CBAsia Tokyo Conference 2016

Parallel session 1 Room B: Consensus building for renewable energy

Public Attitudes to Geothermal Power and Stakeholder Analysis in Beppu; Trade-offs between Power Generation and Hot Spring

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- Public's General Attitudes to Geothermal Power in Japan, Philippines and Indonesia through Trilateral Internet Questionnaire
- Stakeholders' General Attitudes to Geothermal Power in Japan through Online Deliberation Experiment
- Stakeholders' Specific Attitudes to Small Geothermal Power in Beppu through Stakeholder Analysis

Background

- Japan; geothermal power has not been enough introduced due to mainly disputes around trade-offs between hot spring resource though the amount of geothermal power resource is ranked 3rd in the world
- Indonesia and Philippines; the amount of geothermal power resource is ranked 1st and 4th for each in the world, and various support systems has been introduced recently but installation has not been necessarily enough(installed capacity; Philippines ＞ Indonesia ＞Japan)

Overview of Online Questionnaire on Trade-offs between Geothermal Power and Hot Spring in Japan, Philippines and Indonesia

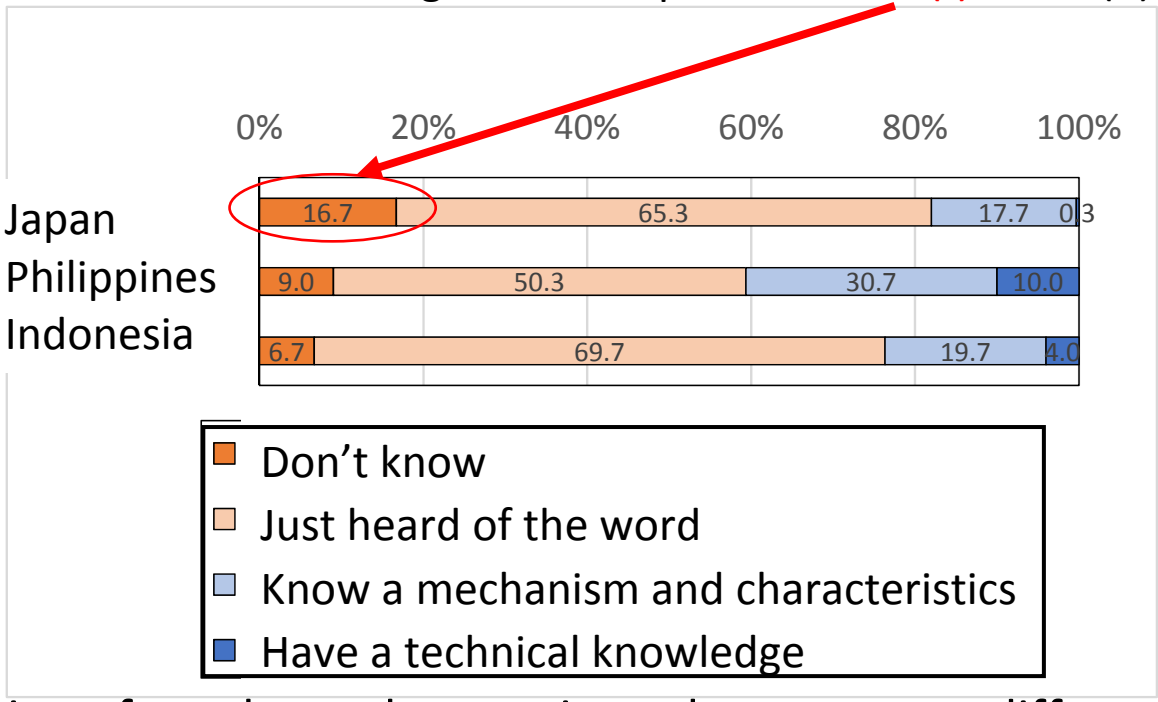
- Purpose; to clarify differences of basic attitude to geothermal power and hot spring of the general public in three countries
- Targeting; the general public living in Japan, Philippines and Indonesia (N = 300 in each country, N = 900 in total) who are registered as monitors of the research company
  - Caution! Characteristics of the monitors in each country may have differences

	20's	30's	40's +
Japan	Each 50 in male and female		
Philippines			
Indonesia			

- Period : Dec 15-18, 2014

Results of Online Questionnaire on Trade-offs between Geothermal Power and Hot Spring in Japan, Philippines and Indonesia

- Familiarity of geothermal power is lowest in Japan
  - Respondents who didn't know geothermal power: 16.7%(J), 9.0%(P), 6.7%(I)

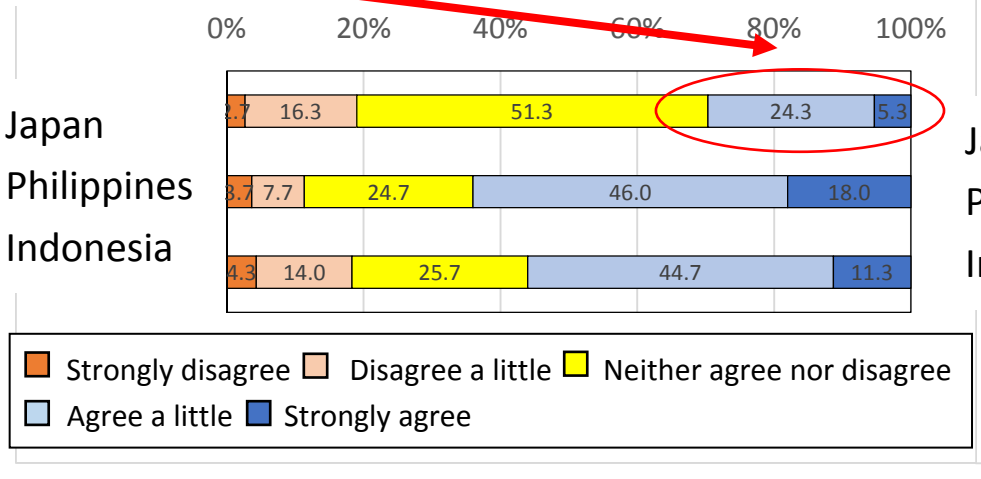


- Risk perception of geothermal power in each country are different
  - Respondents who are concerned about negative effect on hot spring: 10.3%(J), 9.0%(P), 12.0%(I)
  - Respondents who are concerned about negative effect on water contamination: 12.7%(J), 22.0%(P), 19.0%(I)

