

## Tracking innovation progress with robust metrics is essential for the energy transition

**INOVA-E** is a constantly evolving data platform that combines energy and innovation. We currently provide structured information on research, development and demonstration investments in the energy sector in Brazil.

The systematic updating of this information (such as the one we present here for the years 2019 and 2020) is part of this process. Below we present some highlights of updating process made in the year 2022.

Improving and expanding the set of energy innovation indicators is our ambition. To make this possible, the Energy Big Push 2.0 project is an EPE partnership with CGEE, ECLAC and GIZ, with support from the Euroclima+ program.

### 1 In 2020, public and publicly-oriented investments accounted for US\$722 million.

In the last 5 years public and publicly oriented investments were over 683 million dollars per year. In the analysis horizon, growth was supported by publicly oriented investments.

#### RD&D investments by public and publicly-oriented sources. (million US dollars)



#### What are public and publicly oriented RD&D investments?

##### Publicly-oriented investment

Private investment derived from legal obligations with the purpose of inducing companies to make investments in RD&D. In the INOVA-E statistics, RD&D projects regulated by the ANEEL and ANP agencies are part of the scope.

##### Public investment

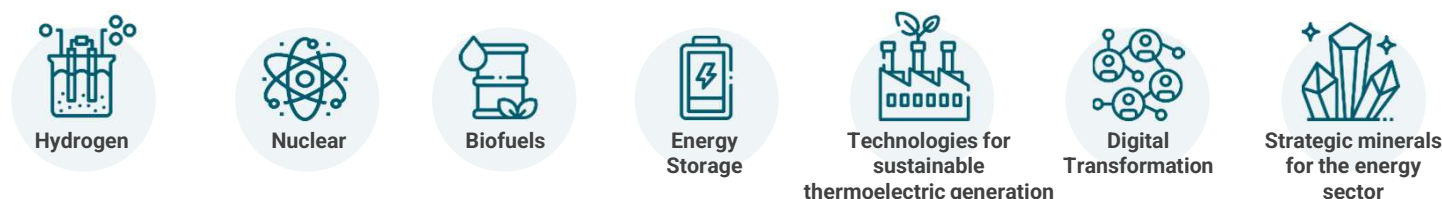
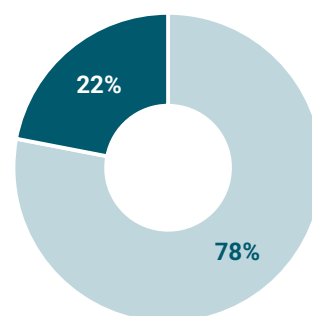
Expenditure on reimbursable and non-reimbursable RD&D projects carried out through public institutions that promote innovation in Brazil. Examples in INOVA-E statistics are the following bodies: BNDES, CNEN, CNPq, FINEP and FAPESP.

### In 2021, strategic themes were defined for publicly-oriented investments

In the last 5 years, publicly-oriented investments in ANP and ANEEL regulated programs accounted for 78% of the total mapped by INOVA-E.

Despite this relevance, and the fact that these resources are derived from a legal obligation, until then there was no guidance on strategic areas for the use of these resources.

In February 2021, under the leadership of the Ministry of Mines and Energy, Resolution 02/2021 of the National Energy Policy Council was published, which guided the prioritization of publicly-oriented resources for seven strategic themes in the energy sector. Are they:

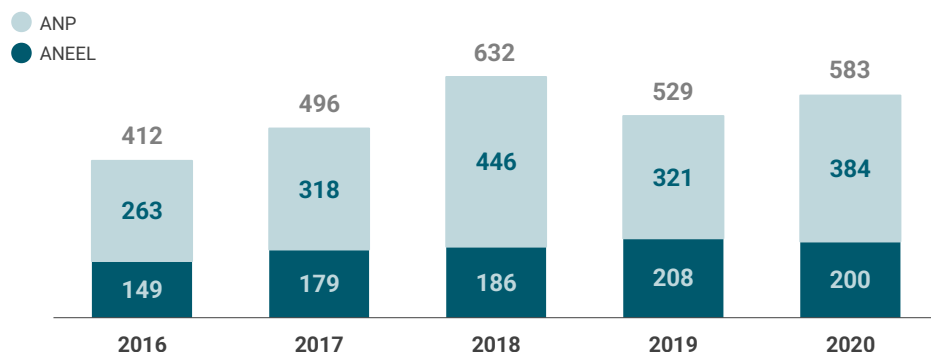


The structuring of investment data in INOVA-E and the 2050 National Energy Plan were relevant inputs for defining the strategic areas of resolution CNPE 02/2021, which highlights the usefulness of the platform to help the public policy development process

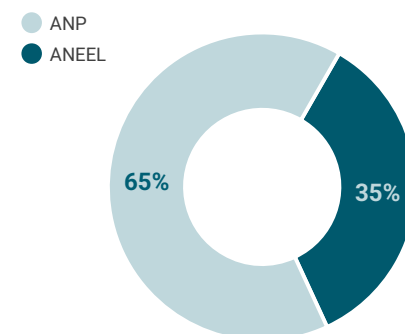
## The institutional framework of publicly oriented resources is resilient in providing stable resources for innovation.

