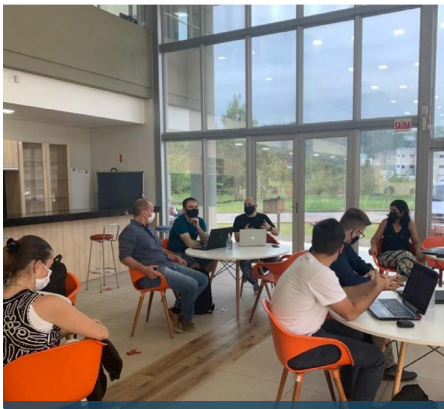
certi®

# ANNUAL REPORT

## 2021


Amazon Journey



INVENT

SCHULZ Compressors


Celesc Charging Station

Computer Vision (A.I.)
for Search and Rescue

# CERTI in 2021 – Executive Summary

## Institutional Evolution

The CERTI Foundation is a private not-for-profit institution dedicated to promoting technological innovation and entrepreneurship. It's earnings come from executing projects, providing technological services, consulting, and short training courses. After two difficult years due to the retraction of R&D investments by the market and the effects of the Covid-19 pandemic in 2020, CERTI regained a context of growth and positive development in 2021. Significant adjustments in organizational structure, with a strong re-structuring of operating processes and management methods implemented in the previous year, allied to measures to mitigate the effects of the pandemic, and strong actions in sales, were assertive and effective. With Net Operating Income of R$ 63,5 million, CERTI's revenues grew 51% over 2020, maintaining its operations with 85% of its staff in a regime of remote work. It acted in the execution of 129 different projects (11% more than 2020), with a staff of 378 employees (also 11% higher than in 2020), attaining a contribution margin of 25% and EBITDA of 1.23%, results that are very reasonable for the nature of the institution, considering current restrictions on R&D investments in the country and the situation of the projects it has been executing, which are of increasing size and complexity, and the risks that are inherent to innovation.

## Actions of special note

**• Technology**

Digital acceleration increasingly traverses all of the institution's actions, whether in its internal operations, or in the development of products, processes and systems for clients, which operate in a wide variety of economic fields and sectors. Strong demand has returned for mechatronic solutions – which integrate mechanical hardware and electronics – firmware, software/applications, instrumentation, connectivity, and artificial intelligence. In the context of productive processes, with an emphasis on Industry 4.0, the solutions are led by intelligent manufacturing systems, MES integrated systems, simulation, prediction and real-time simulation and prediction of processes and control systems, with integration to technologies of computer vision, sensors, and integrity of systems and data exchange platforms by BIM. In the context of innovative entrepreneurship, CERTI's competencies expanded in corporate innovation, organization and management of innovation environments, cooperation models and collaboration in entrepreneurship, with consequences for entrepreneurship and impact innovation. The integration of sustainable production chains seeking environmental preservation, the mitigation of impacts on the climate, and forest, allied to access by farmers to technology and entrepreneurship, will continue to require intensive efforts of proposition, articulation and integration.

**• Market**

In 2021 CERTI increased the competitiveness of its clients with projects for innovation and intensified prospections, conquering new opportunities in important markets. In the industrial segment, there was outstanding action, including the development of Industry 4.0 solutions involving MES, robots, computer vision, and digital twins to increase productivity. Using Artificial Intelligence, IoT and Cloud Computing, and MicroGrids it executed projects for intelligent systems for digital transformation in the fields of healthcare, energy, electrical mobility, and intelligent cities. Combining multidisciplinary competencies, it planned new ecosystems of innovation, generated and accelerated startups, while stimulating impact entrepreneurship, connected with initiatives in the green economy to preserve the climate. It assisted various clients to assemble funding for projects, combining its own resources, fiscal incentives and subsidies from ANEEL, ANP, the computing law , BNDES, Finep, Rota 2030, Sebrae and EMBRAPII.

**• Staff during the Pandemic**

Intense efforts were also made in healthcare, the well-being and safety of employees and their families, through periodic RT-PCR testing, accompaniment of those who tested positive and were ill, as well as care for psycho-emotional health, with psychological support, guided assistance, communication campaigns and interactions for motivation, feedback and professional valuation. The Coronavirus Committee, established in March 2020, remained very active, monitoring indicators, and implementing healthcare actions. In parallel, online work – which was practiced at CERTI – expanded and became consolidated worldwide, leading to expressive turnover of staff in 2021, especially in software fields and activities in technologies that can be developed remotely.

