

What is **SICAPERMA?**

Project presentation

Project ID: 101160837 | CALL: I3-2023-INV2A

What is SICAPERMA?

Project presentation

Title

Sustainable Innovation investment Catapult for Permanent Magnets

Duration Oct 2024 – Sep 2027

Overall Budget 6 244 986 €

EU Contribution 4 371 482 €

Co-funded by



Co-funded by
the European Union

Project ID: 101160837 | CALL: I3-2023-INV2A



The problem

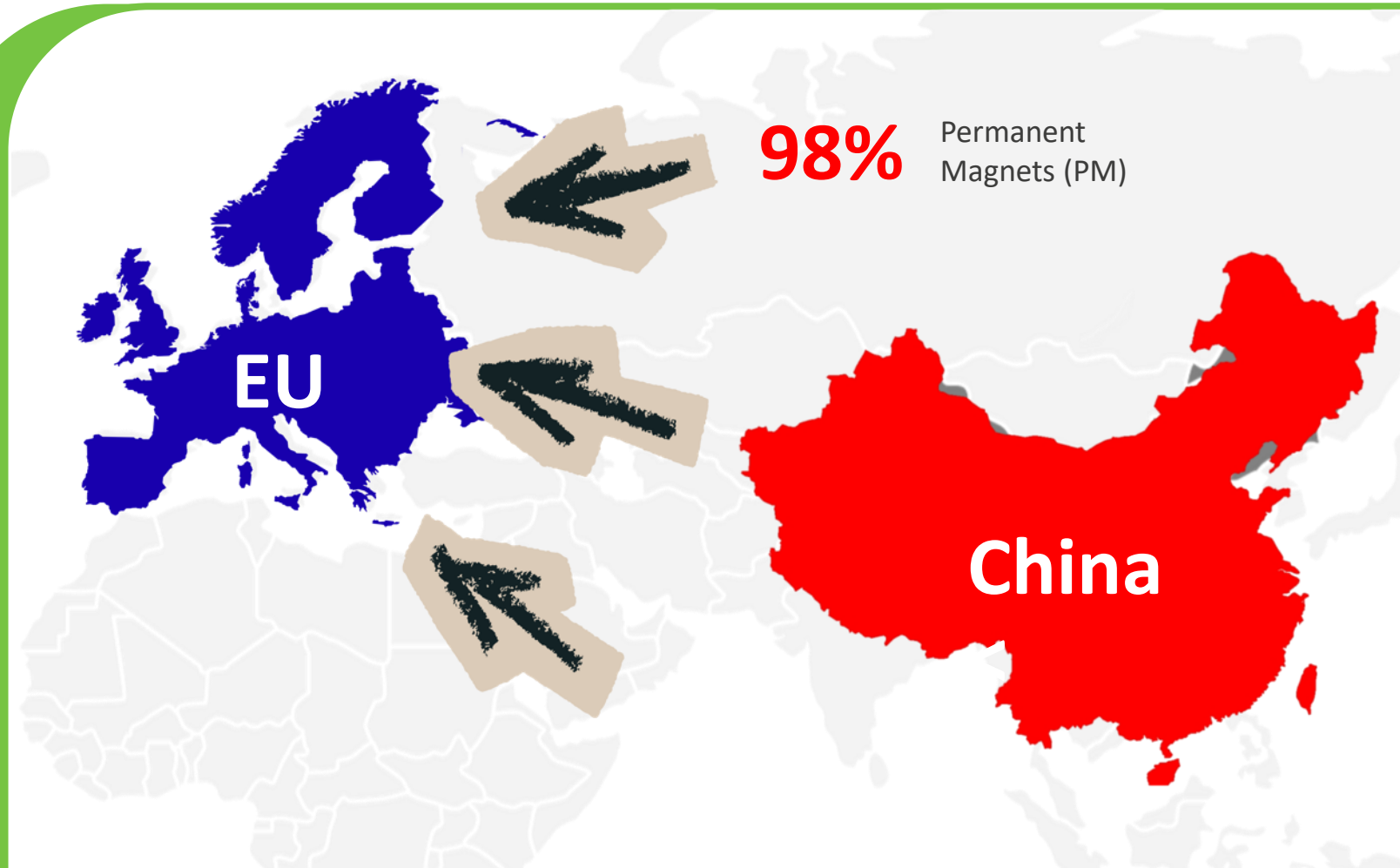
Strategic dependency from a single and strong source

