Particularly suitable weapons of the economic war are rare raw materials, a group of 30 materials, mostly metals, which the EU has declared irreplaceable for a developed industrial economy. Of course, everyone is looking for them, so their price is rising, and countries have become painfully aware of how much they depend on them. According to the analysis of the European Commission, the sectors of air and space transport, defense, electronics, cars and energy-demanding industries necessarily require a constant supply of at least 21 of those 30 raw materials. The renewable energy sector needs slightly less of these raw materials, but it also depends on imports. Without them, it is impossible to produce solar cells, wind farms and electric vehicles with lithium batteries. Rare raw materials are also needed for 3D printers, drones, robots and other digital technology.

When there is nothing, an alternative needs to be found

"The future largely depends on how technology develops," explains Hans Guenter Hilpert, who heads the Asia department of the Science and Policy Foundation in Berlin. "The industry is likely to find ways to find more easily available substitutes for some raw materials or to develop alternative technology."

For example, batteries for electric cars will increase the demand for lithium from Chile, but in fact an even better and practically inexhaustible way of storing electricity is hydrogen. But a way is still being sought to create technology that is also commercially available. When it comes to the group of those 30 materials, they will remain important, as important as iron, copper, nickel and aluminum in the past. "In the future, wars will be fought over rare materials," Hilpert said.

Wars are actually already being fought – but economically. Industrial powers including the US and the EU have tried to anticipate their future needs. The analysis of the European Commission concludes that the demand for lithium could increase 44 times by 2050 if no other way is found to drive electric cars. The demand for graphite or cobalt could be eleven times higher than today. The exploitation of mineral resources primarily depends on the price: some rare raw materials have already been discovered where extraction could pay off in the near future, such as rare metals in Brazil and Vietnam, cobalt in Cuba and Russia or titanium in Brazil and Kenya.

It is there, but it is impossible to reach it

Another option is recycling. It is an old thesis that the mines of the future are our dumps of today, but in this case it is just a theory. As things stand, for many materials, the recycling process is extremely complex and expensive, and on top of that, manufacturers of modern technology devices do not want to say at all which materials they used and how many are in

the device. This means that only those companies can then recycle them. While some materials such as tungsten or cobalt can be recycled in significant quantities, a European Commission study warns that other materials – such as gallium or indium – cannot be separated at all once used.

In those cases, the only possibility is to find an alternative, explains Melanie Miller, who deals with raw materials at the Foundation for Science and Politics. "A lot of research is being done in the area of replacements. For some important and rare raw materials, this is possible, but for others it simply is not. "

Any such assessment is based on current scientific advances. What will happen tomorrow – no one knows, and in fact there is a great search for alternatives to materials that actually have a lot like silicon. Stefan Weber is a polymer physicist at the Max Planck Institute. He says they are looking for an alternative to solar cells there.

"Silicon is not really an ideal material for photoelectric cells because it absorbs light poorly. "To do that, you need a relatively large amount of silicon," Weber tells us.

He is now experimenting with the mineral Perovskite – German geologist Gustav Roze discovered this widespread oxide of calcium and titanium in research in the Urals and named it after the Russian politician and geologist Lev Alekseevich Perovsky.

Weber explains that the creation of solar cells with this material is like "baking pancakes", he pours it over the surface in liquid form and lets it crystallize again. In its current form, the mineral is not energy efficient enough to make everything pay off, but Weber's team is working to create a different nanostructure. For example, if this technology is combined with already known silicon cells, their efficiency increases by about 50 percent.

Perovskite research is promising: solar panels have a layer of silicone 100 to 200 micrometers thick – about the thickness of a hair shell. Weber says that a layer of only half, at most one micrometer of perovskite, is enough for such an effect – that is, one hundredth of the material used today.

Who is persistently looking for ...

But as in any research, there are more problems in this one: perovskite is much less durable than silicon cells. Today they last for about twenty years, and those from Perovskita would lose their properties after two years. In addition, they contain lead, which is poisonous to humans. "There are very strict legal restrictions, and they are strict for good reasons," states the physicist of the "Max Planck" institute.

Still, Weber is optimistic: he thinks the first module could be ready in three to five years, but realistically estimates that at least another decade will pass until the technology proves

mature and reliable enough. “There is so much that we simply do not know today,” concludes the physicist.
Source: dw.com