GREEN ALUMINUM AND CHINA

Paul Adkins

AZ China Limited

Presented by: Paul Adkins

Presenter's Bio

- **Name: Paul Adkins**
- **Degrees and date earned: MBA from University of Newcastle, Australia 2005 and BA 1980**
- **Affiliation: AZ China Limited**
- **Present position: Managing Director**
- **Work experience: Has been in the aluminium industry since 1970 and worked for Alcoa, Alcan Australia, and Tomago Aluminium. At the end of 2004, Alcan appointed Paul to set up its Global Sourcing office in Beijing. He is Founder and Managing Director of AZ China since 2007.**
- **AZ China is a leading consultancy working exclusively in the aluminum sector.**

Introduction

- The global primary Aluminum industry is largely hamstrung when it comes to becoming truly green:
  - The smelter power source determines the largest single contributor of greenhouse gases
  - China produces 60 % of the world's primary aluminum, but only about 10 % of its metal is truly green
  - The industry proposes to take diversionary measures, while China is the only country actively relocating aluminum capacity to "green" electricity
- The IAI predicts that the world will need 150 million tonnes by 2050; but how do we get there if 60 % of our primary metal is coming from China?
- Innovations such as the inert anode are not enough, and will not help most of today's capacity.

China today

- Committed to Peak emissions by 2030 and carbon neutrality by 2060
- 14th 5-year plan is pivotal in achieving the goals
  - Contains many measures aimed at reducing electricity consumption and intensity
- Right now in 2021, the evidence is:
  - They are committed to achieving these goals, as evidenced by the policy deployments we have seen recently
  - Those policy deployments are not without consequences
- Emissions Trading Scheme rolled out but as yet having little impact
  - Impact will be on COP not supply
- The move to hydroelectricity has stalled very recently
- Meantime, China is still building coal-based power plants (and nuclear), and coal remains a powerful lobby group within the corridors of Zhongnanhai.

China's huge aluminum industry

- China is the world's biggest producer and consumer of primary aluminum
- A total of 80 producers and almost 100 smelters producing almost 60 % of the world's primary metal
  - About two thirds of China's smelters are government-owned at some level
- China has the newest fleet, with the average age of a little over 10 years.
  - Multiple locations now running > 600 kA
- The current picture got its start with the Global Financial Crisis (GFC) in 2008.
  - First Xinjiang, then Shandong, Inner Mongolia, Gansu and other coal-rich provinces adding capacity rapidly.
- China now a major exporter of semi-finished metal

But huge climate outcomes

- 2018 CO_2 emissions greater than Japan and EU combined
- Coal represents almost 60 % of China's energy
- 5 Chinese electricity companies account for 50 % of all China's CO_2 emissions
- In 2020, China brought on line 38 GW of coal-fired electricity
  - 3x the total of the rest of the world combined
- China now represents about 28 % of all the world's CO_2 emissions

