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**PLANO
NORDESTE
POTÊNCIA**

**+ JOBS
+ WATER
+ ENERGY**
for Brazil



PLANO NORDESTE POTÊNCIA

Employment, water, power, citizenship, inclusion: the bases of development are here

In a few years, the Northeast region of Brazil, formed by nine states, may experience a new cycle of economic growth, with more jobs, income generation, inclusion, business opportunities and tax revenue. This future is built with a diversified renewable energy mix, and the Northeast has everything to be a protagonist of this new global moment.

If, currently, the region already supplies its energy needs and sends surpluses to other parts of the country, there is much more to come. In the coming years, the Northeast can produce energy equivalent to almost five hydroelectric plants like Itaipu, the second largest in the world, only with the onshore solar and wind energy plants already in place. It can also be an exporter of energy to other countries and of products coming from green industries, to raise funds and contribute to the global economy decarbonisation.

Transforming this immense natural and human potential into green GDP growth and better quality of life for the population relies on a few steps, and the Plano Nordeste Potência proposes ways to do it.

New and modern public policies integrating the needs of both society and the market are the first step. The accelerated implementation of power generation plants has opened opportunities, but adjustments in management and integrated planning with other policies can advance more efficient and sustainable uses of the region's natural resources.

An expansion of power plants that is careful and respectful to rural and traditional communities, and the environment, integrating people and opening doors rather than impacting them, is the foundation of the 21st century economy. Unfortunately, this is not happening; however, if well planned, power generation can become a vector for

local development, fulfilling the needs of the population in a fair and inclusive way.

The **revitalisation of the São Francisco River basin**, which cuts through the Northeast region, together with adequate water management, will transform the river into a complementary power source, almost like a “battery”, to other renewable sources, starting in the next decade. In turn, more solar and wind energy will allow better water storage in the basin during times of less rainfall, with significant benefits for non-energy uses such as water supply, irrigation, tourism and navigation, as well as environmental services.

Energy transition is a global agenda with growing investments, which is based on new relationships between different governmental, business and social actors, and the settings in which they act. For this transition to be fair, it is necessary to rethink the current economic model and put people first. By consolidating good foundations and integrating state governments, the Northeast will play a relevant role in this context, with great potential for attracting investment and serving as an example to be followed.

The Brazilian Northeast region has everything that the green economy of the 21st century demands: sun, wind, creativity, work force and proximity to national and international markets. The pathways presented by the Plano Nordeste Potência that the region can quickly become a reference of sustainable development, with economic growth and social inclusion, for Brazil and the world in the 21st century.



PLANO NORDESTE POTÊNCIA

+ JOBS
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RENEWING RELATIONS WITH PEOPLE AND THE TERRITORY IS NECESSARY

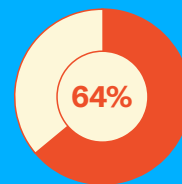
- Renewable energy sources are good for the climate on a global scale, but must also be good for people and the environment on a local scale
- A leading role and inclusion of local populations should be part of every planning process for consolidation and expansion
- Public authorities must ensure respect for human rights, land, culture and access to natural resources, through modern policies aligned to sustainable development
- Power plants that combine the centralised model with distributed generation can foster local development by having solar energy consigned to the surrounding communities

2MILLION

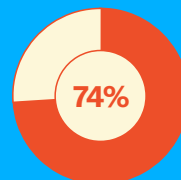
jobs at least could be created in the next five years in Northeast Brazil if the permits already granted for solar and wind, plus distributed solar power, are implemented

- **This is double the number of jobs** that exist today in all of Brazil in these sectors
- **The figure could increase** with more investment in distributed generation and energy efficiency, and in new sectors such as offshore wind farms, electric mobility and green hydrogen

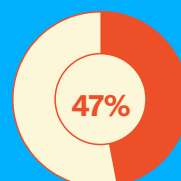
PUBLIC SUPPORT



of the population of Northeast Brazil believe that green industry is the best model for Brazil

