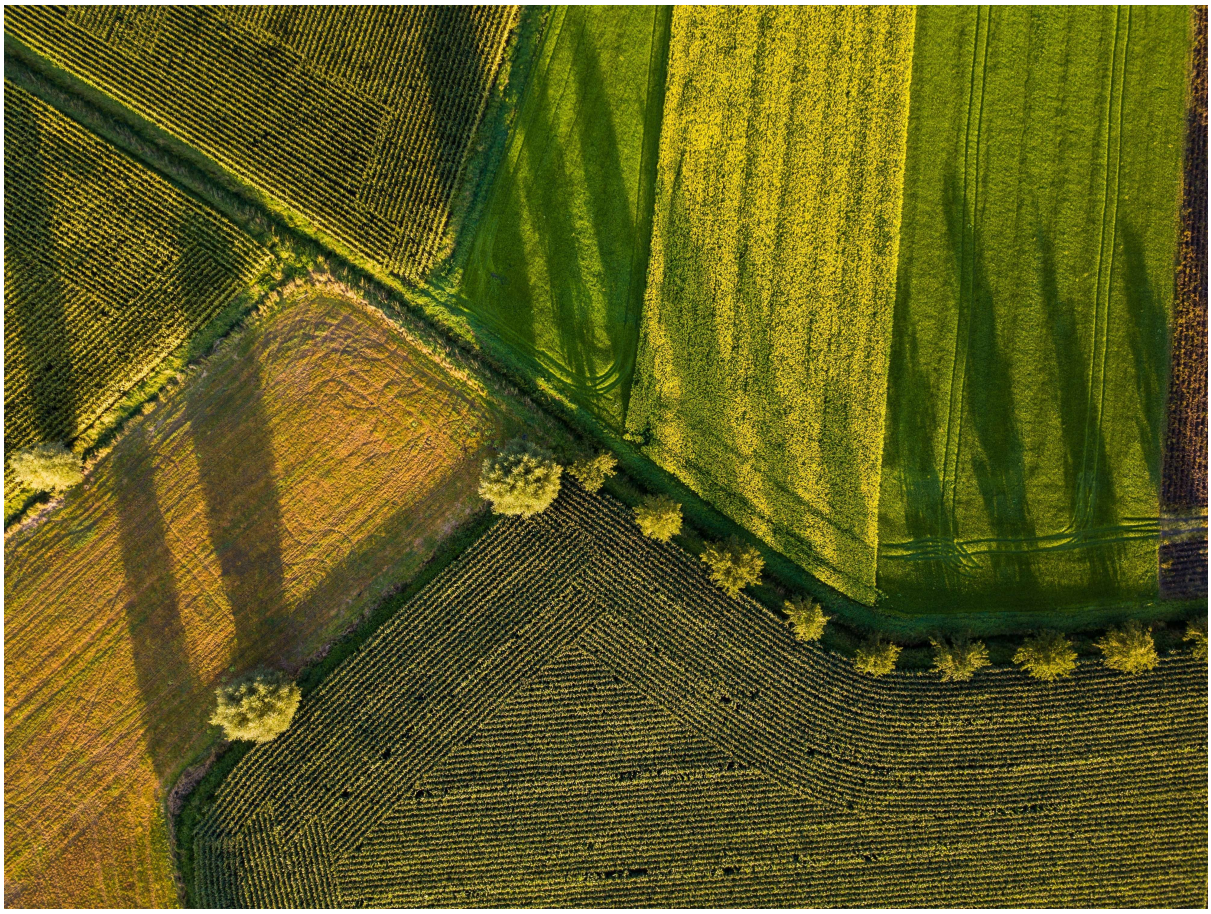
GEFF Green Economy Financing Facility

European Bank for Reconstruction and Development

Where finance and green technologies meet

GEFF in Armenia Newsletter N13: Q1, 2022



Key results as of 31 March 2022

- *GEFF in Armenia has financed 316 projects totalling EUR 26.2 million through partner financial institutions (PFIs), thus reducing primary energy usage by 120,267 MWh/year, saving 28,091 tonnes of CO_2 and 5,653 m^3 of water annually.*
- *Renewable energy projects with an installed capacity of 42.8 MW of energy make it possible to avoid 24,188 tonnes of CO_2 annually.*
- *1,267 EE and RE technologies offered by 175 vendors from 21 locations in Armenia are made accessible through the Green Technology Selector.*

Interview with the Director of R2E2 Fund on renewable energy developments in Armenia

GEFF in Armenia interviewed Mr. Karen Asatryan, the director of R2E2 Fund − Armenia Renewable Resources and Energy Efficiency Fund, who shared his insights regarding renewable energy (RE) developments in Armenia and what opportunities lie ahead in 2022.

