

Activities in Tohoku



Shinya Narita
Iwate University

LCTPC collaboration meeting, 21-Jan-2022

Promotion bodies

- Efforts in the Tohoku Region are coordinated by the **Tohoku ILC Promotion Council**, which consists of members from academia, industries and business, and local governments. The Co-chairs are Hideo Ohno, President of Tohoku University, and Hiroaki Takahashi, Honorary Chairperson of the Tohoku Economic Federation. The Tohoku ILC Preparation Office was established under the Tohoku ILC Promotion Council in 2016.
- In August 2020 with the launch of the IDT, the Tohoku ILC Preparation Office split off from the Tohoku ILC Promotion Council to form the **Tohoku ILC Project Development Center (TIPDC)** with a strengthened alliance of regional industries, academia, and local governments. The TIPDC will address regional issues such as geological and hydrological survey, infrastructure development, and environmental assessment, in more concrete terms.

Promotion bodies

- **The “ILC Promotion Office” in the the Iwate Prefectural Government.** Activities include political efforts for the ILC to be sited in Tohoku, increasing public awareness, preparing for environmental impact assessment, and assessing the readiness of transport and living conditions for international researchers.
- **The Iwate ILC Promotion Council** was jointly established by five local economic organizations in April 2012 to promote awareness of ILC in Iwate Prefecture and to promote the development of research and living environments in order to bring ILC to Japan and the Tohoku region.
- There are other promotion groups in municipalities.

Missions :

- Finalize regional detailed plans for the ILC Project.
- Finalize local decision issues for constructing the ILC.

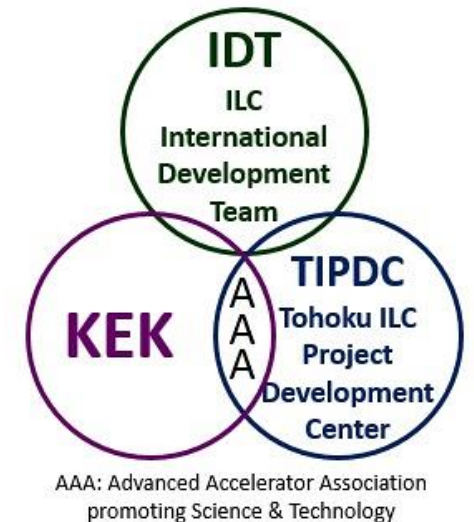
Activities :

- Examine issues that should be tackled by the region in order to improve the area around the ILC construction candidate site, as well as to construct the research facility.
- Examine forms of system and town development that will be able to accept the settlement of foreign researchers and their families.
- Carry out activities promoting local residents' understanding of the ILC.
- Examine the impact of the ILC's construction on the natural environment, society, economy, and more.
- Examine how to use local resources and develop the region during the establishment of the research facility.
- Examine ways to promote accelerator-related industries.
- Any other projects necessary to achieve the purpose of this committee.

Director: Atsuto Suzuki
(President of Iwate Prefectural University)

Member:

23 from local government, municipalities, academia, promotion council.



Take activities with a **closer link** to **IDT, KEK** and **AAA**

Specific activities of TIPDC

1. Preliminary research and analysis activities for ILC construction.
Topographical and geological survey.
Environmental impact study.
2. On-site study of ILC facilities and equipment, providing the information to the IDT.
Formulation of the facility plan.
Study for development of logistics and assembly bases.
3. Promoting the understanding among local residents.
4. Preparation for hosting.
5. Promotion of accelerator-related industries.
6. Development of Tohoku region triggered by the ILC.
Realization of the ILC Tohoku Master Plan and “Global Village Vision*”.
Realization of eco-society through the ILC.