**• Brazil's Data Protection Law**

Intense work to map information flows, define policies and procedures associated to data protection, and a broad process of awareness-raising and training made viable the goal to adapt the institution to this law in 2021.

## Meeting Guidelines and Goals

CERTI is guided by a Strategic Plan, from which each year are derived Guidelines, Indicators and Goals. In addition to this Strategic Plan, CERTI focuses on Strategic Management, which leads to actions, strategic definitions, and their systematic revision in response to signs from the market, technological trends, and institutional sustainability in each situation. The main Guidelines and Goals established for 2021 and the respective results achieved are presented below.

**1. Economic and Financial Sustainability of Operations:**

Although Net Operating Income was 51% above that of 2020, it was 7% below the goal. Costs were also 9% below the target. Work on projects represented 90% of income from production in 2021, a level similar to the previous year. Income from projects in the Oil & Gas (7%), Economic and Social Development (7%) and Aeroespace and Defense (5%) sectors grew above 2020 levels at the rates indicated, these are all sectors where income had declined at the beginning of the pandemic.

**2. Governance of the CERTI System:**

Intense actions were selected to implant an integrated Administration and Governance model, encompassing the CERTI Foundation, Instituto CERTI Amazônia, Instituto CERTI Sapientia, CVentures Empreendimentos Inovadores and Participações S.A. and PRODUZA Indústria, Comércio e Serviços em Eletrônica S.A. The necessary modeling was concluded, with implementation put off until 2022.

**3. Entrepreneurship:**

Defined as an area for strong action and strengthening in the year, through a combination of new initiatives and already existing programs, an expansion of financing options for startups and the creation of an investment fund in CERTI participations, an advanced stage of planning and identification of the respective financial mechanisms was reached. The actions will continue in 2022.

**4. Recurring Income:**

With the goal of strengthening CERTI's matrix of economic and financial sustainability by means of income of this nature, a concentrated effort was made to turn solutions into products. Three CERTI solutions associated to the theme of Industry 4.0 attained the prototype stage, Robotics, Industrial IoT (IIoT) and Manufacturing Execution System software, which will be developed in 2022.

**5. Staff:**

With the goal of improving the attractiveness of working at CERTI, particularly with more inviting work environments, opportunities for professional growth, and performance indicators, the Institutional program "I want to work at CERTI" was launched in 2021, to retain, develop, attract and multiply talents. It is based on research with staff, specialized studies of management of people and thematic work groups.

**6. Real Estate Development:**

To expand, in the near future, CERTI's work in the context of Sapiens Parque, which is located in the northern portion of Florianópolis, prospective and financial studies were conducted in 2021 for the development of its real estate assets at the site, with an emphasis on strengthening entrepreneurship and hosting innovative startups, companies and

# CERTI Centers of Reference in Technological Innovation

## CERTI´s competencies

Product and process engineering, design and management of systems, digital convergence and mecaoptoelectronics, product on processes and industry 4.0, dimensional engineering, intelligent instrumentation, sustainable energy, green economy, impact business, environmental monitoring, innovation economy, ecosystems of entrepreneurship, startup creation, venture capital, business acceleration, corporate ventures.

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## Cooperated Production

The year 2021 was marked by an intensification of the technical actions of the LABfaber 4.0 project, which was marked mainly by the development of advanced applications in the theme of Industry 4.0 They were highlighted by the creation of the industrial software SQUAD, which is a staff group specialized in systems for administration and integration of data on the factory floor, the development of a platform of products dedicated to real-time data collection and information processing via industrial internet, the technical improvement of the Flexible Automation Cell, the creation of a family of low-cost industrial robots, and the development of an intelligent system for managing energy consumption and efficiency in industry. Other important industrial projects were developed during 2021 for clients such as Schulz, Legrand, Electra, Incofios and Ihara, consolidating the Center's action in the application of advanced technologies, focused on increasing productivity and competitiveness of its clients.

**Competencies:** Engineering of costs and new industrial projects / Factory intelligence/ Digital manufacturing / Industry 4.0 / Quality assurance / Conformity and reliability / BIM 4.0 and LEAN 4.0.

**Solutions:** Implantation of solutions in 4.0 for companies/ Advanced materials / Innovative production environments/ Factory-laboratory.