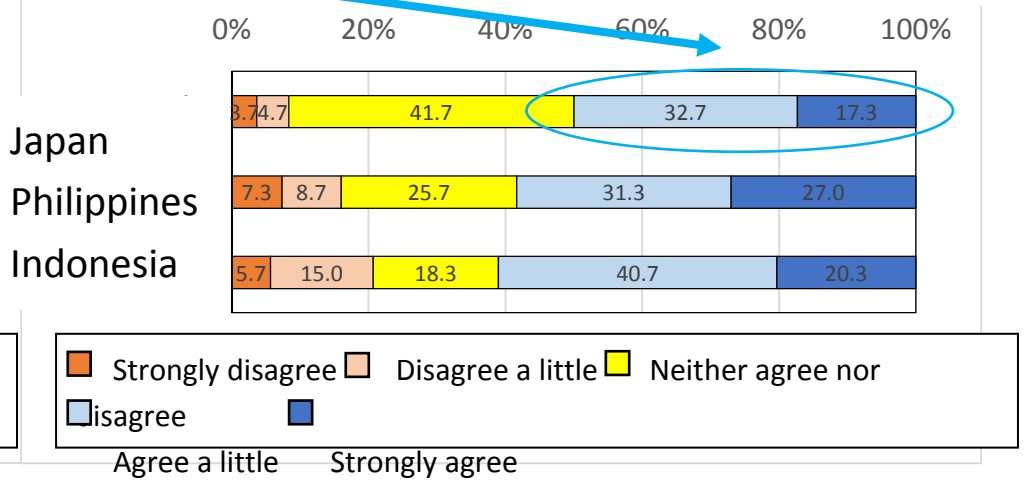
Results of Online Questionnaire on Trade-offs between Geothermal Power and Hot Spring in Japan, Philippines and Indonesia

- Most Japanese respondents less minded trade-offs between geothermal power and hot spring, and effect of community development than other two countries

  - Respondents who supported the opinion “The most important reason of construction of geothermal power plant is to expect effects on local community development”:
    29.6%(J), 64.0%(P), 56.0%(I)

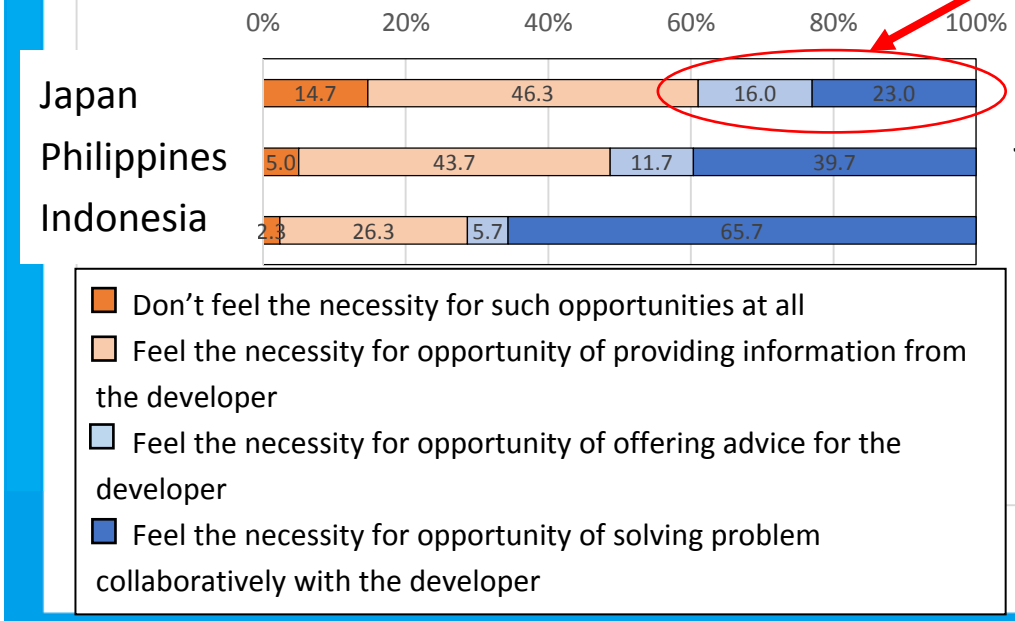


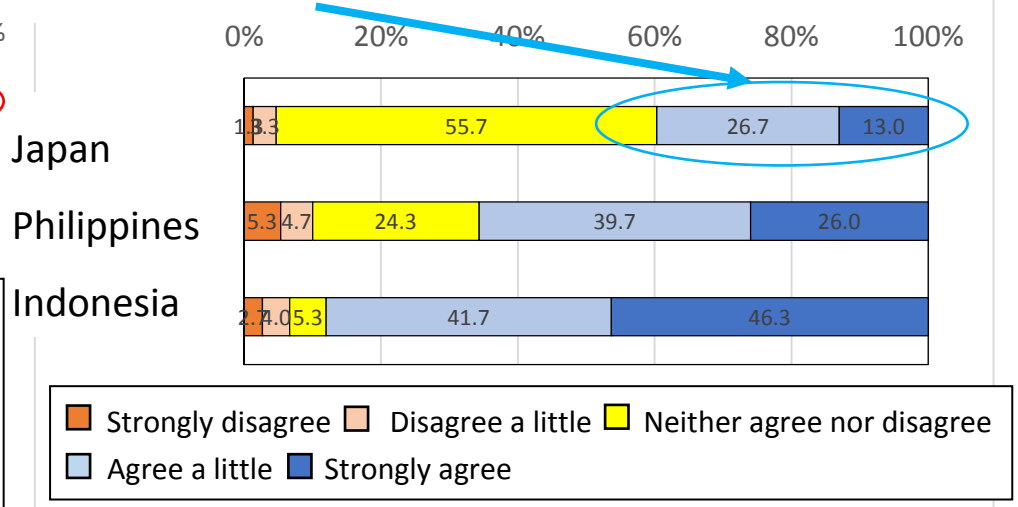
  - Respondents who supported the opinion “Geothermal power plant should not be constructed if it would have significant negative effects on local hot spring resource”:
    50.0%(J), 58.3%(P), 61.0%(I)



