



Bioenergy International World of Pellets 2023

Region	Company	Capacity (t/year)	Region	Company	Capacity (t/year)	Region	Company	Capacity (t/year)
AFRICA (AF)	1. Hecol, Kenya	140,000	ASIA (AS)	1. Hui Sheng Bioenergy, Shandong, China	200,000	EUROPE (EU)	1. Hecol, Kenya	140,000
	2. Woodcote S.P.A., Gambia	18,000		2. Jinyuan Energy, Shandong, China	100,000		2. Woodcote S.P.A., Gambia	18,000
	3. EIP Energy, Morocco	15,000		3. Kopy State Forest Enterprise, Kenya, Kenya	10,000		3. EIP Energy, Morocco	15,000
	4. Lara SA Biomass, Congo, Congo	75,000		4. JIM MAC, Macedonia, North Macedonia	24,000		4. Lara SA Biomass, Congo, Congo	75,000
	5. LPSA, Malawi	20,000		5. Kopy State Forest Enterprise, Kenya, Kenya	10,000		5. LPSA, Malawi	20,000
	6. Muzira Biomass, Malawi, Malawi	25,000		6. Kopy State Forest Enterprise, Kenya, Kenya	10,000		6. Muzira Biomass, Malawi, Malawi	25,000
	7. Zira Energy, Gambia	18,000		7. Kopy State Forest Enterprise, Kenya, Kenya	10,000		7. Zira Energy, Gambia	18,000
	8. Kopy State Forest Enterprise, Kenya, Kenya	10,000		8. Kopy State Forest Enterprise, Kenya, Kenya	10,000		8. Kopy State Forest Enterprise, Kenya, Kenya	10,000
	9. Kopy State Forest Enterprise, Kenya, Kenya	10,000		9. Kopy State Forest Enterprise, Kenya, Kenya	10,000		9. Kopy State Forest Enterprise, Kenya, Kenya	10,000
	10. Kopy State Forest Enterprise, Kenya, Kenya	10,000		10. Kopy State Forest Enterprise, Kenya, Kenya	10,000		10. Kopy State Forest Enterprise, Kenya, Kenya	10,000
AMERICA (AM)	1. Hecol, Kenya	140,000	ASIA (AS)	1. Hui Sheng Bioenergy, Shandong, China	200,000	EUROPE (EU)	1. Hecol, Kenya	140,000
	2. Woodcote S.P.A., Gambia	18,000		2. Jinyuan Energy, Shandong, China	100,000		2. Woodcote S.P.A., Gambia	18,000
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	9. Kopy State Forest Enterprise, Kenya, Kenya	10,000		9. Kopy State Forest Enterprise, Kenya, Kenya	10,000		9. Kopy State Forest Enterprise, Kenya, Kenya	10,000
	10. Kopy State Forest Enterprise, Kenya, Kenya	10,000		10. Kopy State Forest Enterprise, Kenya, Kenya	10,000		10. Kopy State Forest Enterprise, Kenya, Kenya	10,000

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INTERATNAL

in 2022, there were 1 091 operational biomass pellet plants in 64 countries that combined had a total installed capacity of 68 321 000* metric tonnes per annum (tpa).

* incl. 500 000 tpa that consisted of "black pellet" (T capacity (10 plants).

incl. 22 375 000 tpa that is ENplus certified capacity (excl. Belarus and Russia) in 477 plants located in 43 countries.

