

*"Energy is the golden thread that stitches together economic growth,
greater social equity and an environment that allows the world to prosper "*

Ban Ki-moon, New York, September 24th, 2014

"Having the thread is not enough, you must also know how to embroider"

Renato Papale, Pisa, December 24th, 2015



El Regalo de Pachamama

The llama meat is tasty. Recalls a tender goat. But no fat, just muscle. It tends to remain dry during cooking. Do you agree? I do not understand why you Chileans insist to cook it to the plate ... it should need a little bit of sauce ... But no, no, please! Do not put ketchup on it!

I prepare llama meat at Genoese style... Of course, I cook it! Where do I find it? Look, in Italy we have the llama meat. Do not you believe it? It is not as fresh as this, but however, it is good. It is frozen, at the supermarket. There is a supermarket chain, a Tuscan cooperative, that imports typical products directly from the production countries. The llama that I buy comes from right here, from the farms of Toconce. Yes, I saw it on the map, is a pueblo near here, about twenty kilometers from here.

You've never been before? So look, I've got an idea: if there is time after we go to see the llamas at the farm. But, yes we have time: it is early morning and we've all day. To get there, it will not take more than half an hour: there is the narrow

gauge train that drops to Linzor and then slips down the canyon, yes, as you call it, the quebrada ... farms must be spectacular. I hope we can visit ... They produce llamas that export worldwide. I wonder how many animals do they have ...

But you know what I heard? It seems that until five years ago the llama meat was not in the restaurants of Santiago; even in those, specialized with all varieties of roasted meat. It seems to me strange, but they say so. Ah, you confirm it ... They say that in the entire region of Alto El Loa there was not even a slaughterhouse approved, and who bred the llamas had to kill them by himself and to sell the meat on the sly. I do not believe ... Today is a very rich market, they should earn a lot of money...

But five years ago you could eat llama only here in the Andes. The guide told me that if you went to Lasana, in the restaurant in front of the archaeological site of Pucara, same that there is now, but at that time was not so large as today ... It was a wooden hut. As it is now, but much

smaller. In short, it seems that in the restaurant to taste the llama you were to ask softly, as if it were a prohibited good... And it was really forbidden, because secretly slaughtered...

At that time, it seems that there were only a few dozen llamas throughout the region, most of them bred in Taira. It is a pueblo that is now famous.

Yes: it is in a beautiful valley, I went there yesterday afternoon with the guide, while you were making the hike on the small cone of the volcano Poruña. From San Pedro, where we left, follow the lava coming down from Poruña up to the ford of Santa Barbara, then ascend the river El Loa, that creeps into a canyon. yes, of course, a quebrada The valley is very green. First, it's wide, with stony side walls. Then suddenly it narrows, and is closed on either side by two rows of monoliths compact volcanic rock. Are angular columns, such as those of basalt, however, they are red. They look like red giants that protect the valley. The blazing sun draws with shadow grim expressions on their faces...

They told me that five years ago there were in Taira were only three seniors and thirty blade. It seems the song Modugno, do you remember? "We are only three, three bandits and three donkeys ..." No? it's a pity. It 'does not matter. It's an old song, you could not know. My dad used to sing it...

In short, now in Taira it is a cooperative of young people who run a small lake for trout fishing and twenty bungalows. During this season it's all full ...

In the pasture have stopped breeding llama and they keep only valuable alpacas. They explained to me that with European funding and a project of the University of Camerino they imported from farms Peruvian in Toccra a hundred monochrome black animals, and then selected from them a strain of curly alpaca.

They are small in size. "Negrito de Taira," they named it. Of course you've heard of them! They're famous. In short, these alpacas produce three kilos of black fiber per year per head, with a fineness of less than 20 microns. Now in Taira is a handicraft factory for the washing, selection and carding; all used equipment coming from Biella, where were dismantled. And then there is a manufacture of hand-made garments, marketed under the trademark of origin. It seems they have an

exclusive contract with an Italian designer, who next year will put on the market this new line of black alpaca, with the brand and more ...

