

Safety Regulations for Solar Power Generation Facilities in Japan

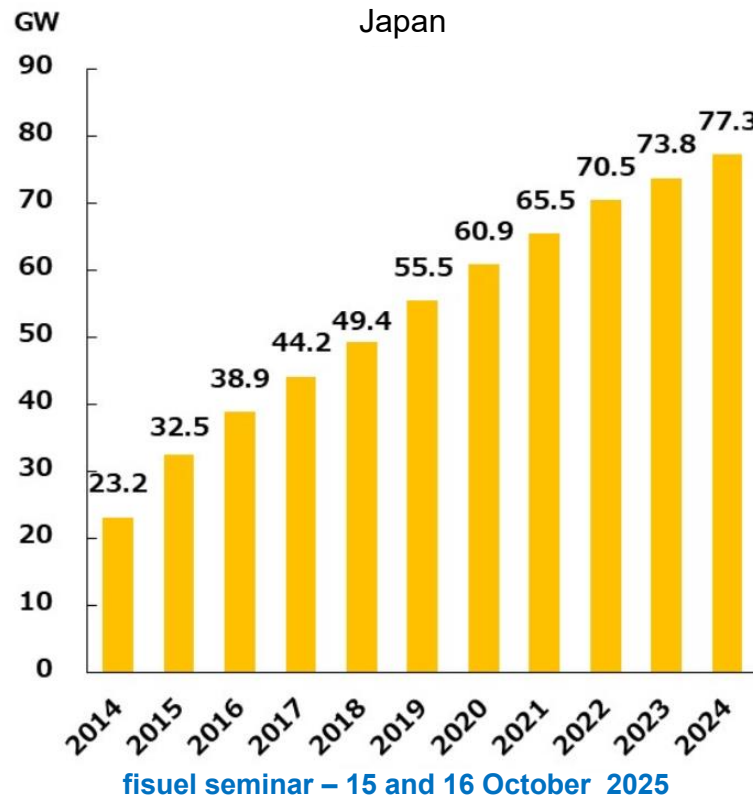
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1. Transition of the introduction of solar power generation facilities