Emissions heavyweight

Percent of global carbon emissions in 2018 by country

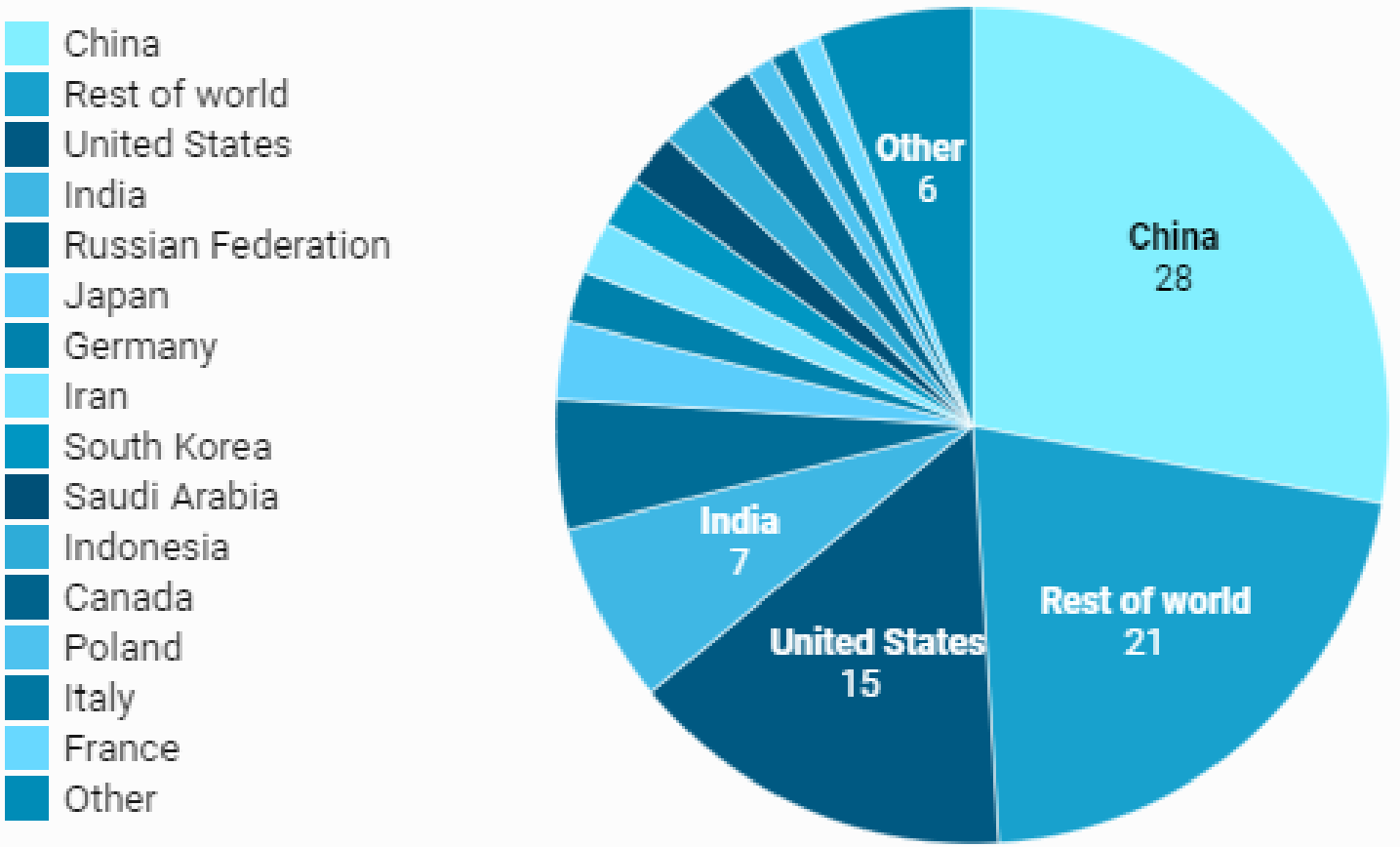
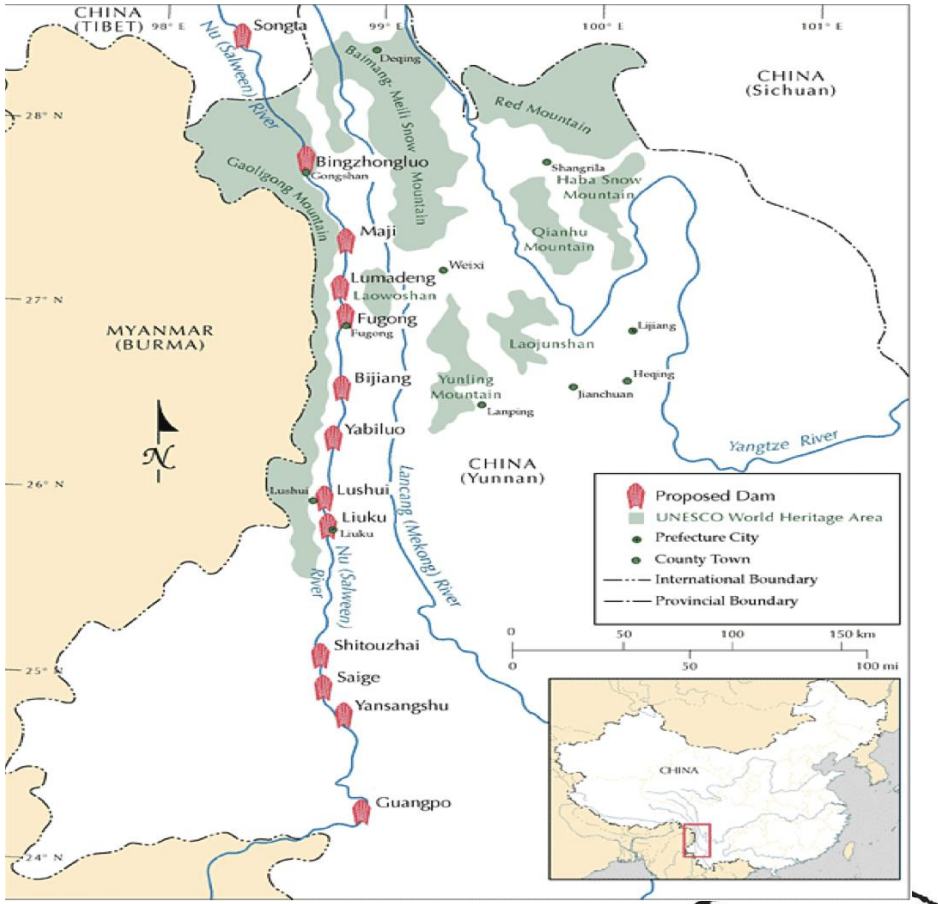