Between 2016 and 2020, publicly driven investments were approximately \$531 million annually. Of these, almost 343 million annually correspond to the ANP programs and 184 million to the ANEEL program.

### Evolution of publicly-oriented RD&D investment (million US dollars)



### Participation of resources by institution



### How can publicly-oriented investments from ANP programs contribute to decarbonization?

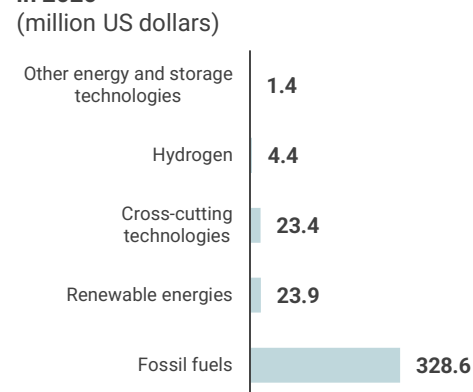
A relevant part of publicly oriented investments are associated with the ANP (65%). These values are derived from the RD&I clause of contracts for exploration, development and production of oil and natural gas.

For this reason, it makes sense that most of these investments are classified as fossil technologies. However, it should be recognized that several innovations can result in reducing the intensity of emissions and increasing energy efficiency in this sector.

It is also noteworthy that innovation in the oil and gas sector have synergy with important topics for the energy transition, such as innovation related to offshore wind production, CCS and hydrogen. These innovations reflect the migration trend of expertise in the Oil and Gas sector and sectoral coupling.

The share of innovations in biofuels is classified as renewable.

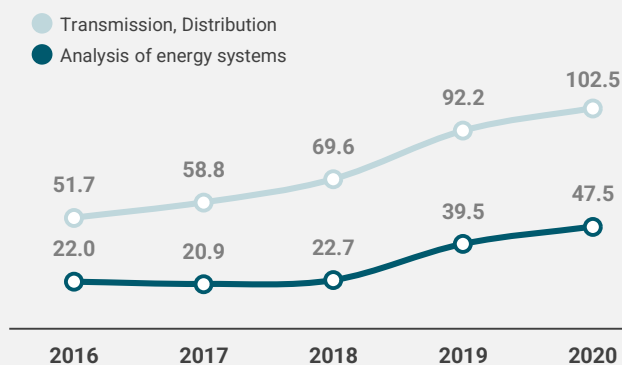
### ANP investments by category technology in 2020 (million US dollars)



### Among the investments made in ANEEL program, storage, distribution and analysis of energy systems have stood out in recent years

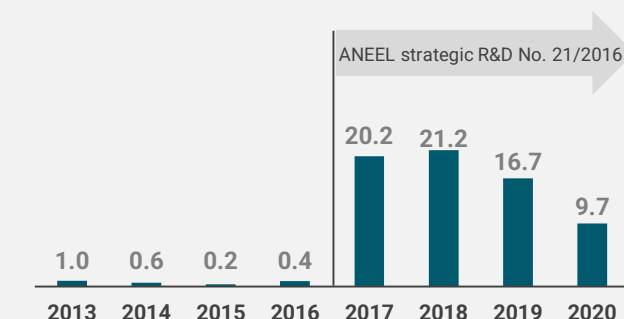
Within the scope of ANEEL's R&D programs, there was a considerable increase in investments for innovation in storage, distribution and analysis of energy systems.

### Evolution of investment in storage, distribution and analysis of energy systems (2016-2020) (million US dollars)



Analysis of energy systems includes the development of machine intelligence tools to improve operations and make decisions for agents, in addition to studies on business models.

### Investment in Energy Storage in the ANEEL R&D programs (million US dollars)

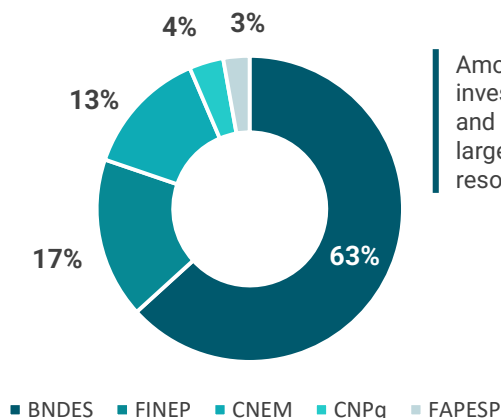


ANEEL's strategic R&Ds program have been an important tool to mobilize investments in a sustained manner in relevant themes. Strategic R&D n° 21/2016 (Technical and Commercial Arrangements for the Insertion of Energy Storage Systems in the Brazilian Electric Sector) increased investments in storage by approximately 23 times.

