

MINA INVIERNO

ENERGY SECURITY



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A Chilean coal project that is going to create a greater level of energy security while increasing the economic activity of a region that has long been stagnated

WRITTEN BY: **ALAN SWABY**
RESEARCH BY: **ABI ABAGUN**



It must have been a nightmare for the first settlers who opened up the very far south of Chile. The country has something like 6,000 islands and most of them seem to be in the south. It no doubt came as a huge relief to set foot on what is today known as Riesco Island. At almost 200,000 square miles in area, it is big enough to feel like terra firma and, although the explorers didn't know it at the time, it is home to Chile's largest coal deposits.

The island has been populated by sheep and cattle farmers for a hundred years, who stripped half the island of its trees to create grazing space. When the wood ran out, life in this cold part of the world was kept reasonably comfortable thanks to outcrops of coal that were easily found on the surface. In fact, it was because of coal that the region's capital – Punta Arena – was established in the mid-1800s as a penal colony.

These coal deposits have been mined commercially in the past but never on a massive scale. At one point 100,000 tons a year was being taken, but from deep underground, and it got to a point where it wasn't economical. It's not particularly surprising that the venture never took off in a big way, as Punta Arena is closer to Antarctica than it is to the capital Santiago. Then, since the 1960s, the government spent a considerable amount of money prospecting and discovered three large deposits of coal on the island with a minimum of 300 million tons, and some estimate there could be as much as a billion tons – certainly enough to keep the lights on in Chile for many years.





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Construction of the new port

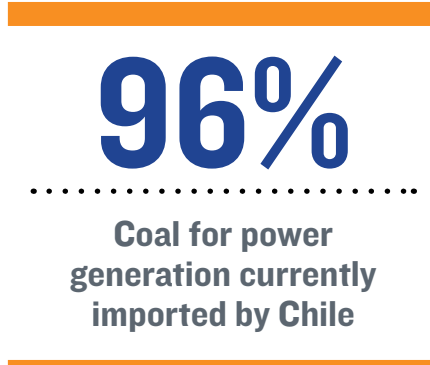
"ALWAYS PRESENT IN LARGE ENGINEERING PROJECTS"



Around the turn of the millennium, BHP Billiton was given a lease to mine for coal and in 2006 the other two deposits were sold by public tender. "We acquired the rights for the two outstanding leases," says Ian Philippi, commercial director of Mina Invierno, "and we also bought from BHP the mine lease already in place and the option to take over BHP's lease when it expires in 2017. Together they form a base of 250 million metric tons of coal reserves, enough to operate for the long term, providing around a third of Chile's

coal needs." Considering that 96 percent of coal for power generation currently has to be imported, this will have a huge impact on the country's finances, and still leave sufficient capacity to generate export sales.

Mina Invierno is actually a joint venture between EmpresasCopec (fuel distributor) and Ultramar (shipping company) – which already successfully developed a similar coal mine venture in Chile in the early 1990s. "Many of the engineers and managers who worked on that project," says Philippi, "are involved with



EMPRESA CONSTRUCTORA BELFI S.A.



Empresa Constructora Belfi S.A. is the company in charge of construction for the Project Mina Invierno under EPC contract, the coal loading mechanized pier in Riesco Island, Punta Lackwater sector in Chilean Patagonia.

The company:

Empresa Constructora Belfi S.A. started operations in Chile since 1950, first as a limited company and since 1965 as a private corporation. During its long history, the company has built important projects in almost all fields of engineering, such as port and maritime works, architectural works, earthworks, road surfaces, bridges, tunnels, hydraulic and sanitary works, civil works, electrical, structural, electromechanical, pipe assemblies, instrumentation and automation. The company is certified under standards ISO 9001:2008 and OHSAS 18001:2007

Experience:

The wide experience gained by the company in more than 60 years, together with an efficient work team and appropriate machinery, guarantees good execution of any project. Belfi has successfully carried out about 50 EPC projects.

Belfi S.A. is a leading company in Chile in building maritime works, such as ports, mechanized piers, submarine outfalls for wastewater and industrial effluents and big siphons for thermal power stations and desalination plants. We believe that 90% of outstanding works in this field in Chile have been carried out by our company.

For almost 10 years, Belfi has been executing works outside Chile, firstly in Peru, then Uruguay and Ecuador, countries where we are currently working. Next, we will be working in Colombia.



MEJILLONES PORT COMPLEX - CHILE



PUNTA CHUNGO SEAPORT - LOS VILOS - CHILE

Mining:

The mining industry has always featured in our history; firstly, through projects with Codelco - Chile and then big private mining companies, for which we have built works like access roads for mines in mountains, massive earthwork for esplanades to built offices, camps and industrial facilities for the mine, tailing dams, very long mineral pipelines, industrial facilities for important civil works and structural assemblies, electrical lighting and power, mechanics installations and instrumentation, mechanized piers for loading concentrate, coal loading and unloading, etc.