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## Green Economy

In 2021, the Center for the Green Economy made important advances in its institutional position towards the Amazon, with innovative solutions that promote the competitiveness of the standing forest. Directly involving the Instituto CERTI Amazônia and other entities in the CERTI System, as well as a growing network of outside partners. In 2021 a series of new mechanisms and tools were developed and prototyped and will be used to give scale to the initiative, inaugurating a cycle of impact for the next five years. One example is Gênese, which is focused on awakening talents with an innovative entrepreneurial mindset focused on forests. Existing mechanisms were customized, such as SINAPSE for the bioeconomy, whose contents, criteria, and platform were adapted to focus on the competitiveness of the Amazon bioeconomy. New mechanisms were implemented inspired by the expertise accumulated by CERTI, such as Sinergia, which promotes mentorships and connections for startups with an Ecosystem cross-learning approach, and the strengthening of habitats of local innovation. Meanwhile, technological tools were applied to organizing and strengthening the value chains of the forest connected to industrial demands, such as the Digital Twin of the Forest, whose MVP was developed. These and other actions realized in2021 established the bases for a cycle of transformation that has begun, like a call to have the diversity of social actors join this journey that is so important to the country.

**Competencies:** Modeling ecosystems of innovation for creation of shared value / Management of natural capital (capacity for dynamic support, carryover & trade, biodiversity offsets) / Management of ecosystemic services / Modeling of impact business / Remote sensoring, multicriteria analysis and environmental modeling / Management of water resources / Management of knowledge / Support to innovative entrepreneurship with impact.

**Solutions:** Models, systems and mechanisms to create shared value / Implantation and support to the operation of innovative experiences of sustainability / Initiatives for promotion, to provide incentives, originate, strengthen and or contribute to entrepreneurship of impact.

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## Innovative Entrepreneurship

In 2021, the Center for Innovative Entrepreneurship continued its operations throughout Brazil, coordinating and executing organizational projects – such as the Inovativa Hub, which expanded the work of Inovativa Brasil, in partnership with the Ministry of the Economy, and the Centelha Program, which was implemented in 26 states in partnership with the Ministry of Science, Technology and Innovation, Finep, and CNPq. It also conducted a survey and planning of ecosystems of innovation in various states, supported by the regional Sebraes and national Sebrae. In the corporate sector, expanded the Invent solution: a methodology it developed to increase the innovative capacity of companies, accelerating the innovation process, reducing risk and strengthening their relationship with ecosystems of innovation. It worked with nationally important companies such as Soprano and Renner, and the Research Support Foundation of the Federal District (FAPDF). The Center also has partnerships with the Ministry of Science and Technology and the Novale Hub of Jaraguá do Sul – which developed the InVent Coletivo, involving 40 companies and startups in the Hub.

**Competencies:** Economy of innovation and regional development / Management ofinnovation and technology / Culture of entrepreneurship / Conception and articulation of ecosystems and networks / Administration and promotion of innovation in the business environment.

**Solutions:** Development of innovation environments / Programs for development of innovative companies / Systems of entrepreneurship and corporate innovation.

# CERTI Centers of Reference in Technological Innovation

## Digital Convergence

In 2021, the Digital Convergence Center sought to become a reference in Brazilian and international markets as a large provider of solutions for digital transformation, through the development of embedded systems, software and complex electronics. Its activities have been aimed at projects such as development of digital systems for remote management and operation, solutions in intelligent systems, artificial intelligence (IA) allied to computer vision, natural language processing (NLP) and data science, web and cloud computing systems and mobile applications. In addition to the internet of things (IoT) and systems and electronics for critical systems. The main segments of activity were consumer electronics, healthcare, aerospace and defense, energy, telecommunications, digital TV, electrical appliances, oil & gas, agriculture, and government.

**Competencies:** Software development / Embedded systems / Mechatronics / IoT / Big data / Cloud computing / Intelligent systems / Artificial intelligence.

**Solutions:** Remote operations and management systems / Intelligent systems / High-complexity electronics / Connectivity and the Internet of Things (IoT) / Artificial Intelligence (AI) applied to image recognition / Analysis of documents and large volumes of data / Solutions in software and electronic healthcare devices / Electrical storage and mobility.

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## Metrology & Instrumentation

The strategic orientation of the Center for Metrology and Instrumentation is to support companies to consolidate their technological advances. The Center operated actively in the digital transformation of processes for improving the quality of products and conserving the integrity of production assets. The participation in R&D projects at large companies stands out, mainly in the oil & gas and aerospace and defense sectors, and in providing technological services to various economic sectors. The year 2021 was marked by the consolidation of its structure of technological competencies to succinctly and cohesively express the activities undertaken. This improves identifying new opportunities and the potential for synergy with other CERTI centers.

