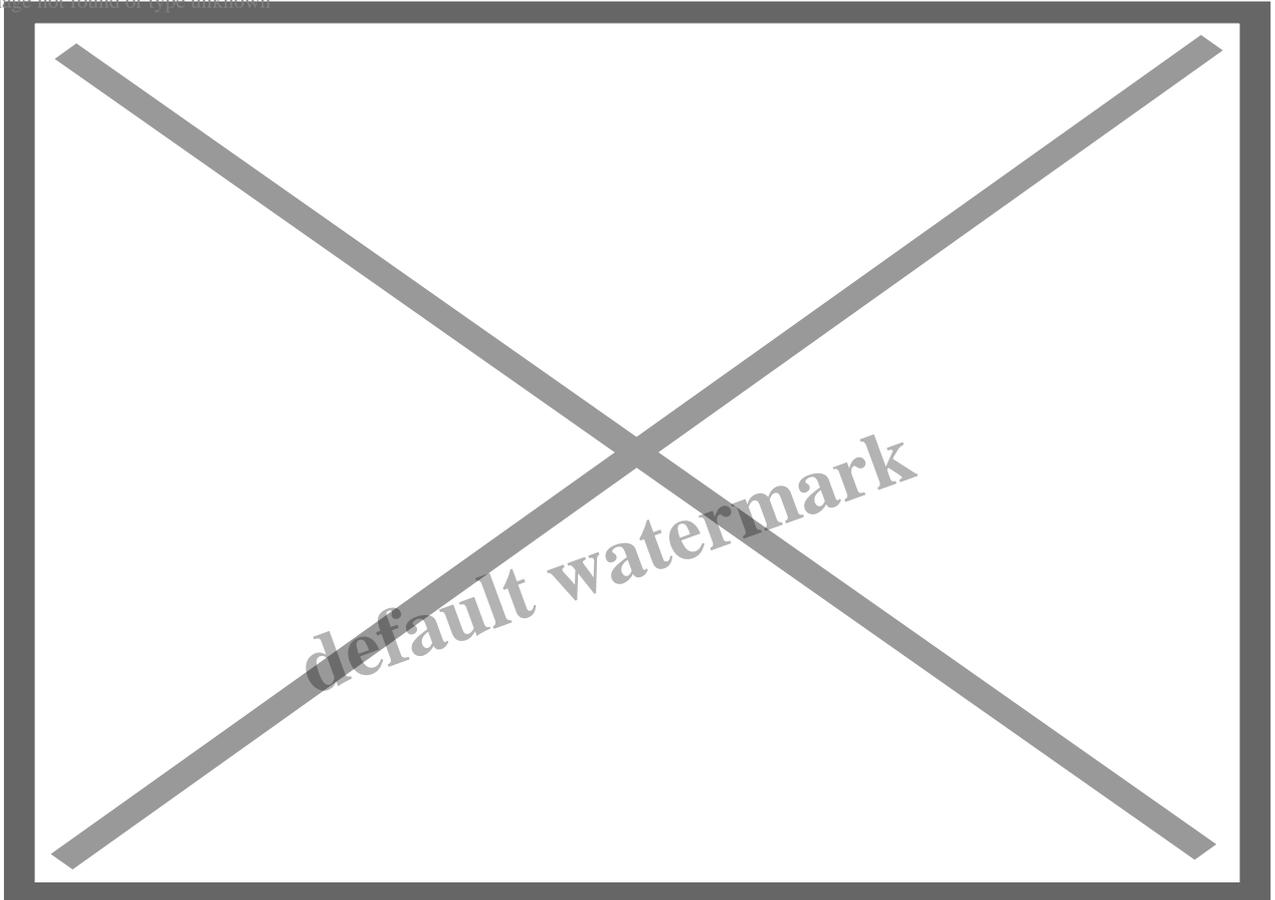


## Metal, mines and music: resonator guitars

### Description

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[John Dee Holeman](#) and his Tricone resonator. Photo by Timothy Duffy – from [Deep in the South: A Music Maker Songbook](#) (2022)

*Metal-bodied resonator guitars first appeared in the 1920s and were played by many blues musicians. Here I celebrate these amazing vintage guitars and their modern counterparts, while also taking a look at the mining industry that produces the metals that go into them.*

Perhaps nothing evokes the essence of [early blues](#) from the southern US more than a National guitar. Looking and sounding like nothing else, these guitars had metal bodies and contained thin metal cones called [resonators](#).

[Booker White](#) (1906-1977) – *Aberdeen Mississippi Blues*

In previous posts, we've looked at the development of home-made "[cigar-box](#)" guitars and the prevalence of relatively inexpensive makes such as [Stella](#) in the south during the early parts of the 20<sup>th</sup> century. In this post, the focus is on resonator guitars, and particularly those with all-metal bodies.

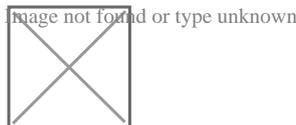
The post has two elements, though. I started it as a piece which celebrates the amazing metal guitars from the 1920s-40s and their more recent counterparts. But then the ecologist in me kicked in and I started looking into where the raw materials for these guitars comes from – the main theme of the Nature of Music, in fact. That got me into the world of mining and mineral extraction, and humanity’s near-insatiable demand for things made of metal. At the end of the post, I do pull us back out of the mine pit though and back to the world of guitars – hopefully with a clearer appreciation of where amazing resonator guitars come from.

## Birth of the resonator

Resonators evolved from [early Hawaiian style guitars](#). They were developed with the aim of increasing the volume of the guitar so that it could be better heard in amongst other, louder instruments and in noisy juke joints.

The history of the development of resonator guitars is a bit like a slow-moving soap opera, in which the various characters form relationships, bicker, split up, create competing companies, file law-suits and more. Keeping track of things is hard, as is tracing all the various iterations of brands through time. I’m not going to do that here, since there are very good accounts already available. For the basics, see [Wikipedia](#), and for a more colourful account see [Ritchie Owens’ article](#) in Premier Guitar, or the [Chasing Guitars](#) site.

