

The Japanese Rare Earth market update and future prospects

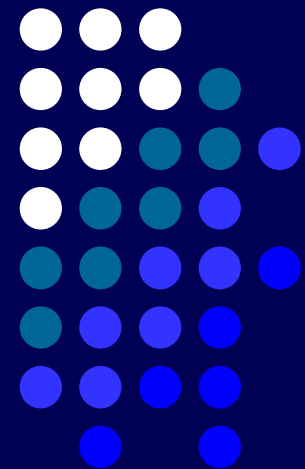
BEIJING MINOR METAL & RARE EARTH

September 4th 2009

Advanced Material Japan Corporation



Shigeo Nakamura



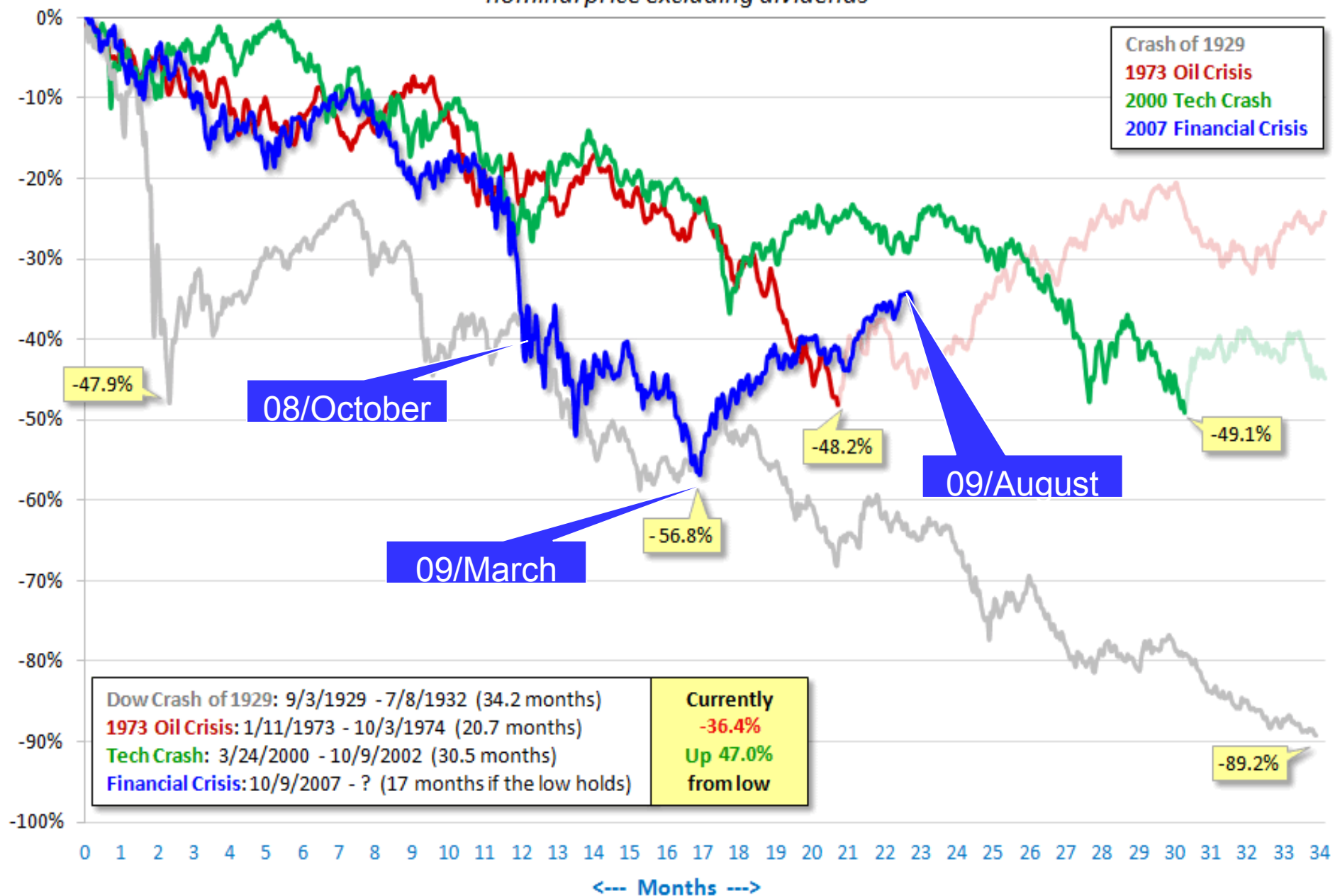
Four Bad Bear Markets

dshort.com

9/2/2009

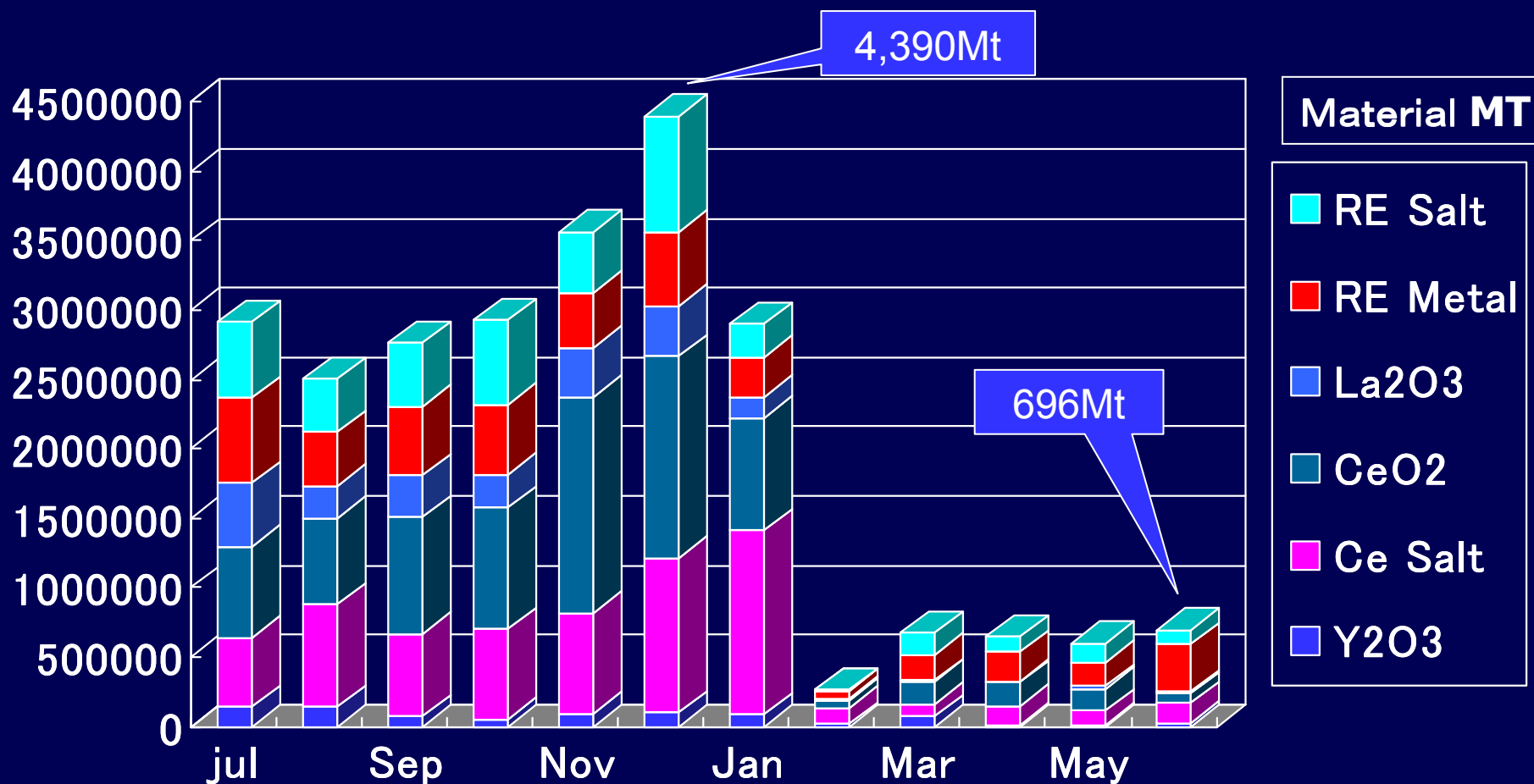
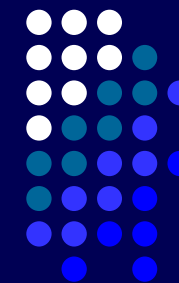
Dow in 1929-1932; S&P 500 in 1973-74, 2000-02, 2007-09

nominal price excluding dividends



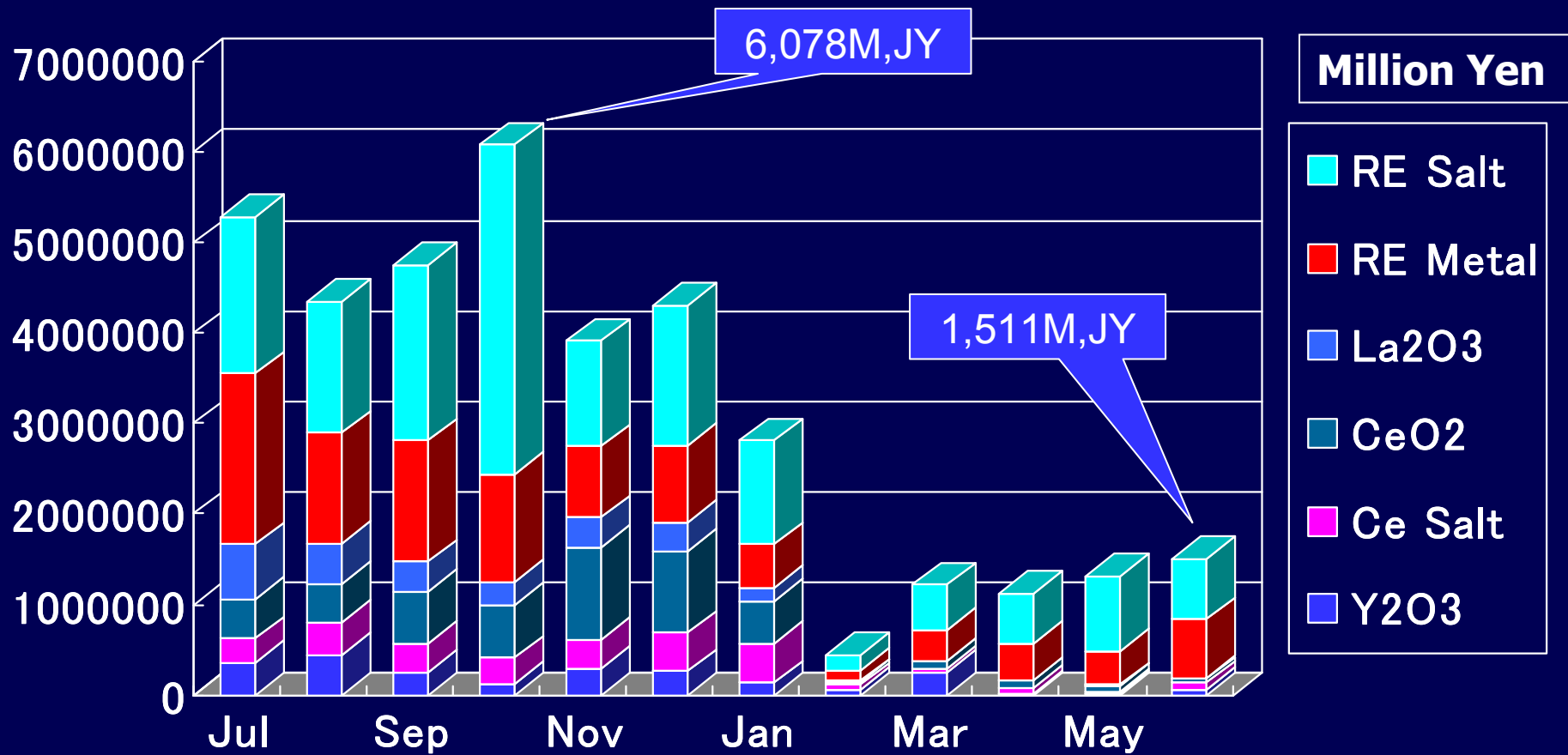
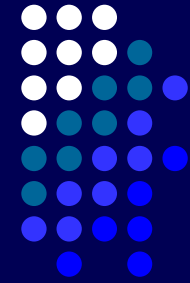


