UNDERGROUND VACUUM SYSTEMS FOR SUSTAINABLE WASTE HANDLING
Waste collection goes underground and takes waste management into the 21st century

Envac is the global leader in vacuum waste collection systems. Internationally recognised for revolutionising the waste collection process by integrating it into the infrastructure of a building, a residential development, a town and even entire districts. Envac has established a worldwide presence with over 700 installations and 36 offices across 20 countries.

The system addresses the perennial problem of waste management for large-scale residential and commercial developments by transporting waste using vacuum technology through an underground network of pipes.

Cleaner. Greener. Leaner.

Urban density is rapidly increasing in line with an expanding global population. The importance of creating a sustainable legacy is now widely recognised throughout the world at every level of society – from those responsible for designing the developments of tomorrow to those who will ultimately inhabit them. Waste management has never before been such a crucial factor in achieving this legacy and is now an essential component of any long-term sustainability strategy.

Cleaner

The automated and underground nature of Envac means that waste collection operatives no longer need to come into contact with the waste. As it is stored and handled underground there are no smells associated with conventional waste collection methods and no unsightly bins. This creates a cleaner environment that is less attractive to pests.

Greener

Our mission is to reduce the growing problems associated with waste handling in cities. We achieve this by eliminating the disruption caused by conventional waste collection methods, traditionally handled above ground, by taking it underground. In doing so, we improve the environments of streets, market squares and buildings making cities safer, healthier and more attractive to residents, businesses and visitors.

Leaner

The Envac system uses vacuum technology, which handles in minutes what multiple waste collection vehicles take all day to do. Powered on electricity and air, Envac is a much more efficient alternative to heavily polluting waste vehicles and each collection cycle is quicker and more cost effective.

Envac’s 21st century approach to waste management is what has made the system appeal to prominent sites and developments across the world in residential areas, business premises, town centres, industrial kitchens, hospitals and airports.
In many cities across the world, waste collection is still based on 19th century principles.

New technologies are continuously developing the urban infrastructure and improving the environment. Yet the principal of waste management has remained unchanged since the 19th century.

From the humble dustcart to the modern day refuse vehicles that populate the roads today, waste is still collected by road from each individual’s house. Whilst other services and utilities such as sewage, water, drainage and now modern day telecommunications have wisely been designed to be out of sight in the underground infrastructure, solid waste collection has remained much the same.

The pressures now facing towns and cities are increasing at a rapid rate. Waste generation is increasing as we are using more disposable packaging. Waste-related hygiene problems have never been so prominent and as...
our cities continue to grow, accessing areas reserved for waste collection using industrial vehicles is becoming more difficult.

The solution can be found underground
We invented underground waste collection technology in 1961 after developing the first hermetically sealed underground transport system for waste. Our experience and history of delivering underground vacuum waste collection systems makes us the global leader.

Like any other infrastructure-led service such as sewage, water, electricity and telephone lines, Envac is the ideal modern day solution for efficient, clean and cost effective waste management.

It is a vehicle for environmental and social change. It increases recycling rates, reduces the amount of carbon emissions created by heavily polluting waste collection vehicles and makes developments and cities more appealing to their residents, businesses and visitors.

In order for us to share this vision it is essential that we regard our customers and those involved at every stage of the supply chain as partners. It is important that everyone involved in the system’s installation, from the architects and planners through to the developers and end-users, understands that Envac is a long-term commitment that delivers long-term benefits.
Sanya Serenity Coast, at Hainan, in China

The natural beauty of Sanya’s Serenity Coast and world-class resort make it appeal to the most discerning crowd.

Surrounded by sea and stunning scenery, Sanya’s Serenity Coast in China’s Southern Province Hainan is real estate with an undeniable beauty.

The high-end development consists of five-star hotels, luxury apartments, villas, business districts, golf courses and diving and yacht clubs. Its natural beauty combine with first-class resort facilities that cater for the most luxury-conscious crowd. In Serenity Coast, beachside homes and hillside estates provide the ultimate in luxury living. Each and every facility installed is of world-class standard.

**Green concept**

Serenity Coast occupies an area of about 4,000 acres with outstanding sea views. In consideration of the geographical location, in the master plan of the real estate project, the developer wanted to take care of the natural environment and build a green community that blended high-end luxury and leisure with sustainability.