There’s also a couple of great books on the topic – one by [Bob Brozman](#) focusing entirely on National guitars, and one by [Mark Makin](#) on Nationals, Dobros and their successors.



## National and Dobro

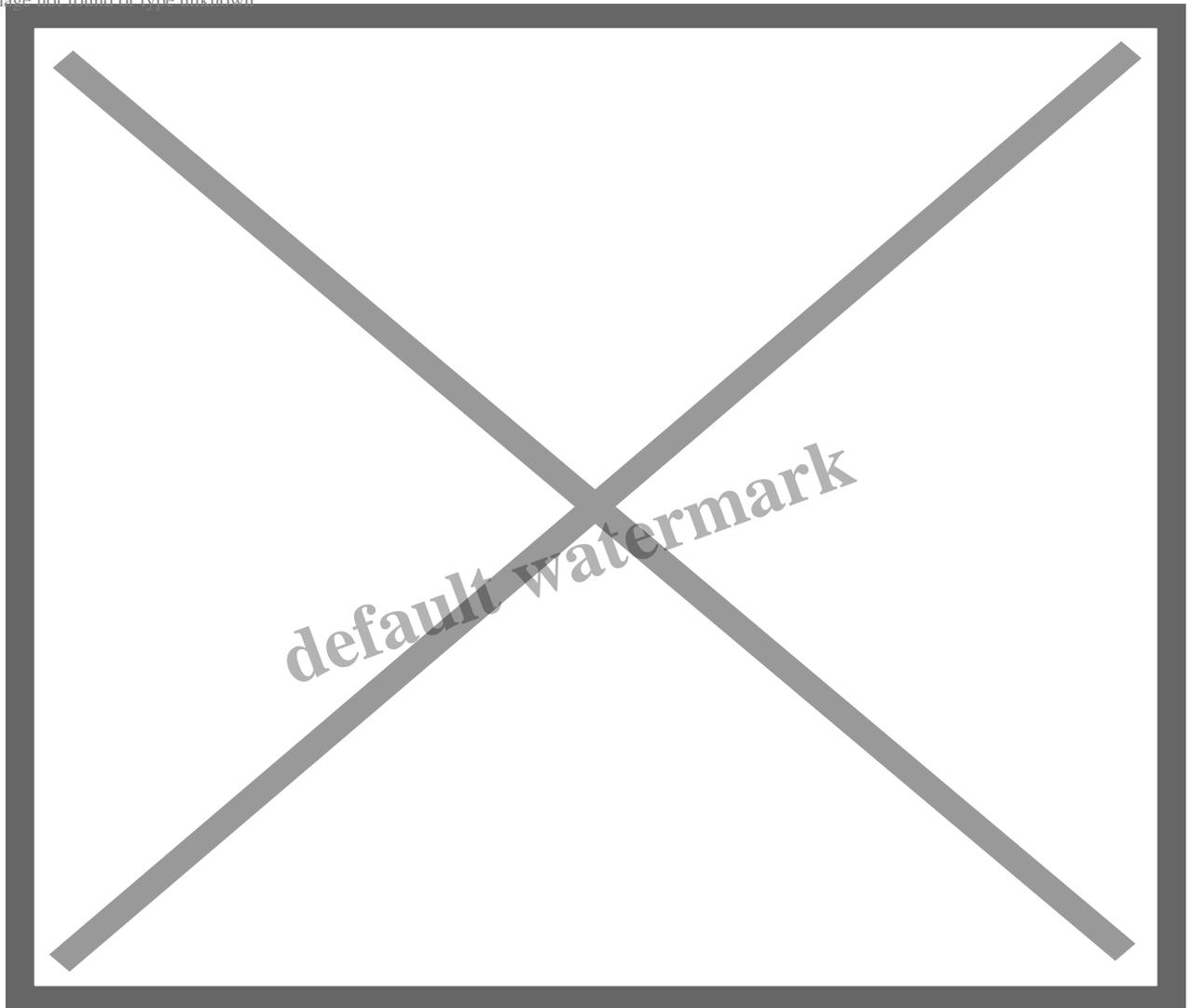
In a nutshell, the original National guitar was designed by [John Dopyera](#) in response to a request from guitarist [George Beauchamp](#) for help in finding a way of making a louder guitar. The two men formed the National Stringed Instrument Corporation in 1927 and started manufacturing metal bodied guitars with 3 resonating aluminium cones joined by a T-shaped aluminium bar that supported the bridge – the Tricone. [The choice of 3 cones](#) seems to have related to the balance of volume and sustain that could be achieved.

Dopyera and Beauchamp did not get along well together for too long, and a year later Dopyera left to set up a new company with his four brothers – aptly naming the company “Dobro”, a shortening of Dopyera Brothers and also, coincidentally, meaning “good” in their native Slovak language. They started producing resonators with a single large cone and reverted to mostly wooden bodies. The cone was inverted compared to the Tricone, and the bridge sat at the centre an eight-legged aluminium “spider”. This was topped with a metal cover plate.

National, meanwhile, also branched into a single cone resonator – but mostly maintained the metal

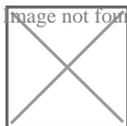
body and kept the cone convex rather than concave, with a wooden “biscuit” at the cone apex to support the bridge. These single cone resonators were often adorned with etched artwork, many depicting scenes of palm trees and tropical islands – reflecting the roots of these instruments in Hawaiian music.