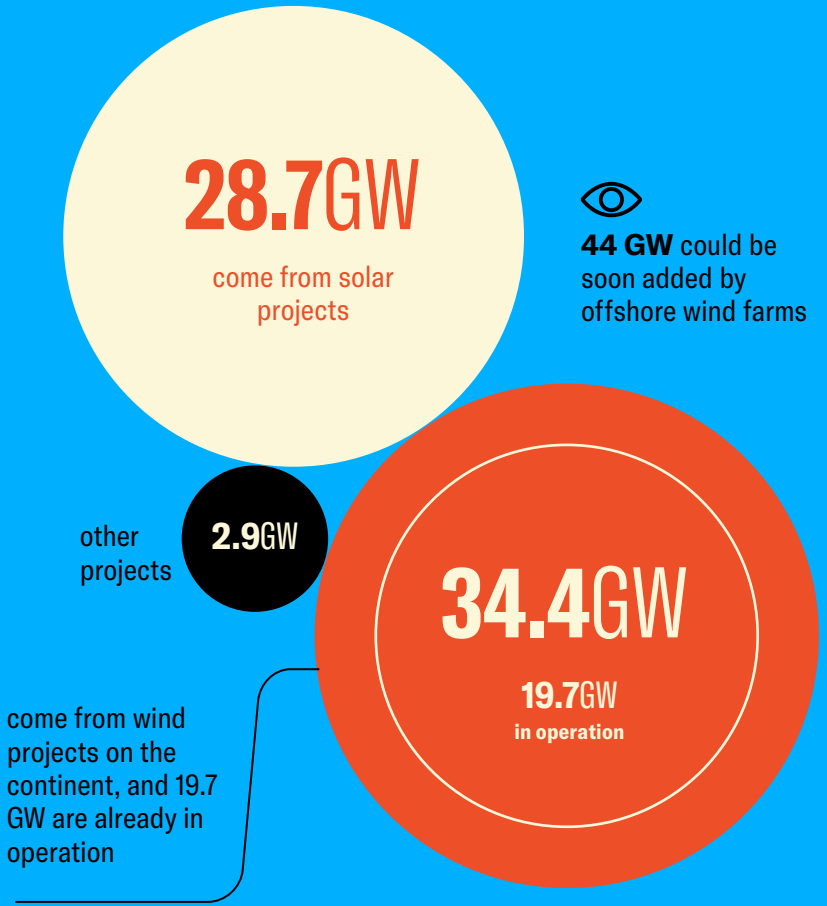


point out that green development should be a priority for Brazil

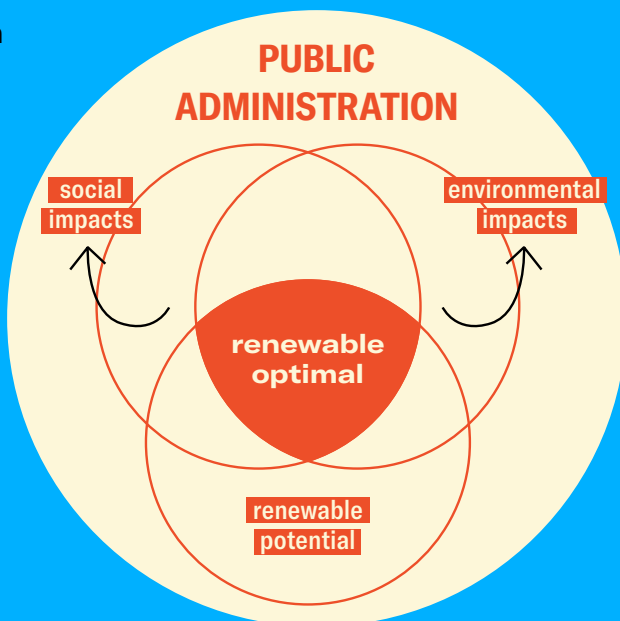


would rather work in green industries than in polluting ones

66 GW in renewable energy projects were granted to the Northeast region, the power granted is the equivalent of **almost 5 Itaipus**



Public administration must promote an integrated view of different components for a fair, inclusive, and green development plan.



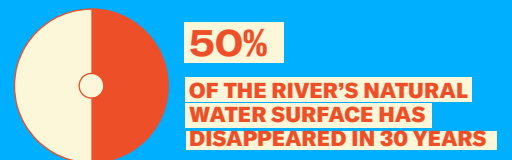
LOCAL ENVIRONMENTAL IMPACTS MUST BE ASSESSED AND MITIGATED

- **Degraded and abandoned areas**, when not a priority for restoration and conservation, should be a priority for receiving new power stations and transmission lines
- **Environmental licencing** should consider future scenarios for the region, as well as working with the latest and most excellent existing science



The revitalisation of the São Francisco basin is urgent

The river is key to the expansion of renewables - hydroelectric plants serve as a complement to varied, or intermittent, wind and solar sources



3.3MILLION

hectares of native vegetation need to be recovered in the São Francisco River Basin

1

OPPORTUNITIES & RECOMMENDATIONS

1 *Energy Transition Investment Trends 2022*. BloombergNEF, 2022. Available on <https://about.bnef.com/energy-transition-investment/>

Internationally, investments in energy transition reached US\$ 755 billion in 2021¹, a growth of 27% from the previous year. Asia is the main destination, while South America is still a market to be better explored.

2 Available on www.nordeste.potencia.org.br/en

The Brazilian Northeast can intensify fundraising efforts for this purpose, and thus transform the regional human geography, with positive impacts spread throughout the territory. Incentives to the new industrial sector, focused on low carbon and inclusive economy, qualification of manpower, adequate territorial planning, social policies, environmental commitment and funding of research and development, may serve as instruments for the inclusion of communities, reduction of inequalities and income

generation, all while respecting traditional ways of life and increasing revenue for states and municipalities.

Therefore, the Plano Nordeste Potência [Northeast Power Plan] offers a set of recommendations for the state and federal levels, as well as suggestions for the private sector, in order to contribute positively to the public debate around this new economy. It also provides a set of studies² supporting the plan, in order to enable the analysis and incorporation of the pathways indicated here in the coming years.

