Japan Magnesium Market Outlook

Japan Magnesium Association
Advanced Material Japan Corp.
D.Konishi

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1. Introduction
2. Updated information
3. JMA & AMJ
4. Unique Products
5. Five big problems in Japan
6. Strong needs for establish a reliable Scrap recycling system
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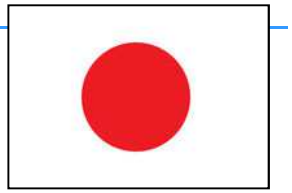
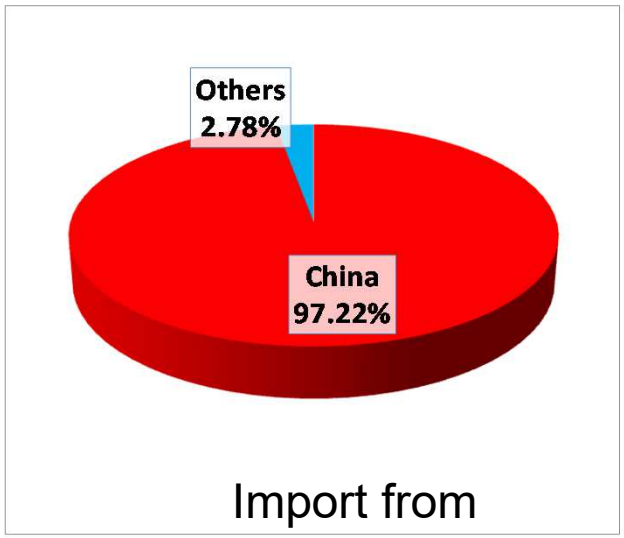
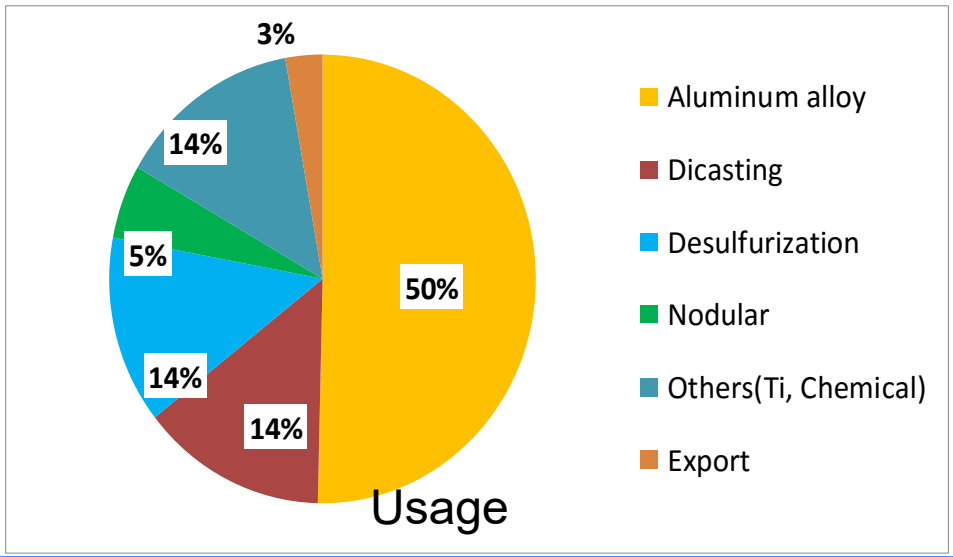
1-1. Our Position in the global market



- Consumption in 2015: 41,308t
  (4% of global market)
- Import from: China 97.22%, Others 2.78%
- No Domestic smelter
- Major Usage: Al alloy: 50%, Mg alloy: 17.3%
  Desulfurization: 13.6%