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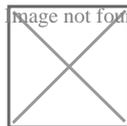
*A recent Bourbon Street Tricone, 1935 Dobro with a spider bridge and 1932 National Style O with a biscuit bridge*

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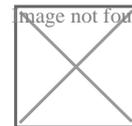
Tricone (Photo:  
[Guitarinsideout.com](http://Guitarinsideout.com))

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Dobro spider bridge

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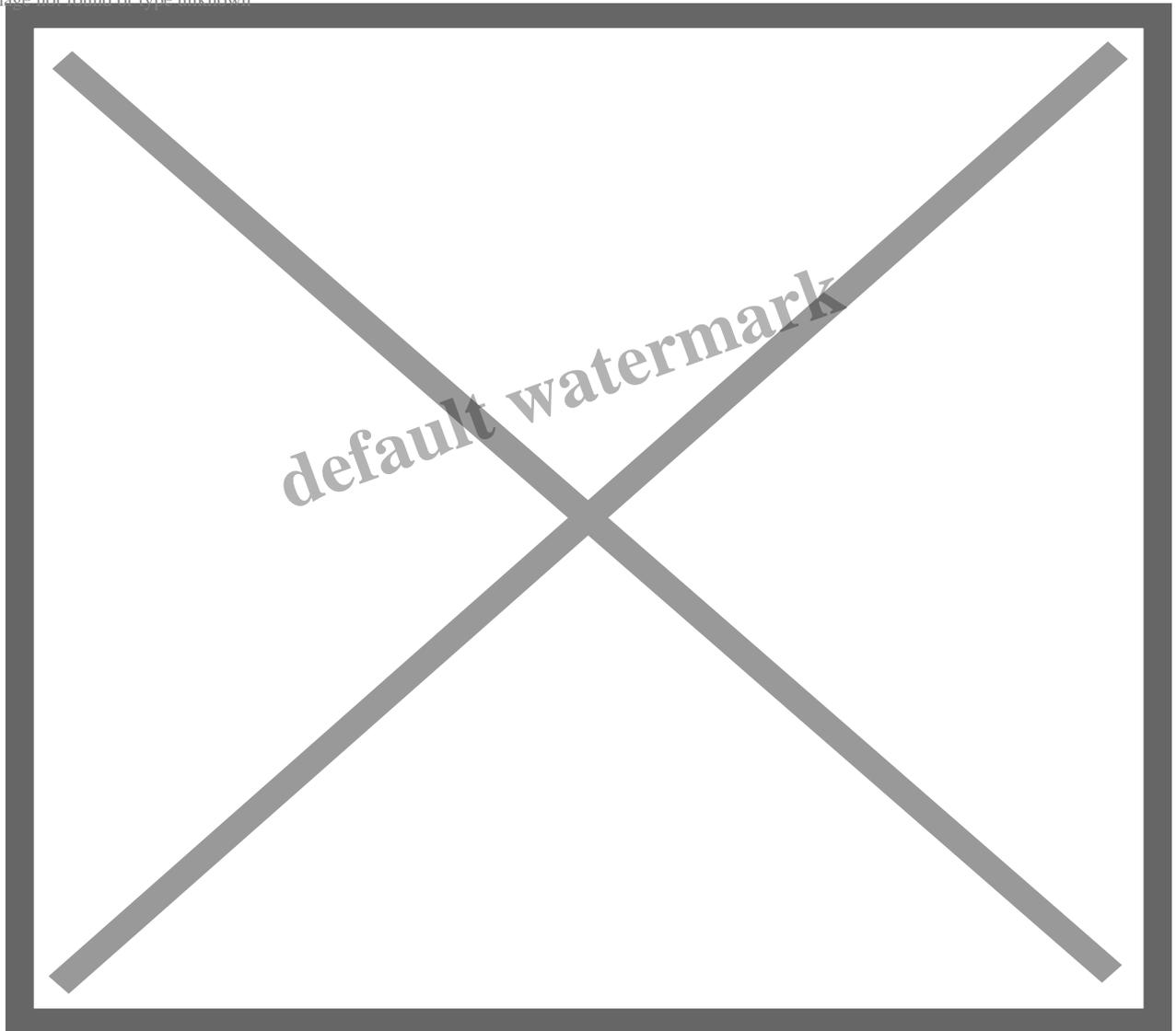


National biscuit bridge

After a bit of legal wrangling, the Dopyera brothers took control of National and merged it with Dobro in 1932. They continued to produce resonators until 1941 when the US entered the Second World War and all production of resonators ceased.

Over the pre-war period, resonator guitars were very popular – to the extent that guitars were produced that looked like resonators but didn't in fact have the resonator cone fitted. These [false resonators](#) (or "Faux Bros") ranged from cheap wooden guitars with a resonator plate painted on the top, through to better quality guitars with a top plate attached, which could either be metal or wood.

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*A Del Oro false resonator from the 1930s: this has a removable wooden resonator cover, but no cone inside. Still sounds pretty good though.*

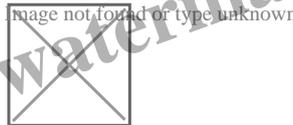
The Dobro name continued to appear in various guises in subsequent decades, before finally being taken over by Gibson in 1993. Metal National guitars were not produced after 1941. These did appear again in the late 1980s though, manufactured in California by [National Reso-Phonic Guitars](#), who continue to make guitars similar to those original Nationals from the 1930s.

## Resonators today

The three main designs of resonator developed in the 1930s – the Tricone, spider bridge and biscuit bridge – remain pretty standard to this day. After their heyday in the pre-war era, resonators lost much of their appeal in the face of the newly-emerging electric options that allowed greater volume through amplification.

Dobros found their home mainly in bluegrass and country music and that has continued through to current times. Metal Nationals were mostly played in Hawaiian and blues music and continued to have a limited niche there. Otherwise, electric guitars filled the space that they once dominated.

However, the shiny National was not forgotten and remained part of the musical fabric, particularly of the southern US.



*“The Mississippi Delta was shining like a national guitar”* Paul Simon, [Graceland](#) (1986)

The old Nationals also received a big boost in interest when contemporary musicians featured them. In particular, Dire Straits’ 1985 [Brothers in Arms album cover](#) featured Mark Knopfler’s 1937 14-fret National Style “O” Resonator.

