

# Roasting coffee with the rays of the sun

November 8 2021, by Andrew Medichini

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Electronics engineer Antonio Durbe sprays water to cool down the coffee grains at the end of the roasting cycle inside the world first solar-powered coffee roaster at his plant PuroSole in the outskirts of Rome, Wednesday, Oct. 13, 2021. Antonio Durbe and colleague Daniele Tummei have spent some six years to create the first solar-powered coffee roaster in the world, which uses a mirror system to convey sun light on the roasting chamber. The machine can roast up to 200kg of environment-friendly coffee per day, with no CO2 emissions and a considerable power saving if compared to traditional roasting systems. Credit: AP Photo/Michele Calamaio

Combining two of Italy's delights—coffee and sunshine—a couple of engineers in Rome have created an environmentally friendly way to roast coffee beans without electricity or gas.

Antonio Durbe and Daniele Tummei have spent almost six years building and perfecting their sunlight coffee roaster.

The result is a system that needs a piece of land about the size of half a tennis court and [sunny weather](#) to roast up to 50 kilograms (110 pounds) of coffee an hour.

The plant is run entirely by energy from the sun. Sunrays are concentrated by a set of mirrors on a coffee roaster and even the few electrical parts are powered by a small solar panel. Sensors controlled by a computer allow the mirrors to follow the sun throughout the day and focus its light on a rotating steel basket that contains the fresh [coffee beans](#). The basket reaches peak temperatures of about 240-250 C (450-480 F), depending on the sun's brightness, and can roast the beans in 20 minutes.

The process isn't only environmentally friendly and economically convenient. According to Durbe and Tummei, it also better preserves the coffee's aroma, giving it a richer flavor. Unlike conventional hot air ovens, which are typically gas-powered, the concentrated sunlight roasts the coffee without heating the air around it—by penetrating the grains in a more uniform way and without burning the exterior.



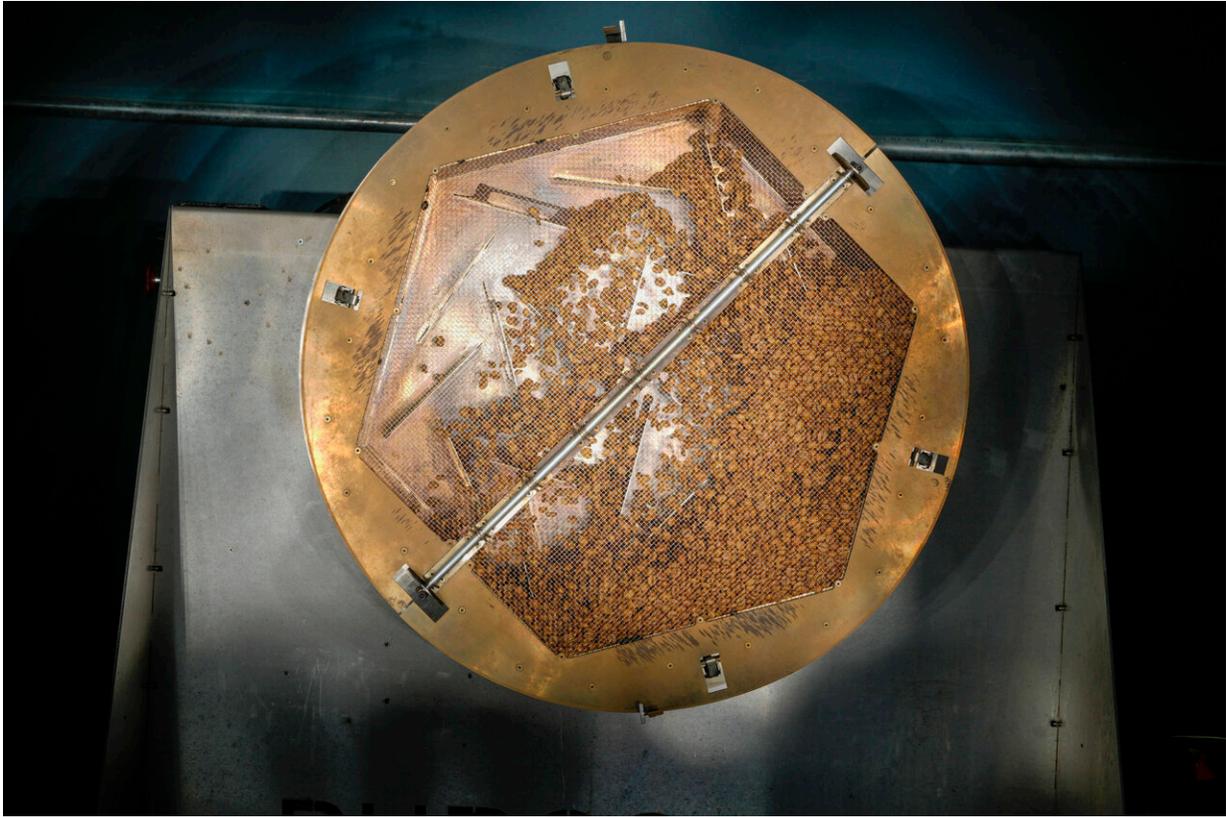
Antonio Durbe, left, and Daniele Tummei overlook the functioning of the "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny weather to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Michele Calamaio