The exclusive building required a new approach to waste management to achieve the vision and guarantee a high environmental standard. Whilst
the developer had strict environmental targets they initially had no idea of the existing technology that could help them to achieve this until they came across Envac’s automated waste collection system.

**Foundations for the future**

Envac was successfully introduced to Serenity Coast in 2007, with a plan to develop the project in six phases. The fifth and six phases are now underway and on completion 7,500 apartments will be connected to two central waste collection stations. Highly aesthetic indoor inlets have been installed on each floor whilst the Envac outdoor inlets are accessible in the public areas, where they are surrounded by greenery.

The first four phases became operational in 2009 and the system’s performance has been praised by the developer and Serenity Coast’s property management company. For them, not only does the system help the development meet its strict sustainability criteria but also generates compliments from residents and supports the green ethos that underpinned the initial vision for the development.

**In numbers**

- 9,324 apartments
- 1,755 inlets
- 1 waste stream
- 2 containers
- 10,900 metres of pipe
- 21 tons of waste per day

9,324 apartments are connected to the Envac system.
Yesterday’s architecture meets tomorrow’s waste collection solution in Spain

The City of León chose an Envac system for the historical part of the city where icy winters and narrow streets made waste collection challenging. It has since been integrated into new districts within the city.

León city has been the capital of the León province in the Castile and León autonomous community since 1983. The city’s historical and architectural heritage, its calendar of events and its location in the Camino de Santiago, which is ranked as a UNESCO World Heritage Site, make it a destination of both domestic and international tourism.

Some of the city’s most prominent historical buildings include the Cathedral, the finest example of classic Gothic architecture in Spain, the Basilica of San Isidoro, the Monastery of San Marcos and the Casa Botines, a Modernist creation of the architect Antoni Gaudi.

When the past and the future collide
Envac was installed in León following a wide-ranging survey and planning programme, which established how
the system could be installed whilst preserving the area’s historical infrastructure and architecture.

Making waste collection easier for waste operatives, who had traditionally had to negotiate the narrow, undulating lanes common with a historical city, was behind the decision to install Envac. However preserving the roads and buildings of historical significance that the area has become world-renowned for was a priority.

After careful excavation and installation work, the system became operational in 1999 and has since been operated and maintained by Envac. The system serves León’s historical centre, also known as ‘Barrio Húmedo, and a densely populated site that includes a large number of bars and restaurants throughout the area.

The 3.2 km long pipe network ends in a terminal station located on the outskirts of the city in a new neighbourhood called La Lastra, which has been designed specifically to integrate with the surrounding buildings.

One of the most important features of this system is the buried air valves, which have freed up a substantial amount of public space that is now available for other uses. In 2009, the system was extended when a further 180 discharge valves were added to the 75 already located throughout the streets of the historical centre. The new 2.5 km network of Envac pipework also connects to the same waste collection centre that serves the historical district. Located inside the buildings and lining the streets, Envac’s waste inlets collect packaging and rest.

La Lastra is one of the latest urban developments to incorporate the Envac system.

Manual waste handling is often made difficult by:

- Old infrastructure
- Narrow, crooked streets that are not suitable for large waste collection vehicles
- Little space for rubbish bins, making at source separation difficult
- High volumes of tourists make traditional bins less accessible by waste operatives, which often conflicts with the objectives of keeping areas associated with tourism clean and hygienic.

Just like a jigsaw, Envac’s existing pipe network can simply be extended and connected to new areas, which is how the historical City of Leon’s automated waste infrastructure has been united with that of La Lastra, a new neighbourhood on the outskirts of the City.
In 2011, the Pearl of Qatar was awarded a distinction at the Green Apple Awards for the Built Environment and Architectural Heritage. One of the development’s award winning factors was its innovative waste disposal system.

The Pearl of Qatar in Doha

For the Pearl of Qatar, the most exclusive address in the Middle East, an invisible waste handling system is the obvious solution.

The Pearl-Qatar in Doha, Qatar, is a man-made island spanning nearly four million square metres. It is also regarded as the most exclusive address in the Middle East.

Qatar is the world’s most rapidly expanding economy and represents an idyllic home for over 41,000 international residents.