*1. What are recent **achievements** in the field of RE in Armenia?*

Armenia is rapidly scaling up variable renewable power. The first utility-scale solar programme in Armenia reached a financial close in March 2020. A second programme for a 200 MW investment project was tendered via PPP and international investors were engaged in 2021. The government is preparing a similar programme for wind power. In parallel, the government is promoting private investments in small industrial-scale solar power plants (1 to 5 MW, although licenses for 200 MW were also issued) and solar net-metering by private households and SMEs.

In total, the government is planning to have 1,000 MW of solar power commissioned by 2030 and 500 MW of wind power by 2040. During the last four years, the number of PV installations by households and businesses has dramatically increased from 0 to 150 MW, due to one of the best-in-class net-metering legislations.

2. What are the main challenges to developing the field of RE in Armenia in 2022, particularly with regard to solar and other sources?

The electric network capacity to accept renewable energy sources could be considered the main challenge.
The R2E2 Fund, with the support of the Government of Armenia, is actively working on promoting renewable energy projects to reach the goal set in Armenia's Energy Strategic Development Program 2020 to 2040 (approved in early 2021). The Program identifies wind and solar expansion as critical priorities and recognises the potential role that energy storage could play if developments in the energy storage market are favourable. By 2040, the share of RE will reach up to 60% with the following distribution − solar 15%, wind 10%, and HHP 30%.

Electric system integration with neighbouring countries will lead to increased energy acceptance capacity by the power grid.

*3. How much **RE sector growth** do you expect in Armenia in 2022, and which **green technologies will contribute** to this growth? Which technologies should businesses and suppliers look out for?*

We can predict up to ten per cent growth in the RE sector in Armenia in 2022. It is most likely that the solar power plants will be the main contributors to this growth. In addition to solar panels, the modernisation of hydropower plants may also be a contributor. There are also precursors for wind power, but growth in the wind energy sector is not likely in 2022. Therefore, suppliers and businesses should primarily focus on highly efficient solar panels and hydro turbines.

4. *Where do you see **opportunities for business development**? Which **sectors or businesses** are likely to contribute to the growth of the RE sector in 2022?*

We see opportunities for business development in evolving ESCO companies, which can provide a wide variety of RE solutions for the business and public sectors.
New technologies such as smart energy management, energy accumulation and hydrogen technologies, as well as software, are capable of supporting all kinds of RE technologies, which could be great opportunities for businesses.

Floating solar PV plants are the next real opportunity for Armenia, taking into account the current pilot project implemented by the R2E2 Fund.