**Competencies:** Mechanical design / Dimensional engineering / Reverse engineering / 3D Metrology / Instrumentation and intelligent automation / Quality of product / Integrity of equipment / Technological networks /Technologicalinfrastructure (TIB.).

**Solutions:** Technological services for quality and innovation / R&D of dimensional engineering / R&D of mechanical systems / R&D of measuring, inspection and test systems / R&D of engineering of product quality / R&D of management of integrity / R&D of technological networks and management of R&D.

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## Sustainable Energy

In 2021, despite the economic challenges caused by the prolongation of the pandemic, concerns about energy security in the country and restrictions on financing for innovation in the energy sector, the Center for Sustainable Energy continued to have resilient growth, becoming an increasingly mature business unit focused on the market and integrated to other lines of multidisciplinary action at the CERTI Foundation. The year, during which the Center became nine-years-old, was highlighted by its enhancements in the delivery of solutions with increasingly higher TRLs, encompassing product development, new services and innovation in business models, and by the opening of new fields of action and new partner clients.

**Competencies:** Distributed generation / Energy storage / Automation and control / Engineering for the electrical system of the future / Modeling of new business / Regulation and market.

**Solutions:** Systems / Microgrids and virtual energy generators / Digital solutions for the energy sector / Autonomous systems for isolated areas / Recharging infrastructure for electrical vehicles / Analysis of viability and modeling of new businesses in the energy market / Solutions for energy reliability and efficiency / Special projects and consulting.

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## Company Incubation

One of the initiatives responsible for placing Florianópolis on the map of innovative entrepreneurship and promoting a technology pole in the city is the CELTA Incubator. In 2021, CELTA's trajectory reached 35-years, during which it has attracted startups and large companies that recognize the ecosystem of the region as a provider of many business opportunities in the Brazilian technology sector. The incubator continues to graduate innovative and high-performance companies, and concluded 2021 with 118 graduated companies operating in the market, and maintaining the success rate of 96%. In 2021, CELTA won a call for projects by Fapesc to support the growth of incubated companies by means of consultancies and trainings, planned to conclude in 2022. The incubator continues to be a reference in Brazil and abroad in the process of virtual and in-person incubation.

**Competencies:** CERNE model of incubation of innovative companies / Business, academic, government and social network / Infrastructure, technological and business environment / Entrepreneurial culture.

**Solutions:** Incubation of base technology companies / Virtual incubation of innovative companies.

# Outstanding solutions for innovation in 2021

## THE LEGRAND PROJECT

The Legrand Project – the path to 4.0, is dedicated to the construction of a Strategic Plan for the implementation of industrial technologies at the 4 factories of the Legrand group in Brazil. In addition to drafting the plan, which is based on the evaluation of R&D guidelines and strategies at each factory unit, followed by a detailed diagnosis of existing processes and technologies, the Project also foresees the development of two proofs of concept, to test and validate the application of new technologies on the factory floor. During 2021, the first proof of concept was applied, in which sensors were applied using IIoT technologies to a complete assembly line for electrical extensions, generating real time indicators to assist management and increase productivity.

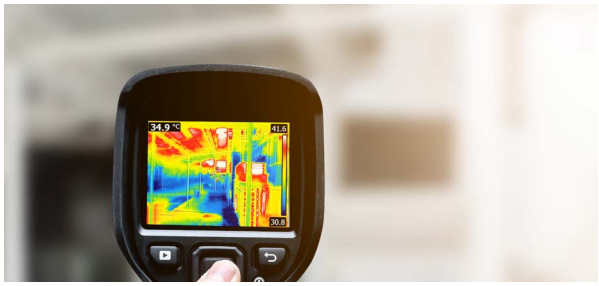

## TERMODRONE

Established by the CERTI Foundation and Copel, the objective is to improve inspection techniques using thermography applied to electrical equipment at substations, adding artificial intelligence to processes that today are conducted by specialists.

The project has two fronts

1) Fixed Monitoring System: involves the development of fixed thermal cameras for continuous inspection of equipment and the development of image processing techniques and artificial intelligence to detect possible defects, reducing the exposure of operators to situations of risk and guaranteeing greater availability of substations, and improving the performance of the indicators of the electrical company.

