ORGANIZATION
will be the key point

The 3 Regions in a commonwealth:
Apurimac, Ayacucho and Ica
can build their own railway
which is Highly Feasible
NO need to activate MTC

Without creation of an
AUTONOMOUS AUTHORITY
for Railroads
Peru will not be able to advance
- not a single step ahead -

Railways

for Peru

Feasibility of Railroads
Energy Generation and Regeneration
Procedure for the Construction
Financing and Mortgage
Generation of massive employment

print-out of www.pusac.org
December edition 2022

Exclusive Summary

Motto: Mining in Perú
- is a locomotive for the economy - but without rails

Exclusive Summary

NOTE:
Rail laid for mine-trains could be very useful for trains of the civil society

THERE IS A DIFFERENCE between railways and trains:
Railroads, railways, ways, tracks, roads and motorways are all infrastructure, and therefore property of the society - of the citizens
Trains are property of the carriers, the transport-companies (just as cars on the roads)
On a railway for mines can run any type of trains, inclusive passenger trains and common cargo trains - together with the heavy material from the mines

FEASIBILITY:
A railroad for mines hold its own feasibility by the flow from the mines paying for their transit
And the mines need a railway to create their flow - Because without flow there is no business
But the mines can't build railways, because they doesn't have any rights nor responsability outside the border of their concession - and they can't expropriate nothing.
Therefore it is the society as have the initiative
If there is no flow garantized by the mines, the people along the route need to create a flow, as can make the railway line economical practicable.
If they can't create sufficient flow (cargo and/or passsengers) as can pay, the people need to give up and leave their railway
- that is what happened with the Central Railway in Peru (FCA) - leaving transport of passengers

Financial MECHANISMS:
Any Local, Regional or National government (MEF) can borrow some Giga-Dollares from World Bank or IDB - or from any bank
The mines can GARANTIZE this loans with the purpose to lower the rent - the don't need to invest directly
The bill as the mines have to pay for tons x kilometers transported over rails is what will reimburse (x años) the loan - and free the mines for their commitment of guarantee
MORTGAGE is a financial tool directed at REAL ESTATE already build
The key concept is to replace a personal bank guarantee for the construction works with a more permanent guarantee on basis of the same real estate just build

Condition:
without creation of an
AUTONOMOUS AUTHORITY
- a new ENAFER -
Peru will not be able obtain a railway

TIME plan for a speedy project
We need 1 year for research, to look for and choose a model for a railway and then to transfer the technology
We need 3-4 years to organize and construct physically the rails - inclisive the expropriations

The quickest PROCEDURE is:
1): Identificate the best suited railway in the World - a task for the authorities and experts
2): Negotiate and purchase their technology - a task for the economists and technicians
3): Transfer the technology to the Andean reality - a task for the engineers
4): Fisically construct a railway for Las Bambas - massive employment for men and women from the villages
5): After that expand a railway network to all the mines of Apurimac, Cusco, Ayacucho and Ica - more employment to the country people
6): Recycle the technology for a next railway as Cajamarca or Pucallpa - task for the engineers and constructors

COSTS for the railroad for Las Bambas is considered to some Giga-Dollars

To compare:
Perú is a mine country by excelence. They export Gold, Silver, Copper, Zinc, Lead, Phosphate etc etc
The value of the exportation of metalic mineral is over 50 Giga-Dollares a year
- that is a value as is equal to several railways to Las Bambas

A RAILROAD AS MAY GENERATE A MASSIVE EMPLOYMENT
To construct a railroad will be a locomotive for massive employment in a time of pamdemic
We could say: Building af infraestructure of any type at once will create MASSIVE EMPLOYMENT for men and women in a pandemic age - and that is what we want.
NOTE: a great part of the costs for construction is used for payment to workers and employed

Klaus Lynge
EUR ING

Declaration:

This 'Pusac Sac' railway project is made freely available to the Peruvian authorities, renouncing any intellectual property expressed in this description of "Railways for Peru"

- and patiently PUSAC continue waiting for the arrival of any local, provincial and/or state authority to receive this donation

Mining transport

If Peru want to construct just NOW

Peru don't need to waste time in a self-development of railway technology
All technologies are at disposal in some place of the World - to study, adapt and tailor to the reality of the Andes mountains

Identify -
Negotiate -
Transfer -

Railroads as a social work

ATTENTION (warning):

Any human activity has an impact - too on the nature
The following pages will walk around and explain the many aspects of the proposed rail project.

The undefined invoice

We have not been able to define a fixed price for the construction, because nobody has made any decisions about where, how and who - or how long, what size etc.
We have given an indication of the amount of money needed as an estimated lump sum like "some GigaDollars" and that's it.
But we have proposed a coordination with the owners of the mines to obtain a more economical BANK GUARANTEE for the financing of the construction, and we have expressed the proposal to establish a Mortgage system for real estate - useful too for the railway when build.

The World will move for money

Without enough money we can't do much, but like any project: results will only be achieved by organization .
Therefore the first recommendation is to CREATE an AUTONOMOUS AUTHORITY - an ENAFER - with the task to organize and build - and after then manage the railways of Peru.

The impacts

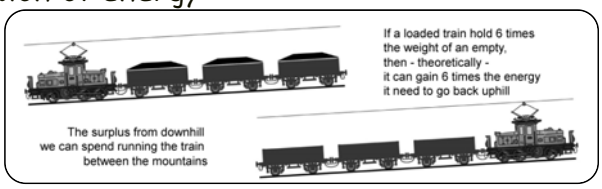
We talk about the economic impact but also the social impact and the ecological and climate impact
However. We recommend starting the project for social reasons - NOW -
Because Peru is in a STRONG ECONOMIC DEPRESSION due to the exaggerated blocking of activities in the time of Covid.
But the company will get a good price-utility ratio because mining railways are very feasible

No trains - only rails

We have removed rolling stock from public investments because it is 100% imported stuff and has no economic impact on the population.
Rolling Stock is the obligation of private carriers and transport users to buy what they need, just as they do with their cars on public roads.

Production and regeneration of energy

A mining transport system ¿that it will never consume energy?



A mining transport system - ¿could it really generate its own energy?

Off Hydropower plants we have many in the Andes.
By passing 1 million tons of water to a turbine, certain electrical energy can be generated - thus by downloading an equivalent million of mineral theoretically and scientifically we can generate the same amounts of electrical energy. That we know.
There will be loss in energy transformations, that is all we know, because in this we have very little experience.
But in all circumstances we have the option of generating and regenerating energy - and that is what is important

We still have the problem to solve: How would be the best way to accumulate the generated energy?
By batteries in the locomotive - or in a hydraulic reservoir of the hydro-electric network? ??

The Option to generate own energy - Something like a "Fata Morgana" = an illusion - or not?

The dream is: start a loaded train from Las Bambas, drive it up the eastern slope, pass the pass in 4300 meters and go down to a port in Marcona.
The hope is to generate so much energy that the train has enough to return empty from Marcona, climb the western slope and go down to 'Las Bambas'
Still an utopia ? ??

Post Note: *'Las Bambas' is located at 4000 meters altitude and 360km in direct line from the port of Marcona.*
The distance by road to 'Las Bambas' is 7-900km and takes 17-19 hours by car.

PUSAC SAC

Certification:

¡ The country stay bad !

- the people suffer unemployment, poverty, need and hunger -

THIS IS A POST-COVID DONATION

The economic collapse as aby an electric operated train consequence of the struggle against the pandemic of Covid with its confinement and curfew bring the need to inject economy in the people by generation of employment - as an alternative to distribution of social assistance to the families -

no-print

The fundamental idea is to generate employment for the people.
The company PUSAC recognises their social responsibility and want to donate their Peruvian homeland their project of heavy mine transport.
Railway lines for mine transport bring their own feasibility by the flow from the mines.
The project will serve to generate employment by the construction of a railway for the Peruvian society - to disposal both for mineral transport from the mines - where the mines can offer the needed feasibility for the construction - but the railway too will stay at disposal for public transport, running on the same rails.

Roads and ways of any sort are property of the society and are for EVERYONE!

This project is Free and Gratis for the country of Peru

DONATION of the Railway project
with its indication of rules and key points - with its plan of procedure
with its ultra speedy way of preparation
with its ideal and verified technical solutions

Given to benefit all Peru and the Peruvians

EUR ING Klaus Lynge
Empresa PUSAC SAC
Fundado 04 dec. 2003
RUC # 20,508,006,285

The only problem with this donation is, that until now - December 2021 - we have NOT FOUND any authority nor organisation as show the capacity to receive -

The DONATION is without any restriction and the procedure and formula is published at the web page: www.pusac.org - the owner is from now the Peruvian society represented by the central or the regional authorities.

The project is to free disposal and free use of the authorities
We only need that these authorities - elected or not-elected - "catch the ball and play it"

In the same way the project with its plan of development will be given over to the congressmen elected by the regions along the route of the railway.

Mine transport in the land of Peru - is missing

The mines of Region Apurímac are suffering because of missing transport to bring their minerals to the coast

The same problem exists in other regions as Cajamarca: missing transport options from the mines to the sea.

Heavy mine transport in countries outside Peru - is prospering

12-14 trains each day - each train transporting the same as a convoy of 2-300 trucks from Las Bambas mine

Mine Transport
7 minor - but important points
as too the authorities need to know

1): We are talking railways - and not trains

Infrastructure as railways as well as roads, ways, highways and motorways with all their bridges, tunnels, traffic lights and control is tasks of the society to establish, where it is needed - and the infrastructure is for use of all the community
The rolling stock as pullmans, freight cars, box cars, flat cars, tank cars, wagons of any sort as ore wagon together with the hauling equipment as motor wagons and locomotives etc. are property of the transport companies and haulage contractors

2): Railways are for heavy transport and/or intensive flows along an established route

Railways are NOT for common distribution

3): Mine railways

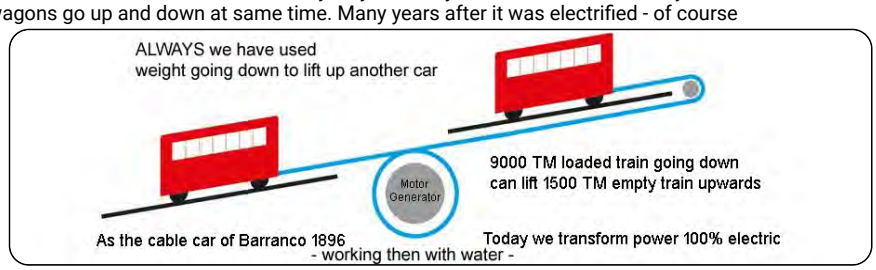
The Mines with their big flow of minerals will guarantee the feasibility for mine railways, because "without flow - no business", and this reality is too effective for mines.
Therefore, a DIALOG between the mines and the authorities is highly recommended

4): The Route of the railway

The same route from the mines to the coast of the sea is an interregional line, passing regions and important cities.
Therefore it should be a decision of the local authorities assisted by the engineers employed in Ministry of Transport - and not otherwise
In no way it should be a decision of the mines outside their own site of land

5): Production and regeneration of energy

From the beginning we have used a car going down to help hoisting the other - as we had done with the **cable car "Fatima" in Barranco**
In 1896 the cable car was activated by a hydraulic system, counterbalanced by water tanks as were filled and emptied and permited the two wagons go up and down at same time. Many years after it was electrified - of course



Especially in the Andean Mountains, with mines in 3000 metres level, is possible to generate power by bring down mineral ore to the coast
Lowering one million tons from 3000 metres (the same for minerals as for water for hydro power stations) is worth 8 gigaWh (Giga Watt/hour)
If a loaded train hold 6 times the weight of an empty, then - theoretically - it can gain 6 times the energy it need to go back uphill - theoretically - Nevertheless - along the line we will have mechanical and electrical loss due to simple friction and rolling resistance together with electrical transformation loss.
Probably - nobody knows exactly - these loss along ALL way through the mountains will eat up the gained power. No surplus.
Our professional dream is to generate **sufficient power** lowering minerals to be able to return same train empty to the mine -

6): Trains on mountain rails of today are electrical

They are not diesel, not driven by gasoline nor gas, neither they are burning coal nor dried dung to heat steam
6a): They are electrical because of the regenerative braking = regeneration of energy
6b): They are electrical because of the need for heavy haul - at each wheel
6c): They are electrical because of the zero emission of toxic gases and no greenhouse effect = less harm at the Environment

7): If Peru desire to construct immediately - just now

Peru doesn't need to lose nor waste time by technical self development
All technologies are at disposal somewhere in the World - to buy

There is nothing as hinder the civil society to use a mine railway for own purposes

Great opportunity
for the civil society:
To drive along the railway line.

