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Session 5: Financing renewable energy – green finance and innovative solutions

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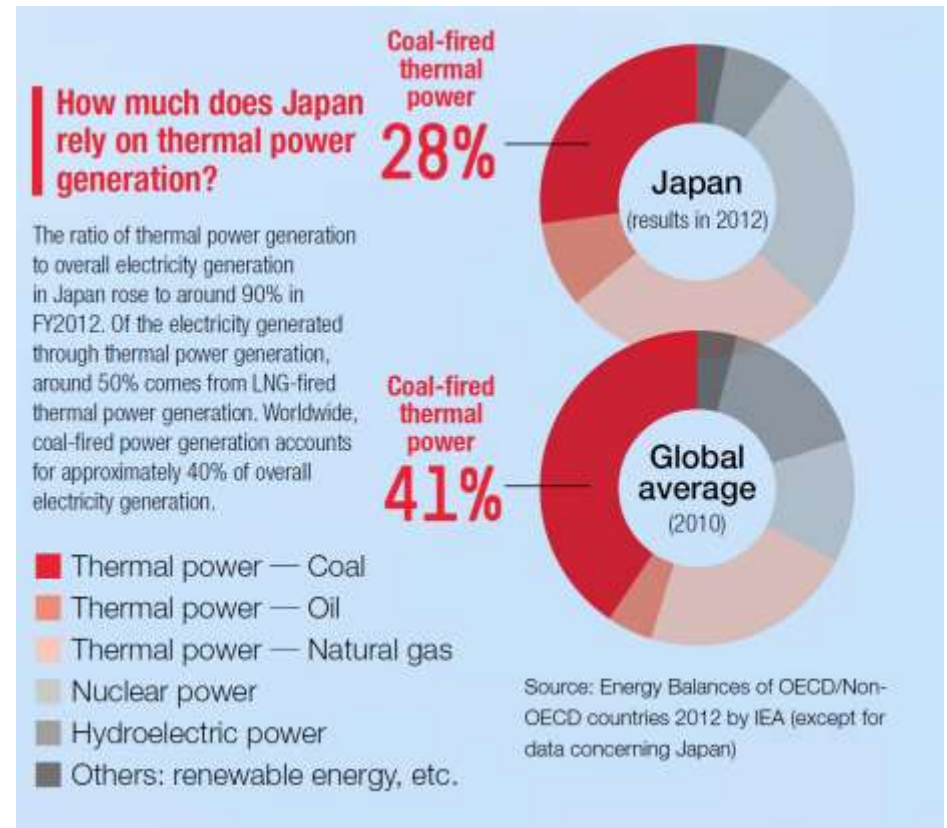
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Advancing Highly Efficient Technology and Environmental Performance

Coal

Surprisingly, coal-fired thermal power plants supply around **41% of the global** volume of electricity generation. The supply ratio is **78% in China**, **68% in India** and **46% in the United States**. Even Germany, which is eager to use renewable energy, relies on coal-fired thermal power plants for slightly more **than 40%** of its total electricity generation.



**Next
from
Japan!**

Future Coal-Fired Thermal Power Generation

**Advancing Highly Efficient Technology
and Environmental Performance**

Can we really call “smokeless” chimneys smokeless? Isogo Thermal Power Plant, located in Yokohama, a large city with a population of 3.7 million people, brings just such a question to mind. Let us give you an overview of this plant, which is said to be the cleanest coal-fired thermal power plant in the world.

Isogo Thermal Power Plant [CLICK!](#)

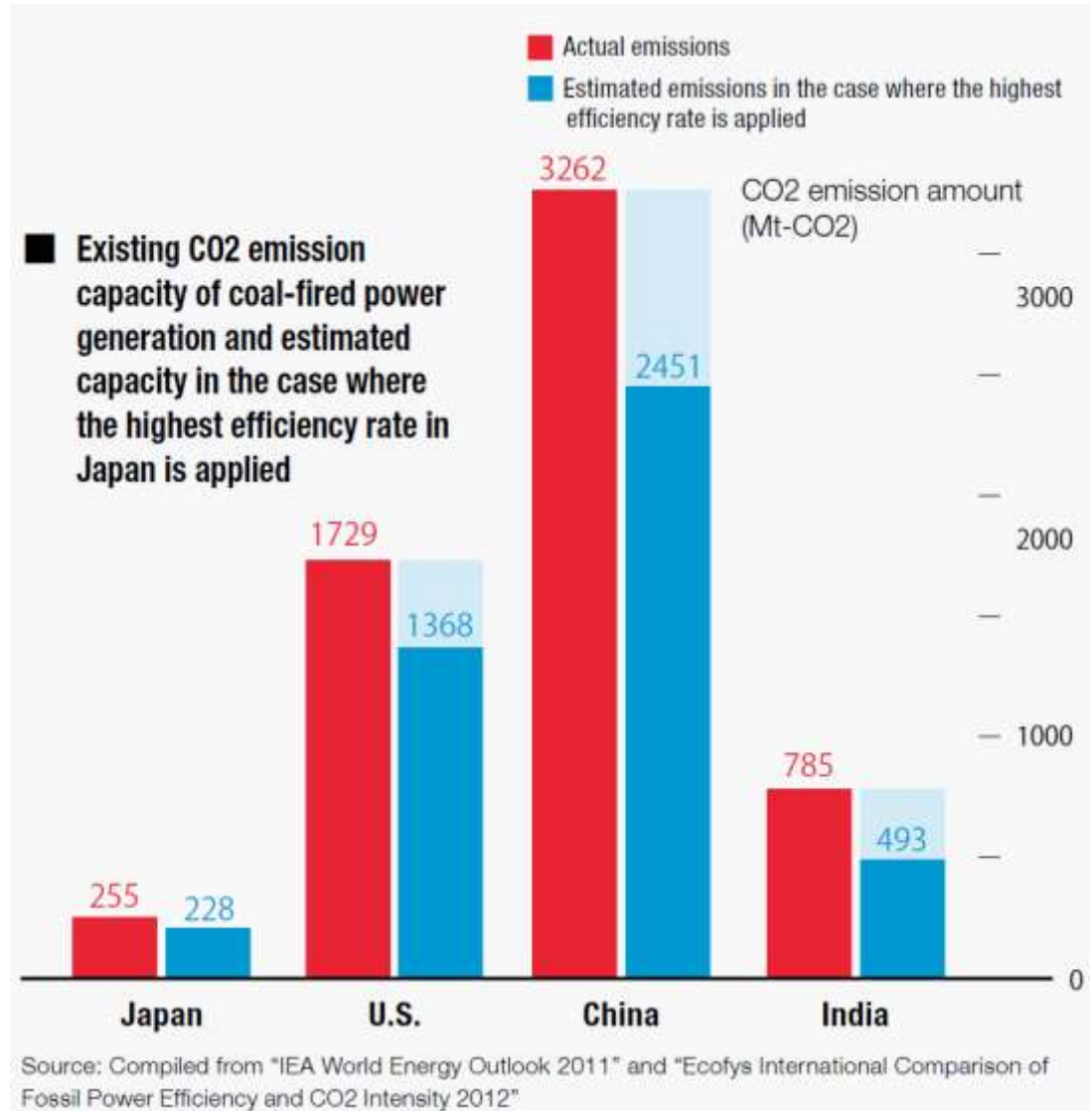
A 200-meter chimney is the symbol of Isogo Thermal Power Plant. Technology eliminating smoke has made it possible to locate this plant near residential areas. The plant was designed to be in harmony with the landscape of the port city of Yokohama.





