



WEEE Marl! Opportunity Site-plan - 1:5000

This document shows the projected economical opportunities related to the strategy proposed. Following the briefing's directions, opportunity sectors are developed based on Marl preexisting industrial infrastructure. Canals, railways and motorways make Marl, and specially the chosen site, an interesting spot to develop new economical tendencies, now that the coal-mine is about to cease its activity. The site plan reveals investment opportunities for private and public sectors linked to the projected impact on the market. This aspect is to be understood in three scales, international market, national market and local market, trying to solve Marl's coming situation with a complex network in which a wide range of agents may benefit from a symbiotic and sustainable strategy.

Fig.81. China's production of Raw materials identified by the European Commission as being critical because risks of supply shortage on their impacts on the economy

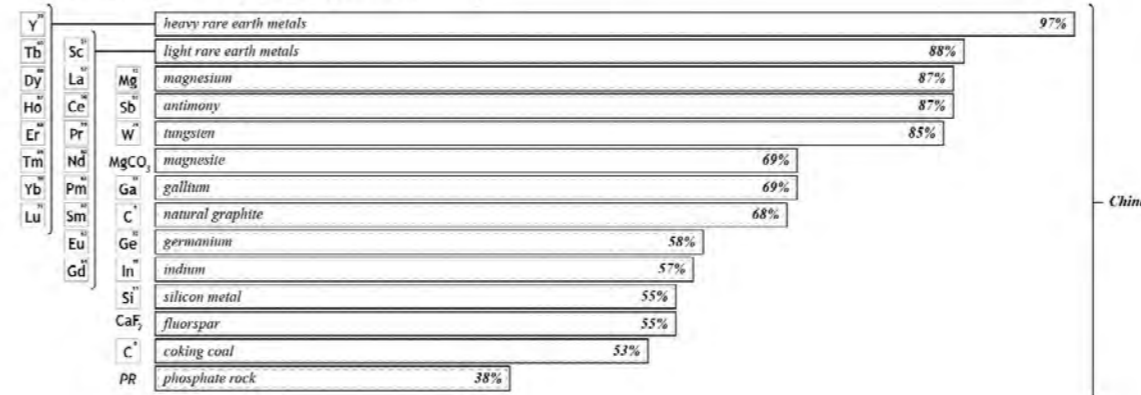


Fig.82. 20 group of raw materials identified by the European Commission and its principal industrial and commercial applications

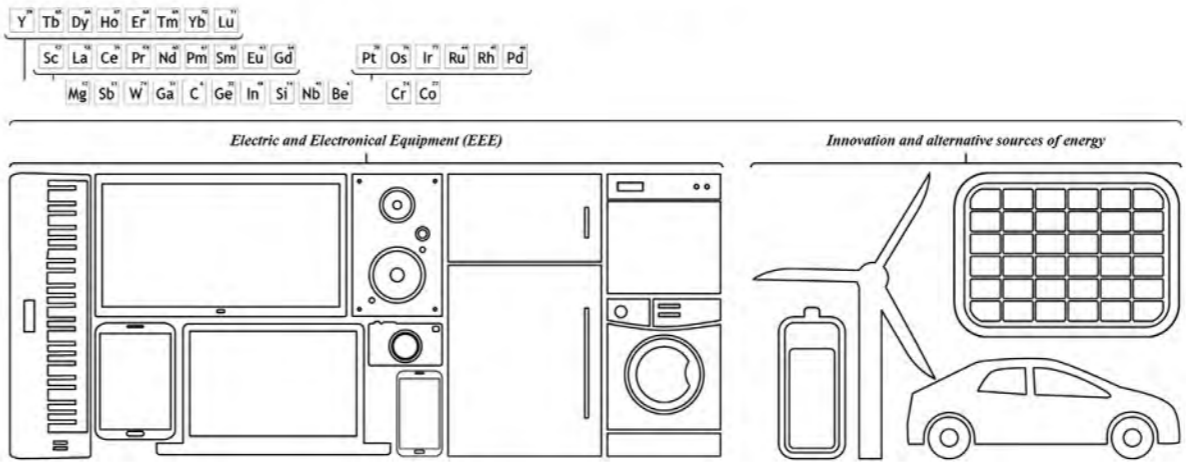


Fig.83. World consumption of EEE (Electronics and Electrical Equipment), with the total amount per country, and the average money spent per inhabitant