Image:
Civil rail car running on mine rails

My "grandfather"
- in the time of WW2 -
running his bus on rails
(and burning wood to generate gas)

The hard reality in Peru:
NO railway will be constructed
without active participation by the MINES
+ commitment by the AUTHORITIES

If the two groups
(AUTHORITIES and MINES)
not can or not will agree
no train will pass here

Proposal to generate immediate employment

in communities, victims of the pandemic

The Project: Building infrastructure of railway lines

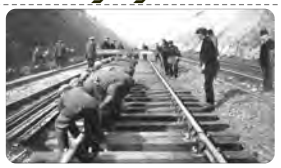
The GENERAL situation post-Covid:

The economic and health crisis as a result of the Covid Pandemic, has generated uncertainty about the future. This forces us to search for alternatives as can alleviate the hunger and unemployment in a way as must be executed in short terms, in addition to benefiting directly to the population.
To overcome this we have to look for something different from Social Assistance, as too can be implemented in a short time - as said to directly benefit the common population.

COVID:
Perhaps the worst is, the LOST hope of people

Laying Rails

Much of the heavy work today is done by help of machinery



Regardless technology, there is nothing as hinder a result by emphasize on work done by men - today as formerly

Our task is: To bring back "the HOPE" to the people

Investing in Infrastructure is one of the options. Any infrastructure - big or small!
Among them, the construction of railway lines is one as attract more attention, by providing benefit - compared to 'social assistance'.
The rails will remain useful for many generations.

Tactically it is rather genial to activate a "class-3 investment" (profit) to obtain a "class-1 purpose" (need) - and thus transfer feasibility into an emergency situation.
Such manoeuvre is not always possible.

The four steps with a domino effect:

1): Generate employment - Hiring local labor.
A railroad construction project will provide an option for the employment of skilled and unskilled labor forces, and these jobs could be filled by the population of the region, where the railroad is built - creating work as source for employment for the resident population in areas where poverty normally is dominant
2): An effect on local activity: A railway - when it is finished - is going to serve the countryside and make it easier for civil society to transport anything like people and cargo - and for its connections with neighboring regions, it will provide options for the development of local professional activities, for example agricultural and industrial activities.
3): A railway needs crew members: The existence of a railway system requires teams for its operations and maintenance of the railroad and its traffic systems - but too teams to maintenance of its rolling stock such as locomotives and wagons.
4): The mines can open up and work: The existence of a railroad in the mountain ranges will allow the mines to open, produce and expand their production with the advantage of a transport system, as can handle a Massive Flow of minerals from the quarries to their collection site on the coast - ready for export.
More mineral extraction will generate more employment for mining workers - and too perhaps, for a process industry.

But before we can start the physical construction of the railroad, we need to complete some preparations, and how to fulfill it quickly is a part of the PUSAC proposal.

The explanation is simple: Choose 'the Experience' abroad - Get it and buy it!

The proposal of PUSAC

Although the government has been giving away bonds to compensate for the lack of employment as effect of the pandemic, this proposal will facilitate useful social projects that can deliver help as are not a lost benefit, but rather represent a payment for services rendered, which will boost the economy of communities and small towns affected by the pandemic.
The objective of this proposal aim to fulfil the physical construction of a railway line for mining transportation in the shortest possible time.

The PUSAC proposal is based on known and proven technology. Directly transferred to Peru and then adapted to the Peruvian reality.
The Achilles heel is the traditional Latin bureaucracy that can easily consume a large amount of time and money.

A new Autonomous Authority for railways:
For this reason, our proposal presupposes the creation of an Autonomous and Independent Authority, which can take care of building the railways - cooperating with ministries and authorities but also with regional and municipal governments

The basic steps of the work plan are:

1. IDENTIFY the best working mining railway somewhere in the world.
2. CHOOSE the best construction concept that can be adapted to Peru
3. NEGOTIATE access to the Know How.
4. TRANSFER the entire and complete railway system adapting it to Peruvian reality.

POST COVID
This recipe is our contribution to rebuild Peru!

The role of PUSAC
1. We have developed the formula and guide for this railway project, and we deliver it without obligation, free of charge - to disposition of the State authorities.
It will also be published on our website: *www.pusac.org* - for the benefit of post-covid Peru.
2. This proposal is expected to be carried out as a public project by the state - with an autonomous entity that can facilitate the execution and administration.

Special conditions in the Andes

Klaus Lynge
EUR ING

A railway from the coast to a mine pit in the central mountains holds some special conditions, as is known at few places in the world - therefore we can find only a little experience, but have a hard challenge for the engineers.

The climatic temperature

First of all the height, where we have to pass up near 5000 metres altitude (at least 4800) to reach the mines. That simply is the condition given by the geography.

The airmen tell us that they calculate with 6.5 degree temperature drop for each kilometer they are going high.

In the Andes 5000 metres is about the snow line and sometimes we have snow - but we don't have hard frost.

The air pressure

The most characteristic is probably the low atmospheric pressure as at 5000 metres is about 50% of pressure at sea level. (Lake Titicaca at 4000 metres is about 60%) The low pressure will not affect an electric locomotive - but some combustion engines will lose force. Passengers can be affected, due to the low oxigen pressure, but a human body may adapt in few days.

The declination

The most mines are situated between three and four thousand metres, so we have to go up over 5000 metres and down to the mine.

The mountain shape is the challenge, because a train is propulsed by the friction between wheels and rails. Therefore we normally is calculating with a certain max declination for a railway. In Peru ve normaly accept 2.5% as max - at least if we are climbing. That low declination give the next challenge. We need to find a way along the slopes.

An example: The first pass on the way from Marcona to Andahuaylas is 4400 meters high and placed about 160km from the coast. In direct line that give us a declination of 2.7%.

Well - so it is -

A railroad

We have to find a route through the mountains as respect the declinations - or - we have to dig out tunnels or build bridges. We of course prefer a direct rute between mine and port. That we can't find, and therefore we have to choose an alternative way as often will give us the choice between the cheapest route winding upwards or an other perforating expensive tunnels and jumping bridges as permit us go more direct and with higher speed. Of course seen as economy far out in the future.

The mine trains offer a special condition. Due to the flow of mineral as goes from the mine to the port - and not opposite - we could say, that the flow is one-way - not the train - and we could therefore design the railway with steep declination for flow downwards (south western slope of the ridge) and minor declination for flow upwards (the north eastern slope). For example 6% versus 3%. That probably will work for mineral trains, but what about full loaded general cargo trains. Will they skate their wheels when climbing 6% - or what? Probably that too will work, but we would like to have it confirmed.

Just south of our border Chile has a railway with 6% declination over 50km - unfortunately the railway in this years is out of service, and there is no experience to pick up.

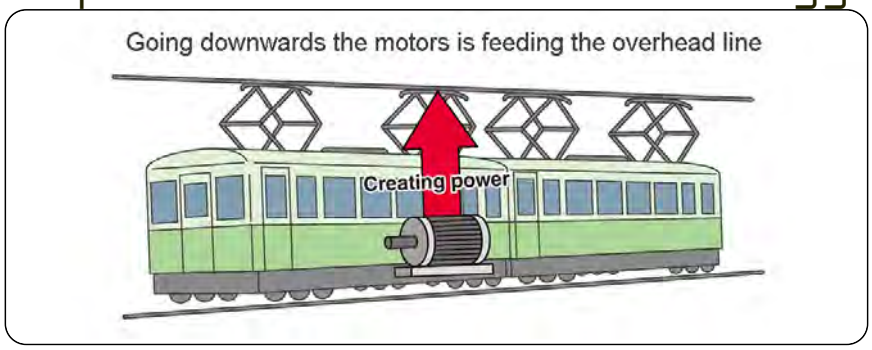
The other known case is Flam Railway (Flåmsbana) in Norway as at 80% of its 20km hold 6% - and that railway is in daily use.

This decision is important, because the choice of a route will bind the plant many years.

Option for Generation own Energy

Overhead line or battery feed ?

That will depend of technology at disposition



A mine transport system, as may generate its own power ?

Hydropower plants we have in large number in the Andes. Passing 1 million tons of water through a turbine can generate certain electrical power - but lowering equivalent 1 million of minerals theoretically and scientifically can generate the same power. That is what we know. There will be loss in the transformations, and that is all we know, but how much is where we have a very little experience, neverthemind, under all circumstances we have the option to generate and regenerate the energy.

We still have the problem to resolve: How can we accumulate the energy generated by the train ?

A Fata Morgana - or not ?

The personal ambition is to start a loaded train from 'Las Bambas', drive it up over the eastern slope, pass the ridge and down to Marcona. My hope is to generate so much energy, that the train has enough to return empty from Marcona, run up the western slope and down to Las Bambas.

Post Note: *'Las Bambas' mine is placed 4000 metres over sea level and 360km in right line from the Port of Marcona. The road to 'Las Bambas' is 7-900km and take between 17-19 hours by car*

Change of focus Needed

To establish Mine Transport in Peru

a MAIN RULE as works for any business - for any kiosk

Without flow: no business - and without business: no investment

this rule also applies to a MINE + a RAILWAY + a PORT + and a SEA TRANSPORT

- and furthermore -

Transportation from the mines to their oversea markets is connected by a chain of not less than THREE links

1): **Land transportation** - ? ??
Establishing of a railroad track is something we in Peru have talked about for 50 years - without a step ahead -

2): **A port for mineral export**
We have Law 28521, legislated 15 years ago, but we haven't got any port - we still discuss

3): **Sea transport = a fleet of vessels for transport of minerals**
A matter that, until now, no Peruvian has dared to dream of. In general, the Peruvians ask a foreign carrier to deliver the products to their customer (delivery service) - or - as they do as with Shougan and Las Bambas: they ask the Chinese themselves to come and collect and pick-up on the site, what they need
Peru hold a tiny Merchant Marine of 30 ships

First link - at land

Land Transport

The first mining railway in Peru was built more than 100 years ago by Enrique Meiggs, who did a beautiful job with the highest railway in the world - bridges, tunnels, zigzags and turntables - to transport minerals from the mines in the mountain range to the port of Callao.
Normal gauge 1435mm and dimensioned for the weight of steam locomotives.