Dry-type desulfurization equipment uses activated coke created from coal to absorb SO_x contained in exhaust gas. The activated coke is recycled.

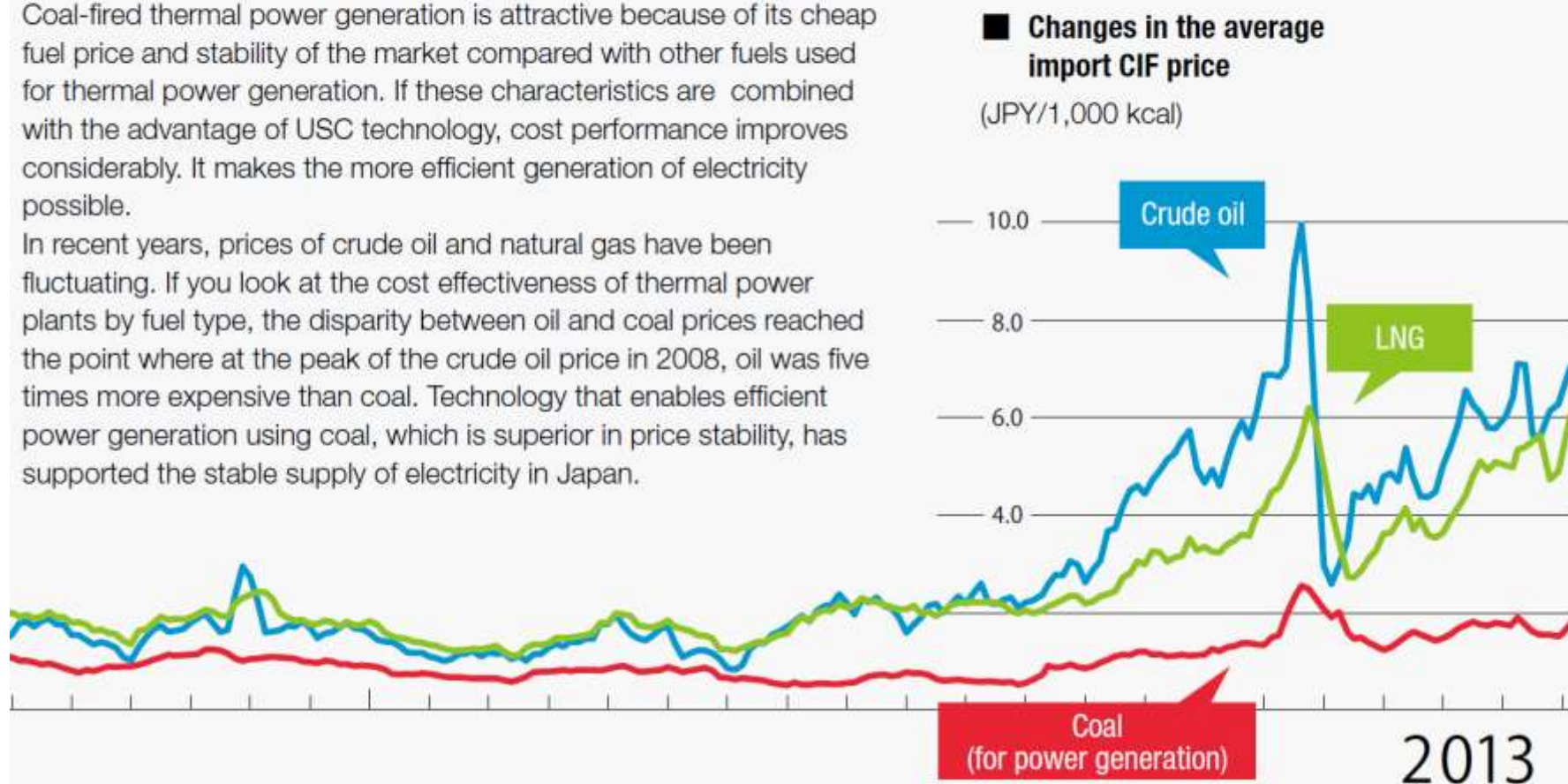
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Amazing Cost Performance

Coal-fired thermal power generation is attractive because of its cheap fuel price and stability of the market compared with other fuels used for thermal power generation. If these characteristics are combined with the advantage of USC technology, cost performance improves considerably. It makes the more efficient generation of electricity possible.

In recent years, prices of crude oil and natural gas have been fluctuating. If you look at the cost effectiveness of thermal power plants by fuel type, the disparity between oil and coal prices reached the point where at the peak of the crude oil price in 2008, oil was five times more expensive than coal. Technology that enables efficient power generation using coal, which is superior in price stability, has supported the stable supply of electricity in Japan.