AXES

ACTIONS



DIRECT PUBLIC MANAGEMENT

- **Participatory development of an Ecological Economic Zoning** (*Zoneamento Econômico Ecológico - ZEE*) for centralized wind and solar facilities, integrating information on conservation units, indigenous lands, *quilombolas* and rural settlements to be safeguarded, and degraded areas for expansion of power generation plants and transmission lines;
- **Articulation of sectorial plans and policies** - including climate policies - within and between states, in order to foster integrated growth and strengthen the region, with integrated planning tools;
- **Funding for energy efficiency** and distributed solar generation by state and local agencies;
- **Guarantees for the affected communities'** participation in expansion, granting and environmental licencing studies;
- **Creation and implementation of policies** to foster the solar industry's value chain;
- **Development of public-private partnerships (PPPs)** for the use of renewable energy sources in public buildings and facilities;
- **Advancement of the electrification of transportation**, with priority for public transport.



TECHNICAL TRAINING

- **Promotion of technical training for renewable energy**, energy efficiency and electrified transport sectors, through agreements with training agents such as Industry Social Service – SESI, National Service of Industrial Training – SENAI, Brazilian Service for Micro and Small Enterprises – Sebrae, etc.;
- **Advancement of environmental, energy and science education** in schools and universities;
- **Capacity building** for rural youths.



SOCIAL PARTICIPATION

- **Creation of permanent forums** to debate and guide the installation of onshore and offshore solar and wind power plants, with the inclusion of environmental and territorial collegiate bodies in decision-making processes;
- **Creation of autonomous instances** for technical and legal assistance, and monitoring of agreements, contracts and processes of communities affected by the developments;
- **Guaranteed rights of identity** and permanence in the territory;
- **Democratisation of information** from studies and installation of solar and wind generation projects, and transmission lines;
- **Definition of new indicators** and chains of responsibility, in dialogue with society, of service providers installing wind and solar power plants.



DISTRIBUTED RENEWABLE ENERGY GENERATION

- **Reduction of access inequalities to quality energy** by (1) encouraging distributed generation and (2) environmental and social compensation for centralised solar and wind generation projects.
- **Promotion of distributed generation of solar energy** with the leading role of local communities;



SÃO FRANCISCO RIVER

- **Promotion of the complementarity of renewable sources with hydroelectric plants** in the São Francisco River basin through debate with the National Electric System Operator (*Operador Nacional do Sistema Elétrico - ONS*), with a plan that guarantees the adequate management of water, its multiple uses and the regeneration of ecosystems;
- **Promotion of community-based projects** for the productive recovery of vegetation, tourism and sustainable extractivism, and the conservation of terrestrial and aquatic ecosystems;
- **Restoration of vegetation liabilities** in the São Francisco River basin;
- **Articulation with the São Francisco River Basin Committee** and state committees.

2

THE BRAZILIAN NORTHEAST EMBRACES THE GREEN



A survey by ClimaInfo Institute, conducted in different state capitals in Brazil in May 2022, shows that the green development agenda has broad support from the Brazilian population, regardless of political leanings and across groups with diverse social values.

The survey indicates that 64% of people agree that green industry, rather than fossil fuels, is the best model for the future of Brazil's economy. Additionally, 73% of Brazilians - in the Northeast the rate is 74% of the population - point out that the federal and state governments should consider the development of a green industry in the country as a high priority.

The survey also reveals that the announcement of a state green development package, which considers renewable energy, electric vehicles and other clean energy transition projects, would generate positive feelings such as hope (47%), optimism (39%), happiness (38%) and pride (29%)³.

Similarly, the announcement of a local job creation programme for the reforestation of riverbanks is seen as something that receives a high degree of priority (71%) and generates positive feelings such

as happiness (48%), hope (39%), optimism (38%) and pride (36%).

Good feelings are also connected to specific technologies. Most people declared extremely positive feelings about solar energy (69%), electric vehicles (51%) and wind energy (48%), while oil and gas received only 27% and 26% of this sentiment. This fact is reinforced by the preference of 51% of people in Brazil for jobs in green industries over polluting industries, which would be chosen by only 12% of the Brazilian population.

When asked about the best arguments for promoting green industries, the Brazilian population argues that these technologies pollute less than those based on fossil fuels, and that these investments help generate new, secure and good-paying jobs for all kinds of people, as well as being necessary in the fight against climate change.

73%

of Brazilians point out that the federal and state governments should consider the development of a green industry in the country as a high priority

69%

of people declared extremely positive feelings about solar energy

³ Some questions allowed the choice of more than one feeling, so the sum exceeds 100%.

3

MORE JOBS

At this time of wars and international financial crises in the post-global pandemic recovery, the expansion of renewable energies and energy efficiency offers a great opportunity to start the transition from the old development model into a sustainable, clean and inclusive pathway, with good jobs for Brazilians.