Today Meiggs' masterwork is neglected, half obsolete. Since Meiggs it was never updated.
The Cusco-Puno-Arequipa railway - does not seem better maintained!
And since then, the last mining railway that was built 50 years ago is the 'Toquepala-Cuajone-Ilo' railway, which belongs to the Southern Copper Corporation. Private rails - exclusively for mining transport!

'Mining concession' and **'Mining transport'** are like Siamese twins - like shoes: inseparable .
That is the explanation why today at NATIONAL LEVEL, there are only 4 feasible mining projects:
'Quellaveco' - near the Southern Railroad + 'Torromocho' - near the Central Railroad + 'Mina Justa' - near the port of Marcona + 'Tia Maria' - near the Islay coast. Well - these mines may export.

The rest of the mining concessions in the mountain ranges are not accessible, and therefore the minerals can rest in peace, until a next generation will solve the transportation problem.
The minerals are NOT going to lose their value.

This prediction is also valid for the 2000 mining concessions registered in Apurímac:
Including mines such as Alpacocha - Anabi - Antabamba - Antilla - Anubia - Cotabambas - 'Chapi Chapi' - Haquira - 'Hierro Apurímac' - 'La Yegua' - 'Los Chancas' - Millo - Pacapausa and Trapiche

These mines are NOT accessible - and for this reason they can only be dedicated to 'buying and selling' of concessions

What we can confirm is, that in the world a massive transport - civil or of minerals - is done by rail
- and - 'the whole world' recognize Peru as a 'mining country' by excellence, due to its richness, which offers a great variety of minerals - and also because it is relatively easy to buy a mine and obtain a mining concession.
So - why don't we build mining railways in Peru?
There are many explanations and excuses - and it IS NOT for lack of academic studies or projects, it is more because: *¿ Who is going to pay "the party"?*
The truth is, that we already have enough studies of this famous mining railway and its port of Marcona. We need decisions!

If the mines continue with trucks as they have done until now, the conflicts with neighboring pueblos will escalate and with even more people killed.
¿ Why continue these conflicts ? They continue simply because any mine needs to leave and to reach their oversea markets - and without rail there is only one solution: convoys of many trucks. And that's what happens in Las Bambas: bullying the civilian population.

In the long term, it must be NATURAL for the administration of mines in Peru, that the same granting of a mining concession, is accompanied by an insured transport - a railroad or another system suitable for the massive transport of minerals.

As said: Investment in Infrastructure is the task of society
- Investment in rolling stock is the task of transporters
- - and the flow will make the infrastructure system feasible = rails + trains

A PORT TO RECEIVE AND DISPATCH

A port IS NOT infrastructure like roads and railways, because it is not extensive; is a NODE and a node is a point in an infrastructure - or - a link between two
This is why a port is rarely a matter for the nation and society - it is a local matter, and a port usually belongs to a city - or - a region.

An industrial maritime port is not only the facilities at the sea

They have too storeroom to receive and accumulate cargo arriving by land (silos) - and there is also quite a large area to handle trains and wagons

- and maybe also the same for trucks

large ships such as bulk carriers (bulkers) need a towing service and supply of any need for the ship itself and its crew - a trip to sea will last months before next disembarkation

Seafaring is not the case in Peru. They have created an APN - National Port Authority - that lives far from the sea, but manages all ports in Peru.
If Peruvians are happy with their APN - I too should be - but I am not. APN functions more as a cashier and accountant and NOT as a boss and leader who takes care of the well-beeing of the ports.
That has created problems. A bigger problem is the lack of connectivity between the largest port: Callao with its region, where customers live. The port with its 4 terminals works quite well but there IS NO access from land. There is no connection between cargo arriving by sea and its departure to the country - or vice versa. The port of Callao is surrounded by the Lima-Callao city. There is no harmonization. There are not the mayor traffical roads penetrating as a port of this size deserves - why - because accessibility is the responsibility of two or three different authorities.
No local boss! - in the port.
Ports as are owned by a city or region work better - much better. A port in Marcona - it must be the responsibility of APR (regional) of Ica, because ICA region is present on the site.
Example: The port of Marcona has had its own Law since 2005 (Law No.28521): *"Law that declares of public necessity and utility the construction of the Megaport in the district of Marcona, province of Nazca, department of Ica."*
With this Law 28521, today's authorities point directly to the bay of San Juan, despite the fact that the preparations of the Law points to San Nicolás. Tampering or missing information? ?? - We don't know.
Today 17 years later - there is still no decision around this port - and a Regional Port Authority (mentioned §2.2 in the Ley) is NOT established so far

Enough with ports - **dixit:** - Peruvians have no maritime conscience - and they are not famous for organizing well - either

The hope of Marcona today is that the Shougan mining company next year (2022) will abandon the port of San Nicolás, because its concession is going to end - and there we have an industrial port for the Apurímac mines. Saint Nicholas.

and arriving at the shore of the sea - ¿ what should we do ?

The Condition of the minerals of PERU:

A TRIP BY SEA TO THEIR MARKET

From its mine at 3-4km altitude - passing over the 5km ridge - and down to sea level

MARITIME transport capacity is not available in Peru

Arriving at the shore of the Sea, any shipments of minerals need:
1): A deep and well-equipped industrial port
+2): a fleet of high-capacity mineral vessels
as can bring on the transport and deliver these materials to their oversea markets

If the market is in Asia, a round trip by sea takes a few months
and a ship would probably be able to complete 5-6 voyages per year

LAND transport capacity is not available in Peru either

Mining ship sailing on the seas. By chance it is painted in the national colors of Peru: White and Red

As a foreign citizen I am NOT so unhappy with this lack of MARITIME CONSCIOUSNESS, because my tiny country currently manages the largest merchant fleet in the European Union and we are ready to carry minerals
- for payment of course -

The need for mine transport in Peru

All the world know, that a massive transport of minerals from mines is done by railway.

We too know that Peru is a mine country by excellence, as offer a great variety of minerals - and too because it is relatively easy to buy a mine and obtain a mine concession.

Nevertheless these two reasons, nobody has constructed any mine railway during the latest generations.

Going downwards with 6% declination gives option to find a shorter way through the Andes

This has as consequence that only some gold mines, with their compact and expensive product + mines in general near the coast - or near the old and obsolete railway lines can produce and export. The rest of the mines in the Central Andean Mountain Range and deeper in - and they are many - are locked up. They can't create flow - and without flow they have no business, and because of that neither investment. These mine companies are dedicated to buy and sell concessions. Not to exploitation.

The Apurimac region holds 2000 mine concessions in their register.

This poor situation is not because of missing ideas nor projects.
The problem seems as the old and well/known dilemma:

"Who will take an initiative? - and whom has to pay the feast?"

Railways in Peru is a sad history

There is very little political interest in a project of this size, because a project of this size can't be terminated within the period of election.
Therefore, we have seen no official initiative to construct mine railways.

From the time in the sixties when 'Southern Copper' had obtained their private train concession, none has been able to overcome the obstacle -

Since 1970 we have known the Railway Project of Apurímac - Marcona.
Personally in 1992 I have met the mine transport project of 'La Granja' of Cajamarca.
Both are projects originating from the time of president Velasco - 50 years ago.

Since then, the miners of 'Apurimac Ferrum' hase fought 12 years for a railway and a port for exportation - and still without a result.
- and we can ask 'Carbones & Derivados' - and we will obtain the same answer.

Recently (2018) - in the last days of the reign before thrown off - the president PPK had ordered his ministry MTC to launch an invitation to a 10 milliones dollars public tender around: *"Consultant service for working out a pre-investment study with strengthened profile for creation of the project of "Railway Marcona port - Andahuaylas"* (ref. Concurso Público 002-2018-MTC/10)
With other words: The task was to pick up and make a summary of what we all skould know until now
Today more than three years after the invitation, we still have heard anything from this tender

Peru doesn't have the political stability to complete bigger projects!

We feel it just as: "Waiting for Godot"
- the tragicomical drama where absolutely nothing is happening -

Cite: *The world is mowing for money - but get ahead by organization*

That is not all. The examples of 'Apurimac Ferrum' and 'Carbones & Derivados' is showing us that a 'private initiative' from one mine alone is not sufficient to penetrate and obtain acceptation by the authorities. The state will not help a private enterprise. Therefore the mines need to act together and create a consortium of owners and users: An *"United Freight Operation"*.

But neither this will be sufficient, to obtain the approvals from more ministries and governmental authorities, together with acceptance from diferent regions. That is something as only the government itself can obtain.
An intelligent try could be to invite the regions to participate in the enterprise - to join each railway company and take a part of the shares. In first instances paid by the mines and later recovered by the concept: *"obras for impuestos"* = a system to pay tax by making public works.
This will not only reduce the transverse bureaucracy, but it too can open the opportunity to use the tool "expropriation" instead of 'forced servitude' or similar. More nimble in any meaning.

For the physical construction of a 500km railway we need to calculate with around five years. To this time span we need to add time for technical preparations + bureaucratic processes + time to make decisions - plus perhaps a time to search for financing.

Price: As price for a mountain railway of 5-600km, without to know details, we estimate 2-4 GigaDollars.
But there is no way of escape for the mines. They need to pay the costs for their transports - pay directly as investment or pay indirectly as a service.

Some points of view around a railway

THE SOCIAL ELEMENT IS TROUBLING EACH MINE PROJECT, because of bad experience in the population. In this case of a railroad there is something to offer the villagers. A railway where the tunnels and bridges are build and the rails placed permit other trains to pass along all the route. Therefore it should be natural that a local company of transport could buy a motor wagon and offer passenger transport as they do with buses - and naturally another company could establish and attend a no-mine freight transport along the route.

IN PERU WE HOLD NO EXPERIENCE WITH CONSTRUCTION OF MINE RAILWAYS. Therefore, if the mines want a railway system ready and operative in less than 10 years, the mines need to import experience from a railway of type "Heavy Haul" as actually is operative.
A railway for mountains - please - and not of plains.

The transport system of 'Las Bambas' mine

For a first step:
Who want to take an initiative ?

Operation of trains

From the time of Enrique Meiggs (who build the Peruvian railways) we have managed the railways together with their trains
In Peru we have the tradition to give in all to one railway company (ENAFER) - rails, wagons and locomotives - and so it was until a later president broke up and sold out of concessions.
But Peru doesn't need to go on so.
In many civilizations (countries) they today have separated in two organizations: administration of railways and administration of trains respectively - and they operate rather independent - but of course coordinated.
Just as we do with our systems of roads and ways. We maintain roads with other organizations than we use it.

In short: The feasibility IS guaranteed by the flow from the mines.