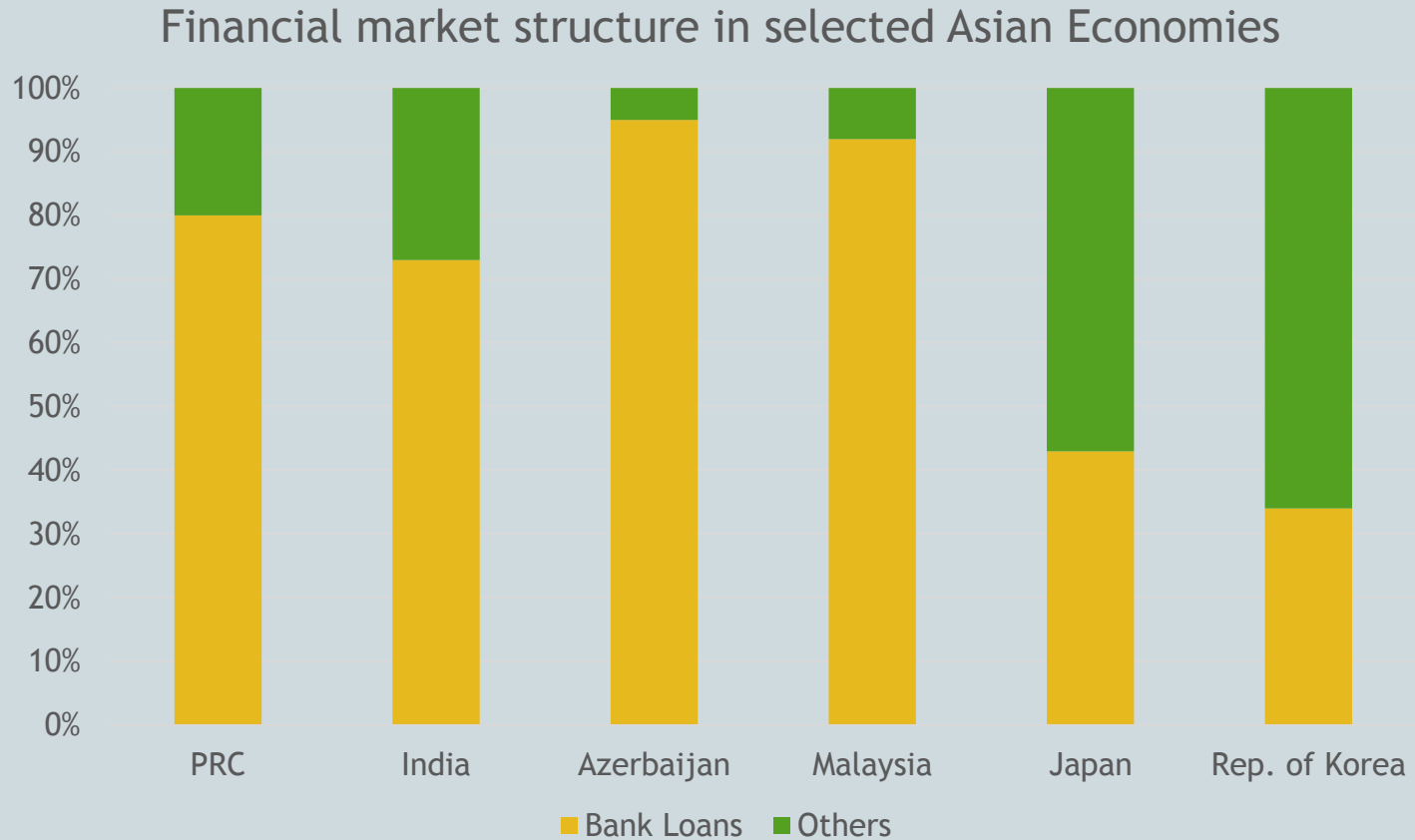
Outline

- 1- Challenges of development of renewable energy projects
- 2- Institutional investors and long-term investment
- 3- Utilizing “Spillover effects” for increasing rate of return on energy projects
- 4- “Hometown investment trust funds”: community based solution for financing smaller scale projects
- 5- Conclusion and Policy recommendations

1- Challenges of development of RE projects:

i)lack of long-term financing ii) low rate of return

Asian economies are bank dominate and many banks are reluctant to lend to RE projects.



Source: Kashiwagi, S. 2011. Presentation at FSA Financial Research Center International Conference. Tokyo. 3 February., Data for Azerbaijan is for 2015.

2- Institutional Investors and Long-term investment

- ❖ Institutional investors, are [the largest] suppliers of capital to listed companies, **managing almost \$100 trillion asset in OECD countries alone**. Because of their size and their role as conduit of savers' climate concerns to the capital markets, institutional investors are ideally positioned to steer corporate capital allocation towards more sustainable uses.
- ❖ Bank loans are not so much suitable for long-term financing, because banks' resources (deposits) are short to medium-term. Energy projects are long-term (10-20 years), hence these projects can be financed by **insurance or pension funds**.



Hydropower plant



Gas fired power plant

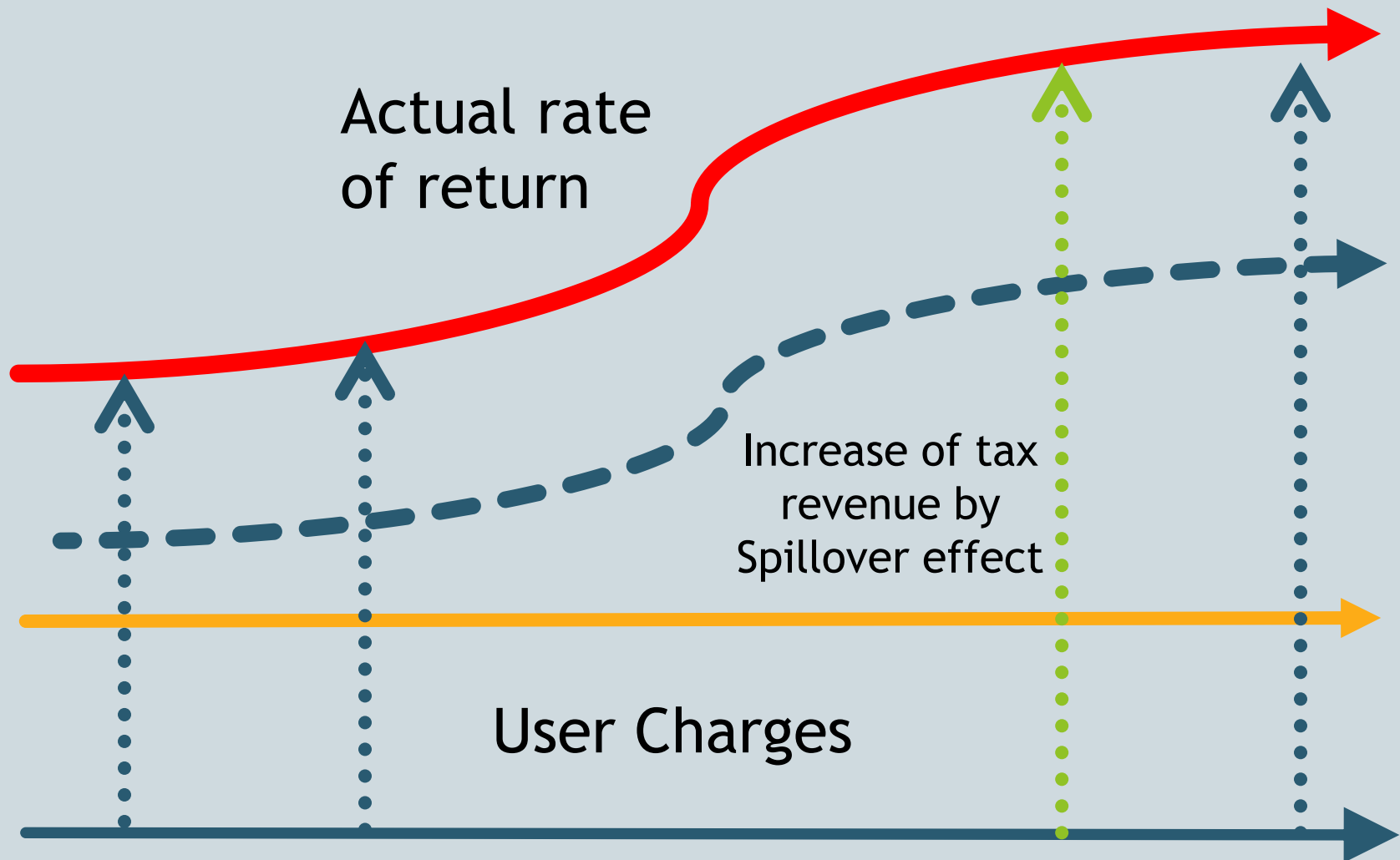
3- Utilizing “Spillover effects” for increasing rate of return on energy projects