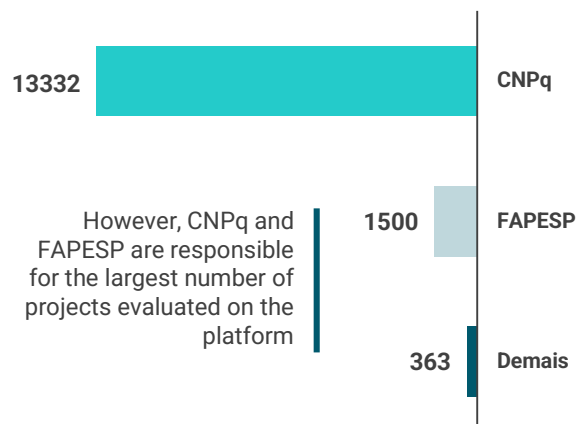
### In public investments there is a high predominance in low carbon technologies.

Public investments in the period from 2016 to 2020 accounted for 758 million U.S dollars, of which almost 80% were allocated to low-carbon technologies.

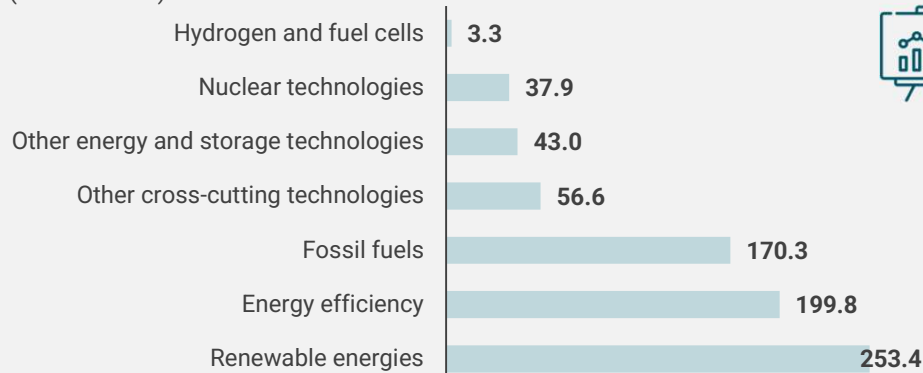
Investment by institution  
(2016-2020)



Number of projects  
(2016-2020)



Public investment by technology category  
(2016 to 2020)



Public investments are predominantly focused on renewable energies, energy efficiency and other low-carbon technologies.

Public financing plays a relevant role as a source of funds for innovations in the early stages of technological maturity.

### The growth of investment in innovation in the hydrogen chain.

Data from Inova-e point to growing investment in innovation in the hydrogen chain, which went from 1.0 to 5.6 million dollars between 2016 and 2020. However, most projects are aimed at industrial use. The expectation is that in the coming years investments in low-carbon hydrogen will gain even more importance, both due to the influence of CNPE Resolution nº 02/2021, and due to the development of the National Hydrogen Program.

Evolution of investment in hydrogen  
(2016-2020)



Indicated as an important vector of the energy transition, hydrogen may have multiple functions in providing flexibility to energy systems



The action plan, to be developed within the scope of the National Hydrogen Program-PNH2, will create a favorable environment for innovations in the low-carbon hydrogen chain

To directly access inova-e and see all this, click here:

**inova-e Brazil**

INOVA-E and Energy Big Push are part of a collective effort to improve discussions on innovation in the energy sector and rely on the collaboration of several entities:

### EXECUTIVE PARTNERS



### PARTNERS

MINISTÉRIO DA  
CIÊNCIA, TECNOLOGIA  
E INOVAÇÕES



MINISTÉRIO DE  
MINAS E ENERGIA



MINISTÉRIO DAS  
RELAÇÕES EXTERIORES



**Coordination**  
Giovani Vitória Machado

**Executive Coordination**  
Carla Costa Lopes Achão

#### Technical Team

Bruno Mauricio Rodrigues Crotman  
Camilla de Araujo Ferraz  
Daniel Silva Moro  
Flavio Raposo de Almeida  
Gustavo Naciff de Andrade (technical coordination)  
Leonardo Falbo Alves de Oliveira (intern)

EPE disclaims any responsibility for decisions or resolutions taken based on the use of the information contained in this report, as well as for the improper use of this information..