The first investors took up residence in 2009 and once completed, the Pearl will have created over 32 km of new coastline including 13 islands. The largest of the islands will include the most luxurious villas, apartments and five-star hotels. The development will also contain over two million square metres of retail space, restaurants and entertainment facilities. The automated vacuum waste system for the entire island has been designed, built, operated and maintained by Envac Middle East.

A contemporary approach to waste management

The system is one of the Envac Group’s largest to date. Four independent waste collection systems that can handle 135 tons of waste per day have been integrated into the development. The system is managed by two waste collection stations and the total pipe network is 55 km in length. There are 415 Envac waste inlets throughout the site, which have been installed indoors and outdoors.
The Pearl-Qatar in Doha, Qatar, is a man-made island that provides an idyllic home for more than 41,000 international residents.

The Envac automated waste collection system was inaugurated in 2010.

The Envac system installed throughout the Pearl of Qatar includes a pipe network that is 55 km long. It can handle 135 tons of waste each day from luxury villas, apartments, three five-star hotels, schools, fire stations and local authority offices.

**In numbers**

- 14,000 apartments
- 415 inlets
  (both indoor and outdoor)
- 1 waste stream
- 55,000 metres of pipe
- 135 tons of waste per day

Once completed, the Pearl will cover over 32 km of new coastline.
Handling waste the Wembley Way, in London UK

Our UK launch quickly saw the Envac system incorporated into one of London’s flagship regeneration projects, Quintain Estates and Development plc’s prestigious Wembley City.

In line with Quintain’s aim of transforming 85-acres of land surrounding the UK’s national stadium into a world-class sustainable region, the system was specified to provide a contemporary waste management solution, increase residents’ recycling rates and contribute towards creating a sustainable environment.

Working closely with Quintain, the London Borough of Brent and international waste contractor, Veolia, we ensured that collected materials were compatible with Brent’s waste management strategy. With over 2,500 metres of pipework and a single waste collection station that will service the entire development, each collection cycle lasts only a few minutes making waste collection more efficient and cost effective.

More importantly, the process is driven by hot air instead of diesel-powered vehicles. Since becoming operational in 2008, the system has generated international acclaim and received awards for its innovative approach to waste management. The system will now connect to Brent Council’s new Civic Centre, which is scheduled for completion in 2013 and will be the UK’s first BREAAM Outstanding rated public building.

The results

Since the system became operational at Wembley City it has:

• Increased Brent Council’s recycling levels by 50 per cent – twice that of the London average
• Reduced waste collection vehicle movements by 90 per cent.

On the development’s completion, Envac will remove over 400 tons of carbon emissions from the local environment each year and manage approximately 160 tons of waste on a weekly basis.

In May 2010, Envac won the ‘Waste Management Initiative in the Commercial and Public Sector’ Award at the Awards for Excellence in Recycling and Waste Management for its Wembley City installation.
Envac has increased one London borough's recycling rates by 50% - twice that of the London average.

On Wembley City's completion, Envac will manage approximately 160 tons of waste every week and remove 400 tons of carbon emissions from the local environment.

When fully built out:
• 7,400 apartments
• 252 inlets
• 4 waste streams
• 2,500 metres of pipe
• 160 tons of waste each week

Area size:
• 85 acres

The UK’s first system became operational in 2008. It is a stationary system that caters for residential and commercial waste. The waste streams collected include residual waste, organic food waste and mixed recyclables with paper and cardboard.
A simplistic approach to waste

Unlike conventional waste collection methods, Envac lets the air do the heavy work.

Using airflow, waste is simply transported under the streets to a waste collection station located on the outskirts of a development. Instead of daily waste collections by multiple vehicles, one waste collection vehicle collects the container when full and takes it to a recycling centre or incinerator facility.

Advantages

- Low energy
- Improves recycling rates
- Can handle in minutes what multiple waste collection vehicles take all day to do
- Low long-term operating and maintenance costs
- Always accessible by the user – 24 hours a day, 365 days a year
- Creates cleaner and more attractive cities, residential areas and work environments
This is how it works:

1. The waste is thrown into a waste inlet.
2. The computer-controlled evacuation takes 30 seconds. One fraction is emptied at a time.
3. All waste is sucked out through a network of pipes at a speed of 70 km/h.
4. Fans create the partial vacuum that sucks the waste through to the reception facility in the terminal station.
5. The waste is directed to the correct container.
6. The air is cleaned by filters before it is released.
All environments need a waste solution – we solve them all

Envac’s flexibility makes it suitable for every waste handling challenge. The system is easily installed and can be adapted to address changes in regulation, waste volumes and waste types.

