KU LEUVEN

Metals for Clean Energy

SOLVING EUROPE'S RAW MATERIALS CHALLENGE

Presentation by Chris Heron

Eurometaux

NFWire Forum, 20 September 2023

A presentation in three parts

1. Defining Europe's raw materials challenge
2. Brand new information on where we are today in meeting the raw materials challenge
3. Three key steps the EU must take to make sure we reach our Green Deal goals together in 2030

The energy transition is a commodities transition

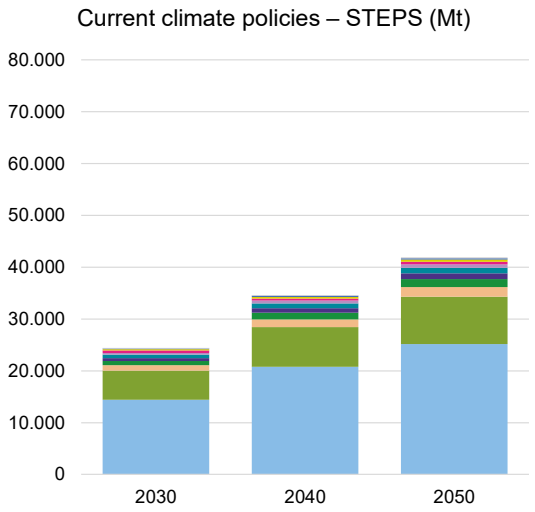
Fact

The faster the world decarbonises, the higher its metals requirements

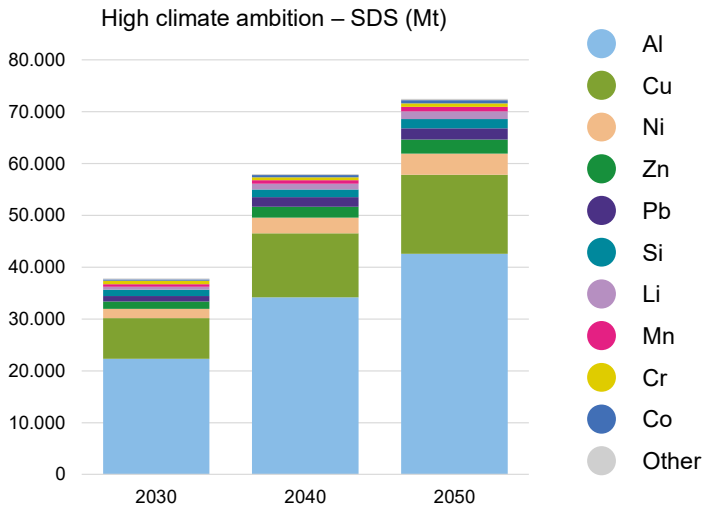
Question

By how much?

Total metal demand by commodity in a STEPS and SDS scenario respectively (Mt)



2050 Metals demand **Current climate policy** | **45 Mt**



2050 Metals demand **Ambitious climate policy** | **75 Mt**

Europe's energy transition = Massive increase in metals demand by 2050

Base metals

Top transition uses

EVs · Solar · Electricity networks

Al	Aluminium	+33%
Cu	Copper	+35%
Si	Silicon	+50%

+ Zinc

Battery materials

Top transition uses

EVs · Battery storage

Ni	Nickel	+103%
Co	Cobalt	+331%
Li	Lithium	+3,500%

+ Manganese & Graphite

Rare earths

Top transition uses

EVs · Wind

Pr	Praseodymium	+587%
Dy	Dysprosium	+827%
Nd	Neodymium	+2,666%

Challenge 1

How can we overcome
the ever-growing gap between
metals demand and supply
in the next 15 years?