1-2. Japanese economy background

US$/JPY Transaction

Rather stable in 2015

Machinery orders & Industrial Production Index

GDP Growth

0.9 -0.4 -0.5 -0.1	1 0.7 0.5 -0.1	1.3 -2 -0.6 0.5	1.1 -0.4 0.3 -0.3

Source: Bank of Japan

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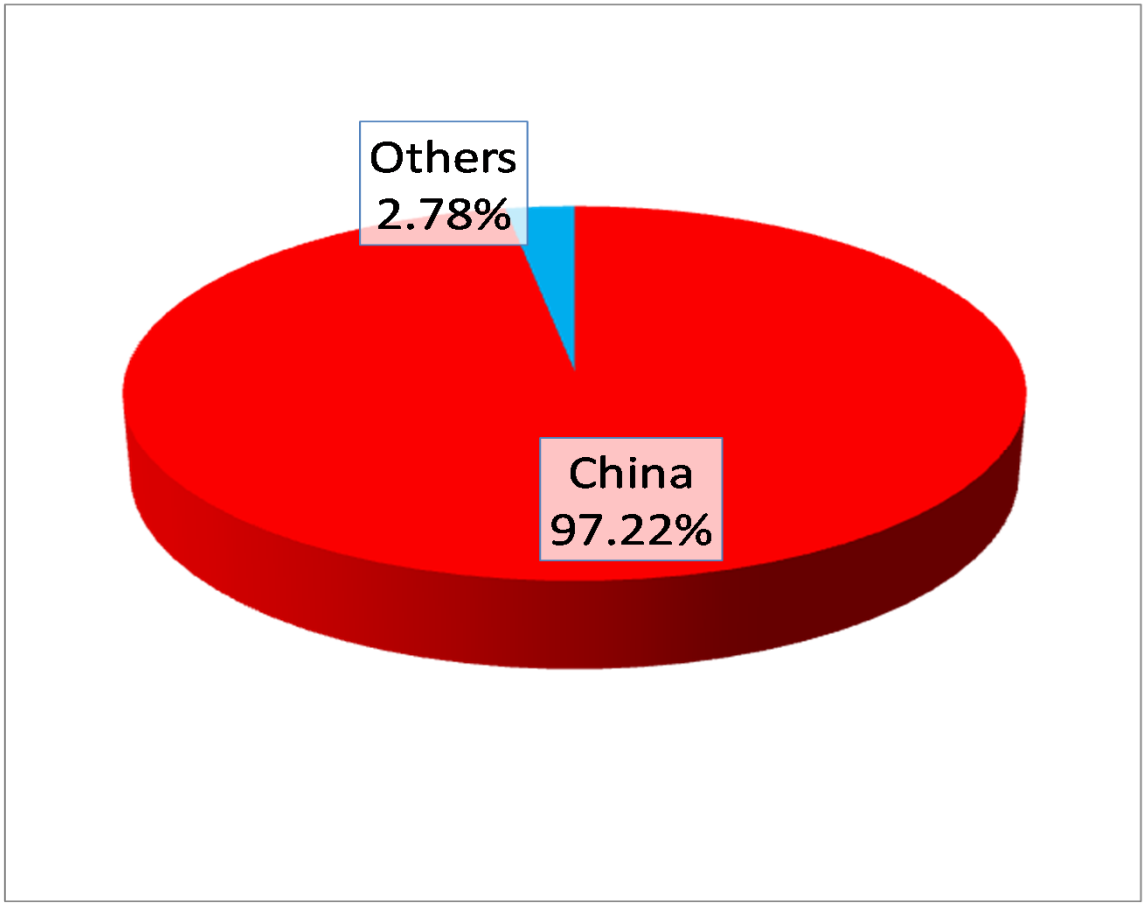
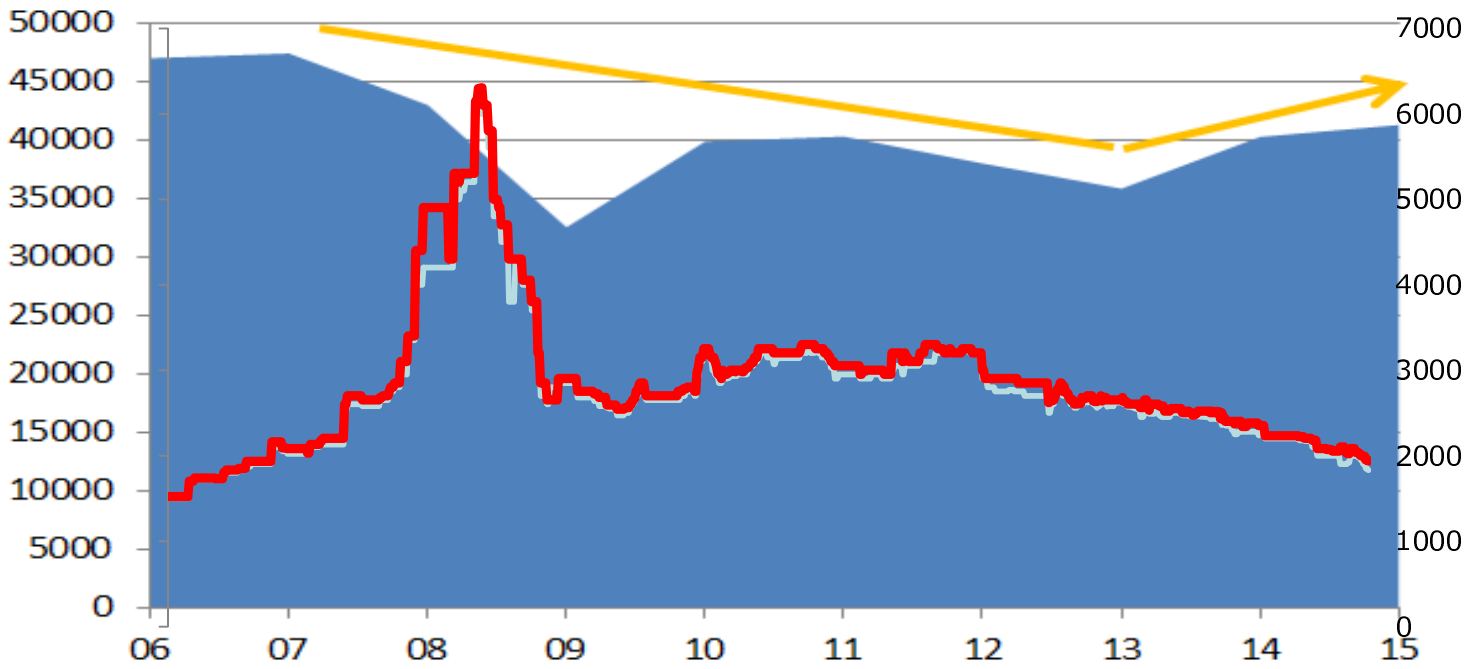
2-1. Import

- Total Import: 38,600t as Material(37,449t as Mg)



data：Japan Customs

2-2. Consumption (these 10years)



2015

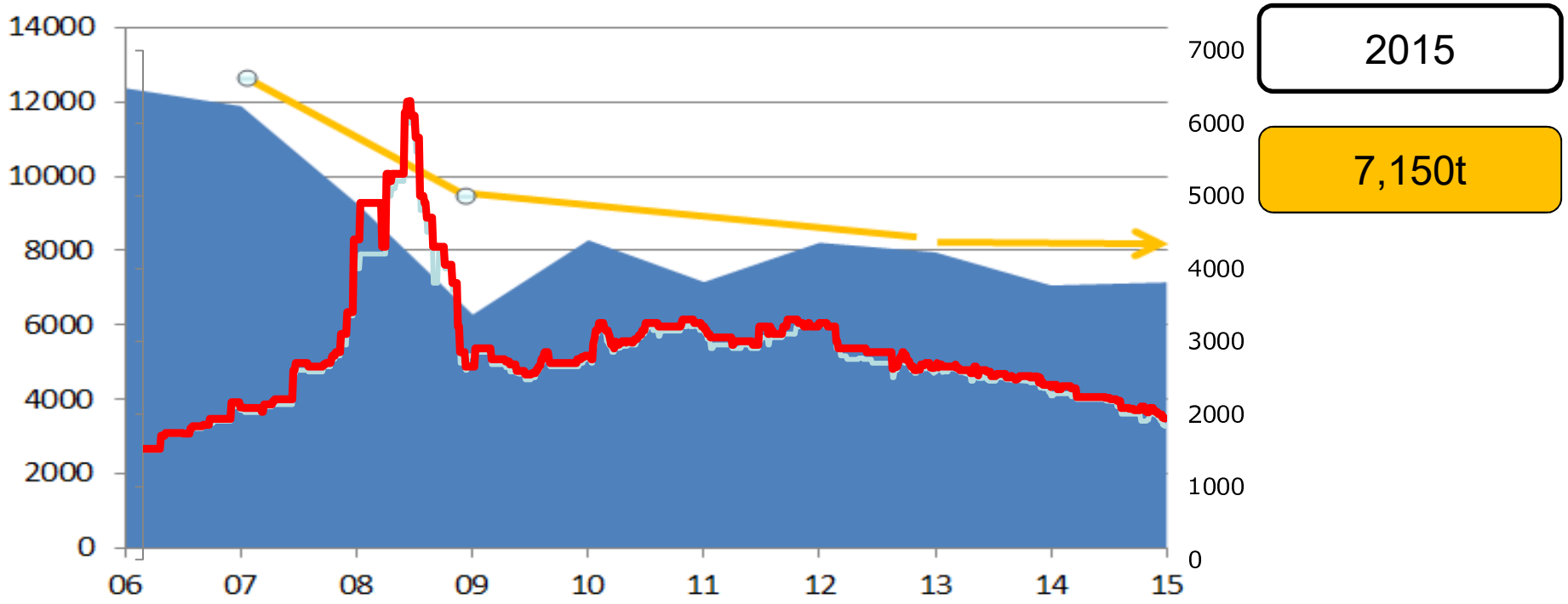
41,308t

- It was sharply down due to the economic crisis & Mg price boiling up in 2008.
- It tends to recover the quantity in these years.