They say that he pays the fiber fifty euro the kilo.

Think: one hundred and fifty Euros a year per animal. And that's just the material; Then there is the work...

But I was saying about Genoese cooking style! No, it has nothing to do with basil pesto. The Genovese is a Neapolitan recipe, made with onion ... I do not know why they name it so! Genoa has nothing to do... It is a sauce for cooking meat. Like a ragù sauce, however, is not based on tomato, but made by the onion.

Mind, that it takes a lot of onion. Then: for eight people put two kilos of onions sliced into pieces in a pressure cooker with a little water. Of course, in a pressure cooker. First, you do before, but more, can you imagine how can be cooked here the onion, without pressure cooker? It would be a jelly. At four thousand meters, water boils at 80 Celsius degrees ... Then mash the onion... And sauté it in oil and red wine. Eventually you brown the meat into pieces and add it to the sauce ...

But how much noise there is! We cannot talk ... How many people will be there, in the room, for breakfast? I think at least five hundred. But yes, look: the tables are eight places, and are almost all full. In the room below are six-times-four twenty-four tables. Twenty more are in these two rows along the window, you see? Ah, no, there are more: not counting the rectangular tables with six seats on that other side! ... Many more! And then also calculates all the people who are still at the buffet, with the plate in his hand ... Today is Christmas; for the holidays there should be more guests than usual.

If they say they do over half a million visitors a year ... The average is more than a thousand a day. Yes, of course, not everyone will come to eat at the Sanctuary Lodge after the performance of dawn. However, a good part ... And why have called it "sanctuary"? Also in Machu Picchu is the same, do you remember? The Lodge at the exit of the archaeological site they call it "sanctuary" but it is a restaurant for hundreds of customers a day ... Oh, you say that the sanctuary relates to the

nature reserve? It seems to me however a blasphemy ... All to overeat, in the "sanctuary" ... Bah? Restaurant I would call it. it was not so cool but more appropriate...

Nice, however, the show! What do you say? It was awesome. The lights, the colors, the music ... but how did they keep music at the time with the puffs of geysers? There is no orchestra, is all recorded! You say that there is a computer connected? But no, I do not think ... they should develop the music in real time. You say you can? I rather think that the geysers are so regular that they can trust to play recorded music ... Bah! But who cares how they do: it was beautiful and it's all. And then when they turned off all of a sudden and it appeared the nightly sky? Wonderful! Of course it was worth waking up so early ... but then why in the night? Okay that it needs the dark, but why not in the evening after dinner? it would be less tiring! The temperature, you say? They explained?

No, I was distracted, you see. So let me see if I understand: before dawn it is the coldest hour of the day, and the steam becomes white and thick, while during the day it disappears? Look, it's really true! From the window now the geothermal park it seems flat and dry, whereas before the sunrise was full of steam, it seemed the Solfatara hundred times larger ... The Solfatara! ... Why, do not you know? It is a geothermal field in Pozzuoli, near Naples, inside a crater ... Look, it is famous. They made films, wrote books ... Of course, it's not as big as El Tatio, does not have the record of the largest geothermal field in the hemisphere, but it is known, come on! The Solfatara ... I went on trips when at school...

I'm joking. You cannot know the Solfatara. But when you come to Naples I'll bring you there, so you tell me if it's as beautiful as El Tatio ...

So, what we do when we're done here? I am not yet eight o'clock and we have the whole day ahead ... Pass me the brochure with a map of the park. We said Toconce, the farms. Here is the timetable of the train ... Virtually every hour. Then, from there you can also proceed to Turi ... Ah, yes, I really want to do a soak in the spa pool at three thousand meters above sea level before we go away. No, here in El Tatio I do not have the courage, I think I can take too cold ...

But you can do it, if you want, I'll wait...