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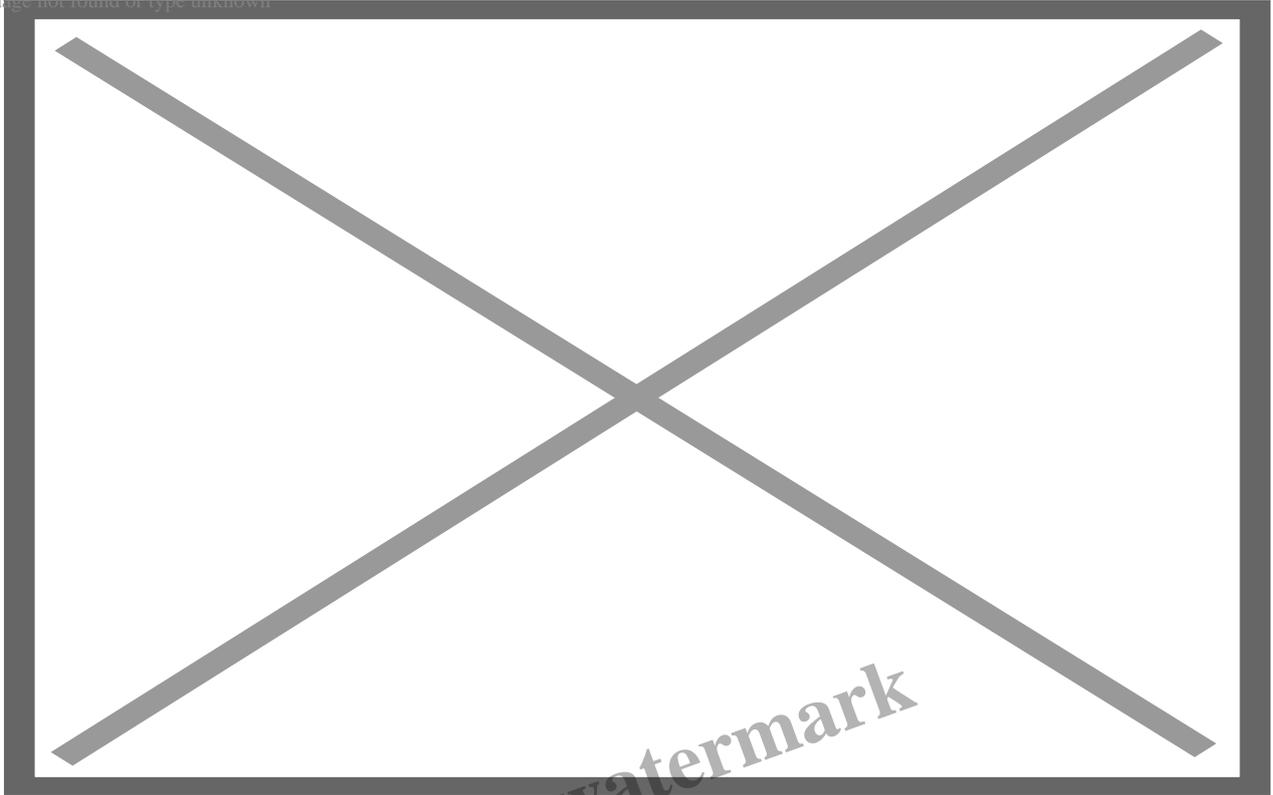


Photo: [Tralfaz-Archives](#)

*Mark Knopfler – Romeo And Juliet (An Evening With Mark Knopfler, 2009)*

Interest in resonators was rekindled, and nowadays there are a wide range of options available, made not only by National Reso-Phonic but also by companies like [Mule](#) and [Beard](#), and also a bunch whose operations are based in China and other Asian countries. These current instruments emulate the original models from the pre-war era, while incorporating modern components.

As always, opinions vary on whether the modern versions are better than the vintage instruments. Vintage resonators are just that – instruments from an earlier era. Some folks like the history and mystique around that, while others prefer the more dependable quality of new instruments.

As well as traditional resonator-style guitars, [metal guitars of various guises](#) have appeared over the years – although unlikely to take over from wooden guitars, metal guitars certainly seem to have their following.

## Holes in the ground

Many types of wood are available for the construction of guitars. What about metal-bodied resonators? Most often they are made from [brass or steel](#), and the shiny ones are usually also nickel-plated. The resonator cones are aluminium. In addition, there are of course other components also made of metal – including tuners, frets, tailpieces and strings. The same goes for most acoustic guitars, and electric guitars also have metals in pick-ups and wiring.

Let's pause for a moment and think about where these metals come from. The short answer is **big holes in the ground** – although they are sometimes holes, sometimes strips, sometimes underground tunnels.

They're all ultimately derived from mineral deposits found in rocks. Steel is made from [iron ore](#), aluminium from [bauxite](#), and [brass](#) is an alloy made from copper and zinc, which in turn come from [porphyry copper](#) and [spharelite](#) respectively. [Nickel](#) is found in laterites and sulfide deposits. Producing the metals involves digging up the raw ore material and processing it into usable materials.

