**Increasing supply: Status quo of supply and the beginning of recycling and research of alternative technologies 2012-2015**

- Bigger REE mines come begin producing at full capacity, increasing supply.
- Exploration of land, oceanic, and cosmic deposits continues.
- Illegal and dirty mines will begin to shut down or be legalized.
- Greener mining technologies increases.
- Stockpiling of strategic minerals increases.
- Plans for funding an environmental mine clean up group will be drawn up.
- A point system for green mining technology established.
- Recycling for those elements with available technologies.
- EU passes new bills funding research on electrical waste.
- WTO trade disputes have been settled.
- Research for alternative strategic mineral technologies, greener mining + refining techniques, and deep sea extraction technology continues.
- An open information exchange board is formed along with a five-year stipend program.

**Continuation of Supply: mining, refining, and recycling advances 2020-2035**

- Protests should have shut down most dirty mines.
- New mines will be opening, old ones shutting down (10-20 year cycle).
- Deposit investigation continues worldwide.
- NASA lands an astronaut on an asteroid.
- Strict regulations are established by SMA for ocean mining and new technologies are developed based on research into deep-sea mining.
- First mine cleanup project. Previously illegal and dirty mines reopen.
- Greener mining + refining techniques become more commonplace, stricter standards (SMA) are applied to new mines opening based on point system incentives.
- By 2030 one third of the world’s refineries will be using solid phase technologies or bioleaching with a 68% average recovery rate.
- Based on past recycling trends, by 2020 platinum recycling rates should have increased 50% to 60 tonnes a year.
- In 2020, the EU collects 10 million tons of electronic waste to recycle.
- India’s phosphorus use will have leveled off and 50% will be recycled.
- 90% of Europe and 80% of N. America’s waste water will be recycled into usable phosphorus.
- End-product producers of technologies using strategic minerals will have a stable recycling plan in their factories.
- Recycling and alternative technologies will be larger parts of supply.
- Supply shortages may replace current technology (with REEs in particular) with more expensive and less efficient technology while research and implementation continues for better alternatives.
- India will have a functioning thorium based fission reactor (by 2020) with more to be developed based on the success of the first one.
- Research will continue, information will be exchanged at research symposiums as part of the open information exchange.

**Minning and recycling continues, regulatory bodies are formed 2015-2020**

- Mining of strategic minerals continues.
- Exploratory deep-sea mines are developed.
- Near earth asteroid mining prospects are determined.
- USGS will have complete geological surveys of probable phosphorus, lithium, and REE deposit areas.
- There will be a commodity exchange of strategic minerals.

- Recycling programs should be up and running for most strategic minerals.
- Phosphorus use in China will have leveled off due to smarter fertilization techniques + recycling of waste material.
- The international body for strategic minerals (SMA) will be established as an organ of the UN. It will deal with regulations concerning worker safety, environmental concerns, mining, and trade.
- Research continues, sharing through the Open Information Exchange Project.

**Changing Supply Sources: focus on mining and refining shifts to recycling and alternative technologies 2050-2070**

- Exploration will have established a good estimate of reserves left for most strategic elements.
- Mining continues for all elements, although competition has reduced prices for end-products, even for scarcer elements like REEs. Development is that much more achievable for countries where end-products are currently out of the price range (i.e., developing countries with a small middle class).
- Recycling process reduces a mount and size of remaining landfills.
- Recycling is now a stable source for REEs, rare metals, phosphorus, and platinum such that supply is no longer solely dependent on mining.
- With R&D funded early on, new alternatives are now produced, with reduced or completely cut use of strategic minerals, that have increased efficiency and lowered costs compared to current technologies.

**New sources of supply, primary recycling and alternative technologies 2070-2080**

- Mining has been shifted towards economically feasible deposits, with demand has made feasible to develop.
- No more high grade phosphorus are left (~25% ore).
- Recycling is now a major comopnent of the supply for strategic minerals.
- Alternative technologies which use strategic minerals will replace current technologies.
- Thorium will be used as a partial substitute for uranium in power p
- Strategic minerals are available on a free market for any and all who purchase them, at affordable price middle class family.

**Supply of strategic minerals is a barrier to development of any 2080-2100**

- Supply comes mainly from recyclable alternative technologies, versus mineral elements. A lack of strategic minerals is no longer a barrier for an aspiring nation to be developed.