

INSPIRING PRACTICES |  WINNER 2023 |  BRAZIL

#ENVIRONMENT

Students develop mini recycling plant for construction waste

The team put its technological knowledge into practice to produce bricks and cement objects from construction waste.

TEACHER

Neuber Araújo

COMMUNITY/CITY

São Paulo do Potengi

STEM AREAS

Science and Engineering

STUDENTS

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SCHOOL

Instituto Federal de Educação,
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OTHERS AREAS OF KNOWLEDGE

Environmental education

PROJECT NAME

Sustainable SPP: Recycling in Potengi

Whether due to a lack of technology or information, in many places in Brazil solid waste is not disposed of properly. This is the case of São Paulo do Potengi, a city in the state of Rio Grande do Norte, in the northeast of the country. The construction debris, which is often seen on the city’s streets and vacant lots, served as inspiration for a group of students who were among the winners of Solve For Tomorrow Brazil 2023, by popular jury.

The team members were in their third year of the integrated technical course in Buildings at the Instituto Federal do Rio Grande do Norte (IFRN). They developed a [prototype](#) for a mini recycling plant for materials discarded from construction sites. Using this waste, they created objects made of cement, mortar and bricks, as well as the correct disposal of what cannot be reused. Entitled “Sustainable SPP: Recycling in Potengi”, the project emerged during the Construction Materials course, as explained by the [mediator](#) teacher Neuber Araújo. “We talked about recycled materials, because it is my area of research since my postgraduate studies. So, I always ask the students what problems exist in their city, what type of waste they see in inappropriate places and how we can try to solve it”, he explains.

Based on these reflections, the students came up with ideas about what could be done with certain types of waste, such as construction stones. Using the structure of the Federal Institute,

the team built a prototype not of a product, but of a production flow. “For this project, we needed a basic laboratory structure that is available at IFRN, equipment that crushes the waste to transform it into sand, and some basic component materials, such as cement. Everything was provided by the Institute,” explains the educator.



Students got involved at every stage of the project

Step-by-step: from waste to brick

The group established the [stages of the process](#), starting with waste collection and moving on to sorting, selecting only those in category A, established by the Brazilian National Environmental Council (Conama). That is, only waste considered “reusable or recyclable”.

These materials are then sent to the crusher to be processed and transformed into recycled aggregates. This result alone could be a product to be sold. But the team went all the way and wanted to transform this waste into bricks. To do this, they mixed the aggregate with cement and water, without the need for burning, as is the case with standard bricks, making the solution even more sustainable. In addition, several cement artifacts can be produced from this prototype, being useful for construction or even handicrafts.



Eureka Moment!

Before submitting the project to Solve For Tomorrow, the team presented the idea in internal competitions and conventions. The group came in 2nd place in a competition on campus, but received negative reviews that made them feel insecure. The educator motivated the students to improve the points they criticized and not give up. Thanks to this, the project reached Solve For Tomorrow in a more mature form. "We chose techniques that we understood were important, such as including some technological tests that would allow for increased material testing and actually following technical standards. We took this into consideration when arriving at the final proposal and it worked out really well," he emphasizes.



"I always tell students that when a project is subject to different points of view, we have to use this in our favor. I'm glad we didn't give up back then!"

says Neuber Araújo.

The compact plant for recycling construction waste is an option for people to avoid having to rely on municipal collection or disposal in places that are not environmentally prepared to receive these materials. This way, it is possible to avoid problems such as environmental and visual pollution, the proliferation of disease-carrying insects and higher cleaning costs.

Results led to partnerships with the City Hall

To achieve the final result, the teacher says that, in order to deepen this knowledge about construction materials, extra hours of guidance and mini-courses were necessary.

And, to disseminate the knowledge acquired, the team gave workshops and mini-courses to the community and created a podcast and a site on social media to share useful information.

With the visibility given to the project, the City of São Paulo do Potengi, through the Municipal Department of the Environment, approached the project to learn more and try to put some of the ideas into practice starting in 2024.

Since the students still have one year to finish their technical course in Buildings, the idea is to expand the scope of the project. Within the Federal Institute itself, postgraduate programs in the

SAMSUNG

environmental area are interested in studying the products developed. A construction company is also considering reusing the materials generated in its own projects with the “Sustainable SPP” technology.

Now, the team’s focus is to transition the mini recycling plant so that new students can continue the project. Neuber Araújo also highlights the positive results in the academic training of the young people involved. “We are already participating in scientific events in the area. We had two articles approved at the Brazilian Concrete Congress, to make this knowledge visible in the technical area of Civil Construction and to make our contribution. The kids will already leave with a very high intellectual capital, they will arrive at graduation with published articles and participation in events, which will be a differential”, says Araújo, excited to register new projects in the next editions of Solve For Tomorrow.



Explaining!

Although the waste is also the responsibility of those who generate it, access to disposal technology and proper treatment of what is left over from construction is not so simple far from the large urban centers of Brazil. Therefore, the project includes environmental education actions and the development of technologies that can be incorporated into the daily lives of local communities in a simple and inexpensive way. “São Paulo do Potengi is a small community, with around 15 to 16 thousand inhabitants, where there is no technology for this. Some people have even heard that it is possible to reuse certain materials, but this has not yet been applied in everyday life”, reports the project’s mediator teacher.




Focus on practice!

Take a look at the teacher's recommendations on how to set up a mini recycling plant for construction waste.




Empathy

 While studying construction materials in the Buildings technical course, four students noticed that the city of São Paulo do Potengi had problems with the proper disposal of construction waste. They decided to put their knowledge to work to find a solution to this problem, that causes mosquito proliferation, pollution and increases cleaning costs.




Definition

 With the mediation of a teacher with experience in waste recycling, the IFRN students planned not only a product, but a production flow. The idea was to create a space with structure and technology to reuse materials discarded from construction sites.



Ideation

 Based on technical standards and a resolution from the Brazilian National Environmental Council, the team developed a production flow with 5 stages: collection at recycling points; sorting and classification of waste; processing and separation; property assessment; and reuse.



Prototype

Construction waste is sent to the crusher to be processed and transformed into recycled aggregates. This product is mixed with cement and water, without the need for burning as is the case of standard bricks, making the solution even more sustainable. In addition, several cement artifacts can be produced from this prototype, being useful for construction or even for crafts.



Testing

The bricks and cement objects created at the compact waste recycling plant meet the technical criteria required for construction materials in Brazil. The goal now is to expand the project's results through partnerships with graduate programs, construction companies, government agencies and the local community.