AMJ

data：Japan Magnesium Association

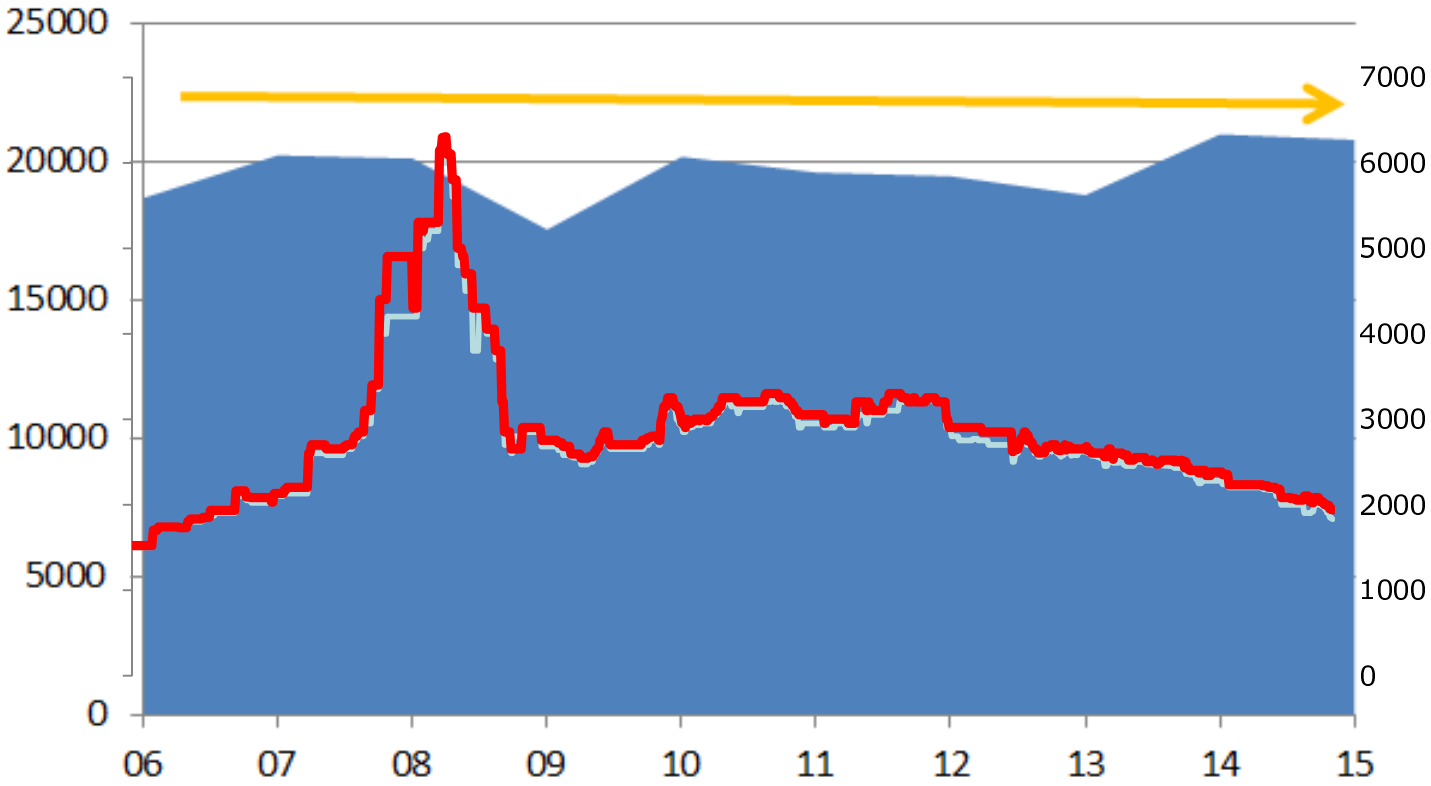
2-3. Magnesium Alloy (06-15)



- The economic crisis & Mg price boiling up in 2008 made the demand into 2/3.
- It is rather stable in these years.

data：Japan Magnesium Association

2-4. Aluminum Alloy additives (06-15)



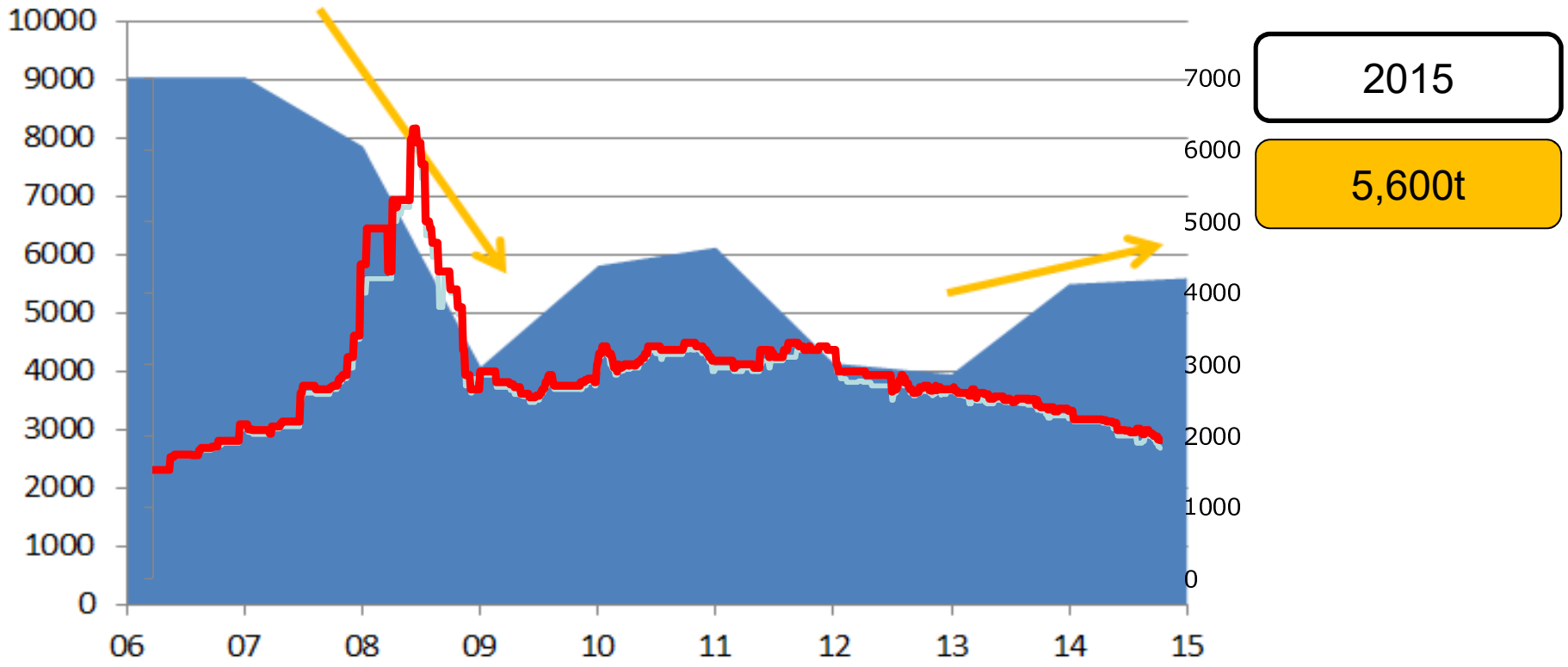
2015

20,800t

- It is rather stable in past 10 years.

data：Japan Magnesium Association

2-5. Desulfurization (06-15)



- The economic crisis & Mg price boiling up in 2008 made the demand into 1/3.
- It is slightly increased in these couple of years.

data：Japan Magnesium Association

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3-1 Advanced Material Japan Corp.

