

Gariuai



Projekto Mini Enerjia Hidrika **Mini Hydroelectric Power Project**



Mos no Renovavel

Eléktrisidade importante ba nasaun nebe deit. Hamenus kiak liu husi forneseamento enerjia eléctrisidade nebe sufisienti no seguru hodi suporta administrasaun públiku, saúde, servisu komérsiu no industria. Timor-Leste iha limitasaun esperiênsia no interupsaun fornecimentu, problema ba buat rua neê mak hanesan operaun existensia infraestruturua no dezemvolvimentu buat foun nebe susar tebes hodi kria servisu no reseita.

Projecto Mini Hidrika Gariuai, sai nudar primeiru konstrusaun sentral mini hidrika iha nasaun neê, kontribui hodi hadia situasaun. Eléktrisidade fornese husi bé moris rua, nebe uluk uja ba irigasaun. Ida neê enerjia ida mos, renovaves, dura ba tempo naruk e diak ba ambiente, ho folin ba operaun menus, tetu ba gerador diesel nebe existi.

Neê mak rezultadu ida husi kooperaun entre Governu Noruega no Governu

Timor-Leste hodi hametin sektór enerjia. Suporta finanseira no téknika mai husi Noruega. Trabalhadores husi aldeis lokal, projektu neê preve mos treinamentu. Autoridade Eléktrisidade Nasionál EDTL kontribui materiál balu ba konstrusaun lina transmisaun, no autoridade ambiente sira DNSA kontribui iha filtrasaun ambienteál no planu monitorizasaun.

Iha tempu badak, be husi be matan rua produs eléctrisidade molok be nee sulin ba natar laran. Ho nunê bele hamenus nesicidade hodi sunu gazoel nebe karun no halo polusaun. Treina trabalhadores rai nain liu husi emprega sira liu konstrusaun neê. Estasaun eléctrisidade neê ho ninia manutensaun nebe propeu sei posivel lao durante tinan 100. Ida hanesan inisiativu diak ida, no hau orgulho tebes hola parte husi neê!

Alf Adeler, Senior Asesor



Clean and Renewable

Electricity is important for any country. Poverty reduction through reliable and sufficient supply of electricity supports public administration, health, trade, services, and industry. Timor-Leste experiences limitations and supply disruptions, a problem for both operation of existing infrastructure and the development of new – making it harder to create work and revenues.

The Gariuai Mini Hydroelectric Power Project, the first mini hydropower station in the country, contributes to improving the situation. It generates electricity from two springs, before the water is used for irrigation. This is clean, renewable, environmentally friendly energy, with low operating costs, as opposed to the existing use of diesel generators.

This is a result of cooperation between the governments of Norway and Timor-Leste to strengthen the energy sector. Funding and technical support from Norway. The workforce is from local aldeias, and they have received on-site training. The national electricity authority EDTL contributed some materials for the transmission line, and the environmental authorities DNSA to environmental screening and monitoring plan.

In short, the water from two springs generates electricity before it flows into the rice paddies. This reduces the need to burn expensive and polluting diesel. Local people have been trained and employed through the construction phase. The power plant will, with proper maintenance, run for 100 years. It is a fine initiative, and I am proud to be a part of it!

Alf Adeler, Senior Adviser

Bé Matan Enerjetíko

Sentral mini enerjía hidríka ba dala uluk opera iha Timor Leste, konstrusaun lao dadaun iha Gariuai, iha komunidadade ki'ik situado entre cidade Baucau no Venilale.

Produz Eléktrisidade

Sentral hidríka produz eléktrisidade liu husi bé sulin no fo presaun ba turbina. Halibur bé hamutuk iha fatin ida neêbe a'as husi fatin turbina no sulin liu husi kanu tun hodi fo presaun ba turbina. Makina jerador liga ba turbina hodi produs eléktrisidade, nebe disponivel iha lina transmisaun eléktrisidade.