⁴ “Renewable Energy and Jobs - Annual Review 2021”, Irena e OIT, 2021. Available on https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Oct/IRENA_RE_Jobs_2021.pdf “Energy Fact – Residential solar installations create the most jobs per megawatt”, The FreeingEnergy Project. Available on <https://www.freeingenergy.com/facts/jobs-solar-installation-residential-utility-g207/> “Wind power and job creation”, Sustainability, 2021. Available on <https://www.mdpi.com/2071-1050/12/1/45>

⁵ *Quilombo* is the denomination for communities of black slaves who resisted the slavery regime that prevailed in Brazil for over 300 years and was abolished in 1888. Source: <https://cpisp.org.br/direitosquilombolas/observatorio-terras-quilombolas/quilombolas-communities-in-brazil/>

As well as being good for the climate, renewable energy sources can be good for people: they create more jobs than fossil fuels. Considering the permits already granted for onshore wind and solar generation, there is potential for the creation of at least 2 million additional jobs, according to calculations based in the International Renewable Energy Agency (Irena) and other agencies that monitor the sector⁴. This is more than double the current workforce in solar photovoltaic (around 68,000) and wind power (40,000) sectors in Brazil.

And the number of jobs will rise. The expected growth for the solar market is much higher than what is already licenced, due to the contribution of distributed installations (PV) and offshore wind projects under development, which have not yet been licenced. Broadening the view of energy transition to other fields, such as the production of green hydrogen, energy efficiency and the revitalisation of the São Francisco River Basin – the latter necessary for a wind-solar-hydro integration –, one can still see that many more job openings need to be created throughout the region.

However, good jobs will not be created automatically in the energy transition. Ambitious political support and investments in a fair, climate-safe and future-oriented direction will have to be instigated, sustained and expanded.

A key step is to support training. Most of the workforce is focused on construction, which needs more manpower than the operation and



maintenance of the plants, and therefore not all the posts created are permanent. However, the consolidation of the sector generates a virtuous circle, which begins with training and continues with the use of knowledge in other related areas, transforming the Northeast into a reference for green jobs in the energy area.

Another issue is planning a workforce transition both on state and regional scale. Comprehensive public policies, based on effective social dialogue, should use incentives that embrace workers leaving jobs in conventional energy, together with industrial and enterprise policies to leverage existing domestic industries.

DIVERSITY AND INCLUSION

In the world, women represent only 32% of the renewable energy workforce, and only 21% of the wind energy workforce. When it comes to roles in science, technology, engineering and mathematics, these figures are even lower: 28% and 14% respectively. They are more likely to be employed in non-technical, administrative and public relations positions with lower salaries than in technical, managerial or policy-making positions.

Although they are more present in renewable energy jobs than in the energy sector as a whole, particularly in oil and gas, women remain under-represented.

Banks and development agencies can play a relevant role in this transformation, stimulating diversity in job creation, with the requirement of a plan for inclusion of local labour, with definitions of participation of women, indigenous peoples, *quilombolas*⁵ and people with special needs for each million invested. In this way, the release of resources is linked to inclusion and equality, promoting social transformation where different groups benefit from the emerging renewable energy sector.



Some public policies need to help increase women's participation in the labour force. These include, but are not limited to:

- **Equal pay** legislation;
- **Policies that provide a better work-life balance** for all employees, such as maternity and paternity leave and part-time working hours;
- **Access to education and training programmes** through technical and higher education courses, with targeted internships and scholarships.



CAPACITY BUILDING

The energy transition requires the creation of 122 million jobs by 2050 worldwide, if the goal is to keep the rise in the planet's temperature below 1.5°C, as set out in the Paris Agreement, with at least half of these jobs to be filled by workers with primary and secondary education. Up to 13% of the vacancies will be filled by professionals with higher education.

The scenarios for the use of manpower - and therefore training - need to take into account all phases of the project, which starts with environmental licencing, followed by civil construction, electromechanical construction, electrical installations, operation and maintenance, and security and surveillance. The government can still generate demand via public procurement and public-private partnerships.

The integration of this labour force must be done in stages, according to the degree of complexity and respecting regional differences.

From this perspective, the Northeast can benefit from training at all levels, from technical to post-graduate, which can be done in partnership with development agencies and regional development secretariats, integrating universities, the National Service of Industrial Training (SENAI), the Brazilian Micro and Small Business Support Service (Sebrae), associations of distributed generation industries, solar, wind, biogas, etc., and the entrepreneurs themselves.

To truly transform the industry, it is necessary to stop importing technical labour from other states and get to export local workforce with knowledge and expertise in the implementation of renewables. This exchange would be the insertion of skilled labour in projects in other Brazilian states, in other regions, making the Northeast a centre of excellence and knowledge in the sector.

13%

of the vacancies will be filled by professionals with higher education

50%

of these jobs, at least, to be filled by workers with primary and secondary education.