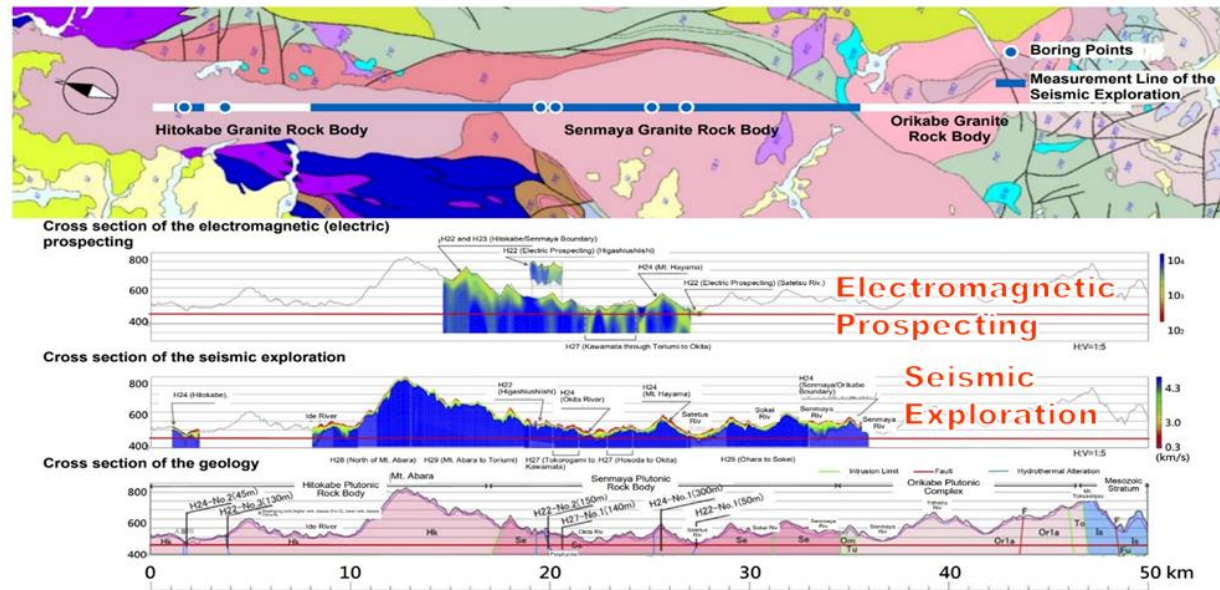
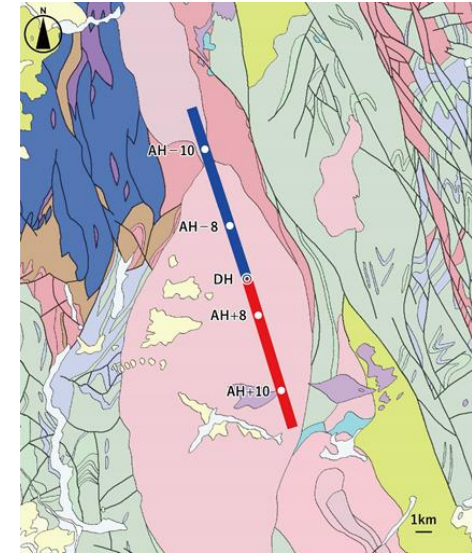
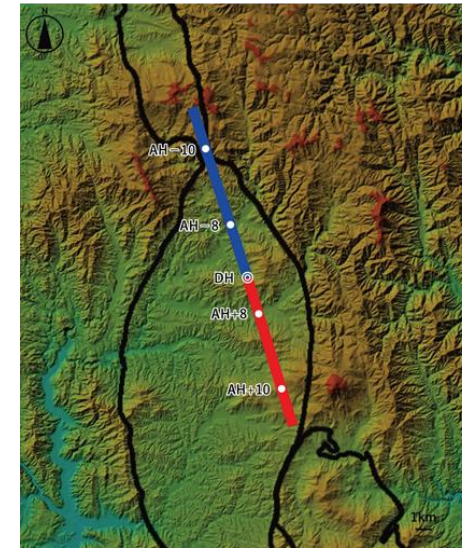
* https://www.kok.or.jp/project/pdf/global_village_vision_web_eg.pdf

Civil engineering study

In 2010, ILC civil engineering studies were started with technical cooperation of KEK, taking full consideration of the topography, geology, and other conditions unique to the site. From 2014, studies on underground civil engineering facilities were carried out under the guidance of Tohoku University's civil engineering experts.

Geological survey

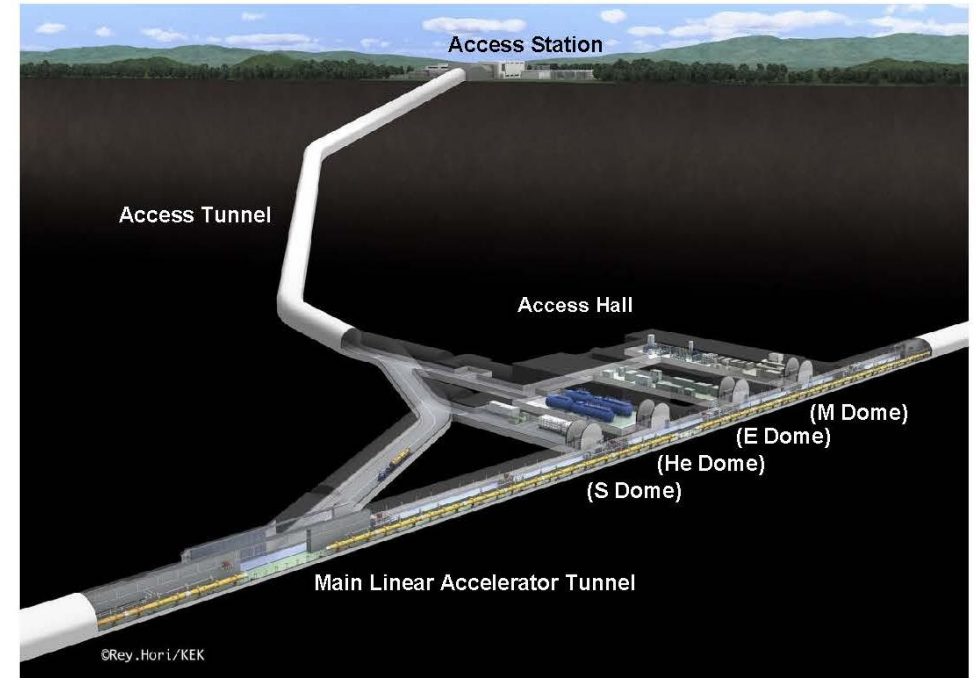
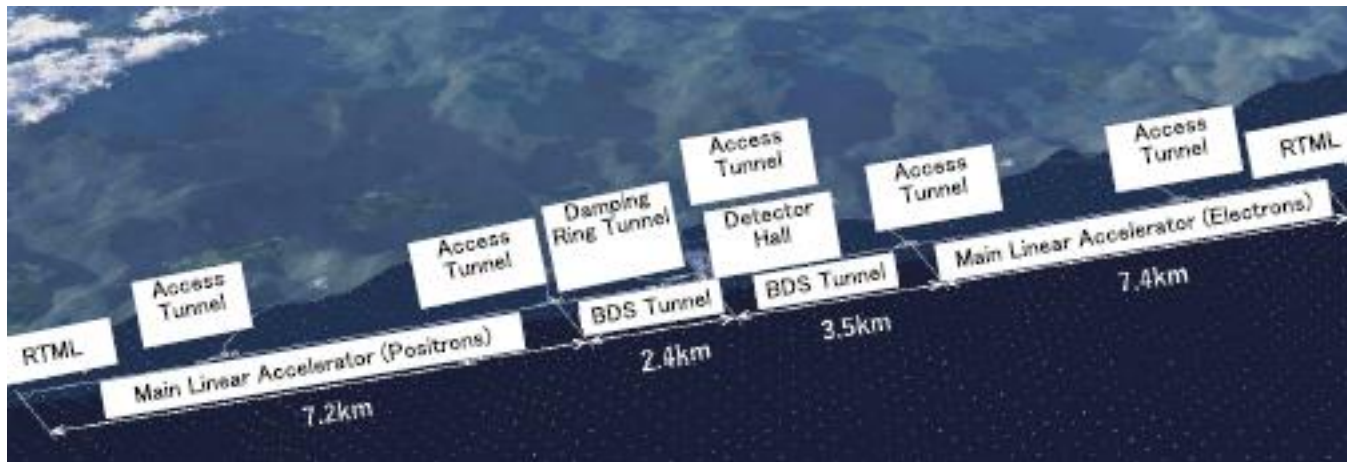
- Electric Prospecting (**crack**)
- Seismic Exploration (**stiffness**)
- Boring Survey
- Borehole Camera
- Measurement of Initial Stress of the Ground