- ❖ Electricity is public goods, so the tariffs are regulated often by the government.
- ❖ Which means for private financial institutions is difficult to finance these infrastructural projects.
- ❖ Because user charges are regulated by the government.
- ❖ Hence in order to increase the investment incentives its needed to utilize the **Spillover Effects** originally created by energy supplies, and refund the tax revenues to investors of the energy projects.

Spill over effects of electricity supply



Injection of Increased tax revenues into energy projects in order to increase the rate of return



Case Study: Southern Tagalog Arterial Road (STAR) , Philippines (Micro-data Analysis)

- The Southern Tagalog Arterial Road (STAR) project in Batangas province, Philippines (south of Metro Manila) is a modified Built-Operate-Transfer (BOT) project.
- The 41.9 km STAR tollway was built to improve road linkage between Metro Manila and Batangas City, provide easy access to the Batangas International Port, and thereby accelerate industrial development in Batangas and nearby provinces.



Establishment of infrastructure (e.g. energy infrastructure) will create spillover effect and increase in government tax revenue.

Case Study: The Southern Tagalog Arterial Road (STAR Highway), Philippines, Manila
Tax Revenues in three cities

Yoshino and Pontines (2015) ADBI Discussion paper 549

表 8 フィリピンの STAR 高速道路の影響のない地域と比較した事業税の増加額

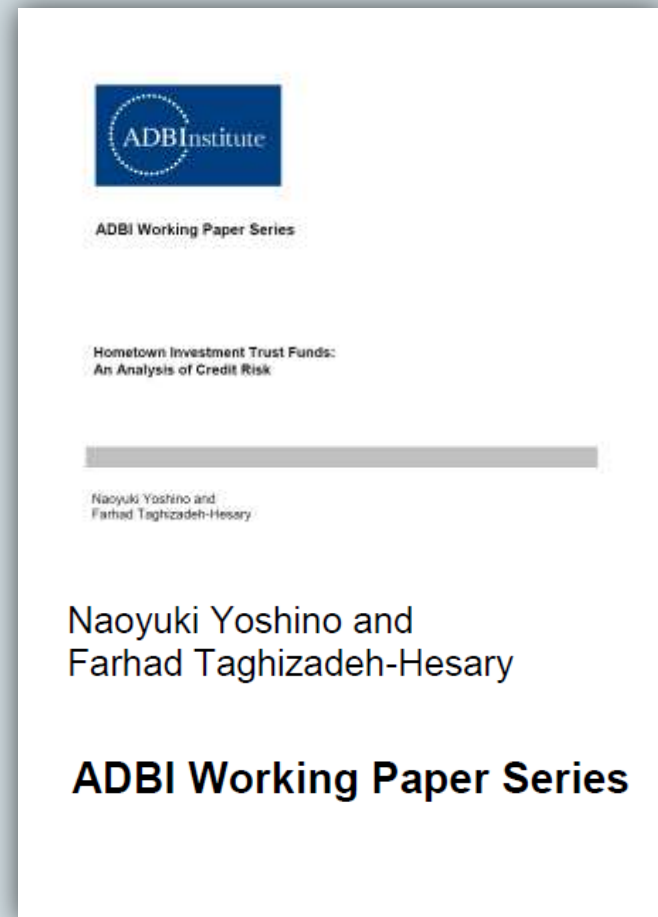
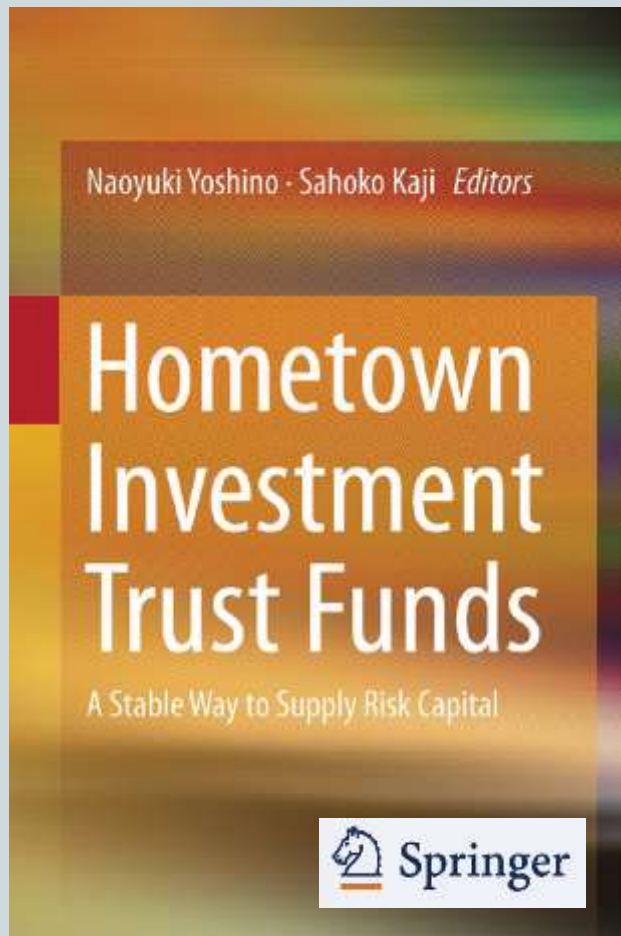
(単位：100 万ペソ)