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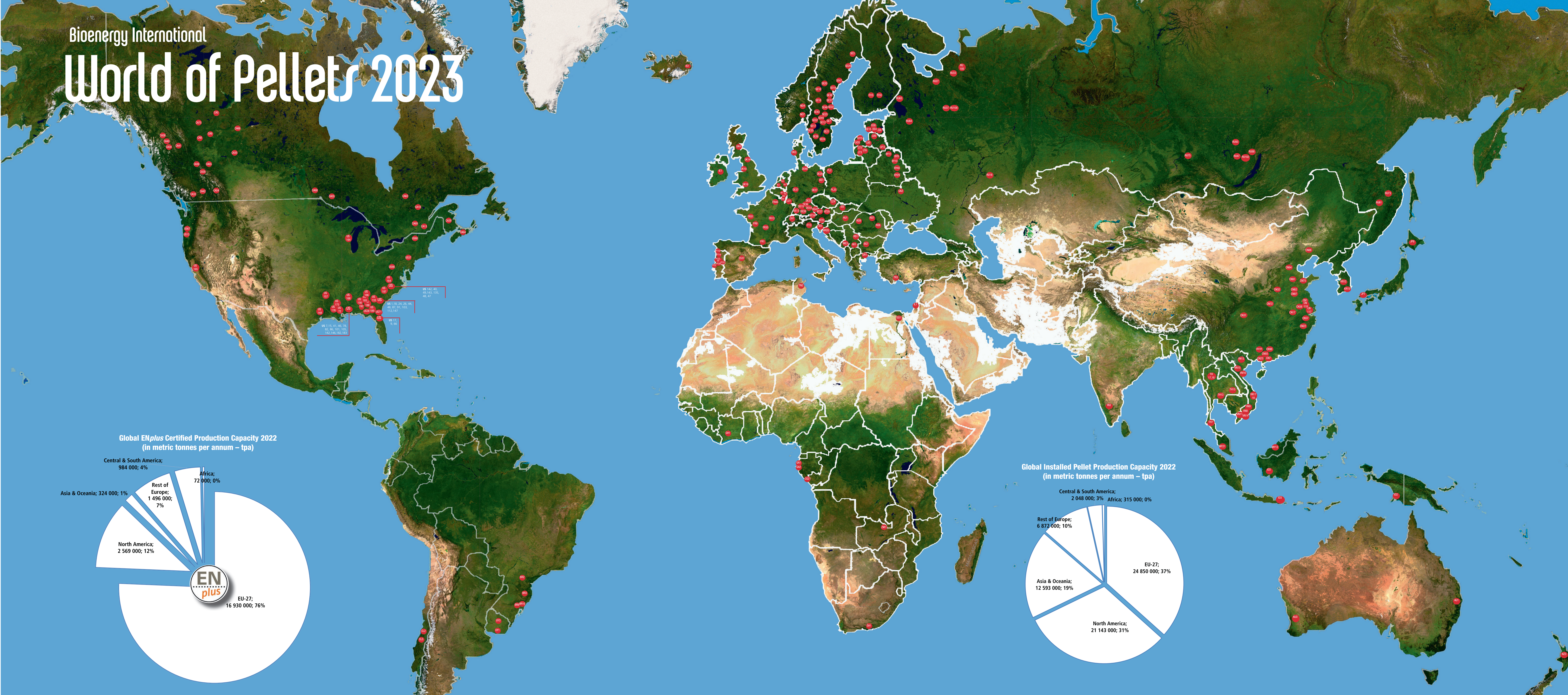
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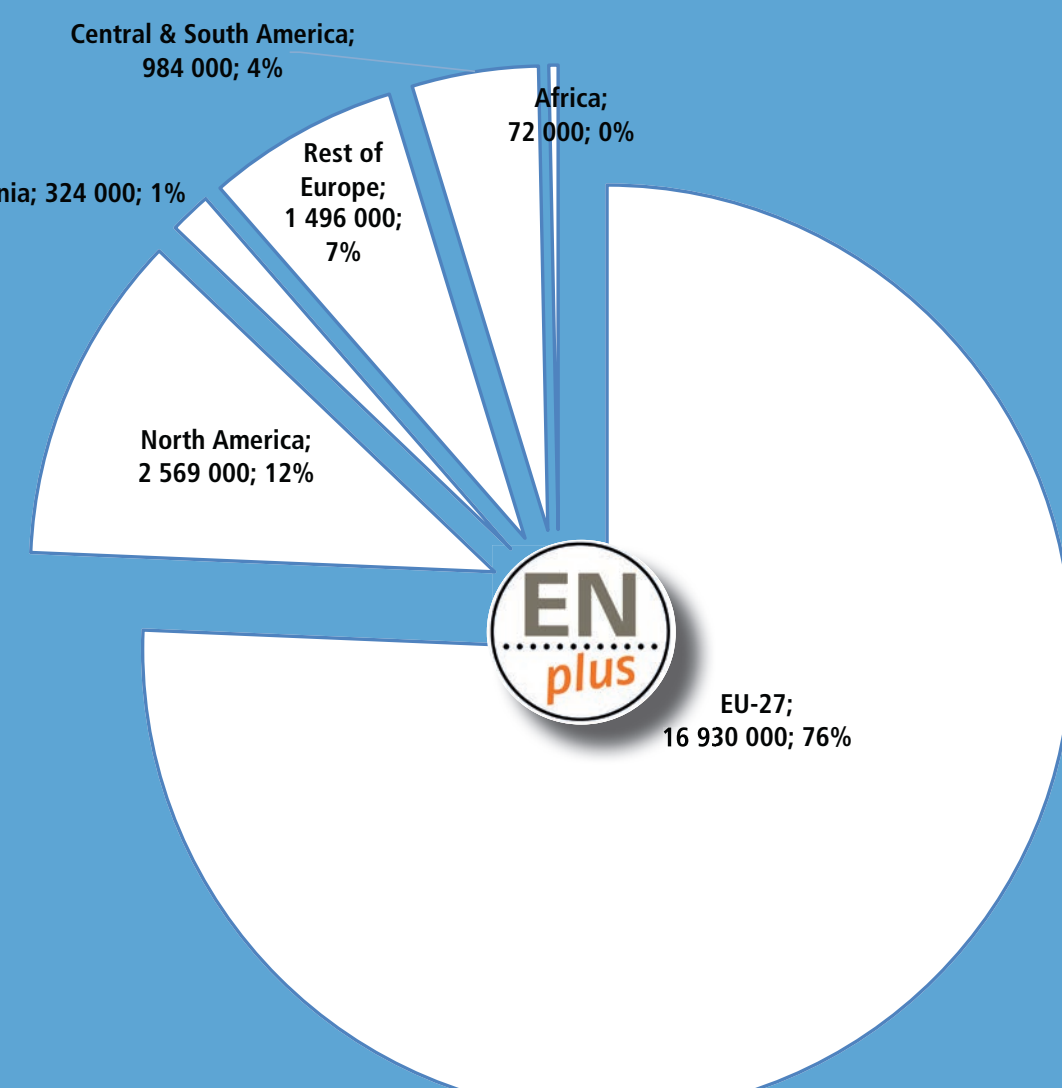