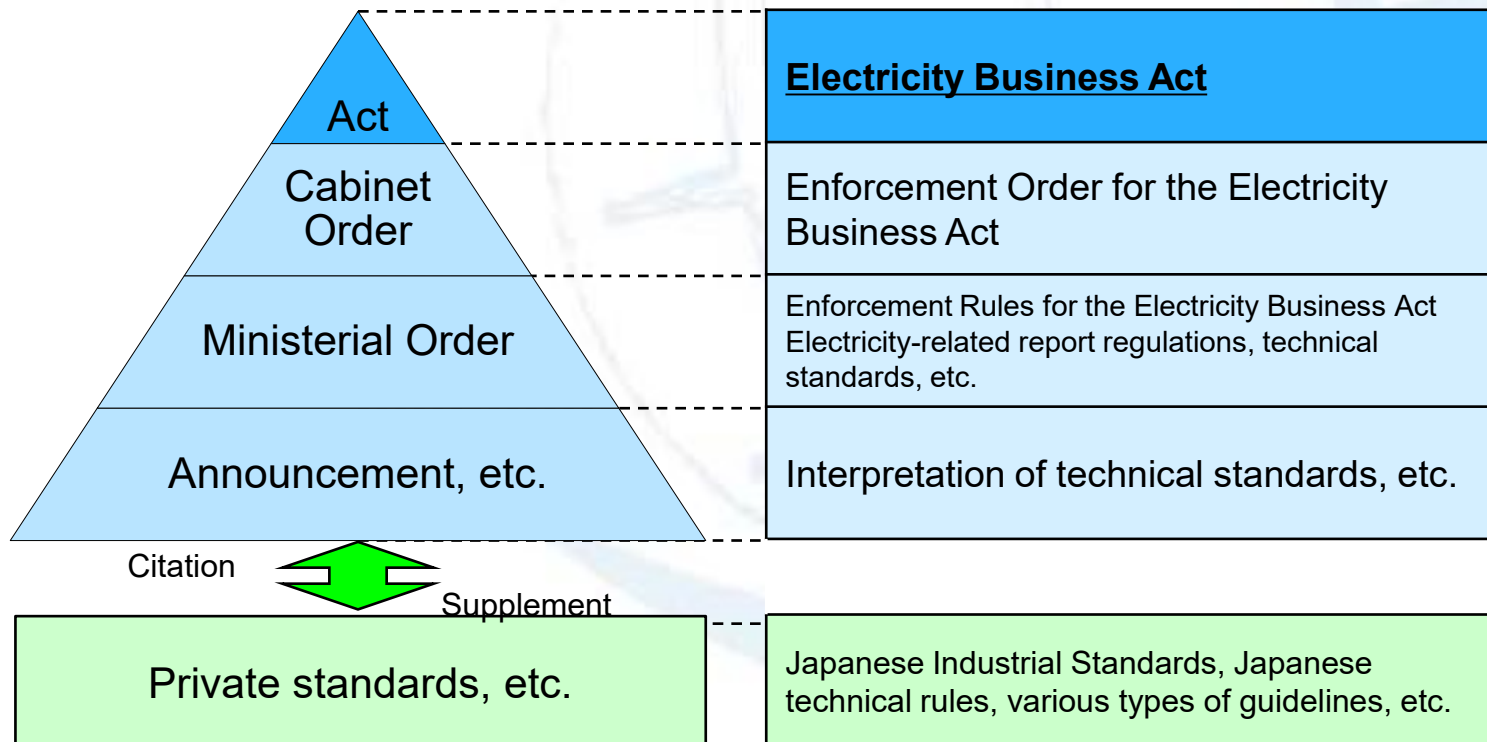
- In the Basic Policy for Energy specified by the national government on a medium- to-long-term basis (7th Basic Energy Plan), solar power generation is given the status of a core for the enlargement of renewable energy in 2040.
- (The ratio of solar power in power supply configuration is expected to increase from 10% in FY 2023 to 23 - 29 % in FY2040.)
- Solar power has rapidly grown due to the start of the FIT system in 2012, and has increased stably.
- In recent years, the amount of introduction tends to decelerate slightly due to factors such as a decline in FIT prices, but it is expected to grow further.



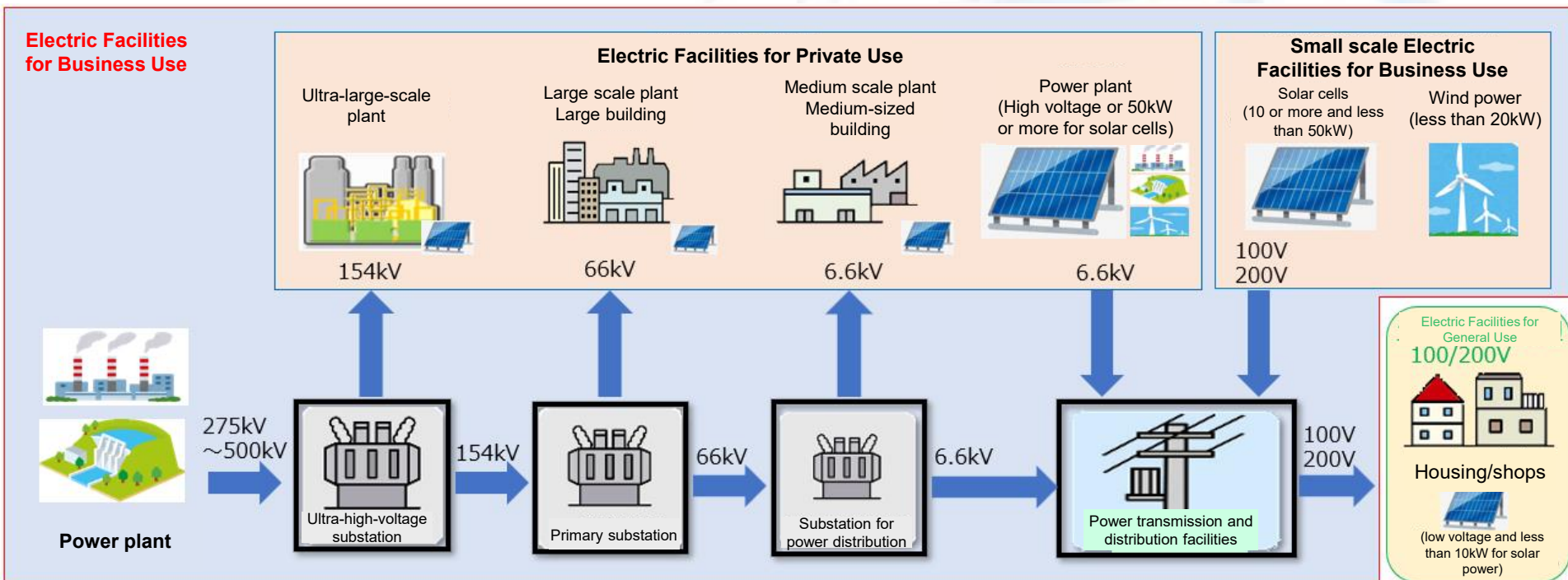
Source: Website of the Japan Energy Foundation