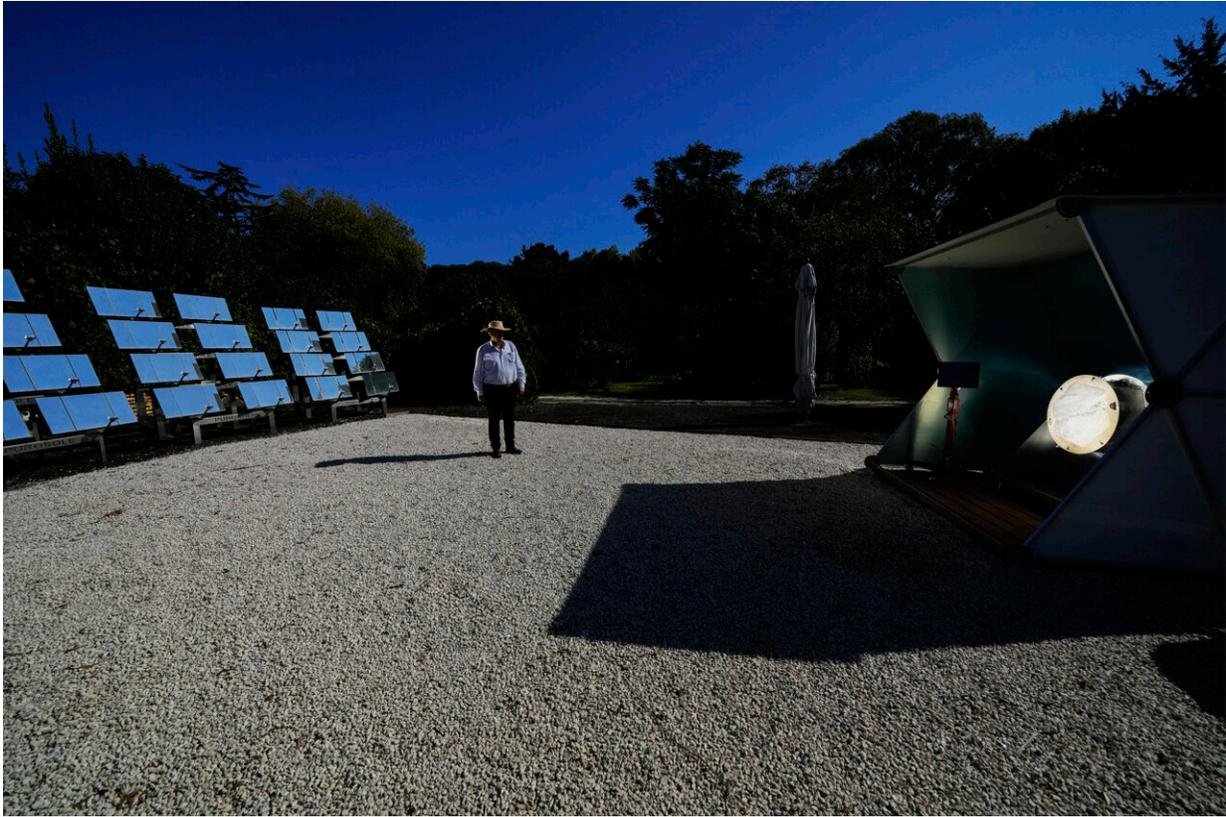
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A steel basket containing fresh coffee grains rotates while toasting them in "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



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Antonio Durbe pours fresh coffee grains in a steel basket before toasting them in his "Purosole", Pure Sun, solar light coffee toaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



Antonio Durbe, left, and Daniele Tummei collect freshly toasted coffee grains from the "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



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Freshly toasted coffee grains are seen just after being toasted with the "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



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Antonio Durbe collects freshly toasted coffee grains from the "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



Daniele Tummei measures the temperature as he grills meat with a barbecue in their "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



Antonio Durbe pours freshly toasted coffee grains into a cooling basket at his the "Purosole", Pure Sun, solar light coffee roaster plant, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



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Sun is reflected in the mirrors of the "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



Antonio Durbe, left, and Daniele Tummei grill meat with a barbecue in their "Purosole", Pure Sun, solar light coffee roaster, in Rome, Wednesday, Oct. 13, 2021. Two two electrical engineers, Antonio Durbe and Daniele Tummei, invented a plant that just needs a piece of land about the size of half a tennis court and sunny wether to toast up to 50kg of coffee an hour. No gas, no electricity, just sun rays concentrated by a set of mirrors on a rotating steel basket filled of fresh coffee grains. Credit: AP Photo/Andrew Medichini



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Naturally, the system does depend on good weather. On cloudy days or after sunset, coffee lovers need to turn elsewhere.

However, in sunny southern Italy, a plant with 40 mirrors is capable of roasting up to 30,000 kilograms (66,000 pounds) of coffee a year, saving about 60,000 kilowatt-hours of electricity, according to the inventors.

Their Purosole, or pure sun, coffee can be bought online, but the main goal of the inventors is selling their solar [coffee](#) roasting plants to small businesses who are sensitive to the environment. Right now, they are operating their plant in the garden of a friend.

The system can be put to other uses as well. At the end of a long work day, Durbe and Tummei place a grill in in front of the mirrors to prepare some delicious sunlight barbecue.

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