HOSPITAL WASTE
A simple waste separation and laundry handling model for hospitals and nursing homes
Efficiency, hygiene and personnel safety are the priorities within health care, which is why it is important to develop safe and reliable waste solutions that do not require physical contact with waste.

Dealing with hospital waste is heavy and demanding work. It is also governed by stringent safety regulations.

In most hospitals and nursing homes around the world, dirty laundry and disposable articles are manually transported. Waste rooms take up valuable space and as they are classed as high hygiene-risk zones, they require careful cleaning and maintenance. Envac addresses these problems as the system transports dirty laundry and waste in separate pipe systems. The risk of coming into contact with the waste is removed and a quiet, hygienic and environmentally friendly patient environment is created.

FOOD CATERING
An improved working environment is now on the menu
Waste management in commercial kitchens is underpinned by rigorous health and safety standards. Manual waste containers are not only a physical burden but they also provide an ideal breeding ground for bacteria, vermin and odours.

When incorporated into restaurants and commercial kitchens, Envac frees up more space for storage and provides additional room for staff working in often busy and congested environments. Not only are unsightly bins removed and the risks associated with bacteria minimised, but also waste collection is cheaper, cleaner and risk free.

AIRPORT WASTE
Automated vacuum waste collection takes off at airports
Airports generate significant volumes of waste. Waste is created on planes, in catering kitchens and throughout the terminals 24 hours a day, 365 days a year. A constant flow of waste needs to be managed quickly, efficiently and in accordance with safety regulations if it is to avoid placing undue pressure on transport logistics. In areas where traffic volumes are already high, manual waste collection vehicles are expected to travel backwards and forwards between the planes to collect refuse bags. Not only is this dangerous but also hugely time intensive. Envac addresses these challenges by relocating the waste management process underground. This improves safety and hygiene conditions for airports and makes waste collection cleaner and cheaper.
Litterbins that never overfill

Overfull litterbins in public places lead to excess littering, attract pests and cause bad smells. With Envac’s self-emptying litterbins these persistent problems are a thing of the past.

Overfull bins are now a thing of the past at Mariatorget in Stockholm.

Litterbins within the public realm are subject to enormous strain and when full, they look messy and often create unwanted smells – particularly in hot climates and during the summer months. At major sporting events and concerts, or where there is a regular influx of people within a short space of time, waste quickly mounts up and the more people there are, the more difficult it is to physically collect the waste. The cost of frequent manual emptying is also high.

Envac’s self-emptying litterbin system addresses these issues.

Litter is placed in bins connected to and emptied by an automated collection system. Each bin contains a level sensor and once full, a valve beneath the bin opens, the litter is sucked into an underground pipe network and transported, by air, to a central collection station.

Mariatorget, a park in the centre of Stockholm, the Nyhavn promenade in Copenhagen’s old town and Almere City Centre in the Netherlands, are some of the public areas around the world that have installed Envac’s self-emptying litterbins.
An innovative mobile waste solution

An environmentally friendly alternative to other mobile waste collection systems

Mobile vacuum waste handling systems were developed in the late 1980s, primarily for small and medium-sized areas. Our third generation of mobile vacuum waste systems – Movac – has a greater capability than its predecessors and is designed for urban and suburban environments. Movac is a cost-effective and environmentally friendly alternative to other mobile collection systems. It is also user-friendly.

Movac is the perfect waste management solution for less densely populated areas.

Faster, quieter, bigger and better

Envac mobile systems store waste in tanks, which are emptied regularly by vacuum trucks at special docking stations. Its increased capacity is due to the new generation of larger vacuum trucks and the enhanced screw tanks, which enable emptying to take place much quieter and quicker.

Key benefits

- Reduces traffic by up to 90%
- For small and medium-sized areas
- No exposed bins or waste storage units
- Valuable space is left free for more useful purposes
- Improves the immediate environment for residents
- At source separation improves recycling levels

Optical sorting for source separated waste

The coloured waste bags correspond to each different waste stream

The Envac Optibag system is a fully automated optical sorting process for source separated municipal solid waste. It has been developed to handle household and commercial waste.

