

How can Elia guarantee round-the-clock, year-round power for my business?



**WOUTER DE GEEST,
CEO BASF ANTWERPEN**

- WITH THE COMPANY SINCE 1982,
CEO SINCE 2007
- CHAIRMAN OF CHEMICAL
INDUSTRY FEDERATION
ESSENSCIA

Energy is the lifeblood of our company. We've worked very hard - and successfully - over the past few years to make our processes more energy efficient, but a 24/7 production site like ours still requires a huge amount of electricity. If we want to continue to grow as a business and keep our operations here in the long term, a secure and competitively priced power supply is essential. How can I be sure that the supply of electricity is guaranteed all year round, and at affordable prices?



**DAVID ZENNER, HEAD OF CUSTOMER
RELATIONS AT ELIA**

"The reliability of our high-voltage infrastructure and security of supply are of vital concern to Elia. Thanks to the tireless dedication of our employees, Elia has one of the top performing grids in Europe. To ensure that this remains the case in the future, we are building tomorrow's grid today. Our investment projects anticipate future developments such as the integration of renewable energy, increasing internationalisation and the emergence of new players and technologies. At the same time, we offer state-of-the-art products that meet the increasing demand for flexibility. We also participate actively in the energy debate and use our expertise to support policymaking. We are not just committed to the security of supply but also to a reliable, sustainable and affordable electricity system for all market players and in particular our industrial consumers. We believe that the grid is crucial to the further economic development of our industry, of Belgium and of our prosperity in general."

99.999%

RELIABILITY GRADE OF THE ELIA GRID



We ensure a secure, reliable and efficient grid

Elia has years of experience in managing its transmission grid and has built up indisputable technical expertise. As the energy transition progresses, the grid is having to accommodate increasing amounts of renewable energy. Such energy is more volatile, making the system operation more complex. In addition to the increased need for new flexible balancing products, Elia, like most infrastructure managers in Western Europe, is faced with ageing facilities.



**FRÉDÉRIC DUNON,
CHIEF ASSET OFFICER
AT ELIA**

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“OUR PRIMARY OBJECTIVE IS FOR ANYONE WHO WORKS ON OR NEAR OUR FACILITIES - BOTH ELIA EMPLOYEES AND EXTERNAL STAFF - TO RETURN HOME SAFE AND SOUND EVERY DAY. WE FIRMLY BELIEVE THAT EXCELLING IN THIS AREA IS A PREREQUISITE FOR OPERATIONAL EXCELLENCE.”

To cope with these changes, Elia is developing new maintenance policies aimed at maximising network availability, smoothing out peaks in equipment replacement and minimising costs. Elia is drawing on new technologies and methods to move to a system of decision-making based on the condition of equipment rather than just a predetermined maintenance or replacement frequency.

Electrical infrastructure is and always will be dangerous. Operational excellence is key to safety, which is an absolute priority. As part of its commitment to safety, Elia is working towards a zero accident rate.

It relies on its staff to meet these objectives. Continuous development of technical, managerial and behavioural competencies is central to the remit of our Competence Centre.

Our ambitions

Safety at work

Safety is a top priority for Elia, which is why it applies the highest standards of safety to its employees, contractors and anyone exposed to its activities. Elia wants everyone to return home safely every day.

At Elia we insist that Health and Safety is at the very heart of the company. Our priorities are the Go for Zero safety behaviour programme and the burnout and stress prevention initiatives. We facilitate change and help our employees to be better prepared for the future transitions. We also strive to create more local empowerment and ownership versus central control.

Operational excellence

As a grid operator, we aim to maximise the availability of our electricity system and keep the lights on at all times. To this end, we constantly optimise our critical and strategic processes in order to minimise operational risks. At the same time, we strive for efficiency and cost savings.



Asset management

A sophisticated asset management strategy has been put in place to closely monitor the functioning of critical infrastructure components. Investment peaks are flattened thanks to a balanced replacement policy. As working methods evolve, staff need training to help them develop the requisite skills and techniques. We provide professional training courses for both our own staff and our contractors.