Japanese RE import for last 12 months from 08/Jul-09/Jun (In Quantity)



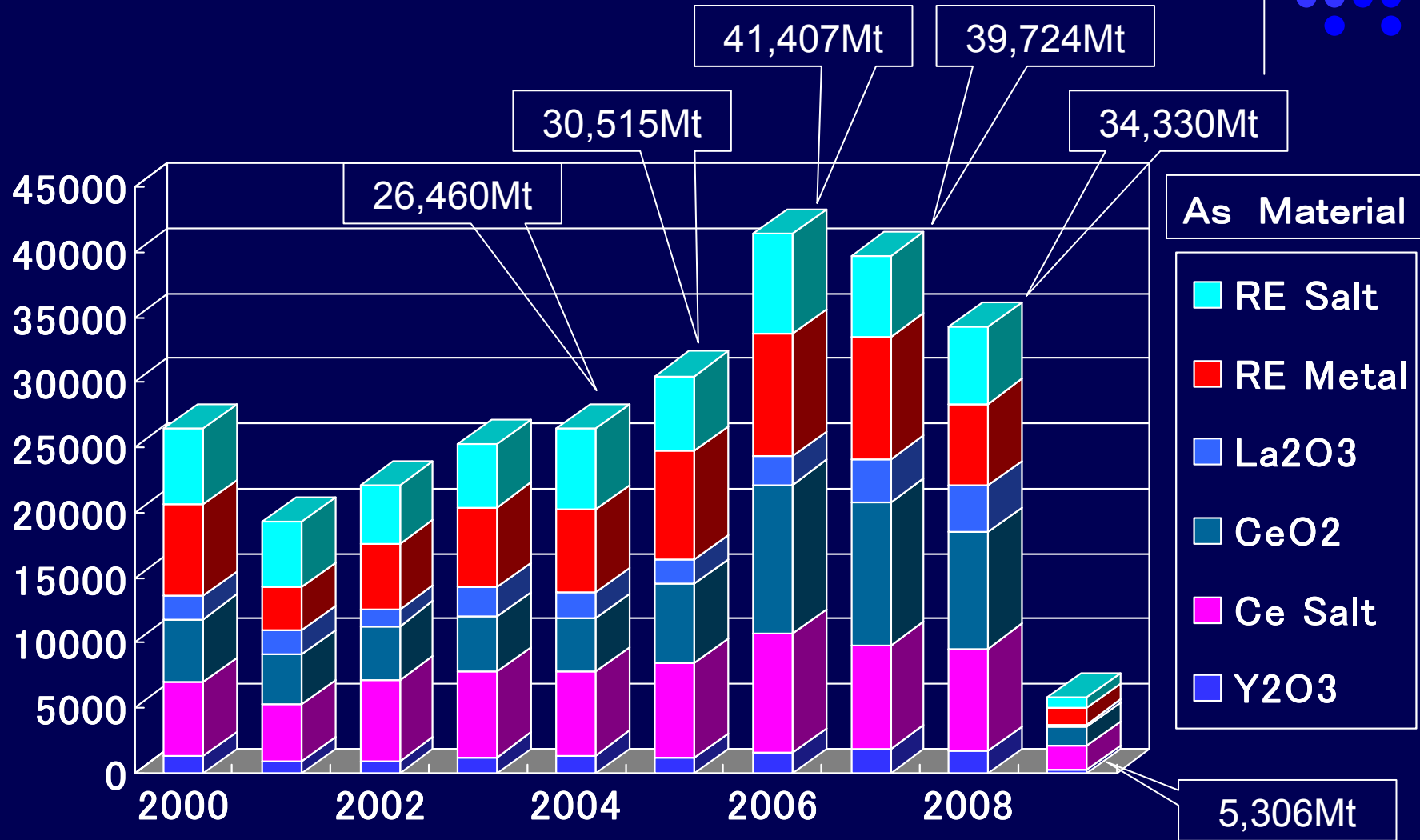
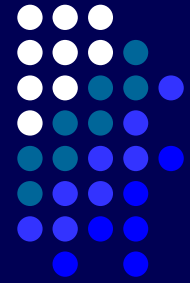


Japanese RE import for last 12 months from 08/Jul-09/Jun (In Amount)



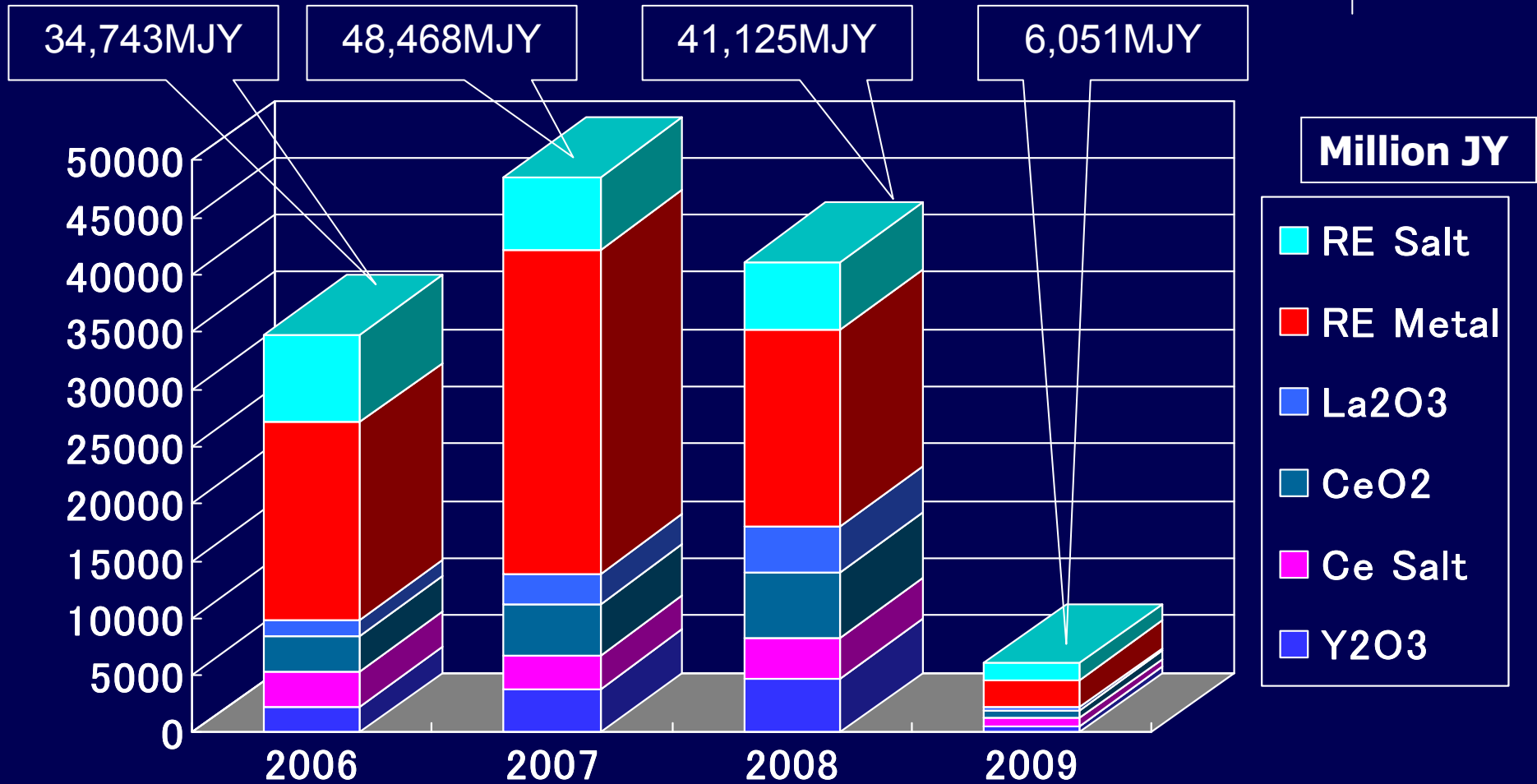
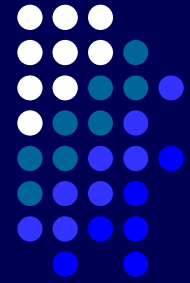