	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	t_{+4} 以降
Lipa 市	134.36	173.50	249.70	184.47	191.81	257.35	371.93
Ibaan 市	5.84	7.04	7.97	6.80	5.46	10.05	12.94
Batangas 市	490.90	622.65	652.83	637.89	599.49	742.28	1208.61

(出所) Yoshino and Pontines (2015)より筆者作成

Completion

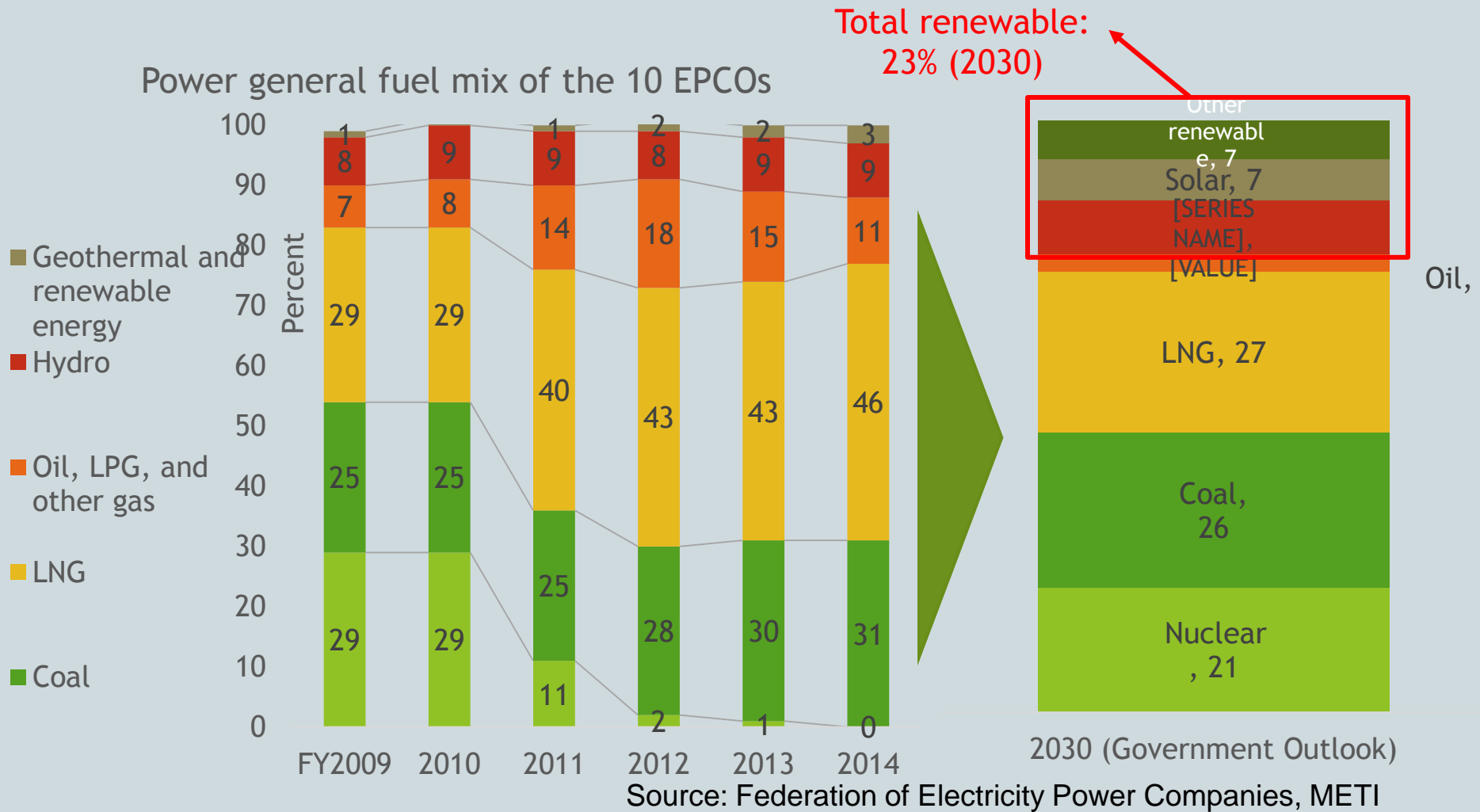
4- “Hometown investment trust funds”: community based solution for financing smaller scale energy projects (solar, small hydro,...)



Case of Japan: Fukushima nuclear disaster led to nuclear shutdown in Japan.



Japanese Energy mix changed after Fukushima Nuclear disaster



In Japan too much dependency on fossil fuels (**single source**) after Fukushima Disaster reduced the energy security



JOURNAL OF COMPARATIVE ASIAN DEVELOPMENT, 2017
<http://dx.doi.org/10.1080/15339114.2017.1298457>