Advanced material Japan Corp.

Turnover : US$2.7million (2015)
Employee : 35
Head Office : Tokyo
Subsidiaries : Singapore, Beijing
Oversea Offices : Shanghai, Hanoi
Moscow, Vladivostok
Toronto

Main Items
Titanium
Magnesium
Tungsten
Molybdenum
Rare Earth
Tantalum/Niobium
Indium
Selenium
Ferro Alloys :
Ni, Mo, V, Cr, Mn, Si

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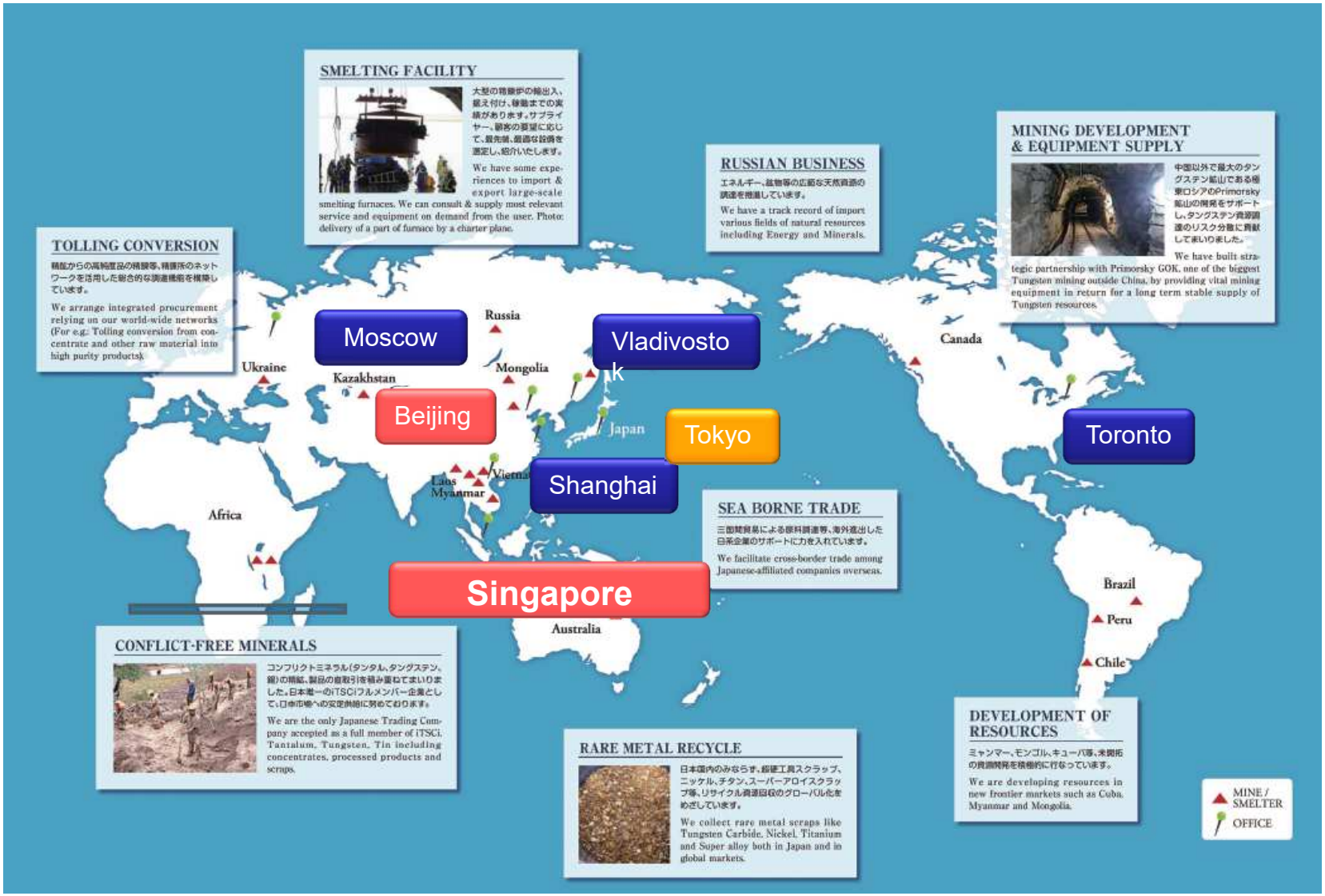
3-2 AMJ's Activity



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3-3 AMJ's Position in Japan

Main Items	Share on Import to Japan(%)	Details
Titanium	50%+	Titanium sponge, Ingots etc.
Tungsten	30%+	APT, AMT, WO3 etc.
Magnesium	**10%**	**Magnesium ingots, Alloys, Powder etc.**
Rare Earth	30%	Neodymium, Dysprosium, Yttrium, Samarium, Samarium, Mish Metal Magnetic alloys etc.
Tantalum	20%	Tantalum ingots, Ta2O5 etc.
Super Alloy scrap	20%	Inconel, Hastelloy, Invar, Monel, HSS

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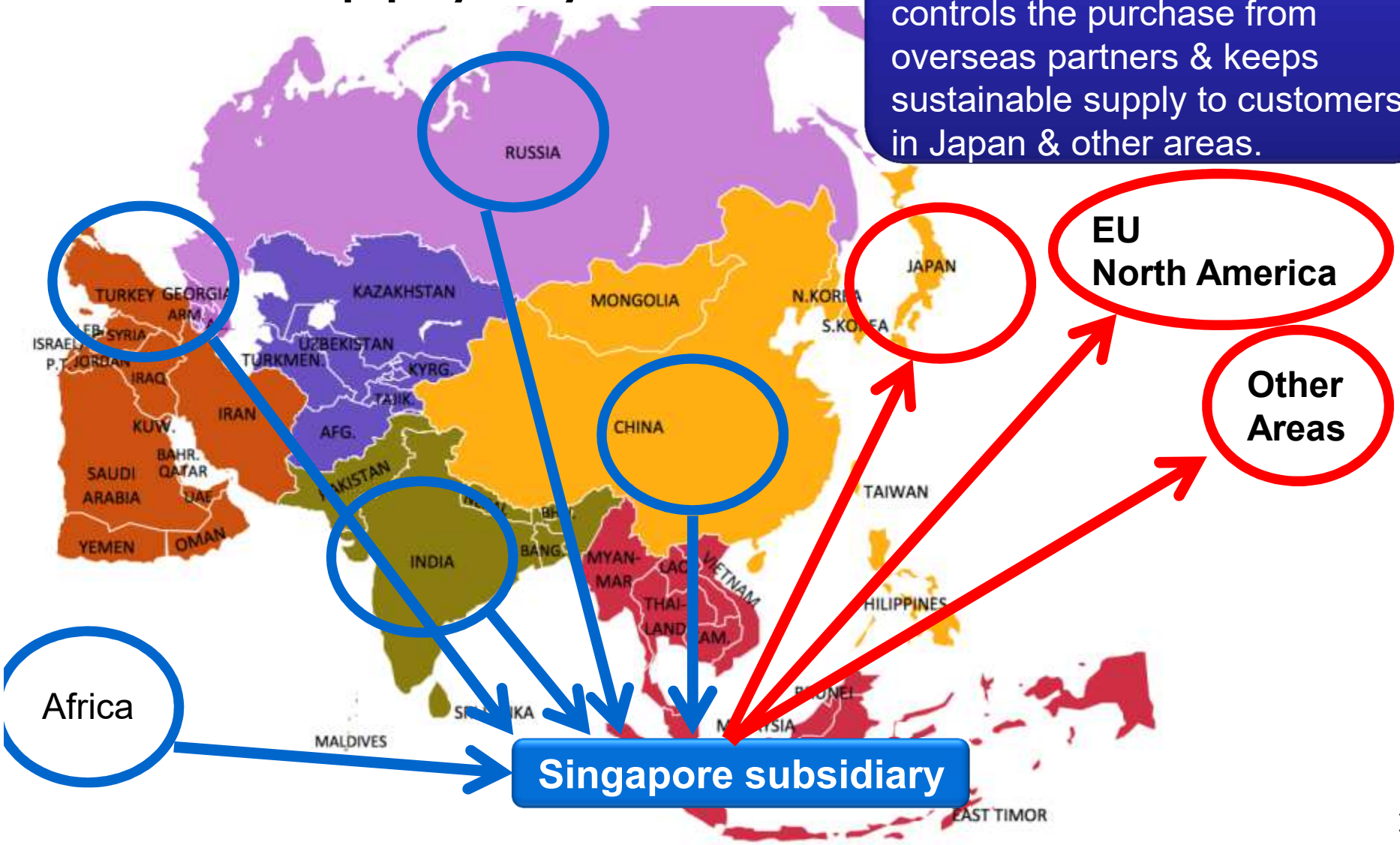
3-4 Safety, Stable, Sustainable Supply System