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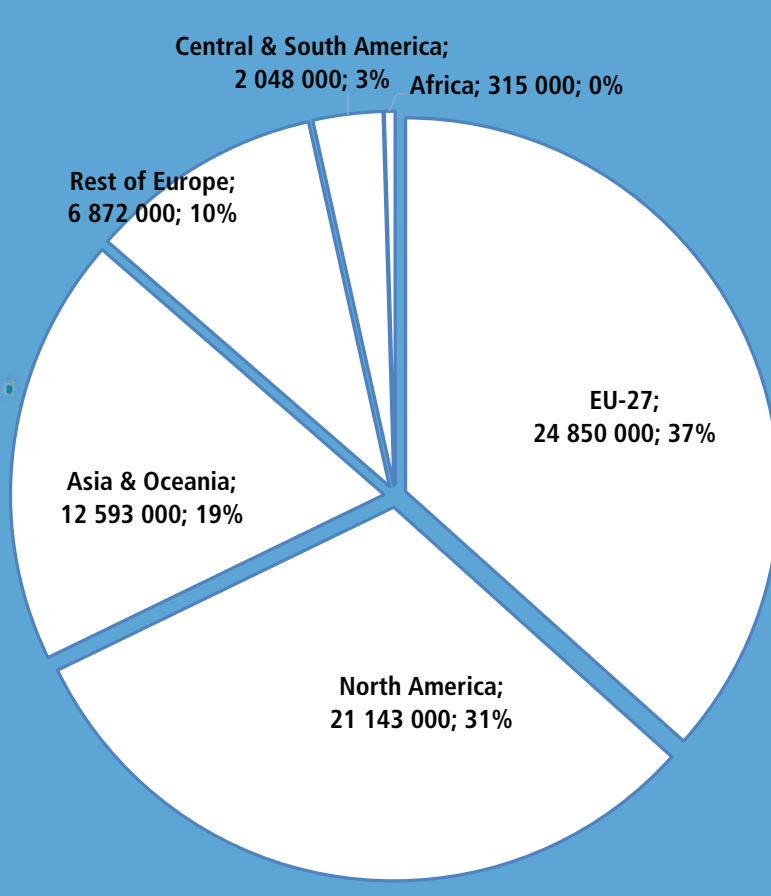
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Global ENplus Certified Production Capacity 2022 (in metric tonnes per annum – tpa)