 **Routledge**
Taylor & Francis Group



Impact of the Fukushima Nuclear Disaster on the Oil-Consuming Sectors of Japan

Farhad Taghizadeh-Hesary ^a, Naoyuki Yoshino^b and Ehsan Rasoulenezhad^c

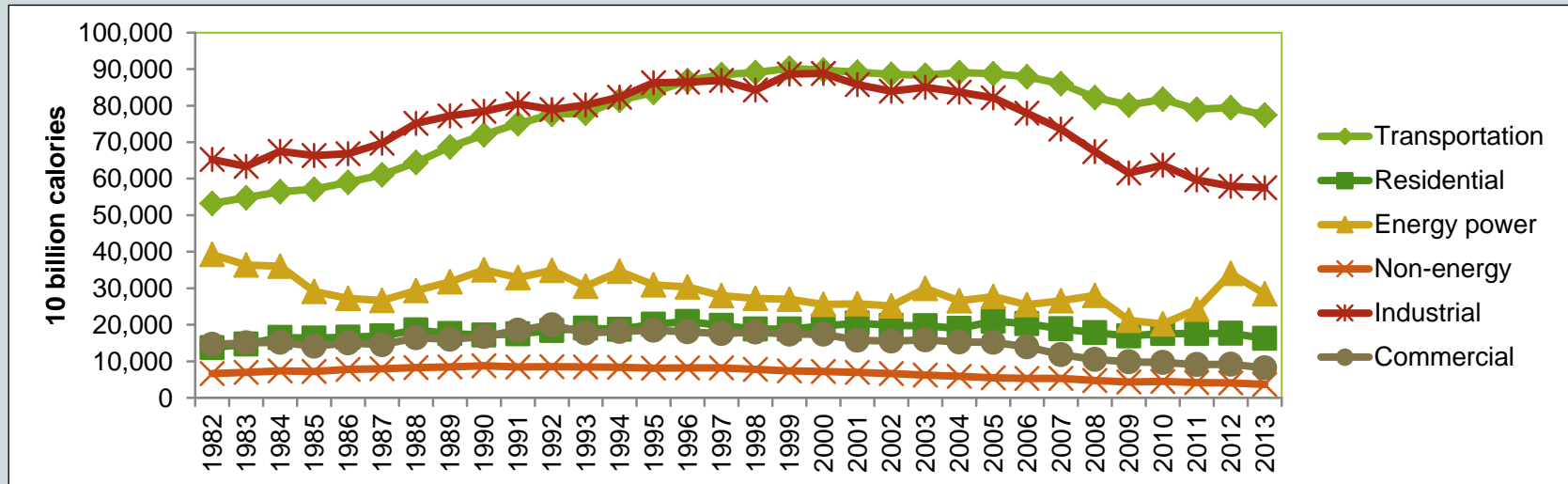
^aEconomics, Keio University, Tokyo, Japan; and Graduate School of Economics, University of Tokyo, Japan; ^bDean of the Asian Development Bank Institute and Professor Emeritus at Keio University, Tokyo, Japan; ^cFaculty of Economics St Petersburg State University, St Petersburg, Russia

ABSTRACT

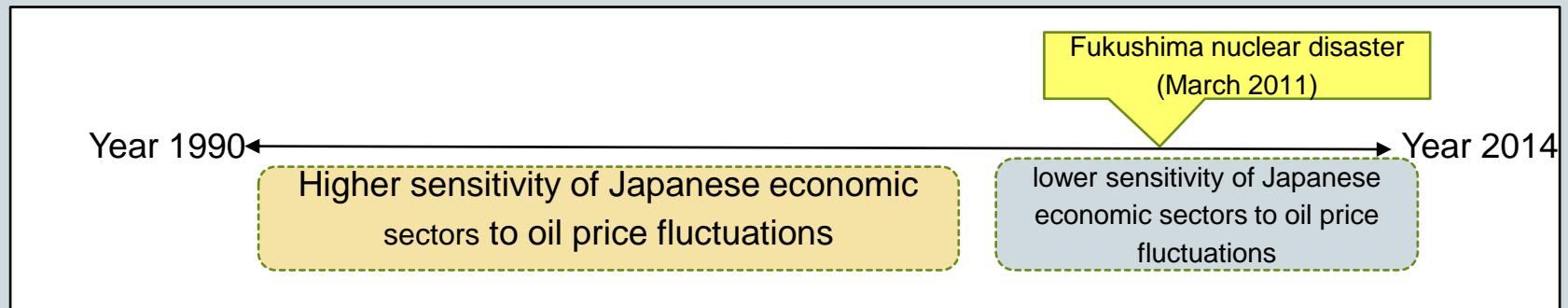
This research sheds light on the elasticity of oil consumption of Japan's various economic sectors and the crude oil price before and after the Fukushima disaster. To do so, the study applies a cointegration analysis and performs a vector error correction (VEC) variance decomposition by using quarterly data from Q1 1981 to Q4 2010 and from Q1 2011 to Q4 2015. The findings reveal that the absolute value of elasticities of oil consumption by some economic sectors reduced after this disaster because of increased

How a disaster can change the energy security?

Crude Oil Consumption by Sector in Japan, 1982-2013

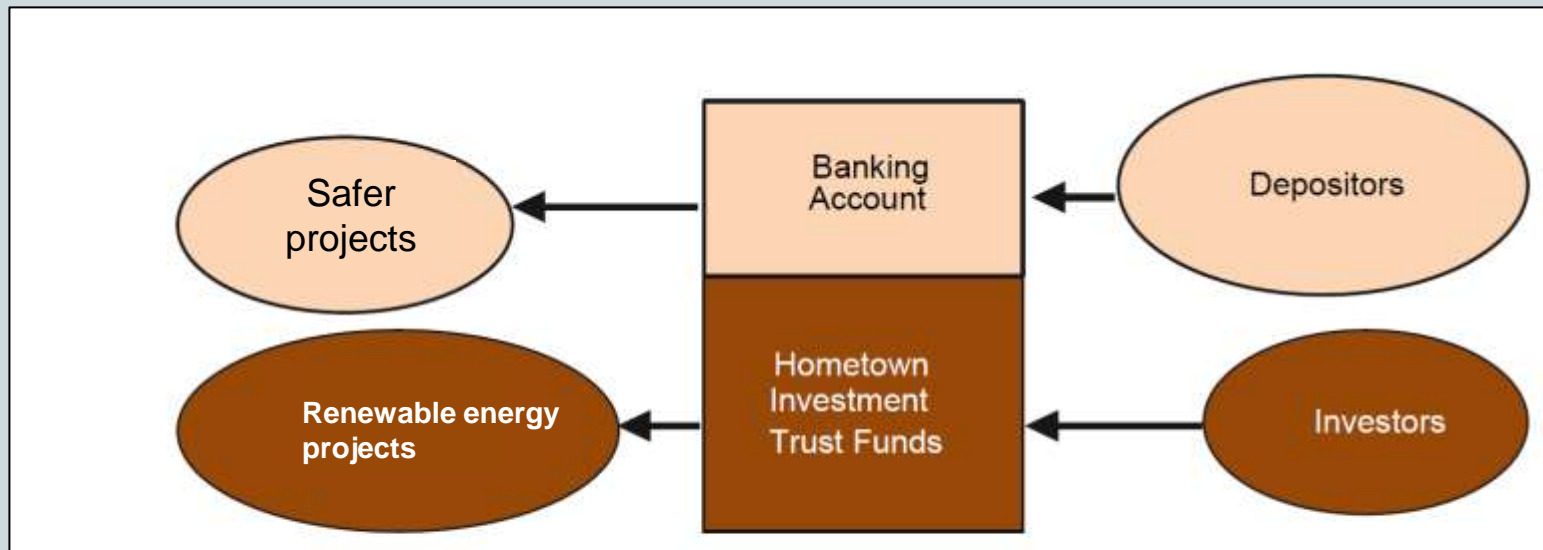


Source: Energy Data and Modelling Center (EDMC) database of the Institute of Energy Economics, Japan (IEEJ).