In the case of mine railways, the mines can guarantee a flow, as along the years can pay the costs of construction and maintenance of the infrastructure. This will be a simple calculation, as don't need much of studies.

The world of capital

The financing has their own rules.
A railway is an infrastructure as will not escape, drive away or disappear. That is a construction as will stay in the same way as a house, a building - it is as an infrastructure as a road or a bridge.

Financing of buildings as fixed asset
Properties as houses normally are constructed by own funds or by a loan from a bank. (Any bank. Too 'Banco de la Nación')
A bank loan is given against a guarantee from the owners or guarantors. The price of a loan depends of the solidity of the guarantee - the security
As in any case of loans, the borrower - for example "the mines", "the partners" or "the company" need to complete the construction. If they don't meet the conditions of the loan, they may be forced to give in their security to the bank.

After constructed, the bank loan inclusive all the interests and interest of interest normally are replaced by a MORTGAGE.
Then the bank leave, because its business is done.
A MORTGAGE is a loan / a finance of a real estate - with the guarantee based on the same fixed assets - and the next 15-30 years the owner has to pay for it monthly - paying off his mortgage until termination

Financing of railways
A railway IS by nature is a "fixed asset" just as a real estate with all its plants for electricity, signalization, tunnels, bridges etc.
(As said: Railway is as a way with rails - without its cars, buses, vans and trucks)
It is "fixed" because it can't run away and escape from a loan giver.
Therefore a railway should fulfil the conditions for a Mortgage.
But Peru actually DOESN'T HOLD the financial tools to make a general Mortgage bound to a fixed asset of this type.

ROLLING STOCK as locomotives, motor-wagons, pullmans, box cars, flat cars, freight cars, tank cars etc. are NOT fixed assets and can't be financed by mortgage.
Furthermore rolling stock should be bought or brought by the same mines, private transport companies or public companies.

The World of Heavy Haul Railways

Outside the political blocks (USA, China, Russia)
there are wery few mine railways as are interesting for a mountain country

The Northern Hemisphere

1): LAPLAND IN SWEDEN AND NORWAY probably have the best model for Peru.
The railway line for transport of iron ore runs between the iron mine in Kiruna and the ports of Narvik in Norway and Luleå in the bottom of the Gulf of Bothnia - crossing the polar circle.
Those trains have a gross weight until 8.660 tons, inclusive the locomotive and are the heaviest in Europa.
The rails resist 16.5 tons each wheel. They use the special SA3 coupler. They are fed electrically by 15 kV 16 2/3 Hz. (as is a mechanical reduction of 50Hz).
Sweden and Norway employ normal gauge of 1.435 mm
General cargo trains in Sweden don't weight more than 3.500 tons - limited by their buffers and couplers.

The trains for iron ore are hauled by the electrical locomotive "IORE 101/102":
Length 45,8 m (2 x 22,9m) - weight 360 tones (24 wheels)
Maximum power 10,800 kW
Maximum haul 1200 kN (120 tons)
Maximum speed 80 km/h
The same rails too are trafficed by passenger trains, but with a speed until 135 km/h

NOTE: Trains for heavy haul in general are working on plane areas, buy these trains of Narvik ARE PASSING A MOUNTAIN RANGE, uphill are 10‰ (1%) in loaded train direction.
NOTE2: Flåmsbana in Norway is a mountain railway line for passengers where 80% of the line holds 5,5% DECLINATION.

2): FINLAND TOGETHER WITH RUSSIA
The most heavy trains in Finland weights nearly 5.400 tons and are transporting y iron mineral in 'pellets' from the process plant of Kostomuksha, Rusia. From Kostomuksha they go to Oulu, Finland as units of 60 wagons as measure nearly 880 metres in length. In Finland this trains are hauled by two electric locomotives of the Sr2 class at 25 kV 50 Hz AC while in Russia the locomotives are of diesel - double 2TE116 class.
Because of the restrictions along the line between Oulu and the port of Kokkola (200km against south), the trains are reduced to 30-40 wagons from Oulu.
In general this stretch is operated by electrical locomotives of class Sr1 on the rest of the way. The trains use exclusively Russian rolling stock and are equipped with SA3 couplers. Finland was separated from the Russian Empire 1917 - and its gauge of 1524mm (=5 pies) is a heritage from Russia
The port of Kokkola (Finnish language) = Karleby (Swedish language) - is placed 200km south of Luleå in Sweden. (the Kiruna ore railway) - and Oulu between the two, against east in the third corner of a 200km triangle.

3): LABRADOR IN CANADA
Trains for bulk in general are limited to 3km of length and up to 20,700 gross tons, but the trains for iron in Quebec North Shore and Labrador Railway keep until 30,000 tons. This railway line of 414km is operated by the 'Iron Ore group of Canada' = IOC, as is a consortium between 'Rio Tinto', Mitsubishi and the 'Labrador Iron Ore Royalty Corporation'.
They use the normal gauge of 1.435mm and haul with diesel locomotives.
The railway line is feeding the exportation port of Sept-Iles at the southern coast, at the mouth of St.Lawrence River.

Interesting note: After terminated the mine activity, 200km of the railway line today are transferred as property of the original people (First Nations People), and is operated by themselves.

LOOK WELL AT AUSTRIA AND SWITZERLAND:
There are good reasons to pay attention to the railway technology of Austria and Switzerland where a lot of railways are connecting South with North in Europa. A railway corridor with a heavy transit crossing the steepest Alps and with a railway technology up to date.
Furthermore they are two rather neutral countries in the middle of bellicose (warlike) nations.

The World of Heavy Haul Railways

IORE - the locomototive most powerful in the World is electric

The Southern Hemisphere

- the South hold more friendly climatic conditions -

4): BRAZIL

The railway line of Carajás hold 892km in length and connect the Worlds biggest open pit iron mine: 'Mineradora Vale' in south east of the state Pará, with the private port 'Ponta da Madeira' in São Luís, the state of Maranhão. This port receives mineral bulkers of 23 metre depths. In total 120 millions of tons mineral and 350,000 passengers is travelling each year.

Around 35 DIFFERENT TYPES OF TRAINS circulate simultaneously on the railroads, inclusive the longest trains in regular function - as typically are trains of 330 wagons, each train of 3km length.
Broad gauge of 1.600mm. Operated by diesel locomotives.

5): SOUTH AFRICA

The railway line of Sishen–Saldanha goes to the port of Saldanha Bay in West Cape, and hold 860km of extension. Trains of 41,400 tons - 3.875 metres length = 342 wagons with 100 tons of mineral each one. Hauled by 9 locomotives distributed along the train. Their power are controlled remotely.

The line is fed electrically by 50KV AC. Narrow gauge of 1,067mm (3 ft 6 in). Speed 80 km/h.

6): WEST AUSTRALIA

In the Pilbara Region of West Australia, there are 5 mineral ports along a coast of 200km: Dampier, Anketell, Herb Elliot, Hedland, Cape Lambert.

Those ports are feeded by FOUR railways for heavy transport:

Fortescue Railway of 280 km hold the STRONGEST rails of the world, as endure 20 TS FROM EACH WHEEL = 40 tons at each axle. Too there is Goldsworthy Railway of 208km, 'Hamersley y Robe River' Railway of 1300km and Monte Newman Railway at 426km. Standard gauge is 1435mm. All trains are operated by diesel.
Today - March 2022 - the Fortescue mine has decided to construct their next railway working only by batteries using, the gravvitation force to recharge. Without additional power, they have declared. We look foreward to hear about how they will come off.
In West Australia they too have 'Road Trains' = Trucks hauling up to 4 trailers.

7): PERU

Toquepala-Cuajone-Ilo railway = 240 km. The last mountain railway constructed in Peru - 50 years ago.
Belong to the company Southern Copper Corporation, owner of the mines, and is operated by diesel locomotives.
Peru use 'Normal gauge' of 1435mm - and their national electric grid hold 60Hz

Remarkable is a tunnel of 15KM LENGTH. A port in Ilo don't exist. The jetty for mineral in Ilo is not specially impressive.

Klaus Lynge
EUR ING

8): PERU-CHILE

Just south of Peru near the border Peru-Chile exists a 200km mountain railway: Arica-La Paz, as over 50 kilometers is **climbing 6%**. There is no actual information available of operation nor of its function. We only know that it exists, and that the climbing earlier was supported by a 'rack and pinion' system.
Actually there are indications, that Chile and Bolivia will reactivate this railroad

Diesel locomototives seems very powerfull and frecuently they work 'hand in hand' hauling long and heavy trains

- but they are not able neither to GENERATE nor REGENERATE energy -

Studying the theme of feasibility

Construction of any infrastructure traditionally is usable to generate employment
A **mine railway** is specially serviceable by **bringing its own feasibility** - guaranteed by the flow from the mines

Rule for Mines - as well for Railways (como cualquier kiosco)

"Without FLOW there is NO business - without business there is NO investment"

The situation of the National State. Just now the people are suffering need and hunger, and because of its social responsibility the state has to inject economy in some way.
That gives options for Railways - or - the Railways give options for the state.
Uniting the two needs: Create employment by construct a railway as the mines need.
That combination seems as an ideal option to relieve a difficult situation for the state.
Once established, a railway system of cause will be at disposition for use of anyone in the society. NO monopoly - please -

The situation for the mines is, that they need to establish an access to their oversea markets to be able to create flow - and only with that, they can exploit their concessions and produce. The same flow is able to pay a railway - or the mine will not be established.
In this way, the mine railways of Apurimac-Marcona together with the mine railway Cajamarca-Bayovar are both guaranteed a feasibility by the flow from the mines. The same day of inauguration the mines will be able to send off their first train

The proposal of Pusac is valid for mine railways. The feasibility of railways for common freight and passengers will depend of their use and the frequency.
Any other railway project without mines - have to fight to conquer a flow, because the actual existing flows are until now moved by trucks and buses handled by other transport operators.
A way out of that dilemma is to invite the truck and bus owners to use the rails - to move either their trucks onboard a rail wagon, or the bus and truck owners can purchase their own trains and motor wagons.
Strategy: *"If you can't beat them - then join them."*

A strategic investment still need feasibility - - - even if it can permit more time to the pay back

Strategic considerations around some railways

Peru has few railways, but many railway projects - railway dreams - modestly registered by MTC (the Transport Ministry) on their map.