Then, first thing before you move away, we make a visit to the Archaeological Park with the guidance. They make us see drilling tools used by the Company Larderello almost one hundred years ago, and then those of Corfo Chile in the 80s, and the campsites for the workers ...

The air up here is so dry that after forty years it's all perfect yet without any trace of rust ... Do I exaggerate? It's written here. So then we'll see ... I want to see also the pastures of vicunas, the greenhouses of tomatoes and aubergines drip irrigated, and then bofedales, the wetlands that have created with water from the central ... The whole area around the power plant is a garden in the desert, full of animals. Here is a photo of a nest of partridges on an industrial trellis...

Uh, what a pity! ... We missed it! ... What? The "chaccu"! Look, they say that in November, when here is spring, they perform the capture and shearing of vicunas. It's called "chaccu". In the days before, they collect them all in the valley of the Rio Salado, around the greener pastures. Then men and women, waving colored flags, push the animals within the temporary precincts made of nets on both sides of the valley and gradually shake them down. They push them slowly to the bottom of the networks, to a large circular chamber, where they close them; then they take the animals one by one, shear them and then release them.

Here is written that in the valley every year they capture many hundreds of leaders. Only the hair on the back is thin, and each animal produces about three hundred grams. The fiber, after hand selection is sold to spinning companies in Italy for a thousand euro per kilo ... One euro per gram! And what is it, gold?

So, how much does it worth the poncho of Garibaldi? But you do not know anything! How can you ask: who is Garibaldi! He was like Simon Bolivar for you, that's who he was ... The difference is that Garibaldi came here in South America, while Simon Bolivar never came in Italy. And even Simon Bolivar had a poncho of vicuna. I saw him at his home in Lima, Peru.

Of course, however, a vicuña scarf like the one I saw yesterday in Caspana in the bed and breakfast I would appreciate a lot... Today is Christmas ... well, now, I send a text message to whom you know and I tell him that I'll spend a hundred euro in his name for the gift that he must give to me... What time is now, in Naples? Okay, okay, it's noon. At this hour he's buying pastries to be brought to his aunts for Christmas lunch... He'll go to eat the tortellini soup and reinforced salad, with pickles and cauliflower ... Let's go, that it will be also a pleasure for him, if I write and give my wishes to him...

The collection of the vicuna is written here that is a concession by the state, given to the pueblos of Caspana and Linzor, where there are also women who then make a selection by hand and the first carding ... That's why the B&B landlady last night had vicuna products on sale inside a locked cabinet ... Do the math: three hundred euro for each animal, for a country like Caspana is a lot of money ... And then in the country also have the sale of hand-made products in all hotels and B&Bs...

After the tour to the Archaeological Park, the electric minibus will drop us here at "Sanctuary" and we can have a snack. But no, I did not mean that we will come to have lunch here. Rather now we can prepare some sandwiches with bread and a little 'cheese and ham from the buffet, and we will carry them away ...

So, it is all inclusive...

I know that they offer also the long tour, which goes to Laguna Colorada in Bolivia to see the pink flamingos, but I just do not want to do it. Meanwhile, we must go through a valley in nearly five thousand meters above sea level, and I am afraid that I feel bad. And then it takes all day ...

Instead we go back here at the end of the morning, and then at one o'clock we take a train to go to the farms of Toconce, then to Turi for a bath.

Yes, come on, that we'll have fun anyway, and instead of flamingos we'll see llamas and will take a bath ... Then in Turi there is another electric public bus for Caspana, where we return soon soon, we'll take our luggage and we'll have

another tour in the pueblo (I must choose my vicuna scarf) and then we'll go back to Calama ...

Look, the B&B that you booked on Booking.com is really nice, on top of the hill near the funicular stop ... it looks like being at Vomero ... No, I will not tell you what Vomero is. Google it on the Internet, with your smartphone!