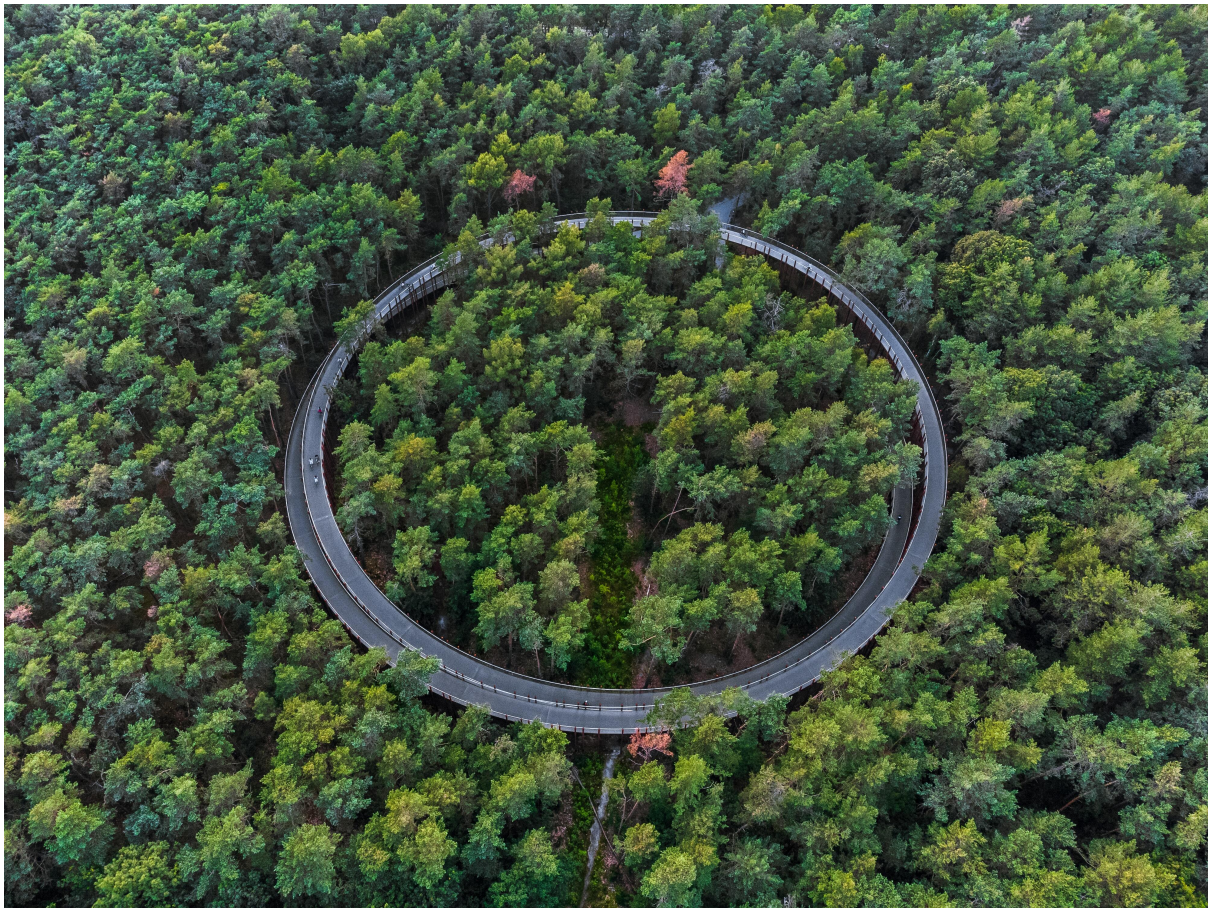


Photo by Thomas Bormans on Unsplash

Accelerating a circular economy in EBRD countries and Armenia

As part of the EBRD's ongoing support for developing a greener economy in its countries of operation, the bank's Taipei office hosted a webinar called "Accelerating the circular economy" on 24 February 2022. The main purpose of the event was to raise awareness about the circular economy and various actions businesses can take to fast-track their transition towards it. Unlike a linear economy, the circular economy is aimed at recirculating products and materials in order to eliminate waste and pollution.

"As half of the total greenhouse gas emissions come from resource extraction and processing, scaling up circular economy activities will make a decisive contribution to achieving climate neutrality by 2050," the audience heard the EBRD Associate Director, Ksenia Brockmann, say during her opening remarks. Indeed, circular economy principles motivate people and businesses to evaluate their use of natural resources, design products with recyclability and reusability in mind and develop ways to be more flexible and accessible in an unpredictable environment.

Several innovative CE solutions were showcased at the event. Miniwiz Co recycles plastics and fibres and turns them into building materials, wallpaper, chairs, various textile materials, wireless chargers, etc. The company's challenge at the moment is the lack of

experience on the part of consumers and producers alike, which is crucial in creating a market and a high-quality product.

Enrestec Inc upcycles tyres into various products, such as wet suits, ink applications, and sports inventory. As Mr Yuan highlighted, “conquering” the recycling part is not as challenging as creating a good product. Despite his company’s 17 years in operation, it is still working on improving the final output that is delivered to customers. Nevertheless, Enrestec’s products help avoid about 72% of emissions.

Yet another case for waste management, was presented by KiSmart Corporation. The company turns waste into organic fertiliser, allowing drastic decreases in the use of chemical fertilisers, soil-borne diseases, reduction of carbon in land soils and energy use.

