The Energy-Mineral Resources Nexus

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In order to reduce our fossil energy consumption and GHG emissions, numerous wind turbines, solar power stations and other facilities for the storage, distribution and use of low-carbon energy will have to be constructed in the next decades. Building this new infrastructure requires vast amounts of diverse mineral resources, and energy is required to produce these mineral resources. Therefore, the production of (even clean) energy and mineral resources are inseparable issues that need to be addressed in one comprehensive framework. We have combined the material and energy intensities of energy production facilities with various energy scenarii to estimate the amount of mineral resources that will be required in the next three decades. Large variations are observed for different global scenarios from the International Energy Agency and the Wide World Fondation. Our results are discussed in the light of the raw materials primary and secondary production and the evolution of reserves observed since the beginning of the century. They show that the replacement of fossil energy by renewable energy requires the use of large amounts of other fossil resources. The availability of mineral resources might eventually put a limit on the achievement of the most stringent scenarii.