



Ministry of the Environment  
Japan

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# Study on E-waste Circularity and Management in ASEAN

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Satoshi YOSHIDA

Ministry of the Environment, Japan

## Outline

- ASEAN-Japan partnership will **increase the circularity of electronics** and other relevant supply chains in ASEAN countries to strengthen the supply of critical minerals and raw materials for the transition to a net-zero economy, **improving human health**, and **promote environmentally sound recycling of e-waste** and **recovery of critical minerals and raw materials**.

## Expected cooperation

### 1 Promotion of an enabling environment

Support ASEAN countries to develop necessary laws and regulations including standards and guidelines for collection, dismantling and disposal. It also includes registration and permission system of recycling business, reduction of environmental contamination and improvement of human health.

### 2 Capacity building

Promote capacity enhancement of governments and businesses.

For governments: enforcement of laws and regulations and monitoring of the entire operation from collection and recycling to final disposal.

For businesses: improvement of technical and operational capacities of recycling operators.

### 3 Promotion of private partnerships

Foster collaboration between local companies and Japanese ones e.g. Technical cooperation, Joint ventures, Investments in local facilities

### 4 Promotion of the uptake of recycled material

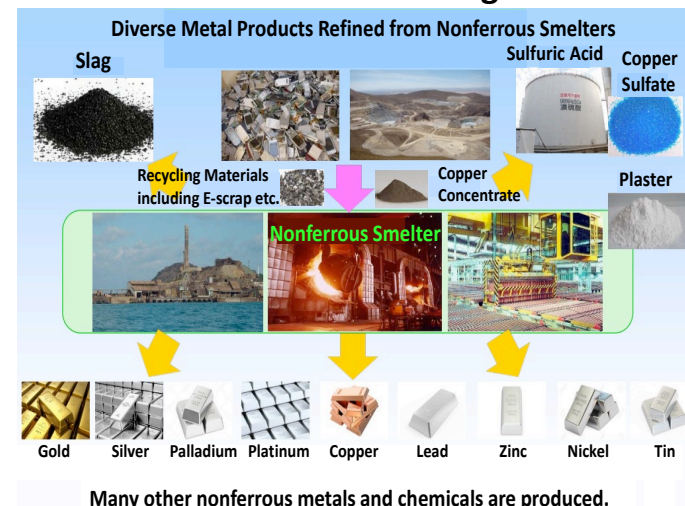
Promote the uptake of recycled critical minerals and raw materials in key supply chains.



Hand dismantling of e-waste (in Bangkok)

Open burning of cables (in Indonesia)

## Advanced technologies



MOEJ conducted a study on e-waste management in some ASEAN countries to explore possible cooperation.

## Contents of studies on e-waste management in ASEAN

### 1. Landscape analysis in five ASEAN countries

- ✓ **Laws and regulatory systems** and environmental standards regarding E-waste
- ✓ **Environmental pollution** caused by E-waste
- ✓ **Material flows of e-waste**
- ✓ **Business practices** of local collectors and dismantlers

### 2. Identification of Cooperation Activities

- ✓ Identification of possible cooperation activities
- ✓ Discussion with relevant agencies

### 3. B2B collaboration between Japanese companies and local companies

(e.g. advanced recycling technologies improving efficiency and environmental management)

# Regulatory frameworks concerning household and business-generated waste



- EPR regulations are considered or established, but not fully implemented.
- Recycling targets and actual rates were not available.