2. Regulatory system of solar power generation facilities

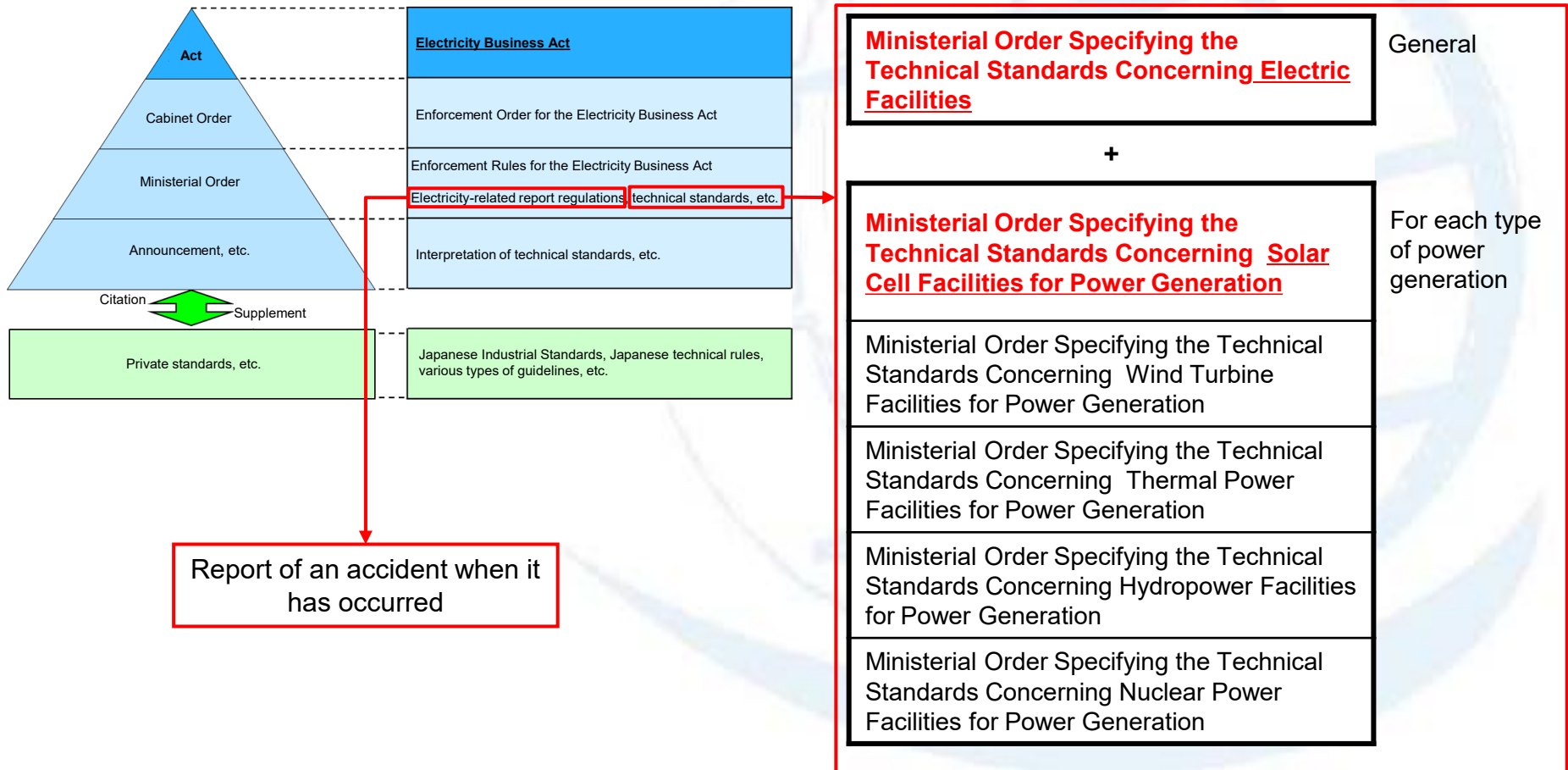
- Regulated mainly by the Electricity Business Act
- The purpose of the Electricity Business Act is “ to protect the interests of electricity users and achieve the sound development of Electricity Businesses by realizing appropriate and reasonable management of Electricity Businesses, and to assure public safety and promote environmental preservation by regulating the construction, maintenance and operation of Electric Facilities.”