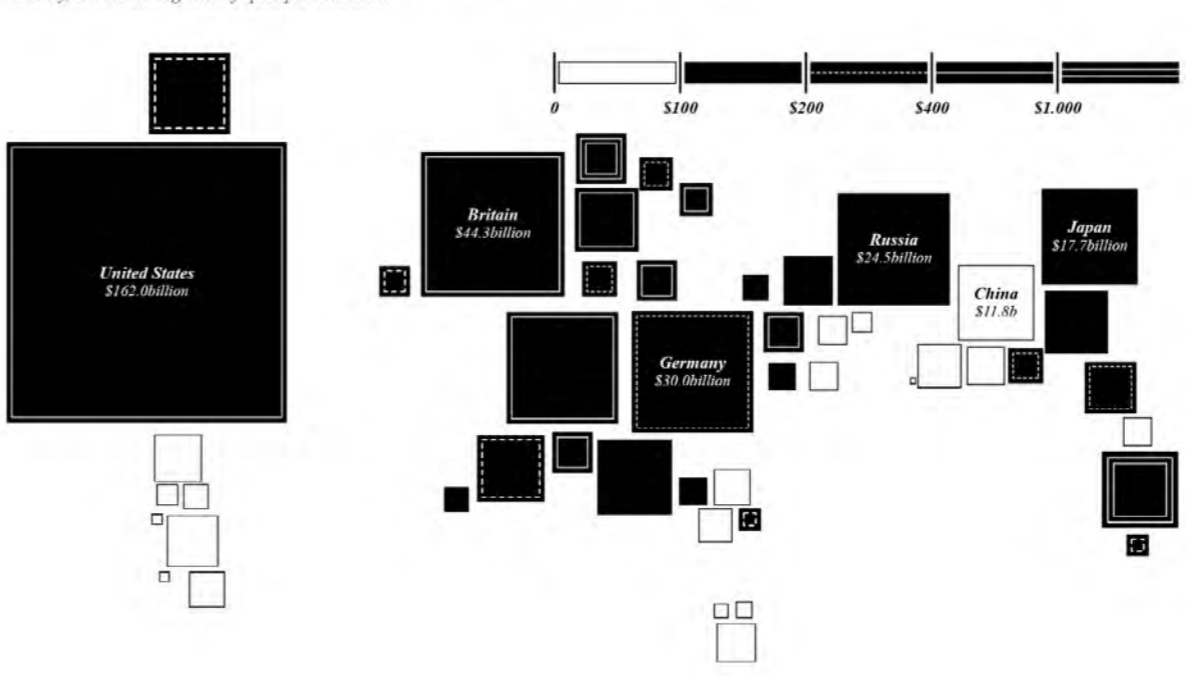


Fig.84. World flow of EEEE (Electronics and Electrical Equipment) and WEEE (Waste of Electronic and Electrical Equipment)

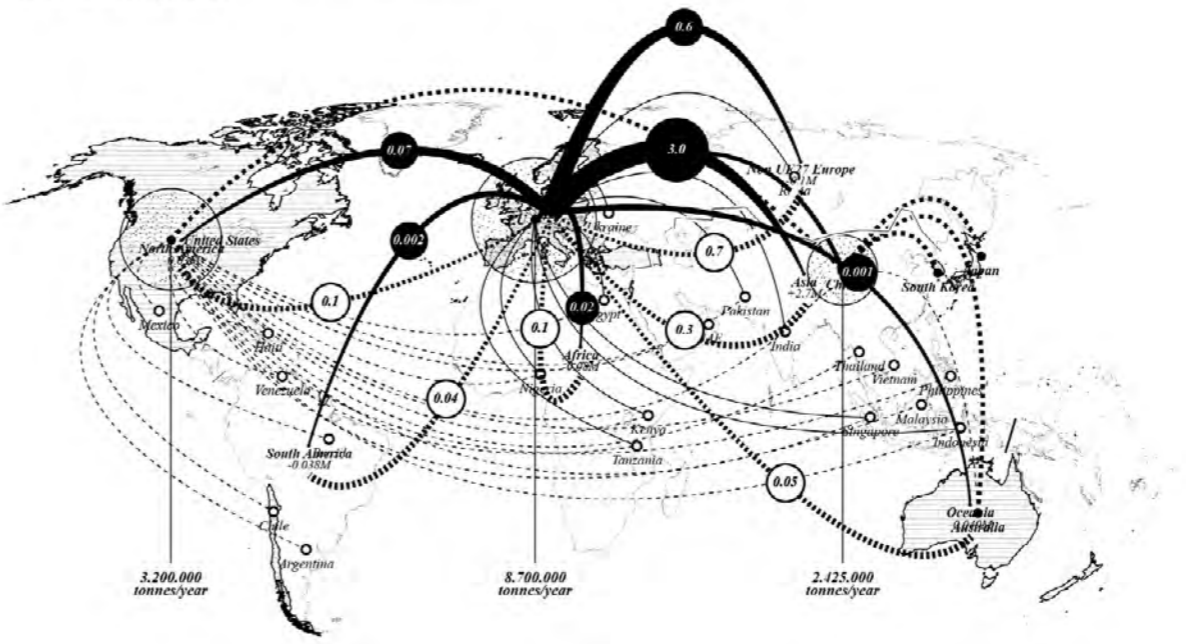


Fig.85. Planned obsolescence diagram: evolution of the life of different EEE devices during the last 40 years



Fig.86. Total amount of e-waste generated during the last year, subdivided in the different categories in which WEEE is classified. Evolution of the WEEE treatment industry during the last 12 years



Fig.87. Recycle percentual rate of the members of the European Union (EU27)