	A	B	C	D	E	
<b>Establishment of Recycling Regulations</b>	While <b>EPR regulations exist</b> , there is no scheduled enforcement.	The draft of <b>WEEE law was proposed</b> . A <b>revised bill will be published</b> .	<b>Preparation of EPR guidelines is underway</b> internally. (contents are not disclosed)	<b>A recycling bill is proposed on six items</b> (TV, Acs, PCs, Fridges, washers, phones)	The ministerial ordinance of <b>EPR has been established</b> .	
<b>Recycling Rates/targets</b>	<b>No data</b>	<b>No data</b> (under preparation)	<b>No data</b>	<b>No data</b>	<b>The targeted recycling rate is 5-15%</b>	
<b>Manufacturer/Importer Responsibility</b>	<b>Collection obligation is defined</b> , (not enforced)	Conduct a responsibility plan of WEEE management	<b>not specified</b>	<b>not specified</b>	Recycling of the product or contribution to Protection Fund	
<b>Obligation of generators</b>	<b>Separation</b>	<b>Delivery</b>	<b>Separation</b>	<b>Proper storage, treatment, and delivery to designated facilities</b>	<b>Separation</b>	
<b>Collection and Transportation</b>	Permit system	Registration system (for businesses registered /local government)	Registration system	Registration system	Recyclable products are exempt from the collection and transportation permit.	
<b>Intermediate Processing</b>	Permit system	Permit system	Permit system	Permit system	Permit system	
<b>Disposal</b>	<b>Recovery (including refining)</b>	<b>No specific regulations</b> . However, <b>refining requires a permit</b> .	<b>Regulations exist</b> (permit system for processing in reuse/recycling facilities). <b>Refining requires a permit</b> .	<b>No specific regulations</b> . However, <b>refining requires a permit</b> .	<b>No specific regulations</b> . However, refining must be processed at a <b>permitted full recovery facility</b> .	<b>Regulations exist</b> . <b>Refining requires a permit</b> .
	<b>Export</b>	<b>Hazardous waste can be exported</b> if the generator is unable to dispose of it, provided that it is approved by the Minister of Trade.	<b>Export for resource recovery purposes is permitted</b> with the condition of environmentally sound management.	<b>Export for resource recovery purposes is permitted, when no domestic treatment facilities are available</b> .	<b>Require approval</b> from the Director of the Environmental Bureau	<b>Export for resource recovery purposes is unrestricted</b> .
	<b>Final Disposal of Residues</b>	In a permitted final disposal site under the permit system	In a permitted final disposal site under the permit system	In a permitted final disposal site under the permit system	In a designated waste incineration facility or landfill under the permit system	In a permitted final disposal site under the permit system

	Processing method	Emissions to the atmosphere	Discharges to water and soil
<b>ASEAN Formal</b>	Dismantling and recovery of Freon inside of the facility for e-waste	Generation of greenhouse gases due to the use of electricity within the facility <b>High concentration of hazardous substances in dust due to enclosed spaces</b>	Release of hazardous substances from dismantling residues disposed of in landfills
<b>ASEAN Informal</b>	<ul style="list-style-type: none"> <li>Dismantling of e-waste outdoors</li> <li>Non-recovery of Freon</li> <li>Metal recovery through open burning</li> <li>Illegal dumping of unwanted items like glass</li> <li>Incineration residues</li> </ul>	<ul style="list-style-type: none"> <li>Release of <b>F-gases (HCHC, CFC, HFC)</b></li> <li>Generation of dust containing <b>high concentrations of heavy metals (Cu, Pb, Zn)</b> during dismantling</li> <li>Emission of exhaust gases from open burning (CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>, DXNs, Hg, flame retardants, plasticizers)</li> </ul>	<ul style="list-style-type: none"> <li>Discharge of heavy metals present in E-waste</li> <li>Release of <b>heavy metals (Hg, Pb, Cd, etc.), DXNs, and other hazardous substances</b> from incineration residues</li> </ul>