Global Installed Pellet Production Capacity 2022 (in metric tonnes per annum – tpa)



ABOUT WORLD OF PELLETS 2023

The data is for 2022 and was collected during December 2022 – April 2023. “P” denotes planned, “C” denotes under construction and “T” denotes advanced pellets with coal-like properties (aka torrefied, steam treated or hydrothermal carbonisation). Plants with an installed capacity of 10 000 metric tonnes per annum (tpa) or more, and that were in operation at some point during 2022 are listed. Plants with an annual installed capacity of 100 000 tonnes or more are also “marked” on the map itself. One or two have been marked as “closed”, the plant was idle during 2022 with little or no production but not permanently closed.

Observe that installed capacity does not necessarily reflect actual production of any given plant. Instead, it is the given name-plate capacity, permitting capacity, or approximate – based on the pellet press (td) tonnes per hour nominal capacity x 7 500 hrs. The listing is by country and in alphabetical order. Note too that a number of plants also produce other densified products such as animal bedding, sorbent pellets or briquettes at the same location. The vast majority of plants listed use wood as feedstock, however, a growing number use other biomass sources, sometimes at the same plant and co-mingled with wood – bamboo dust, cereal straw, rice husk, sunflower husk, combustible waste, peanut hulls, sugarcane bagasse, empty fruit bunches (EFB), and oil palm trunk (OPT).

Plants marked in green denotes an **ENplus certified** facility. While the map has listed **477 ENplus certified facilities** above the 10 000 tpa threshold, this does not necessarily reflect actual ENplus certified output of the plant neither does the list include all ENplus certified plants – many are below the 10 000 tpa capacity threshold. More importantly, the certification status can change for any given company, facility, and/or country – as per April 15, 2022, ENplus certification was suspended for all producer, traders, and service providers based in Belarus and Russia on account of the invasion of Ukraine. This means that for neither these companies will be able to sell ENplus certified pellets as long as the suspension remains, nor new applications for certification from these two countries will be accepted. For current status always check with www.enplus-pellets.eu. For clarity it should be pointed out that ENplus is a quality standard covering the technical performance of pellets in (European) residential and commercial heating installations (stoves and boilers). There are other such standards, for instance the Pellet Fuels Institute (PFI) standard for US domestic heating appliances, while other industry standards cover utility grade pellets for power plants.