China controls 98%
of PM supply

Only 1% of PM
are recycled

Demand of PM
will triple by 2024

PM are key for the
Green Transition

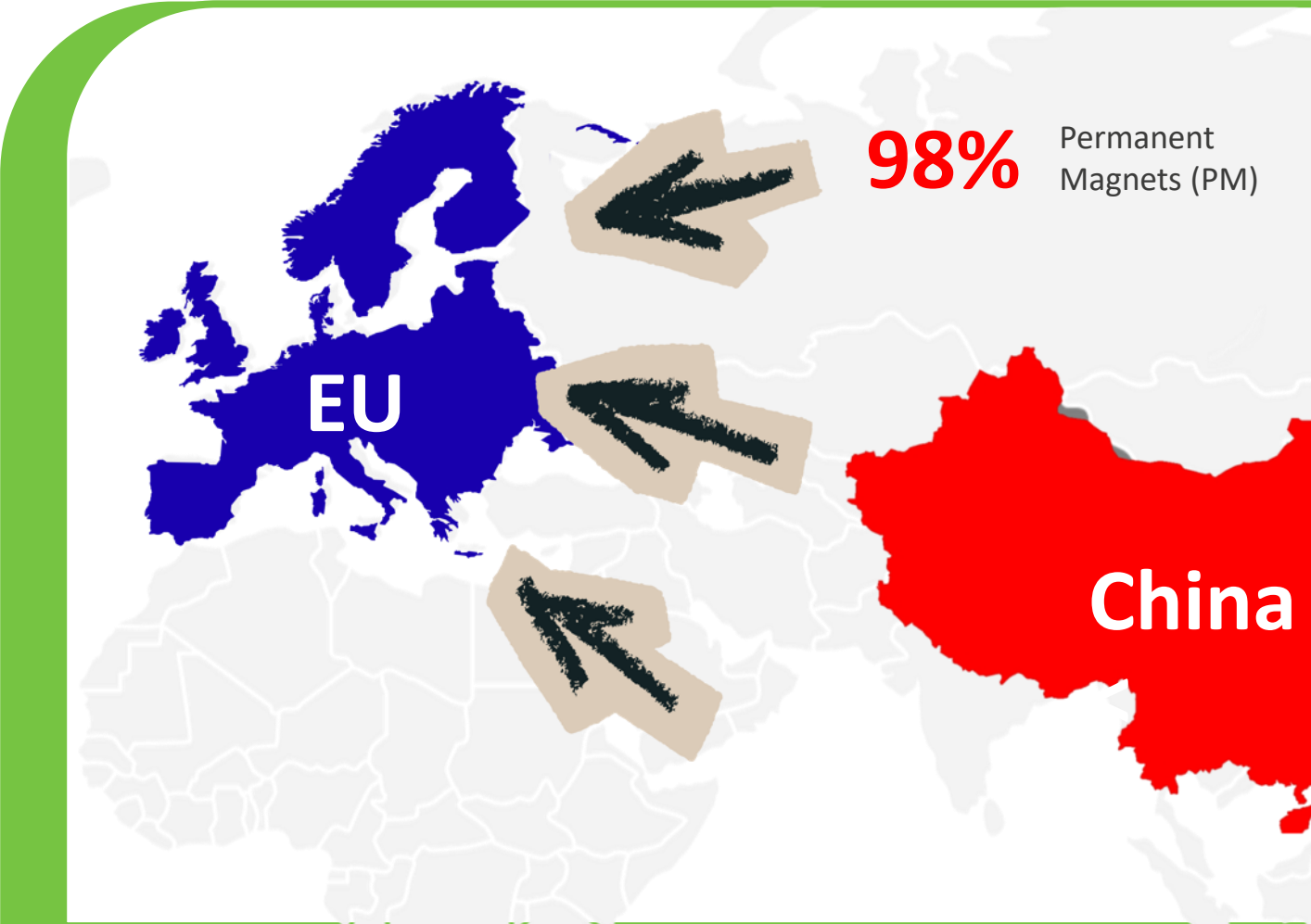
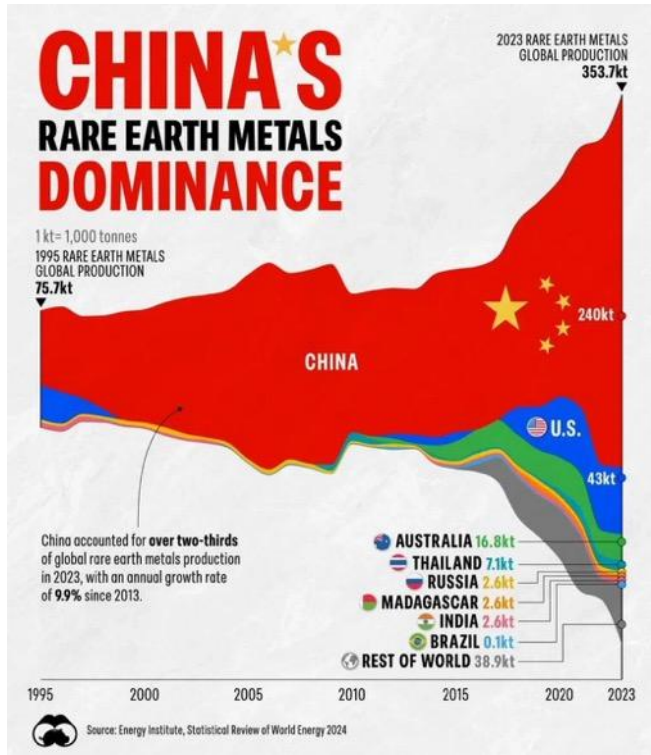