Our Singapore company controls the purchase from overseas partners & keeps sustainable supply to customers in Japan & other areas.



3-5 Japan Magnesium Association

Japan Magnesium Association

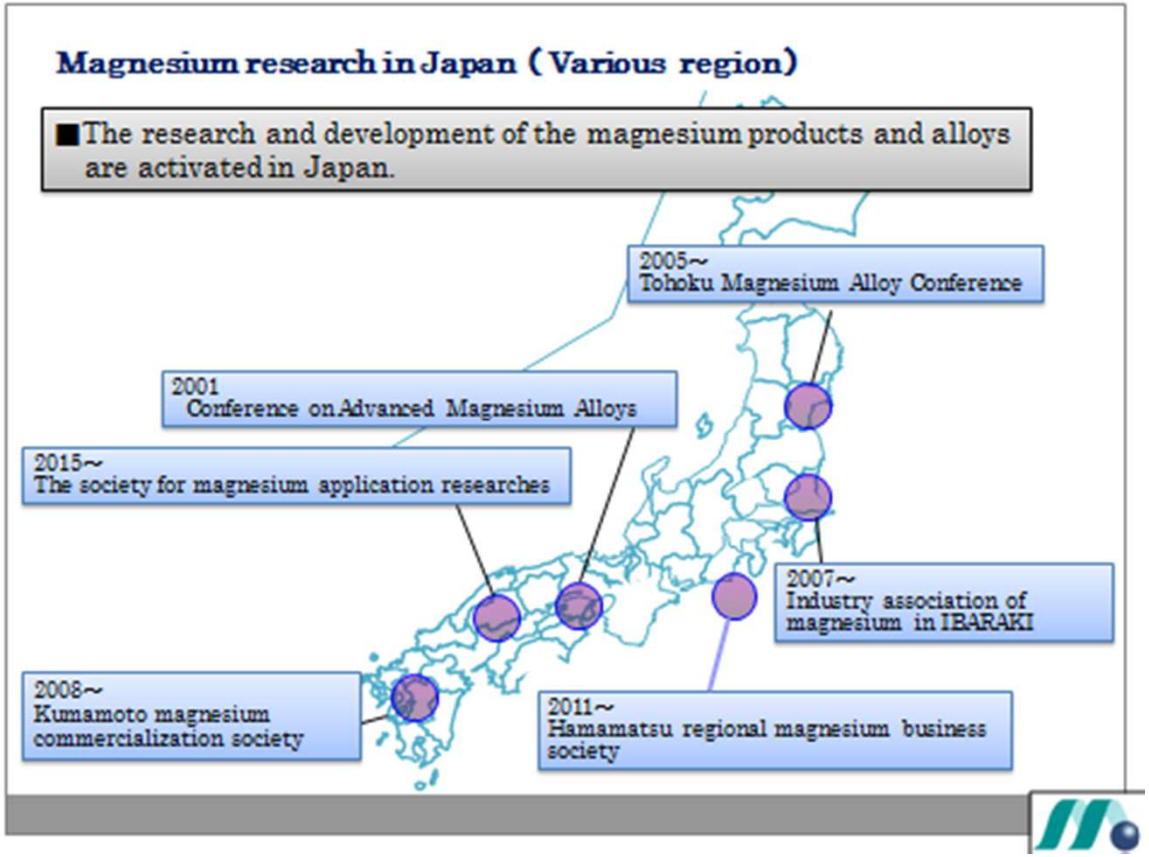
114 Regular Members

- Recycle/ Smelter : 10
- Die casting : 17
- Casting(Sand etc) : 10
- Wrought : 12
- Fabrication : 9
- Facility : 14
- Surface treatment : 10
- Customers : 16
- Trader : 14
- Organization : 2