More than 150 attendees out of 30 countries including 9 attendees from Armenia had the chance to witness how companies apply circular strategies. The webinar also gave vendors from around the world the opportunity to engage with one another, not only in the form of questions but also in one-on-one virtual meetings and networking sessions. Many of the examples given at the webinar by the companies might have seemed like science fiction, but they were in fact real examples of the principles of upcycling, recycling, reusing, and value recovery being applied in business operations.

Armenian companies financed by GEFF nominated for ENERGY GLOBE Awards

For a second time, GEFF in Armenia has nominated programme beneficiaries (sub-borrowers) for National ENERGY GLOBE Awards (EGA).

The nomination of projects in Armenia for the award plays a significant role in keeping Armenia on track with sustainable development and on the green initiatives global map. Though Armenia is relatively new in this field, its efforts must be acknowledged, in order to give the market a boost and support further development.

Kataro LLC, a well-known Armenian winemaker, built a new production site in the Ararat valley equipped with the newest energy-efficient technologies from wine processing and bottling equipment producers in Italy. The company will be able to achieve energy savings of 41%, create a stable base for its development and give a boost to its brand while creating jobs for refugees from Hadrut, where the company originates. It will also contribute to CO_2 savings of three tonnes per year. Nominating the company for the award at the national level gives the renowned brand the opportunity to present itself in foreign markets and at the same time, lead the local food processing market in its efforts to become more energy efficient.

With its investment in energy- and water-saving cooling equipment, Tamara Fruit CJSC is another success story in Armenia. The company's investment covers its energy and water-saving needs while minimising the risks of environmental hazards and the health of staff. The new Freon gas-based cooling equipment enables the company to save 84 MWh/year of electricity and 1,895 m^3/year of water as well as contribute to CO_2 savings totalling 37 tonnes annually. Since 2000, the ENERGY GLOBE Award's database has grown to approximately 20,000 emissions-reducing projects from around 180 countries, all of which serve one aim: to uncover and present innovative and sustainable projects to a broader global audience bearing potential for replication.