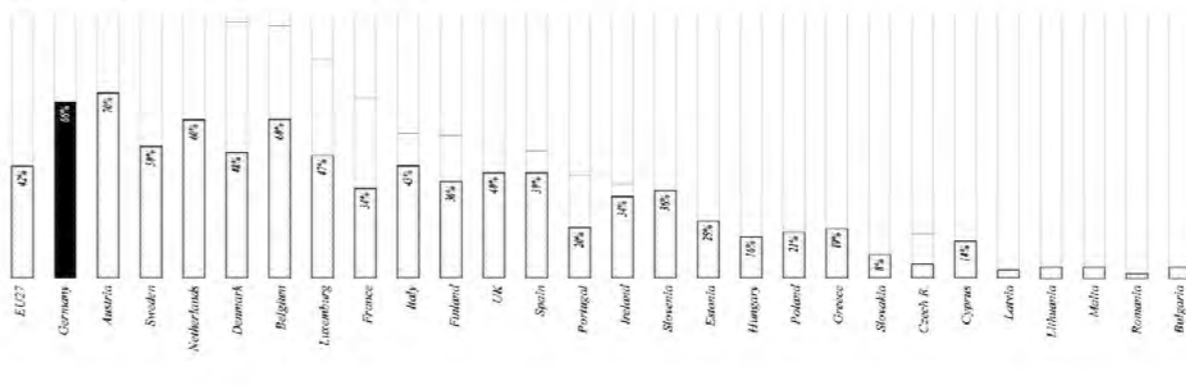


Fig.88. Comparative analysis and data between China (top producer of EEE and Rare Earth Metals) and Germany (one of the top importers of Rare Earth Metals and leader in the new technology sector)



Fig.89. Marl's strategic position, thanks to the pre-existent industrial connections by train, motorway and canals



Critical raw materials, technology metals and its geopolitical relevance

Contemporary mining categorizes certain materials as "specially relevant" due to the relation between its resource shortage and its high demand. Nowadays most of them are Rare Earth materials. Its worldwide demand has increased vastly from 1.000 to 150.000 tons a year in the period between 1953 and 2012. China is currently the main producer with over 37% of the natural deposits and 97% of the global production. Most of the extraction companies are settled there. European countries are forced to import 100% of its Rare Earth needs, although part of the most important sectors in actual occidental economy require high amounts for its production processes.

What are they used for?

Rare Earth materials are the key elements in the production of Electronic and Electrical Equipment (EEE). This is a very common type of product in lots of sectors, mainly in electronics, batteries and renewable energy devices. Day to day appliances need these materials to be produced, although the amount is proportionally very small compared to the rest of the components, they are essential. So we may consider to be constantly surrounded by Rare Earth. Smartphones, tablets, LCD-screens, music equipment, refrigerators or laptops are some of them. But these are not the only devices which require electronic metals. Rare Earth materials are again key elements to the production of many products dealing with green energies, such as wind turbines, solar panels or electric car-motors. Only one of these motors needs 10 to 15 tons of Lanthanum. Ironically, the extraction of Rare Earth materials may be highly pollutant if done without extreme care.

World consumption of electronic and electrical equipment

Europe, USA and Japan are the biggest Electronic and Electrical Equipment (EEE) consumers worldwide. Consumption rates increase every year and the economic sector is considered as one of the most thriving. Although many developers are also situated in the western world, China is the main producer of manufactured appliances. Due to their working conditions chinese production companies are now the most competitive, nearly in every sector. Planned obsolescence and the speed of technological development shorten vastly the appliances service life, rising society's needs to substitute their obsolete devices. This process obviously generates an enormous amount of waste called WEEE - Waste Electrical and Electronic Equipment. WEEE will increase in the coming decades with an expected rate of a least 4% per year, about three times higher than the growth of the average municipal waste. Much of WEEE is exported to Africa, China and India to be disassembled under inadequate working conditions, compromising also the environment. The Organisation for Economic Co-operation and Development (OECD) has therefore banned their members to export Waste Electronic and Electrical Equipment to these countries, trying to minimize the damage caused by their malpractices. China and India are anyway allowed to buy these elements in the second hand market, as their are still supposed to be reusable. More than 78% of European Waste Electrical and Electronic Equipment is currently land filled or incinerated, meaning tons of highly valuable material is being squandered.

Recycling economics and urban mining

Recycling is mainly about sustainability, but also about economy. It is the worlds second largest employer in the world after agriculture and one of the less exploited sectors in economy. Properly treated waste in Europe could save about 72.000 million Euros to its members and the creation of over 400.000 workstations according to recent studies carried out by the European Commission. If their strategy succeeds about 2.4 million workstations could be created in the coming decades. A business valued in about 187.000 million Euros. Nowadays about 40 million tons of WEEE are generated per year worldwide. Only 10% are recycled. In Europe, the amount of WEEE generated is 12 million ton per year, of which 2.2 ton is treated (about 18%). WEEE contains large quantities of recoverable metals such as steel, stainless steel, aluminum, copper, brass, zinc, gold, silver and Rare Earth materials. The prices of these materials are expected to increase by 15% annually due to increased demand, quotas, supply shortages and China's production monopoly. Traditional mining is becoming harder every day making prices grow over the demand's limits. Recycling certain type of elements is now much more cost-effective than mining. A ton of soil containing gold extracted from a gold-mine holds considerably less gold than a ton of smartphones. Cities and their citizens contain more extractable raw material than natural resources. This new tendency is called urban mining.