4

MORE WATER

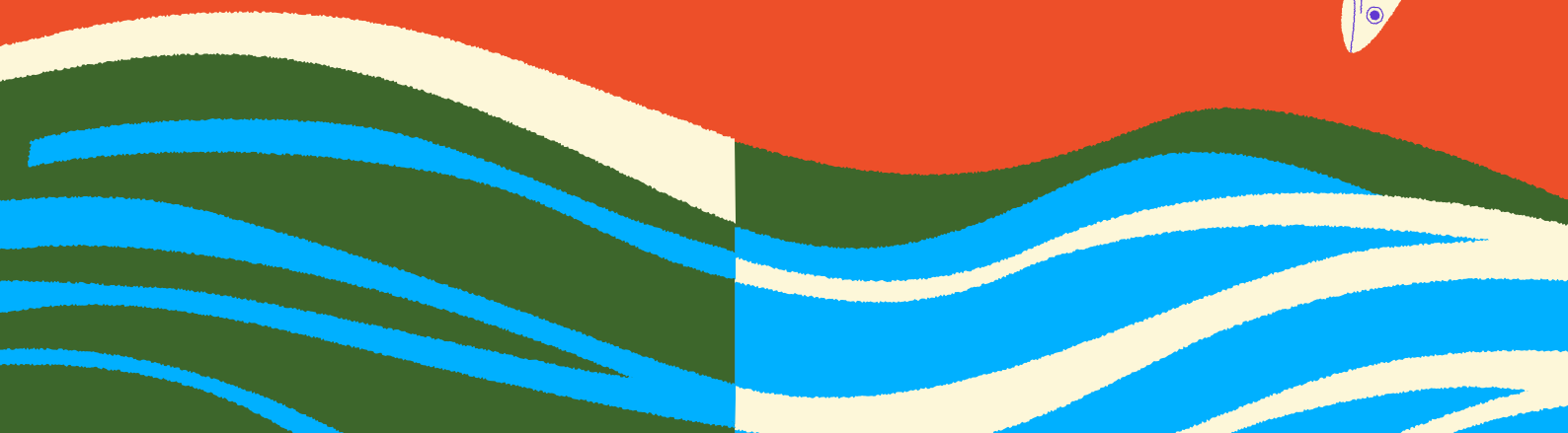
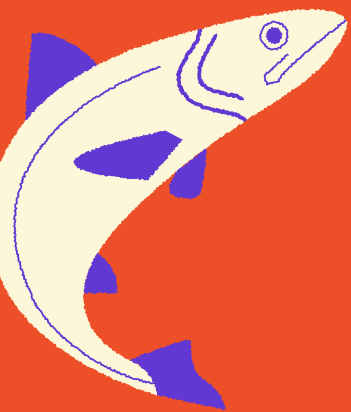
Water reservoirs are the battery that Brazil needs to diversify its energy mix without fossil fuels, gaining stable power for growth.

The synergies of hydroelectric generation with other renewable sources, operational flexibility and water storage in reservoirs, which can be used as a complement to wind and/or solar power generation, increase supply reliability.

As wind and solar energy grab a larger share of the Brazilian energy mix, it is necessary to review the way in which hydroelectric power plant reservoirs are used, as the demand for operational flexibility increases significantly. It is possible to cover events of low generation in one source from another with high capacity, as long as there are good water reserve management practices, providing seasonal stability to the system.

Studies by the Brazilian Ministry of Mining and Energy already take into consideration such a complementary nature of the national energy mix with the use of non-dispatchable renewables for the next 15 years, without the need to build new large dams⁶.

⁶ As explained in “Sistemas Energéticos do Futuro: Integração de Fontes Variáveis de Energia Renovável na Matriz Energética do Brasil”, EPE, 2020. Available on <https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/estudo-de-integracao-de-fontes-renovaveis-variaveis-na-matriz-eletrica-do-brasil> (in Portuguese)



This path is essential to maintain a clean profile of greenhouse gas emissions in the Brazilian electricity sector, avoiding the use of thermal plants based on fossil sources such as gas and coal to offset periods of water crisis, along with other measures such as permanent management of demand, energy efficiency actions and optimisation of operating hours⁷.

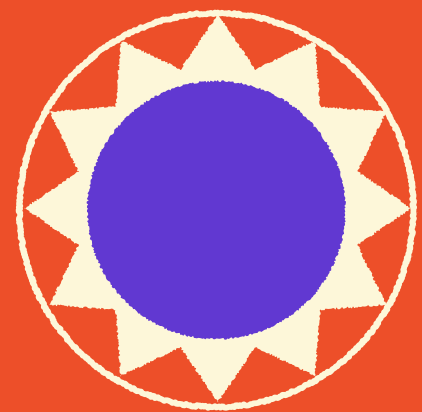
The traditional choice of “dirty” sources as reliable is bad for the climate, and also for the budgets of Brazilians. This is what we saw in the commission of emergency energy to overcome the water crisis of 2021, when fossil gas thermoelectric plants were contracted at an average price of US\$ 512/ MWh (BR\$1,563.61/MWh), about five times more than the amount paid for solar projects in the same auction (US\$66/MWh, or BR\$343.00/MWh)⁸.

The four large hydroelectric plants on the São Francisco River have immense potential to act as a battery for wind and solar power plants. Additionally, reservoirs can and should provide a range of non-energy services, such as flood control, water supply for human consumption, fishing, irrigation, recreation, and navigation, as well as environmental services.