Iha Gariuai, bé halibur husi bé matan rua mak hanesan Wainalale no Builai, molok suling tuir kanu ho distansia



metrus 1700 tun ba iha sentral eléktrisidade no turbina, ho diferensia elevasaun metrus 187. Ho volume bé litros 202 kada segundu produz presaun ho forsa nato'on hodi dulas turbina hodi produs enerjía másimu 326 kw (rihun watts), depende ba disponibilidade bé nian nebe iha mudansa durante iha tinan ida nia laran. E depois bé neê sulin hikas fali ba mota hodi bele kontinua uza ba irrigasaun natar no fornimentu suco sira nian.

Enerjía ba Povu

Eléktrisidade produz iha Gariuai preve ba povu sira nebe hela iha area neba liu husi lina transmisaun local, inklui iha sidade Baucau. Konstrui tiha ona lina transmisaun hodi liga sentral electricidade hidríka ba lina nebe existi 20 kv, ho distansia kilometru 4. Produz eléktrisidade kontinualmente, hodi fornese enerjía iha kalan no loron. Permite ba manutensaun oras 360 kada tinan, periodo servisu sentral enerjía oras 8400 no produsaun anual kuaze 1.5 gwh (kalkula husi kalkulasaun fornimentu bé sulin nian).

Produsaun eléktrisidade sentral mini hidríka Gariuai preve adisaun signifikante ida ba area Baucau. Ohin loron, produz eléktrisidade utiliza gasoel, nebe karun dadaun no mos halo polusaun ba ambiente. Enerjía hidríka mós, renovavel, seguru, enerjía nebe diak ba ambiente, ho folin operaun nebe baratu no esperansa moris naruk nebe povu Timor Leste nia presiza.

Kréditu ba Trabalhador Sira

Kuaze trabalhadores 1500 participa iha konstrusaun sentral enerjía, liu husi sistema planu rotasaun, servisu kada semana



rua nebe envolve aldeia ualu (8), seguru tamba fo benefisia rendementu ba ema barak no treinamentu liu husi projeto. Rotasaun neê jere husi jestor konstrusaun Sr Vasco Pinto rasik nudar ema local, kolaboraun ho chefe suco Sra Maria Lidia de Jesus Belo. Projeto neê inklui konstrusaun kilometru 4 estrada temporáriu ba iha fatin projetu nian, keê no depois taka hikas fali rai koak kanu nian ("penstock") ho distansia metrus 2350, konstrusaun tanki inan iha bé matan rua, kulvert no tunel, instalasaun kanu, prevensaun erosaun rai nian, konstrusaun sentral enerjía (hamutuk facilidade seguransan no armazem) no asembleia ba turbina, no mos hamos dalan portaun nian, hari airin eléktrisidade nian no dada fiu ba lina transmisaun ho distansia kilometrus hát. Konsidera hanesan servisu bo'ot nebe grupo neê komite ona.

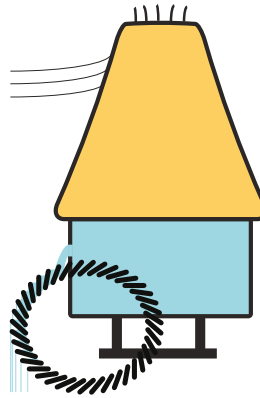
Adicionalmente iha projeto, participa mos: Grupu joventude balu hodi pre-



para ai-riin eléktrisidade iha Dili molok tula ba fatin projektu. Estudante eskola vokasionál local husi Fatumaka partisipa nudar estajiáriu. Konsultór externa liu husi kooperasaun ho autoridade ambientál sira (DNSA) halao filtrasaun ambientál no planu monitorizasaun. JV Norconsult/ Norplan Noruega ho planeamentu no konsultoriu. Fundasaun Bouvet preve material informasoes. Administrasaun projeto mak Ministerio Infrastrutura liu husi Hidro Timor.

