Vanadium key to building a sustainable future

Vanadium is a key metal for sustainable development around the world. It is used to reduce the CO_2 footprint of steelmaking and applied as electrolyte in vanadium redox flow batteries (VRFBs), which are set to play a leading role in long duration energy storage.

The use of this strategic metal is growing rapidly as the developing world is applying more vanadium-bearing steel in the construction industry and in other industrial sectors like defence, aerospace, rail and electric power sectors. This is significant as the steel industry is one of the world's major emitters of greenhouse gas and China is by far the biggest producer and consumer of steel.

China's new rebar standard is leading the construction industry to replace low-strength carbon steel with high-strength alloy steel containing vanadium. When high-strength alloy steel is used, much less steel is required for the construction of infrastructure, which in turn leads to a significant reduction in carbon emissions.

The development has a further far-reaching, positive effect on the environment as less steel needs to be produced and built structures use less energy. One of Vanitec's members, Largo Resources, has pointed out that lower volumes of steel will result in lower iron and coal consumption and indirect benefits such as reducing the movement of commodities around the world.

Vanitec believes the environmental and economic benefits of adding vanadium to steel far outweigh the cost of vanadium. Terry Perles of US Vanadium, another member of the association, explains: "This might raise the steel mills' production cost but they are able to sell vanadium-bearing steel for 20% to 40% more than carbon steel. The construction industry also wins as it requires less steel and the end user benefits from operating the building with much less energy."

Fast-growing countries such as India and Brazil are also using increasing amounts of vanadium-bearing steel as their architects and builders are learning about the material and embracing it as a more effective construction material. The good news is that there is still great potential for increasing its usage in these countries.

While the Chinese government is leading the reduction of the carbon footprint of steel, one of Vanitec's researchers, Dr Dawid Crowther, highlights a broader trend of using vanadium to increase sustainability.

Making the world greener

This is evident from the use of vanadium in the production of rail steels, where it reduces the need for the repair and replacement of rails. When it is applied in power stations, the metal helps to make the utilities more efficient as they are are able to run at higher temperatures. In the automotive industry, high-strength steels make cars lighter and more efficient, which benefits the environment.

Vanadium is also used in the aerospace sector for the manufacturing of master alloys used in jet engines.

Vanadium is set to assist a range of industries in becoming more sustainable, owing to its exceptional ability to strengthen other materials. Its use in long duration vanadium-based batteries signifies that it is a key element in unlocking the full potential of renewable energy integration.

Production from by-products

About 70% of the world's vanadium units are produced from steel slag (a by-product of steelmaking) in China, Russia and New Zealand. 20% is produced from mining operations and 10% from recycling spent catalysts. Meanwhile, there are a number of vanadium ventures around the world seeking capital investment to bring new production online.

Paul Vollant of Largo Resources says the company is proving that vanadium miners are focusing on reducing their environmental impact by employing greener sources of energy at their plants.

In the medium term, it is likely that vanadium production from secondary sources will increase as the International Maritime Organisation's new regulations on bunker fuel will lead to increased production of spent catalysts. Perles estimates that the next five years will see higher growth in vanadium production from this recycled source. This is good for the environment and naturally supports resource sustainability.

Vanitec expects that vanadium will be increasingly recognised as a sustainable metal in future. "Infrastructure needs to be built to create opportunity and improve people's lives," says Perles. "If we

want to create opportunity while making minimal impact on the environment, vanadium is critical to reaching our objectives."

About Vanitec

Vanitec is the only global association that represents vanadium. For more information visit the Vanitec website at vanitec.org.