The problem

Strategic dependency from a single and strong source

China controls 98% of PM supply

And is making use of this dominance

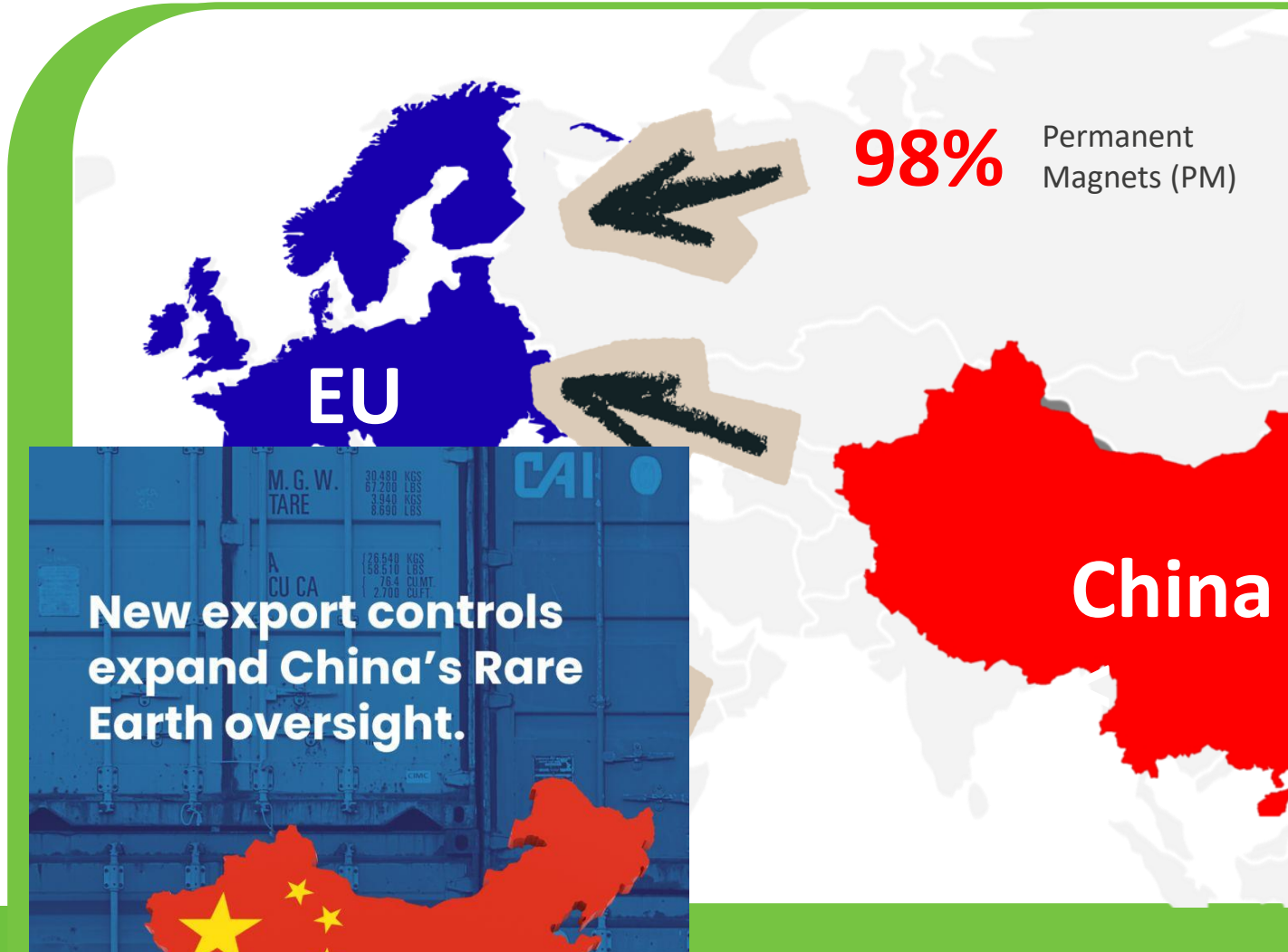
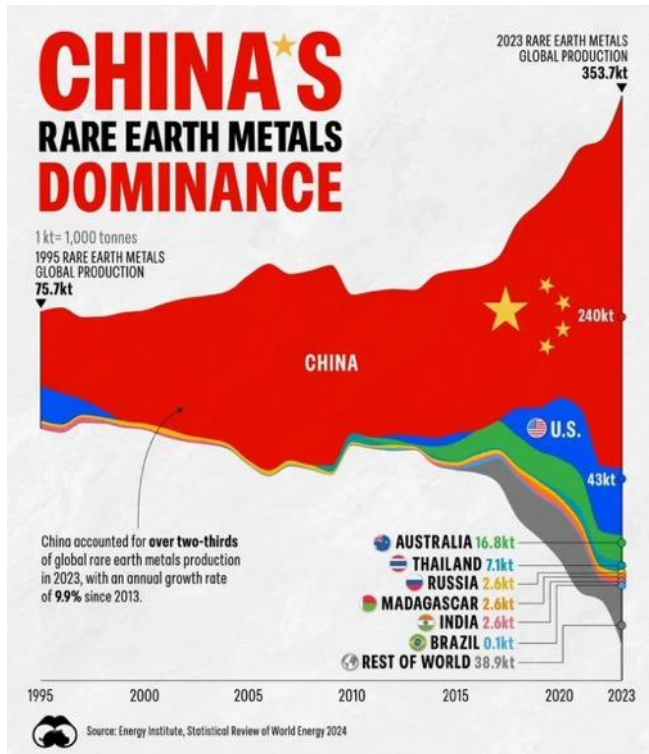