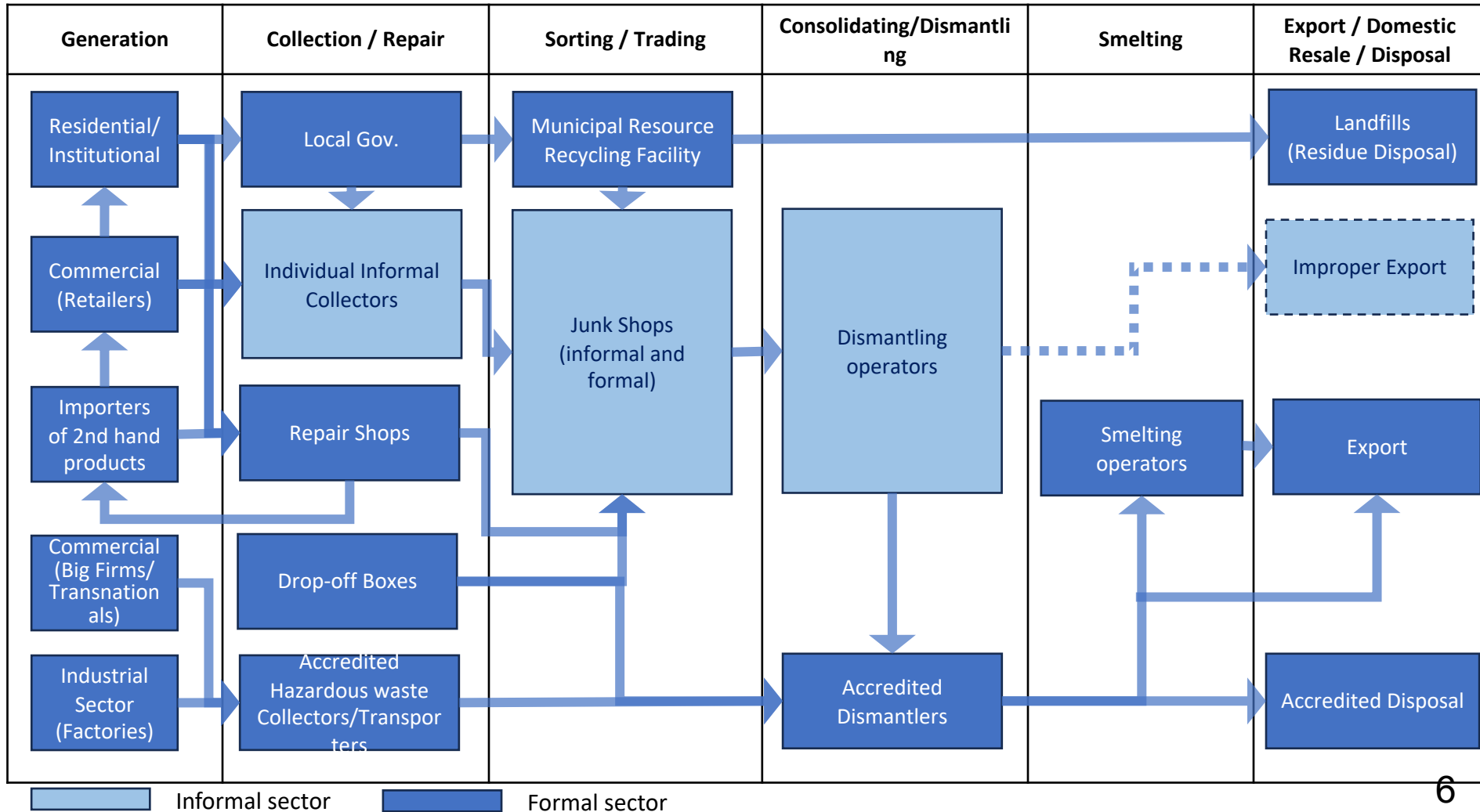
	Pre-processing	Intermediate Processing	Refining/Smelting
<b>ASEAN Simple Refining</b>	Heating dismantling of e-waste	Crushing and physical sorting	Melting metals with heat or acid to produce ingots
	<ul style="list-style-type: none"> <li><b>Discharge of Sn (5.62%) and Pb (2.96%)</b> contained in the solder of waste electronic boards</li> <li>Emission of exhaust gases such as CO<sub>2</sub>, SO<sub>x</sub>, NO<sub>x</sub></li> </ul>	<ul style="list-style-type: none"> <li>Glass fiber powder is reported to be generated 376 kg per 1t of waste electronic boards</li> <li>Wastewater is generated during the crushing and physical sorting process</li> </ul>	<ul style="list-style-type: none"> <li>Heat Method: <b>CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>, DXNs, flame retardants, plasticizers, and Hg</b> are emitted</li> <li>Acid Method: <b>Requires wastewater treatment facilities to handle metals and impurities present in the solution</b></li> </ul>

# Current material flows of e-waste (generalized)



- E-waste generated from **major manufacturers** is in many cases assumed to be properly collected and processed **by registered companies**, whereas **most household e-waste** is informally collected, sorted and dismantled.
- Only a small amount of waste is presumably treated properly according to available information.
- Quantification of transferring e-waste from the informal to the formal sector remains challenging.

## Generalized E-waste/E-scrap material flow



# Business practices of E-waste/E-scrap processing through the stream



- In most countries, recycling facilities exist to formally handle E-waste, but their quality varies among countries with different capacities. Overall, **since the treatment capacity is insufficient, opportunity for business cooperation** is evident for enhanced collection, dismantling, recovery including refinery.

