ENHANCING THE VALUE OF THE PROPOSED IRON BOOMERANG RAILWAY LINE

Andrew W. Batchelor

AUTOBIOGRAPHIC SUMMARY

I am a university academic with several textbooks on engineering topics. Currently I am teaching finance and engineering subjects at some G-8 universities. My professional experience includes project engineering on railways and the role of renewable energy in major national oil companies.

ABSTRACT

The project known as Iron Boomerang involves investment in new transport infrastructure involving a long-distance freight railway. It is suggested that the value of this railway is enhanced by using it to support the installation and maintenance of a high capacity electric power cable or cables located close to the railway line. The cable would transport solar electric power on a large scale, exploiting the East-West time difference to supply the East Coast of Australia with solar power during the early evening period of peak demand. The cable need not be visually intrusive and its route can be modified to suit cultural requirements.

PROPOSAL

The proposed Iron Boomerang Railway Line would become a major capital asset with commensurate financial expectations. This railway line would connect the North-West of Australia with the East Coast of Australia, which has a value beyond the transport of iron ore, steel, metallurgical coal and any other associated product.

Any major capital asset would benefit from further sources of revenue in addition to the originally planned revenue source.

The railway could transport not only iron-ore related cargoes but also equipment and supplies for a D.C. (direct current) high voltage cable placed parallel but some distance from the railway (e.g. 50 metres). This distance is advisable in case of derailments from the railway, which could otherwise damage the D.C. cable and allows maintenance of either the railway or the cable without any mutual interference. Railway sidings (additional to those required by the freight trains) could be installed to allow parking of cable-related trains while the freight trains progress along their route undisturbed. After an initial peak in transport needs during the installation of the cable, long-term transport requirements would be mostly limited to maintenance.

D.C. power cables are technically superior to A.C. (alternating current) power cables for long distances such as proposed here [https://www.nationalgrid.com/sites/default/files/documents/13784-High%20Voltage%20Direct%20Current%20Electricity%20%E2%80%93%20technical%20information.pdf].

The cables would be placed discretely below ground without the visual disturbance of electric pylons.

D.C. high voltage cables are now used to convey electric power for considerable distances in Europe. In Germany electric power will be conveyed from Northern to Southern Germany [https://www.globalconstructionreview.com/germanys-dmt-lands-roles-building-worlds-longest-underground-cable/] while in China, cable lengths have reached 3,000 km.

There is a 2-hour time difference between the North-West of Western Australia and the East Coast where most of the Australian population resides. A critical disadvantage of solar power occurs in the early evening when power demand is high (cooking supper and air-conditioning for returning families) while the sun is low in the sky and easily obscured by clouds. By contrast, the North-West would still be in the mid-afternoon with strong sunshine, the more northerly location further boosting the available solar power into the winter. Solar power projects have already been proposed in the North-West to support the mining industry. https://stockhead.com.au/energy/asx-green-energy-stocks-fmg-plans-pilbara-renewables-hub-agl-exits-coal-three-years-ahead-of-schedule/

These projects (that are related to the mining industry) could be extended to provide late afternoon power for the East Coast (as well as power at other times) if a suitable D.C. cable(s) exists.

A major asset such as D.C. cable requires easy access by maintenance staff and their supplies to ensure reliable power transmission. The Iron Boomerang Railway Line could provide the necessary transport and logistics infrastructure for this purpose.

Revenue for the Iron Boomerang Railway Line from the D.C. cables could be calculated from maintenance service costs and perhaps a $/MW-hour payment scale for the transmitted electricity. Simple calculations reveal that if e.g., 4 GW of power is conveyed, then with a moderate conveyance charge of a few cents per kW-hour, an annual revenue in excess of $1 billion may be generated.

It is also conceivable that surplus electric power could be supplied to electric locomotives on the Iron Boomerang line, thereby avoiding import of diesel fuels.

Rural communities close to the railway line and the D.C. cable could be supplied with electric power without the need to install electric power generators.

East Coast solar power installations could supply power to the North-West in the early morning using a reverse flow of electric current. This would be of benefit as any storage batteries may be depleted after supplying power during the night.

Solar power can be supplemented by power from e.g., wind turbines or tidal energy as the source of electric power would not affect cable operations.

The route of the electric power cable can contain deviations to avoid disturbance to any sacred sites. The minimum radius of curvature of the cable is less than the minimum radius for a freight railway, so the cable can closely follow the railway line.