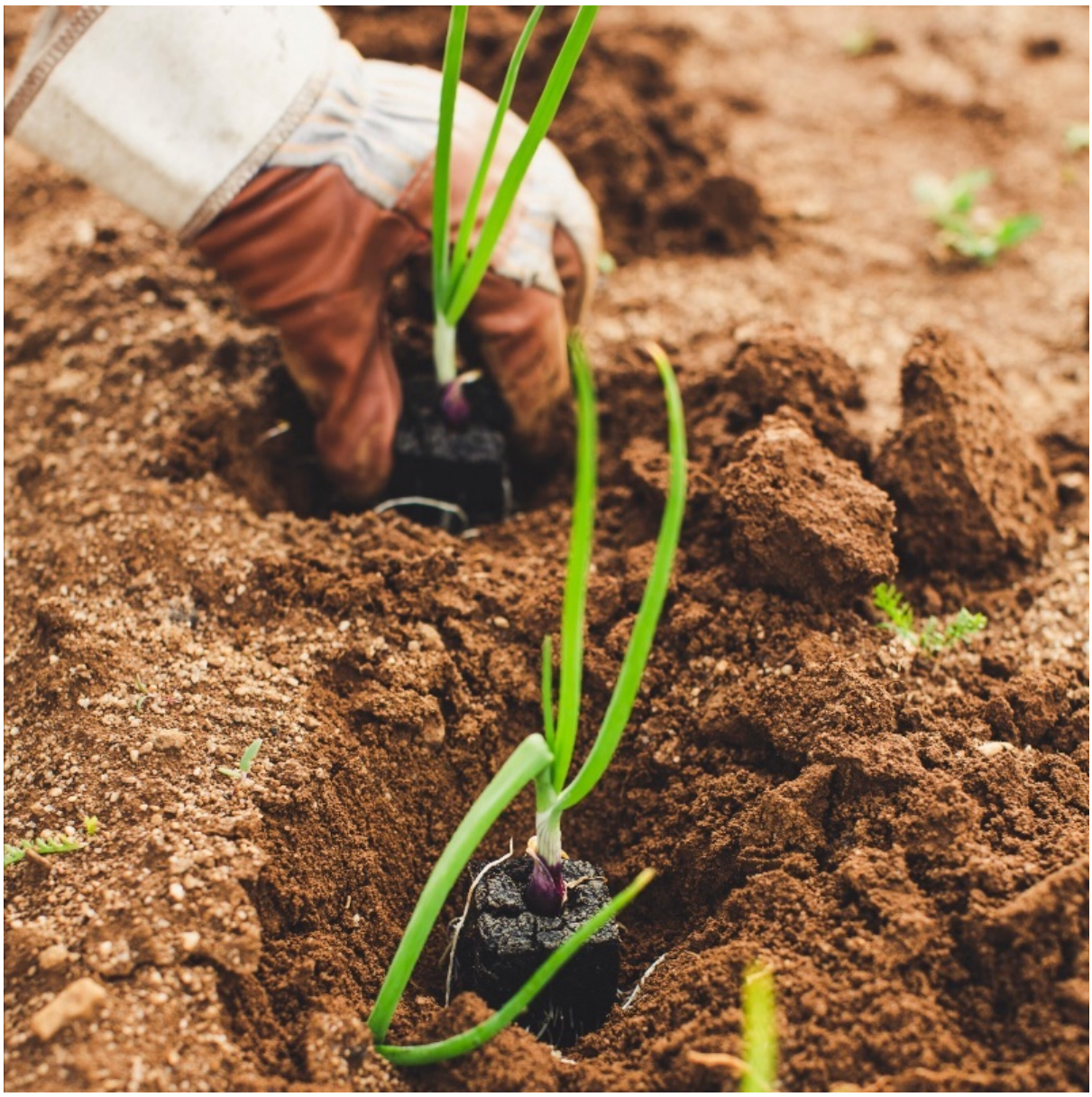


Photo by Markus Spiske on Unsplash

Climate change and sustainability in the Armenian agricultural sector

Agriculture is one of the key economic sectors in Armenia. It is significant not only as an important contributor to the nation's economic well-being, but also as a sector that affects the country's security, the productivity of land use as well as the population's health, nutrition, and quality of life. However, **Armenia is highly vulnerable to global climate change** and is counted among the most sensitive countries in Europe and Central Asia regions.

Armenia is a landlocked country with 90% of its territory situated at over 1,000 m above sea level. The terrain is mostly mountainous, with fast-flowing rivers and a few forests. The climate is highland continental, which means that the country is subject to hot summers and cold winters. A high frequency and magnitude of hazardous hydro-meteorological phenomena (HHP), which trigger droughts, landslides, mudslides, forest fires, etc. and inflict significant losses on the population and the economy, are characteristic of the

country.

In recent decades, HHP-related threats have been coupled with a significant increase in temperature change rates. The frequency of warm days/nights has dramatically increased, while cold days/nights have decreased significantly. **Climate projections indicate that temperatures across the country may rise by 4.7ºC by 2100**, combined with an 8.3% decline in average annual precipitation and an increase in the frequency and intensity of other HHP. Changes such as these will impact all-natural and managed systems, water resources, agriculture and food security, human health, settlements, and infrastructure.

Climate change is expected to have **three main effects on crops in Armenia**:

- First, the appropriate zone for growing **each individual crop will likely move 100 m upwards in altitude** by 2030 and 200-400 m by 2100. In general, more land at higher elevations will become appropriate for growing crops, which may create competition for higher land now used for pasture or hayfields. In most cases, sub-alpine pastures and hayfields would not be able to move further upward into the rocky mountainous outcroppings in response to this competition.
- Second, for many areas, the combination of higher temperatures, increased evaporation and lower precipitation levels will lead to a **loss of productivity for most crops**, unless irrigation levels can be increased, and the irrigated area can be expanded. In isolated cases, higher temperatures could make cultivation possible in higher altitude areas that have arable soils and, in the future, will have sufficient precipitation for good productivity; several mountainous areas will receive more precipitation and grow warmer in the northeast, the western Lake Sevan basin, Syunik, and Aragats. Overall, the yields of main agricultural crops are predicted to decrease by 8-14% without adaptation by 2030.
- Third, changing weather patterns may cause **damage to crops and agricultural land in ways that cannot be predicted**, due to average temperature increases or changes in annual precipitation levels. As climate change progresses, weather patterns are expected to become more erratic with more severe storms. High winds and heavy rains can damage crops, reducing yields. Severe storms can also trigger natural disasters such as landslides, mudflows, and floods, which can cause damage to agricultural lands and irrigation infrastructure.