Stream	A	B	C	D	E
Generation and Collection	Some of household E-waste can be transferred/transacted from urban to rural areas				
	Startup companies are emerging for ESG purposes				
	<ul style="list-style-type: none"> <li>Environmental pollution is observed</li> </ul>	<ul style="list-style-type: none"> <li>Environmental pollution is observed</li> <li>Telecom companies are involved in collection service</li> </ul>	<ul style="list-style-type: none"> <li>Telecom companies are involved in collection service</li> </ul>	<ul style="list-style-type: none"> <li>The certified collection companies are registered</li> </ul>	<ul style="list-style-type: none"> <li>Certified collection companies exist</li> <li><b>EPR for E-waste enters into force in January 2025.</b></li> </ul>
UP to MID	Most of <b>household E-waste</b> is transacted through <b>an informal value chain. But the amount is not assessed.</b>				
Sorting, Collection, Dismantling	<ul style="list-style-type: none"> <li>The number of registered and certified companies is unknown.</li> <li>Bought by very few formal companies</li> <li>Scrap circuit boards are exported in original/crushed/ground/ ingot form</li> </ul>	<ul style="list-style-type: none"> <li>Bought by formal sector and refined (formalization of E-scrap)</li> <li>Scrap circuit boards are exported in original/crushed/ground/ ingot form (<b>refining companies exist</b>)</li> </ul>	<ul style="list-style-type: none"> <li>Bought by formal sector</li> <li><b>Refining companies do not exist.</b></li> <li>Scrap circuit boards are exported in original/crushed/ground form</li> </ul>	<ul style="list-style-type: none"> <li>The certified dismantle operators are registered (Full/Partial Recovery facilities). <b>Capacity is insufficient.</b></li> </ul>	<ul style="list-style-type: none"> <li>Certified companies are registered</li> <li>Presence of smelting companies are confirmed</li> </ul>
Smelting, Export, Domestic sales, Disposal	<ul style="list-style-type: none"> <li>Scrap circuit boards are exported in original/crushed/ground/ ingot form</li> <li><b>A refining company exists</b> (capacity is likely insufficient)</li> </ul>				
Entire stream	Manufacturing companies ( <b>industrial waste</b> ) follow proper management as <b>hazardous materials</b>				
	Formal value chain can only be monitored.				

### 1. Laws and regulatory systems

Most countries have considered or established their own regulations including EPR, which are widely varied. Overall, means of implementation on the ground is still under preparation in some countries. Therefore, detailed ordinances, regulations and guidelines can be elaborated for effective enforcement.

### 2. Environmental pollution caused by E-waste management

Environmental pollution is more frequently observed in places where the informal sector is involved than formal recycling by certified companies. Recycling facilities still need technological improvement and capacity expansion to ensure environmentally sound treatment.

### 3. Material flow (generation to disposal through collection and dismantling)

E-waste from the industrial sector is mostly collected and dealt by a certified (formal) stream. By contrast, household-origin e-waste goes into a complicated informal flow, which makes it difficult to quantify. The material flow of informal involvement (from collection to export/resale/disposal) needs further studies.

### 4. Business practices of local collectors and dismantlers

Permit/License or registration system works for collection, transportation, dismantling, and other processing including smelting. Development or improvement of monitoring system for traceability is also expected.

With the growing demand for efficient dismantling and recycling of e-waste, there are business opportunities despite possible difficulty of local businesses.