The problem

Strategic dependency from a single and strong source

China controls 98% of PM supply

And is making use of this dominance

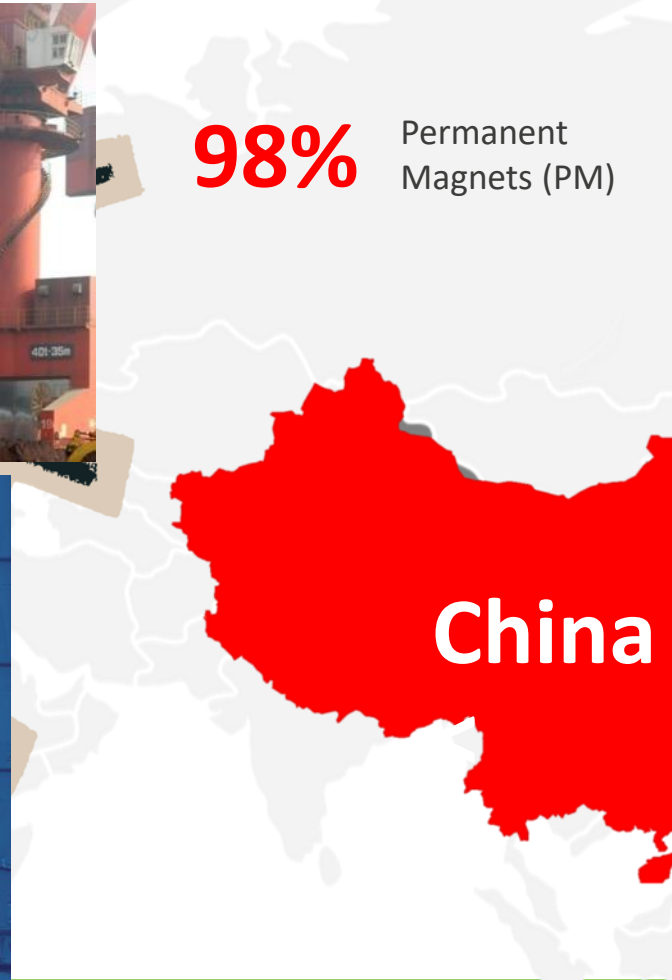
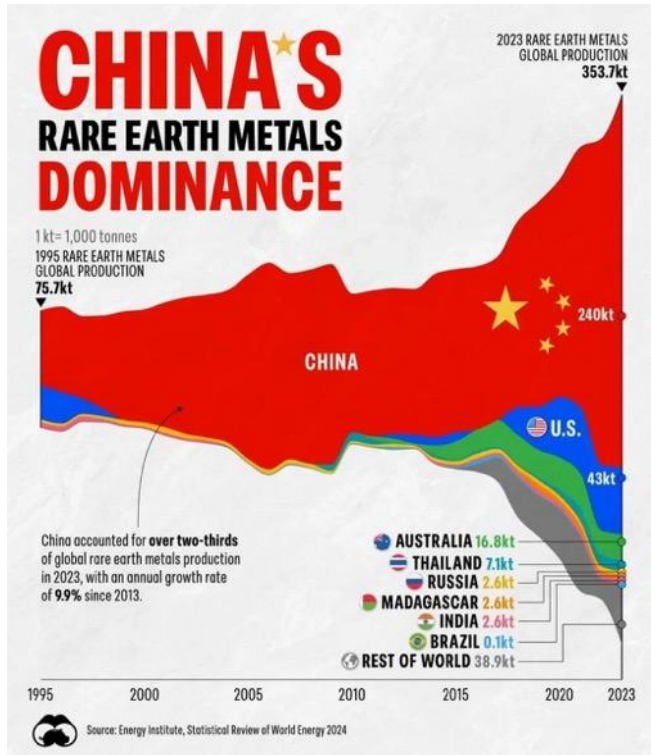


The problem

Strategic dependency from a single and strong source

China controls 98% of PM supply

And is making use of this dominance

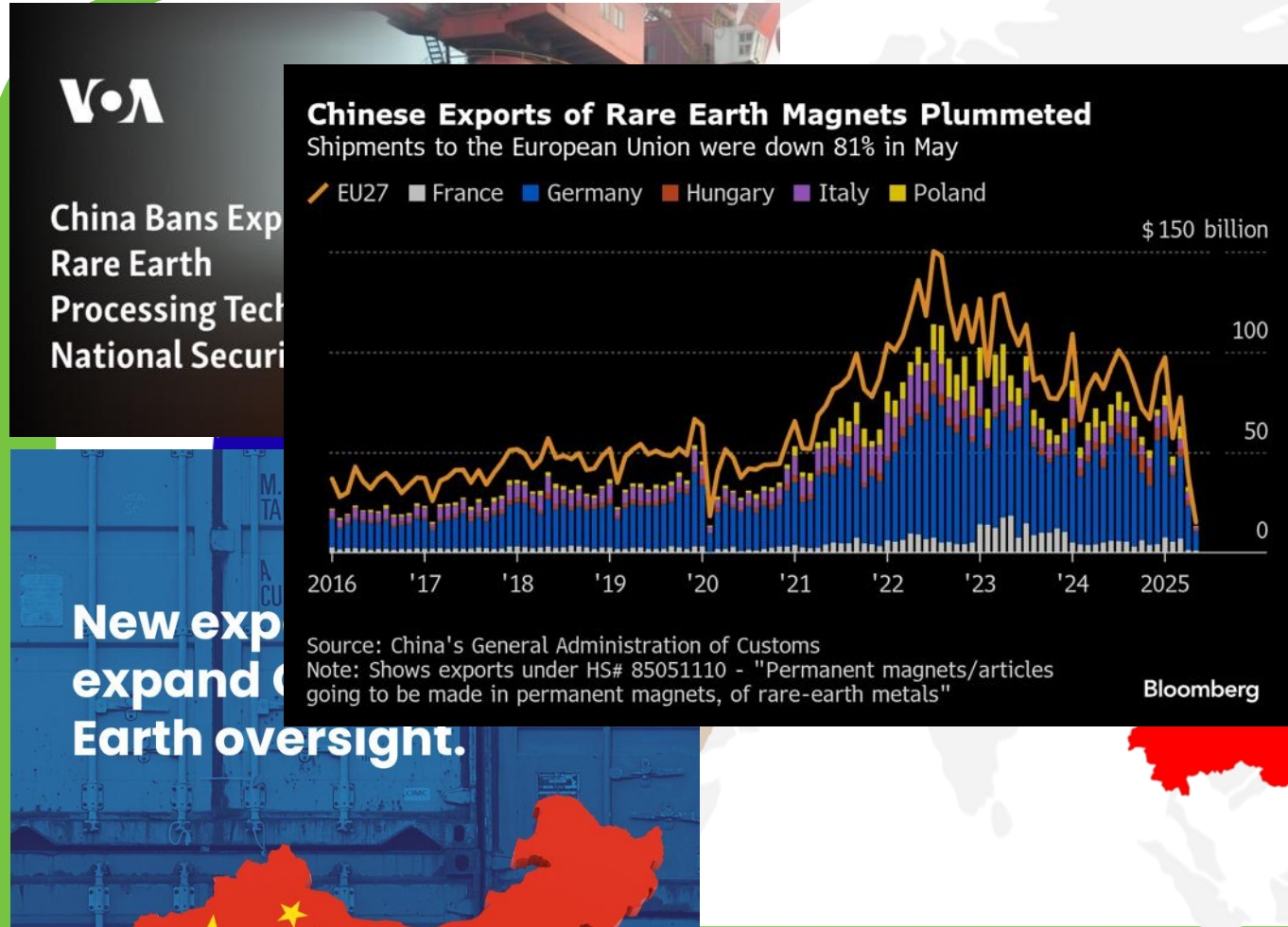
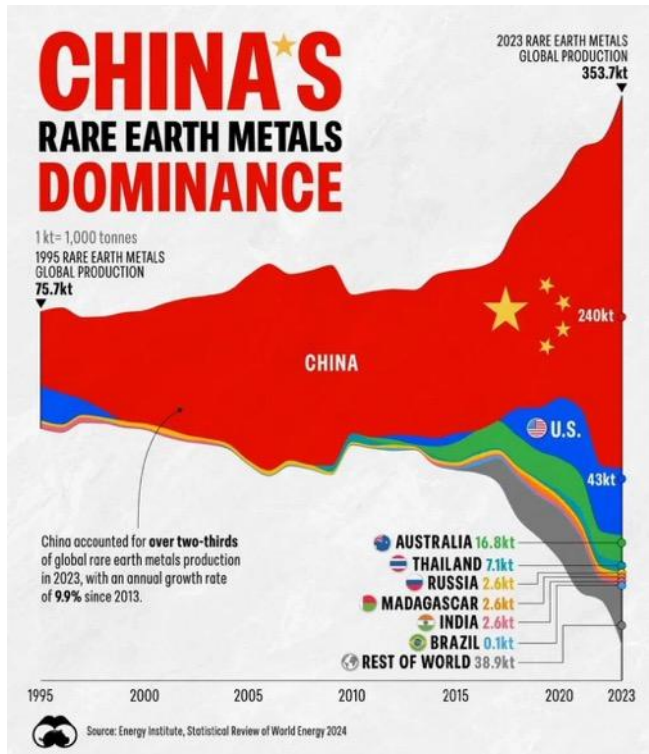