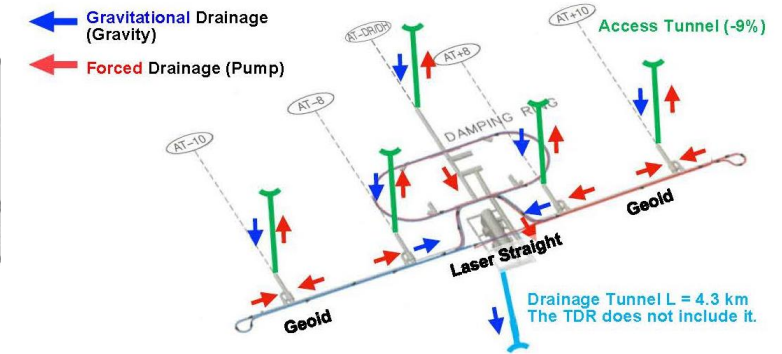
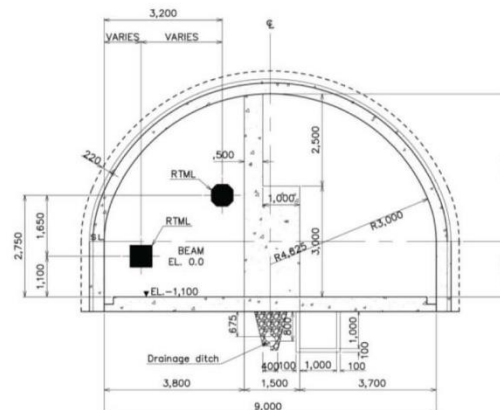
- Hard, uncracked granite is expected to be distributed at the depth of the tunnel.
- Uniform geological conditions, sturdy rock mass

Civil engineering study

Planning of Underground Facilities at Kitakami Site.
 Conceptual Design, Construction Plan,
 Estimated Construction Cost, etc.