Electricity networks EVs Solar Battery storage Wind

Copper

39 Mt global demand in 2040*
(+ 53% from today)

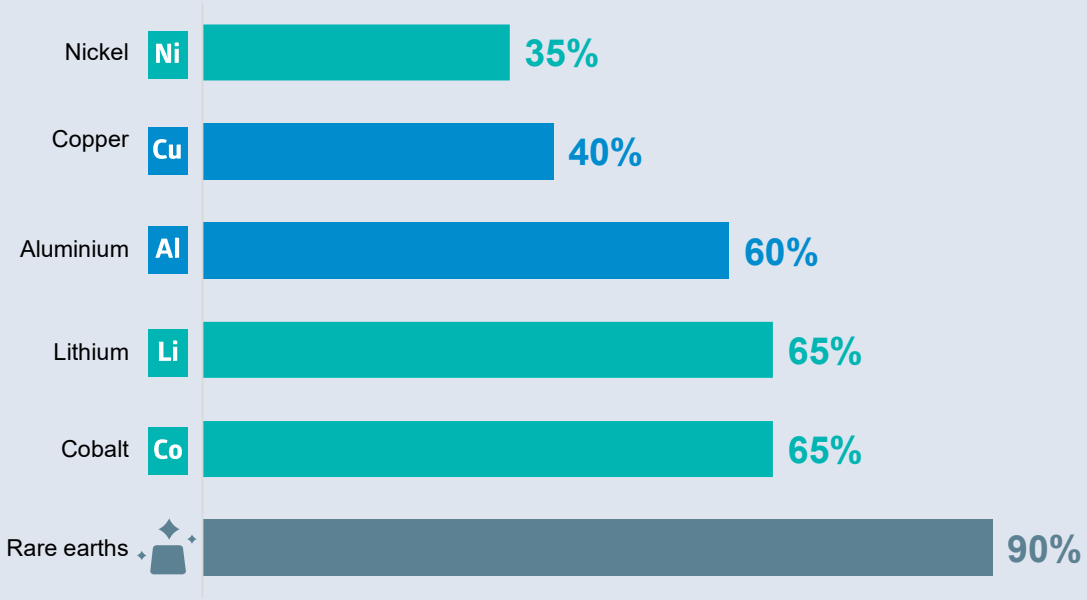
Up to **36%**
Shortfall
(5-14 Mt supply gap)

*Source: Bloomberg New Energy Finance, 2022

Challenge 2

How can we avoid filling Europe's demand gap only with imports from unsustainable single suppliers?

China's share of global processing



+ Control of:

- 15 out of 17 DRC cobalt mines
- Majority of Indonesian nickel
- Growing South American lithium assets

Five necessary pillars for Europe's metals & clean energy bridge

STARTING POINT

NOW

- Acceleration of clean energy transition
- Aim to improve strategic autonomy for energy

STRONGEST IMPACT: NOW → 2040

2035 ONWARDS

END POINT

2050

- Clean energy system with higher level of strategic autonomy & right level of sustainability

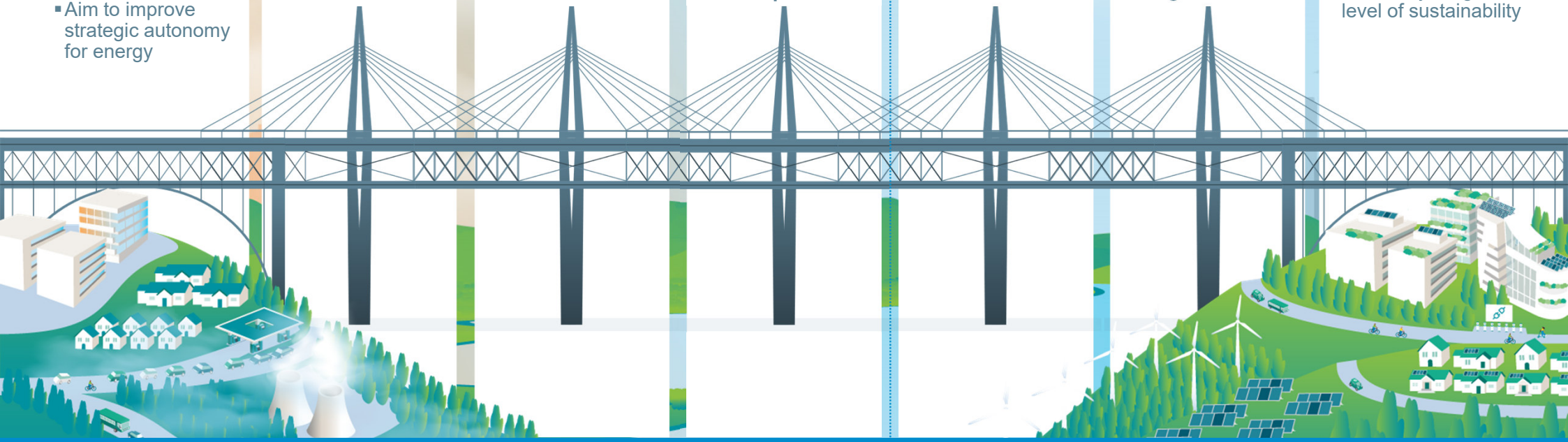
PILLAR 1
Fulfil domestic mining potential