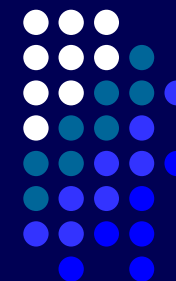
Japanese RE import till 2009 Half



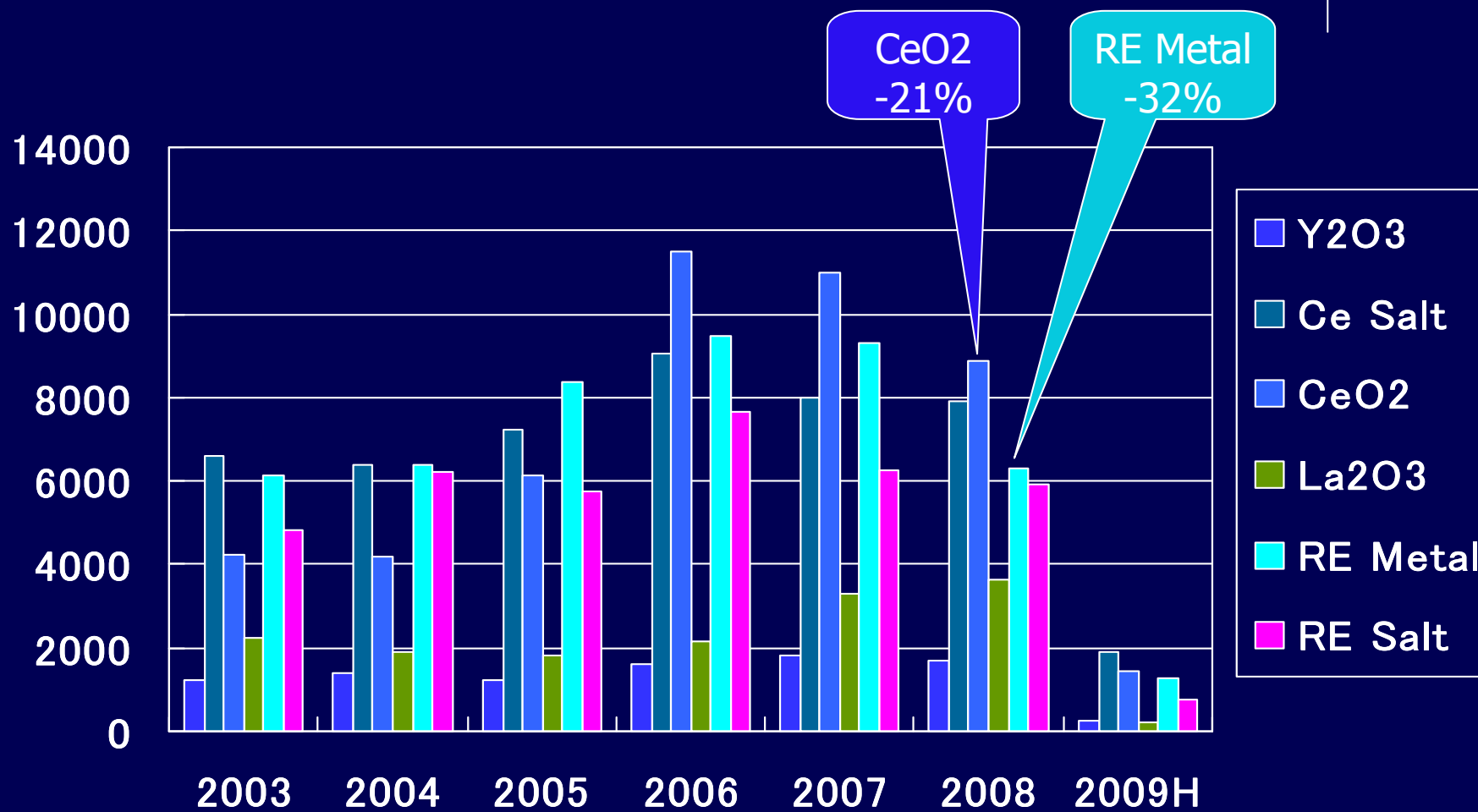


Japanese RE import Amount till 2009 Half





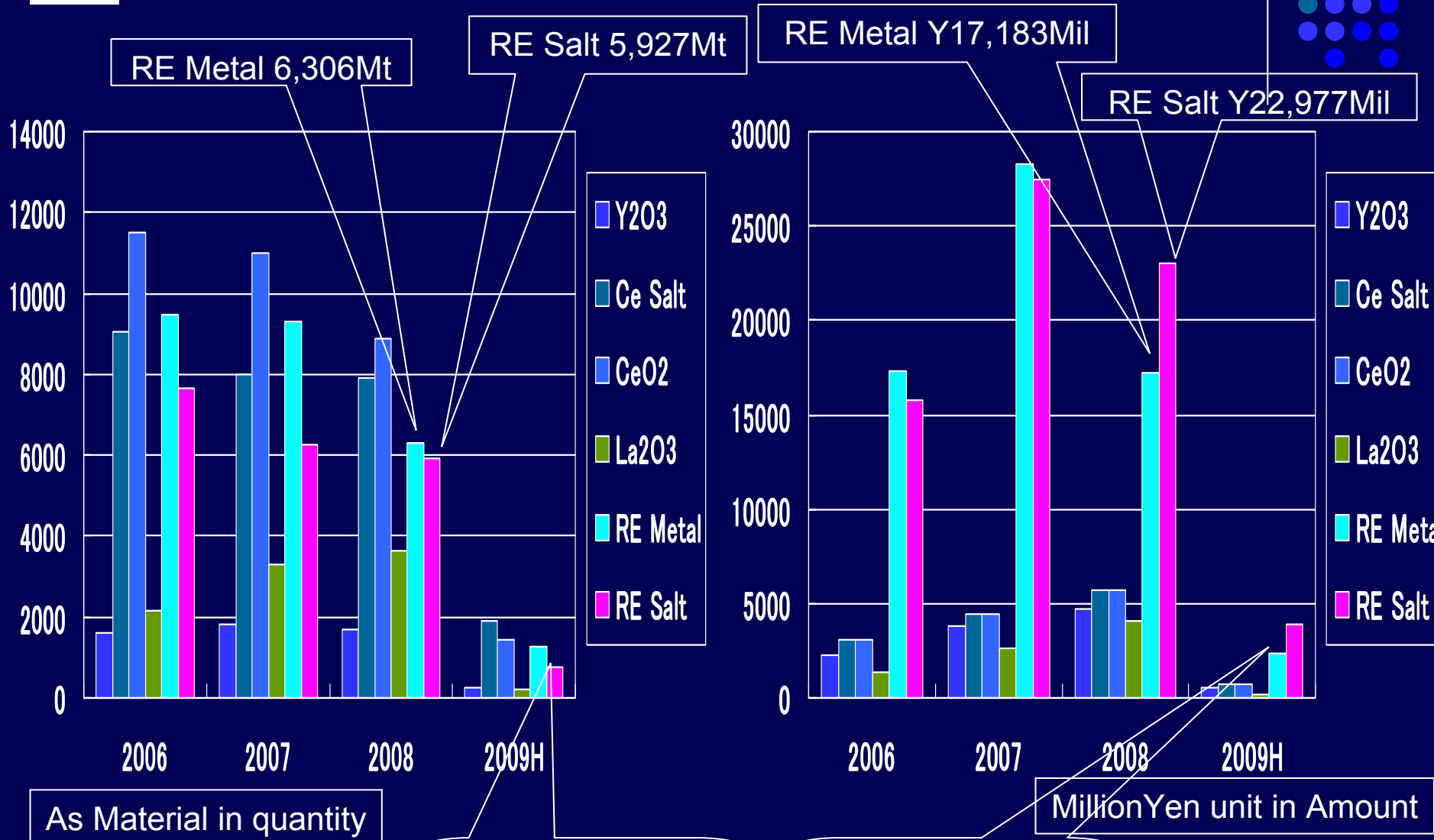
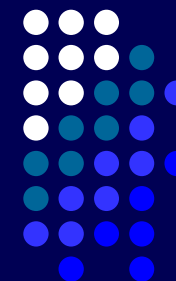
Japanese RE import till 2009H



As Material in quantity



Japanese RE import Trends

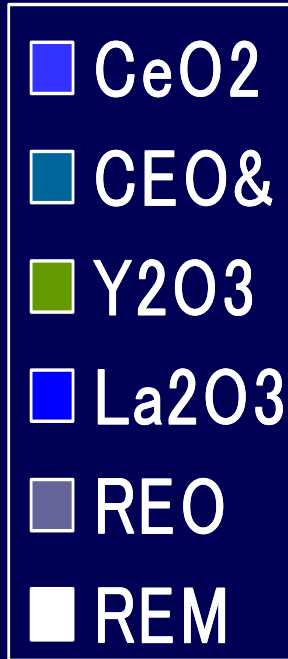
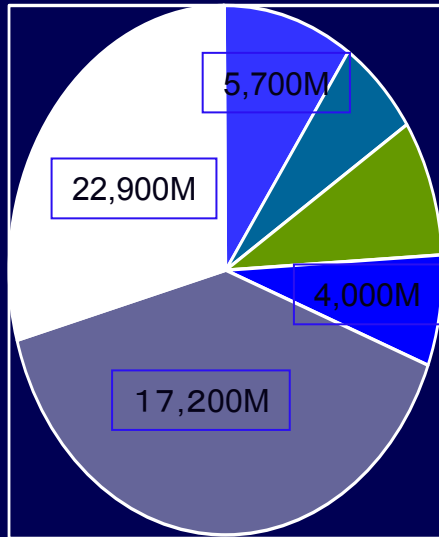
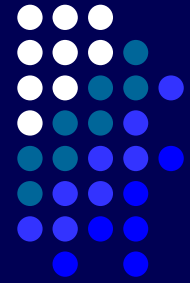


Re-metal is -60% and RE-salt is -75%

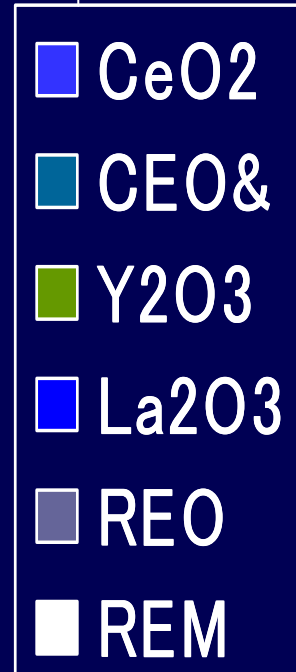
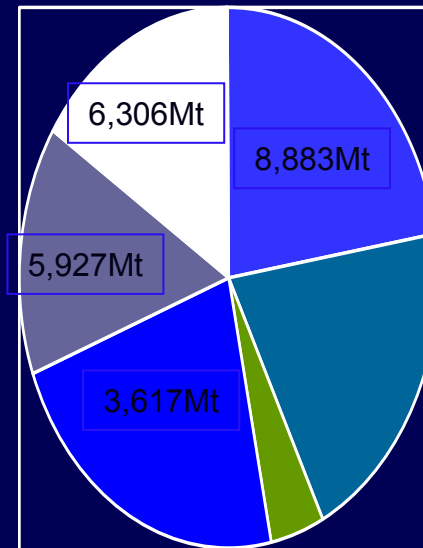
Re-metal is -72% and RE-salt is -66%



Comparison between import Amount and Quantity in 2008



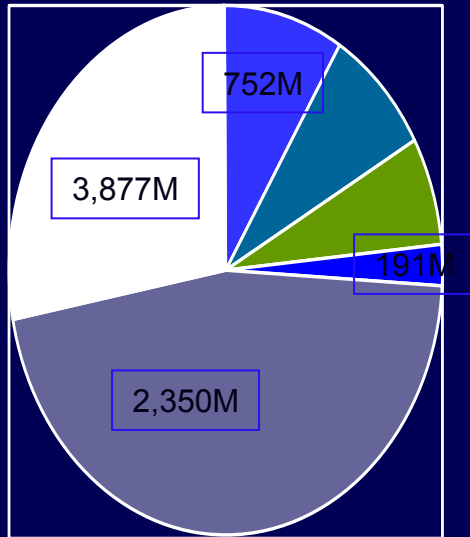
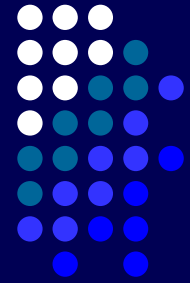
Total Amount is JY41,125M



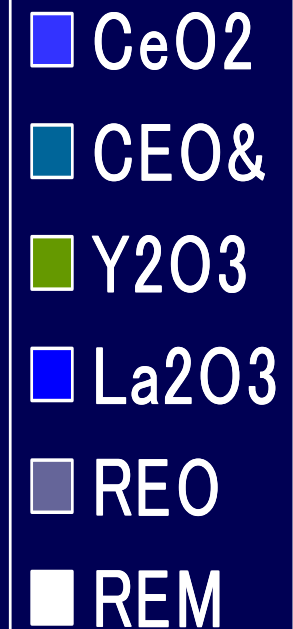
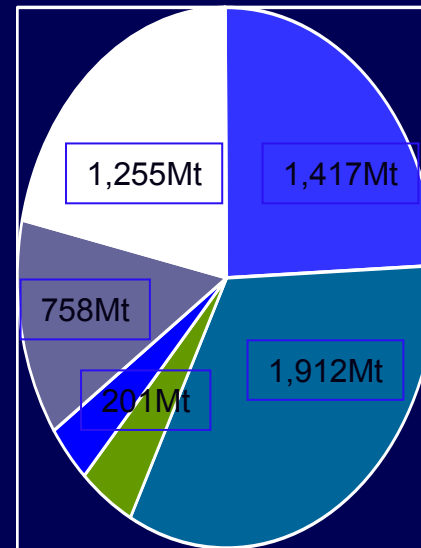
Total Quantity is 34,330Mt



Comparison between import Amount and Quantity in 2009 Half



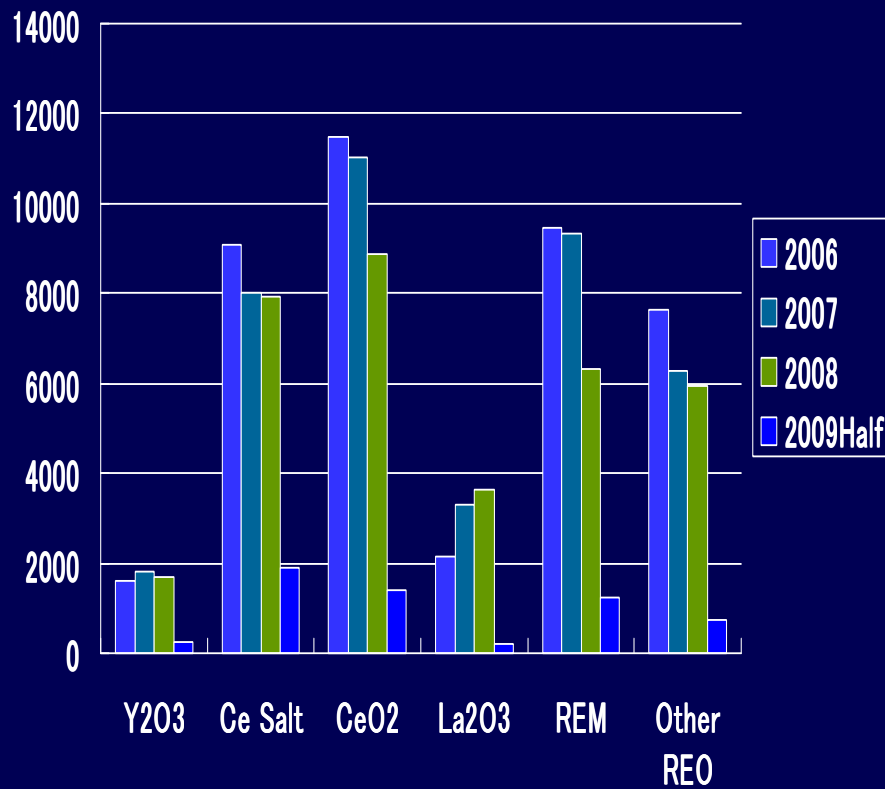
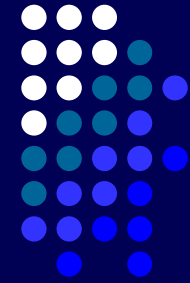
Total Amount is JY6,051 Million