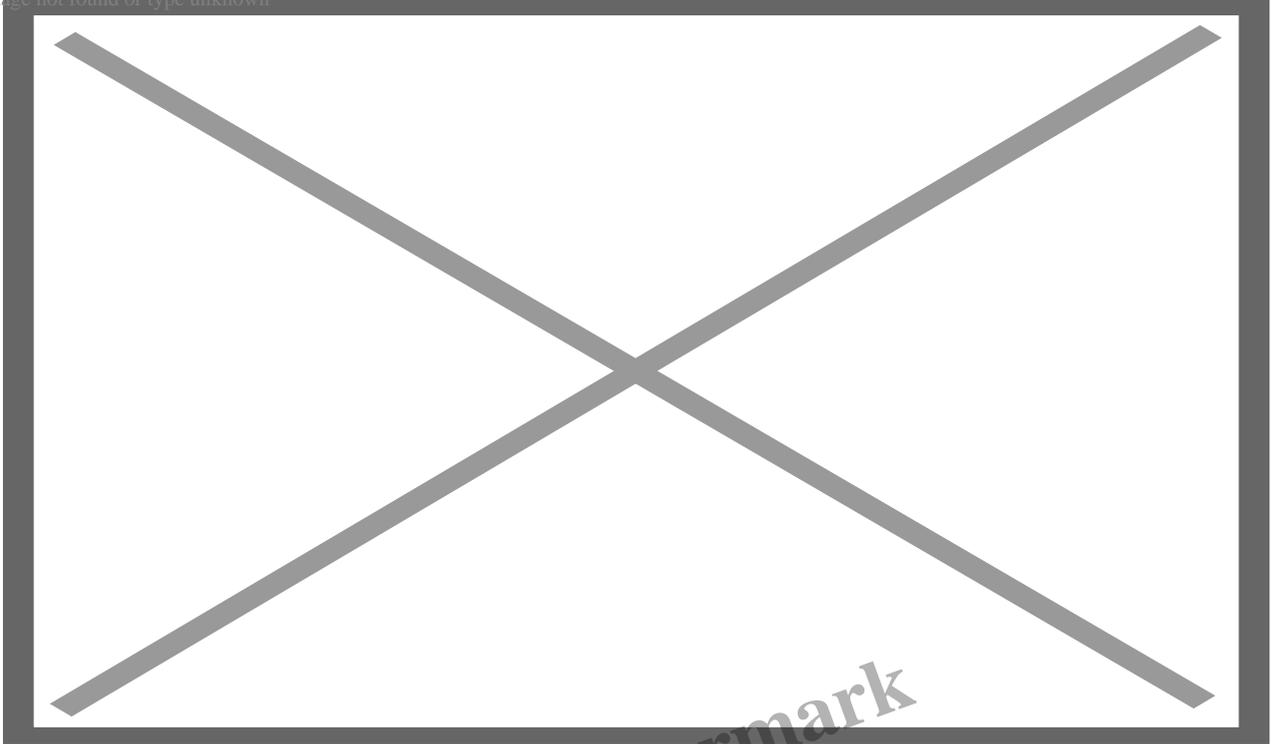
Processing the raw ore can include a variety of processes of [extractive metallurgy](#); leaching, smelting, electro-chemical processing and the like. Some of these, such as the [steel-making](#) process are incredibly energy intensive and also involve the use of a lot of water and fossil fuels, particularly coal derivatives.

## Living in a mining state

It's perhaps appropriate that I should be writing about metal guitars, since I live in one of the [mining centres](#) of the world. The [world production](#) of metals is huge. Western Australia, where I live, has large amounts of the raw materials that produce iron, steel, aluminium, nickel and lots more – including [lithium](#) which has rocketed in importance as a raw ingredient for batteries for electric vehicles and solar energy storage.

The abundance of resources has been exploited enthusiastically by mining companies. Western Australia has [7 of the 10 largest iron ore mines](#) in the world. Much of the dug-up material gets exported, a lot of it to China. It's interesting to speculate that [copper from Western Australia](#) could have gone to China where it was turned into a brass [Bourbon Street](#) tricorne – which has now returned to Western Australia and sits in my study here in Fremantle.

Image not found or type unknown



*Brass Tricone made by Bourbon Street. This is not my study in Fremantle.*

Mining has brought in rich revenues for the state – indeed [minerals and energy extraction](#) make up over 90% of the state’s export income (and over 40% of Australia’s as a whole). In the process, it also sees huge profits being made by large mining companies like BHP and Rio Tinto, and has made some individual mine owners obnoxiously wealthy. The two [wealthiest people](#) in Australia – Gina Rinehart and Andrew “Twiggy” Forrest, each with a net worth of over \$30billion, both made their fortunes by digging up vast amounts of iron ore from the state’s Pilbara region.

## Sustainable metals?

When reading around the topic of metal guitars, I came across an article on Reverb about aluminium guitars – which have a niche following and are produced by quite a few builders these days. The article suggests that aluminium guitars can have many appealing qualities, but also contained this interesting statement:

*“Besides its tone and resonant properties, a case for aluminum guitars can also be built on the material’s durability and sustainability. As one of the most abundant elements on our planet, it’s in much less danger of being severely depleted than, say, mahogany or rosewood, and once the instrument is built, it will effectively last forever with little to no energy devoted to upkeep.”*

*Reverb article by Jamie Wolfert (2014) [“Aluminium guitars – a primer”](#)*

The suggestion that an aluminium guitar could tick the sustainability box better than a guitar made from wood is an interesting proposition. It raises the question of the difference between [renewable and non-renewable resources](#)

Aluminium is an example of a non-renewable resource: there's a finite supply of the raw material and once it's all dug up, there is no more. On the other hand, theoretically, wood is a renewable resource: managed properly, forests regrow and produce a potentially endless source of wood. (Yes, good in theory, but as we've seen in many previous posts, forests around the world have been mined rather than managed).

## Mining cons

Living in a mining state and working as an ecologist, I've frequently bumped into the environmental issues involved in mining. Obviously, digging big holes in the ground or clearing strips of forest to remove ore has to have an impact on the local environment. In fact, it's likely to completely remove the ecosystem and species that were there before mining.

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*Images from [Google Earth](#) of various mines in Western Australia – iron ore mines at Tom Price and Paraburdoo, Nickel mine at Ravensthorpe, and bauxite mining in the Jarrah Forest SE of Perth. Note the scale markers in the bottom left of the photos.*

As mining operations scale up, the extent of this removal increases. As well as the direct, local impacts, there can be a wide range of [broader impacts](#) too, through [dust and water pollution](#) and the effects of the [broader infrastructure](#) supporting the mine – including roads, exploration grids and the like.

All this occurs in places that most likely had important values before the mines started – including cultural and biological values and other uses (such as agriculture).

In the past, mining interests mostly proceeded unfettered by much concern for such values. But in more recent times, environmental and cultural checks and balances have been put in place that weigh the likely benefits of a mine against the values it might threaten. Impact assessments are required in many places and should, in theory, protect against unwanted damage. There are also important obligations placed on mining companies to clean up after mining is finished, as well as undertake ecological rehabilitation to put some semblance of an ecosystem back (to the extent that this is possible given the nature and scale of many mining operations).

