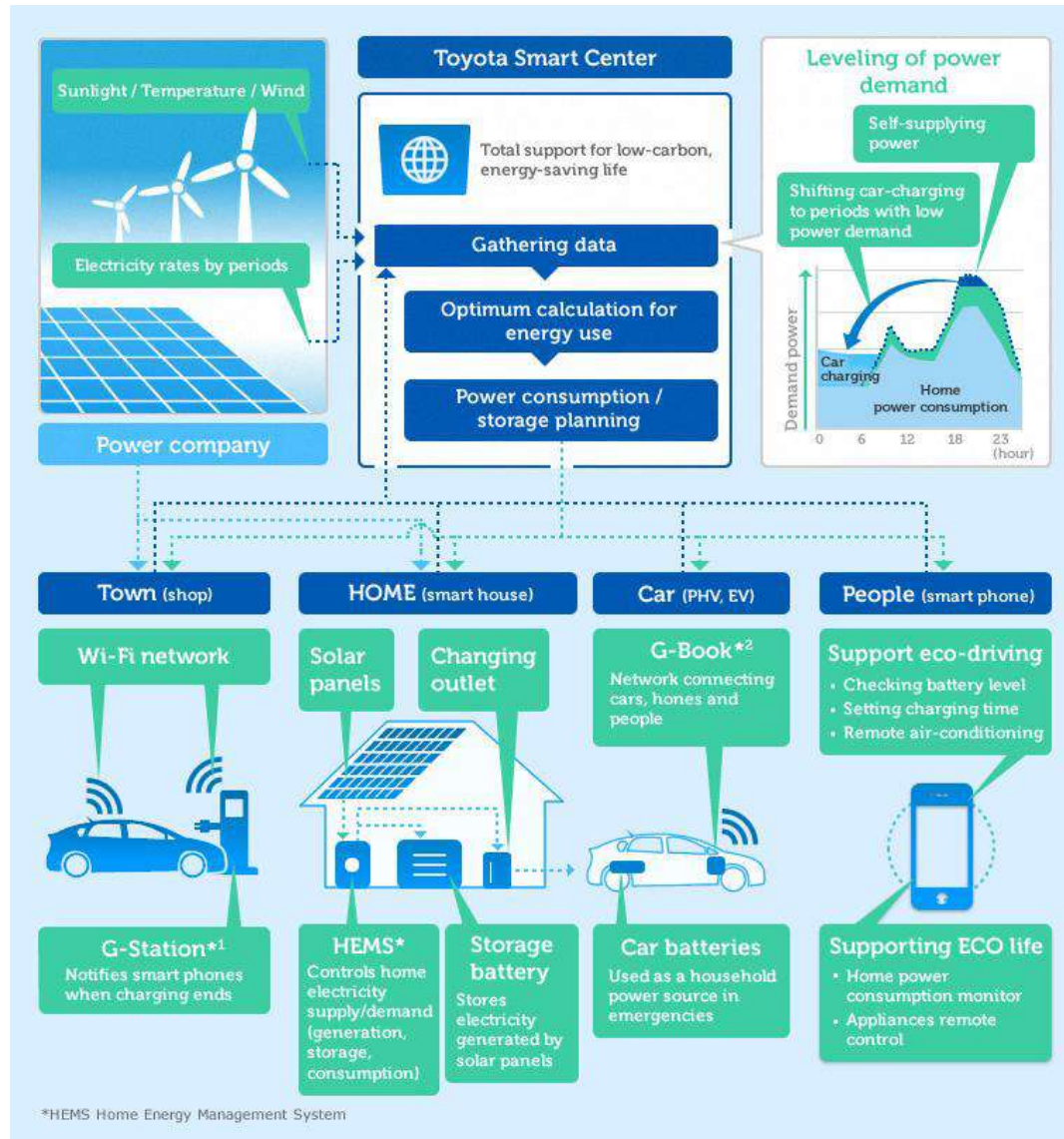
1. Sapporo City
2. Aomori Prefecture
3. Tsukuba City
4. Kashiwanoha
5. Koto Ward
6. Otemchi/Marunouchi/Yurakucho
7. **Yokohama City**
8. **Toyota City**
9. Gifu Prefecture
10. Nanto City
11. Sapporo City
12. Kyoto City
13. **Keihanna**
14. Osaka Prefecture
15. Kobe City
16. **Kitakyushu City**
17. Fukuoka City
18. Goto City
19. Minamata City

Organization of the smart city development project in Toyota City



* Bold characters represent captain companies in sub modules.