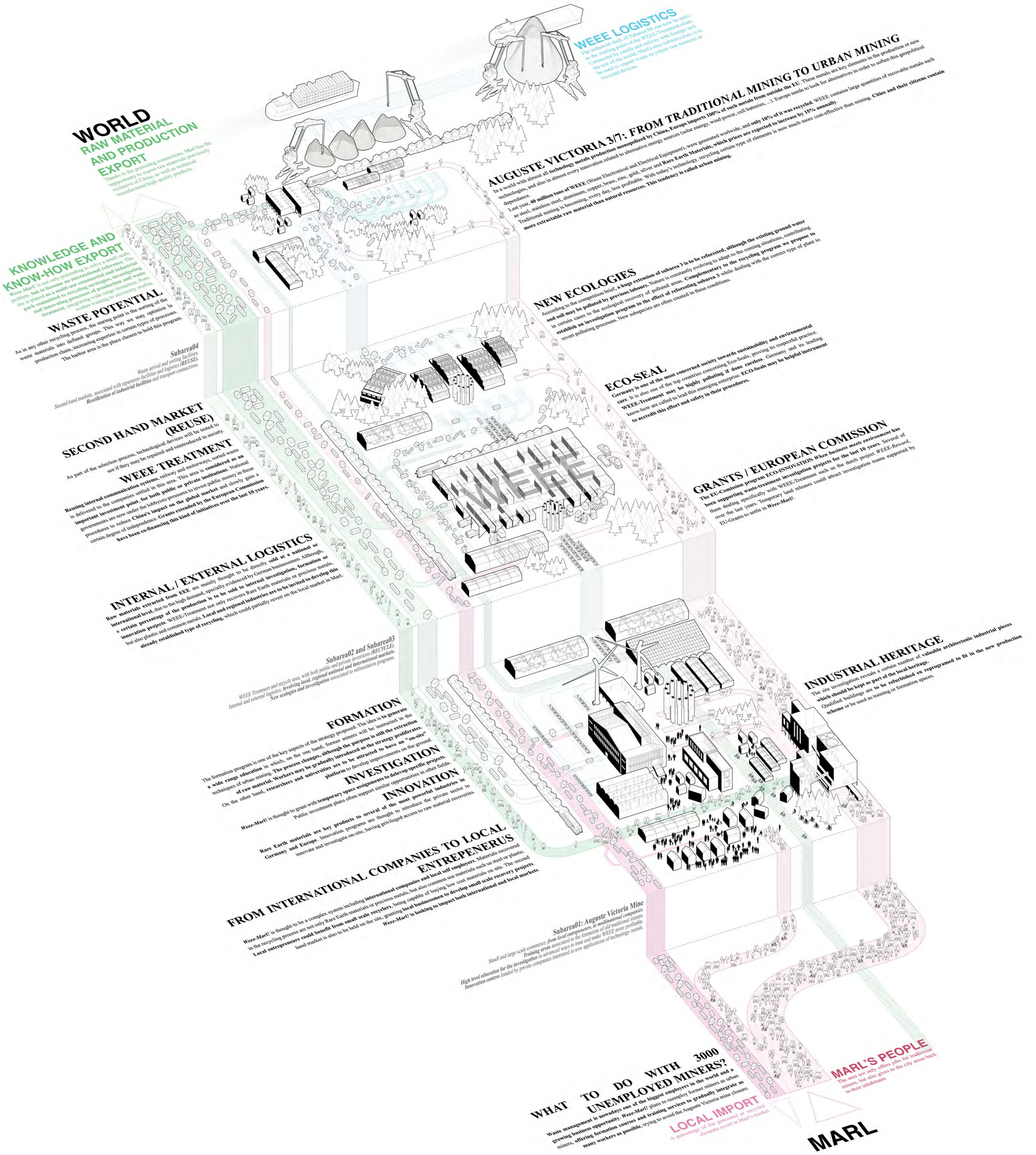
WEEE-Recycling: Situation and opportunity

This issue has been growing in its intensity due to the increasing development in technology. The European Union has been granting several individual projects regarding WEEE-treatment improvement and sustainable technology design facilitating its posterior recycling. 2010 is an important year to understand Rare Earth's geopolitical impact. Due to chinese unexpected price raise, European leaders and private businessmen became more aware of the need to lower China's control over these resources. Germany is one of the leading countries regarding automotive industry and renewable energy devices, both dependent of Rare Earth components. Many leading companies in the german economy have already requested public investment in these areas to become less dependent. Highly influential personalities in these sectors such as Matthias Wissman, president of the german association of the automotive industry (VDA) and Klaus Mittelbach, representative of the german electronic industry (ZVEI) have publicly revealed their concerns on this matter and demanded a political solution. This regards mainly to ways: investing in traditional mining companies to exploit foreign resources or investing in WEEE-Recycling programs. As previously mentioned, Waste Electronic and Electrical Equipment are already being generated in Europe, although no important treatment stations have been established. Recycling is a very wide field which needs social awareness to be effective. Germany is one of the leading countries regarding sustainable practices and social commitment towards the environment. It is the most recycling country in Europe and holds one of the highest rates worldwide.

We propose a multi-use commercial and industrial park committed to WEEE recycling strategies, investigating and innovating processes of production and waste treatment, integrating wide range formation, from worker training to specialized studies.

Why in Marl?