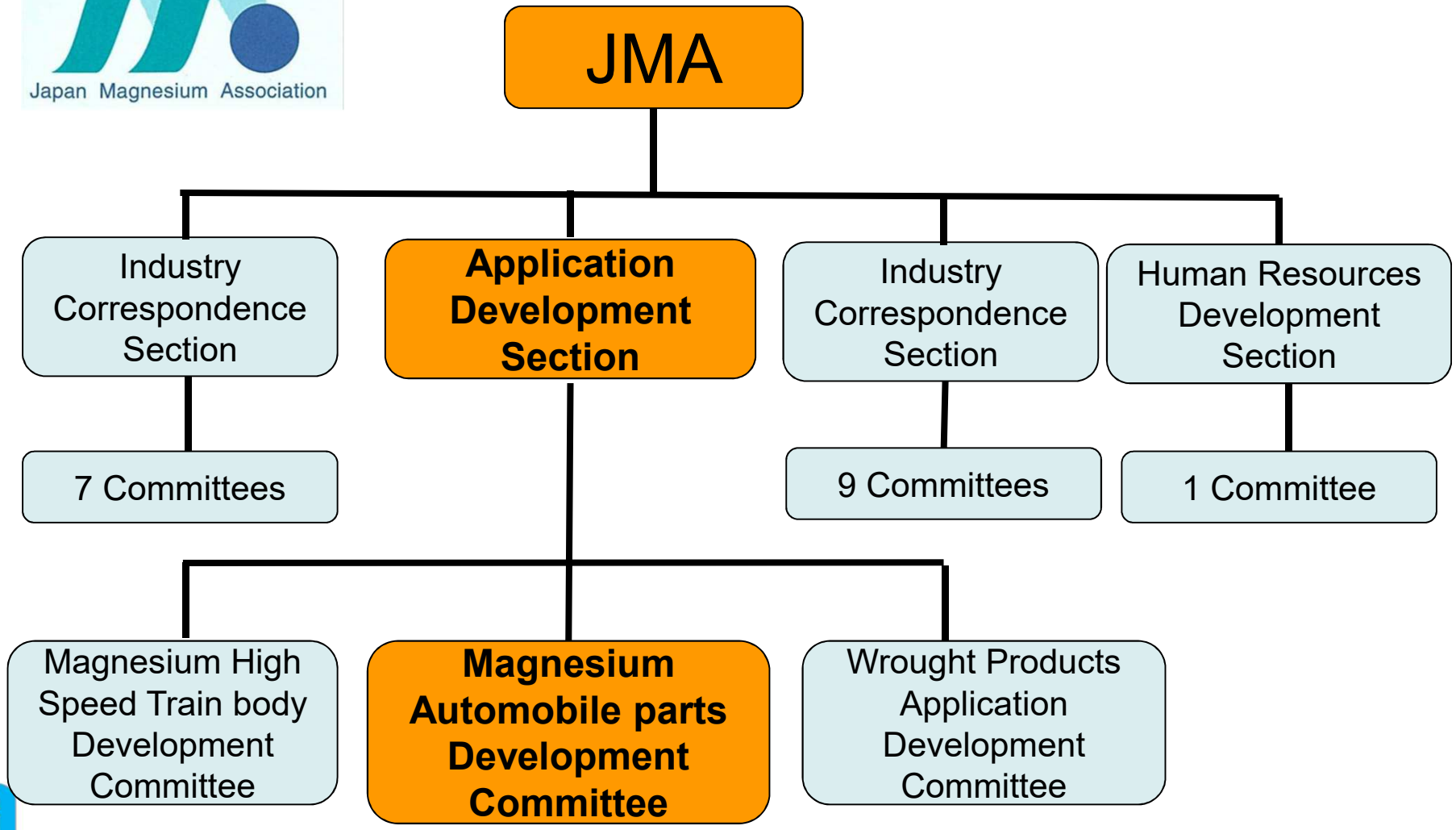
13 Supporting Members
78Private Members

(Data: March, 2016)

Magnesium research centers in Japan



3-6 JMA's activity



3-7 JMA Automobile parts Development Committee

Japan Magnesium Association

1. Members are 17 companies including Automobile producers & Automobile parts producers.
2. Developing low cost Magnesium alloy raw material & design and process for low cost die-casting automobile parts.
3. Planning to produce oil pans, Instrument panels, Transmission, Staring wheels etc. with Magnesium alloy.
4. JMA is planning to speed up the project till 2018.

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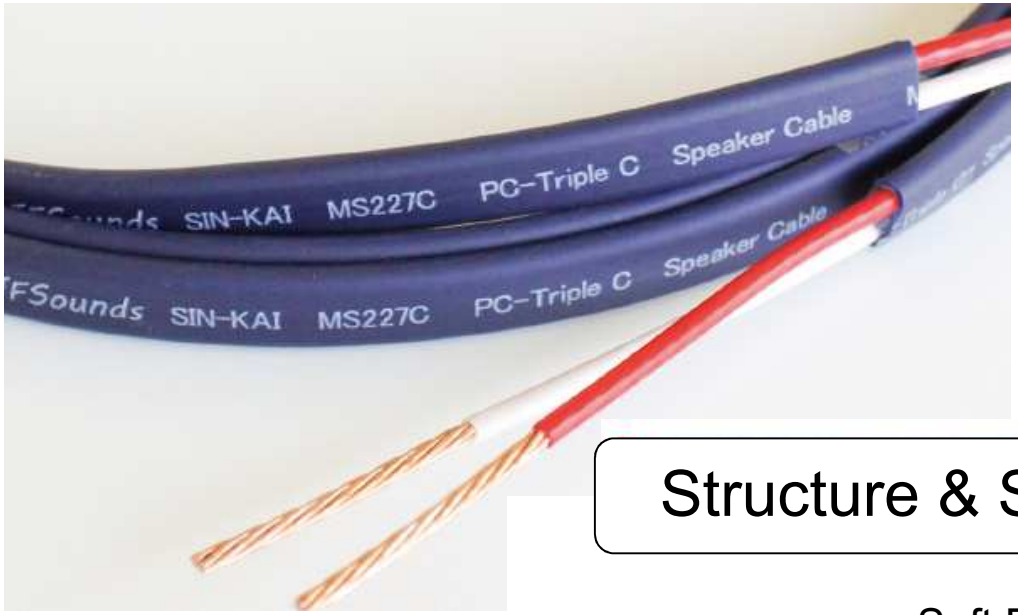
4-1 Cold drawn items by Macrw

Very Light & Stylish Sticks

Environment friendly furniture

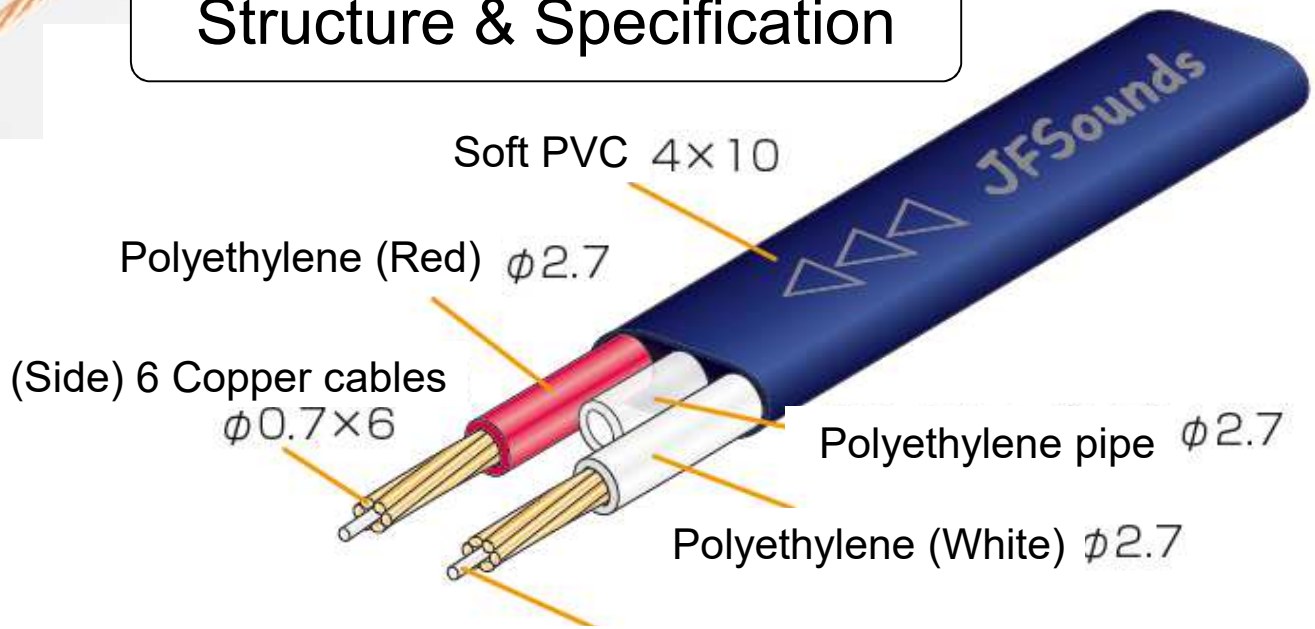
AMJ

4-2 Music cable by Japan Fine Steel



Music cable ''SIN-KAI''
This name represents the image of deep ocean without any noise.