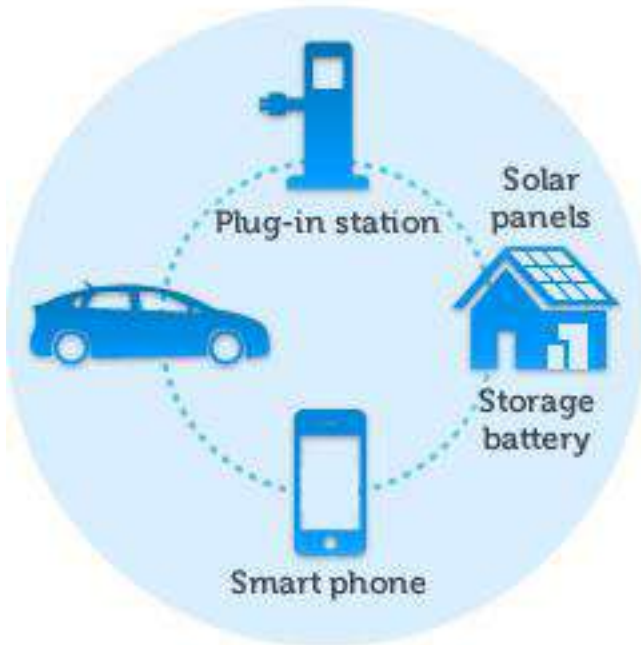
Outcome of the project: Toyota's smart grid



Toyota Smart Center

1

PHV/EV charging and home electricity use are properly controlled.



2

Each home's power use is monitored by the information center, the "Smart Center".



3

Controlled by the "Smart Center", electricity is efficiently used in the entire community.