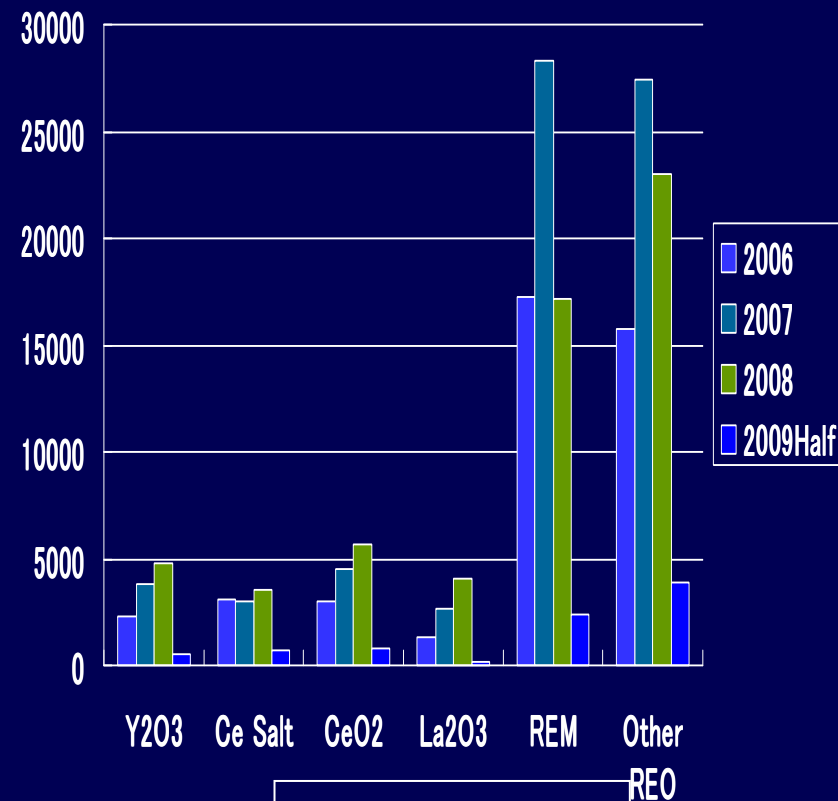
Total Quantity is 5,778 Mt



Import quantity and total sum for 2006, 2007, 2008 & 2009Half



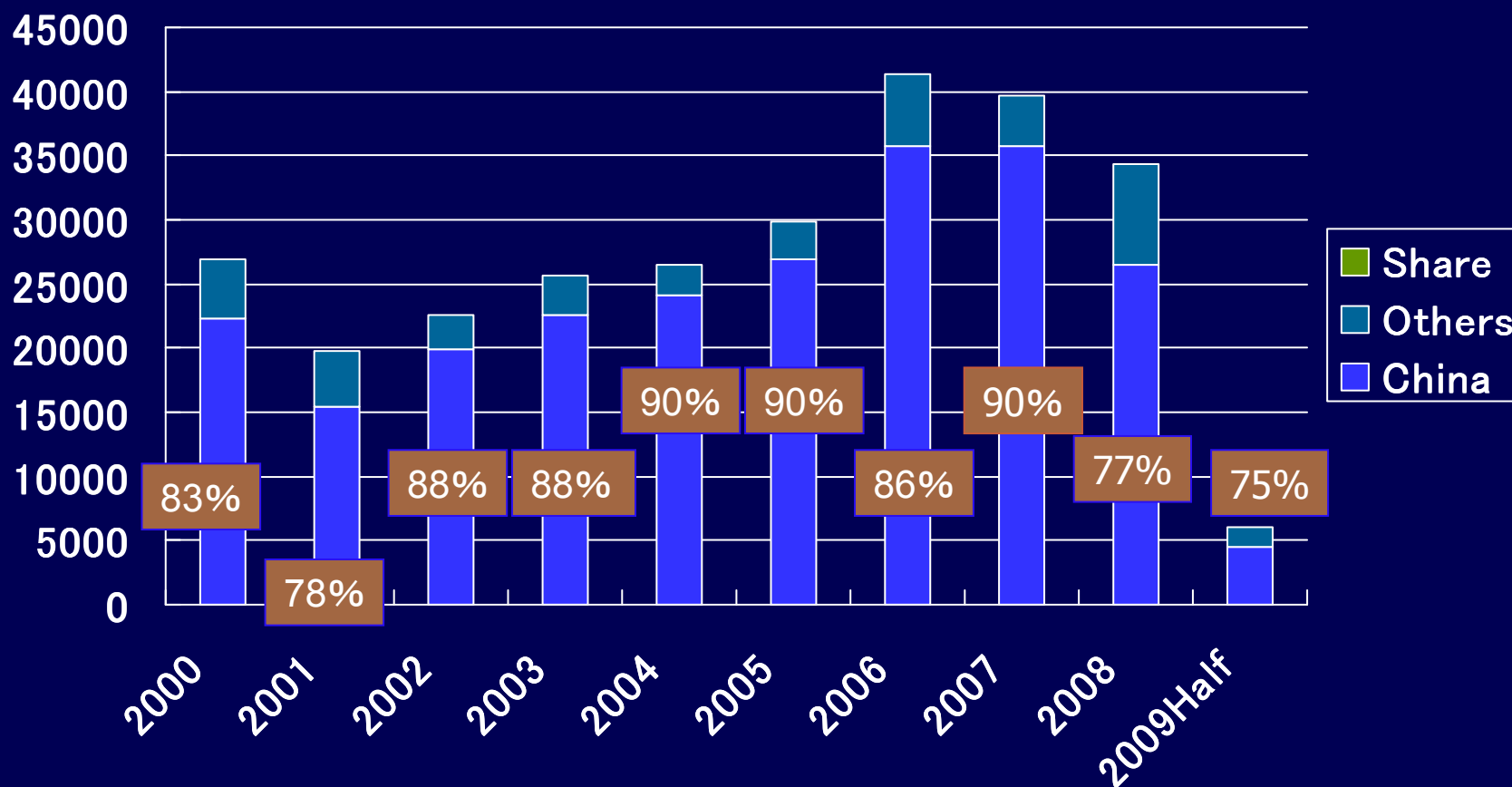
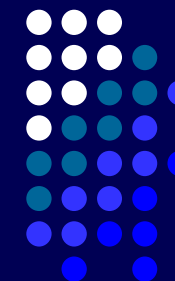
Import Quantity



Import Amount



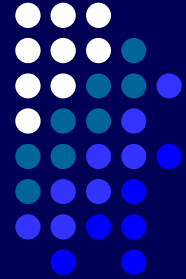
Chinese RE import share to Japanese market in quantity



Chinese import share increase year by year.



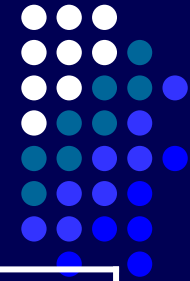
Japanese Rare Earth market



- **New Growing Field of Rare Earth in Japanese market (mainly for Magnetic material, Nickel hydrogen battery, fluorescence material)**
- **Demand prediction according to an HEV market**
- **NdFeB Magnet market in Japan.**
- **Ni-H Battery Market in Japan**
- **Fluorescence Market in Japan**
- **Future view and Trend of Japanese Rare Earth market**
- **How does Chinese influence become it from now on?**



New growing field application for Rare Earth elements

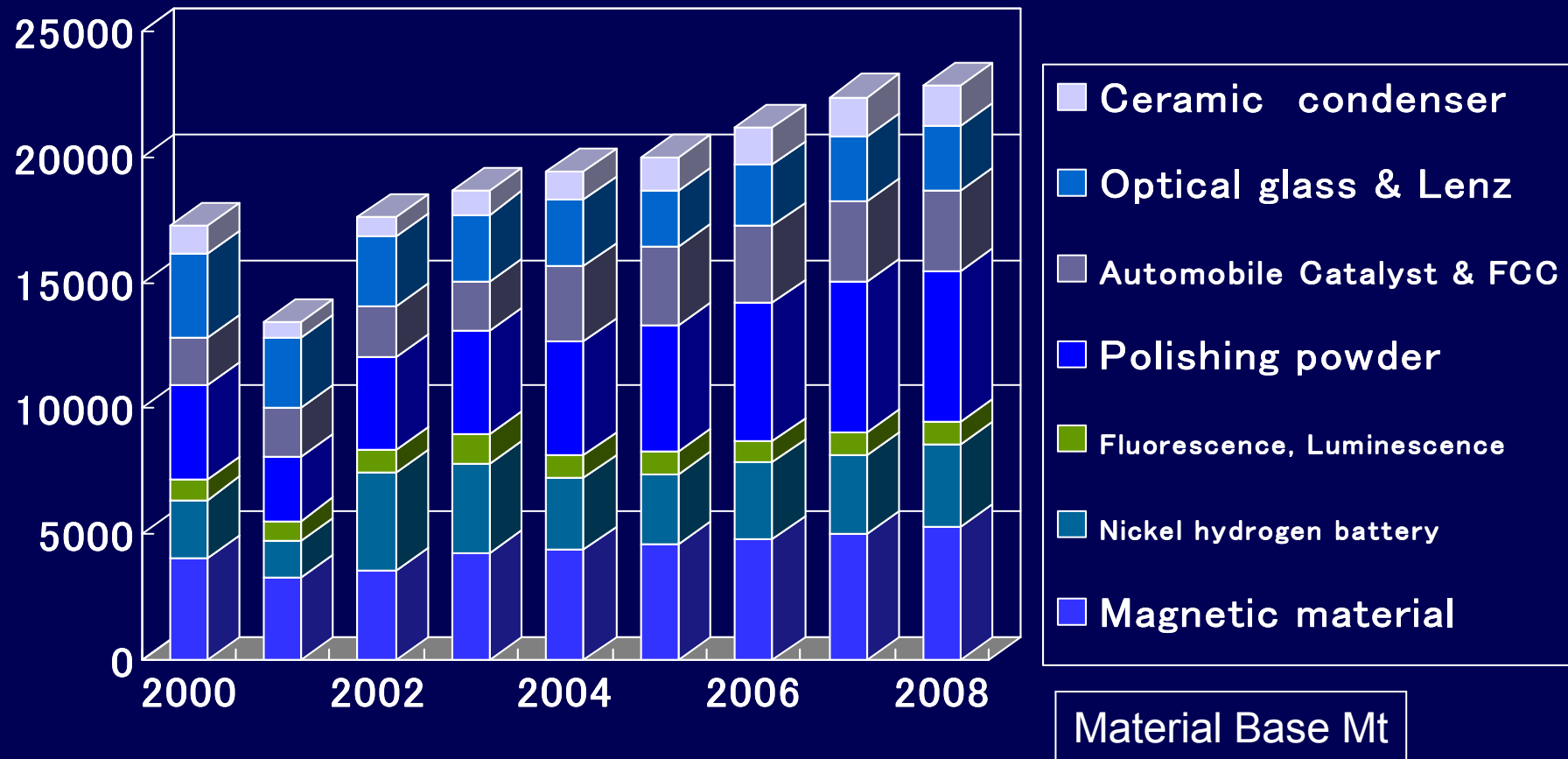
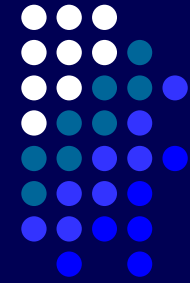


Magnetic material	Di, (Pr, Nd), Sm, Tb, Dy
Nickel hydrogen battery	Mm, La, Ce, Nd, Others
Fluorescence, Luminescence	Y, La, Ce, Eu, Tb
Polishing powder	Ce, Bastnasite
Automobile Catalyst & FCC	Y, Ce, La, Nd
Chemical Catalyst & Paints, glaze	Ce, La, Pr
Optical glass & Lenz	Y, La, Ce, Pr, Nd, Eu, Gd, Ho, Er
Ceramic condenser	La, Nd
Others	All kind of the rare earth.