## Potential areas of cooperation



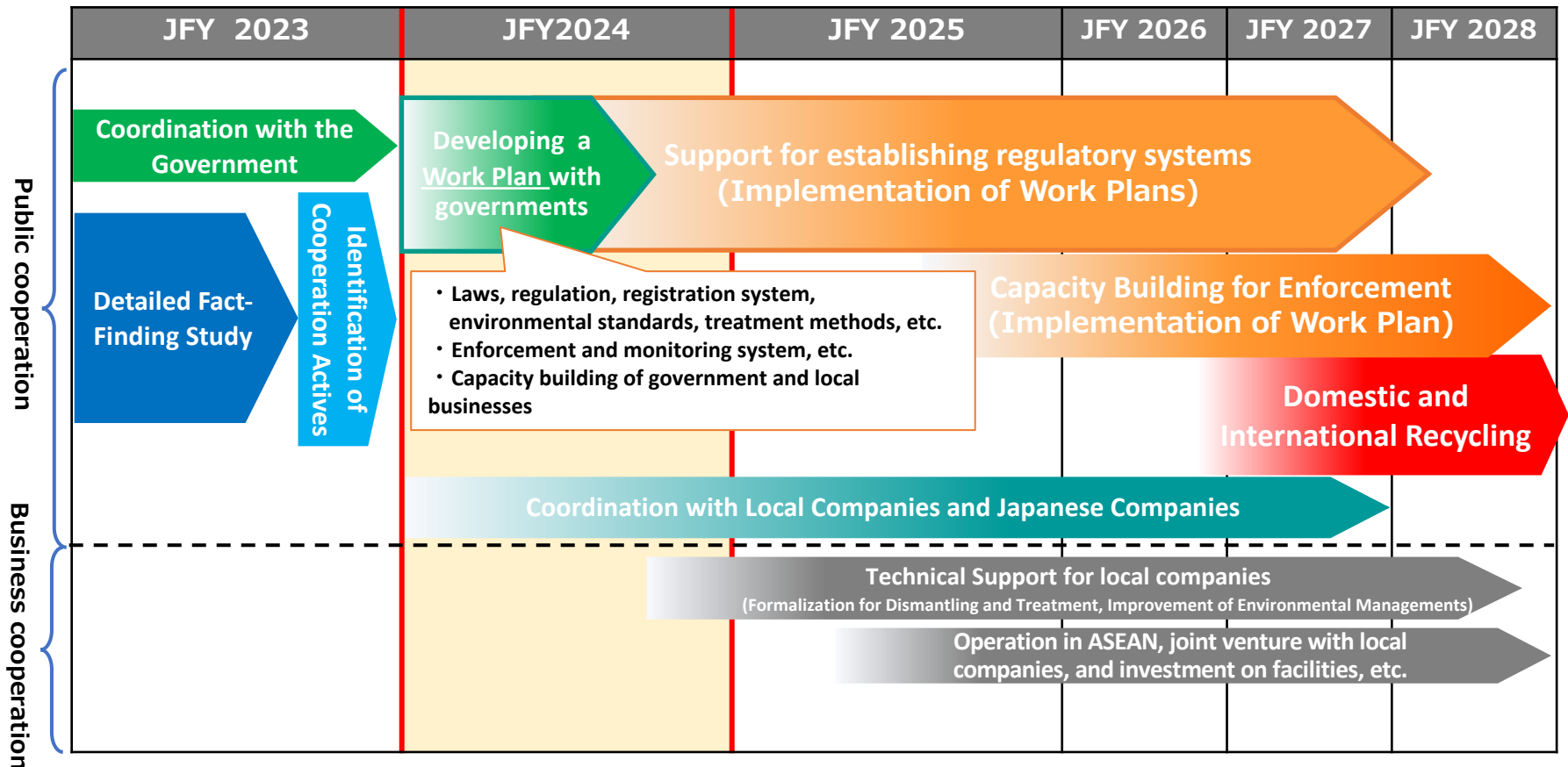
- The study has identified some areas of cooperation, which need to be discussed by partner countries based on their needs.

Areas	Suggested items
<b>Material Flow</b>	<ul style="list-style-type: none"><li>• Material flow analysis can be further improved in cooperation with the governments and relevant private sector organizations, among others</li></ul>
<b>Regulations</b>	<ul style="list-style-type: none"><li>• Assessment of challenges of the implementation of EPR schemes (proposed or enacted)</li><li>• Reviewing existing regulations and guidelines for effective enforcement</li><li>• Establishing new ordinances and guidelines under the proposed/existing WEEE regulations/legislation</li></ul>
<b>Enforcement and Traceability</b>	<ul style="list-style-type: none"><li>• Formalization of recycling operators can be enhanced through permitting system</li><li>• Possible improvement of registration systems for monitoring, data management, and traceability</li><li>• Development of monitoring, data management, and traceability</li><li>• Involvement of the informal sector in particular at the collection stage</li></ul>
<b>Business collaboration</b>	<ul style="list-style-type: none"><li>• Organizing business matching workshops among key local and Japanese companies including recyclers, transporters, technological providers, and manufactures</li><li>• Assessing technological and other needs from local companies</li><li>• Fostering investments in local companies and facilities</li></ul>

## Next steps: Expected timeline

- Based on the survey and its key findings, cooperation work plans will be developed.
- Building/strengthening regulatory frameworks, capacity building, and business collaboration for investments and improvement of technological capacities will be implemented, taking into account different conditions and national circumstances.

### Timelines and areas of cooperation (to be considered in the study)



Thank you