Some of the more interesting railway projects:

1): 'Train of outskirts' is going out of Lima and northwards along the coast.
2): 'Train of outskirts South' is going out of Lima and southwards along the coast
3): Prolongation of 'FC Central' to Cusco, passing Huancayo, Huancavelica, Ayacucho and Abancay
4): Pucallpa connected with Lima over either 'Cerro de Pasco', 'Tambo del Sol' or Tarma /Oroya
None of these projects bring their own feasibility from any mine. But nevertheless, that could be a good idea to establish some of these lines of strategical reasons to join the country - and in combination with the Covid situation create employment.

electric trains means too electrification

'Trains of the outskirts' may feed the comming Chancay and Pachacamac seaports

Of course there is a need for "Tren of outskirts", a railway as is going out of Lima against North and South - but - - -
On the other hand, Lima has always existed without such train, and of course Lima can go on without.
The real problem of Lima is the port of Callao, as during the years has been encircled by the metropolis of Lima-Callao - encircled in a way as doesn't permit the flows to and from the port to pass the city in a swift way.
The port of Callao is still the principal seaport of Peru and handles for example 2-3 million TEUs of containers each year, as all have to pass out through the congested streets - by trucks. No container is passing by train. The port of Callao is locked up.
If the authorities can't resolve an access and transport between the port and the country of Peru, a solution could be to create satellite ports = subdivision of Callao port - as for example Chancay 80 km at north and Pachacamac 40 km south of Callao.
Such two satellites could relieve the press on the streets of Lima-Callao and by the highways outside Lima permit a connection with the country of Peru.
In such case too the "Tren de Cercania" may be of great value for Peru, escaping the need to pass the roads through the congested centres of the city Callao-Lima. This is more a question of urban planning, strategical considerations and decisions - but a railway is a clear option.
Of course the south going line of this railway in the city of Nazca should be connected to the future Apurimac-Marcona railway.

New extensions to the old Central Railway

Any connection of new railway lines to the old '**F**erro**C**arril **C**entral' will put a focus on the bad preserved state of FCC.
Any new line should be able drive through with 80km/h and 160km/h - respectively for cargo trains and passenger trains.
This make necessary a new - or at least a corrected - route to give a speedy run-through by removing some bottle necks.

Hundred years ago the old Central Railway was constructed, and nobody has cared to modernize it, why it now is degraded and obsolete - but still in use. It serves only the last mines in the mountains over Lima. It has no importance for transport of persons nor goods, and Lima has in fact lost its only railway.
The poor condition of this old-timer railroad has as consequence, that any extension as may be wanted, raise the urgent need to renovate the old railroad, and upgrade it to a higher level of service.
Zigzags and turntables should be eliminated - at any railway

The City of Cuzco is declared a UNESCO World Heritage

- but furthermore is the capital of the HIGH plateau - the table-land

A railway Lima-Cusco is an old dream. It has always been seen as a prolongation of the central railway from Huancayo, passing the rail route of 'Tren Macho', and from the railway station of Huancavelica passing over the main cities of Ayacucho, Abancay and to Cusco.
That is a dream, an old dream, but a nice dream.
Once terminated the new airport in Chincheros, our vision is to convert the old airport of Cusco to a cargo station (a ZAL = Zone of Logistic Activity) to serve the high land plateau between Cusco and Titicaca together with the low land regions the rainforrests to North and East.

A railway to the Rain Forest

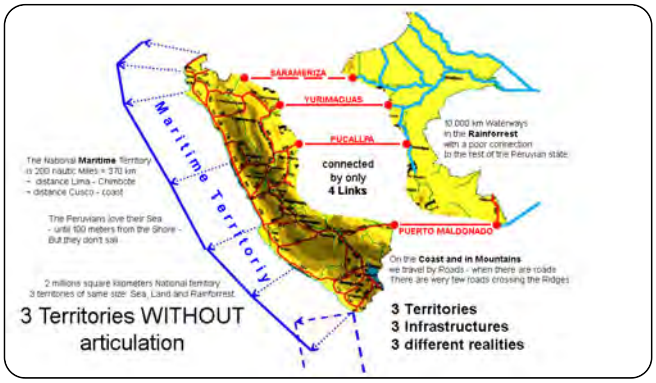
Looking at the map of Peru, we see that the country is divided in two. One half (the costal part) works in "normal" way with roads, highways, some railways, electricity and communication etc - whereas the eastern half is rainforest, as is serviced by boats on navigable rivers.

There are no roads in the rainforest!

The task of a transport ministry is:

Administrate the Laws - and support LOCAL GOVERNMENTS *to interconnect their towns - with infrastructure of any kind*

- and don't forget the old LAW 4113: as ordered Road Work Conscription



For the RAIN FORREST it is easier to export by rivers to the Atlantic Ocean - To send their production through the mountain ranges to the Pacific Ocean is difficult in any sense

The distance Pucallpa-Lima in straight line is 500km - by road 800km - and it takes 17 hours by car
[Link: www.pusac.org/Pucallpa-21-UK.htm]

The river system is impressive. 10,000 kilometres of navigable rivers, as are united in a tree formed structure, where many of the branches meet the trunk somewhere down in Brasil. That works, but that doesn't works well.
A problem is the weak connection with the mainland. 4 connections are shown, but as Sarameriza doesn't work and 'Puerto Maldonado' not is much port, but more a land-connection to Brazil, then we have only two valid connections. The northern of these is Yurimaguas as mostly is an export harbor connected rather directly to the ocean port of Paita - whereas Pucallpa is considered as the port of the rainforest. What it really is, except that there is no port in Pucallpa - they land on the shore of the river.
As gate to the tropical rainforest - Pucallpa is the commercial centre, doing the administrative business service and is "factory" for all the rainforest, processing their raw materials, as are wood, fruits and animals - and too medicinal plants inc. coca leaf and derived.

To give Pucallpa a new connection could be a wise idea

A railway to Pucallpa is NOT urgent,
because Pucallpa exists as a gateway to the Amazon lowland and can go on so -
But of pure strategical reasons, that could be a clever thing to join the divided country -

Lima is the main market for the Rain Forest - and Lima too is the administrative headquater of the nation.
The proposal of PUSAC is to make a better connection between the gate of the Rain Forrest (Pucallpa) and Lima. That means to connect the two main lands of Peru with a stronger link: A railway as can take over and ease the heavy flow, as exists.
We are not aware of any study, neither technical nor commercial of such a connection, and we too know that we need to pass some years after construction to gain our part of a flow to obtain feasibility - to turn the flow from trucks to rails.
Nevertheless, we of strategical reasons recommend: To unite Peru, as the Constitution §43 demand: "The State is one and indivisible."

Some common rules to consider

Railways are infrastructures - trains are not

By definition: "Infrastructure" is ALL as connect a country, and therefore infrastructures should be responsibility of the state.
Any type of infrastructure as land roads, river roads y and seaways as well as navigable lakes are to consider as a traffic backbone interconnecting the country.
Infrastructure we understand equal important as any strategical company + the armed forces, the police, the curt of laws, and the public administration etc.
The use of this type of infrastructure should be for ALL the population and should therefor NOT be given in any private concession

Purchase of rolling stock IS NOT the responsibility of a government!
One thing is infrastructure, another is the vehicles, the vessels and the crafts running on the infrastructure.
- the general traffic of wagons, cars, buses, trains, locomotives, trucks, boats or yachts on any piece of infrastructure could be property of any

1): Each mine could purchase their own locomotive and its wagons
2): The mines could join and create an "United Freight Operation" as maintain their own locomotives and wagons
3): The mines could contract a transport company, as come with his locomotive and haul the miners' wagons
4): The mines could give over all transport to a transport company
5): The communities, regional or local governments or regional could administrate companies with own wagons, etc.

Klaus Lynge
EUR ING

The line for Las Bambas

Railroad as a solution for mine transport

'Las Bambas' is the epicenter of a Social Conflict. The social conflict continues to the shame and dishonor of the nation, because the authorities do not show the capacity to solve the problems.
The conflict broke out in 2014 as a consequence of the mysterious transfer of the mining concession between Glencore of Switzerland and the Chinese of MMG. It has cost several farmers their life - and the conflict continues to abuse civil society - and continues without a solution.
*Naturally there is **no social Licence for that mine** - not at all* - but such is not important for a chinaman.

This project attempt to solve two emergencies:

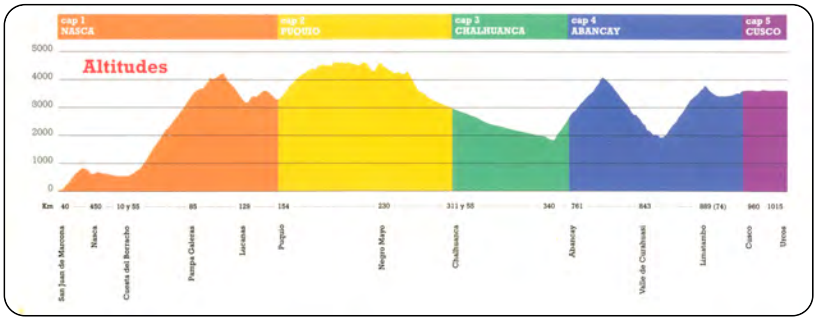
A): The need for a solution for Las Bambas mining transport and
B): The urgent need to generate employment after the economic destruction of the fight against Covid by building infraestructure.
If the government agree to use the railway project, it is free and available for Peru and is published on the website www.pusac.org

The strength of this project is its short time for technical preparations by buying Know How of a mining railway in use - and then going more directly to a construction. We should honestly say that construction of any infrastructure can generate employment, but a MINING RAILWAY bring its own FEASIBILITY - due to the flow of minerals.

While waiting to start construction of the railway – we have build and finished this Corridor

The southern interoceanic corridor = IIRSA SUR, was completed 2 years before the conflict of Las Bambas started, this corridor - Survial - too is useful for a train as can take up to 6% declination.

Profile of the Survial route of iirsa 026 already built



Respecting 3% going up and 6% going down a train will pass

The Survial corridor opens up more interesting opportunities for civil society - and the Social License could be possible.

If we can use this corridor, there is NO reason to pass towns like Lomas, Yauja and Chala on the desert coast - as the 1970 Canadian proposal indicates - and from there then too MTC. With classic elements such as Bridges, Tunnels, Galleries, Platforms, Platforms, Embankments and Levels - without Zigzags and without Turntables of course - we can build a railroad track along the corridor and pass trains with adequate speed - both freight trains and trains for passengers
Infrastructure IS the responsibility of the state, and not of private parties. The trains with their wagons would be owned by private companies - being freight trains or passenger trains - and for Las Bambas it is the flow from the mine that makes the construction of a railroad feasible

The urgent task is:

Generate massive employment at all levels

The quickest process is:

1): Identify the best railway in the world - employment for the authorities and experts
2): Negociate and buy it's technology - employment for economists and technicians
3): Transfer the technology to the reality of the Andes - employment for engineers
4): Physical build a railway for Las Bambas - employment for men and women from the region
5): Afterwards expand the rail network to the mines of Apurimac, Cusco, Ayacucho and Ica - more jobs for the countryside people
6): Reuse of the technology for next railway, as could be for Cajamarca or Pucallpa - employment for engineers and builders

Electric trains are very powerful - and overcome steeper declination - and steeper declinations permit other route between the mountains

with until 6% declination is opened up for new railway routes through the mountains - for example along Corridor SurVial

Organization for Construction

The construction will start with a trip by a commision visiting and studying the railways of the world - live and direct. For example, with the participation of professionals from MTC, MEM, MEF and Ministry of Environtment (SENACE) + the mines (SNMPE) + the Regions and the National Congress.

This commision will evaluate and choose the most suitable model for Peruvian conditions - and then negotiate the price.
With the model chosen we need a consulting company of same nationality to extract "Know How" and experience.
If there is NO consensus - I will recommend a copy of the Kiruna mining railway in Sweden (the homeland of Volvo)

The foreign consultant company need a Peruvian peer who can recieve and adapt to the reality of Peru and its geography - and to prepare instructions for local contractors

The need for an Autonomous Railway Authority !
For a project of this magnitude, with its legal procedures and its many expropriations, it is recommended to establish an Autonomous Railway Authority - an 'ENAFER' - as later will monitor and administer the use, in charge of the complete national network.