2) Mobile Monitoring System: presents the experimental development for the use of VANTs equipped with a thermal camera for inspections at substations. It involves the realization of pilot operations to acquire thermal images with a VANT, the analysis and testing of algorithms for autonomous operations with VANTs, as well as research of security norms for the use of VANTs at substations.



## METROLEAK
### Quantification of fugitive emissions with images

The purpose of the project is to develop a technique to quantify fugitive emissions using algorithms for processing images acquired with specific IR cameras for certain volatile organic compounds (VOCs) and methane (CH4). Another objective of this work is the metrological validation of the results obtained with laboratory tests and their comparison with consolidated measuring methods.

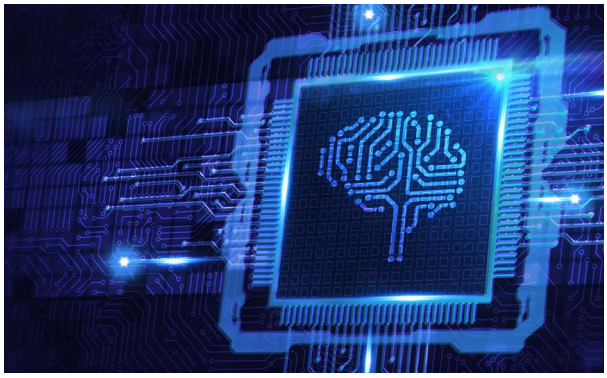
## Computer vision and artificial intelligence (AI) for Search and Rescue

Development of a system in the form of Proof of Concept that uses artificial intelligence and computer vision to assist search and rescue teams, by recognizing objects in images of a water surface. The AI model developed was trained to identify boats adrift, shipwrecks and other objects of interest in search operations, and reached a high degree of accuracy. The system can operate independently, generating alerts according to criteria defined by the operators and can be used on aerial drones or embedded in search and rescue planes.

# Outstanding solutions for innovation in 2021


## MICRO-GRIDS - PHASE 2

In 2021, the Micro-grids project – Phase2 installed and commissioned six micro-grids in the form of Proofs of Concept of the system for monitoring micro-grids at clients of AES Brasil, totaling 56 points of monitoring in the field, including the monitoring of load, photovoltaic systems, Battery Energy Storage System (BESS), diesel generators and a 750kW electrical grid. In addition, software was implemented with which the final client gains real-time information about the installation and historic data, and can monitor the load, generation, and storage systems. Moreover, a business plan was developed along with AES to expand the E+Box product, which is a controller developed by the project, and an in-depth study of market insertion of the solution developed, with the objective of conducting a rollout of the complete solution.



## Research and Development Project to Verify Medical Exams using Artificial Intelligence

This project involves the development of software to verify medical exams, based on artificial intelligence techniques, such as machine learning and natural language processing. The software is responsible for the textual analysis of the medical reports and detection of errors and inconsistencies in the text of the reports and in general data about a patient. It thus acts as a quality assurance mechanism, that is capable of anticipating problems before they are sent to the patient or to the attending physician, avoiding harm to the patient and negligence claims.

## Computer Vision and Artificial Intelligence (AI) for monitoring traffic

This project entails development of a software model based on computer vision and artificial intelligence (AI) for monitoring traffic. The solution, which can detect objects of interest and automatically recognize vehicle license plates, was developed and improved for high performance edge processing (low latency and high accuracy) in the target hardware for the project.

## CERTI - an EMBRAPII Unity

EMBRAPII
UE - CERTI
SISTEMAS INTELIGENTES

CERTI is an EMBRAPII Unit accredited to act in the field of competence of Intelligent Systems, which allows its RD&I projects to have 33% of their total value financially subsidized. There are three subfields of action in Intelligent Systems: Mechatronic Systems, Software for Intelligent Systems and Manufacturing Systems. In compliance with the strategic guidelines for 2021, CERTI strengthened and expanded its base of partner companies in strategic sectors for EMBRAPII projects.

CERTI is accredited to execute R&D& I projects and in the context of the Priority Hardware BR Program, it is administrator of the Labfaber 4.0 project (www.LABfaber.org.br). LABfaber is a reference project in the development of concepts, technologies and solutions in industry 4.0 and in the effective application of these technologies in a real environment of manufacturing and production Brazil's computing law allows that resources destined to FNDCT be deposited in the BR Priority Hardware Program to support the LABfaber project. Learn more: https://info.certi.org.br/por-que-investir-no-labfaber.