7 “Crise hídrica, termelétricas e renováveis - Considerações sobre o planejamento energético e seus impactos ambientais e climáticos”, IEMA, 2021. Available on http://energia.eambiente.org.br/wp-content/uploads/2021/09/IEMA_crisehídrica_termelétricas.pdf (in Portuguese)

8 “Termelétricas a gás mais caras foram as mais contratadas no Leilão de Energia Emergencial desta segunda”, IEMA, 2021. Available on <https://energia.eambiente.org.br/termelétricas-a-gás-mais-caras-foram-as-mais-contratadas-no-leilão-de-energia-emergencial-desta-segunda-20211025> (in Portuguese)

The synergy between electric sources must, therefore, observe other contexts, such as environmental and social ones, in which water management is carried out in the most virtuous and careful way possible, guaranteeing the minimum and maximum levels suitable for multiple uses and the regeneration of ecosystems. Populations throughout the basin depend on the resource and, in particular, vulnerable groups may be especially impacted by the storage and sudden outflow of reservoirs.



URGENT REVITALISATION

For good reservoir management, it is also necessary to take a step back and ensure that there is abundant water in the basin.

Data collected by the MapBiomias Initiative for the Plano Nordeste Potência show that the natural water surface of the São Francisco is now half of what it was 30 years ago. The intensive use of the resource for irrigation and an excessive and growing deforestation have led to this situation, which generates consequences already known by the population, such as stretches that were once navigable and are now dry, and seawater reaching miles upstream from the river mouth on the ocean.

The situation is aggravated by climate change, with unfavourable future scenarios in which the flow throughout the basin is expected to decrease⁹.

To guarantee the operation and security of supply of a power system with low greenhouse gas emissions, it is necessary to implement the urgent hydro-environmental recovery of the São Francisco basin, as well as good

practices of land use and the adequate management of water resources, with public policies that acknowledge how the nationally-interconnected system is fed by streams, human water consumption, and traditional, agricultural and industrial uses of the river.

There are at least 3.3 million hectares of vegetation liabilities to be recovered in legal reserves and permanent preservation areas in the São Francisco basin, according to the Forest Code [*Código Floresta*], the main Brazilian environmental law. There is also an upward trend in land use change in areas of intense agribusiness expansion. Therefore, processes of native vegetation recovery beyond riparian forests, prioritising recharge areas, for example, should accompany the fight against deforestation. This parameter can be included in environmental regularisation programmes, with rapid validation of rural environmental records located in the basin and the inclusion of rural properties with liabilities in recuperation programmes.

The revitalisation of the São Francisco River Basin also has the potential to generate more jobs and income in the region, through the production and distribution of seedlings needed to recover liabilities; and through incentives for projects to enhance productive recovery activities for traditional sustainable family farmers.

⁹ *“Análise do impacto das mudanças climáticas em índices climáticos associados com a variabilidade dos regimes de chuva e vazão na bacia do rio São Francisco”, in “Secas e Cheias: Modelagem e Adaptação aos extremos hidrológicos no contexto da variabilidade e mudança do clima”, Zenodo, 2022. Available on <https://zenodo.org/record/6569311#.YtddEuzMLMJ>. (in Portuguese)*



5

MORE ENERGY FOR BRAZIL

Currently, the Northeast region accounts for 20% of the total electricity generated in Brazil, second only to the Southeast region. Even with the inclusion of new consumers, especially with the 2003 Light for All Programme [*Programa Luz para Todos*], which brought electricity to rural consumers, the region produces more energy than it consumes and still exports, in average, around 1GW to the rest of the country.



There is an important potential for increasing the Northeast's national participation, grounding the region as a major supplier of the power needed by the country to resume economic growth in the next decade. With energy being exported as green hydrogen, the Northeast may still gain prominence as a key element for other countries to achieve a carbon neutral profile.

The expansion of electricity generation planned for the region, granted by the National Electricity Agency for the coming years, is of the order of 88 GW, of which 75% come from renewables. The wind source alone has been granted 34.4 GW, of which 19.7 GW are already in operation. In addition, the Northeast has approved solar grants that will add 28.7 GW of photovoltaic capacity to the region.

In other words, the Northeast has in renewable energy its main asset, with less greenhouse gas emissions. The variable renewable sources, although initially more expensive than traditional ones, became more competitive as the sector expanded due to the growth in numbers and technological advances. As a result, on average around the planet, a dollar put into wind and photovoltaic sources generates four times more electricity than it did ten years ago.

However, the growth of thermal power plants threatens the "certification" of good sources for climate and budget. As previously discussed, the complementarity between solar, wind and hydroelectric sources would afford to provide security to the system, reducing the dependence on fossil sources as an emergency solution. Energy mix diversification, as well

20%

of the total electricity generated in Brazil comes from the Northeast region

as proper management of available resources, includes the need to reduce greenhouse gas emissions while supporting a secure power system, even during crises.

Keeping focus on renewable sources is the way to secure more resources. This happens because the debate on climate change has ceased to be a subject restricted to diplomatic negotiation tables and has become a good deal in financial decisions of global markets.

By 2021, US\$ 371 billion were invested worldwide in new renewable energy generation systems¹⁰, 70% of the total energy investment, a clear indication of the trend to rapidly abandon fossil sources in order to ensure a stable climatic environment in the coming decades.