Results of Online Questionnaire on Trade-offs between Geothermal Power and Hot Spring in Japan, Philippines and Indonesia

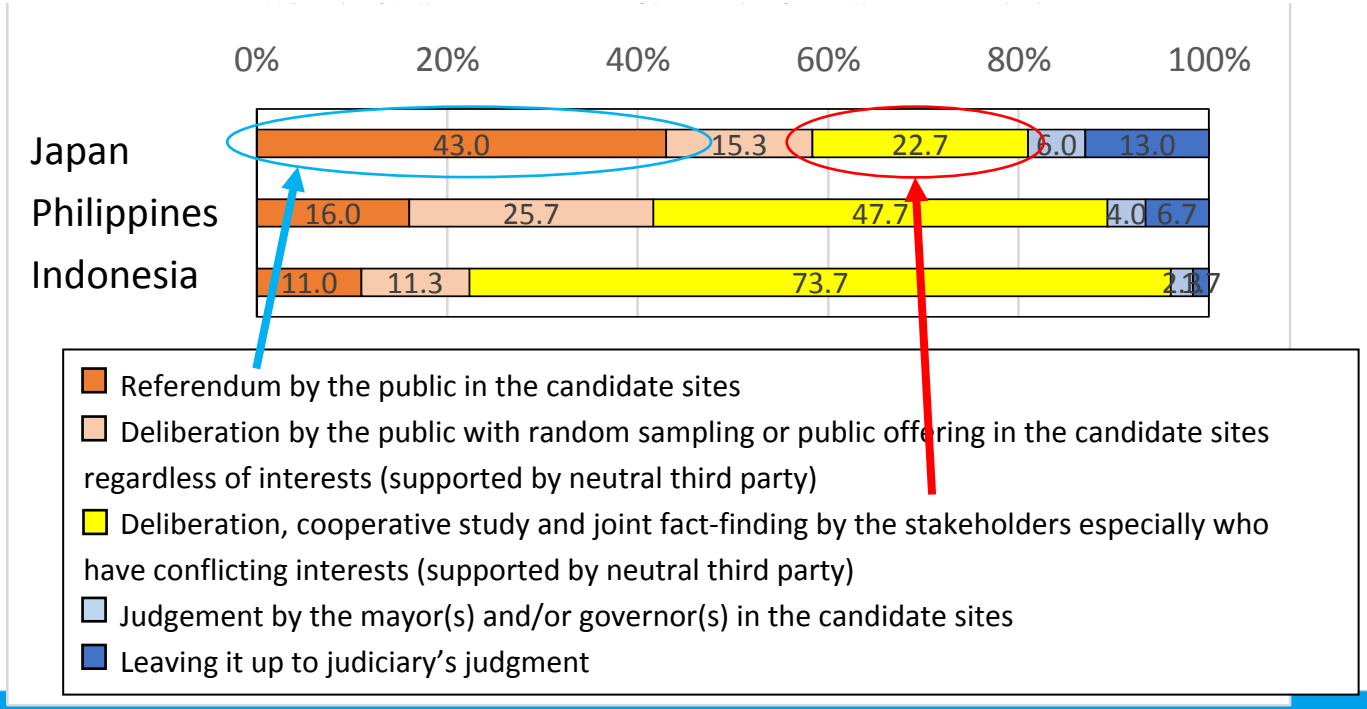
- Most Japanese respondents less preferred to be involved in the construction process of geothermal power than other two countries
  - Respondents who preferred to be involved in the process: 23.0%(J), 39.7%(P), 65.7%(I)
- Most Japanese respondents less favored to geothermal power than other two countries
  - Respondents who favored to geothermal power: 39.7%(J), 65.7%(P), 88.0%(I)





Results of Online Questionnaire on Trade-offs between Geothermal Power and Hot Spring in Japan, Philippines and Indonesia

- Tendency of responses to “the acceptable decision making approach for introduction of geothermal power in case of the location would be close to your home” were different in each country
  - Respondents who preferred to referendum: 43.0%(J), 16.0%(P), 11.0%(I)
  - Respondents who preferred to joint fact-finding by stakeholders : 22.7%(J), 47.7%(P), 73.7%(I)



Results of Online Questionnaire on Trade-offs between Geothermal Power and Hot Spring in Japan, Philippines and Indonesia

- Characteristics of Japanese respondents in this questionnaire
  - Most people were unfamiliar with geothermal power
  - Most people less minded trade-offs between geothermal power and hot spring, and effect of community development than other two countries
  - Most people less preferred to be involved in the construction process of geothermal power than other two countries
  - Most people prefer referendum rather than joint fact-finding of scientific evidence ⇒ distrust to experts?