Others are Magnetic optical recording material, Hard disk material, Fuel cell and solid electrolyte, Superconductivity, Atomic power and Structure materials, Rader, Nuclear Reactor and all kind of the Metallurgy use.



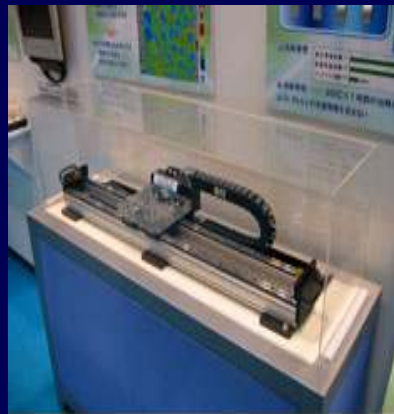
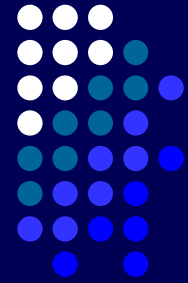
Rare earth application trend



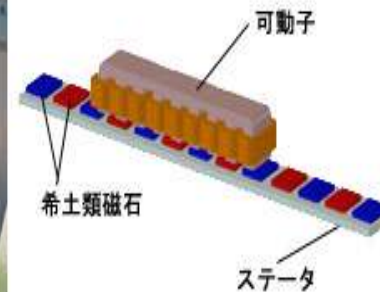


The automobile field

Hybrid car , Electro mobile and Electric hybrid bicycle and
Linear motor car

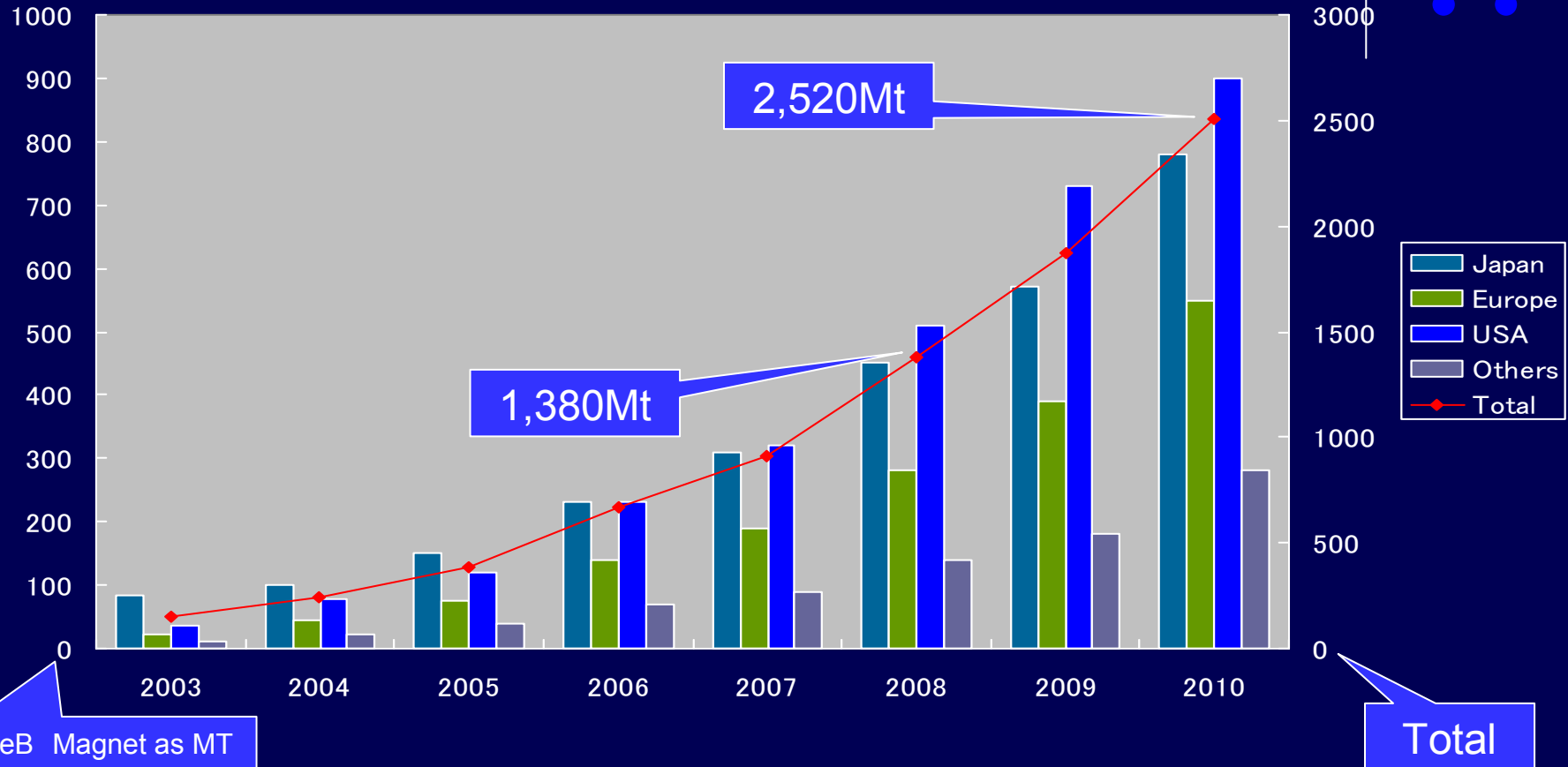
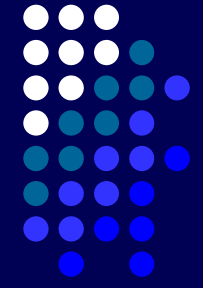


リニアモータ





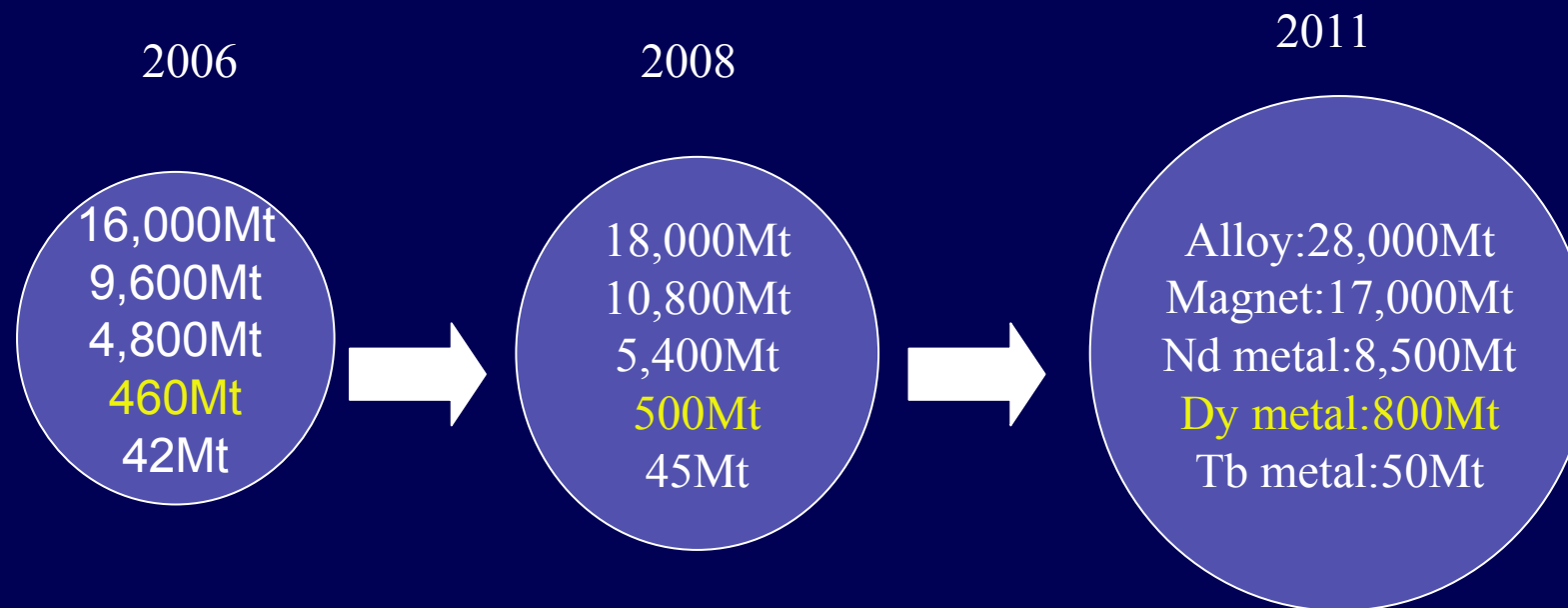
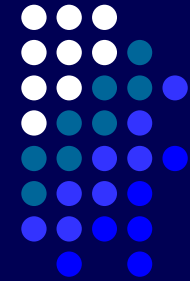
Demand prediction for HEV market



In Japan, 300Mt of the NdFeB Magnet in 2007 will become 800Mt in 2010 for HEV production. In the world market of 2010, it will become 2,520Mt of the NdFeB Magnet (4,200Mt NdFeB-Alloy) from 1,380 Mt in 2008.



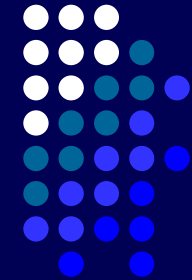
Prediction of NdFeB-Alloy, Magnet and RE metal demands in Japanese market



It became 18,000Mt of Alloy in 2008. Growth rate was 13% from 2006. In case of the yield rate is 60%, Magnet demand will become 10,800Mt scale and Nd metal demand was 5,400Mt, Dy demand was 500Mt and Tb was 45Mt respectively. In 2011, Alloy will become 28,000Mt and Magnet will become 17,000Mt base and Nd metal demand will become 8,500Mt and Dy will become 800Mt base .