Pasture area and yields are forecasted to decline by 4-10% (19-22% in the most valuable pastures in the sub-alpine and alpine zones). Grassland yields could potentially decrease by 7-10% which could reduce fodder production. Additionally, **outbreaks of crop diseases** and pests are likely to become more severe, owing to changes in the range of pests and diminished winter dieback. Some opportunities may also be presented by climate change – for example, while pasture yields may decline in existing areas, these

pastures could be expanded as the growing season lengthens. In addition, temperatures may rise in the foothill areas, where precipitation may increase or hold steady, thus enhancing the environment for fruit tree production.

We are not only talking about the future − **these processes have gradually begun taking place**.

The **government has recognised the issue of climate change impact** and developed/adopted various decrees as well as plans relating to all aspects of mitigation and adaptation activities, such as sustainable development, energy efficiency, sustainable agriculture, protecting land, soil and water resources as well as waste management. To ensure the financial stability of the agricultural sector, government authorities have been implementing various financial instruments (subsidy programmes) to mitigate and adapt to climate change.

And indeed, **innovative approaches have already been developed** in both the state and private sectors, for example, the introduction of intensive orchards. There are many other investment measures, which are promising and important for the local market, such as sustainable and climate-smart technologies: drip irrigation and hail nets. In addition, the expansion of greenhouses also enables local farmers to get great value for money, and at the same time mitigate the adverse impact of climate change. Armenian agricultural businesses need to invest to improve their efficiency so that they can both compete at home and take advantage of change-driven opportunities. The challenges faced represents the **clear potential for more sustainable development**.

Do you plan any investments soon? Let us know about your ideas and we will gladly advise you on potential technical options as well as inform you how they can be financed with the support of the GEFF in Armenia programme.

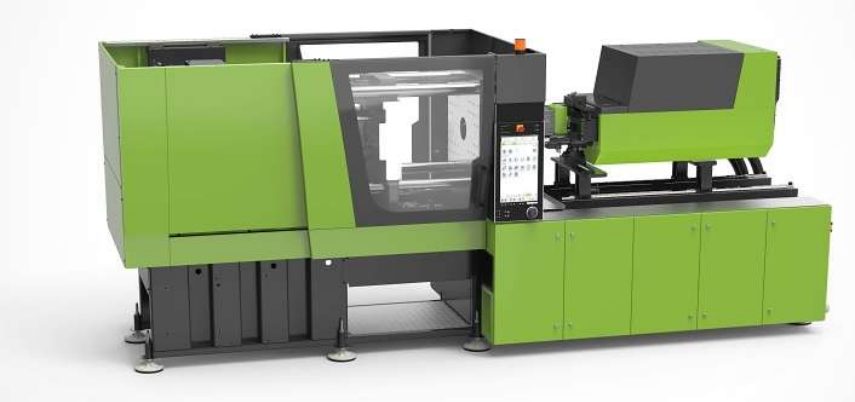
Sources: Ministry of Nature Protection of the RA. Stockholm Environment Institute (The Socio-Economic Impact of Climate Change in Armenia). EU4Environment (An Assessment of Investment Needs for CA in Armenia up to 2030). G. Fayvush, A. Nalbandyan (A Method to Project Changes in Climatic Conditions for Different Types of Vegetation). L. Khachatryan (The Assessment of Vulnerability of Agricultural Crops as a Result of Climate Change).

Featured Technology:

Injection moulding machines

Modern plastics date back to the late 19th century when European and American

chemists were experimenting with various types of rubber and chemical residues.
There are two main types of plastics produced: thermoplastics and thermosets. The original thermoplastic injection moulding method has remained unchanged since 1946 when World War II created significant demand for inexpensive, mass-produced products.



James Hendry built the first screw-type injection moulding machine and thereby revolutionised the plastics industry. Injection moulding is a process during which a material is converted into a viscous-flowable state and then injected under pressure into a mould where the product is shaped.