The problem

Strategic dependency from a single and strong source

China controls 98% of PM supply

And is making use of this dominance




China Bans Exports of Rare Earth Processing Technology for National Security

New export controls on rare earth oversight.

The problem

1 1008 H Hydrogen																	2 40026 He Helium																													
3 694 Li Lithium	4 9012 Be Beryllium											5 108 B Boron	6 1201 C Carbon	7 1401 N Nitrogen	8 1600 O Oxygen	9 1899 F Fluorine	10 2018 Ne Neon																													
11 2299 Na Sodium	12 2431 Mg Magnesium											13 2698 Al Aluminum	14 2809 Si Silicon	15 3097 P Phosphorus	16 3207 S Sulfur	17 3545 Cl Chlorine	18 3995 Ar Argon																													
19 3909 K Potassium	20 4008 Ca Calcium	21 4496 Sc Scandium	22 4788 Ti Titanium	23 5094 V Vanadium	24 5200 Cr Chromium	25 5494 Mn Manganese	26 5585 Fe Iron	27 5893 Co Cobalt	28 5871 Ni Nickel	29 6355 Cu Copper	30 6539 Zn Zinc	31 6972 Ga Gallium	32 7264 Ge Germanium	33 7594 As Arsenic	34 7922 Se Selenium	35 8011 Br Bromine	36 8380 Kr Krypton																													
37 8547 Rb Rubidium	38 8762 Sr Strontium	39 8891 Y Yttrium	40 9122 Zr Zirconium	41 9291 Nb Niobium	42 9594 Mo Molybdenum	43 9724 Tc Technetium	44 10107 Ru Ruthenium	45 10137 Rh Rhodium	46 10638 Pd Palladium	47 10787 Ag Silver	48 11241 Cd Cadmium	49 11482 In Indium	50 118710 Sn Tin	51 121757 Sb Antimony	52 127603 Te Tellurium	53 127603 I Iodine	54 131294 Xe Xenon																													
55 13291 Cs Cesium	56 13725 Ba Barium	57 13891 La Lanthanum	72 1784 Hf Hafnium	73 18072 Ta Tantalum	74 18385 W Tungsten	75 18620 Re Rhenium	76 19023 Os Osmium	77 19322 Ir Iridium	78 19619 Pt Platinum	79 19724 Au Gold	80 20059 Hg Mercury	81 20439 Tl Thallium	82 2072 Pb Lead	83 20898 Bi Bismuth	84 20898 Po Polonium	85 2101 At Astatine	86 222 Rn Radon																													
87 22307 Fr Francium	88 22610 Ra Radium	89 22703 Ac Actinium	104 261 Rf Rutherfordium	105 262 Db Dubnium	106 263 Sg Seaborgium	107 264 Bh Bohrium	108 265 Hs Hassium	109 266 Mt Meitnerium	110 267 Ds Darmstadtium	111 268 Rg Roentgenium	112 269 Cn Copernicium	113 270 Nh Nihonium	114 271 Fl Flerovium	115 272 Mc Moscovium	116 273 Lv Livermorium	117 274 Ts Tennessine	118 286 Og Oganesson																													
<table border="1"> <tr> <td>58 14012 Ce Cerium</td> <td>59 14091 Pr Praseodymium</td> <td>60 14190 Nd Neodymium</td> <td>61 14274 Pm Promethium</td> <td>62 14392 Sm Samarium</td> <td>63 14491 Eu Europium</td> <td>64 14725 Gd Gadolinium</td> <td>65 14827 Tb Terbium</td> <td>66 15035 Dy Dysprosium</td> <td>67 15196 Ho Holmium</td> <td>68 15392 Er Erbium</td> <td>69 15725 Tm Thulium</td> <td>70 15893 Yb Ytterbium</td> <td>71 17304 Lu Lutetium</td> </tr> <tr> <td>90 23204 Th Thorium</td> <td>91 23204 Pa Protactinium</td> <td>92 23804 U Uranium</td> <td>93 23704 Np Neptunium</td> <td>94 24404 Pu Plutonium</td> <td>95 24304 Am Americium</td> <td>96 24704 Cm Curium</td> <td>97 24704 Bk Berkelium</td> <td>98 25104 Cf Californium</td> <td>99 25204 Es Einsteinium</td> <td>100 25204 Fm Fermium</td> <td>101 25604 Md Mendelevium</td> <td>102 25604 No Nobelium</td> <td>103 25904 Lr Lawrencium</td> </tr> </table>			58 14012 Ce Cerium	59 14091 Pr Praseodymium	60 14190 Nd Neodymium	61 14274 Pm Promethium	62 14392 Sm Samarium	63 14491 Eu Europium	64 14725 Gd Gadolinium	65 14827 Tb Terbium	66 15035 Dy Dysprosium	67 15196 Ho Holmium	68 15392 Er Erbium	69 15725 Tm Thulium	70 15893 Yb Ytterbium	71 17304 Lu Lutetium	90 23204 Th Thorium	91 23204 Pa Protactinium	92 23804 U Uranium	93 23704 Np Neptunium	94 24404 Pu Plutonium	95 24304 Am Americium	96 24704 Cm Curium	97 24704 Bk Berkelium	98 25104 Cf Californium	99 25204 Es Einsteinium	100 25204 Fm Fermium	101 25604 Md Mendelevium	102 25604 No Nobelium	103 25904 Lr Lawrencium	<table border="1"> <tr> <td>60 14190 Nd Neodymium 144.24</td> </tr> </table>															60 14190 Nd Neodymium 144.24
58 14012 Ce Cerium	59 14091 Pr Praseodymium	60 14190 Nd Neodymium	61 14274 Pm Promethium	62 14392 Sm Samarium	63 14491 Eu Europium	64 14725 Gd Gadolinium	65 14827 Tb Terbium	66 15035 Dy Dysprosium	67 15196 Ho Holmium	68 15392 Er Erbium	69 15725 Tm Thulium	70 15893 Yb Ytterbium	71 17304 Lu Lutetium																																	
90 23204 Th Thorium	91 23204 Pa Protactinium	92 23804 U Uranium	93 23704 Np Neptunium	94 24404 Pu Plutonium	95 24304 Am Americium	96 24704 Cm Curium	97 24704 Bk Berkelium	98 25104 Cf Californium	99 25204 Es Einsteinium	100 25204 Fm Fermium	101 25604 Md Mendelevium	102 25604 No Nobelium	103 25904 Lr Lawrencium																																	
60 14190 Nd Neodymium 144.24																																														