The Peruvian contractors
For Las Bambas we are talking about 6-800 km of electrified railway line, which give us space for several independent but simultaneous work teams. We ca divide into independent sections or we can build under the leadership of a main constructor, who will coordinate subcontractors.
A trick for contractors could be to use more labor forces and less machinery, as a point of competition.

The work of the line incorporates Tunnels, Bridges and Galleries where it is needed. We are talking about an electrical train, which involves poles, electric overhead lines, power substations, etc.

Framework: 1 year of preparation + 3-4 years of construction
Completion before the change of president 2026.

With the rails in place and with the plant inaugurated, we are ready to recieve the first train from the mines
(Don't forget that we also need a sea-port, as can RECIEVE the mineral comming with train - and send it off over the sea)

Operation after Construction

Mining transport
The state is in charge of the infrastructure. Rolling stock is the responsibility of the mines, as can each buy their own rolling stock - but there is nothing as will hinder the mines going together and create an "United Freight Operation" company.
The mines need wagons and locomotives.
Of course they can buy, they can rent, lease or hire both locomotives and wagons independently.
For their transport any business combinations is possible. **That is the client's own decision!**
Civil Transport
It is the transport carriers who are going to handle everything running on the rails
- just as they do with their busses and trucks on the highways.

And too for those carriers there are all kind of organization available
There are owners of locomotives to tow the wagons.
There are owners of wagons of any kind, who rent their equipment.
Of course there are owners of whole trains.

Klaus Lynge
EUR ING

A current business model is that an operating company take charge of all the administration and permissions from the authorities to pass the rails (paying per kilometer traveled) - and then require (hire) wagons and locomotives from specialized companies.
There are workshops that maintain rolling stock of any kind.
There are companies as are responsible for keeping cars clean and presentable.
There are, of course, also operators who are in charge of loading and unloading trains, trucks or others.
All managed by companies and private agreements

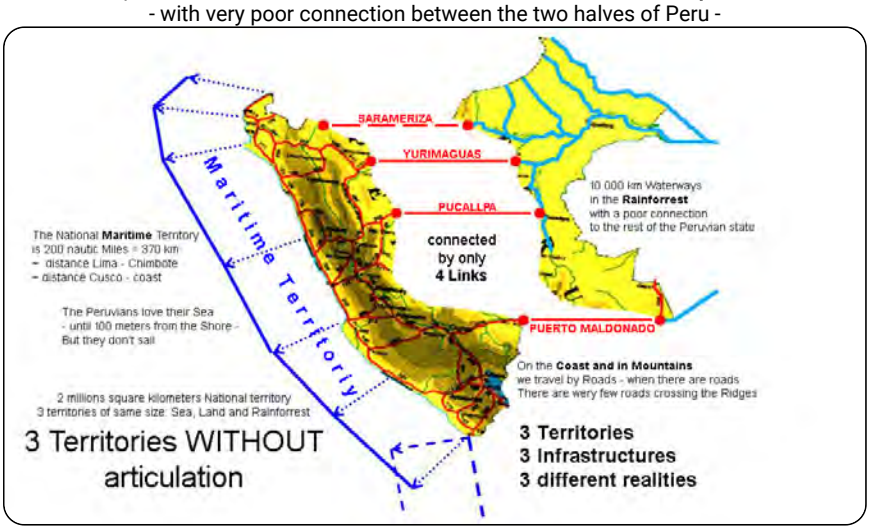
The time where a company handled EVERYTHING, as Enafer did in the time of steamers, seems over. Today the trend is to subdivide into several specialized companies.
There is a lot of things to do

"ENAFER" as authority is limited to keep the railways operational. As authority they doesn't operate trains - but in general they will employ specialized private contractors for the physical and technical work, as has to be done.

A GEOSTRATEGIC ISSUE: LIMA, PUCALLPA AND THE RAINFORREST

Railroad to connect the waterways of the rainforrest with the city of Lima

PERU: 1.2 million square kilometers of land divided into a **coastal and mountain part** and a **rainforrest part**
- with very poor connection between the two halves of Peru -



In addition there is an equal third "half" - as **maritime territory** .
200 nautical miles along the 2000km coastline
- and very few Peruvian ships to navigate it

One half of Peru is Rainforrest - connected to the other half of Peru with only 4 links:

1): SARAMERIZA - NOT ACTIVE - a port as is not yet established
2): YURIMAGUAS - It has the only river port in the Andes, useful for export over Paita to the Pacific Ocean
3): PUCALLPA - A Productive node with a large flow. NO port - only landings and road connection to Lima
4): PUERTO MALDONADO - There is not much port - but there is a good land connection to Brazil

In the Andean part of Peru, all is by highways.

NO navigable rivers

In the Rainforrest part of the country, all traffic is navigating on the rivers.

There are NO roads

There are too 700 thousand square kilometers of maritime territory
But Peru IS NOT a MARITIME country. In NO WAY. The small fleet of Peruvian ships IS NOT enough to serve the imports and exports of the country, and therefore we need support from foreign carriers.
There is no "DELIVERY" for the export - there is a type of "SELF-SERVICE": Customers can come and pick up their purchases!
CONCLUSION: In Peru there is simply NO maritime consciousness. *(There is too a large fleet of crafts fishing eagerly, but a great part of these are under foreign control)*

The rivers are very winding, but they are the only transport ways in the rainforrest

The rivers in the south-east of Peru (Yarúa River, Purús River, Madre de Dios River with Piedras River and Tambopata River) do not serve much as waterways to interconnect the country - they are running downwards and connects to Brazil

The proposal is to JOIN Peru

- connect the rivers of the rainforrest with the market of Lima -

Establish a railroad from "the gate" of the rainforrest (Pucallpa) to the Capital

TOPIC-1: Where to climb a railroad

from the lowland and up the slopes of the mountain ranges

- and where to connect to the old FCA railroad

The half of the population of Peru lives in the capital Lima
The capital Lima is the main market for products from all over the rainforrest
- too very important: The port for export to the Pacific Ocean is Callao - the export to the Atlantic Ocean goes down the rivers to Iquitos.

the strategic VALUE and the FEASIBILITY of the current FLOW of cargo between Pucallpa and Lima has still not been studied

Proposal from the year 1950 - for a train as never arrived in Pucallpa

1): If the best route is from Pucallpa by Carretera Marginal - La Merced - Tarma /Oroya to get to Lima by FCA
- or maybe:
2): From Pucallpa through Tingo María - Huanuco - Cerro del Pasco to arrive by FCA to Lima
- that depends of a simple decision 3): A side-leap: The geographical and geometrical center of Peru is Puerto Inca in Huanuco

the difficulties of today are the zigzags built for steam trains

Topic-2: Utility of the FCA rails

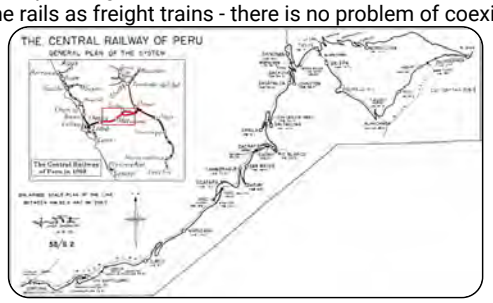
If a train from Pucallpa needs to pass the old and obsolete rails of FCA, we need to correct the line and eliminate zigzags and turntables in a way that allows electric trains to pass with high speed.

NOTE: A railway must allow freight trains to pass with at least 50km/hour - all along the length
And minimum the double speed for passenger trains
Passenger trains run on the same rails as freight trains - there is no problem of coexistence

FCA was designed in the time of Pacific war - and took 35 years to build

Today as a transport system it is more or less obsolete - it does not even carry passengers

Nevertheless: FCA is an impressive work seen with historical eyes.



The wild many zig-zags of the Central Andean Railroad

*The idea of **the Ministry of Culture**, to freely hand this railway over to UNESCO as Cultural Heritage of Humanity*

That for me looks great:

The idea to change it to a Historical Monument, an on-the-site museum or a footpath for tourist and adventurous cyclists or something like that

¡ One stone less in the shoe !

In the old days, construction machinery ran on steam engines, they used chisels and hammers for drilling and black powder for blasting - and men with pickaxes and shovels loading cars as were pulled by horses. From there the construction technology has developed strongly.
Tools of today and machinery allow superior solutions to serve our needs.
The solution of today is as always: bridges, tunnels and galleries **- but now with <u>more declination</u> and smoother curves**

the greatest obstacle is Lima itself

Topic-3: The city of Lima and Callao

Penetration in the city is very difficult for cargo - both by trains and trucks

A station is a place where an exchange is made between two or more modes of transport.
We can characterize it as a NODE between transport systems.

Although FCA today is a train for cargo only, the entire province of Lima lacks a 'Freight Station' or 'a Dry Port' as can receive the trains for transfer of their flow of cargo to another mode of transport for distribution
A cargo station is different from a passenger station and very rare we can see the two stations united in one.
It is not my impression that the province of Lima has foreseen a cargo station.
Neither has Callao, where the FCA only can arrive with their minerals to one of the 4 port terminals. No general cargo.

The problem in Lima in relation to the trains, is not the geography as in the mountain ranges, it is its lack of needed space.
IF Peru in the future decides to connect with its rainforrest = connect to Pucallpa with a cargo station in the surroundings of Lima - and with the port of Callao for export. There is no planning that has foreseen a railway more than the old FCA.
There is no room to establish a bigger station - there is NO surface room to penetrate the city with corridors and rails.
They probably need to drill underground with tunnels.