PILLAR 2
Maintain and increase domestic refining output

PILLAR 3
Secure sustainable imports from reliable partners

PILLAR 4
Maximise recycling, including new streams

PILLAR 5
Drive technological & behavioural change



EU Critical Raw Materials Act: 2030 targets for building this bridge

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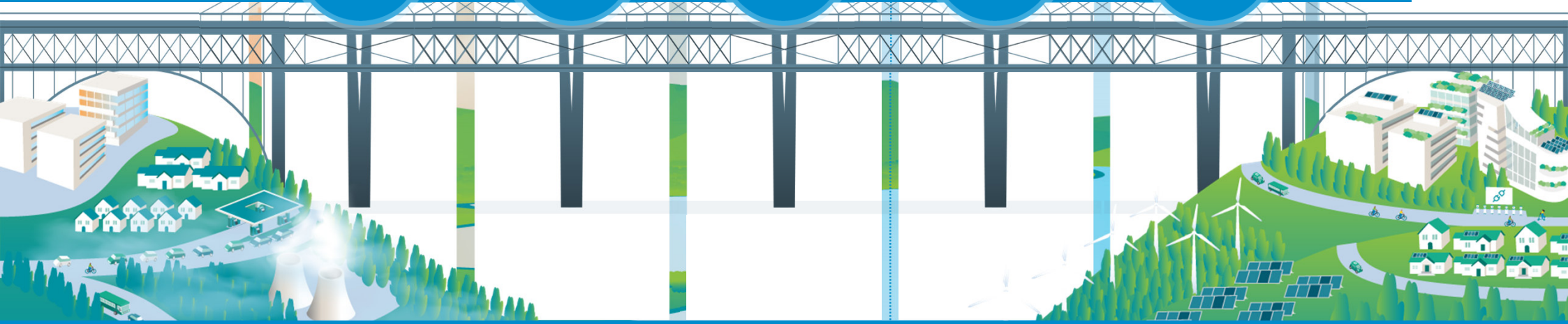
EU 2030 BENCHMARKS:

- **>10%** from domestic
- **>40%** from domestic
- **<65%** Single source
- **>15%** of EU demand
- **Stronger innovation focus**