Rare earth elements (REEs) are a group of 17 chemically similar metallic elements (15 lanthanides plus scandium and yttrium) **crucial for high-tech devices**, electric vehicles, and defense systems.


 **Nd-Fe-B magnets**
(Neodymium Iron Boron)

are the strongest type of commercially available permanent magnets, known for exceptional magnetic strength, high coercivity (resistance to demagnetization), and relatively low cost compared to other high-performance magnets.

The problem

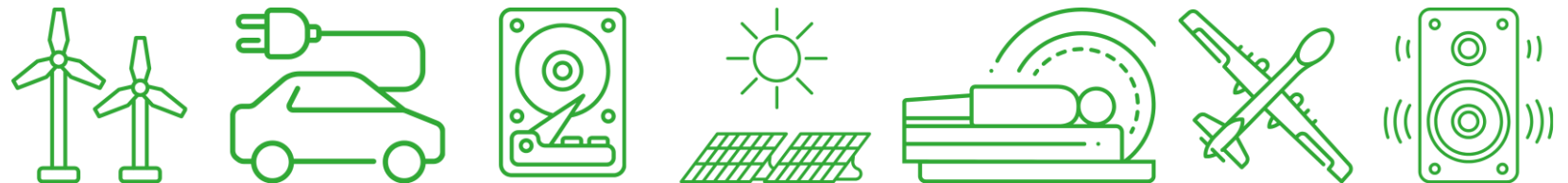
Ce Cerium	Pr Praseodymium	Nd Neodymium	Pm Promethium	Sm Samarium	Eu Europium	Gd Gadolinium	Tb Terbium	Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium
Th Thorium	Pa Protactinium	U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium

60
Nd
Neodymium
144.24



Nd-Fe-B magnets
(Neodymium Iron Boron)

And therefore, they are essential to a wide range of modern technologies, including electric motors, sensors, consumer electronics, renewable energy systems, electric vehicles (EVs), medical devices, and defense applications.



The solution

(or part of it)

Consumption and demand

The European Union (EU) is one of the largest consumers of rare-earth magnets, such as neodymium-iron-boron magnets, due to its focus on clean technologies.

Demand will not decrease.

Research and development

Europe is **investing on R&D into technologies for recycling** and replacing rare earth elements, including neodymium and boron.

Reducing dependency

The EU has launched projects and strategies, such as the *European Raw Materials Alliance (ERMA)*, to secure supply, **diversifying imports**, and strengthening the **circular economy**.

Policy initiatives and regulation

The EU has strict regulations on mining and environmental impact, which makes it difficult to extract rare earths locally but **encourages recycling** and efficient use of these materials.

The solution

(or part of it)

Consumption and demand

The European Union (EU) is one of the largest consumers of rare-earth magnets, such as neodymium-iron-boron magnets, due to its focus on clean technologies.

Demand will not decrease.

Research and development

Europe is **investing on R&D into technologies for recycling** and replacing rare earth elements, including neodymium and boron.

Reducing dependency

The EU has launched projects and strategies, such as the *European Raw Materials Alliance (ERMA)*, to secure supply, **diversifying imports**, and strengthening the **circular economy**.

Policy initiatives and regulation

The EU has strict regulations on mining and environmental impact, which makes it difficult to extract rare earths locally but **encourages recycling** and efficient use of these materials.

But this is not an easy task... **How do we do it?**

What

is

SICAPERMA?

The project

SICAPERMA aims to

establish Europe's first fully integrated circular value chain for recycled permanent magnets (Nd-Fe-B).

The project specifically focuses on empowering Less Developed Regions (LDRs) in Europe to become leaders in this high-tech field, reducing the EU's dependence on China for these critical materials.