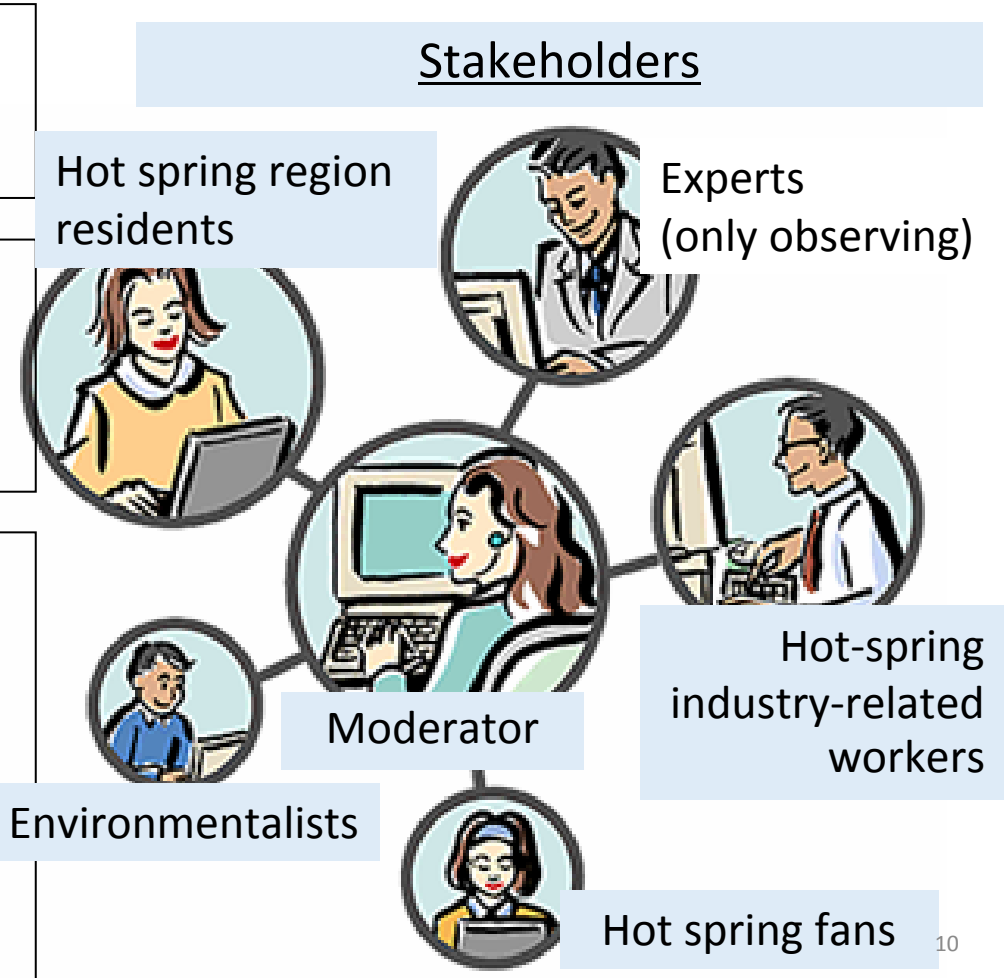
Overview of Online Deliberation Experiment on Trade-offs between Geothermal Power and Hot Spring in Japan

- Purpose; to clarify stakeholders' attitude change by providing expert knowledge within Japan using a system such as an Internet billboard

1. Screening survey and recruiting
   - Screening survey (T1)
   - Recruiting participants (selecting and inviting)

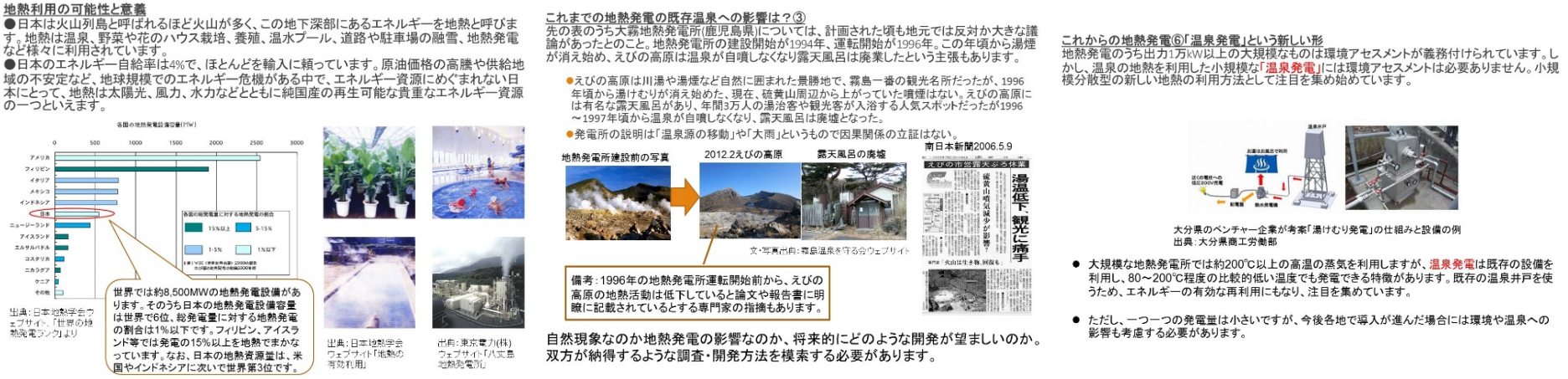
2. Preparing documents presenting expert knowledge
   - Members of experts panel and specifying issues

3. Deliberation (March 3 to 16, 2014)
   - Providing expert knowledge about issue 1 and pre questionnaire survey (T2), and deliberation
   - Providing expert knowledge about issue 2 and deliberation
   - Providing expert knowledge about issue 3 and deliberation
   - Post questionnaire survey (T3)



Overview of Online Deliberation Experiment on Trade-offs between Geothermal Power and Hot Spring in Japan

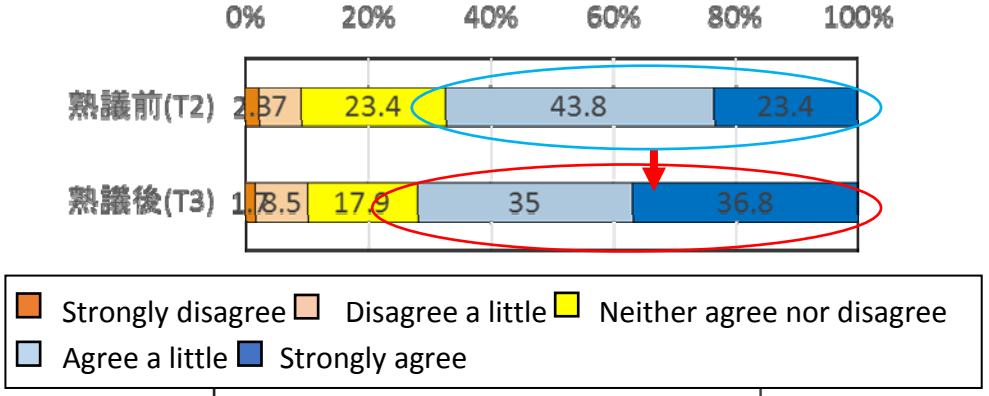
- Providing expert knowledge: With the assistance of expert panel of geothermal engineering, geochemistry and hot spring science, more than 10 slides were prepared, provided in 3 stages, and arguments from both viewpoints of for and against to geothermal power were included.
  - First: What is geothermal power generation?
  - Second: Issues about past geothermal power generation
  - Third: Issues about future geothermal power generation
- Discussion supported by a moderator (Moderator)