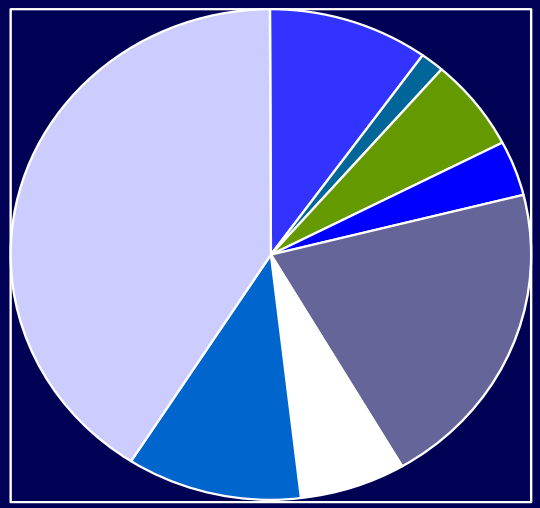


Battery Market in Japan 2005→2008 (Amount)



2005

US\$5.72 Billion



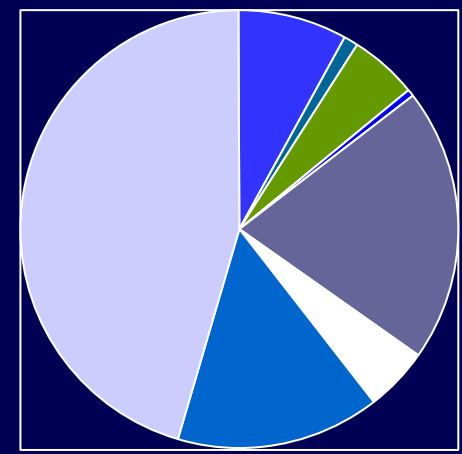
Primary Cell 21%

Secondary Battery 79%

- Alkali Mangan
- Silver Oxide
- Lithium
- Others
- Lead Strage
- Alkali
- Ni-H
- Li-Ion

2008

US\$8.46 Billion



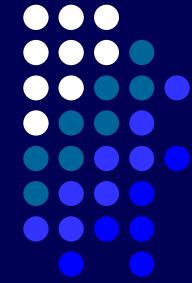
Primary Cell 15%

Secondary Battery 85%

- Alkali Mangan
- Silver Oxide
- Lithium
- Others
- Lead Strage
- Alkali
- Ni-H
- Li-Ion

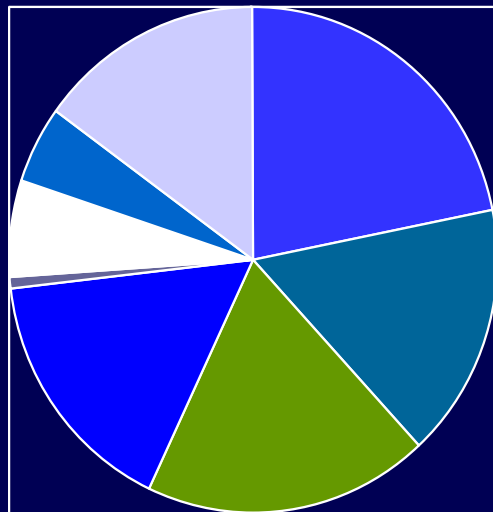


Battery Market in Japan 2005 → 2008 (Quantity)



2005

5.8 Billion Sets



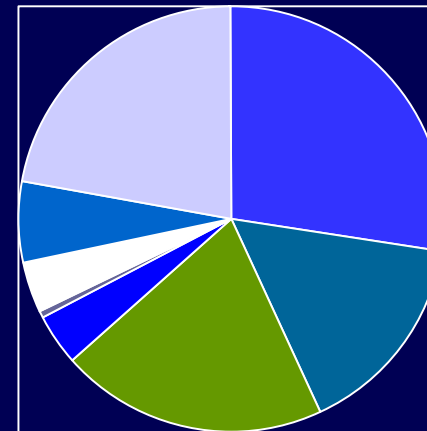
Primary Cell 73%

Secondary Battery 27%

- Alkali Mangan
- Silver Oxide
- Lithium
- Others
- Lead Strage
- Alkali
- Ni-H
- Li-Ion

2008

5.38 Billion Sets



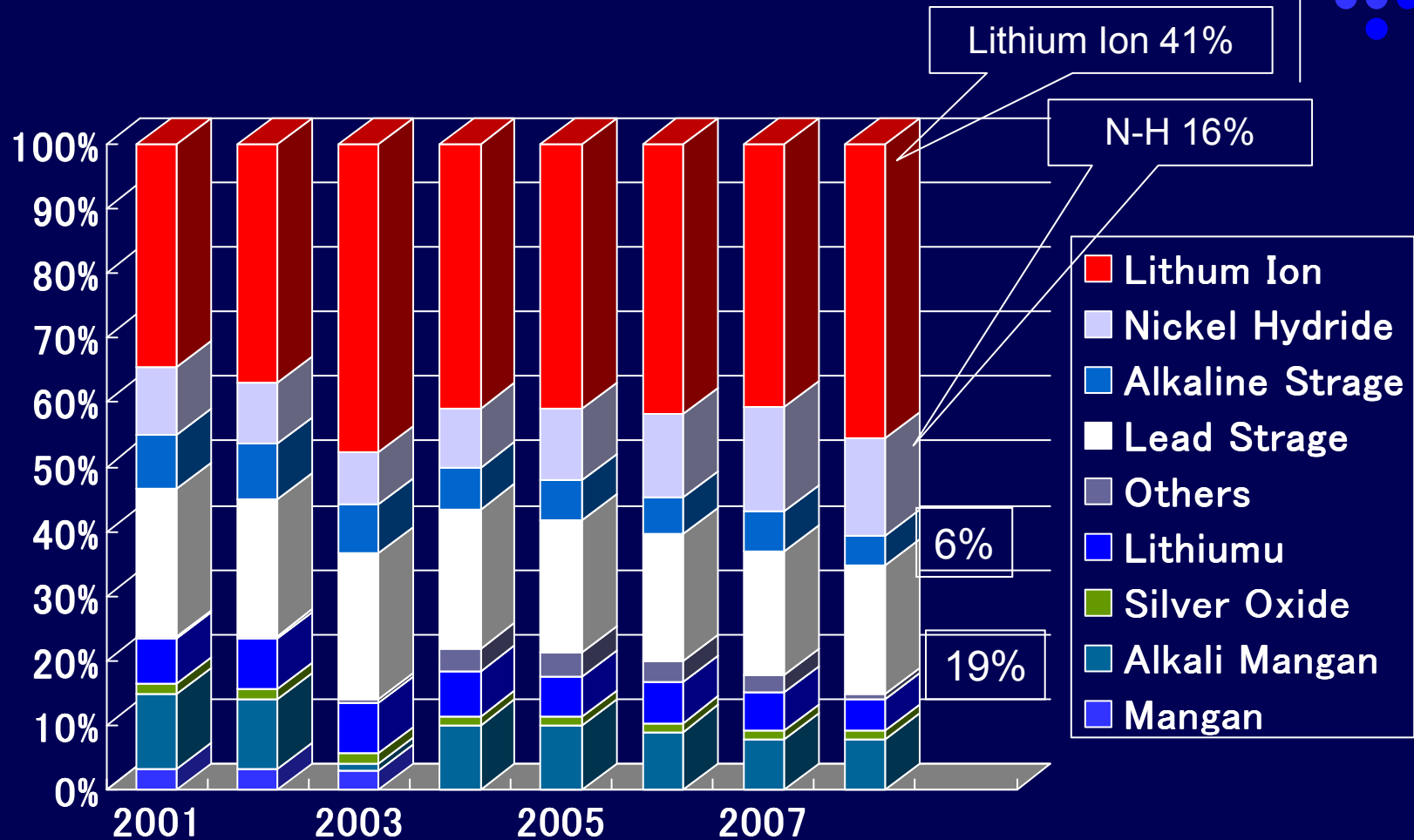
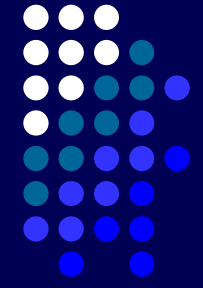
Primary Cell 67%

Secondary Battery 33%

- Alkali Mangan
- Silver Oxide
- Lithium
- Others
- Lead Strage
- Alkali
- Ni-H
- Li-Ion



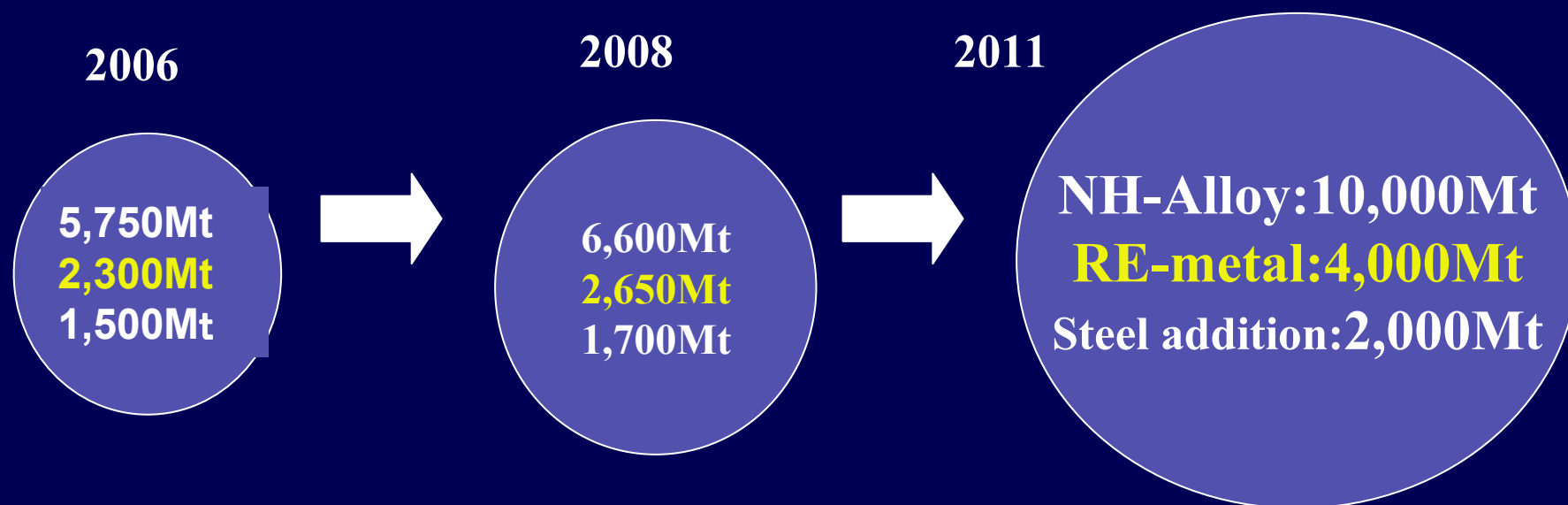
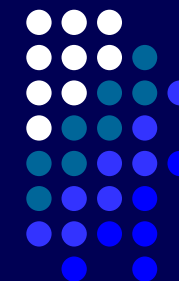
Rechargeable Battery demand share



Primary Battery Amount Share is only 18%, Secondary Battery is 82% share



Prediction of Nickel hydrogen battery and Steel additive demand for Japanese RE market.

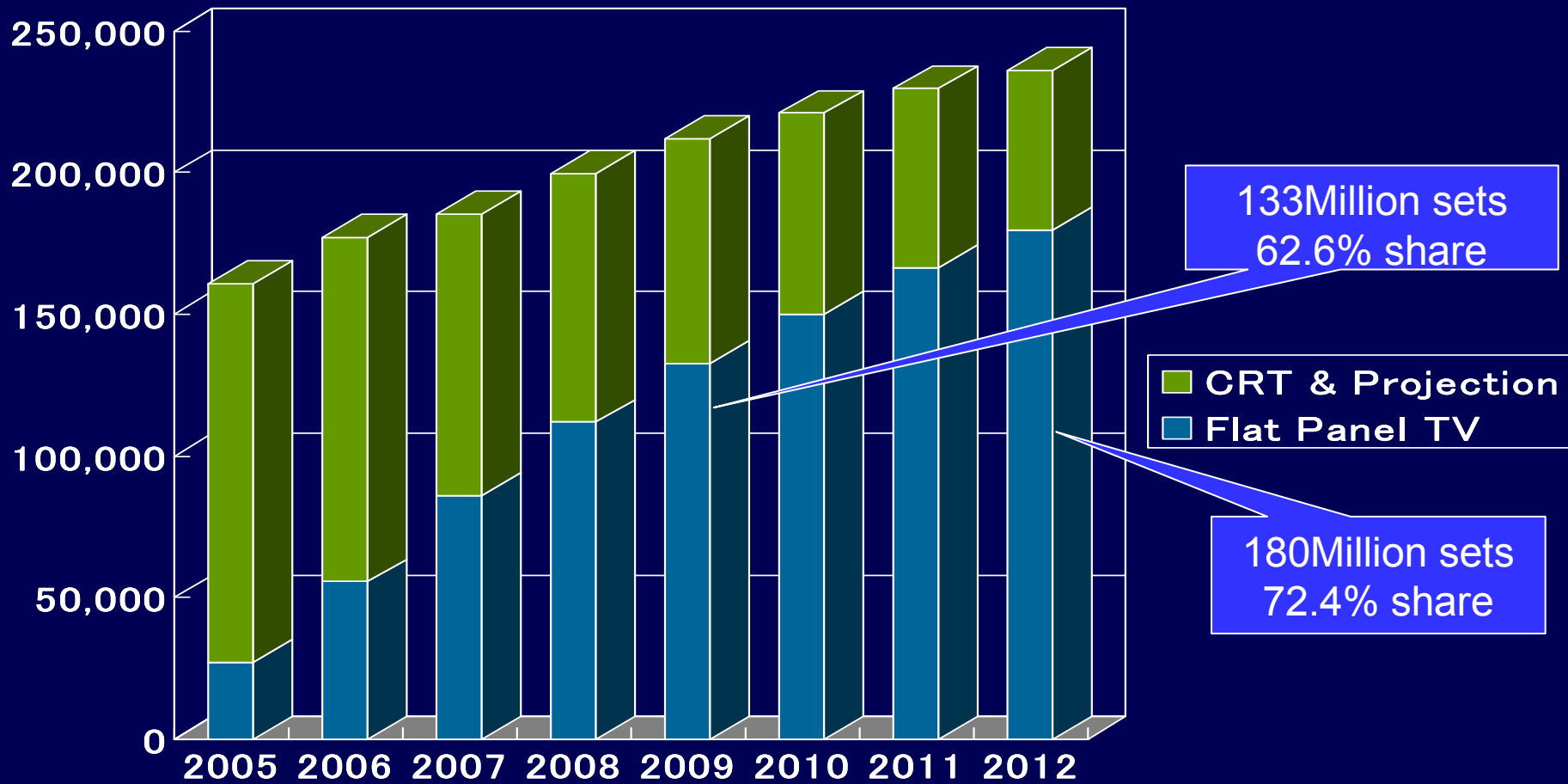
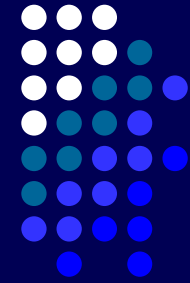


