

Materials for a Low-Carbon Energy Future

Resourcing Future Generations

Fly low over the landscapes of many countries today and you'll see solar panels and wind turbines dotting plains, hillsides, coastlines and rooftops — perhaps the most visible signs of the growing infrastructure and market worldwide for sustainable power. But, solar and wind still account for only a sliver of primary global energy production. Low-carbon energy economies envisioned for the future will require vast expansions in production from renewable sources, which means we'll need enough raw materials to build an enormous amount of additional generating and distribution capacity.



So, where will these raw materials — such as tellurium and gallium for use in photovoltaic solar cells; neodymium for permanent magnet generators in wind turbines; and aluminum, copper and steel needed to expand electric power grids — be found? How will we find them in time to quickly reach targets for reducing atmospheric CO₂ emissions in climate change mitigation efforts? And how can we obtain them responsibly so as not to offset the benefits of those efforts?



The success of international climate agreements hinges on opinion leaders, policymakers, legislators and the public addressing these questions at international and national levels. And the necessary starting point is action by opinion leaders and policymakers to promote, shape and enact policy that will ensure the continuous availability of critical materials throughout the transition to a low-carbon energy system.



Initial steps were taken in July 2015 when the International Union of Geological Sciences (IUGS) convened an international group of experts in geology, mining, economics, sustainable development, and environmental and social sciences at Namibia's GocheGanas Nature Reserve to detail the challenges and opportunities in meeting global demands for natural resources needed to build our low-carbon future. Two critical goals of the IUGS's "Resourcing Future Generations" initiative came to the fore as issues offering both challenges and opportunities: socially and environmentally responsible mineral resource development to ensure adequate future resource supplies, and poverty reduction through local capacity-building.

Metal and mineral resources, through their ubiquitous use in technology and infrastructure, have underpinned the dramatic improvements in living standards seen in the 20th and 21st centuries. To maintain this trajectory while addressing climate change and rising world population — projected to reach roughly 9 billion by 2040 — sustainable sources of raw materials are required, in both developed and developing countries. Resource recycling and usage-efficiency improvements are vital, but will simply not be enough on their own.

Finding and developing new mineral resources is a lengthy process under the best circumstances; and most easily accessible deposits have already been or are currently being tapped. Thus, regardless of whether known supplies are enough to cover demand in the near term, efforts must be made now to forestall unpredictable yet inevitable supply shortages in the decades to come — shortages that would dramatically impact deployment of low-carbon technology.

Unfortunately, natural resource development is often accompanied by undesirable impacts on landscapes, on air and water quality, and on human and wildlife health. As part of the push toward sustainability — globally, regionally and locally — mining efforts must be pursued responsibly and efficiently to minimize damage to ecosystems and ensure accessible supplies for future generations. Responsible resource development has the added proven potential to alleviate poverty and empower communities and nations, particularly in developing nations.

Compared to Europe and North America, much of Africa, Asia and Latin America remain under-explored with respect to metal and mineral deposits. With international support to build local knowledge and capacity, and with enactment of appropriate policy and regulation to oversee development, communities and countries can benefit substantially through economic growth and material availability. Global benefits would be realized as well through the influx of supply to international resource markets.

The meeting in Namibia led to a detailed report outlining these challenges and offering solutions by which world leaders can begin addressing them. In brief, the expert panel recommends thoughtful, coordinated and urgent policy action to:

- ◆ Support investment and research into new mineral exploration and extraction technologies.
- ◆ Develop international guidelines for global mineral consumption.
- ◆ Raise awareness of the impacts of mineral consumption.
- ◆ Foster global best practices for responsible mineral resource development.



To read the full report from the RFG workshop in Namibia, visit

<http://iugs.org/index.php?page=resourcing-the-future-initiative>.