The burning question for our work ahead

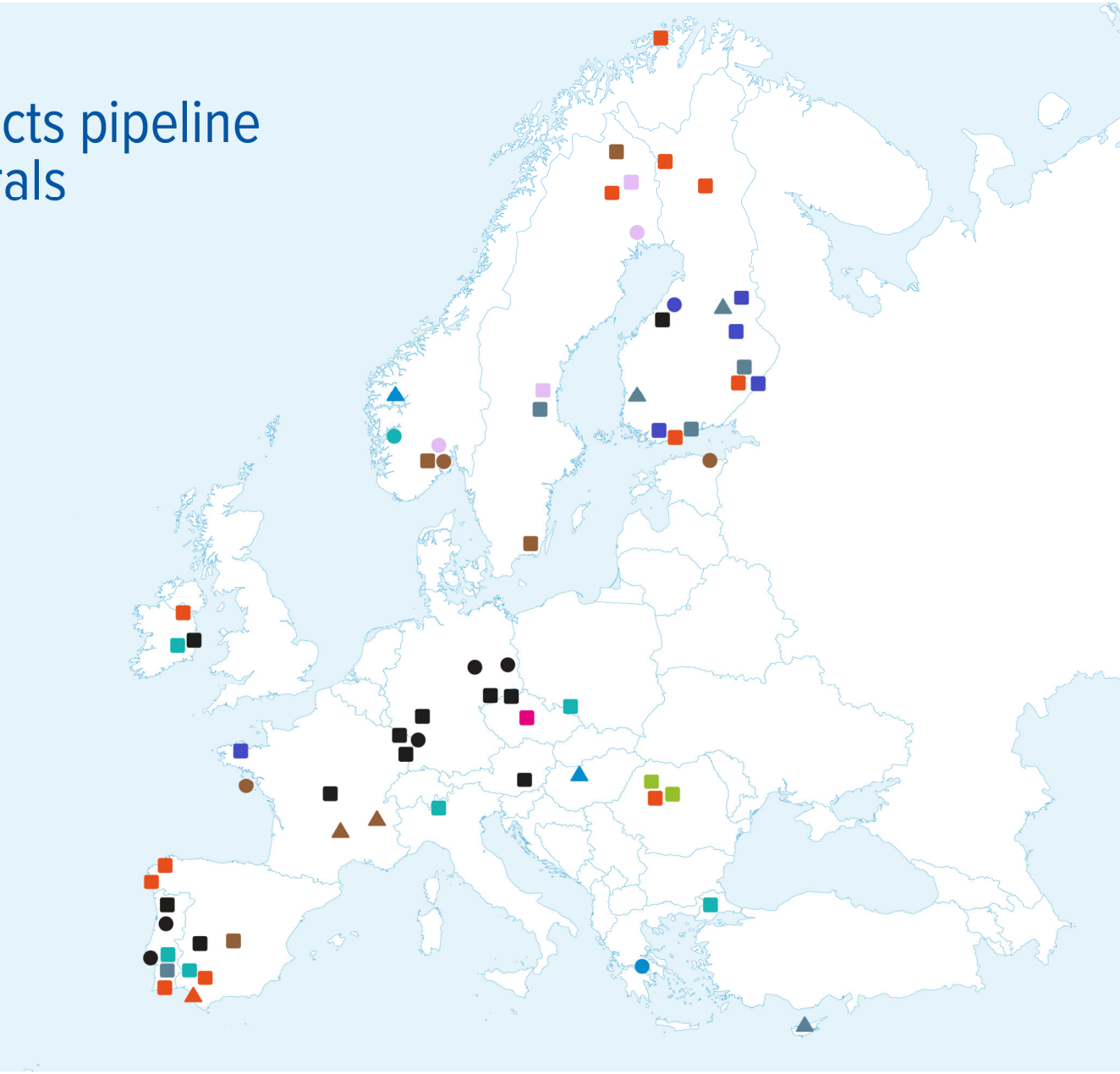
To what extent is Europe on track in meeting these four 2030 benchmarks?

Europe's 2030 potential projects pipeline for strategic metals and minerals

- Aluminium
- Copper
- Nickel
- Zinc
- Cobalt
- Lithium
- Rare Earths
- Manganese
- Graphite
- Magnesium

- Mines
- Processing
- Recycling

Note: Electric Vehicle battery recycling projects not included on map, but the main recycling source for lithium, cobalt, nickel, manganese etc.



Europe’s 2030 potential is there, but what’s the current forecast?

Base metals

Copper, Aluminium, Zinc, Silicon

Overcast

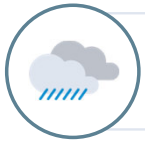
Key battery materials

Nickel, Lithium, Cobalt

Rain with a little sunshine

Other key materials

Graphite, Rare earths, Manganese



Heavy rain ahead

And we all know the energy crisis has brought major **thunderstorms for everyone**

1

Base Metals: Existing EU capacity mostly already exceeds 2030 benchmarks

	Production Goals			Diversification goals	
2030 EU SUPPLY PROJECTIONS	**MINING**	**PROCESSING**	**RECYCLING**	**MINING (TOP IMPORTER)**	**PROCESSING (TOP IMPORTER)**
Cu Copper	35-40%	85%	55%	20%	20%
Zn Zinc	30-50%	100%	40%	20%	-
Al Aluminium	3%	43%	45%	65% (Guinea)	20%
Si Silicon		73%	4%		40%

1

But the energy crisis has brought existential storms

50%

EU aluminium & zinc capacity offline in 2023

+

30%

EU silicon capacity offline in 2023

→

Priority question

Can Europe afford to deindustrialise further?