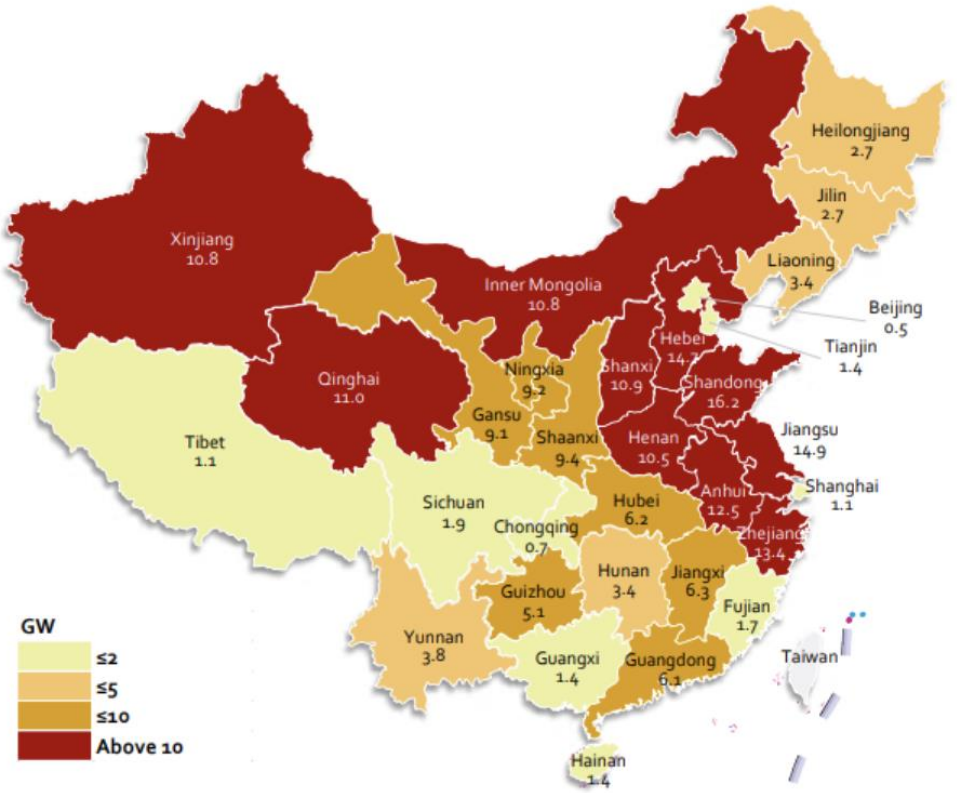
Chart: Scott Carpenter • Source: International Energy Agency via Union of Concerned Scientists • Get the data • Created with Datawrapper