Unfortunately, the assessment process is not always thorough – with assessments being done on short timelines and unable to do a full accounting of likely impacts. It's also hard to satisfactorily compare projected profits from the mine against the value of species, ecosystems and heritage. While attempts can be made to put dollar values on such things, the bottom line is that they are valued more in non-monetary ways – which are all too easy to disregard in a [neoliberal money-centred worldview](#). Their demise may not result in a monetary loss but will often have important non-monetary effects.

The assessments are also only part of the picture, and the decision to proceed with a particular project is a political process that can be influenced by many factors. The mining proponents are usually wealthy and influential and often have the ear of government. The promise of jobs and wealth from the mine may sway some in the community to accept the likely damage and loss as a necessary part of reaping the mine's riches. All too often, environmental and social concerns are brushed aside by the prospect of financial gain.

[16 Tons](#) – song by Merle Travis, performed by Tennessee Ernie Ford (1956)  
“You load sixteen tons and what do you get? Another day older and deeper in debt”  
Working in mines has historically been hard, dangerous, backbreaking work. Today’s miners may have better conditions, but still work in extreme environments and often have “Fly in Fly Out” (FIFO) working arrangements that can be hard on family life.

## Social license

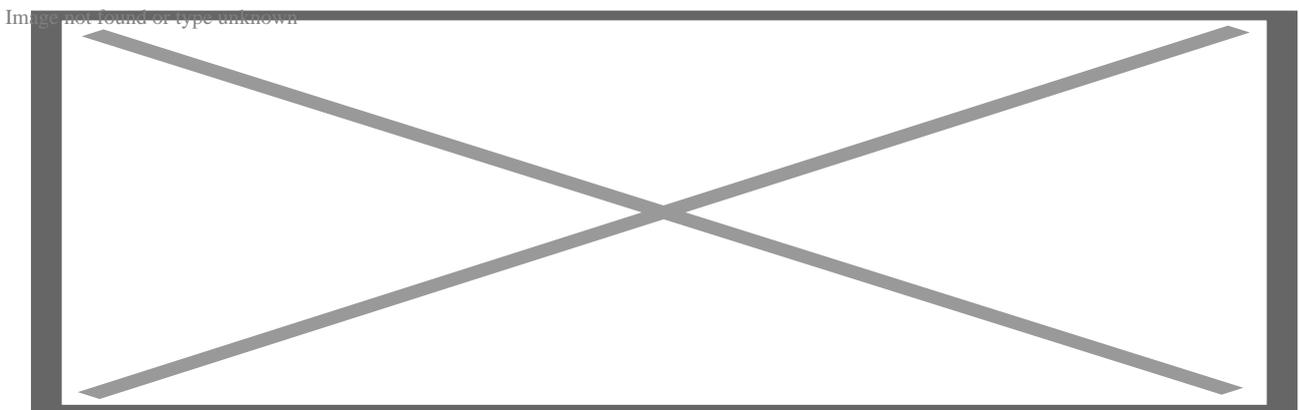
So, this often leads to conflicts between mining interests on one side and conservation and societal concerns on the other. It’s a pretty one-sided contest in many cases, although conservation legislation can spark review and changes to proposals. Usually, however, persistent and effective community action is the main thing that can tilt the balance.

In addition to obligatory formal legal and regulatory licenses, mining companies increasingly rely on a nebulous thing called “[social license to operate](#)”. This is “the informal ‘license’ granted to a company by various stakeholders who may be affected by the company’s activities. Such a license is based on trust and confidence – hard to win, easy to lose.”

Mining companies seek to bolster their social license in a number of ways, including sponsorship of the arts, sports, research and community activities. While this is, of course, to be welcomed, it can also be viewed as a cynical exercise in PR that disguises the company’s otherwise unscrupulous activities (see for example [a recent article](#) on Gina Rinehart’s sponsorship of Australian netball). And usually the amounts of money involved represent an almost infinitesimal fraction of the company’s income and profits.

Regardless of how much support a company provides, if it is seen to be ignoring its broader corporate social responsibilities, it will run the risk of losing public – and potentially political – support. And if mining activity threatens things of value to the community, community push-back can be expected.

Here in Western Australia, we’ve seen numerous examples of this. For instance, long-term community action resulted in mining being prevented in the [Helena and Aurora ranges](#) that contain “banded ironstone formations” – rich in iron but also [spectacularly diverse and unique biologically](#).



Source: [CCWA](#)

## Valuing ore more than heritage

On the other hand, mining giant Rio Tinto significantly dented its social license to operate a couple of years ago by [destroying highly significant Aboriginal sites](#) when it blew up caves in [Juuken Gorge](#) in Puutu Kunti Kurrama and Pinikura country in the Pilbara region. Although such action was permitted under the regulatory agreements, it flew in the face of valid Aboriginal arguments for the preservation of significant indigenous cultural heritage and recognised sacred sites.

Juuken Gorge is just one example of many where Aboriginal heritage is compromised by mining activities, but it represented something of a tipping point. Rio Tinto probably did not expect the huge public backlash – both locally and worldwide. It resulted in an apology from the company, a review of procedures and, eventually, the resignation of the company’s CEO, Chairman and other executives. A review of the legislative procedures that allowed the destruction to happen was also set in motion, recognising the [serious failings of the existing legislation](#).