Marl's preexisting industrial infrastructure make it a perfect city for this strategy to be implanted. The selected site is perfectly connected with the rest of Ruhr's industrial area through canals, railway and motorways. This means not only the possibility to relate with nearby consumers, but also opens a gate to the international market, specially due to the proximity to Duisburg's industrial harbor. Moreover, about 3000 workers are about to lose their job due to the new coal mine is about to cease its activity. WEEE-Marl! plans to gradually integrate this workers from traditional mining to urban mining through formation programs and training centers as part of the greater project. The predisposition of the German government, the European Commission and several of the most relevant european companies to encourage this kind of initiatives provide a wide range of possible investors to fund the starting phases of the program.



WORLD RAW MATERIAL AND PRODUCTION AND EXPORT
Thanks to the existing connections, Marl has the opportunity to export raw materials, particularly electronic waste, as well as technical components of high quality products.

KNOWLEDGE AND KNOW-HOW EXPORT
Weee-Mar! is not only producing to solve a strategic problem, but to become an international reference. The site is designed as a model-use commercial and industrial park committed to recycling strategies, innovation and waste treatment, integrating a wide range of formation, from worker training to university studies.

WASTE POTENTIAL
As in any other recycling process, the starting point is the sorting of the waste materials into defined groups. This way we may optimize the production chain, increasing expertise in certain types of processes. The harbor area is the place chosen to hold this program.

SECOND HAND MARKET (REUSE)
Second hand markets, associated with repair facilities and transport connections. Revitalization of industrial facilities and transport connections.

WEEE TREATMENT
As part of the selection process, technological devices will be tested to see if they may be repaired and reintroduced in society.

WEEE TREATMENT
Reusing internal communication systems, railway and motorways, sorted waste is delivered to the companies located in this area. This area is considered as an important investment point for both public or private institutions. National governments are now under the lobbyist pressures to invest public money in these procedures to reduce Chloro's impact on the global market and slowly gain a certain degree of independence. Grants extended by the European Commission have been co-financing this kind of initiatives over the last 10 years.

INTERNAL / EXTERNAL LOGISTICS
Raw materials extracted from WEEE are mostly thought to be directly sold at a national or international level, due to the high demand, especially evidenced by German businessmen. Although a certain percentage of the production is to be sold to internal investigation, formation or innovation projects, WEEE-Treatment not only recovers Rare Earth materials or precious metals, but also plastic and common metals. Local and regional industries are to be invited to develop this already established type of recycling, which could partially revert on the local market in Marl.

FORMATION
The formation program is one of the key aspects of the strategy proposed. The idea is to generate a wide range of education to which, on the one hand, former miners will be introduced in the techniques of urban mining. The process changes, although the purpose is still the extraction of raw material. Workers may be gradually introduced as the strategy progresses. On the other hand, researchers and universities are to be attracted to have an "on-site" platform to develop improvements on the ground.

INVESTIGATION
Weee-Mar! is thought to grant with temporary space assignments to develop specific projects. Public investment plans often support similar opportunities in other fields.

INNOVATION
Rare Earth materials are key products to several of the most powerful industries in Germany and Europe. Innovation programs are thought to introduce the private sector to innovate and investigate on-site, having privileged access to raw material recoveries.

FROM INTERNATIONAL COMPANIES TO LOCAL ENTREPRENEURS
Weee-Mar! is thought to be a complex system including international companies and local self-employers. Materials recovered in the recycling process are not only Rare Earth materials or precious metals, but also common use materials such as steel or plastic. Local entrepreneurs could benefit from small scale recovery projects, being capable of buying low cost materials on site. The second hand market is also to be held on the site, granting local businesses to develop small scale recovery projects. Weee-Mar! is looking to impact both international and local markets.

Subarea01: Auguste Victoria Mine
Small and large scale commerce from local entrepreneurs, to multinational companies. Training areas associated to the formation of old traditional miners, being able to treat and make WEEE more profitable. High level education for the investigation in advanced ways to treat and make WEEE more profitable. Innovation centres funded by private companies interested in new applications of technology metals.

WHAT TO DO WITH 3000 UNEMPLOYED MINERS?
Waste management is nowadays one of the biggest employers in the world and a growing business opportunity. Weee-Mar! plans to reemploy former miners as urban miners, offering formation courses and training services to gradually integrate as many workers as possible, trying to avoid the Auguste Victoria mine closure.

LOCAL IMPORT
A percentage of the generated or recycled elements revert in Marl's market.

MARL'S PEOPLE
The area not only offers jobs for traditional miners, but also gives to the city areas back to their inhabitants.

WEEE LOGISTICS
In a world with almost all technology metal production monopolized by China, Europe imports 100% of such metals from outside the EU. These metals are key elements in the production of new technologies, and also in almost every innovation related to alternative energy sources (solar energy, wind power, cell batteries, ...). Europe needs to look for alternatives in order to soften this geopolitical dependence. Last year, 40 million tons of WEEE (Waste Electrical and Electronic Equipment), were generated worldwide, and only 10% of it was recycled. WEEE contains large quantities of recoverable metals such as steel, stainless steel, aluminum, copper, brass, zinc, gold, silver and Rare Earth Materials, which prices are expected to increase by 15% annually. Traditional mining is becoming, every day, less profitable. With today's technology, recycling certain type of elements is now much more cost-effective than mining. Cities and their extreme contain more extractable raw material than natural resources. This tendency is called urban mining.