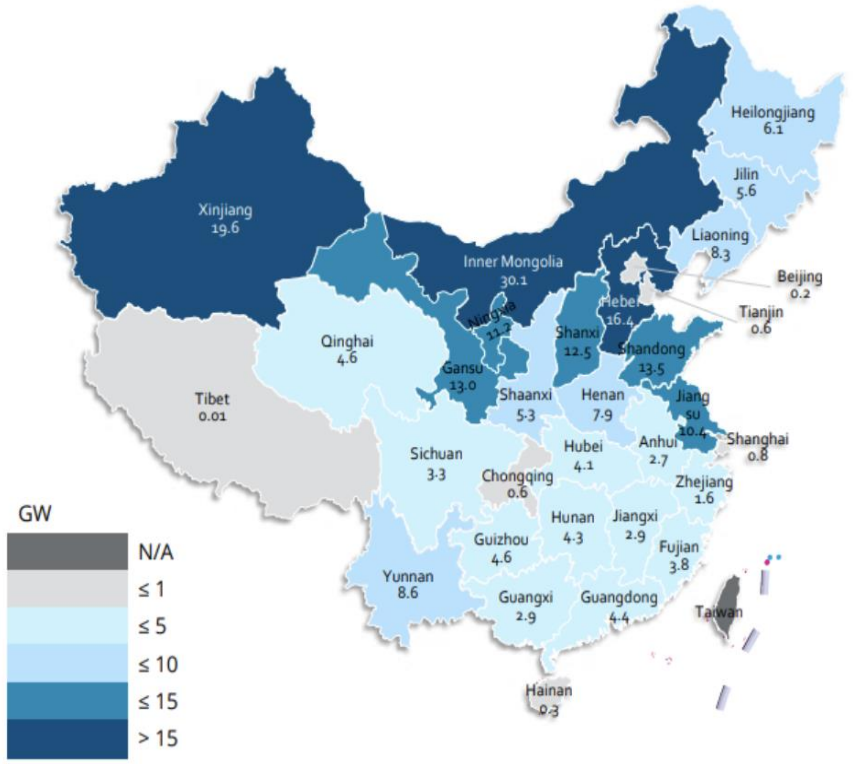
The move to green aluminum

- China understands like the rest of us, green energy is the key
- China's largest single source of green electricity is via the river systems high in the mountains west of Yunnan province.
- China has about 4mt capacity in Yunnan province now
- Can grow to 8-8.5 mt by 2030
- Other renewable energy sources add some small amount of additional metal.



Solar and Wind power in China





Holistic approach still a long way off

- Considering the split of corporate structures in China, there are few companies that can even start with an in-house holistic approach to reducing environmental impacts along the supply chain:
  - Bauxite: Mine closures and reforestation, heavy vehicle transport
  - Alumina: Coal-fired energy, red mud
  - Smelting: Coal-fired energy, PFCs, carbon plants, SPL, Spent anodes
  - Downstream: Energy, scrap, emissions
  - Recycling: Effluent, chemicals
  - Common factors: Dry Bulk sea freight and containers, raw materials transport, travel

The problems are not just China's

- In 2020, Reuters reported the following global split of energy sources for primary aluminum:
  - Coal: 59 %
  - Hydro: 30 %
  - Natural Gas: 9 %
  - Nuclear: 2 %
- In other words, around 70 % of the world's 65 million tonnes of primary metal is made with emissions that are greater than 4 t CO_2 / t Al
- In this respect, only China has made the move to relocate plants to renewable energy sources (Yunnan hydroelectricity)

But what exactly is the target?