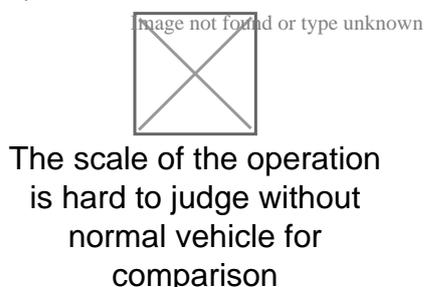
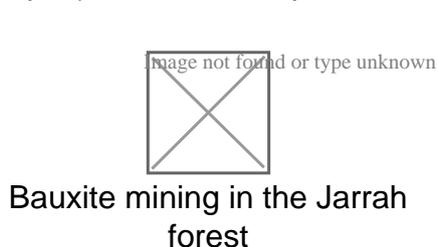
*The full story of the Juukan Gorge sacred site disaster and aftermath | Back Roads | ABC Australia Jan 2022*

*“In allowing the destruction of the Juukan Gorge rock shelters to occur, we fell far short of our values as a company and breached the trust placed in us by the Traditional Owners of the lands on which we operate. It is our collective responsibility to ensure that the destruction of a site of such exceptional cultural significance never happens again, to earn back the trust that has been lost, and to re-establish our leadership in communities and social performance.”*

[Rio Tinto](#)

## Bauxite brawl

[Alcoa's bauxite mining operations](#) in the jarrah forest east of the city of Perth provide another example of waning social license. Alcoa has been mining bauxite in the forest since the 1960s. Mining the bauxite ore involves removing the forest vegetation and surface mining the ore bodies to a depth of a few meters. Following ore removal, the pit site is revegetated with forest tree and understorey species. The process results in a patchwork of pits of various ages and restoration stages across the forest landscape (as seen in the photo earlier).



Since initiating mining operations, Alcoa has progressively improved its rehabilitation methods and by

the 1990s was a recognised world leader in minesite rehabilitation. As a restoration ecologist, I worked with Alcoa on numerous projects aiming to improve their methods and outcomes. They had a strong ethic of seeing their rehabilitation as an important part of their operations, and did a lot to foster restoration science and practice.

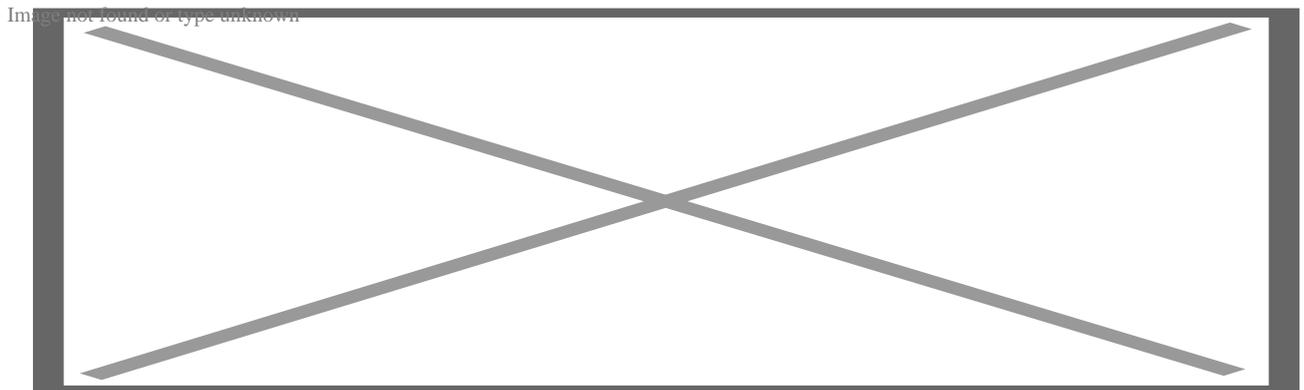
The nature of bauxite mining in the forest does, however, mean that the mining footprint becomes quite large – aerial and satellite views show the extensive area of the disturbance caused to the forest. Although the rehabilitation process is probably as good as anywhere, it still falls short of restoring the forest to the way it was before mining. How can it when several meters of material have been swiped from under the forest that was there before?

In addition, the overall ethos of the company has been gradually changing so that the investment in staff, resources and research effort going into the rehabilitation has lost its leading edge. At the same time, bauxite mining in the forest is under the spotlight currently because of proposals to significantly increase the extent of the mining. [Increased community concern](#) is bubbling over.

The state government is also in the process of instituting [a ban on native forest logging](#), but that does not include mining operations. Concerned community members rightly ask why logging (which removes trees but keeps the rest of the forest there) will be banned but mining (which removes the whole ecosystem) will continue.

We're again faced with a question of whether the forest is worth more to society than the ore that it sits on.

## Is sustainable mining an oxymoron?



*"Is Sustainable Mining an Oxymoron?" Aaron Wells, [The Boss Magazine](#)*

*"An oxymoron is a figure of speech that juxtaposes concepts with opposing meanings within a word or phrase that creates an ostensible self-contradiction." [Wikipedia](#)*

*"A real debate about sustainability and mining recognises that the true environmental costs of minerals is already significant and is continuing to boom – a boom that clearly cannot increase unquestioned forever"*

Gavin Mudd 2007. Sustainable mining – an oxymoron? [TCE – The Chemical Engineer](#), 798/9, pages 27-29.

*“The mining industry moves more earth than any other human endeavor. Yet mining companies regularly claim to practice sustainable mining. Progressive redefinition of the term sustainability has emptied out the concept of its original reference to the environment. Mining companies now use the term to refer to corporate profits and economic development that will outlast the life of a mining project. The deployment of corporate oxymorons like sustainable mining is one of the key strategies corporations use to conceal harm and neutralize critique.”* Stuart Kirsch, “Sustainable Mining”. [Dialectical Anthropology](#) 34, No. 1 (March 2010), pp. 87-93

*“Mining is like a search-and-destroy mission.”* – [Stewart Udall](#), Former United States Secretary of the Interior

*“There are no wastelands in our landscape quite like those we’ve created ourselves.”*? [Tim Winton](#), Western Australian Author

## So – no more mines?

OK, so all that suggests that mining sucks, right? Well, that depends. Mining, like anything, [can either be done well or done badly](#). Yes, the inevitable result is a hole in the ground, but how the process of making that hole and dealing with it afterwards is managed will determine the damage it causes and its value relative to other things.