In the pueblo, you saw, they were all excited that in February the UNESCO Commission will come to hand them the title of "World Heritage". They spoke of nothing else! This is also a project born in Italy, thanks to a "twinning" with the Sassi of Matera. They did it the Chilean Universities in collaboration with the Faculty of Architecture of Naples and Florence. And then the whole hotel system here on the Andes, who arrived to offer almost five hundred beds only in the Pueblo Caspana, is grounded on an Italian format, the "spreaded hotel", born fifty years ago to reuse villages depopulated by the earthquake!

Caspana looks really like Matera ... with the homes of the Neolithic age in the walls of the, .. of the quebrada. And the houses of hewn stone belonging of Inca times, and the most recent on the terraces; and the little church, the little square, the little bridge ... Of course I only use diminutives: I felt like I was in the crib!

Listen: during Christmas evening, under the stars, there were missing only the pipers ... But no, I'm not despising anything, it is a lovely place. I like the crib. Look, in Naples we spend a lot of money every year, for the crib...

It deserves it, it deserves the title of "World Heritage". And then, it's a so old pueblo...

Full stop. Now it is time. We prepare two sandwiches and go to the bus. So we agree? Archaeological Park, greenhouses, bofedales and local train to Toconce and Turi ... Come on, that at Laguna Colorada in Bolivia we'll go back again, maybe for Christmas next year, when there will also be the air service. That here we come willingly. And next year I want also to come with my boyfriend, that to move him from Naples and from Mom during holidays it takes the tow truck. You understand me...

The two girls leave. I see them heading to the buffet, where certainly they will implement their purpose, to hide bread and cheese for lunch in their bag... They never stopped talking! And so loudly that even if I wanted to, I could not help but listen. But actually it was pleased to eavesdrop.

Mainly, for the Neapolitan accent of one of the two, which is recognized well even if she spoke Spanish ... It did feel me air of my hometown. And then, I was intrigued by the comments of two young people who first come to visit the Andean region of Alto El Loa.

It seems to me that they have remained enthusiastic ... Having worked here the last years, I feel a bit proud of it.

Our idea at first seemed so visionary, to be difficult even to communicate it... Now that the thought has become a reality, it all seems very simple, almost predictable.

The project in a nutshell was something like this: in a poor and sparsely populated region, but rich in a renewable energy resource in abundance, we believed that the construction of a small power plant would have created the spark to start the economic development needed to enable the future users to pay for the energy they would have used...

It seemed then a plan totally out from the market logics. But the facts have shown that those "logics" were unreasonable. In fact, what we proposed is not anything different from the creation of basic infrastructure; the same initial "step" that allowed our Western economies to start...

The development that came out was extraordinary, beyond all expectations: it enabled the development of an economy based on environmental and cultural wealth of the territory, linked to traditional crafts. The Andean pueblos of the entire region of Alto El Loa have repopulated. Young people, who to study and find work had to leave the country of their birth, are back on the Andes, where they found living conditions and well-paid jobs, both for those who had high professionalism and for those who had

ideas for the development of innovative commercial activities.

At the beginning, the project started slowly, shared on social media, thanks to the interest of some environmental organization and the support of local ProLoa. Then, the crowdfunding arrived, the network of experience, the support of the "Aymara nation" and of that Quechua, the sustainable tourism; and then the Universities, the European projects ... Slowly some small companies intervened, and finally we convinced the big investors ...

Five years ago in South America the development of geothermal energy was almost completely stopped, in spite of an apparent great interest. Only in Chile were active at least 80 exploration licenses for an area of several thousand square kilometers, and another 24 applications were pending, for other 220 thousand hectares. But only one project (Cerro Pabellón) was then actually under development phase.

Along the cordillera, from south to north, there were resources recorded for more than 60 MW already available for exploitation, closed in wells already drilled long time before. But no power station was in operation or under construction. In my memory, I remember 12MW in Curacautin (Chile); 20MW in Copahue (Argentina); 20MW in Sol de Manana (Bolivia); 10MW in El Tatio (Chile).