# CERTI's Position in Relation to SDGs

For the CERTI Foundation, sustainable development is an attitude that considers the needs of all interested parties in the present and future in any activity. Society faces structural challenge when striving to evolve development practices and models that are currently out of alignment with sustainability. These strategic changes often confront technological barriers and require solutions in distinct economic fields.

CERTI understands that innovation is an element key to sustainable development. Questions such as increased urban and rural resilience to climate changes, the transition to a low carbon economy and the great humanitarian challenges will be overcome through innovative, sustainable and intelligent strategies. In addition, innovation is a critical factor of success for the strengthening of institutional capacities aimed at full implementation of the essence of our Federal Constitution and the basic rights it foresees. We accompany the evolution of Agenda 2030 and continually reinforce our strategies towards a prosperous and balanced future to support the progress and well-being of Brazilian society. In 2020, we undertook an important strengthening of our consistent and dynamic ecosystem of innovation, technology and entrepreneurship, reaffirming our commitment and contributing in an important manner to Brazil's sustainable development.

In 2021, CERTI strategically defined the Bioeconomy as one of the pillars of its operations, along with Industry 4.0, Digital Transformation and Innovative Entrepreneurship, which are directly related to the 2030 agenda and to our efforts to make important contributions to the competitiveness and sustainable development of Brazil.

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SUPERINTENDENT OF OPERATIONS, FINANCE AND ADMINISTRATION

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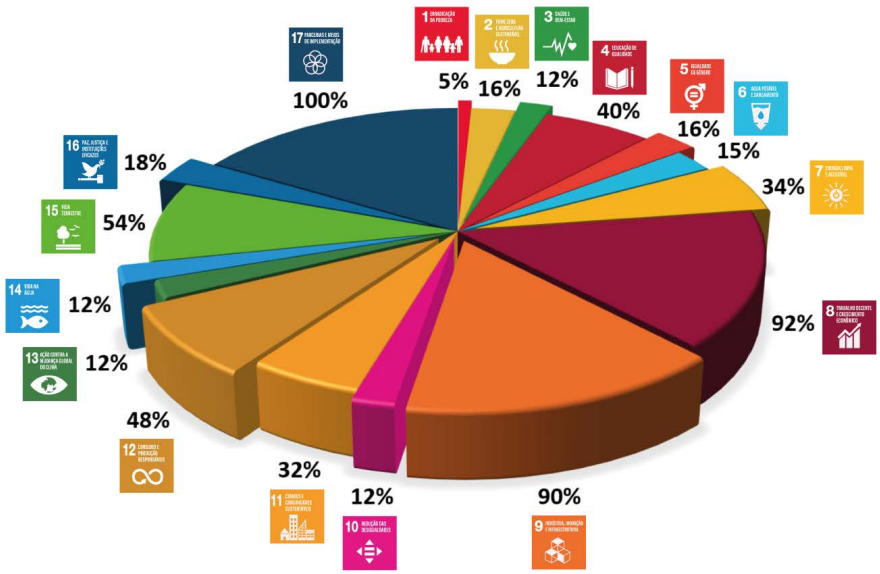
## ODS PROFILE

To understand how CERTI's actions relate to the Sustainable Development Goals, we compared the 169 objectives associated to the 17 UN Goals with projects conducted by CERTI in 2021 to outline what we call the 2021 Sustainable Development Goals Profile. Seventy-four projects of CERTI clients were analyzed that contributed in some way to all of the 17 Goals. It is important to emphasize that various projects contribute to more than one Goal and with more than one element within a single Goal. This analysis is represented below, highlighting the 17 SDGs that had the greatest positive impact in the projects of 2021, and the others, with the respective percentages of the contributions received, compared to the volume of the contribution received by the highlighted SDG.




1 No Poverty **1%**
2 Zero Hunger **12%**
3 Good health and well-being **6%**
4 Quality education **40%**
5 Gender equality **10%**
6 Clean water and sanitation **12%**
7 Clean energy **26%**
8 Decent work and economy growth **100%**
9 Industry, innovation and infraestructure **79%**
10 Reduced Inequalities **18%**
11 Sustainable cities and communities **25%**
12 Responsible consumption and production **50%**
13 Climate action **9%**
14 Life below water **4%**
15 Life on land **18%**
16 Peace, justice and strong institution **9%**
17 Partnerships for the goals **65%**

## CERTI ecosystem of organizations with operational and strategic partnerships

certi.org.br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