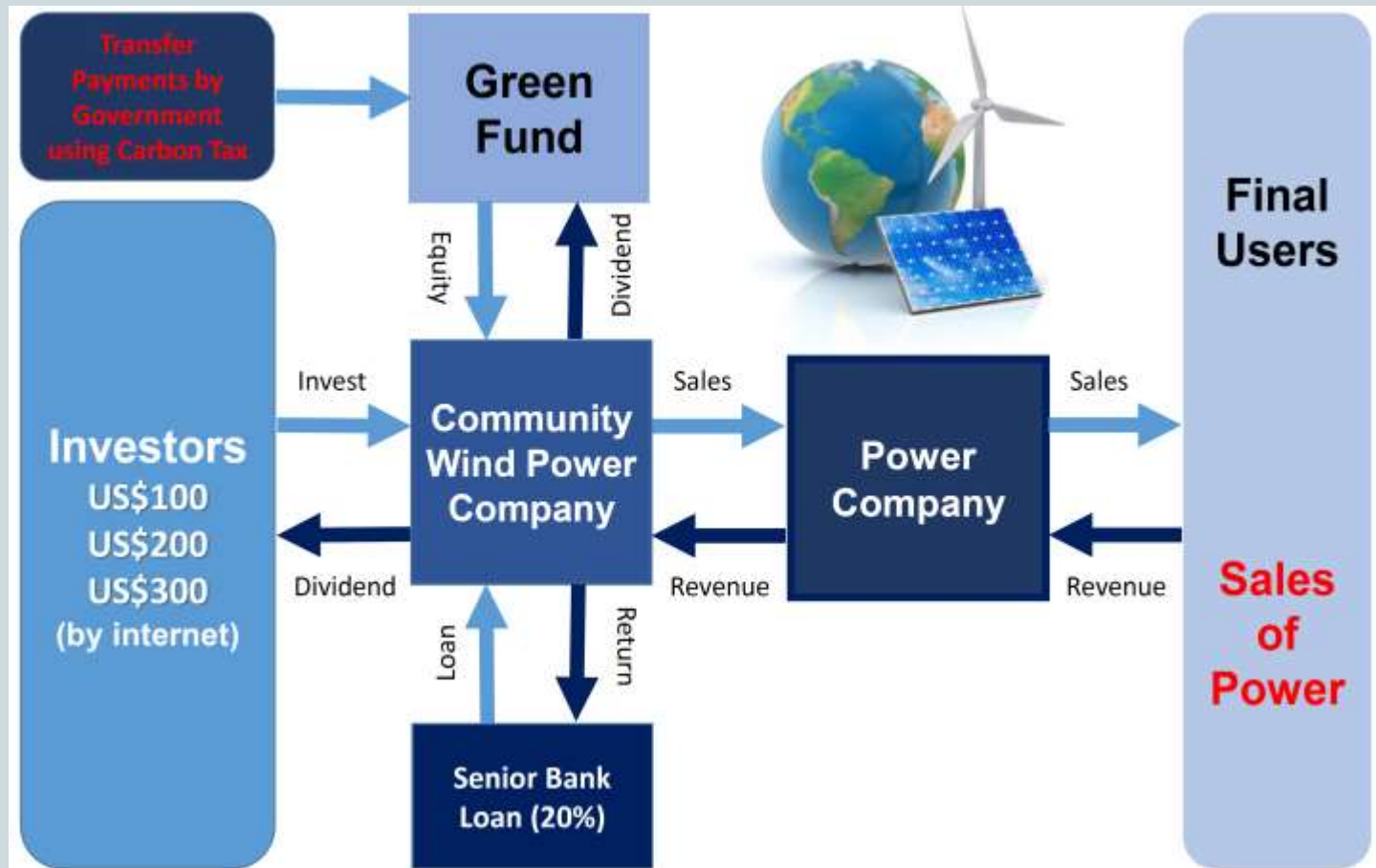
Source: Taghizadeh-Hesary, Rasoulinejad, Kobayashi (2015)

Hometown investment trust funds (HITs) a new way to finance for *risky businesses*



Source: Yoshino and Taghizadeh-Hesary (2017)

Financing Scheme for Renewable Energy Projects Using HITs and Carbon Tax



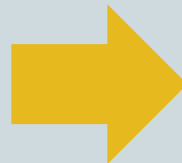
HIT = Hometown Investment Trust Fund.
Source: Yoshino and Taghizadeh-Hesary (2017)

A “warm feeling” is behind the Hometown investment trust funds (HITs)

A “warm feeling” is behind the **Hometown investment trust funds (HITs)**, because investors are sympathizing with the company/project owners and their efforts and not solely seeking the profit.

Through about 40 funds, Music Securities Co. raised **1.08 billion yen for earthquake** reconstruction efforts and replacing renewable energy.

Note: Music Securities micro-investment platform, that allows users to invest in local regions or industries through HITs Japan



Example of implementation of hometown investment trust funds in green energy projects: Solar roof project



- Business owner: Easley Co., Ltd.
- Region: Nagano prefecture
- Installation location : Roof of private building around Chino city
- Installation period:
From December 17, 2015 to March 31, 2016
- Operation period: 10 years
- Number of applicants: 74 people



Example of implementation of hometown investment trust funds in green energy projects: Wind power project

249 people participated (donation and investment)

