

# ILC Vanguard Initiative

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**Abstract.** The ILC Vanguard Initiative was established August 2023 with the premise of siting the ILC in Japan. This includes the construction of a new social model, the creation of new values, and the implementation of the plan. The primary focus is to prepare for urban development and future growth at the prospective site locations, which require extensive surveys, facility reviews, and careful planning. In this talk we report motivation and recent activities of the ILC Vanguard Initiative.

## 1 Introduction

It has been over a decade since the scientific community identified the Kitakami mountain region in Tohoku, Japan, as the most suitable candidate site for the International Linear Collider (ILC). Although no official decision has been made to construct the ILC in Japan, intensive efforts to promote the project have been ongoing.



**Figure 1.** IVI has been organized to study issues to promote ILC in Japan.

While considerable work still remains, efforts encompass various aspects, including: developing management plans for establishing the first global research institute in Asia; designing an advanced science city in the Tohoku area; conducting comprehensive environmental assessments.

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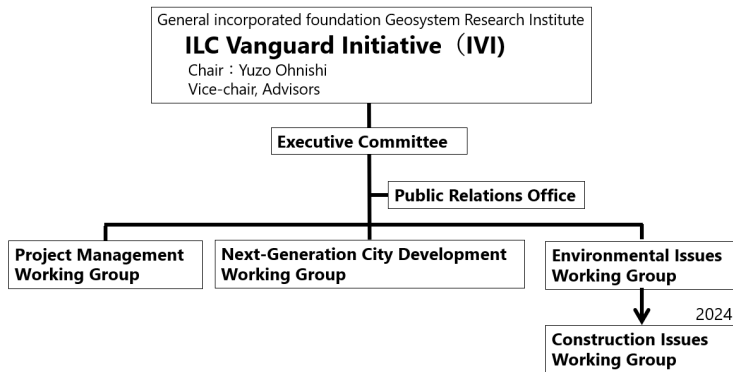
These endeavors necessitate close collaboration with local governments and communities, potentially requiring years to complete. Given that activities related to the ILC in the Tohoku area are constrained by the absence of an official decision regarding its construction in Japan, we have established a research group, the ILC Vanguard Initiative (IVI), to study various issues, particularly those that require close collaboration with local communities or involve site-specific challenges that cannot be addressed independently[1].

This group will focus on essential preparatory work that must be completed prior to construction, ensuring readiness in the event of official approval for the ILC project.

In this report, we show the organizational structure of IVI and present recent developments from the activities of its working groups, specifically the Project Management Working Group, the Next-Generation City Development Working Group, and the Environmental Issues Working Group.

## 2 Organization

ILC Vanguard Initiative (IVI) was organized August, 2023 as research group within the Geosystem Research Institute. The organization of IVI is shown in figure 2.



**Figure 2.** Organization of IVI

The chair of IVI is Yuzo Ohnishi, professor emeritus of Kyoto University, and the vice-chair is Satoru Yamashita of Iwate Prefectural University. The author of this article is the chair of Public Relation Office. Approximately 40 members participate individually from various universities and companies. The members come from leading Japanese industries, including construction and telecommunications, as well as academic institutions. We have several working groups focusing on different aspects such as project management, next-generation city development, environmental issues. The environmental issues working group was recently reorganized to construction issues working group to handle more comprehensive issues that are necessary to have it ready to start the ILC construction.

Each working group and the public relations office members meet regularly to discuss their respective activities. In addition, the executive committee members hold monthly online meetings to keep abreast of the activities of the working groups and the public relations office and to discuss IVI's overall policies and strategies.

### 3 Working Group Activities

#### 3.1 Project Management Working Group

The Project Management Group will make recommendations for the appropriate management of the overall construction of the facility through lectures and interviews with expert in large-scale science and technology planning and project promotion.