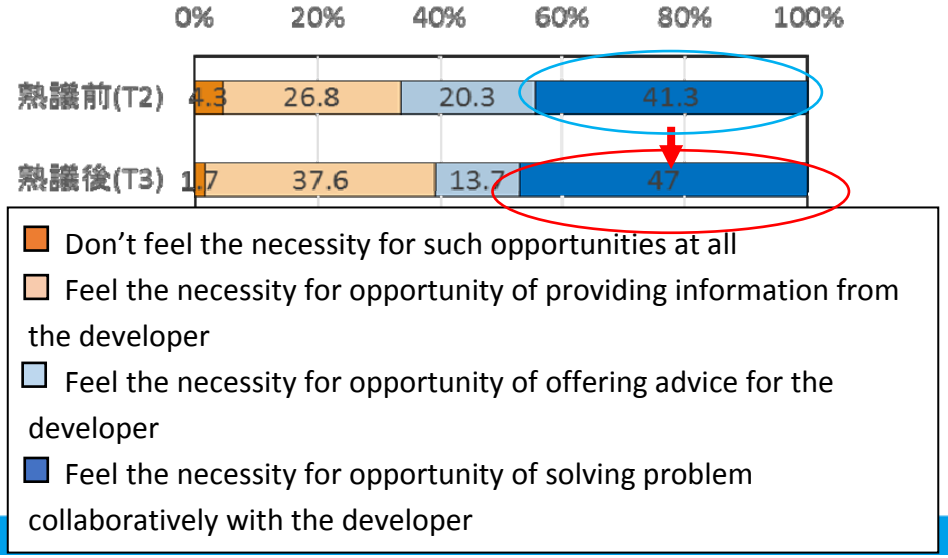


Figures: examples of provision of expert knowledge

Overview of Online Deliberation Experiment on Trade-offs between Geothermal Power and Hot Spring in Japan

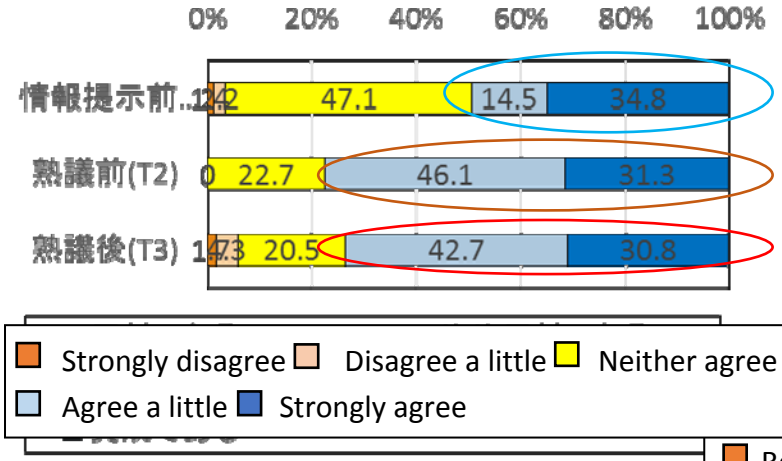
- Change of risk perception of geothermal power as a result of the deliberations...
  - Respondents who are concerned about negative effect on hot spring significantly increased: 58.6% ⇒ 84.6%
- Change of views on trade-offs of between geothermal power and hot spring as a result of the deliberations...
  - Respondents who supported the opinion “Geothermal power plant should not be constructed if it would have significant negative effects on local hot spring resource” slightly increased: 67.2% ⇒ 71.8%
- Change of willing to participate in a geothermal power plant construction process as a result of the deliberations…
  - Respondents who preferred to be involved in the process slightly increased: 41.3% ⇒ 47.0%

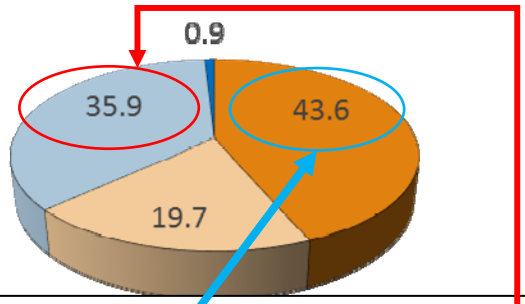




Overview of Online Deliberation Experiment on Trade-offs between Geothermal Power and Hot Spring in Japan

- Change of pros and cons of construction of a geothermal power plant power as a result of the deliberations...
  - Agree: Significantly increased from 49.3% ⇒ 77.4% ⇒ 73.5%
  - Medium: Significantly decreased 47.1% ⇒ 22.7% ⇒ 20.5% = providing expert knowledge
- Tendency of responses to “the acceptable decision making approach for introduction of geothermal power in case of the location would be close to your home”...
  - Most respondents preferred to “referendums” (43.6%) and for “joint fact-finding” (35.9%)





- Referendum by the public in the candidate sites
- Deliberation by the public with random sampling or public offering in the candidate sites regardless of interests (supported by neutral third party)
- Deliberation, cooperative study and joint fact-finding by the stakeholders especially who have conflicting interests (supported by neutral third party)
- Judgement by the mayor(s) and/or governor(s) in the candidate sites
- Leaving it up to judiciary’s judgment

Summary of the Two Surveys

- For persons unfamiliar with geothermal power...
  - Little interest in trade-offs between geothermal power and hot springs
  - Prefer a referendum rather than joint fact-finding of scientific evidence ⇒ distrust to experts?
- But when a certain level of expert knowledge are provided to stakeholders...
  - Many people become aware of risk on hot springs.
  - But, many people become to agree to construction of geothermal power plants as a general term, whereas a few people become to object to it.
    - ⇒ Generally speaking, expert knowledge helps to determine attitudes
    - ⇒ This means providing both the merits and demerits of the problem
    - ⇒ It would not do to enhance risk perception unnecessarily
  - To avoid potential dispute, monitoring of steam and water quantity by a neutral third party are supported by many people
    - ⇒ It appears that understanding the importance of scientific knowledge deepened
    - ⇒ Nevertheless, there is a constant tendency to prefer referendum

Stakeholder Analysis in Beppu

Past: Geothermal power accompanied by large-scale development
Recent years: Small scale distributed geothermal power with less environmental impact

Beppu City in Oita Prefecture is a one of Japan's leading hot spring regions in terms of both number of hot water sources and quantity of hot water welling up, and is also an early example of small-scale distributed geothermal power

But;

Some people feel risk of exhausting the hot spring water

Selecting stakeholders with some interests to hot springs

Studing the state of interests of the stakeholders to clarify the potential disputes of interests

Clarifying what kinds of measures can be taken to prevent the occurrence of disputes in advance

Stakeholder Analysis in Beppu

Beppu City

- Population; approx. 120,000 (declined over 30 years and also in birth rate and grown in aging population, but N of households is increasing)
- Hot springs; amount of discharge and number of source of spring are No.1 in Japan, landscape of steam is certificated as “important cultural landscape” from Gov’t, annual number of visitors is approx. 8 million.