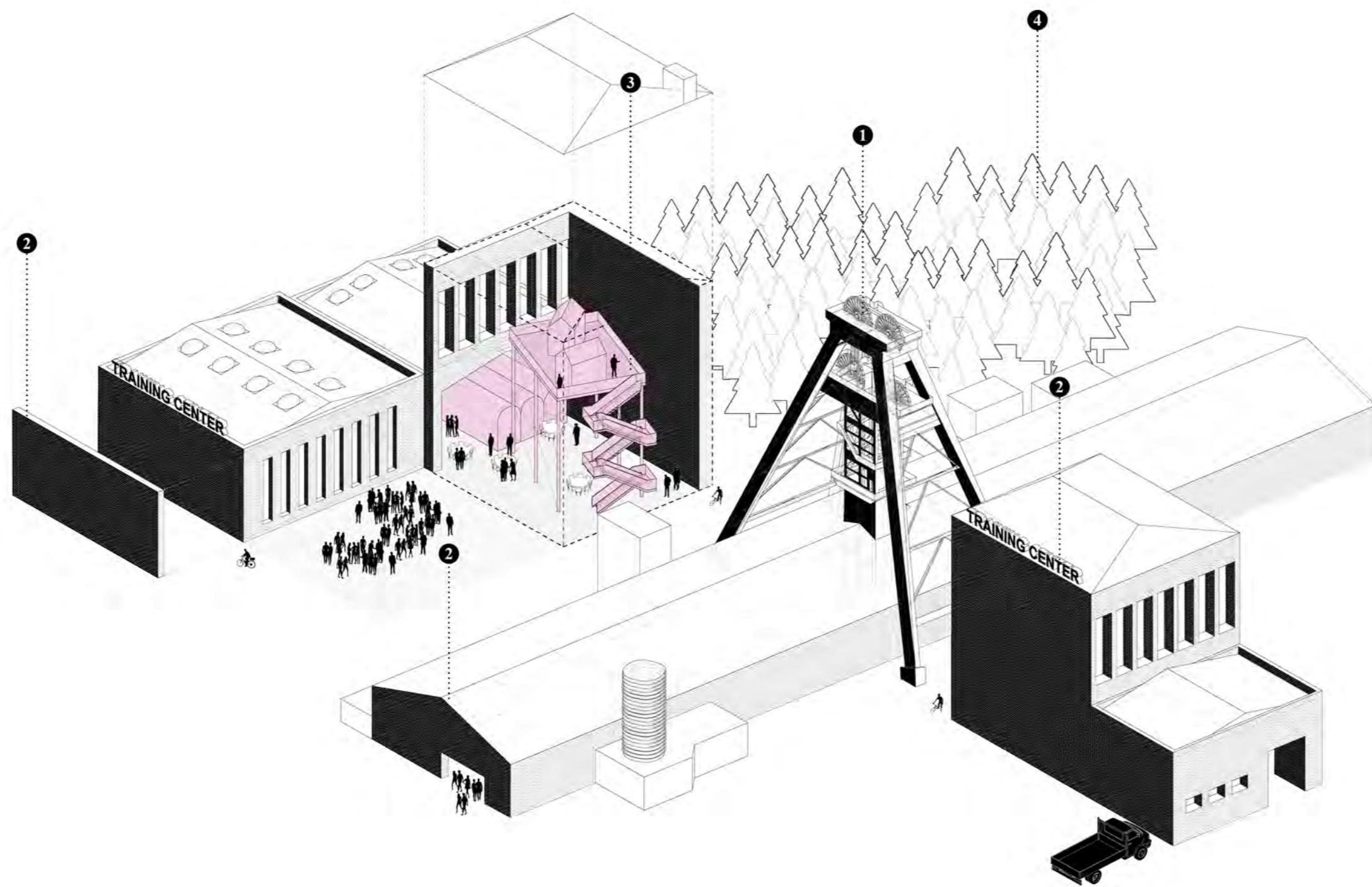
AUGUSTE VICTORIA 3/7: FROM TRADITIONAL MINING TO URBAN MINING
According to the competition brief, a huge extension of subarea 3 is to be reforested, although the existing ground water and soil may be polluted by previous labours. Nature is constantly evolving to adapt to the coming situations, contributing in certain cases to the ecological recovery of polluted areas. Complementary to the recycling program we propose to establish an investigation program to the effect of reforesting subarea 3 while dealing with the correct type of plants to revert polluting processes. New subspaces are often created in these conditions.

ECO-SEAL
Germany is one of the most concerned society towards sustainability and environmental cars. It is also one of the top countries concerning Eco-Seals, proving its respectful practice. WEEE-Treatment may be highly polluting if done careless. Germany and its leading know-how are called to lead this emerging enterprise. Eco-Seals may be helpful instrument to accredit this effort and safety in their procedures.

GRANTS / EUROPEAN COMMISSION
The EU-Commission program ECO-INNOVATION (When business meets environment) has been supporting waste-treatment investigation projects for the last 10 years. Several of them dealing specifically with WEEE-Treatment such as the dutch project WEEE-Reward, over the last years. Temporary loan releases could attract investigation teams supported by EU-Grants to settle in Weee-Mar!