It became around 6,600Mt in the amount of hydrogen storing metal alloys in 2008, and it became around 2,650Mt from 2,300Mt in the amount of misch metals for NH usages. It will be expected 4,000Mt of misch metal will be needed in 2011.

The demand of the misch metal for steel addition is slightly increase.

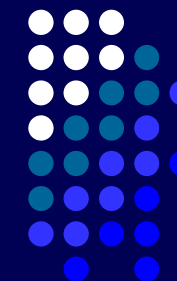


Trend of the Flat panel TV world demand





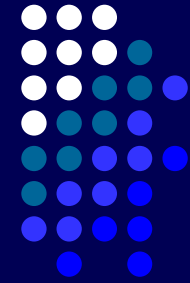
Chemical contents of the Rare Earth Ore



	Bastenasite		Monazite	ION Exchange	
	Baotou	Mt.Pass	Mt.weld	xunwu	Longnan
Eu ₂ O ₃	0.2	0.1	0.55	0.5	0.1
Tb ₄ O ₇	0.1	Trace	0.07	Trace	1.3
La ₂ O ₃	23	33.2	25.1	43.4	1.82
CeO ₂	50	49.1	48.5	2.4	0.4
Nd ₂ O ₃	18.5	12	16.7	31.7	3
Y ₂ O ₃	Trace	0.1	0.35	8	65
Dy ₂ O ₃	0.1	Trace	0.23	Trace	6.7
Content of the rare earth(%)					



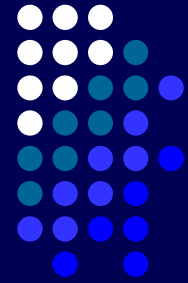
Global market prediction of the use of the fluorescent substance



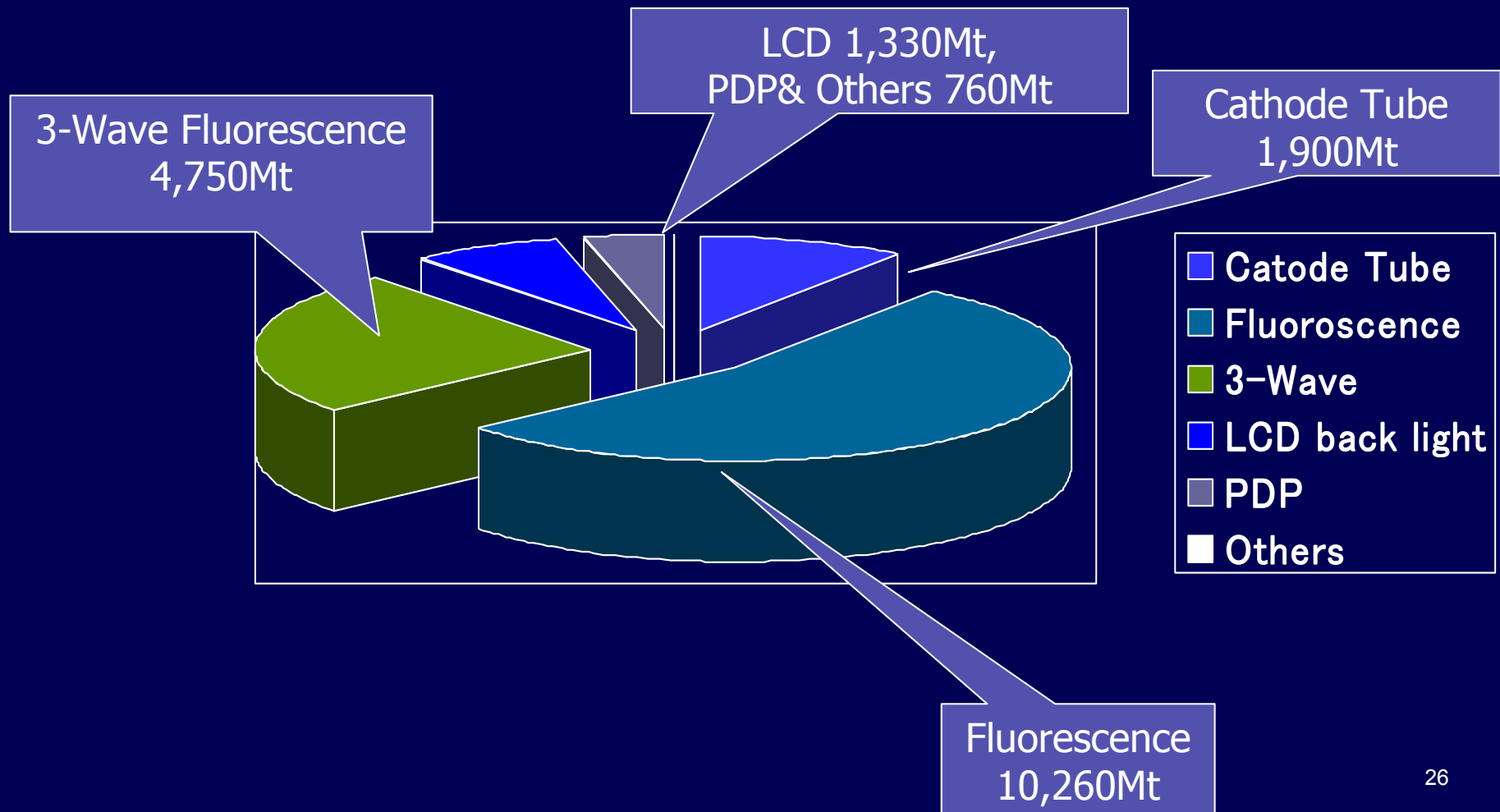
	2002	2005	2008	2011
All fluorescent substances	17,000t~ 18,000t	17,500t~ 18,500t	18,000t~ 19,000t	19,000t~ 20,000t
Fluorescent tube (white type)	57%	60~61%	54~55%	~50%
Fluorescent tube (3 wave)	11%	14~15%	25%	40%
Cathode Tube	30%	20%	~10%	1%
Cold Cathode Fluorescent lamp (LC Back Light)	0.3~0.4%	}~1%	7~8%	10%
PDP	0.25%		2~4%	4% less
Market Scale	500Mil \$	600Mil \$	700Mil \$	800Mil\$



Fluorescence Market 19,000Mt

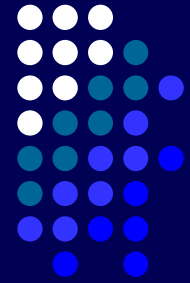


2008

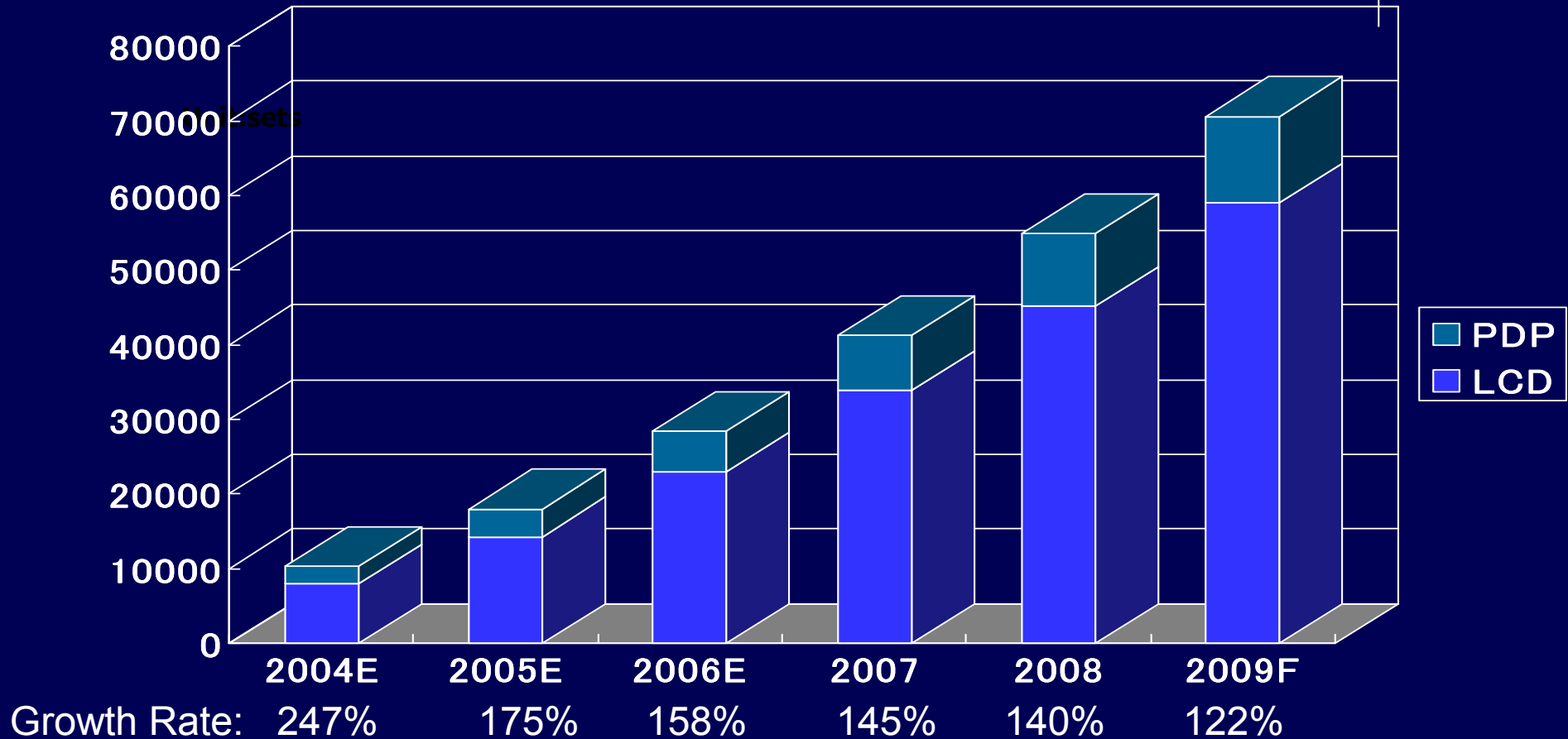




Production of LCD/PDP Display

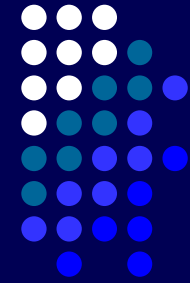


Unit: Thousand sets



*2008-2009: expectation

*Source: Technological industry corporation electronic information association (JEITA)