Small geothermal power (micro binary hot spring power)

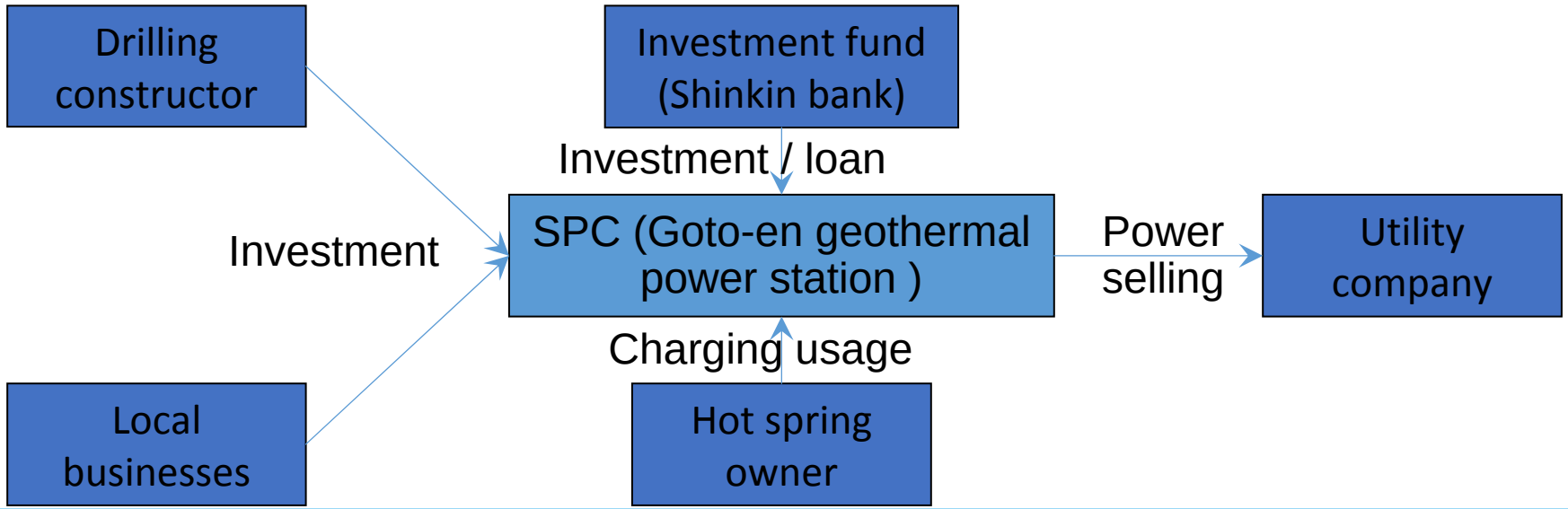
- Drying off a medium such as pentane which have a low boiling point, using relatively low-temperature exhaust heat and hot water from hot spring, and driving a turbine with the steam to generate power.
- Recently 6 units in three sites have been operated in Beppu. Each unit has a capacity of 100-200 kW.

Stakeholder Analysis in Beppu

Finance

Finance of one site, "*Goto-en*" geothermal power station whose capacity is approx. 100kW is as follows;

- Four local and external small businesses have established SPC (special-purpose company) who took a loan from the local *Shinkin* bank (Japanese credit union for small businesses) and obtained subsidy from prefecture government for construction.
- The SPC continue to sell electricity to the utility company at the rate of 40 yen/kWh for 15 years, and the hot spring resource owner is financially rewarded for the term.



Stakeholder Analysis in Beppu

Stakeholder Analysis

- Format: Semi-structured
- Basic questions: Present situation of use of hot-spring, Interests on use of hot-spring and geothermal power, Future actions to use of hot-spring and geothermal power, new stakeholders whose involvement will be needed ("snowball" sampling)
- Survey period: Jul.-Aug. 2014

Attribution	N	Attribution	N
City gov't	4	Drilling constructor	2
Prefecture gov't	6	Consultant	1
Commerce and industry	1	Investment fund	1
Sightseeing	1	Machinery manufacturer	1
Hot spring inn	7	Geothermal power company	5
Civic organization	2	Education and academic	3
Hot spring owner	2	Total	36

Types of Geothermal Power Generation and Object of the Survey

Characteristics	Dry steam	Flush	Binary (Large-scale)	Thermal spring power generation/Binary (Small-scale)	Cloud-of steam power generation
Underground fluid	Only steam	Steam/hot water	Low temperature steam/hot water	Steam/hot water	Steam (hot water)
Power generation method	Unseparated steam and water turn turbine	Steam and water are separated and steam turns turbine	Low boiling point heat medium is boiled to turn turbine	Low boiling point heat medium is boiled to turn turbine	Expansion of steam is used to turn turbine
Need for new drilling	○	○	○	×	×

The object of this survey was the relationship of small scale geothermal power generation. which imposes a light environmental load, with hot spring use. ※ Conventional large-scale geothermal power generation is not considered.