2

Key battery metals: 2030 benchmarks are mostly achievable *if* uncertain projects are taken forward by latest 2025

2030 EU SUPPLY POTENTIAL	MINING	PROCESSING	RECYCLING	1ST SUPPLIER MINING	1ST SUPPLIER PROCESSING
Ni Nickel	Up to 22%	Up to 50%	15%	50%	30%
Li Lithium	0-39%	Up to 54%	10%	-	55%
Co Cobalt	Up to 7%	Up to 40%	15%	75% (DRC)	20%

3

Other key raw materials: Europe off track today for meeting 2030 benchmarks

2030 EU SUPPLY PROJECTIONS	MINING	PROCESSING	RECYCLING	1ST SUPPLIER MINING	1ST SUPPLIER PROCESSING
Mg Manganese	0-20%	0-20%	10%	-	-
Graphite	0-20%	0-20%	<5%	**100%** (China)	**100%** (China)
Rare earths	0-20%	0-20%	0%	**100%** (China)	**100%** (China)
Mn Magnesium	0-20%	0-20%	15%	**100%** (China)	**100%** (China)

Whatever the forecast, Europe's raw materials bridge must be built

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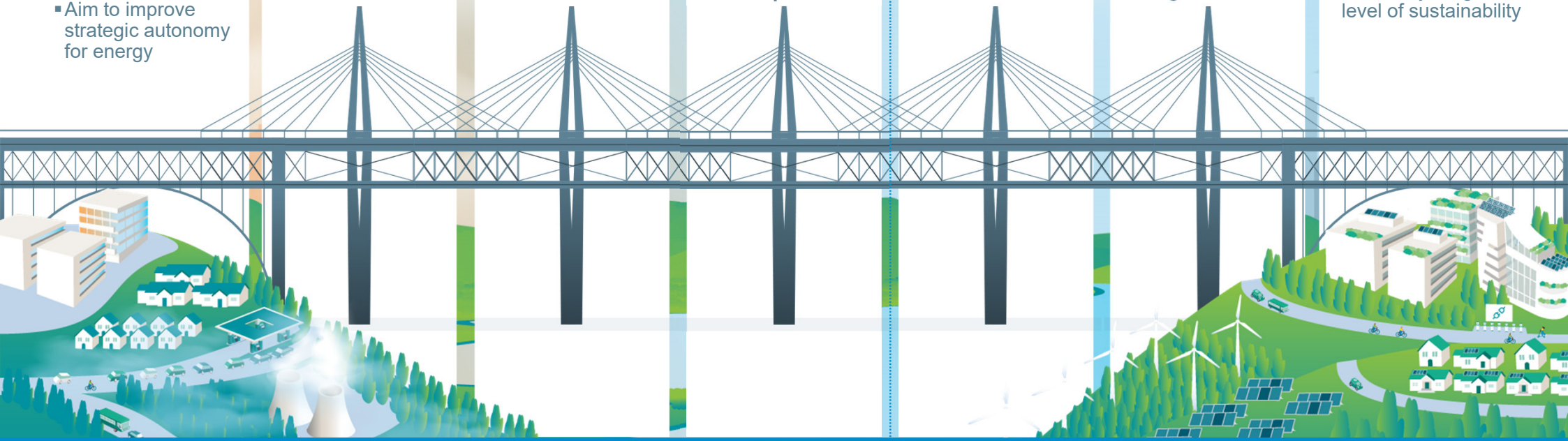

How can we create the strong foundation for a lasting raw materials bridge?

OPERATIONAL COMPETIVENESS

Action to address high EU capital / operating costs

EU-level Critical Mineral Fund, inspired by IRA's clarity and simplicity *(+ energy costs!)*

PERMITS THAT WORK FOR ALL

Effective streamlining to fix today's 10 year project delays

Accelerated permitting timelines while keeping environmental checks

EU: A STRONGER GLOBAL PLAYER

A stronger global agenda, securing supplies while keeping level playing field

Valid EU alternative to China "resources at all costs" model + action on global distortions

Read more!

www.eurometaux.eu/metalscleanenergy

Metals for Clean Energy:

Pathways to solving Europe's raw materials challenge

POLICYMAKER SUMMARY