Total cost of one wind power = 2 million US \$

5% extra price is charged = $(1+0.05) \times PE$

People should reduce Energy consumption by 5%

so that total energy costs remain the same

<Bank Loans to environmental projects>

Revenue : sales price of

electric power supply

cannot set the price

based on MC

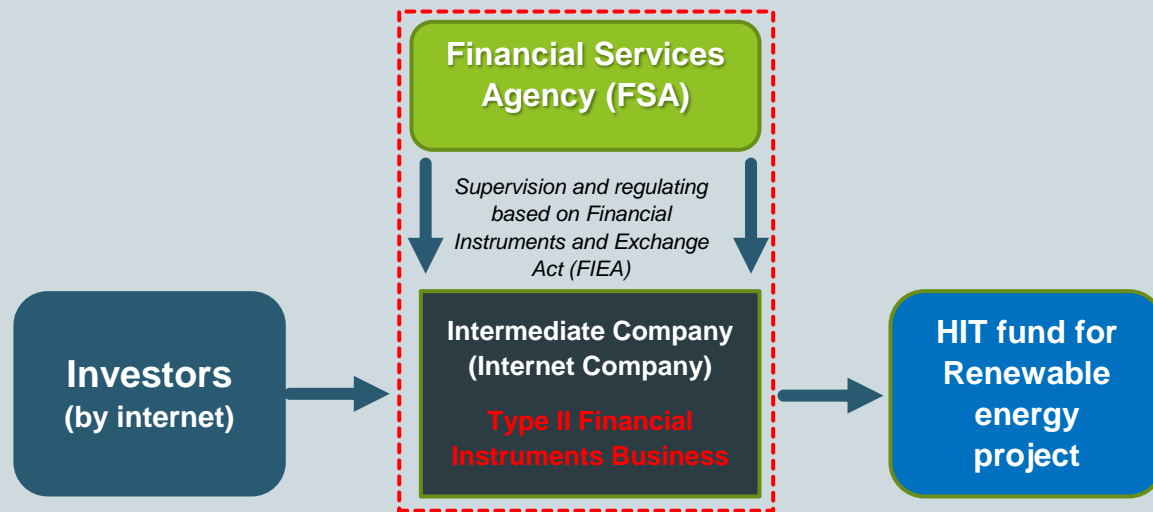
(Price=MC)



Hometown Investment Trust Funds (HITs) became a national strategy in Japan under the prime minister Abe's direction

- ❖ Financial Service Agency of Japan(J-FSA) is regulating and supervising the micro-finance/investment companies that develop HITs. (such as Music Securities co. and etc.)
- ❖ Deposit Insurance corporation does not guarantee the investments in HITs.
- ❖ The principle and the margin is not guaranteed.
- ❖ The return in HITS are products (electricity, agricultural products,...) or whether liquid return (money).

Supervision of HITs' intermediate companies (Case of Japan)



HITs = hometown investment trust fund
Source: Yoshino and Taghizadeh-Hesary (2017)

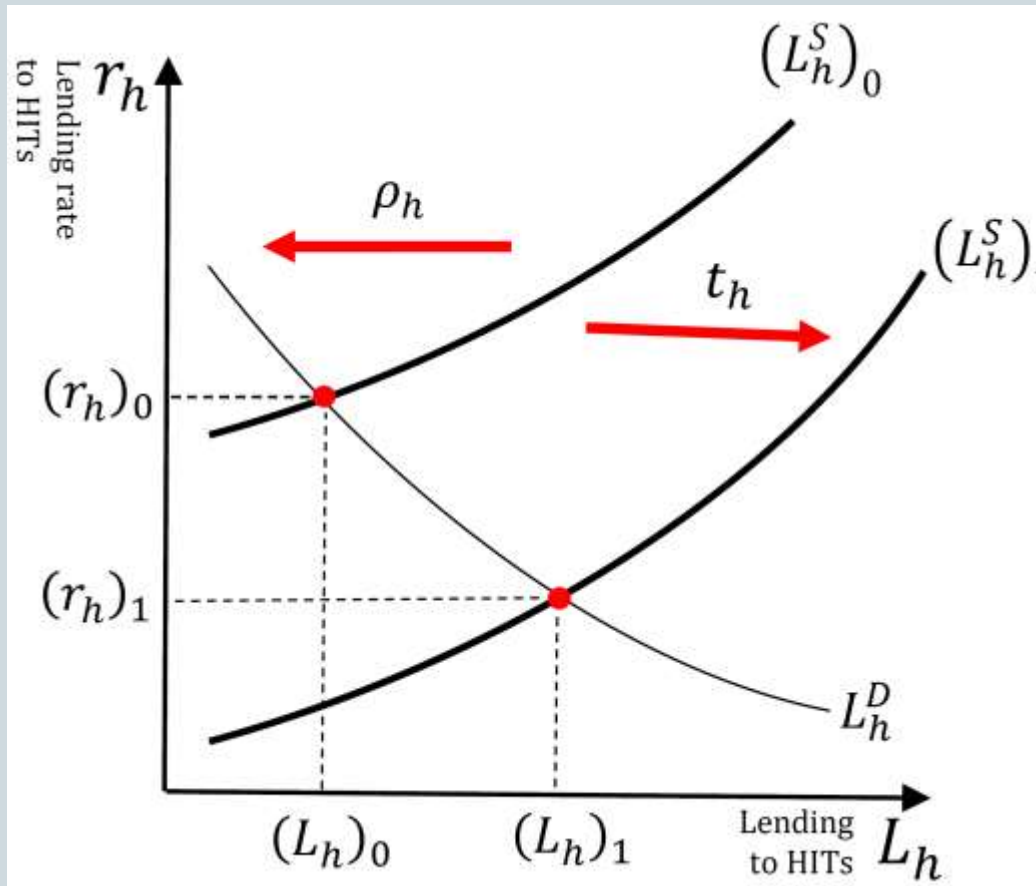
Expansion of Solar power projects throughout Japan by utilization of hometown investment trust funds



Solar Power projects in Japan



Injection of Carbon Tax into Green HITs and Higher Supply of Money to Green Projects



HITs = hometown investment trust funds.
Source: Yoshino and Taghizadeh-Hesary (2017)

5- Conclusions and Policy recommendations

- ❖ Diversification of energy resources (RE and non-RE) is important for raising the energy security and mitigating environmental concerns in Asia-Pacific
- ❖ Too much reliance on overseas finance will create future burden for the country. Too much creation of external debt will lead to very risky situation specially for developing economies. Circulating domestic savings to domestic investment and Maximizing non-debt financing (FDI, remittance) are keys.
- ❖ Institutional investors (Insurance companies and pension funds) are potential long-term investor in RE projects.
- ❖ Utilizing tax revenue by use of the spillover effect of energy projects will increase the rate of return and is an incentive for private investors.
- ❖ For financing smaller scale RE projects using micro-investment schemes such as Home town investment trust funds, village funds could be an appropriate choice.

Reference

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Thank you for your attention!

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