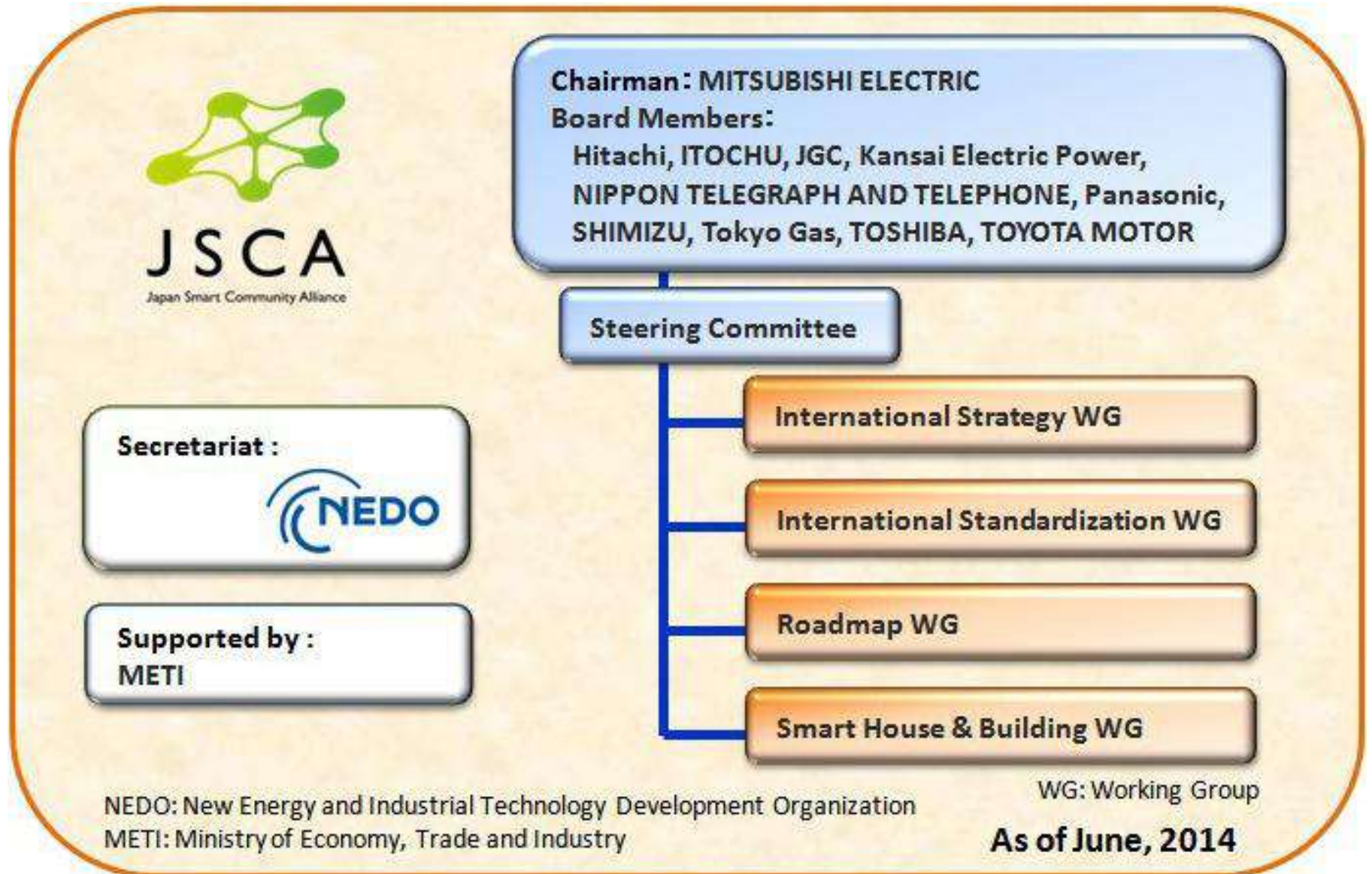


Japan Smart Community Alliance (JSCA)

In order to support the future growth of Japan's leading energy-saving and new energy technologies, an organization composed of domestic companies needed to be formed that addresses common issues. For this purpose, the Japan Smart Community Alliance (JSCA) was established in April 2010 to accumulate knowledge and promote collaboration between the public and private sectors.

JSCA aims to contribute to the domestic and international dissemination of smart communities, which are based on the integration of innovative energy and social infrastructures, including smart grids. JSCA is working to facilitate the development of smart communities through collaborative efforts of the public and private sectors in Japan by planning and implementing activities that contribute to Japan's economy. Such activities include fulfilling local government needs, overcoming potential barriers and issues as well as sharing information on public financing for smart grid technology development.

Organization of JSCA





JSCA's international alliances

- April 2010: Joined Global Smart Grid Federation (GSGF) as a founding member
- April 2010: Concluded MOU with GridWise Alliance and held a joint workshop
- September 2011: Concluded MOU with Korea Smart Grid Association (KSGA)
- February 2012: Concluded MOU with SmartGrid GB (SGGB) and held a joint workshop
- March 2012: Concluded MOU with Smart Grid Interoperability Panel (SGIP)