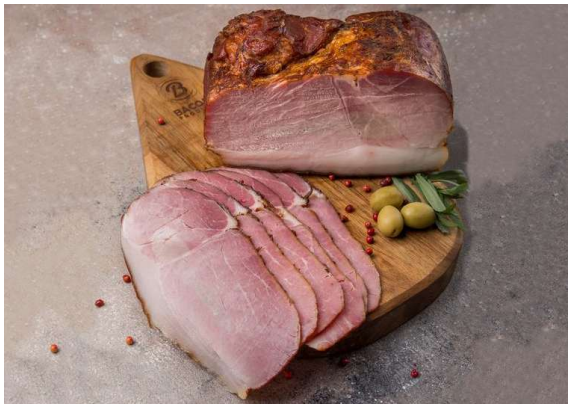
The injection moulding method is the most common in the processing of most industrial thermoplastics. In addition, this process is used to produce reinforced, hollow, and multi-colour products made from foaming plastics, etc. The main advantages of injection moulding machines are:

- versatility owing to recycled plastics
- high performance
- high quality of the products
- ability to manufacture parts with a very complex configuration or thin-walled products
- no additional processing of the final product (except for the removal of sprues)
- full automation of the process.

Currently, injection moulding machines are classified primarily by the type of driving system employed, i.e., hydraulic, electric, or hybrid. Historically, hydraulic machines were the first to be used. With a hydraulic drive, higher energy levels can be reached, thus achieving higher injection pressures compared to an electric drive. The main disadvantage of a hydraulic injection moulding machine is the high energy consumption. It runs at maximum power in every phase of the moulding process, resulting in high energy costs. The base load (energy consumed when the machine is idling such as during cooling phases) can amount to 75% or more of total energy consumption predominant in most countries.
For electric and hybrid machines, the base load is much lower, as motors are only powered when required. Typical base loads are approximately 10-20%. By only using energy when a movement is required, base loads are dramatically reduced and overall energy savings of up to 60% are made possible.
The competitiveness of a plastic producer is highly dependent on the efficiency of the

production process. Today's plastic injection moulding machine technology is far more energy-efficient than 20 years ago. Making a conservative estimate, modern hydraulic plastic injection moulding machines are 25% more energy efficient than those manufactured in 1997. Meanwhile, the best all-electric machines produced today may be up to 80% more energy efficient than their 20-year-old hydraulic predecessors.
Please browse through our Green Technology Selector to view accessible injection moulding machines.

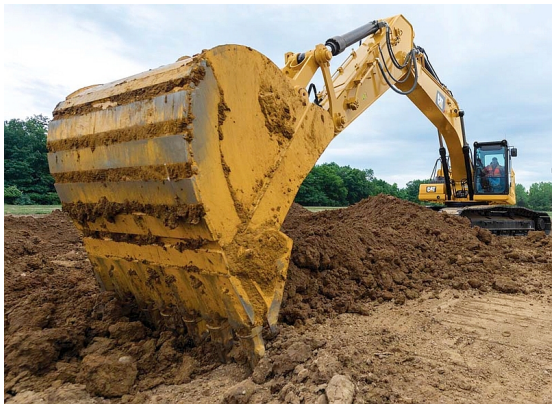
Success stories



Bacon Product LLC

Established in 1995, Bacon Product LLC is a company active in the manufacturing of meat products and convenience food. The state subsidy support programme enabled the purchase of a high-performance Ecoline BITZER series refrigeration system, which was selected using the GTS, helping the company to stay competitive by keeping the quality of its products high.

Location
Kotayk
Investment
Refrigeration system
Investment size



Spectekh LLC

Spectekh LLC was established in 2018, with the aim of delivering quality construction equipment rental services to the fast-developing real estate development sector.
The hydraulic excavator purchased meets the industry's highest standards. It offers increased operating efficiency of up to 45%, fuel efficiency improvements of up to 20%, and around 20% lower maintenance costs.

Location
Yerevan
Investment
Hydraulic excavator

US$ 10,900

Energy savings

4.4 MWh per year

CO_2 savings

1.1 tonnes per year

Impact

Operating reliability; low lifecycle costs

Donor

GCF, CIF

Investment size

US$ 163,000

Financial results

Payback in 6 years

Energy savings

336 MWh per year

CO_2 savings

94 tonnes per year

Impact

Higher quality service; increased cost-efficiency

Donor

GCF, CIF

View more success stories on our website.

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