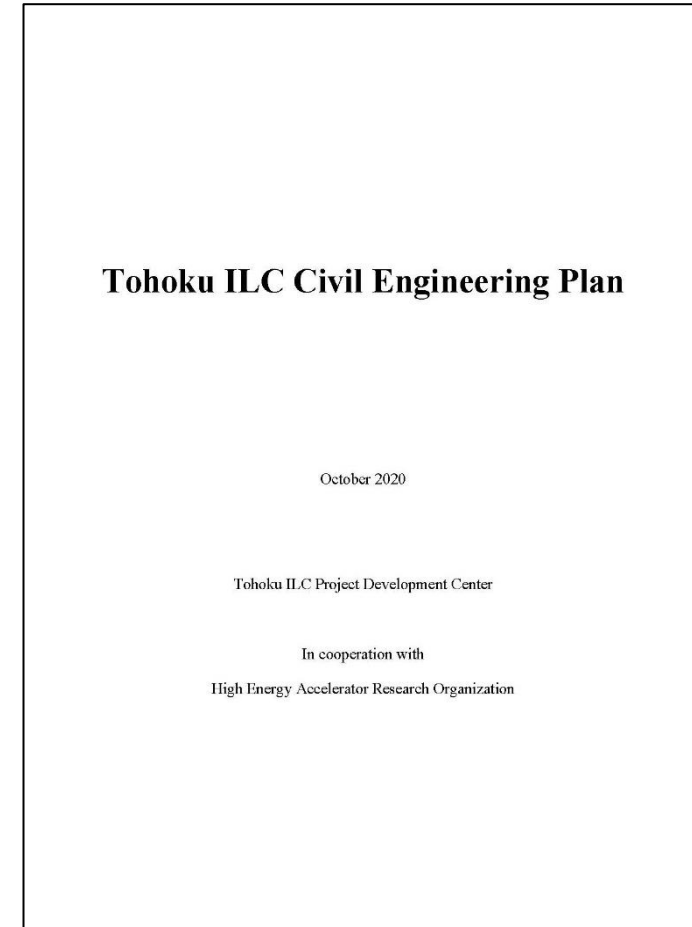


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	AT-8																
	AT-DR																
	AT-DH																
	AT+8																
	AT+10																
ダンピングリング																	
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	AH-8-AH-10																
	AH-8-DR																
	AH+8-DR																
	AH+8-AH+10																
	AH+10-ループ																
検出器ホール	アーチ部掘削																
	本体部掘削																
	構築コンクリート																
検出器ホール立坑	メインシャフト																
	ユーティリティS																
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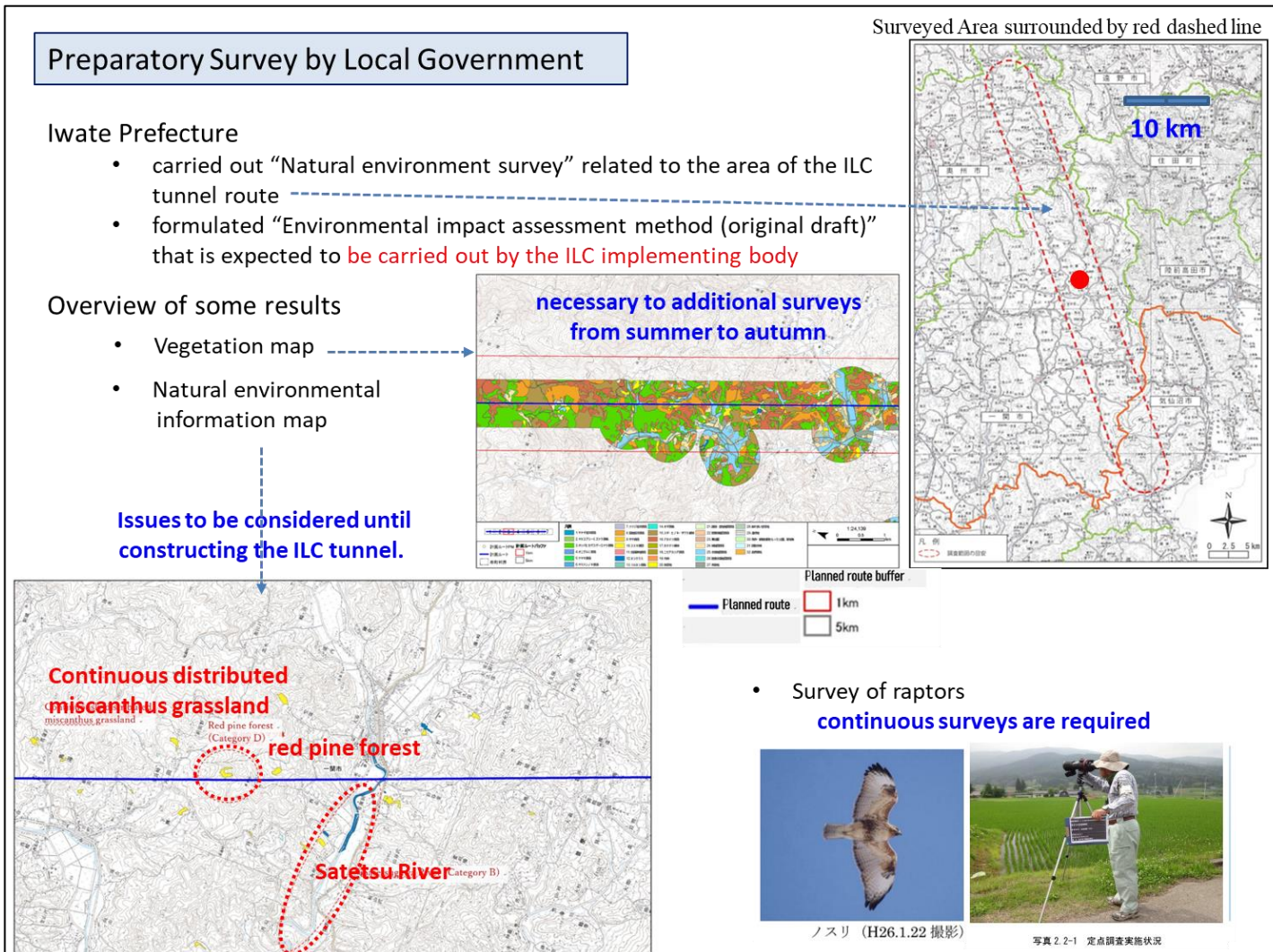
Civil engineering study

- The results from the civil engineering study were compiled into the “Tohoku ILC Civil Engineering Plan” in 2019 with the cooperation of KEK.
- The plan was reviewed by external civil engineering experts. The Subcommittee on the Evaluation of the ILC Civil Engineering Plan of the Rock Mechanics Committee of the Japan Society of Civil Engineers (JSCE) evaluated the plan to be appropriate from the viewpoint of rock mechanics and engineering.



Environmental assessment

Iwate Prefecture conducted a basic survey for environmental assessment. They identified some issues to be considered until the construction starts.



KEK established the "ILC Environmental Assessment Advisory Board" in September 2019 to obtain advice from external experts on the environmental assessment of ILC. The "Summary of Discussions" was published in February 2021