The technology is based on a video system that recognises the colours of waste bags when passing a sensor.

Users are provided with different coloured waste bags, which correspond to each different waste stream. For example, green could be used for food, red for paper and yellow for cardboard packaging.

The waste bags are placed in the designated chute, bin or container and then collected with a conventional waste truck or through an Envac system. Upon arrival, the waste bags are dumped into a receiving pit and transferred to a conveyor belt.

Once on the conveyor belt, the bags are sorted automatically using camera technology that recognises the colour of the bag.

When a food waste bag is recognised, a signal is sent and the bag is automatically pushed off the main conveyor belt and onto a secondary belt. It is then directed to the appropriate container. Depending on the waste stream this could be a bale press or a compost plant.

Envac Optibag AB is a fully-owned subsidiary within the Envac Group.

The Envac Optibag system in operation at Linköping, Sweden.

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The Envac Optibag system in operation at Linköping, Sweden.
Our entire product line has been installed throughout Stockholm and applied to a number of environments including:

Hospital and nursing homes • public parks and spaces •
Above installations are only a small part of all Envac systems running in Stockholm.
Our expertise will pioneer new developments

For more than 50 years we have built up an unparalleled level of expertise by solving new problems and meeting new challenges. It is this and a commitment to our people that has made Envac the market leader.

**Solutions for the future**

Waste management is one of the fundamental pillars of society. Without successful waste management, society would not function. Large problems quickly arise in the absence of waste collection as we have experienced during strikes and natural disasters. The requirements and regulations governing waste collection are changing, waste volumes are increasing and the demands for a cleaner environment are growing. Therefore it is essential that we deliver solutions that will continue to meet the needs of the future.

**Experts in project management**

When the decision has been taken to invest in an Envac system, we put together an expert project management team with responsibility for the entire installation.

This provides a level of security that we call the Envac Turnkey Installation.

**Service over time**

To maintain high performance in your Envac waste management system, Envac Services offers regular operations and maintenance programs. Well-planned tailor made packages make our customers’ automated waste service packages system run...
without interruption, year in and year out.

Our service packages cover everything from managing to upgrading and extending the system.

**Envac Services**
- **Managed operations**
  We ensure daily operation of your installation – year in, year out.
- **Survey and maintenance**
  We make sure that general wear and tear doesn’t turn into a major problem.
- **Tuning and control**
  We continually adapt your installation so that as your requirements change, so does your system.
- **Performance assessment**
  We will guide and advise you on how to futureproof and get the best performance from your system.

**Envac Quality**
The Envac Quality Assurance system, which is ISO certified, has been in place since 1998. The current certificate is based on ISO 9001:2008, which focuses on:
- **Management responsibility**
- **Handling of resources**
- **Measurement, analysis and improvement**
- **Customer satisfaction**
The system performance is checked periodically using both internal audits and external audits (Lloyd’s Register Quality Assurance).

**The Envac sustainability philosophy**
We set environmental requirements for our products and our suppliers.

We take the end-user into consideration at every stage of our processes, from product development and planning through to installation and operation.

We work proactively to minimise the installation, operation and component costs associated with our systems.

Progress in these areas is reviewed annually.
We work closely with our customers to ensure that we deliver a system that meets their requirements. Regular meetings and ongoing dialogue are essential in order to ensure the success of a project.

Our customers’ goals drives our own development
Together we are developing a world-class environmental standard

In partnership with all of Envac’s stakeholders, from the architects and developers through to the local authorities and end-users, we constantly strive to improve our products in order to simplify the waste handling process and enhance the urban environment.

We examine the users’ needs down to the finest detail
In order to deliver the most effective solution that meets the needs of each individual, we focus on customer-oriented research and development. In collaboration with city planners, architects and waste experts, we have developed our systems to achieve optimal performance, attain the best in environmental standards and meet the increasing demands of modern day developments.

High expectations
In collaboration with our customers we aim to:
• Increase recycling rates by making source separation as simple as possible for the user
• Create attractive financing models
• Increase the level of automation and decrease the day-to-day operating costs
• Reduce energy consumption and any negative environmental impact.