Stakeholder Analysis in Beppu

- Major issues and concerns; we selected matters of common concern to set the following four issues

Issue 1. Risks about the present state of Beppu City

Issue 2. Perception of geothermal resources

Issue 3. Perception of small-scale geothermal power

Issue 4. Coordination of the interests

Disputed Point 1. Fears about the Present State of Beppu City

Awareness of hot spring resources

- Change of spring quality, hot water quantity, temperature etc. of hot spring
- Adequate feeling of security about new drilling restrictions
- Few scientific opinions about geothermal resources

Decline as a sightseeing region

- Relative decline compared with rival sightseeing regions
- Revision of seismic standards
- Facility deterioration countermeasures
- Responding to changing times

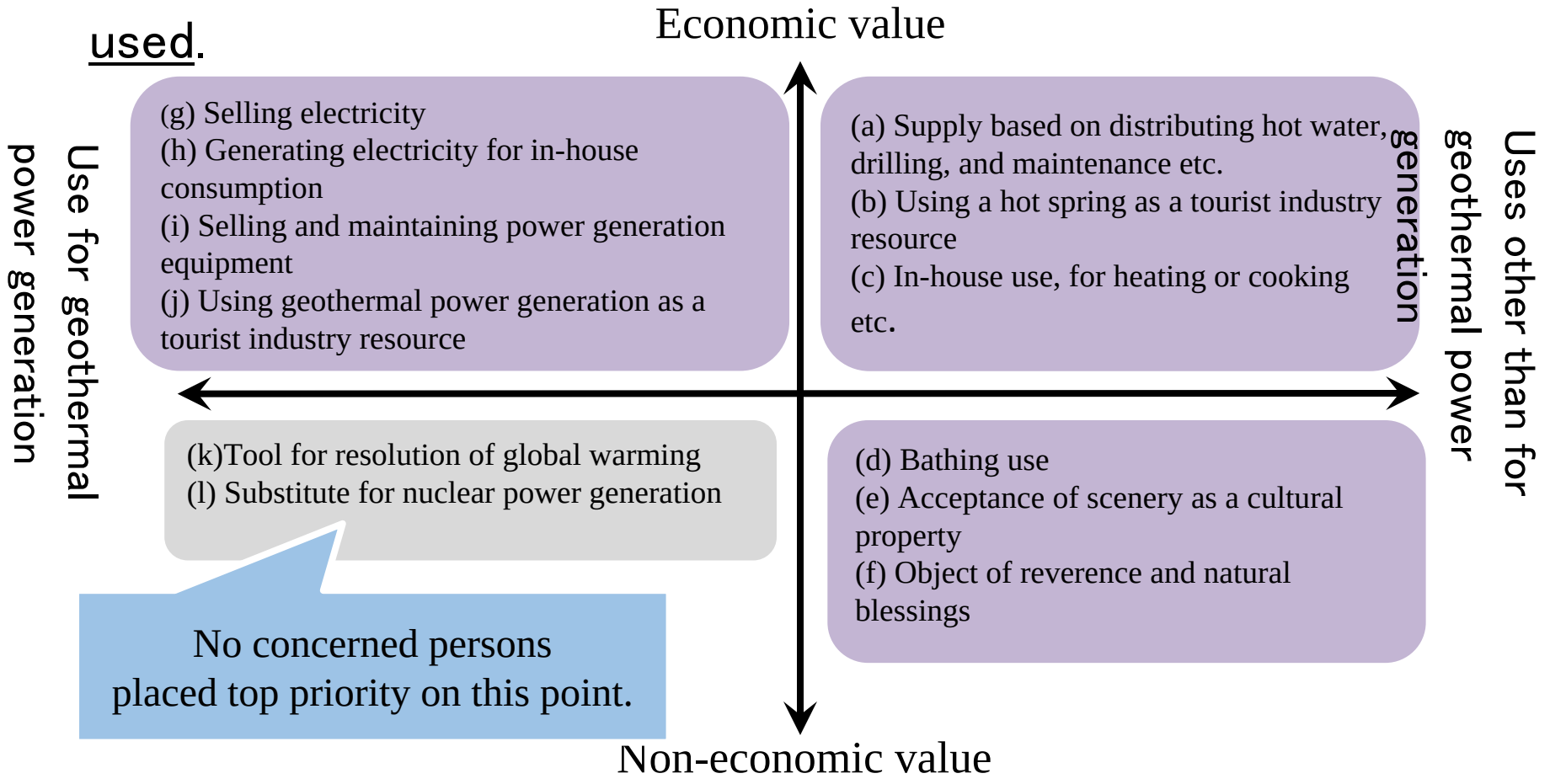
Deterioration of hot spring culture

- Shortage of successors to take over ryokans
- Decline of public bath culture caused by aging of society

There was a common problem consciouisness of the need for regional development.

Disputed Point 2. Perception of Geothermal Resources

- Perceptions of geothermal resources vary, but they were classified as follows by organizing prioritized values and methods used.



Disputed Point 3. Perception of Small-scale Geothermal Power Generation (Concern and Understanding)

- Scattered concern with this problem impacts degree of understanding and awareness of causal relationships.

Concern with small-scale geothermal power generation	High	Little low
Concern with obtaining knowledge of small-scale geothermal power generation	High	Low
Information sources	On-site knowledge from makers etc.	Geothermal general scientific knowledge
Causal links between geothermal power generation and hot springs ≒ Won't geothermal energy generation dry up hot springs?	Assumed absent (Grounds also agree: because no new drilling will be done)	Anxiety

※ But, common awareness that "ultimately the ground underneath is a mystery".

Disputed Point 3. Perception of Small-scale Geothermal Power Generation (Profitability)

- Perceptions of economic benefits of small-scale geothermal power generation are not limited to profitability; they include sightseeing resources and PR for their companies.

Small-scale geothermal power generation based direct profits (=awareness that profibility is appropriate)

Small-scale geothermal power generation based indirect profits Ex. sightseeing resources and PR for their companies

But many are aware that the costs are too high.
So business operators who use it as an in-house electricity source include many who are aware that overall it is unprofitable.

Disputed Point 4. Harmonizing Interests

- There is a need to harmonize the (potential) interests of a variety of concerned persons

Considering consciousness of the local people

■ Concern by many concerned persons

∵ In Beppu City, hot springs are extremely close together and their water sources effect each other.

⇒
- Businesses: Also take steps to actively share their respective information
- Local residents: Views that are obtained by explanation meetings or monitoring

Concern for investors (Inflow of businessmen who disregard feasibility and risk)

Anticipated roles of the government

Prefectures: Need for overall links with prefecture administrations and importance of drilling standards

Cities: Awareness of a desire to have them play an information provision role

All administrators: Releasing data, linking with residents, providing success models, leadership

Stakeholder Analysis in Beppu

No obvious conflicts of interests were observed at present

On the other hand, some stakeholders held an attitude that they will take an opposing position when any impacts have appeared to hot springs

It is necessary to explain the impacts on underground resources in advance to build a consensus about measures to be taken to deal with impacts when they would have appeared

<u>The following 2 points are cited as actions that should be taken</u>

① Provide all stakeholders with interests so that they will readily participate in deliberations

②Let the stakeholders enhance understanding of the issues so that the deliberations are more substantial.