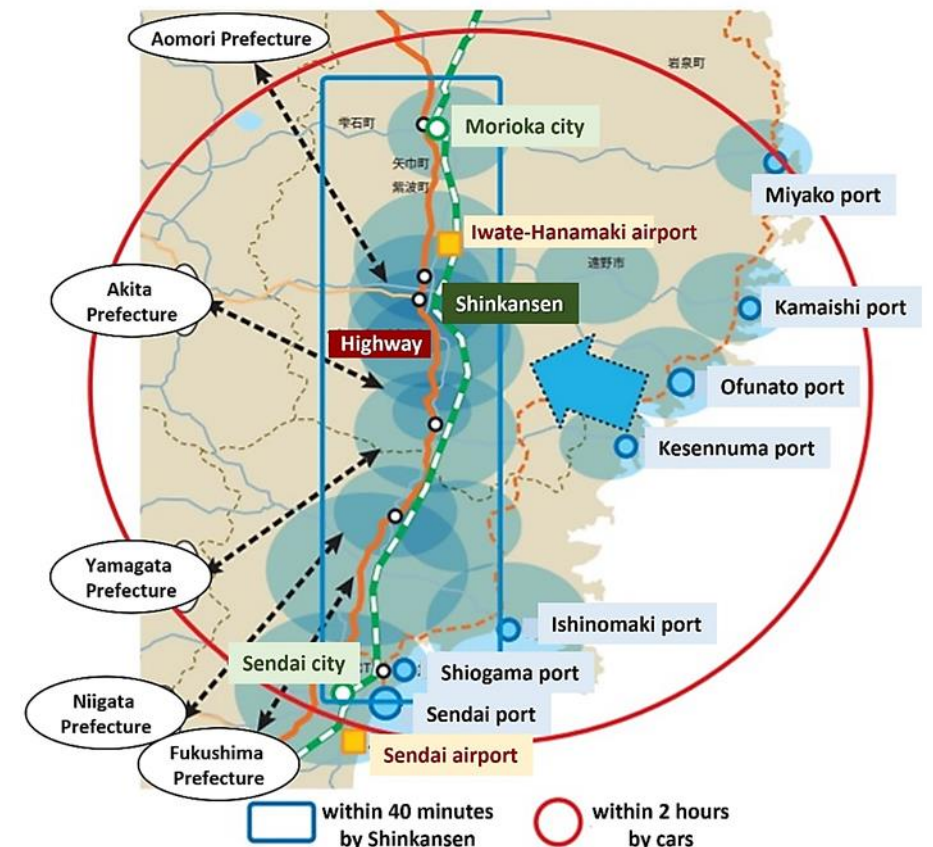
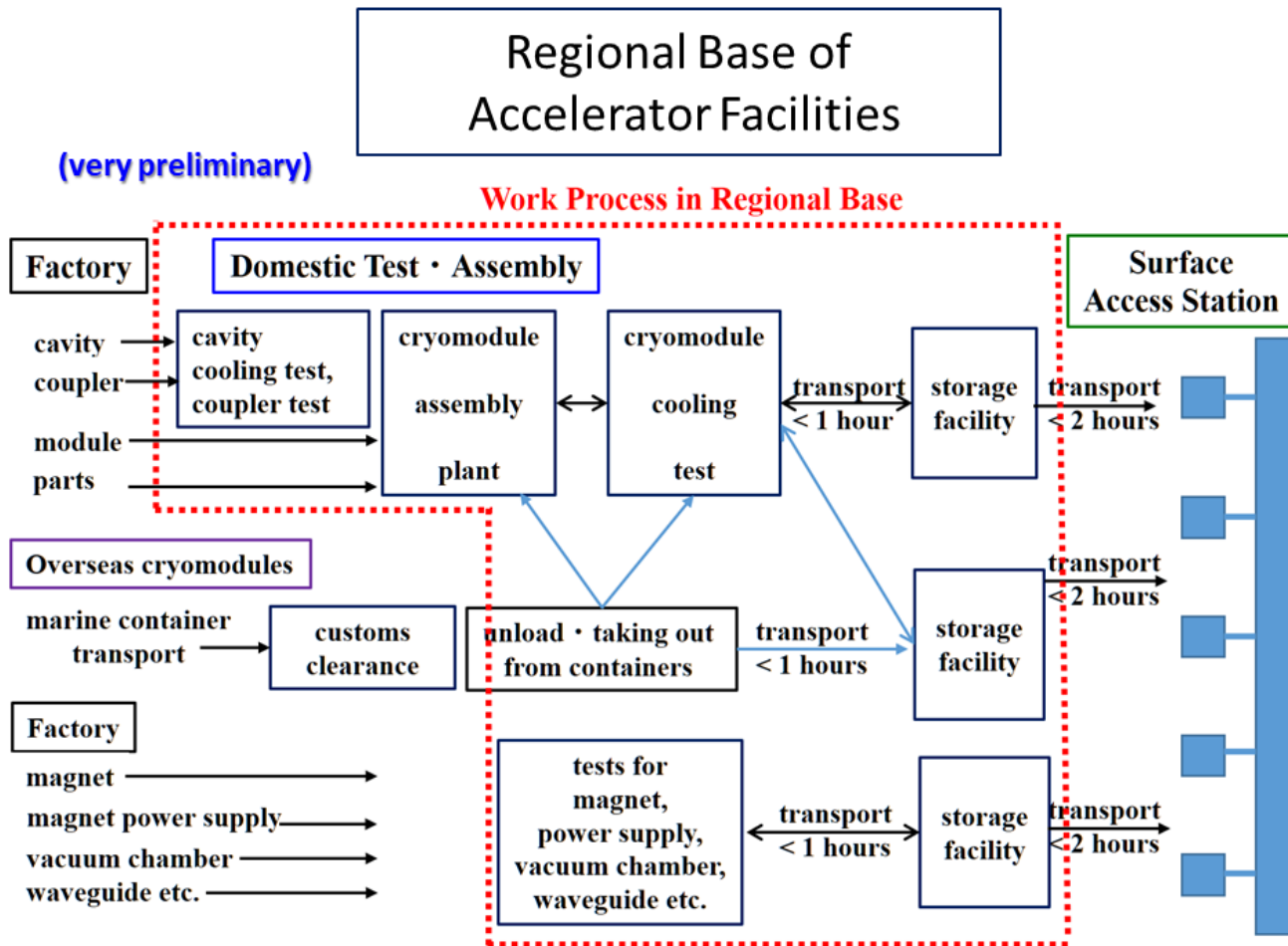
..., in order for a smooth and appropriate promotion of the project, it will be necessary to implement the Strategic Environmental Assessment ("SEA"), which is to be conducted during the decision-making process (strategic phase) up to the project implementation phase, prior to the environmental assessment by the project implementing body at the stage when the project plan takes its shape (Project Phase Assessment).

https://www2.kek.jp/ilc/ja/contents/docs/Strategic_Environmental_Assessment_of_the_ILC_Project_Summary_of_the_Discussion_r.pdf

Together with KEK members, we have been holding regular study sessions on environmental assessment by inviting experts.