Its primary task is creating models for governance, work-sharing, timelines, and bidding processes. This group ensures that the project’s diverse components operate cohesively and on schedule. One of its outcomes so far is the development of a comprehensive construction model that outlines the division of technical, facility, and infrastructural tasks between local and international stakeholders.



**Figure 3.** A construction model discussed in the Project Management Working Group

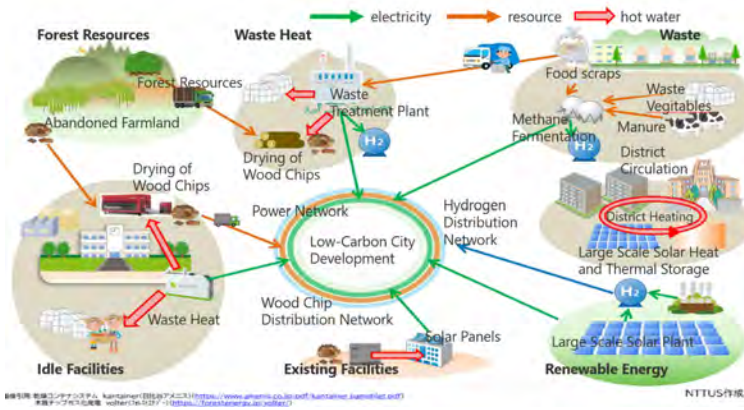
The construction model proposes to divide ILC related work into three portions.

- Site or surface-related works, including environmental assessment and city development, which local government and community are the main players while maintaining close collaboration with the academic community.
- Scientific facility or underground works, which include the accelerator tunnel, equipment, and experimental detector. These are mostly developed by the academic community.
- Technological research, which is pure technological study and can be performed independently of site-specific issues. It is currently conducted by the International Technology Network (ITN) and planned to be part of the ILC preparatory laboratory, then eventually to be integrated into the ILC international laboratory.

The model separates the work to be done primarily by the local government or community in the candidate site from the work to be done primarily by the researchers, and further identifies the work specific to the candidate site and the technology development that can be done independently. This model facilitates collaboration between researchers and local governments and communities in the candidate sites, and allows for parallel preparation for the attraction of ILCs in situations where the candidate sites have not yet been officially identified.

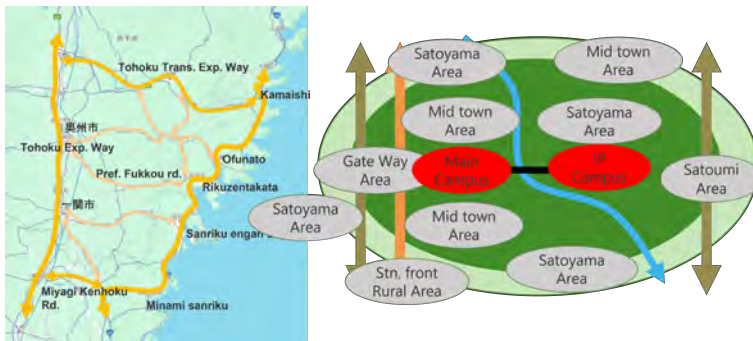
#### 3.2 Next-Generation City Development Working Group

The Next-Generation City Development Working Group focuses on creating a sustainable urban environment around the ILC facility. Its goal is to demonstrate how the ILC can contribute to solving broader societal challenges in the Tohoku region, the ILC site candidate. It also aims to present possible solutions to future global societal challenges.



**Figure 4.** Figure 4 Illustration the concept of a low-carbon city, integrating renewable energy, sustainable transportation, and waste management. Originally created by NTTUS and translated to English by the author.

In figure 4, we show a concept of a low-carbon society. We create a concept of a low-carbon city that integrates renewable energy sources, sustainable transportation networks, and innovative waste management systems. Some of the initiatives include the utilization of solar panels, district heating systems, and hydrogen distribution networks. By fostering these developments, the group aims to enhance the quality of life in the region while also creating a model for future urban developments both in Japan and globally.