Husi Povo Noruega

Projektu ne'e hanesan parte ida husi kooperasaun instituisional entre Dir-esaun Rekursu Bé no Enerjía Noruega nian no Ministerio Infrastutura. Projectu ne'e hanesan parte ajuda husi Noruega ba Timor-Leste. 🇳🇴



HydroTimor

Energetic Springs

The first mini hydroelectric power plant operating in Timor-Leste, has been built in Gariuai, a little community situated between Baucau city and Venilale.

Generating Electricity

A hydropower station generates electricity by leading water under pressure through a turbine. The water is collected from a place higher than the turbine site and led through a pipe down to the site. A generator is connected to the turbine and produces electricity, which is then available through the electricity grid.

In Gariuai, the water is collected from two springs, Wainalale and Builai, before being piped 1700 metres down to a powerhouse with turbine, 187 metres lower. The up to 202 litres per second of water create enough pressure to run a turbine generating a maximum of 326 kw (thousand watts), depending on availability of water, which changes during the year. Then the water is released back to the stream, where it continues to irrigate rice paddies and supply villages.

Power to the People

The electricity generated in Gariuai is made available to the people living in the area (including in Baucau city) through the local power grid. A transmission line has been built to connect the powerhouse to the existing 20 kv grid, four kilometres away. Electricity is generated continuously, providing power night and day. Allowing for 360 hours of maintenance per year, the plant will operate 8400 hours and produce around 1.5 Gwh annually (calculated from estimated available water flow).



The Gariuai mini hydroelectric power plant is a significant addition to the Baucau area. Today, electricity is generated using diesel, which is expensive in addition to polluting the environment. Hydropower is clean, renewable, reliable, environmentally



friendly energy, with low operating cost and long life expectancy – what the people of Timor-Leste need.

Credit to the Workers

More than 1500 local workers participated to the construction of the plant – many through a two-week rotation scheme involving eight aldeias, securing that many people benefited from income and training through the project. The rotation was managed by the construction manager Mr Vasco Pinto, himself a local, in cooperation with the suco leader Mrs Maria Lidia de Jesus Belo. The work included construction of four kilometres of temporary roads to the site, digging and later backfilling of 2350 metres of ditches for the pipes (“penstock”), construction of intakes at the two springs, two culverts and one tunnel, of pipe installation, soil erosion prevention, construction of power house (with security and storage facilities) and installing of the

turbine, as well as gate clearing, pole erection and cabling for the four kilometre long transmission line. A considerable amount of work done by a committed crew!

In addition to the site workers, others participated: A crew of youth with preparing the electricity poles in Dili before transportation to the site. Students with the local vocational training institute in Fatumaca as trainees. An external consultant in cooperation with the environmental authorities (DNSA) with the environmental screening and a monitoring plan. The Norwegian JV Norconsult/Norplan with planning and consultancy. The Bouvet Foundation with information materials. The Ministry for Infrastructure through HydroTimor with project administration.

From the People of Norway

This project was a part of an institutional cooperation between the Norwegian Water Resources and Energy Directorate and the Timor-Leste Ministry for Infrastructure. The project is a grant from Norway to Timor-Leste. 🇳🇴



Gariuai

Projekto Mini Enerjía Hidrika

Mini Hydroelectric Power Project

Dadus Tekniko Importante

Technical Key Data

produsaun annual	1.5 GWh	annual production
tipo turbina	pelton	turbine type
kapasidade turbina	326 kW	turbine capacity
kanu be dalan	2350 m	penstock
rede aério	187 m	net head
diskarga máximu	202 l/s	maximum discharge
lina transmisaun	4 km	transmission line
folin konstrusaun	USD 2 mill	construction cost
folin enerjía	USD 0.07 / kWh	cost of energy
anual paupa ba enerjía diesel (sira seluk)	USD 300,000	annual savings vs diesel (ex investment)

Informasaun Barak Liutan Bele Hare Iha

More Information

web site	www.hydrotimor.com	web site
dirasaun eléktronika	info@hydrotimor.com	email address

tradus ba tetum

carlos freitas & kassius klei ximenes

translation to tetum

foto, layout & produsaun

basil rolandsen ♥ bouvet foundation
www.bouvet.info

photo, layout & production