Development of logistics and assembly bases

As testing and storage facilities for parts and equipment that come from Japan and overseas are necessary, these base for the facilities are being considered in consideration of available roads, ports, and existing facilities that can be utilized.



Promoting the understanding the ILC among local residents

- ILC Seminars targeting local residents have been held jointly with KEK to explain the merits of the ILC and international trends, as well as safety management of the ILC.
- Explanatory materials to address concerns raised by residents have been prepared and made available to the public.

Main concerns

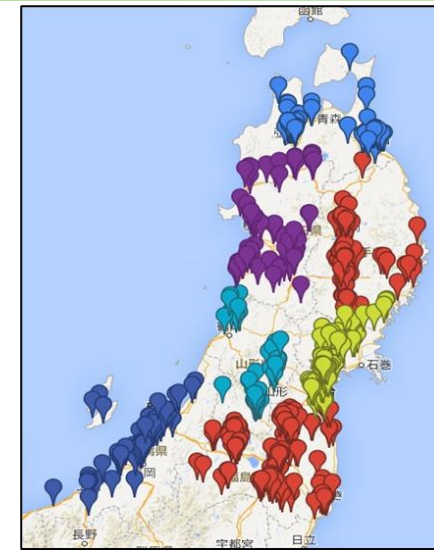
- Disposal of radioactive materials generated by the operation of the ILC
- Disaster (earthquake, power outage) countermeasures
- Securing of electric power
- Impact on the environment due to construction, etc.

- The Tohoku ILC Preparation Office, the predecessor of TIPDC, had published the booklets called the “ILC Guidelines.” The contents will cover topics relevant to local communities, such as the merits of the ILC, contribution to regional development, and impact on local communities.



Promotion of accelerator-related industries.

- There are several hundreds companies with fundamental technologies related to accelerators in Tohoku region. (including Niigata)
- TIPDC has supported the entry of local companies for accelerator-related industries by linking up with international research institutes, etc.
- TIPDC has also supported the formation of alliance between companies and academia through case studies.
- The "Iwate Accelerator-related Industry Study Group," a collaborating organization, holds regular ILC technology seminars, and also organizes KEK tours and technical training for engineers from local companies.



*Surveyed by Tohoku
Economic Federation*

Promotion of accelerator-related industries.

Example of collaboration : R&D of E-driven Positron Source

Kondo Equipment Co. Ltd.
Metal Technology Co. Ltd.
TOHOKU SEIMITSU CO. LTD.

KEK, Hiroshima U
Iwate U, Tohoku U

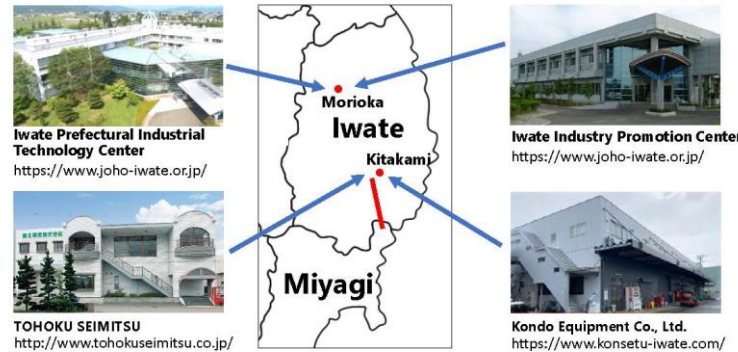
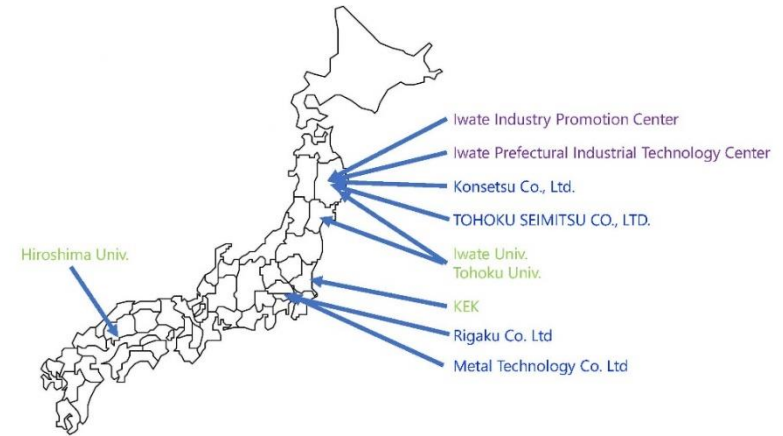
Iwate Industrial Research Institute
Iwate Industry Promotion Center

E-driven positron source R&D by Industry-Government-Academia collaboration

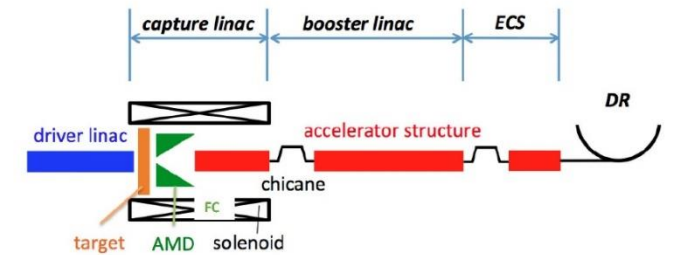
Tohru Takahashi for the Collaboration

High Energy Accelerator Research Organization(KEK)
Hiroshima University
Iwate Industrial Research Institute
Iwate Industry Promotion Center
Iwate University, Kondo Equipment Co. Ltd.
Metal Technology Co. Ltd.
TOHOKU SEIMITSU CO. LTD.
Tohoku University

ILCX2021
October 28, 2021



E-driven ILC Positron Source



There are many other projects in which local companies are participating.