EU-27
The European Union (EU-27) had the largest installed capacity share – some 548 facilities with a capacity of 10 000 tonnes per annum (tpa) or more operational during 2022 had a combined capacity of 24.8 million tpa or 37 percent of the global installed capacity. The capacity from the UK has been transferred to the “Rest of Europe”. With just over 3.6 mtpa, Germany has the largest capacity in the EU-27, and is followed by Sweden (2.3 mtpa), France (2.07 mtpa), Latvia (1.99 mtpa), and Austria (1.93

mtpa), the latter with around 800 000 tpa in capacity increases to come online 2023/24. Cyprus and Malta remain as the only two EU Member States without pellet production capacity, at least not larger than 10 000 tpa. As can be expected the EU-27 has both the largest volume and share of ENplus certified production capacity – almost 16.6 mtpa or 68 percent of the EU-27 installed production capacity. In global terms, the EU-27 accounted for 78 percent of global ENplus certified capacity. Several Member States have pretty much 100 percent of capacity certified – Czech Republic, Germany (the single largest ENplus certified producer), Luxembourg, and Ireland (Republic) while Finland had no ENplus production during 2022.

NORTH AMERICA
With its 21.1 million tpa in 2022, North America is the second largest region in terms of installed pellet production capacity accounting for 31 percent of global capacity. It also had the third largest share of global ENplus certified capacity, at 10 percent or just over 2.5 mtpa. As a country, the United States (US) continues to dominate as having the world's largest fleet of pellet plants – 128 facilities with 10 000 tpa or more as well as the world's largest pellet producer (Envia). Moreover, the country continues to have the largest volume of installed production capacity, just over 16.3 mtpa. Looking ahead, the largest volume of known planned/proposed new capacity is also in the US. For example, Drax is targeting to reach 8 mtpa capacity by 2030 while Envia intends to double its capacity to reach around 13 mtpa over the next four years. Notable too that it is in the US that the world's largest plants are operational, with several in the 750 000 tpa capacity range. However, here too Envia is raising

the bar – to over 1 million tonnes, both in Luccedale, which is operational, and Bond, which is has begun its permitting process. Canada, with its almost 5 million tpa capacity, is the world's third largest producer. Despite both closures, and curtailments, British Columbia (BC) is the largest pellet producing province. Alberta and the eastern provinces such as Québec and New Brunswick are emerging provinces. Since its acquisition of Pinnacle Renewable Energy, Drax is not only the country's largest producer but is second only to Envia.

ASIA PACIFIC & OCEANIA
The region had the third largest installed capacity share in 2022, almost 12.6 mtpa or one fifth of global capacity. Of the ten countries featured, China stands out with 6.2 mtpa or just over half of the region's capacity, placing it as the world's second in terms of installed capacity and (known) plant fleet. It is though with a caveat that the information has a higher degree of uncertainty. Little of China's pellet production is exported – production is driven by domestic national and regional policies to replace coal in residential and local heating with densified biomass fuels made from local forest industry and agricultural residues. In addition, current policy remains restrictive on wood pellet imports though indications are that this may change. There are additional plants operating, and projects in various stages of development in Malaysia, Indonesia, Thailand, and Vietnam though public details remain sketchy. The latter in particular has significantly more production than accounted for on this map. In India, it is worth highlighting the development of micro-scale biomass pellet production for cooking. Here the model is self-production for self-consumption on a village-scale a couple of hundred kg per day. Although in its infancy, it could prove a successful and

replicable model across tens of thousands of villages, not just in India. With the exception of New Zealand, ENplus certification had remained elusive in the region, perhaps on account of the pellets (outside of China) being primarily destined for utilities in Japan and South Korea but now the first Chinese producer has been ENplus certified, and a second is on the way. The Australian government's amendment to Renewable Energy (Electricity) Regulations to exclude electricity generated from the combustion of “native forest wood waste” from eligibility under the Renewable Energy Target (RET) might have implications for pellet plant operators.

REST OF EUROPE INCL. RUSSIA
The region had the fourth largest installed capacity share in 2022, almost 7 mtpa or 10 percent of the global share. Almost two thirds of the region's installed capacity had been ENplus certified but, as previously mentioned, Russia's invasion of Ukraine in February 2022 led to trade embargoes and economic sanctions as well as the suspension of ENplus and SPF certifications in both Belarus and Russia. In effect locking these volumes out of the EU market. Several countries in the Balkans region such as Albania, Bosnia & Herzegovina, Kosovo and Serbia have built out capacity in recent years both for domestic markets and export to the EU. Iceland with a single producer is new on the map.