Brazilian public and private financial systems have been creating alternatives to support this market, but there is still a lack of well-defined public policies that cover other items besides tax incentives, such as more stimuli via research, development and innovation agencies.

According to the International Energy Agency (IEA), the main global obstacle to accelerating the energy transition is the lack of more markets with well-constructed regulatory foundations and domestic policies to support the sector. It is therefore urgent that an enabling environment is created in the Northeast region, in order to quickly bring investors' interests, while directing profits towards local development and the inclusion of different sections of the population.

¹⁰ World Energy Investment 2021. IEA, 2021. Available on <https://www.iea.org/reports/world-energy-investment-2021/executive-summary>



RESPECT FOR COMMUNITIES

If the technology is said to be “clean”, the way it is used does not always follow the same line. Cases of violation of land rights and of the right to informed listening, violence, disrespect for traditional ways of life and environmental damage are on the rise. In the majority of cases, these problems could be avoided with advanced legislation, the inclusion of stricter social and environmental parameters throughout the decision-making chain, better practices within companies and greater social participation.

From granting to operation, from credit to marketing, the damage to society and nature have been left aside due to the opportunities and urgency imposed by the climate crisis. Such costs are not included in the energy sector’s spread sheets, but they accumulate, mainly in the interior of the continent and on the shoulders of the most vulnerable groups, and have already left indelible marks on society’s perception of renewable technologies.

The expansion of renewable sources should not be implemented at the expense of minority, traditional and rural populations, and the environment, but rather should be used as a vector for the creation of opportunities, inclusion and local socio-economic development.

The repetition of an old model of occupation of the territory by building infrastructure, in which the decision for the installation of the enterprise is taken without extended listening processes and respect for the population’s leading role and needs, and without looking at the environmental characteristics of the landscape, does not align with another basic precept of the regenerative economy of this century: that social justice, guaranteed rights and the maintenance of ecosystem services are part of ethical and sustainable development.

Changing this game and focusing on human assets, instead of dealing with social liabilities, brings more legal security to businesses focused on the expansion of wind and solar energy, since it avoids future litigation challenges. In addition, it can still transform the Northeast region into the clean reference that the global market seeks, an example that the paradigm of low carbon economy is possible and real.

Subnational governments have a central role in guaranteeing the rights and duties of the actors involved in the process. The tendency to expand renewable generation will demand special attention and strengthening of environmental agencies in the licencing of these undertakings, with an adequate ecological, economic and social zoning of the states, which integrates analyses on environmental, cultural and social aptitude for the installation of new enterprises.



WIND

- **Since the first federal auction held in 2009**, centralised wind energy has been the highlight of the expansion of renewable sources in Brazil, with installation costs falling 58% from 2010 to 2021. Among the five regions, the Northeast is the most important, with 805 parks in commercial operation and 19.5 GW installed on land, equivalent to more than 10% of the total power installed today in the country.
- **More than USD 1 billion in investments** in wind power are estimated by 2030 in the country, and the Northeast region will be especially privileged¹¹. The growth trend for the coming years places the region as one of the main energy producing centres for the development of Brazil.
- **Some states started ahead**, but all states currently have investments in the area, with prospects for growth of the sector in the coming years, whether on land or at sea.
- **Accelerated construction projects** have brought significant resources to the states, but have also generated social and environmental impacts. The expansion has replicated old models of land occupation and income concentration, with exclusion, damage and disrespect to traditional populations.
- **History repeats itself now with the prospect of large offshore generation plants**. There are already requests for licencing 44 GW on the Northeastern coast and, as with onshore generation, they lack a thorough analysis of social and environmental impacts, of the needs and opportunities of local populations, and of the adequacy of public management in its various spheres.
- **Changing this game is essential** to ensure that international funding flows are directed to the Northeast region, since social and environmental responsibility is now part of the process of deciding where resources will be applied. The ESG agenda, an acronym for “environmental, social and governance”, is advancing rapidly in the private sector, and is guiding investment decisions.

¹¹ “Oportunidades para o Nordeste em energia eólica”, Caderno Setorial Etene, Banco do Nordeste, 2021. Available on https://www.bnb.gov.br/s482-dspace/bitstream/123456789/974/1/2021_CDS_177.pdf (in Portuguese)



SUN

- **Solar photovoltaic plants** started slowly in the Northeast, but plans for the coming years are to jump from 5.8 GW installed today to the 28.7 GW already licenced.
- **Technological advances and increased solar-based power generation** in recent years have reduced costs - globally, they fell by 13% between 2020 and 2021 - and improved equipment performance and reliability.
- **Modules produced in Brazil** are eligible for low interest rates on financing, but met only 3.8% of the demand in 2020. There is already a significant process of cost reduction and government incentives, but it can be better stimulated by public management.
- **Besides central power plants**, another field for expansion in the Northeast region is decentralised micro and mini-generation. In 2022, in Brazil, small-scale generation reached the mark of 11 GW of installed power, with emphasis on the photovoltaic solar source, strongly supported by the connection to the local distribution grid. In the Northeast, there is currently 1 GW of distributed generation installed, according to data from the Brazilian Association of Distributed Generation [*Associação Brasileira de Geração Distribuída*], still very little when compared to the regional potential.
- **Besides contributing** to the diversification of the Brazilian power mix, with the increase of energy supply stability, distributed generation reduces losses and relieves transformers and feeders, because the consumers are close to the generation site.
- **This modality brings the most direct benefits** on a local scale, as it stimulates business and jobs and democratizes access to energy. Systems that take into account both methods - distributed and centralised - promote the inclusion of local and rural populations in the sector, producing tangible benefits while feeding into the national system.
- **Besides stimulating micro and mini-generation**, especially in the countryside, state governments can lead by example by installing solar panels in public buildings.