In this mode: **The technical problem of connecting the rainforrest with Peru is the same Lima**

EJEMPLOS:

Trains running on the Railways of the World

:

Trains for transport of passengers

Local Trains

Local train - one wagon

:(A):

Local Train - two wagons

Regional Trains

Regional train - 4 wagons

:(B):

internal of the same regional train

Trains for medium distances

locomototive with wagons in two floors

:(C):

inter-regional train with many wagons

High speed trains for large distances

express x2000 passing a curve with a speed of 250km/h

:(D):

internal of train x2000 - common class

Special trains

Transport of road carriages

Train with mixed cargo

:(1):

Delivery of new cars

Transport of whole trucks

long distance transport of loaded trucks

:(2):

minor trucks on a "rolling road"

Transport of hangers WITHOUT driver

Transport of tank hangers for liquid

:(3):

Transport of hangers for general cargo

Loading with hangers

placing a hanger with crane (from above)

:(4):

placing hanger with fork-lift (from the side)

Trains for many products

Transport of containers

Train with containers - one container on each wagon

:(5):

Dual layer containers in front of tunnel - low wagon

Material for construction

transport of long pipes

:(6):

steel bars for building construction

Transport of flammable liquid

tank wagons for liquid fuel

:(7):

LNG - Liquid Natural Gas

Agriculture and farming transport

Tank wagons for milk

:(8):

hopper wagones for grains

Treains for primary material

Transport for the wood industry

Raw trunks for sawmill

:(9):

processed planks and plywood

Mineral products

tank wagons for cement in bulk

:(10):

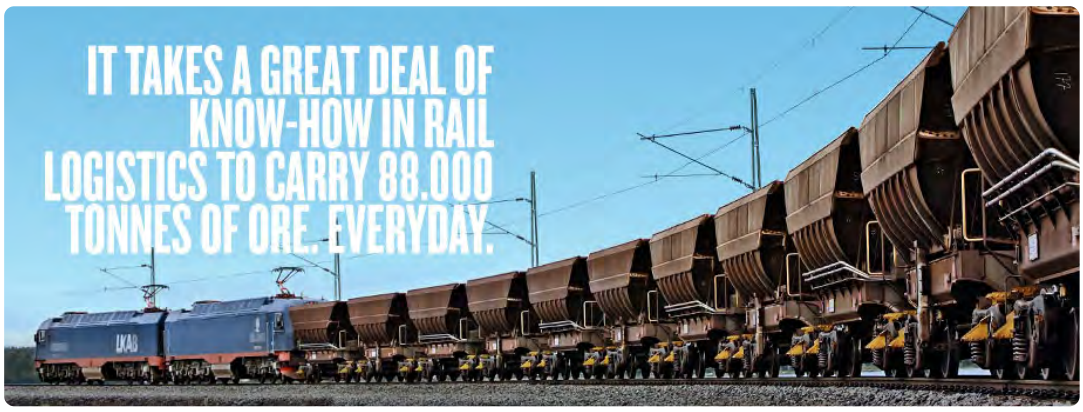
Transport of mineral from 'Las Bambas'

Transport of mineral ore from the mines

tipper wagon unloading its 100 tons in the bottom

:(11):

wagon unloading by tipping sideways



Massive transport in Kiruna: Mine train transporting iron ore - 10-12 trains a day

Responsibilities - and some limits

Condition for expropriations: "Necessity and public utility" (ref. Constitution PE §70)
Consequences: The "Southern Central Macroregion" can build their Apurimac-Ayacucho-Ica railway - if the Macroregion decide.
Alternatively too a commonwealth of Regions /Municipalities along the route - too can do it.
- and the regions of Cajamarca, Lambayeque and Piura together can construct a railway fromCelendín to Bayovar - if they desire

Infrastructure is everything as connect a country, a city, a society

Infrastructure of a country - any type of infrastructure - is the responsibility of society, and this is to be established by its elected or non-elected authorities.

A free society cannot escape from this responsibility by concessions, privatizations or similar 'Neo-Liberal tricks', because infrastructure is what unite and connect the country /society - and therefore it is property of the society.

task of the mine company:

load wagons by silo and hopper or load wagons by frontloader

A NODE is a point in a infrastructure network - or between two networks

Within a node the owner has the authority to organize as he wants - but in accordance with the laws and rules of society - of course.

A landowner can make his track where he wants over his fields. A districtal, provincial or regional authority can place its roads, their own trams and railroads. A "macro-region" can do the same.

The mines, who have bought, rented or granted their land, decide within the same plot. In principle they can exploit and sell as they want - and pay the State for what is extracted.
A payment in relation of what type of ore is mined - naturally.
All equipment and buildings inside the mine lot is: Decision of the Mining Company. For example: Where to lay down their own RAILS for trains within the land of the mine itself. Where and how to load the wagons. By mobile rolling equipment - or by mechanized fixed installations of silos, hoppers and transportbands etc.
This is NOT the responsibility of society.

The surrounding society

Mining companies - regardless of their country of origin - are and have to be a natural part of society where they work, and they therefore must follow the same rules and common laws of society.
Inside a country the society itself alternatively a commonwealth of Regions/Municipalities as well.has to build the infrastructure, which the society needs: in this case the rails for trains - too mine trains. The responsibility of the ENAFER authority will start at the exit gate of the mine, and ENAFER will direct the train on all its network.

Who owns locomotive and wagons IS NOT business of ENAFER.

Nor is ENAFER going to drive these trains. Like trucks and buses on the highways, the trains are privately owned and come with their own driver.
The trains will pay tolls per ton, per train and/or per kilometer - and not for the value of the minerals.
The rule for everyone: That man as pays, he decides - to rent, to buy own train, to create a "United Transport Company" together with other mining companies or simply to hire a professional transport company - - - but all trains technically need to comply with ENAFER standards, just as any truck needs to meet the MTC regulations for transit.
If the final customer of the ore lives in Asia, the delivery of the ore is in Asia. For example: A contract with India to deliver 20 million tons of iron per year. This iron needs to be extracted from a mine in the mountains and then pass through a transport chain and perhaps some processings before being delivered to a port in India.

unload wagons in the port

by turning over the whole wagon or dump it over the side

The port and its equipment

Transportation from the mine is by rail and ends at an export port. The mine decides which port for exportation, because the mine is the owner of the cargo. It is also the responsibility of the mine to organize reception of the mineral ore in the port, and there store it until a mineral bulker can arrive.
That include too a system to empty the wagons and deposit the material in silos. And for this reason the wagons are normally built as tippers which are to be emptied directly down into the store from a position above the silos - or alternatively into a receptor hopper and then lifted by a belt conveyor and dropped into a silo.
Silo storage requires another mechanical system to extract the ore bulk from the silo,for then to pass a shiploader with a capacity of a few thousand tons per hour to be able to load an ore bulker in a few days.

A long voyage over the seas

Well loaded, the ship will sail for some months to cross the sea and reach her destination, where she will unload the ore and return. With distances 15-20,000kM - two times to return, there are probably a maximum of 4-6 trips per year for each ship.
Peru hold 2000 kilometers of coastline and 700,000 square kilometers which is its MARITIME TERRITORY = as is more than 50% of the Peruvian land area.
However, Peru does NOT have any "MARITIME AWARENESS". In the Peruvian ship roster there are around 30 ships available - and none of them are mineral carriers - and naturally all the 30 ships are occupied with other business.
It is a situation a bit sad. This not being able to transport their own products, has as consequence, that Peru (= the Peruvian mines) need to hire foreign carriers (bulkers) to make their oversea "delivery".

red - white ensign sailing on the sea

medium size bulk carrier

Fortunately, this situation is foreseen in Law 28,583 - "Law for Reactivation and Promotion of the National Merchant Marine"
As a result of the Law, there is the option, that these foreign carriers, who have ships available, can fly their ships with the Peruvian flag, by registering their ships in the Peruvian registry. This transfer will give certain advantages to Peru. Especially if a congress decides to declare minerals from the mines as Peruvian, until delivered to the client abroad - or alternatively until the mineral has obtained some added value by processing in Peru.

It seems worth to compaire with **"Jones Act", USA** = Promotion and protection of the National Merchant Marine - of USA

Processes placed between the mine and its export port.

pellets - or sponge iron

a simple process giving pure iron

Surely the mine is going to organize a refining process.
They do this simply because a mine does not want to pay for the transport of tons of earth and stones that have no value.
That assumption is valid for any mineral like lead, zinc, copper or iron.
Iron for example is normally sold and transported as pellets or sponge iron = pure FE (ferro). It is the first refining step.
Being a process before export, the refinery (for example a steel plant) is naturally connected to the railway system - somewhere on the way between the mine and its port. The degree of refinement and post-processing: from raw material, to bars, blocks, rods, plates, sheets or tubes, etc. is a matter of the market and its prices.
Pellets explanation, Wikipedia: 'The process of pelletizing combines mixing of the raw material, forming the pellet and a thermal treatment baking the soft raw pellet to hard spheres. The raw material is rolled into a ball, then fired in a kiln or in travelling grate to sinter the particles into a hard sphere'.
There is a notable consumption of energy for the process.

Trains powered by electricity

There is no doubt that trains af today are powered by electricity.

They are electric due to their regenerative brakes (power generation)
They are electric because of their strong traction - at each wheel
They are electric because of their zero emission of toxic and greenhouse gases - with less damage to the Environment

Trollybus is flexible in transit

with its 2 conductors hanging above electric train with pantograph

one conductor only and many pylons - or a third rail for power

located between the rails or on the side

100 years of experience with electrification of transport

Trains and trams are powered by electricity. The experience exists in a multitude of solutions around the world with all forms and combinations of voltages, frequencies and power systems.
There are many details to study - but in principle there are only 5 systems:

1): - two independent phases - two conductors hanging in the air
2): - one conductor hanging in the air - the other by the rails
3): - a third electrical rail on the side or underground to power the vehicle
4): - a large battery (accumulator) to charge before - and possibly durinandedg the trip
5): - or we simply change all the battery in fixed stations

Heavy trains are called "Heavy Haul"

Electric trains as those from the mines, we have known powered by an overhead conductor. There are more than 100 years of experience.
We also know trains operated by batteries (accumulators) but the experience of heavy haul trains with batteries is very scarce. Neither experience with mine railways between high mountains does not exist.
This is why we have been in dialogue with locomotive manufacturers, and the only valid remark is that the technology for these trains today is a rapid developing technology - as still not is matured.
Well - we too need some few years to prepare and build a mining railway, while - perhaps - the technology will mature.

Let's get technology proved - by years of use, please

The proposal of PUSAC sac is to acquire verified technology. It is our firm recommendation.
Technology verified by years of use somewhere in the world.
For electric trains the most verified and common technology is with a high voltage network extended along the route and feeding the moving trains by a conductor suspended in the air above the rails.
That is the classic solution.
The problem with this is the extension of the mining routes, as we are facing. There are 500 kilometers of distance between Marcona and Apurímac, and this seems a much to establish in a time where the technology of batteries - accumulators of electrical energy - is in full advance.
With battery locomotives pulling a battery powered tender, for example, the train could start its journey with a “full tank”, and we don't need catenary for many kilometers - and the locomotive maintains its autonomy.

A combined technology might be more viable for Peru

A combination of hanging conductors on a part of the route, where passing trains can recharge their batteries. If we could reduce the catenary span to 20% of the rail span, that would be a welcome reduction in cost and maintenance and that seems technically feasible.
Naturally, this will complicate a political decision around railways, because it will reduce the investment of ENAFER and force carriers to invest in battery-powered locomotives.
Against this: carriers keep their regenerated energy.
The argument for not electrify is that public infrastructure is not obliged to sell energy or fuel to carriers. On the other hand, we can look at energy supply as a service to the carriers - a business
Naturally we have to discuss this with some experienced operators and with the producers of Locomotives of the future before decision.

The batteries are arriving

too for freight trains
too electrification on roads and tracks

electric Volvo truck - today with battery

Fuel - in light of the History

Human history has allways shown problems with power supply during a trip.
Horses have increased their master's mobility - and have also been able to forage for their own pasture along the way. cool! A technically almost ideal solution.
Steam engines on ships and trains - have expanded transport capacity, but have needed their coal and water to keep on traveling -

Historically, the Falkland Islands of this reason were taken by the English Empire (before the great Panama and Suez canals) to create a strategic base with a station as could supply their imperial fleet with COAL before passing Cape Horn and start a long journey onto the Pacific Ocean.
We can imagine that England of today does not need the Falkland Islands as a deposit for coal, and this may be an option for Argentina to express its interest in an agreement between 2 countries, without provoking a new war.