- In Japan, Electric Facilities are roughly classified into Electric Facilities for Business Use (= for industrial use) and Electric Facilities for General Use (= housing, etc.).



- An installer of Electric Facilities for Business Use (for industrial use) is required to comply with the technical standards and to report an accident when it has occurred
- Compliance with the technical standards is assured by means of administrative guidance and an order to discontinue use, etc. against violators



- For Electric Facilities of a certain size or larger, self inspection before use and notification of its result, etc. are required.
- The requirement applies to 10 kW or more for solar power generation facilities.

Implementation items of self inspection before use of solar power generation facilities
(specified by an announcement, etc.)

(1) Appearance inspection
(2) Confirmation of design load
(3) Confirmation of supporting structure
(4) Confirmation of member strength
(5) Confirmation of materials used
(6) Confirmation of joint structure
(7) Confirmation of foundation and anchor strengths
(8) Confirmation required when the maximum height of the array surface exceeds 9 m
(9) Confirmation related to prevention of sediment runoff and failure
(10) Confirmation of observance of rules in relevant laws and ordinances
(11) Various types of other tests

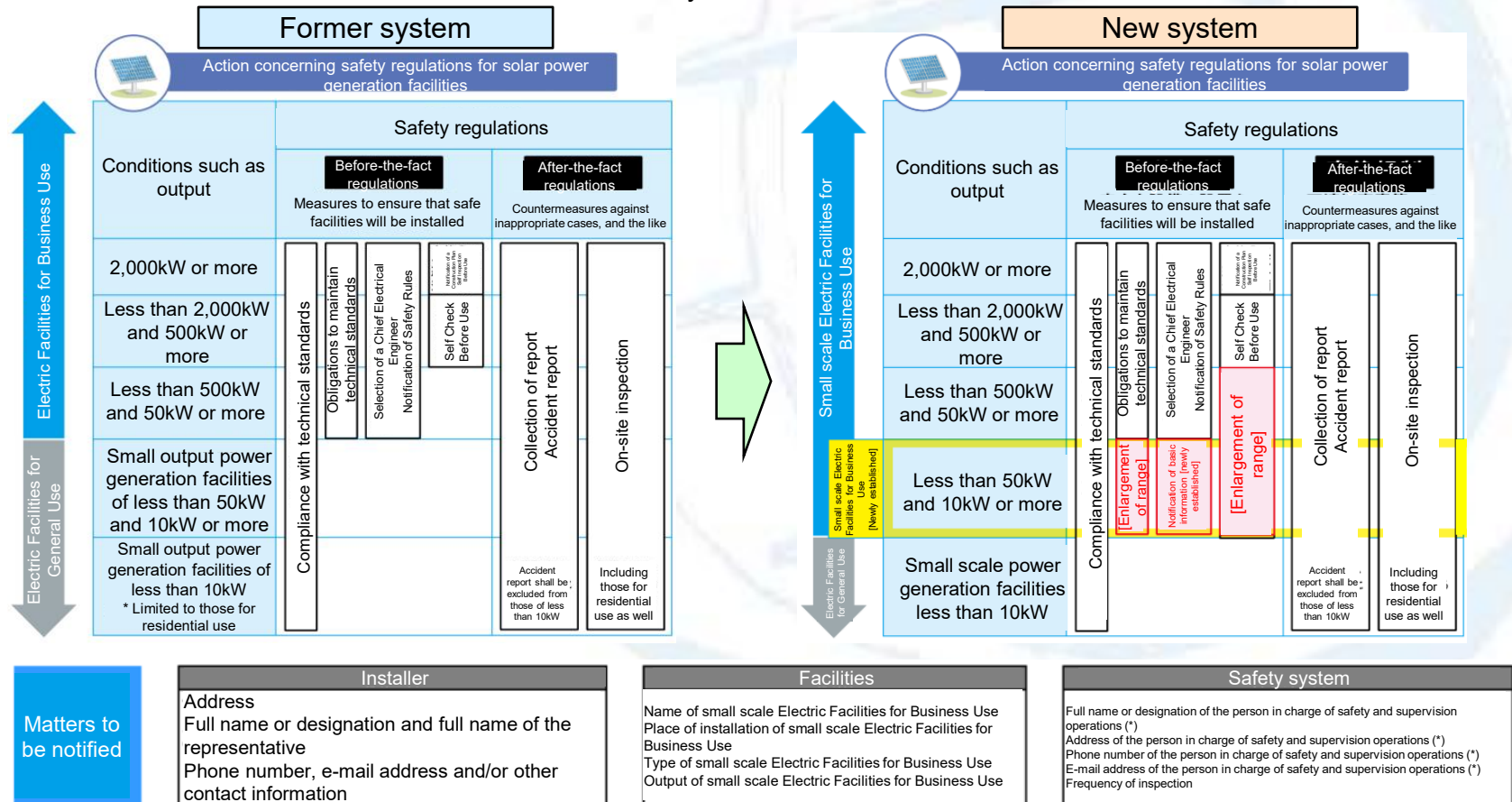
- ① Ground resistance measurement
- ② Insulation resistance measurement
- ③ Dielectric strength test
- ④ Protective relay test
- ⑤ Circuit breaker-related test
- ⑥ Comprehensive interlock test
- ⑦ Control power loss test
- ⑧ Load cutoff test
- ⑨ Remote monitoring control test
- ⑩ Load test (output test)

3. Strengthening of regulations on solar power generation facilities in recent years