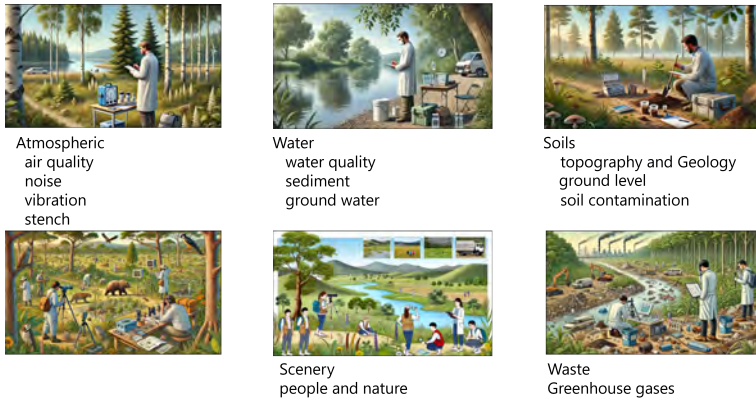


**Figure 5.** A concept of next generation advanced mobility system around the ILC site. Originally created by Fukken Gijyutsu Consultants, Mitsui Consultants, Fukuyama Consultants and modified and translated by the author.

Figure 5 shows a concept of the next-generation mobility system around the ILC site. In the left panel, major transportation networks, highways, and Shinkansen trains are shown, which connect cities around the ILC site and to Tokyo, a gateway to the global community. In the right panel, a concept of a residential area around the ILC laboratory is shown. Centered on the ILC campuses, urban town areas, Satoyama areas (a concept of a landscape where sustainable human activities and nature coexist), and the gateway to major cities in Japan are located. This arrangement allows researchers, their families, and the local community to live in a global science city that harmonizes nature with urban convenience.

### 3.3 Environmental Issues Working Group

The Environmental Issues Working Group is tasked with conducting environmental assessments critical to the success of the ILC project.



**Figure 6.** GPT-4o illustration of environmental assesment issues.

These assessments include a wide range of factors.

- Atmospheric  
air quality, noise, vibration, and odors
- Water  
water quality, sediment, groundwater
- Soils  
topography and geology, ground level, soil contamination
- Animals, Plants, Ecosystem
- Scenery  
people and nature
- Waste, Greenhouse gases

Given the complexity and duration of these assessments, the group works closely with local communities to ensure that all environmental concerns are addressed thoroughly and transparently. The group leverages lessons learned from large-scale infrastructure projects, like the Shinkansen and expressway tunnels, in which many IVI members were involved. This experience is invaluable in guiding the environmental planning and assessment processes for ILC.

## 4 Summary

Since its establishment in August 2023, the ILC Vanguard Initiative has been actively addressing key areas such as project management, city development, and environmental assessments in preparation for the ILC. We have held three symposiums, tackling challenges such as public-private partnerships, environmental assessments, and the development of a global research laboratory and city. As a result, the City Development and Environmental Issues

Working Groups have summarized their activities for 2023. To better address the broader scope required for ILC construction, the Environmental Issues Working Group has been re-organized into the Construction Issues Working Group in August 2024.

Going forward, we will continue management studies and propose frameworks for efficient and timely ILC implementation. In urban development, we aim to envision the next generation of international science cities, sharing our findings to raise awareness and promote understanding of the ILC project. In construction, we plan to offer concrete solutions for environmental assessments and civil engineering projects. To support these efforts, we will hold additional symposiums and conduct joint research with local governments.

## **Acknowledgement**

The author would like to thank all members of the ILC Vanguard Initiative (IVI) for their valuable contributions and collaboration in advancing preparations for the ILC project. Special thanks go to Professor Yuzo Ohnishi, for his leadership and guidance. The author is also grateful to the executive committee members for their efforts in managing the proactive activities of the IVI.

## **References**

- [1] <https://ivi.huhep.org> in Japanese  
<https://ivi-en.huhep.org> in English