- Generally recognized that the threshold is 4 t CO_2 / t Al produced.
- But the ASI has set a more moderate target of 7 t.
- Important difference between the two targets:
  - A smelter running on coal-fired power using acceptable processes and treatment centres could be anywhere between 12 and 18 t.
  - At a threshold of 4 t, total green capacity = 8 million tonnes metal
  - At a threshold of 7 t, total green capacity = 14 million tonnes metal
- Therefore, a ***maximum*** of around 20 % of the world's primary aluminum can even be called "green".

Supply and demand unlikely to match

- If China is successful at moving more capacity to the Southwest, and keeping the power supplied, then the world's green aluminum supply might reach 12 to 16 million tonnes. This is < 25 % of the world's primary aluminum.
- However, demand is taking off. Quickly.
- European car companies, packaging companies, home appliance and engineered products companies are all "hearing the call". Ref. Apple.
- The world's citizens are quickly taking up the concept of climate change and the consciousness will move from vague concepts to sharp and detailed demands.

Our Industry taking the wrong option

- The global aluminum industry started by trying to address carbon emissions, but has shifted policy.
- The Aluminum Stewardship Initiative has “negotiated” a threshold of 7 t CO_2 / t Al.
  - Allows Middle Eastern smelters to join the “club”.
- The ASI has housed climate among many other worthy issues – child labour, slave labour and so on.
- The aluminum industry is proposing to be its own “policeman”, but history is littered with examples of this approach failing.
  - Self-policing requires a coercive element.

Why self-policing won't work

- Apart from issues about the model of setting own standards and rules, there are important reasons why this model will ultimately not work.
  - "Follow the Molecule". As we all know, there is no structural or microscopic difference between aluminum made using coal-fired energy versus renewable energy.
  - Ultimately the consumer/buyer has no certain way to confirm that the metal he is purchasing is indeed "green". He has to rely on the word of the supplier and the protocols and rules of the ASI and the industry at large.
  - There is nobody measuring the volume of metal sold as green compared to the amount of metal that is actually green.
  - Green aluminum will attract a price premium, and this could be an incentive to sell as much as possible in the green category, regardless the volume that is really green.

Why self-policing won't work, part 2

- Ultimately, the world's citizens will demand we as an industry meet the world's expectations when it comes to climate.
- We have a duty – the green products of tomorrow, such as electric vehicles, new forms of computers, driverless trucks and so on, will all need more aluminum, not less. We must reduce our impact on the climate per ton of metal produced, if we are going to rise to the levels predicted by the IAI.
- The danger is that if we do not take more decisive action to be part of the solution, governments of the world will decide the solutions for us.
  - Ref. Europe and Carbon Border Adjustment Mechanism (CBAM)

Can China succeed in going green?

- China represents almost 60 % of the world's aluminum, so where China goes on this challenge, so does the rest of the industry.
- China makes about 4 million tonnes using hydro and other renewable energy, or about 10 % of its total. It can grow to about 8 mt by 2030.
- As much as 3 million tonnes of this can and does go to automobile manufacture inside China, as foreign firms such as BMW demand uniform raw materials standards and as China adopts electric vehicles domestically.
- China has a huge financial incentive to continue relocating smelters to hydro power, and increasing renewables into the grid.
- Ultimately, the best it can do by 2030 is little more than 8 m tonnes.

Can we as an industry succeed in going green?

- It's intensely difficult to relocate existing coal-fired capacity to renewable energy sources.
  - Kitimat increased output using hydro (2015)
  - Karmoy smelter in Norway has increased output
  - China is the only country in the world where smelters are being actively relocated
- I am advocating a new approach to new aluminum capacity investment, based on:
  - Renewable energy
  - Inert anodes and other breakthrough technologies
  - Green alumina
  - A holistic approach – SPL, red mud etc.
  - Using liquid metal deliveries where possible
- **Ultimately, it's not a case of can we, it's a case of We Must.**

Thank you.

Questions?

Paul.adkins@az-china.com