INDUSTRIAL HERITAGE
The site investigation reveals a certain number of valuable architectural industrial pieces which should be kept as part of the local heritage. Qualified buildings are to be refurbished or reprogrammed to fit in the new production scheme or be used as training or formation spaces.

MARL



Industrial Heritage

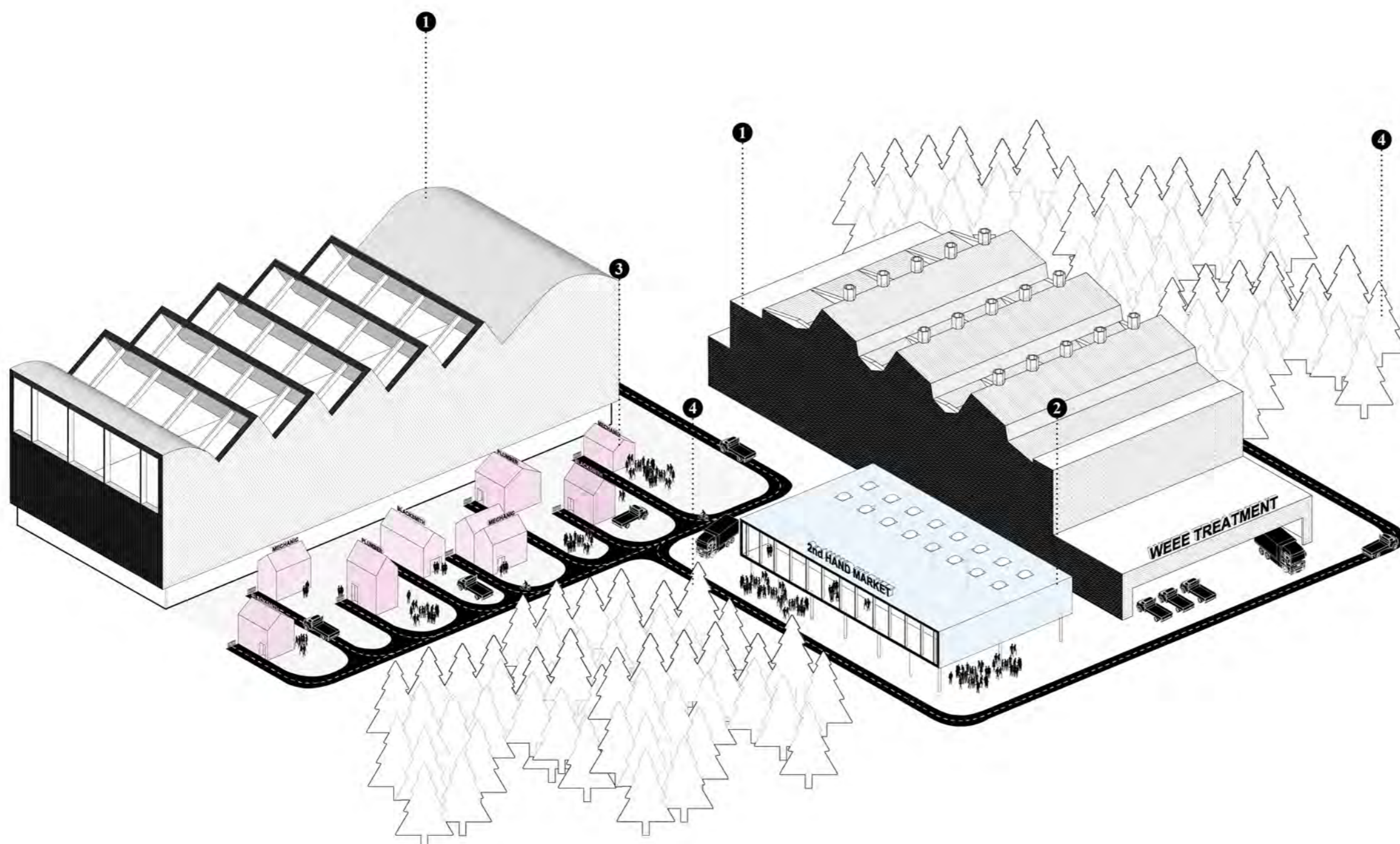
German industrial heritage is widely known for its architectural character. It is not only providing historical presence of societies development over the last century, but also reveals its influence in contemporary architecture. *Weee Mar!* plans to prevent this buildings from disappearing.

Well known interventions over the world have succeeded or defeated in their attempts of trying to bring these buildings back to life, hosting art centers, housing, etc.

Weee Mar! tries to evolve its own practice, keeping its industrial character not only as a visual or architectural aspect, but also as a program, adapting its needs to contemporary processes.

Therefore buildings are to be refurbished and eventually host new structures to implement their capacitance.

- 1 Revalued heritage icons
- 2 Refurbishment of the industrial buildings
- 3 New structures colonizing industrial buildings providing additional uses
- 4 Natural species to condition soil, water and air quality.