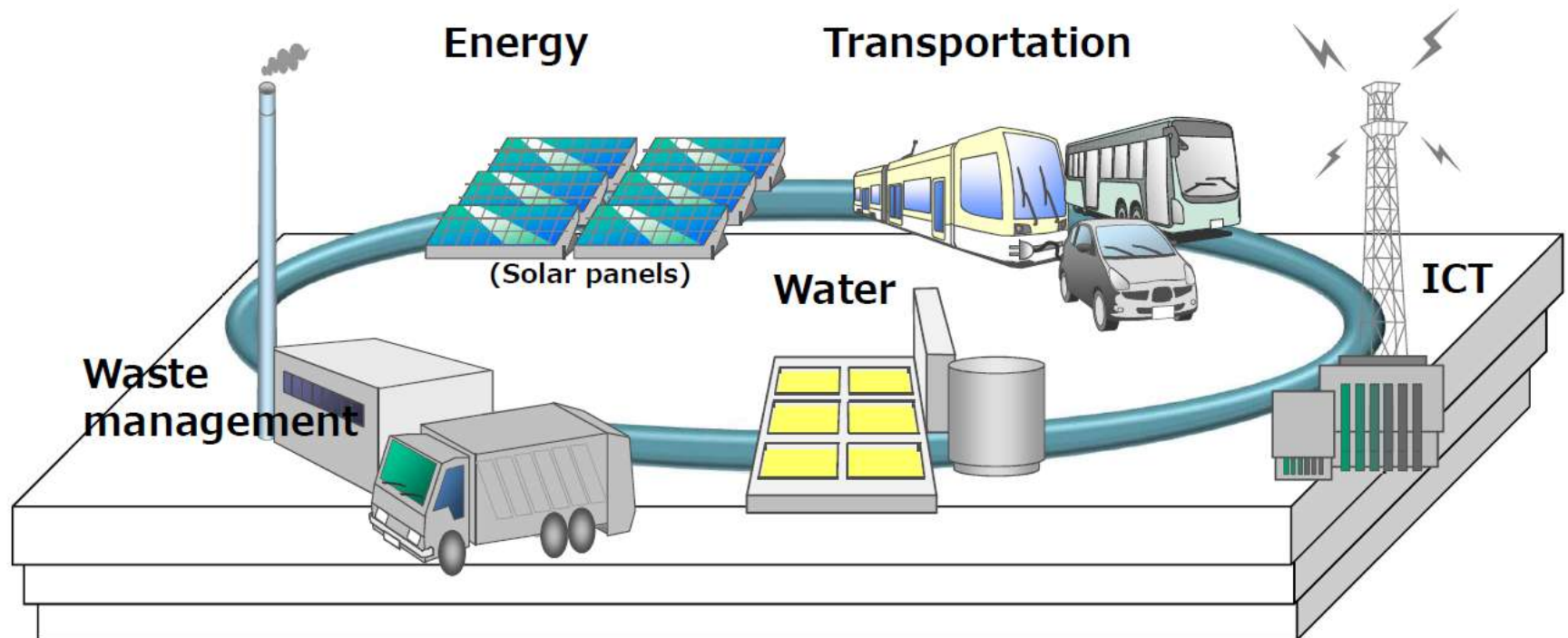


Activities for standardization

- February 2012: Japan (Mr. Yoshiaki Ichikawa of Hitachi) took a position of the chairperson of ISO/TC 268/SC 1 Smart Community Infrastructures.
- April 2014: ISO/TR 37150 (Smart community infrastructure – Review of existing activities relevant to metrics) was published.
- May 2015: ISO/TS 37151 (Smart community infrastructures – Principles and requirements for performance metrics) was published.
- August 2016: ISO/TR 37152 (Smart community infrastructures – Common framework for development and operation) was published.

What is smart community infrastructures

Smart community infrastructures





Activities of ISO/TC 268/SC 1

TG 1: Roadmap

TG 2: Smart community infrastructure – Pilot Testing

WG 1: Infrastructure metrics

WG 2: Integration and interaction framework for smart community infrastructures

WG 3: Smart transportation

WG 4: Data exchange and sharing for smart



Members of ISO/TC 268/SC 1

Participating members (21)

1. Austria
2. Canada
3. Chile
4. China
5. Denmark
6. France
7. Germany
8. India
9. Japan
10. Korea, Republic of
11. Mexico
12. Netherlands
13. Norway
14. Russian Federation
15. South Africa
16. Spain
17. Sri Lanka
18. Sweden
19. Ukraine
20. United Kingdom
21. United States

Observing members (12)