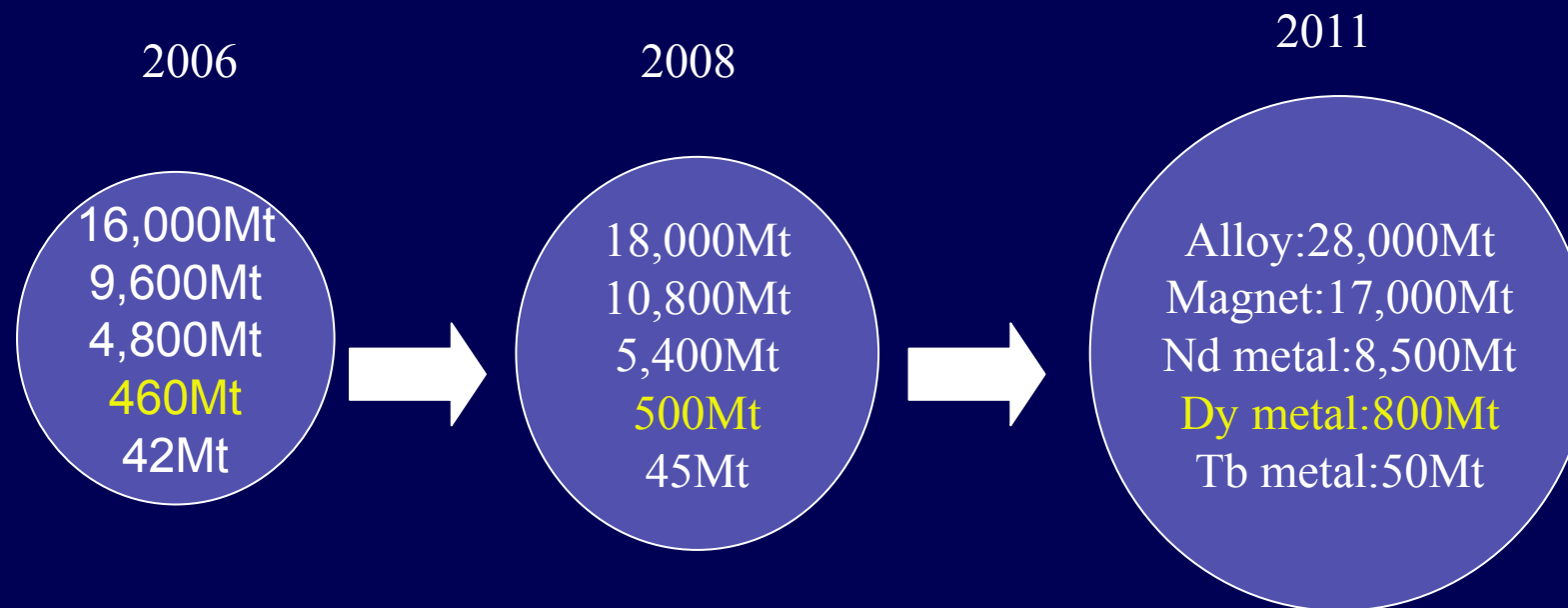
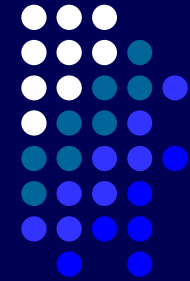


How to Dysprosium shortage?

- Hybrid car needs NH Battery & NdFeB.
- How to become supply & demand for Dy for 3 years later ?
- Dr. Sagawa newly developing Dy content for NdFeB at 1% addition technology only from 4%.(Substitution is impossible)
- Recycling rate will become 30 percent.
- Chinese supply 2,000Mt of Dy per year. And exports to Japanese market is 500Mt. What can be covered by the new resource and Recycling and reduce technology and stock pile ?
- How to achieve the Dy resource development in Brazil, Vietnam Malaysia, Canada and Australia by the year of 2012.



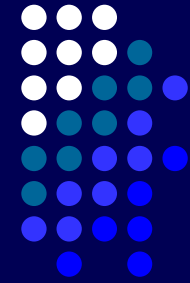
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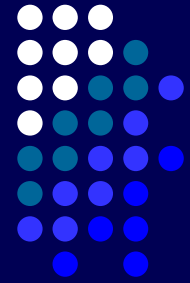
How to Dysprosium shortage?



- Ion exchange ore production in China is 4.5 million tons. Dy production is 2,000 Mt as Dy base. Exports are about 25 percent for Japanese market and it needs annual 500Mt.
- Demand of Dy for NdFeB needed **500Mt in 2008**.
- In case of the growth rate is 17%, it will be needed 585Mt in 2009, 684Mt in 2010, also estimated 800Mt in 2011. It means market needs more additional 300Mt for coming three years later.
- But actually In 2008, maximum market scale amount of 18,000 Mt of alloy needs 3% = 540Mt Dy metal. (But VCM need not 3% Dy), so real demand should be **270Mt** at 1.5%.
- Reduce rate in 2008 will be = **90Mt** (270Mt - 180Mt as reduce tech of 1%).
- Recycling rate will become 30 percent (500Mt X 0.3) average for every year. = **150Mt**
- Demand 270Mt > new 3R Supply 240Mt (90Mt + 150Mt.) + α (stock pile)



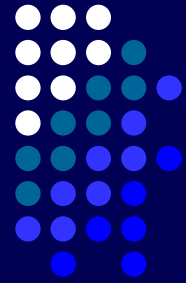
3R (Reduce, Reuse, Recycle) will help Dysprosium market.



- In 2011, maximum market scale amount of 28,000 Mt of alloy needs 3% =840Mt Dy metal. (But VCM need not 3% Dy), so real demand should be **420Mt** at 1.5%.
- Reduce rate in 2011 will become 1% =**280Mt**.
- Recycling rate will become 30 percent (500MtX0.3) average for every year.=**150Mt**
- Demand 420Mt is almost balanced 430Mt of 3R supply as (280Mt +150Mt.) **420Mt \doteq 430Mt**
- Stock pile will be **250Mt** average annually.
- New Heavy rare earth source will be developed by the end of 2012 from Vietnam, Australia, Brazil and Canada.

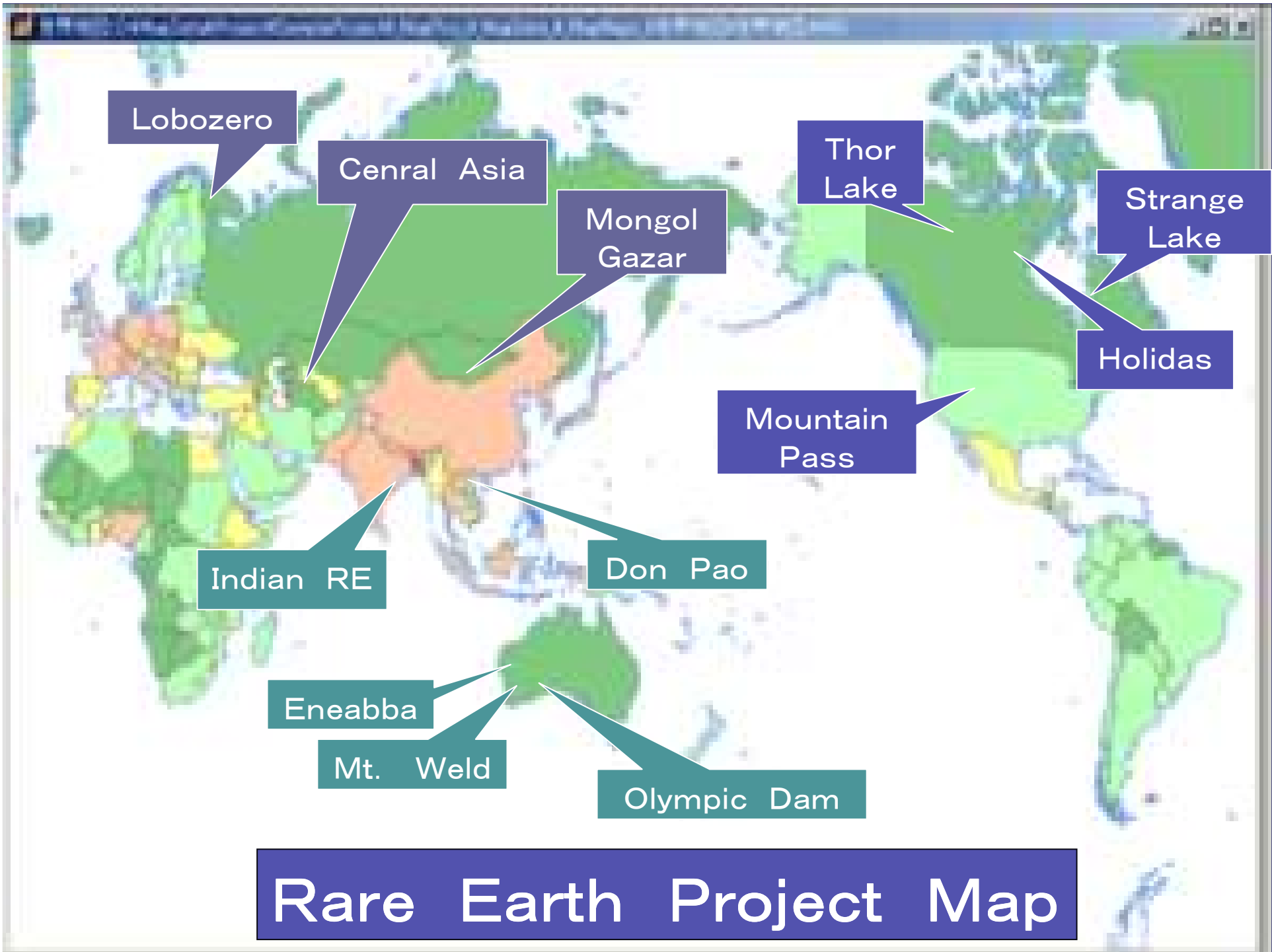


Where is the Rare Earth?



- Vietnam Don Pao & Others.
- Mt. Weld Project Lynus of Australia stop now.
- Thor Lake Project Canada.
- Arafura Australia
- Holidas Lake, Strange Lake
- Mongolia Republic are promising RE deposit.
- The Indian government is making a strenuous effort for development, too.
- Mt. Pass of the Moly corp reopens from 2008.
- Discovered in the Central Asia and Brazil, too.





Lobozero

Cenral Asia

Mongol Gazar

Thor Lake

Strange Lake

Holidas

Mountain Pass

Indian RE

Don Pao

Eneabba

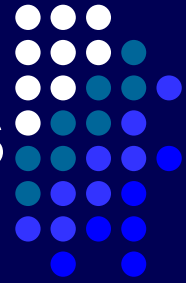
Mt. Weld

Olympic Dam

Rare Earth Project Map



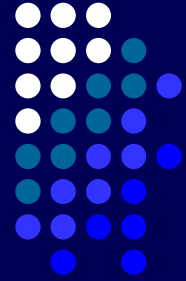
Japanese Chinese rare earths conference in Tokyo



- It was held in Tokyo on April 14 & 15, 2009.
- 100 participants from Japan and 31 participants from China.
- China became the world's greatest foreign reserve nation and began regulation of the resources export.
- Japan establishes an important point for the security of the stable supply source except China and the development of substitute materials, a resource saving study, and the recycling.
- The agreement of the interest was not seen, but the opinion agreed on "Japan and mutual development of the Chinese rare earths industry" at present.



Conclusion



- **Since the demand of Japanese market is decreased sharply in 2009 until the recession over.**
- **It is the most important issue to have the stable supply sources to realize the stable growth of the rare earth market.**
- **Dysprosium will be well balanced for coming few years.**
- **Chinese export policy influenced seriously and collaboration between Japan and China is important.**

Thank you for your attention.



AMJ

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