Mixed scale system

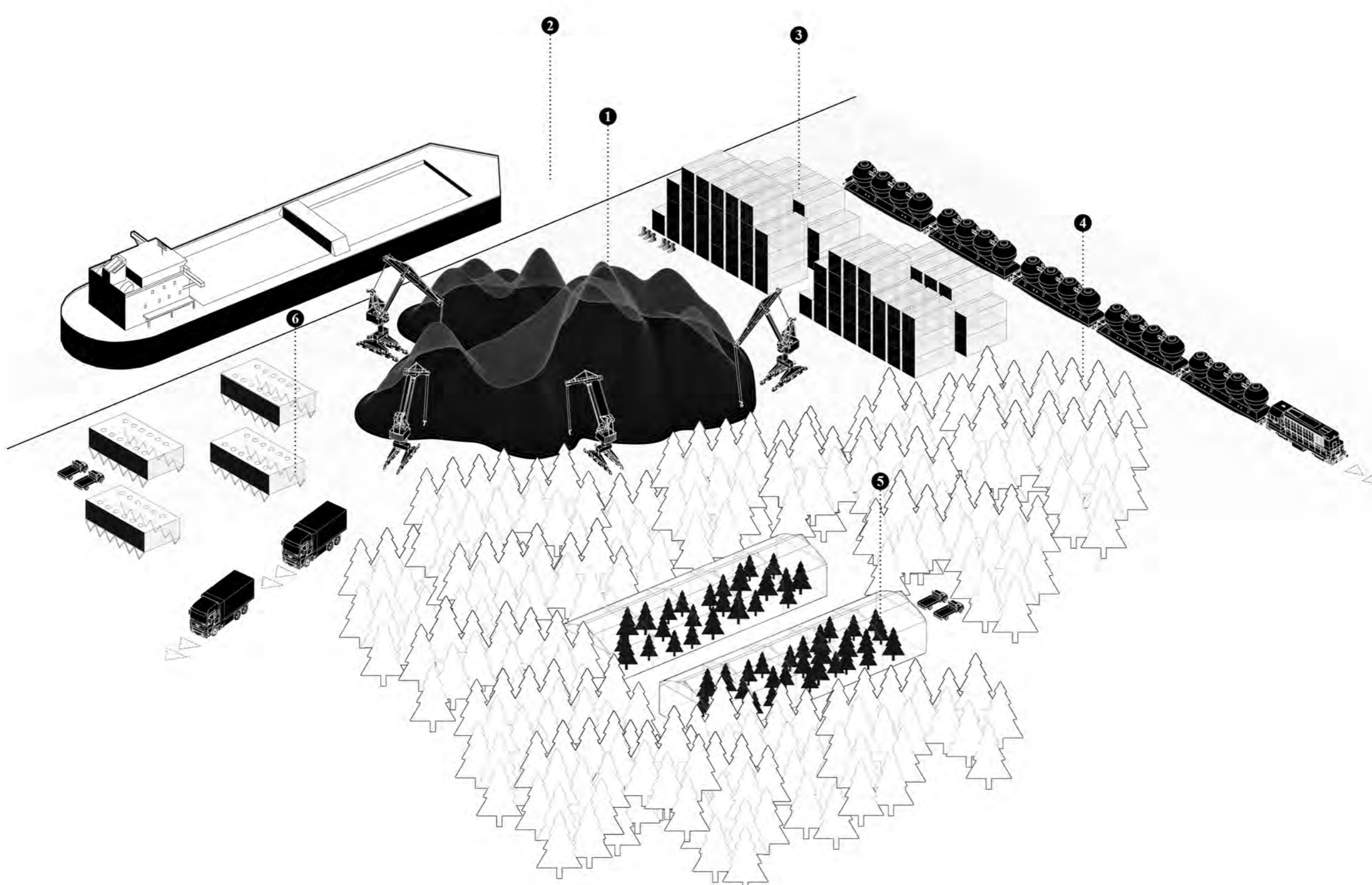
From international companies to local entrepreneurs.

Weee-Mar! is thought to be a complex system including international companies and local self employers.

Materials recovered in the recycling process are not only rare earth materials or precious metals, but also common use materials such as steel or plastic. Local entrepreneurs could benefit from small scale recyclers, being capable of buying low cost materials on site. The second hand market is also to be held on the site, granting local businessmen to develop small scale recovery projects.

Weee-Mar! is looking to impact both international and local markets.

- 1 New industrial buildings fitting specific needs of the Waste Electrical and Electronic Equipment's Treatment. Big Scale producers.
- 2 2^o Hand Market. Control and reparation of preexisting devices to set them back in the market if possible. Mid scale producers.
- 3 Local workers benefiting from the proximity to raw or industrialized materials or external service supply. Small scale producers.
- 4 Natural species to condition soil, water and air quality.



New landscapes

According to the competition brief, a huge extension of subarea 3 is to be reforested, although the existing ground water and soil may be polluted by previous labours. Nature is constantly evolving to adapt to the coming situations, contributing in certain cases to the ecological recovery of polluted areas. Complementary to the recycling program we propose to establish an investigation program to the effect of reforesting subarea 3 while dealing with the correct type of plant to revert polluting processes. Contemporary landscapes are manufactured. New ecologies try to integrate different kind of elements into a new natural combinations. Greenhouses appear as atmospherical devices introducing different kind of species, searching for those which may fit the new demands.

- 1 Waste disposal mounds
- 2 Industrial canal system
- 3 Imported container storage
- 4 Local species
- 5 Greenhouses as part of the investigation program
- 6 Waste sorting devices