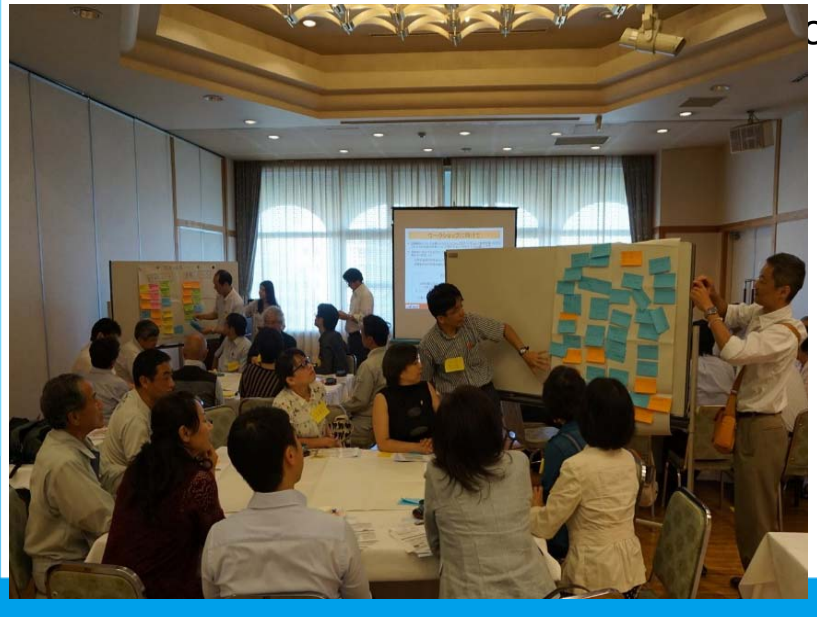
Stakeholders Workshop in Beppu

- Date/time and venue
  - Date/time: 16:00 - 17:30, August 7 (Fri.), 2015
  - Venue: Hotel New Tsuruta (in Beppu City)
  - Participants: stakeholders and mainly residents of Beppu City (Held in two stages with the Hot Spring Meister Course by the NPO Beppu Onsen Geo-Museum, and with the participation of many Hot Spring fans)

- Agenda
  - 16:00 - 16:30 Presentation of topics
    - Results of the interview survey with persons concerned with hot spring and geothermal power generation in Beppu City, results of nationwide deliberations among hot spring fans, hot spring region residents, and people involved in geothermal matters, etc.
  - 16:30 - 17:20 Discussions by participating residents
    - Three groups of 10 people were formed to discuss 2 topics: popular places and problems in the Beppu hot spring, and how to make geothermal a resource for sustainable development of Beppu.
  - 17:20 – 17:30 Reports and summaries by each group

Stakeholders Workshop in Beppu

- Favorites in Beppu Hot Spring
  - In any case, it offers many diverse pleasures (hot water quantity, quality, types, bathing style)
  - Ease of use and casualness (open hours are long and fees are low)
  - There are places to make contacts and places for communication between locals and hot spring fans.
- Challenges for hot springs in Beppu
  - Although people perceive a risk that the hot spring will drain, they tend to waste or do not promote effective use of hot water quantity and quality.
  - Public bathing is hard to maintain and manage, and people fear its decline.
  - [illegible] exaggerate the attractiveness of the hot springs.



- How to make underground resource for sustainable development of Beppu
  - Making and enforcing rules governing, and strengthening monitoring of, geothermal use.
  - Revising overflow and using hot spring resource energy.
  - Linking with the tourist industry to train personnel to publicize attractive qualities of the hot springs

Stakeholders Workshop in Beppu

- Compared with the interview surveys with concerned persons, many more opinions from the perspective of third parties, impossible without hot spring fans and hot spring Meisters, were cited.
- Characteristic opinions
  - Even when compared with nationwide hot springs, there is not one hot spring with as distinctive a character and as rich variations as Beppu.
  - Many initiatives are taken utilizing hot springs, hot-spring connoisseurs and certification among them, and hot spring fans enjoy communicating.
  - Local people either don't notice its attractive qualities, or inversely, are convinced it is the best, and don't try to learn about others.
  - They have a low sense of crisis about drying up or deterioration and are not skilled at publicity.
  - There is plenty of hot water for the hot spring so they carelessly let it overflow and lose it and they feel no regret about their wasteful actions.
  - They think it would be a good idea to link hot spring tourism and geothermal energy use, but they should study the failure of other hot spring regions and learn from their mistakes.
  - At the same time as they use geothermal heat, they should make drilling rules and strengthen regulations and monitoring of drilling.

スライド 29

PD2 I suppose that 温泉通 means people who are considered authorities on the quality of hot springs. so this might mean that the hot spring industry of a region encourages such people to come to their ryokan to give good reports.
Please confirm this
Peter Dunning, 2015/10/23

Summary of the stakeholder analysis and Workshop in Beppu

- The results of stakeholder analysis
  - There are no conflicts over hot spring resource in a visible manner at present because the micro binary hot spring power system does not require new excavations for its development theoretically.
  - Most stakeholders commonly have significant risk perception on drain of hot spring resource, decline of tourist industry and extinction of ONSEN (hot spring) culture.
  - So if the needs for new excavations arise, the conflicts would become obvious. To avoid the situation, we need an adaptive governance including getting common understanding of hot spring resource, visualizing underground situation and collaborative monitoring supported by a neutral third party.
- The results of stakeholder workshop
  - Most people proud of the Beppu's hot water quantity, quality, types, bathing style (ONSEN culture) and so on.
  - Although people perceive risk that the hot spring will drain, they tend to waste or do not promote effective use of hot water quantity and quality.
- Recommendation; holding joint fact-finding to monitor hot spring with variety of stakeholders and to change the framing of micro binary hot spring power to benefit the local community in some ways such as community development by adding new value.