Works:

The scope of works under construction by Belfi for Project Mina Invierno, is the following:

1. Crushing tower: The project involves the construction of two primary and secondary crushing towers to crush material extracted from the mine. These crushing towers include the construction of auxiliary works:

- Electromagnet tower. - Conveyor belts.

2. Material transport system: A system of two conveyor belts with more than 1,120 meters of belts, from the crushing tower to the loading platform at the pier. Throughout the transport system, the material will go through the following complementary works:

- Transfer tower. - Weight meters.
- Sampling tower. - Counterweight tower.



GNL MEJILLONES SEAPORT - CHILE

3. Pier: Mechanized, capable of serving vessels such as Handy type, Panamax and Capesize. The pier will have the following elements:

- Loading platform adequate to attend bulk carriers.
 - Two cargo platforms with enough surface to serve a shiploader each.
 - Access bridge for the loading platform with 411 meter length, adequate to erect transport belts with transfer capacity of 3000 metric tons of coal per hour.
 - Pedestrian walkways between access bridge and anchor poles.
 - Two breasting dolphins with flexible defense to dock vessels.
 - Four anchor poles with release hooks.
 - Docking cleat, buoys, poles and/or other mooring systems.
 - Navigating lights for emergency signals and to protect the facilities.
 - Pedestrian walkways between breasting dolphins, between anchor poles and between breasting bridge and anchor pole.
- 4. Auxiliary infrastructure and facilities:** Access and circulation roads, power room, changing room and offices, warehouse and workshop.

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ARA WORLEYPARSONS

ARA WorleyParsons, a recognized authority in the design of infrastructure for mining operations, is proud to have successfully delivered its front end consulting, engineering, purchasing, costing, scheduling and site services capabilities to the Mina Invierno Project.

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Almost all Chile’s coal fuelled power stations are in the north of the country – around the capital Santiago and beyond. The only way to get the coal there from Riesco is by ship – a journey of 2000 to 3000km, taking seven or eight days. So the Mina Invierno project consists of two parts – the mine itself and a new port and loading facilities.

“Despite our Chilean customers being restricted to Panamax sized vessels, or 70,000 tons dead weight,” says Philippi, “the port at Mina Invierno will be able to accommodate much larger ships of up to 140,000 tons. This gives us the option, which we are already actively pursuing, of exporting part of the mine’s output.”

The \$550 million project is being financed by a \$450m loan from Chile’s Itaú Bank and work is already underway. The port has the longest lead time and in April 2012 is around 40 percent complete, as is the civil construction work at both locations. The mine won’t be going underground but has identified



Riesco Island nursery




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“THE PORT AT MINA INVIERNO WILL BE ABLE TO ACCOMMODATE SHIPS OF UP TO 140,000 TONS”



Invierno pit area



The mine's modern greenhouse



Livestock are part of the company's environmental strategy

“WE KEEP THE LOCAL COMMUNITY VERY WELL INFORMED AND THERE IS A HIGH LEVEL OF AWARENESS AND ACCEPTANCE OF WHAT WE ARE DOING”

coal deposits starting at around 30 to 40m below the surface, down to a maximum depth of 180m. Pre-stripping of overburden has started and the material is being used in the construction of a new 7km long road between the mine and the port.

“The mine will eventually have a fleet of 15 x 240 ton trucks to move the overburden,” says Philippi, “and three shovels with 34m3

buckets. To move the coal to the port there will be two smaller shovels and 11 x 100 ton trucks.” All the equipment is already in Chile, most of it assembled on site.

Phase I of the project should see the first coal being shipped by the end of the year and production will gradually ramp up to six million tons per annum over a four year period. With reserves in Phase I of over 70

million tons, there is enough to be going on with for a decade.

Despite its strategic importance to the country's balance of payments, the project hasn't been given the go-ahead without some opposition. Environmentalists are concerned that the mine will lead to de-forestation on the island, but Philippi argues that the farmers have done that job for them long ago. Nevertheless, Mina Invierno has undertaken to refill the open pit mine using the removed overburden, and re-forest more than 500 hectares on the island as part of its exit plan. It is already growing thousands of saplings for that purpose.

Away from the cozy comforts of Santiago,

where most of the vocal opposition comes from, the local population is strongly in favor of the project and trying desperately to keep the discussions with Mina Invierno strictly at the local level. “We keep the local community very well informed,” says Philippi, “and surveys show us there is a very high level of awareness and acceptance of what we are doing. There will be a workforce of 1000 during construction and once complete, 700 permanent jobs in an area that is otherwise stagnant.” **BE**

For more information about Mina Invierno visit: www.minainvierno.cl



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