Five years ago someone already was beginning to talk about speculation. But the difficulties in investing were perceived as real, because of a development model that pretended that a central four thousand meters above sea level in the Andes would compete on the price of electricity to power generation with a coal-fired one on the coast ...

It was positive for the geothermal energy to stop chasing far away electricity users, to be served by mean of costly high-voltage lines, but to use the resource in the high Andes for the local development of the territory.

Some coincidences facilitated the process. First, the availability of the most modern industrial technologies for the efficient use of geothermal resources (*H2ORC - High Enthalpy Organic Rankine Cycle*) and for real-time management of

isolated electricity networks (*smart grids*). We worked with the University Pisa to join them in terms of sustainability. For example, the pumping of water for drip irrigation and battery chargers for electrical transport systems have been integrated in the electrical network as tools for energy storage and load leveling between production and demand of electricity.

And then, there were international agreements on geothermal energy as a result of the COP21 conference in Paris, the interest of the then UN Secretary General, confirmed by his successor...

And finally we cannot forget the economic situation. Namely, the deep and sudden crisis, you remember, that five years ago struck the mining industry, until then considered the only source of wealth of the region (although obtained at the cost of the impoverishment of the environment).

This fact forced a total rethinking of industrial logics.

It finally led to the historic agreement between Bachelet and Morales about the coordinated development of geothermal energy in Chile and Bolivia and for the exchange of energy. An international agreement that opened the progress of Andes made by the geothermal development, that we can see today, after decades of stagnant immobility of investments.

It closed in the name of renewable energy a century-old dispute between the two countries on the so-called "Bolivian littoral"... Now, the whole international geothermal community vies to participate with its own piece to this puzzle. New projects are opened all along the Cordillera. How can you not participate in the exciting challenge of creating excellence for a sustainable development on the "Roof of the World"?

First it should be noted the commitment of Italy, where the idea was born first. Then, the participation of the Israelis, with the plant technologies and experience of drip irrigation in the desert; later North Americans, who began experimenting the extraction of lithium from geothermal fluids, valuable component for the batteries. And not least the Icelandic people, with the chemical plant just commissioned for the production of methanol from CO₂ geothermal

(which releases oxygen as a byproduct) have made possible the imminent opening of a network of air transport on the Andes, using it as a fuel.

The power plants operate with total re-injection of fluids (zero-emission geothermal), without harming the environment. On the contrary: the supply of water for greenhouses and wetlands through the filtration of condensed steam is not a damage but an improvement in the biosphere.

Now, with the release of oxygen in the atmosphere, some fanatic proposed to call the process "below-zero emission" ...

In addition to the benefits for the local economy and for Andean people, the project has had the effect of demonstrating clearly that geothermal energy is not only a renewable energy source and "sustainable" in the sense that its weight is "bearable" by the environment. But rather it is able to create and "sustain" human development and the environment, to keep away the desert and create value for the surrounding natural environment. There were dissolved some misunderstandings, and it is now clear that geothermal is not a mining industry, even though it uses some of the technologies.

Unlike multinational copper mining Companies, geothermal not excavates the ground to extract the ore and take it away; to drop everything when the resource or the favorable economic situation are over, leaving only a huge and desolate hole in the ground. Geothermal energy on the contrary "cultivates" the resource as if it were an agricultural field, without taking away any material, but only by extracting the energy that is constantly renewed, to create local infrastructure of a growing region.

Cambia. Aqì, todo cambia...

Here the two girls are back to the table, laughing at their clumsy attempt to hide the loot ... I think I will propose to accompany them to visit the power station, to show the nests of partridges and the dens of *viscachas* along the steam gathering...

I think its' a very Merry Christmas.
Merry Christmas to all of you.

*Sanctuary Lodge, El Tatio, Chile,
December 25th, 2020.*