First fully integrated circular value chain for recycled permanent magnets.

Scaling up technological maturity from TRL 7 to 9. Industrial-scale market deployment.



Interregional Resilience: Unlocking the "hidden" technological capabilities of less developed regions to strengthen European autonomy.

SICAPERMA INTERREGIONAL VALUE PROPOSITION



14 PARTNERS

7 COUNTRIES

- Spain
- France
- Romania
- Slovenia
- Slovakia
- Austria
- Croatia

PROJECT PHASES

Three pilots to close the loop

3 Industrial Pilots



3 Industrial Pilots



Pilot 1

Demonstrating Multi-Stream
Permanent Magnet (PM)
Dismantling & Processing
Tech



3 Industrial Pilots



Pilot 1

Demonstrating Multi-Stream
Permanent Magnet (PM)
Dismantling & Processing
Tech



Pilot 2

Demonstrating Innovative
Sintered and Bonded PM
Production from Recycled
materials



3 Industrial Pilots



Pilot 1

Demonstrating Multi-Stream
Permanent Magnet (PM)
Dismantling & Processing
Tech



Pilot 2

Demonstrating Innovative
Sintered and Bonded PM
Production from Recycled
materials

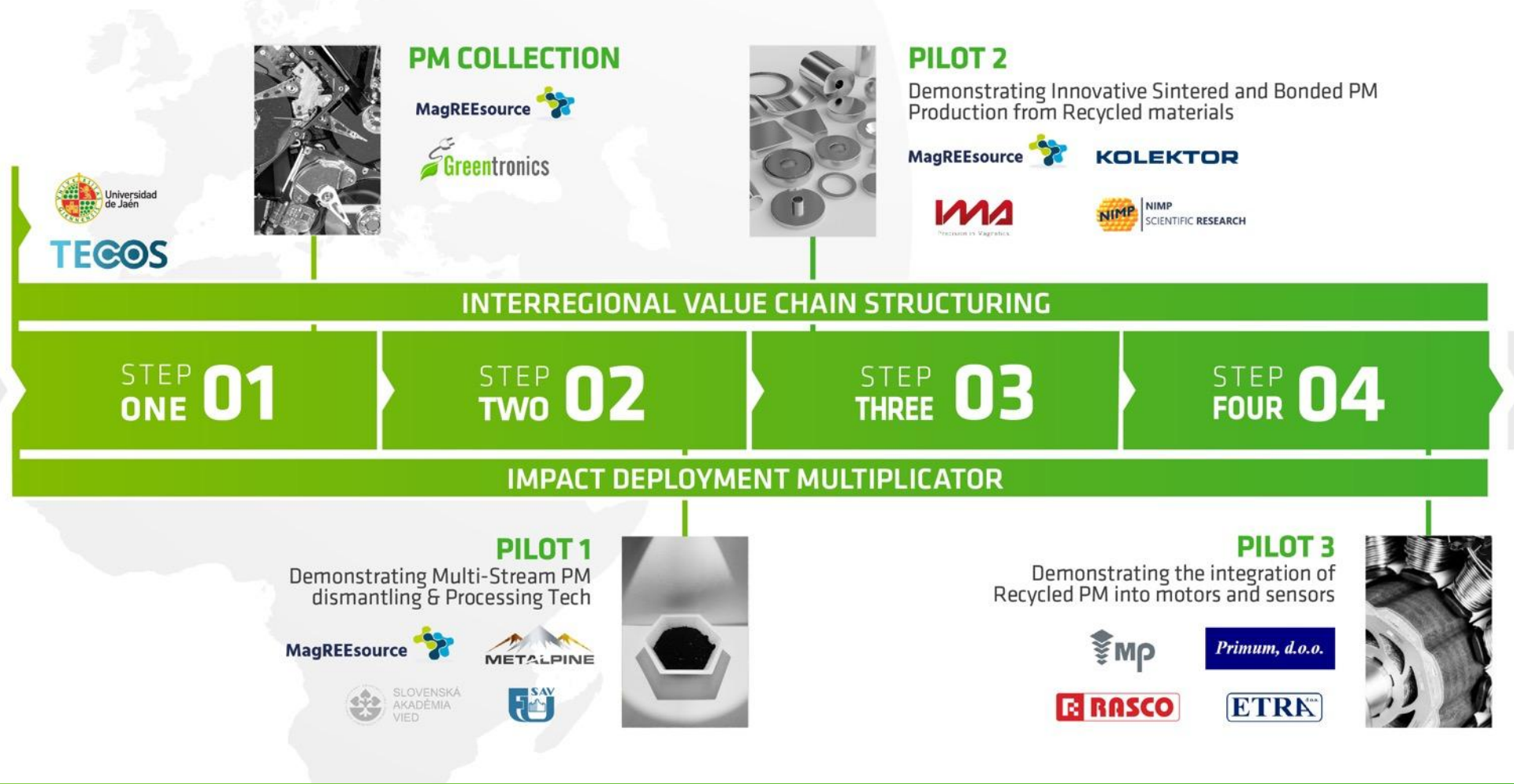


Pilot 3

Demonstrating the
integration of Recycled PM
into motors and sensors

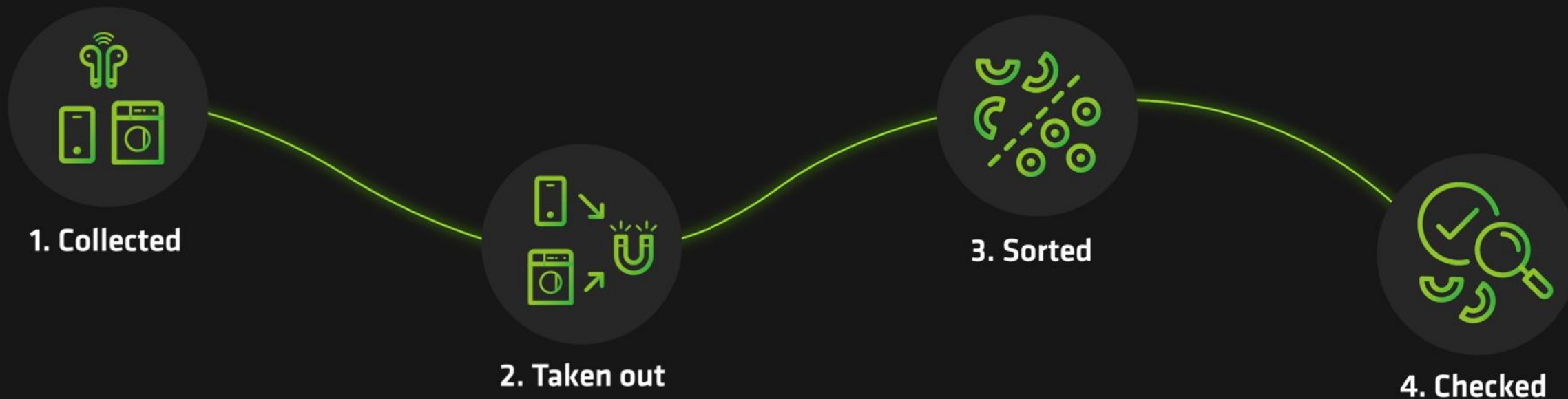
SICAPERMA VALUE CHAIN

SICAPERMA offers the first specialisation area where Less Developed Regions can become the leaders in EU Resilience: Nd-Fe-B Recycling Technologies



Step 01

Collection, Dismantling & Sorting



Step 01

Dismantling & Sorting

Two main collection sources

MagREsource 

 Greentronics



 **Small Household Appliances,
Electrical and Electronic Tools
& Air Conditioning**



Hard Disc Drives (HDDs)