GREEN HYDROGEN

- **Hydrogen (H₂)** is used in a huge variety of processes in almost all productive sectors, but almost 90% of it comes currently from fossil sources such as coal and oil, making its production, therefore, harmful to the climate. Transitioning the production sources to renewables can bring environmental advantages and put Brazil on the green business investment map. However, to turn this idea into reality, there is still the need for further development and more studies.
- **Brazil, and the Northeast region in particular**, is one of the main potential producing and exporting centres of green hydrogen (GH₂ - produced with renewable energy sources) in the next two decades, due to the availability of natural and human resources, capacity to construct the necessary infrastructure and ease of export via ports. It is no coincidence that European countries, such as Germany and the United Kingdom, have been observing and even stimulating this sector, with information and support.
- **New technologies need government funding** and private sector investment to respond disruptively to new challenges. The production and export of GH₂ will require energy and logistical planning, with specific training, the creation of its own tax policies, research and development, public-private institutional arrangements, investment in more efficient and safer production, storage and distribution processes, and special care for the environment and the well-being of workers and populations directly and indirectly affected.
- **Looking beyond the state**, at a regional level, can generate multiple benefits for the Northeast. GH₂ production and distribution corridors are highly recommended. This requires urban and rural planning that must be informed by scenarios of GH₂ use for: electric mobility; industrial hubs; various types of transport for human mobility and production flow - both for domestic consumption and exporting.
- In addition to exports, and precisely because of the challenges that exist on GH₂ transport, the Northeast can stimulate the development of an industrial sector in the region, creating an environment in which companies consume green hydrogen in their processes and export the product already embedded with a smaller carbon footprint. This would lessen the techno-economic challenges of exporting GH₂ to the world, increasing job supply and income growth.
- Another relevant issue is the high energy demand and associated costs. Currently, plans for GH₂ in the Northeast are focused on the imminent opening of the offshore wind market, which has been moving at a rapid pace in Brasília, to bring down the cost. However, as with inland wind farms, environmental and social risks are relevant to the Brazilian coast. Specific studies assessing impacts on the region are still lacking, which could “tarnish” the clean image of GH₂.



ELECTRICAL MOBILITY

- **Electrical mobility** has barely started to crawl in Brazil, but the prospects are positive, especially with the advancement of green hydrogen production and the consolidation of renewable energy sources that can feed an automotive industry with a smaller carbon footprint.
- **The path starts at vehicle manufacturing**, from the suppliers of the most basic components in the logistics chain to the assembling plants. Energy inputs for component and vehicle production must come from renewable energy sources, as must electricity itself. However, the project needs to anticipate, from its conception, how consumer materials will be disposed of and recyclable materials will be reused, thus adopting the principles of circular economy, something still incipient in the Brazilian automotive industry.



TRANSMISSION GRID

- **This surge in power generation** will require a significant expansion of the power transmission grid in the Northeast. There is a need for investment in more than 12,000 miles of transmission lines in the Brazilian basic grid, totalling US\$ 16 billion¹², most of it in the Northeast region.
- **However, this expansion**, even if it is centrally planned, must take into account the negative impacts on rural territories, traditional or not. The social and environmental risks cannot be underestimated, and the states must guide the course to the Ministry of Mining and Energy from the study phase on, in order to avoid liabilities with local effects that are difficult to resolve.

¹² In “Descarbonização do setor de energia”, Instituto E+, 2022. Available on <https://emaisenergia.org/publicacao/descarbonizacao-do-setor-de-energia-no-brasil/> (in Portuguese)



PLANO NORDESTE POTÊNCIA

ABOUT US

The Plano Nordeste Potência is built by four Brazilian civil organizations: *Centro Brasil no Clima* [Brazil in Climate Centre], *Fundo Casa Socioambiental* [Casa Socio-Environmental Fund], *Grupo Ambientalista da Bahia* [Environmental Group of Bahia] and *Instituto Climainfo* [Climainfo Institute], with support from *Instituto Clima e Sociedade* [Climate and Society Institute]. Our goal is to promote public debate about post-pandemic economic recovery in the Brazilian Northeast on a green, fair and inclusive basis, in a system that brings benefits to all strata of society.

More information on the Plano Nordeste Potência, as well as access to the main studies and analyses carried out under this project and by third parties, which provided inputs for this document, can be obtained at www.nordestepotencia.org.br/en.

The studies cited above do not necessarily represent the views of this group.

July 2022.

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