Structure & Specification



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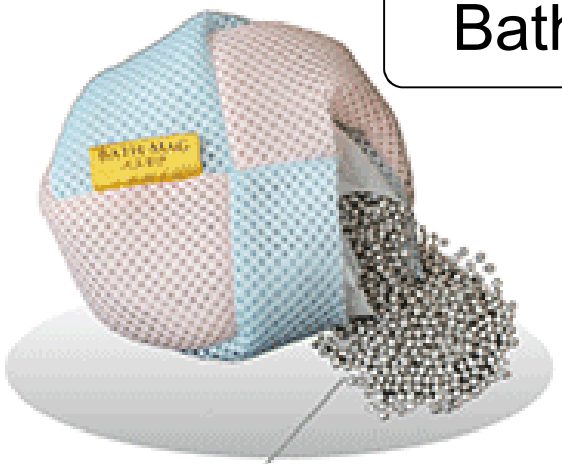
4-3 Bath Mag by Miyamoto

Bath Mag



Pure Magnesium balls

Properties

- The both water changes into Weak Alkaline Ion water. It has property of **Removing bacteria**, **Washing** & **Deodorization**.
- Continuously generates 0.6-1.2ppm of hydrogen gas from the surface of net. So, you can take **Hydrogen bath**.

How to use

- Just put two pieces of Bath Mag into the hot water 30 minutes before taking bath.
- Taking the bath with keeping Bath Mag in the bathtub.
- For the purpose of removing the hydroxide film on the surface, please wash Bath Mag together with laundry machine with clothes, once in twice use.

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4-4 Bland new tries by Macrw

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5 Five big problems in Japan

1. Poor Recycling System
2. Less Sustainable Supply
3. High competition with other High Specific Strength materials & Compound Materials
4. Poor LCA
5. Various Specifications

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5-1 Poor Recycling System

Magnesium Alloys

1. Most of Die-casting producers relies on outside Recycling processers
2. Turnings & powder are difficult to be recycled
3. The capacity of recycling processers is small. So, their re-melting & refining costs are rather high

V.S.

Aluminum Alloys

1. Most of Die-casting producers can re-use the scraps on the line without refining
2. Turnings & powder will be dispatched to Secondary Aluminum producers located close to the plant
3. There is free market for Aluminum alloys. So, the price for Aluminum alloy ingots are based on the production cost of the Secondary alloys and supply & demand balance.

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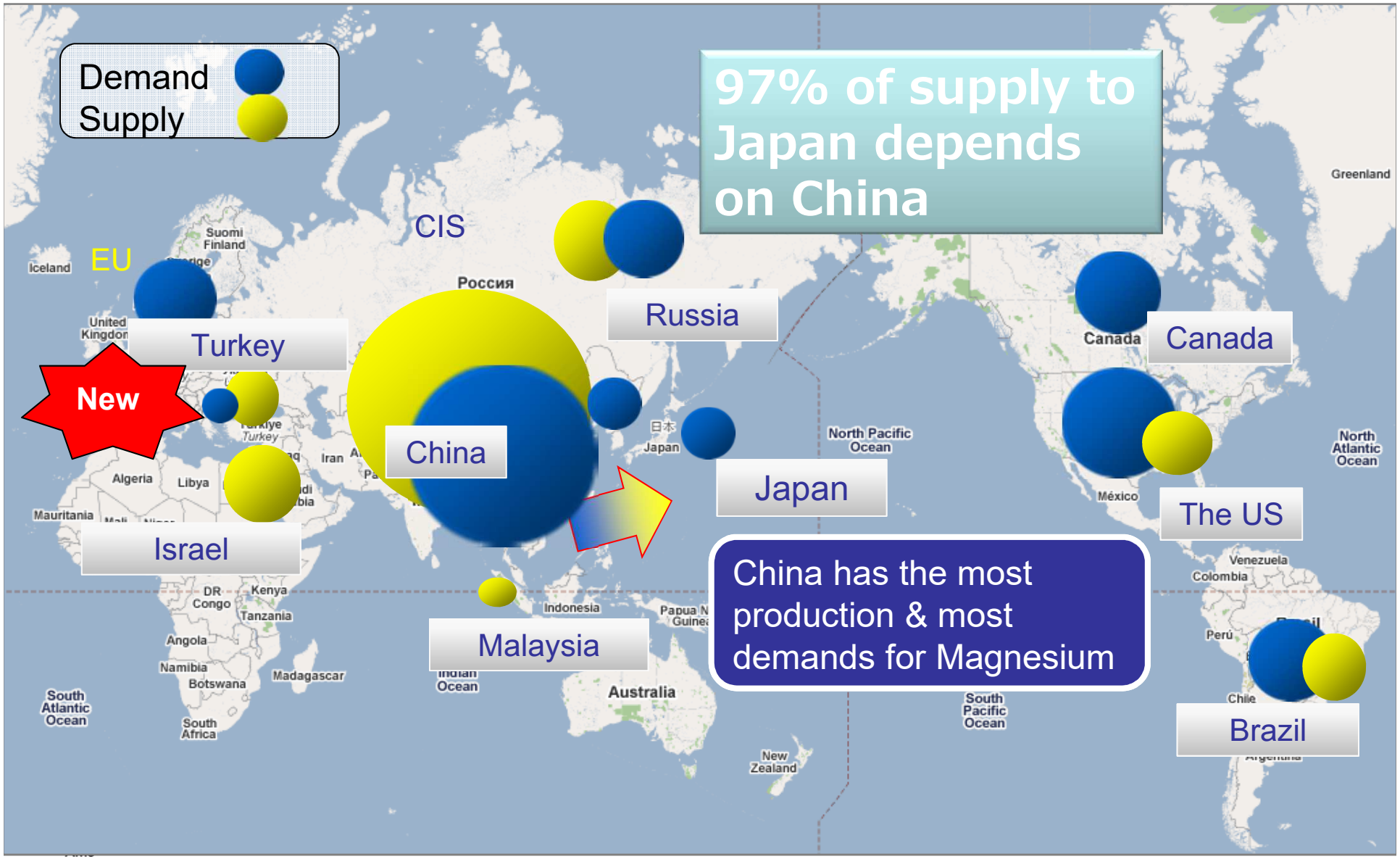
5-2 Less Sustainable Supply