- The regulations on small scale solar power generation facilities have been strengthened as follows.

Enlargement of the applicable range of the accident report system in 2021 (applicable to: 50kW or more -> 10kW or more)

Enlargement of the applicable range of obligations for maintaining of compliance with technical standards and self check before use, and establishment of a new system for notification of basic information in 2023



Background of the enhancement of regulations ① Problems due to inadequate safety regulations become apparent

- Due to poor construction and inadequate maintenance, accidents of a scattering of panels, etc. occurred frequently during a disaster.

Background of the enhancement of regulations ② Intensification of impacts of natural disasters

- Due to typhoons, torrential rain, and earthquakes, damage to and outflow of solar power facilities occurred one after another, becoming a social problem.
- In particular, typhoons that hit Japan in 2018 and 2019 caused damage to numerous solar power facilities.

Trees and utility poles fallen down by a typhoon



Panels and others were collapsed due to sediment collapse caused by torrential downpour



Destruction of floating panels caused by violent winds

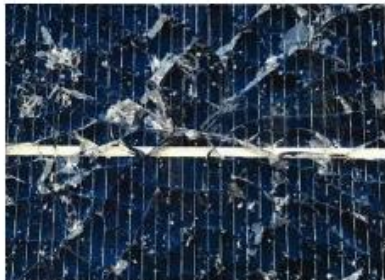
↓ Floats having been turned up by violent winds



Source: 14th New Energy Power Generation Facilities Accident Response/Structural Strength WG "Features of accidents related to solar power generation facilities in this summer"

Destruction of panels caused by pressure due to strong winds and flying objects

↓ **Panels shattered to pieces**



↑ **Glass broken by external stress**



↑ **Glass broken by scattered objects**

Panels were torn off from racks by strong winds and scattered.