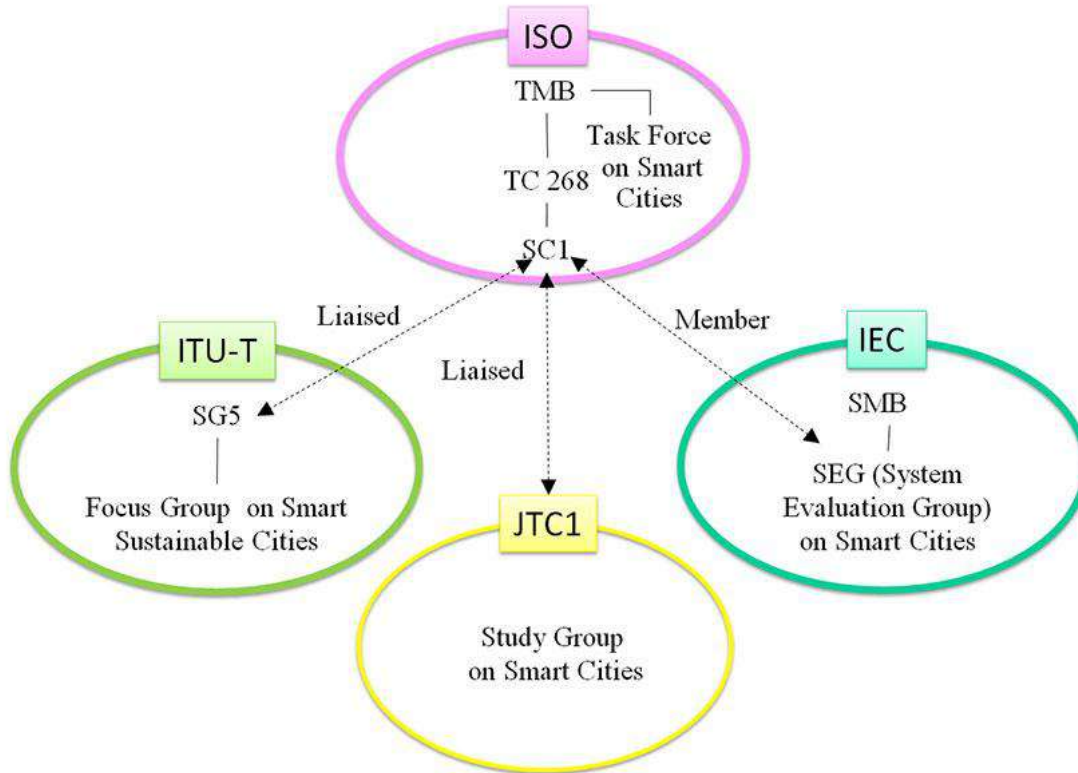
1. Argentina
2. Brazil
3. Czech Republic
4. Egypt
5. Finland
6. Iran, Islamic Republic of
7. Malaysia
8. Poland
9. Singapore
10. Switzerland
11. Turkey
12. United Arab Emirates

Layers of a community

Layers	Examples of functions
Community services	Education, healthcare, safety and security, tourism, etc.
Community facilities	Residences, commercial buildings, office buildings, factories, hospitals, schools, recreation facilities, etc.
Community infrastructures	Energy, water, transportation, waste, ICT, etc.
NOTE "Water" includes sewage and wastewater as well as drinking water.	

Community infrastructures support the other 2 upper layers.

Current situation of standardization for smart cities



ISO: International Organization for Standardization

TMB: Technical Management Board

TC: Technical Committee

SC: Subcommittee

IEC: International Electrotechnical Commission

SMB: Standardization Management Board

ITU-T: International Telecommunication Union
Telecommunication Standardization Sector

SG: Study Group

JTC: Joint Technical Committee



Conclusions

Business models should be considered based on future business models to develop businesses using smart grid technologies.

If business using smart grid technologies are considered based on smart cities, it would be possible to make business models.

International standardization is now lead by Japan and we hope Japan's smart city models can be imported to various foreign countries.