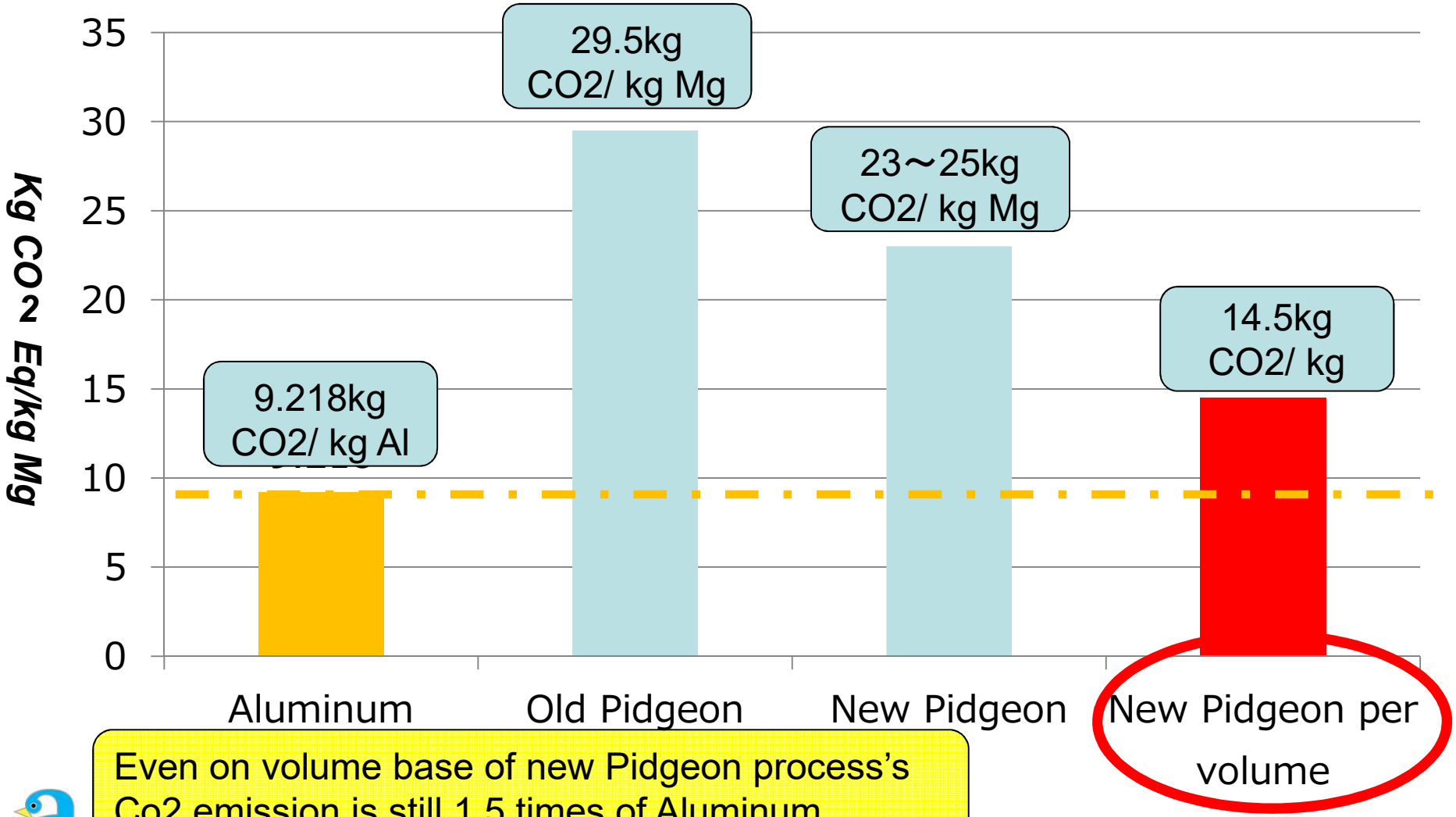


5-3 High competition of materials

The direction for material change from Steel							
		Improvement on Steel	Material Change				
			Non-ferrous metals			Resin	New Material
Parts	Weight Ratio	High strength sheet Steel	Aluminum	Magnesium	Titanium	Resin	CFRP
Body Parts: Flame	20%	Flame	High-end cars				High-end cars
Body Parts: Exterior	13%		High-end cars			Outer panel Bumper Back door	High-end cars
Body Parts: Interior	11%	Seat				Door trim Instrument panel	
Under carriage	22%	Suspension	Suspension				
Power Train	25%		Engine parts	Transmission case Cylinder block	Muffler Connecting rod	Intake manifold Fuel tank	Propeller Shaft
Electric equipment	9%		Harness				

Source: Ministry of Economy & Trade of Japan

5-4-1 Poor LCA on Pidgeon process



Even on volume base of new Pidgeon process's Co2 emission is still 1.5 times of Aluminum.

data：Japan Magnesium Association

5-4-2 Poor LCA on Die-casting

Average Consumption of SF6 gas on Mg alloy Die-casting production in Japan

	2006	2007	2011	2012	2013
SF6 gas consumption (Unit: kg/t Mg alloy cast)	1.46kg	1.66kg	0.56kg	0.57kg	0.53kg
Equivalent to CO2 (Unit: t/t Mg alloy cast)	**34.46t**	39.18t	13.21t	13.45t	**12.51t**

Practically, Aluminum alloy die-casting doesn't need covering gas.

data: Japan Magnesium Association

5-5 Various Specifications

- The common Die-casting Magnesium alloys (AZ91D, AM60B & AM50) are considered as not enough physical property to apply the power train parts of Automobile.
- it needs high-strength & heat-resist property.
- For the purpose of controlling the production costs, such alloys should be one or two types maximum.

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6-1 Scrap from disused cars

- We need Sorting the Magnesium alloy parts scrap from disused cars by car producers.
- Reasonable collecting system for sorted Mg alloy parts scrap is much expected.
- The purpose is minimizing the refining process.
- How to recycle the parts with different materials joining?
- Any people has consisted this kind of system in Europe or the US, yet?

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6-2 Scrap from Die-casting process

- We need low cost recycling system for Scrap occurred from Die-casting & machining process.
- In-house or In-line recycling system for gates & runner scrap.
- In-house recycling for dirty scrap.
- How to recycle or reuse for chips & fine power scraps?
- In Europe & the US, In-line & In-house recycling has been the main stream, yet?

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6-3 Scrap from RE Magnesium alloys

- We need Recycling system for Magnesium alloys including Rare Earth elements.
- Is it possible to arrange In-line & In-house recycling system?
- How to refine the Rare Earth oxide dispersed during re-melting process? Refining should be done with special flux or gas bubbling??
- Should we add Rare Earth elements for compensation of the loss during the refining process?

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Conclusion

1. The Macro economy transition of Japan in 2015 had been going on rather upward tendency.
2. The demand for Magnesium from each usage was generally stable, total approx.43,500t of annual consumption was no change.
3. JMA members much expect the increase of demand for Die-casting Magnesium alloy parts for Automobiles. JMA is planning to accurate this activity till 2018.
4. Except Automobile parts, JMA members develop several unique items from Magnesium metal.
5. From 5 big problems, we consider establishing recycling system for Magnesium alloy scrap to be the most important & should be settled ASAP.
6. About recycling system, we much welcome any suggestions & advices from you.

AMJ

Thank you!

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