Activities through 2020 are summarized in this paper.

*Proceedings of the 17th Annual Meeting of Particle Accelerator Society of Japan
September 2 - 4, 2020, Online*

PASJ2020 WEPP57

STUDY ON A SUSTAINABLE ENERGY MANAGEMENT SYSTEM FOR THE ILC

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^{D)} Iwate Prefectural Office

^{E)} NTT FACILITIES, INC., Solution Business Department, Tohoku Branch,

^{F)} TOBISHIMA CORPORATION, Civil Engineering Division

^{G)} Sumitomo Mitsu Construction Co.,Ltd. Civil Engineering Division

Abstract

A large accelerator facility is also a large power load facility. In that sense, Japan's largest facility was TRISTAN and KEKB of KEK with a maximum contracted power and annual power consumption of 96 MW and 500 million kWh, respectively. Electricity was received from the commercial grid and the end thermal energy was released into the air with a cooling tower. However, in recent years, sustainable energy management of large-scale accelerator facilities has become a prerequisite for their acceptance by society worldwide. Since the ILC would use more power than TRISTAN, its facility design should be based on that idea. In this paper, we discuss not only electric power used in the ILC but also the general and comprehensive management of electric power and thermal energy based on the characteristics of the entire region where the facilities are to be located. Energy sources including electricity will be comprehensively considered, such as commercial grids, co-generation, seasonal solar heat utilization, heat utilization of unused biomass, geothermal, hydropower, and wind power. Finally, we propose a new energy management system that would be set in motion by ILC.

Realization of eco-society through ILC ~ Part of Green ILC activities ~

Exhaust heat recovery from the ILC

- The water vapor adsorption material HASClay composed of nano-sized clay has been recently developed.
- It has a heat storage capacity with a principle of energy transfer in the desorption of water vapor.
- It particularly has an excellent storage ability for low-grade heat (<math><100\text{ }^\circ\text{C}</math>). In addition, the heat stored can be reused offline by transporting the material with a sealed container.



Granularly molded HASClay® sintered body.

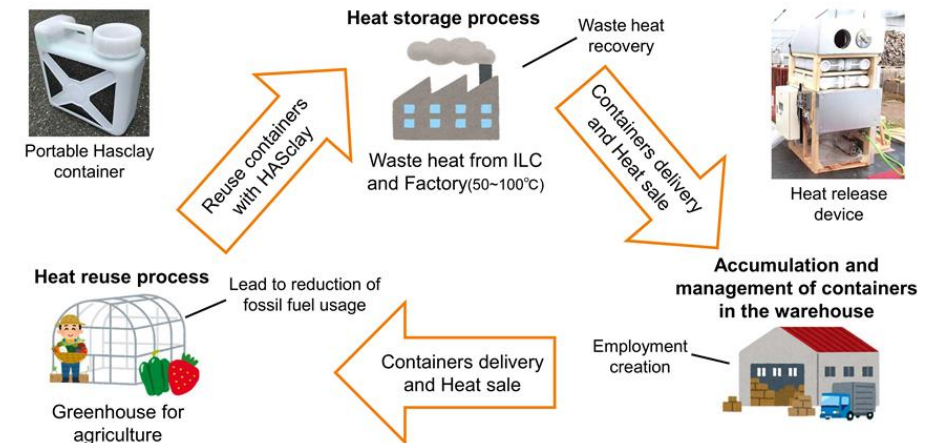
It is possible to establish a new heat supplying service if we can recover it by the HASClay from not only the ILC waste, but also various sources in the area around the ILC.

*Exhaust heat from industrial facilities, waste treatment facilities
Geothermal, hot spring, ...*

Higashi-Nihon Kidenkaiatsu Co.,Ltd., WING Co., Ltd., Takasago Thermal Engineering Co., Ltd.
The National Institute of Advanced Industrial Science and Technology (AIST), Iwate University
Iwate Prefectural Office

aiming to launch a new business

Utilization of heat circulation in Iwate prefecture by using HASClay®.



We have been doing the field test to recover the heat from the hot springs and dissipate it in strawberry houses.

Realization of eco-society through ILC ~ Part of Green ILC activities ~

Connecting the ILC with the local forestry industry

Recently, a large-sized wooden building has been realized by the progress of timber engineering. Even for the accelerator facility, such building has been constructed, for example, the main building of Swiss Light Source in Paul Scherrer Institute (PSI).



ILC-related facilities will be constructed of wood, taking advantage of the abundant forest resources in the Tohoku.

Model Study

We proposed a wooden building in the area of 6000m² for the ILC detector preparation and verify the economic ripple effect by utilizing local wood.

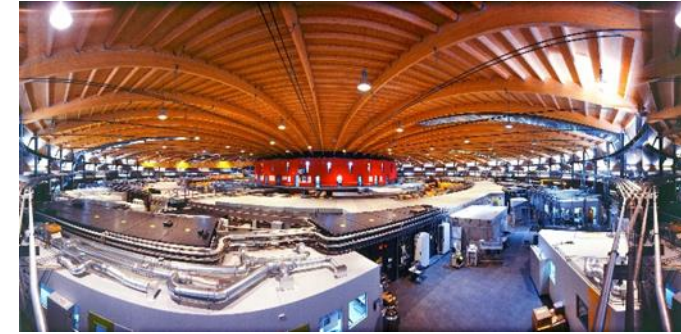
It was found that the mixed structure of wood and RC is far superior to the mixed structure of steel and RC in terms of overall evaluation, including economic ripple effect and employment induced, when locally produced wood is used.