Step 01 Dismantling & Sorting

Some challenges



50 kg
of PM

Step 01

Dismantling & Sorting

Some challenges



As there is sensitive data in HDDs, they use to be shredded leaving valuable components out of the loop.

It is important to establish secure lines to recover PM with HDD owners.

Step 01

Dismantling & Sorting

Future perspectives

70.000
tons of PM

from decommissioned
European wind turbines



Step 02 Processing



IMA

MagREEsources

NIMP

KOLEKTOR

METALPINE

SAV

Step 03

Manufacturing routes for recycled magnets

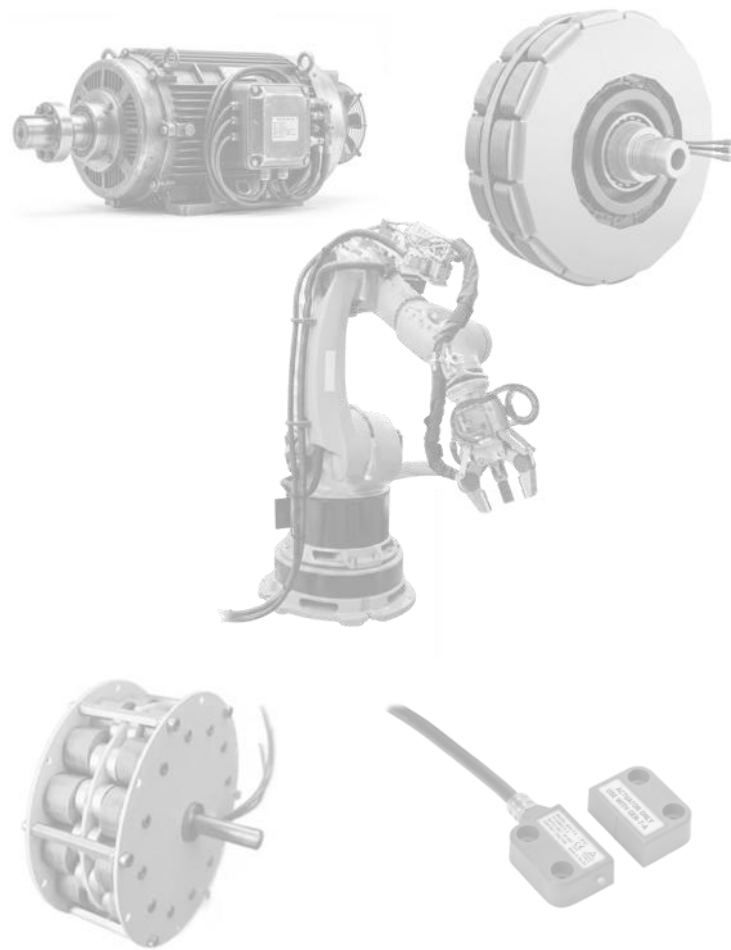


Sintered magnets

Bonded magnets



Step 04 Integration



 **MP**
Primum, d.o.o.
ETRA
RASCO

MagREEsources 

UNIVERSIDAD DE JAÉN

& Analysis

Committee
of **investors**

Review of
legislation

Demos

Recycling
strategy

Regional
hubs

Interregional **Impact** Deployment & **Value Chain** Structuring

Business
investment
plan

Capacity-
building

Exploitation
sessions

Portfolio

Market
asesment

Risk **capital**
funds

Clustering

Policy
recommendations

TECOS

MagREEsources 



UNIVERSIDAD DE JAÉN



Thank you for your attention!

Follow us on

www.sicaperma.eu



Project ID: 101160837 | CALL: I3-2023-INV2A

ICAPERMA

Sustainable Innovation
Investment Catapult
for Permanent Magnets



Universidad de Jaén



NIMP
SCIENTIFIC RESEARCH



Precision in Magnetics

MagREEsources



enprojects

KOLEKTOR



SLOVAK
ACADEMY OF
SCIENCES



Primum, d.o.o.



TECOS



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Innovation Council and SMEs Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.



Co-funded by
the European Union