Our priorities include:
• Adapting the technology to meet the needs of other services and infrastructure-led developments
• Developing the technology to manage new types of waste
• Minimising the system’s operational energy requirements
Over 700 completed installations across Europe, Asia, the Middle East and North and South America showcase our expertise and our ability to deliver complex, large-scale developments.

Here are some of our flagship installations that have been developed with our partners.

**USA, DISNEY WORLD, FLORIDA**
This world famous theme park was the site of the first American Envac installation. The underground system that manages waste in the amusement park has been in operation for over 30 years.

**FRANCE, PARIS**
In 2011, Envac was installed in Romainville, Paris. The system will handle residual waste and mixed recyclables with paper, and has been designed to manage 12 tons each day.

**UK, LONDON**
Wembley City is a development of 85 acres of land surrounding the new national stadium. On completion, the site will comprise of 7,400 apartments, a designer outlet, a new Hilton Hotel plus retail, leisure and entertainment venues. Envac is an important part of the development’s infrastructure.

**NORWAY, BERGEN**
Bergen is located on the coast between the Atlantic and high mountains. The Envac disposal system handles three separate waste fractions in two inlets: paper and plastic in the one inlet and residuals in the other. Paper and plastic are separated at a later stage. Both households and businesses are connected.

**SWEDEN, GOTHENBURG**
Eriksberg is a model of modern housing and shops with a clear environmental profile. Here, the Envac underground waste collection system was an obvious choice for housing, hotels, restaurants, shops and offices in the area.

**QATAR, MSHEIREB DOWNTOWN, DOHA**
The whole area that will be built encompasses approximately 760,000 m². Envac waste collection systems will handle three fractions, dry mixed recyclable, organic and residual waste.

**PORTUGAL, LISBON**
In connection with the World Exhibition, Expo ‘98, Lisbon inaugurated what is now one of the world’s largest underground transport systems for waste. Here, more than 80 tons of waste is transported every day across three Envac systems.

**USA, ROOSEVELT ISLAND, NEW YORK**
The automated waste collection system that was delivered by Envac at the beginning of the 1970s.

**SPAIN, VITORIA**
The lovely town Vitoria was founded in 1181 and is today the capital of the Basque region. The old infrastructure with its narrow and crooked streets made it hard for large waste collection vehicles to collect waste. In 2003 the town decided to install an underground waste collection system from Envac. Today the town’s 35,000 residences uses the system.

**SPAIN, BARCELONA**
The installation of an Envac system in Vila Olimpica proved to be not only a starting gun for the development of speedy waste technology in Barcelona, but in other areas of Spain, too.

**SPAIN, MAJADAHONDA**
A suburb of Madrid with a population of 50,000 and four automated waste collection systems that each manage two separate waste fractions. Today, close to 60% of the city’s population has access to an Envac system.

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**PUTTING Envac on the map**
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Here are some of our flagship installations that have been developed with our partners.
The Suurpetlo project, which includes plans for up to 5,000 homes and a business park with thousands of workplaces, has taken inspiration from Hammarby Sjöstad in its choice of technical solutions. The system has a design capacity to handle 9 tons per day.

The Sail@Marina Bay, Singapore
Designed to resemble a sail sculpture created by the hands of nature, the Sail® Marina Bay tower 245 metres above sea level at the highest point. It will be Singapore’s tallest residential development and a global waterfront landmark on Singapore’s skyline.

Korea, Gwangmyeong City
This high-speed train station is located in Gwangmyeong and we have two projects completed in this city: Gwangmyeong Reconstruction is one of the projects and serves 7,400 households. The collection station is located underground to minimise waste collection vehicles in the residential areas.

Korea, Yongin City
This estate has been developed by the Korea Land & Housing Corporation. Up to 30% of the area is reserved for a green zone and Awes is a part of the sustainable infrastructure of Heung-Deok Project. A new type of Envac inlet with doors that automatically open and close have been introduced on this project.

China, Tianjin Eco-City
The Sino-Singapore Tianjin Eco-City is the result of a joint venture between China and Singapore. It’s also the first city in China Mainland to separate waste at source. The construction of the eco-city displays the Chinese and Singaporean governments’ commitment to enhancing environmental protection and responding to global climate change.
We have offices in the following countries:

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