↓ **Damaged panels**



Ignited panel! →

Source: 14th New Energy Power Generation Facilities Accident Response/Structural Strength WG "Features of accidents related to solar power generation facilities in this summer"

4. Current trends of safety regulations

- Further optimization of current regulations
- Development of technical standards being studied for new technologies (perovskite solar cells , etc.)

Present challenges

Accidents related to structural strength, etc. of supports

- Study of measures for securing appropriate design and construction

PCS damage accidents and serious electric fire

- Study of measures for preventing PCS failures and ignition
- Improvement in the analysis capabilities of administration on constituent equipment

Future challenges

Securing the safety of perovskite solar cells

- Exemplifying safe construction methods, etc. ahead of the propagation of varied modes of installation that are anticipated

Source: 31st meeting of the Industrial Structure Council, Committee for Security and Consumer Products Safety , Subcommittee on Electric Power Safety , "Safety Challenges and Response Directivity Concerning Renewable Energy Power Generation Facilities"

fisuel seminar – 15 and 16 October 2025

[For reference] How to proceed with the Guidelines for Installation and Construction of Flexible Solar Cells

Partially modified the "9th Public-private Council for expanding the introduction of next-generation solar cells and strengthening industrial competitiveness - Secretariat Material"

- Regarding the Guidelines for Installation and Construction of Flexible Solar Cells (soft and lightweight solar cells such as perovskite solar cells) that take safety into consideration, a Learned People WG is planned to be held with the relevant ministries and agencies including MLIT participating as observers, with a view to preparing and publishing the Guidelines within this fiscal year.
- While summarizing the design methods, etc. with reference to relevant laws and ordinances and various types of existing documents, knowledge acquired through verification experiments, etc. will be utilized, and the installation and construction methods that will serve as model cases in the initial period of introduction and the matters related to safety will be organized.
- Even after that, with the progress of product specifications as well as installation and construction technologies, the Guidelines will be updated whenever necessary.

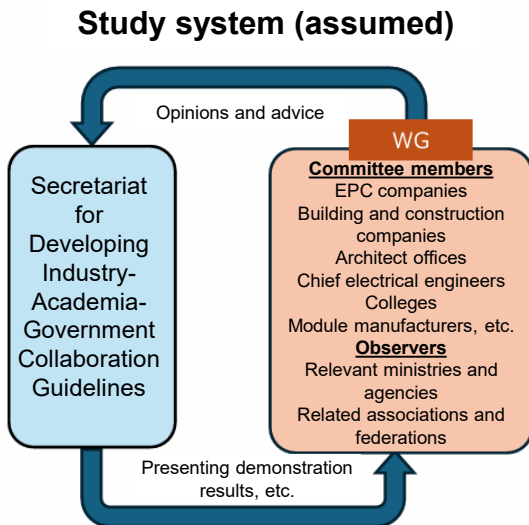


Illustration of Guidelines Contents

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|--|-------------------------------------|
| 1. General rules | 11. Foundation design |
| 2. Cases of suffering from disasters | 12. Corrosion engineering |
| 3. Structural design and construction plan | 13. Electrical equipment design |
| 4. Electrical design and construction plan | 14. Construction |
| 5. Prior investigation and plan | 15. Maintenance and management plan |
| 6. Site construction plan | |
| 7. Solar cell array arrangement plan | |
| 8. Design load | |
| 9. Materials used | |
| 10. Rack design | |

Source: 31st meeting of the Industrial Structure Council, Committee for Security and Consumer Products Safety, Subcommittee on Electric Power Safety, "Safety Challenges and Response Directivity Concerning Renewable Energy Power Generation Facilities"

Summary

Safety regulations for solar power generation facilities in Japan ...

- Safety is assured by safety regulations pursuant to the Electricity Business Act and ministerial ordinances.
- We have been working on the review of regulations to address various types of problems, such as the strengthening of regulations on small scale power generation facilities.
- At present, discussions on safety regulations are under way, concerning new technologies such as perovskite solar cells.



MERCI - THANKS