Use of woody biomass as a heat source from scrap wood generated by lumbering.

→ can use for the heat circulation system.

Systematic forestation will also contribute to the realization of carbon neutrality.

PSI-SLS

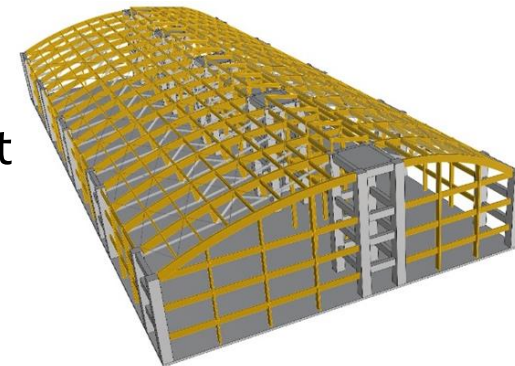


<https://www.psi.ch/en/psd/facilities>

Shelter Co., Ltd.

Iwate University

Iwate Prefectural Office

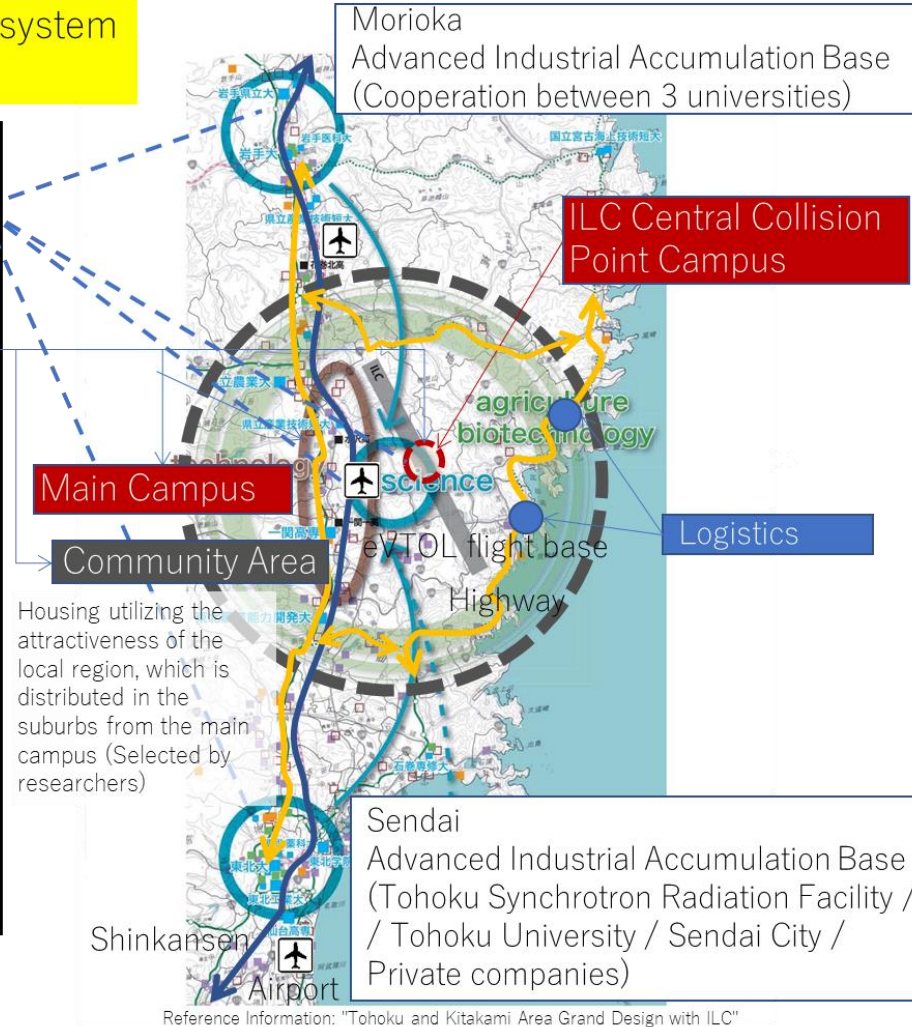


Realization of eco-society through ILC

(4) The Green ILC concept and community development and planning - building an energy recycling society based on the Global Village Vision

Aiming to build a wide-area ILC Eco-system by considering followings

- Knowledge transfer
Tohoku ILC Eco-system
- Mobility
Autonomous driving / eVTOL special zone
- Green ILC / Energy Sustainability
Next-generation agricultural, forestry, and fisheries bases utilizing ILC waste heat and other sustainable energy sources
- Advanced Communication Infrastructure
- Healthcare/Education
Internationalization and ICT
- Accommodation / Residence



The future of the Tohoku is being studied, taking into account the various development possibilities triggered by the ILC.

Summary

- In Tohoku, ILC promotion activities are actively carried out by various organizations including industry, government, academia, and local governments.
- In cooperation with the IDT and the research community such as KEK, the region is taking the initiative in addressing issues that need to be promoted.
 - Research and analysis for ILC construction, facility and equipment planning, and base development planning
 - Promotion of understanding the ILC among local residents
- The ILC is being used as an opportunity to study new regional development that takes advantage of the characteristics of Tohoku.
 - Promotion of accelerator-related industries.
 - Tohoku Master Plan, Global Village Creation Vision, Green ILC.

Preparations for the ILC are actively underway in Tohoku.