CENTRAL & SOUTH AMERICA
The five countries had a combined installed capacity of just over 2 mtpa in 2022, about 3 percent of global capacity. Countries like Argentina, Chile, Colombia, and Uruguay are developing small to medium sized domestic pellet production for local residential heating markets whereas Brazil, the largest producer in the region with over 1.3 mtpa, is developing capacity primarily for export including pellets made from sugarcane bagasse. About half of the region's installed capacity was ENplus certified or five percent of global ENplus capacity.

AFRICA & REST OF THE WORLD
In terms of potential growth, the region is showing signs of positive development with over 300 000 tpa of production some of which is ENplus certified. Moreover, based on the current project pipeline, installed capacity could double soon as, perhaps for the first time ever, projects in excess of 100 000 tpa are in construction for example in South Africa. It should also be pointed out that several countries have small-scale production (less than 10 000 tpa) using a multitude of biomass feedstock serving local markets, in particular for cooking. Like India and emerging economies in other regions, it is also this sector that local small-scale production of densified biomass fuels has an enormous potential to address several social and environmental issues such as deforestation, illegal logging, indoor air pollution and bush encroachment.

ALBANIA (AL)	CAPACITY
ENplus certified plants (1), 47% of total capacity	16 000
Total number of plants (1)	34 000

BELGIUM (BE)	CAPACITY
ENplus certified plants (3), 85% of total capacity	755 000
Total number of plants (3)	885 000

CHILE (CL)	CAPACITY
ENplus certified plants (1), 25% of total capacity	110 000
Total number of plants (1)	375 000

ESTONIA (EE)	CAPACITY
ENplus certified plants (1), 79% of total capacity	1 239 000
Total number of plants (1)	1 689 000

GREECE (GR)	CAPACITY
ENplus certified plants (1), 20% of total capacity	32 000
Total number of plants (1)	16 000

IRELAND (IE)	CAPACITY
ENplus certified plants (1), 100% of total capacity	32 000
Total number of plants (1)	32 000

ISRAEL (IL)	CAPACITY
ENplus certified plants (0), 0% of total capacity	0
Total number of plants (0)	0

LUXEMBOURG (LU)	CAPACITY
ENplus certified plants (1), 100% of total capacity	30 000
Total number of plants (1)	30 000

POLAND (PL)	CAPACITY
ENplus certified plants (4), 60% of total capacity	934 000
Total number of plants (4)	1 349 000

SLOVENIA (SI)	CAPACITY
ENplus certified plants (0), 0% of total capacity	0
Total number of plants (0)	0

THE NETHERLANDS (NL)	CAPACITY
ENplus certified plants (2), 70% of total capacity	245 000
Total number of plants (2)	349 000

URUGUAY (UY)	CAPACITY
ENplus certified plants (0), 0% of total capacity	0
Total number of plants (0)	0

COUNTRIES WITH FIRST PELLETS ON THE WAY	CAPACITY
DEM. REP. OF THE CONGO (CD)	0
Congo Basin Pellets, Itombi	50 000P
REP. OF THE CONGO (CG)	0
Congo Basin Pellets, Brazzaville	50 000P
Congo Basin Pellets, Pointe Noire	100 000P
GHANA (GH)	0
Congo Basin Pellets, Batak	45 000C
Congo Basin Pellets, Port Gentil	130 000C
MEXICO (MX)	0
PelletEX Chihuahua, Chihuahua	20 000C
PelletEX Coahuila, Coahuila	30 000C
PelletEX Sinaloa, Sinaloa	30 000C
PelletEX Chiapas, Chiapas	30 000C
SOUTH AFRICA (ZA)	0
Congo Biomass Centre, Port Elizabeth	100 000C

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Acknowledgements & Disclaimer
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