The unfortunate underlying truth is that humanity can’t do without mines in today’s world. The materials emerging from the holes in the ground provide many things we can’t do without, even with the increasing push towards recycling and conservation measures and renewable energy sources. Indeed making the most of renewable sources [requires metals from mines](#) to build the necessary equipment.

Hence, the social and environmental damages caused by extracting the minerals have to be weighed up against the benefits gained from the use of the final product. Cleaner mining technologies backed up with strict and effective environmental and heritage legislation can make that process easier. In addition, maybe society as a whole needs to press for lines in the sand which declare some areas and sites too valuable to even consider mining.

I live in a state whose prosperity depends, to a large extent, on the mining industry, and I benefit from that in many ways. I know many people in the mining industry who have a job because of the ongoing need to extract minerals from the earth, and most of those people also want to do the right thing by the environment and society. It is, however, a long way from the mine pit to the corporate boardroom where decisions are made and policies and procedures determined. As we’ve seen in [the world of guitars](#), corporate thinking does not always incorporate the good of the people working for the company or broader environmental and social issues.

As consumers, we can make informed choices about the things we buy and where the materials that go into them come from. And we can also exert influence on those corporate decision makers.

*'Mines ... seem to lurk in the public imagination as remote places that are dangerous, dirty, damaging, violent and destructive. They pollute streams, corrupt politicians, degrade communities and explode indigenous artefacts.*

*Or they are places where bad people go – those who exploit and extract at the expense of others, human and nonhuman, and are not concerned about the cost. We seem to prefer not to think about them unless we have to.*

*And yet, we can't live our modern lives without mining. We may slowly be turning our backs on fossil fuels, but what about all the other geological resources with which our lives are entangled? The mined ore in our mobile phones – those palm-size assemblages of cobalt, lithium, copper, manganese and tungsten. The lead and zinc in our car batteries, the aluminium in our bicycles, the steel in our buildings, and the copper in the hidden networks of cabling that hold our worlds together.*

....

*After 26 years, I have learned that all mining operations – actual and potential – require us to pay attention to what is most difficult about our lives: how what we consume relates to the future of the planet and the lives of those we share it with. The problem of mining is not just one of how we should extract, but how we should live."*

Bridget Storrie, [The Conversation](#), September 2022

## Bye bye metal guitars?

So what about all these shiny metal guitars I talked about at the start of this post? Should they be frowned on from an environmental point of view? How do they stack up against regular wood guitars?

As with most things, there's no clear-cut answer to these questions. I think the guy who wrote the Reverb article on aluminium guitars was drawing a fairly long bow to suggest that they might be more sustainable than guitars made from some types of wood. But on the other hand, there's far less metal in a resonator guitar than your average SUV, Harley Davidson, or even bicycle or refrigerator.

The new metal resonator guitars available from National Reso-Phonic, Mule and others are very nice guitars, as are the array of cheaper resonators from China and other Asian countries. Cheaper doesn't necessarily mean lower quality, even though some folks will argue that it does. The proof is in the playing.

They are all, of course, made from metals freshly dug out of a hole in the ground. If that fact turns you off, there's always the vintage market to consider. Buying a used guitar is a great method of recycling – and the older Nationals and Dobros can be very cool indeed. Interestingly, only a few varieties from the 1920s-40s are considered really valuable (in comparison to some of the wood guitars from that period).

It's certainly the case that resonators from that era have not all travelled well through time. A vintage resonator may require a fair bit of work to bring up to scratch. But if you can fix things up, you can end up with an amazing guitar that transports you right back to that era of wonderful music.

As well as reusing old guitars, some builders are making new guitars with recycled materials. And some of those are pretty cool too.

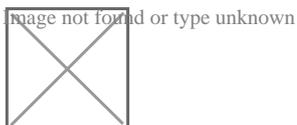
## Rustbuckets – resonators from recycled iron

[Don Morrison](#) is a musician who spent many years on the road playing in pubs and clubs around Australia. He wrote a very amusing book about his experiences, wryly titled "[This Could Be Big](#)". He's also been making amazing resonator guitars for over 20 years. Based in Adelaide, he makes resonators from a variety of materials, including old galvanized corrugated iron sheets – fence and roof materials that he scavenges from sheds and farms. This material can have a history of its own and be 100 years old or more.

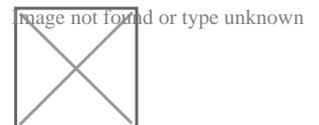
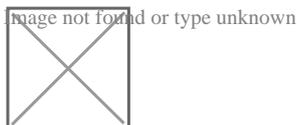
I'm the proud owner of one of Don's "[Rustbucket](#)" guitars. This combines the reclaimed corrugated iron sheet with a neck of Blackwood salvaged from furniture from a local community radio station 3D premises and a fretboard is of Gidgee from Queensland.

The iron bears the insignia "Adams-Mars". After a bit of ferreting around, I found that this meant that the iron came from the [Mars Iron Works](#) of [George Adams and Sons](#) in Wolverhampton, England. The company appears to have operated from 1867 until the factory closed in 1925.

Corrugated iron from the Wolverhampton factory was then shipped across to Australia for sale as a construction material. Adverts for Adams-Mars can be found in South Australian newspapers in the early 1900s, and it's likely that the piece of iron in my guitar dates from around that period. Another amazing thought, that the iron smelted in England made its way over to Australia over 100 years ago, spent most of its life as part of a shed, and then ended up being re-crafted into a fine resonator guitar.



Source: [Flickr](#)



Guitars made from metal are no better or worse ethically and environmentally than guitars made from wood. The same set of issues underlie each, and alternative approaches are possible in each case. Being aware of the issues should not dissuade anyone from admiring and appreciating the beautiful instruments produced from the raw materials, whether these are derived from minerals or from living things. In fact, it can enhance one's appreciation through an increased understanding and sense of awe regarding the wonderful things that are in the world. Human ingenuity can work with these natural wonders and turn them into works of art. That same ingenuity can be directed at making sure that we're doing that in ways that will prevent and reduce harm to the planet and its inhabitants.

*Booker White – Poor Boy Long Way from Home*

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