"Better to seduce than to violate", that is what every man and woman knows - too in Argentina.
And everyone had preferred to see the Argentines seduce their chosen one - and not violate her.
What conditions the Argentines now may go to offer the Falkland Islands for a future together - what dowry they may offer the bride - that we are waiting to know - - -
Or are we talking about Imperialism versus Romance - and maybe against Self-Determination of the islands?

The Falkland Islands - 100 years ago

"trains" propulsed by renovable energy: the wind

An example of another fuel: The Yavarí boat of Titicaca is the oldest iron ship in the world. Yavari was prepared in England around 1860 and then the thousands of pieces were transported by mule from the Pacific to the highlands, to be assembled on the Titicaca shore. At first, their boiler was fed by dry dung (KK for llama), because there is no firewood nor coal in the highlands.
Since 1911 Yavari has been sailing on a diesel Bolinder - and she continues to sail to this day.

The arrival of the diesel engine, burning oil in some form, has made it easier fuelling vehicles for long trips. For this reason there are many mining trains around the world running on this fuel.
TODAY diesel for motors is NOT an accepted technology in an ecological world - That's one.
Nor can we generate or regenerate ANY diesel energy by lowering minerals from the height. - That's another one.

Lately we have to to recognize, that Peru is a country where water is pouring down from all the mountains and is totally GRATIS, to a degree that allows us to generate enough electricity to supply all South America.
In any sense, Peru is a country filled up with "green energy" = energy inexhaustible - and in abundance.
There is energy from the sun in abundance. There is wind power by the current of the wind. And there is his brother, the current of the river. There is also available geothermal energy in Aguas Calientes and there is wave energy throughout the maritime territory. An ocean of energy.

E N A F E R

With railways built for the mines, the rails are laid
- and these rails are also available to the people and their carriers along the entire line
- for their cargo and passenger transport -

Railroads - are a source for many Trashy Pseudo Studies

Example: The Public Tender No. 002-2018-MTC/10 - "Ferrocarril Puerto San Juan de Marcona - Andahuaylas"
Conclusion: There is no reason to get entangled and complicate our life by many "studies" done by the many consultants paid by many Governments.
We simply do NOT need more studies:
Peru deserves RESULTS

The truth is, we already have enough of academic and theoretical studies of this famous mining railroad and its port in Marcona.
50 years we have known an access route (one among more) to penetrate the mountain ranges with a railway.
The Canadian project with its railway study: "PRELIMINARY FEASIBILITY STUDY of THE APURIMAC IRON ORE DEPOSIT, PERU" has been known since 1970 - and to date has led to nothing more than the following studies simply have copied the main points:
The same route between the mountain ranges - the same old railway technology - the same old thinking of our grandfathers.

The same with the port of Marcona, which has had its own Law 28521 since 2005. Not a step forward for implementation.
But note, that the discussion in the 'house of Law' since the time of president Toledo: San Juan Bay - or/and - San Nicolas? ?? This discussion is simply buried. Nobody dares to think about it, because the mineral port of San Nicolás is a Chinese concession. It is sacred.

In 1970 the construction price was calculated to 175 million US dollars - in the money of that time.
Today we need to multiply the same price with 50 years of inflation = a factor of 10 - or maybe 20 -
A more logical alternative is to re-calculate, but this would be needless until someone has made the fundamental decisions: which mines to connect, which towns to pass, which route to take, number of bridges and tunnels etc.
Quite simple: Which importance may we provide to this piece of infrastructure. (Are we talking a simple VW or a luxury Mercedes? ??)

The feasibility we know with certainty, because it is garantized by the flow from the mine concessions:
"Without flow there is no business - and without business there is no investment" - and that we don't need to go on studying.
This rule is valid for mines as well as railways. And because mines are going to fight and create their flow to survive - this same flow is also going to serve as the basic flow for a railway

Feasibility vs. strategic investments:
- they are different only by the horizon of the calculated pay back

So. If we don't need more academic studies like 'feasibility', 'pre-feasibility' etc. The proposal of PUSAC is to change focus = change paradigm - change procedure - with the purpose to escape many errors and to gain time by speeding up the process of railway construction in Peru
- for the benefit of a Peru that need to raise up again after the COVID knock down

A new approach (paradigm) towards Railways for Peru

The proposal of PUSAC is to start the "rail work" seeking 'Know How' abroad: Visit, study, choose and transfer the experience of mining trains operating in Australia, Brazil, Canada , Sweden - or wherever they are.

In Peru we do NOT have railway engineers
- NOT with experience

There is no doubt, that the lines - the traces, the known corridors - need to be checked by foreign experts in accordance with modern technology: Electric trains, "Heavy Haul" rails, large slopes and curves for high speed. A supervision carried out by experienced foreign builders and transferred to the Peruvian engineers

After having chosen and transferred technology to Peruvian engineers
then we can talk about self-construction of railways for a future

There is much more than civil and mechanical works. Within a technology package we also need a part of 'railway administration' - plus 'communication', inc. 'safety' and 'control with trains'

The proposal include sending a high-level commission to see in live and directly what solutions are working around the World - and then choose technology, systems, organization and maintenance to these models - to adapt a copy to the Peruvian reality.
After then we can go on with the *Mandatory Tenders* to fulfill what is decided - not before.

New Plan: Work on hard and achieve the result

First look to learn what is possible in today's world in relation to mining railways
Then we choose what we want for our mines
- and from there we will transfer to the Peruvian reality.

Just like in a restaurant:
First see the menu before choosing
- then eat

Tomando en cuenta que una tren moderna con tracción de cada eje puede aguantar subir hasta 8% - y por esto puede pasar cordilleras por rutas más cortos y más directos.
Tomando en cuenta que trenes de hoy son electricos que puede generar y regenerar energía
Tomando en cuenta que transporte minero hoy pasan por rieles 'Heavy Haul' que aguantan una carga por cada rueda de 20 toneladas
Tomando en cuenta que vías férreas construídos para trenes mineros 'Heavy Haul' también sirve y debe servir para trenes de los pueblos
Tomando en cuenta que una ruta optima pasando las cordilleras políticamente necesita 'licencia social' de las sociedades
No olvide - si también desea viajar con alta velocidad - tu necesitas suavizar y inclinar cualquier curva angosta

OJO: En todo este estamos hablando exclusivamente vía férreas como infraestructura

Material rodante como trenes, vagones y locomotores etc. es y debe ser responsabilidad de los transportistas
Igual los estaciones: Estaciones NO son infraestructura y por esto NO ES responsabilidad de una organización ferrocarrilero como ENAFER.
La vía férrea necesita una plataforma de 2 meteros de ancho para parar un tren y nada más

Y el resto de una estación con sus edificios, playas de estacionamiento, terminal de buses y taxis, centros comerciales, mercados, kioscos, sala de espera y servicios higiénicos etc. eso es la responsabilidad de la comunidad de construír en la amplietud que el pueblo desea.

Curriculum Vitæ
- for -
Klaus Lynge

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Official photo by DICAPI 2015

Education and training
Klaus Lynge holds the EUR ING title awarded by Feani - European Federation of Engineers - and is a member of the Danish National College of Engineers: IDA
Klaus is born and raised in the Nordic culture - in Denmark, where he was trained and educated as an industrial engineer in organizations such as Nordisk Elektrisk, Technical University of Denmark, Copenhagen Business School, KESF and others.
In Denmark Klaus worked in large companies such as Arcodan, Kosan, 'Hardi International' and the 'NKT Group' as technical manager, production manager, factory manager etc.

First encounter with a contry of the Latin culture.
During the years employed in 'NKT Flexible' (Pipelines) Klaus was send to 'NKT-SUD' in Italy to manage the 'off-shore' work laying out 3 submarine pipelines (27km) to supply the Island of Capri with fresh water from the mainland. A work carried through with special pipeline 'lay barge' filled up with high technology.
Another experience, more simple but no less interesting, was to lay out 1½km of steel pipeline for waste water - assembled on the beach, hauled at sea by a tugboat, connected with the diffusors and at last digged down in the seabed.

Experience in Peru
Klas came to Peru as a representative of the Danish Ministry of Transport in its agreement with MTC of Peru, and when the ministry withdrew he stayed. He is now a resident.
From the beginning he has crossed and travelled all the mountain ranges from Santa Maria de Nieva in the north to Desaguadero in the south and had worked with the local authorities on their particular problems - in general electrification and infrastructure.
(Example: Municipality of Bambamarca, Municipality of Chuquibamba, Municipality of Celendín, Municipality of Sitacocha + Region Renom and Region Cajamarca)
Infrastructure is to understand as all the technical systems that connect a society, city, country, continent - and infrastructure together with organization - understood as the ability to organize - is what can raise a country to a higher level of development.
The experience deep in Peru led to the book "Landet der kaldes Peru" ISBN 87-988133-0-7 - a compilation of observations and experiences about Peru - with an emphasis on transportation.

Professional activity
His activity as a consultant led him as lecturer at events in the National Congress, in universities and in educational organizations - for talks and lectures as external professor - and he has worked as advisor to COMMPE (College of Officers of the Merchant Marine of Peru), the 'Maritime Block' and Fentenapu.
In Peru it has participated in tenders for ports, tunnels, project evaluation, etc. and has discussed ports and railways with all authorities in the field.
He worked with mining companies such as 'Omen Milenium', 'Mineria Mapsa', 'Apurimac Ferrum' and 'Carbones & Derivados' mainly trying to establish a port for the export of their minerals on the southern coast and solve the heavy transport from their mines.
An old problem, which has not yet found its solution.

Professional support
Klaus IS NOT member of CIP = Association of Engineers in Peru. Klaus hold more than 50 years organized in IDA of Denmark
In Peru he is related to the professional groups of consultants around CIDATT

Interests and special skills related to Peruvian society:
1): Creation of a common dictionary for the many Quechua dialects - *(http://www.runasimi.net/quechua.htm>*
2): Principles for navigation with rafts of Tupac Yupanki type (Kon-Tikis) - *(http://www.runasimi.net)*
3): Structure in formulation of National Constitutions - *(http://www.runasimi.net/const.htm)*
4): Heavy transportation from central mines to their overseas markets - *(http://www.pusac.org)*

Recognition from Peru
Honorary Member of AMLQ, Cusco - awarded by the '**A**cedemia **M**ayor de la **L**engua **Q**uechua'
Patron de Yate (Yacht Skipper) #01135-16, DICAPI 2015. (his only official Peruvian education)

Pusac Peru

Plan of Actions

- If Peru really want to construct their Railway -

0): Take the decision to build! !!
1): Create an Autonomous Authority - an ENAFER
2): Study the 7 models of Heavy Haul railways
3): Choose and Take the best for Peruvian conditions
4): Negotiate access to technology, organization and systems
5): Define políticallly WHAT to connect of mines and towns
6): Define HOW TO obtain an optimal line (technically and geographically)

After that: WORK and BUILD - physically

Observation:
While waiting for a start of construction
of the railway
-
we have designed, constructed and
terminated the iirsa26 highway
- running the same route -