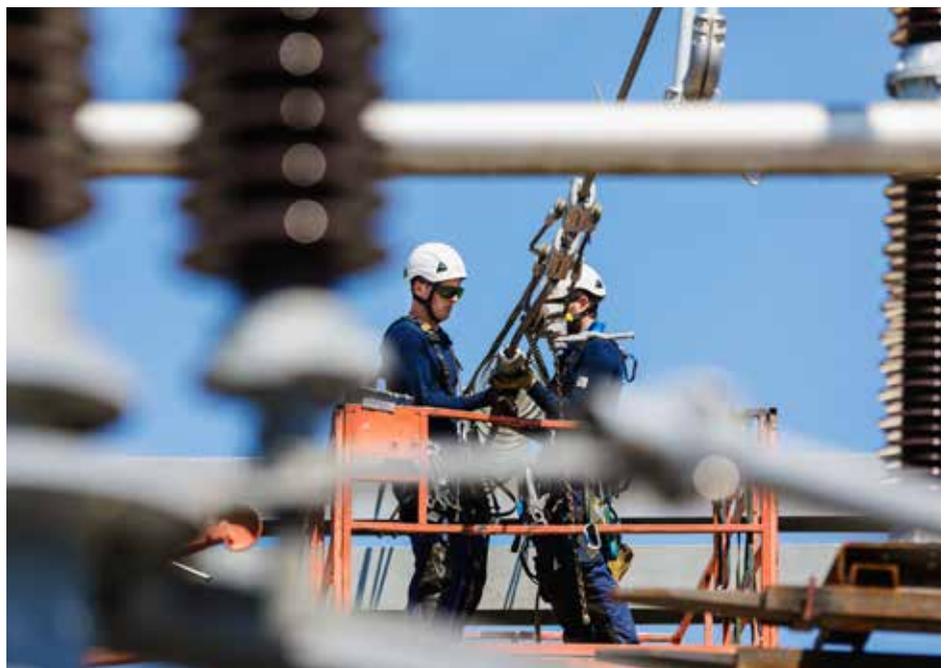
A reliable grid 24/7

Elia strives to ensure a highly reliable power grid to support economic activity and the well-being of the population. To this end, optimal planning of its network and outages (scheduled outages for maintenance and projects) are vital, as well as efficient and safe, real-time operation of the electricity system.



OBJECTIVES

We are preparing the system of the future, integrating high levels of renewable energy and new types of consumption in a secure way, while giving the market maximum use of our infrastructure.



What we achieved in 2017

Safety always comes first GLOBAL PREVENTION PLAN TO ENHANCE SAFETY

Elia has developed a five-year Global Prevention Plan for 2016 to 2020. The plan outlines planned prevention activities for the five-year period, including risk analysis, measures, objectives and required instruments. The comprehensive plan was put in place in close cooperation with stakeholders and was approved by Elia's management.

THE GO FOR ZERO SAFETY PROGRAMME

Safety is our top priority. In 2017 Elia worked intensively in order to achieve its ongoing objective: zero accidents, for its employees but also for its contractors, colleagues from the distribution system operators and third parties in the vicinity of its installations. Efforts are coordinated via the Go for Zero programme, which is an Elia-wide initiative and includes all the projects that aim to optimise safety and its culture within Elia.



MAARTEN KONINGS, QUALITY, COMPETENCE & METHODS MANAGER AT ELIA

"IN OUR LINE OF WORK, SAFETY REQUIRES GOOD OPERATIONAL DIALOGUE BETWEEN ALL PARTIES OPERATING ON A WORKSITE. WE ARE STRENGTHENING OUR CAPABILITIES IN ORDER TO EXCEL IN THIS AREA, AS WELL AS IMPROVING OPERATIONAL DIALOGUE WITH OUR TECHNICIANS, WE WANTED TO ENHANCE THE SAFETY OF OUR CONTRACTORS AND THE DISTRIBUTION SYSTEM OPERATORS WE WORK WITH."



01 People & technical skills

In an ever-changing world, everyone needs to hone their skills constantly and learn continuously. With that in mind, the People & Technical Skills project aims to catalogue the technical and behavioural skills within Elia, then develop training paths to enhance the skills of Elia staff.

With this project, Elia wants to reinforce the safety culture. By teaching its employees the right methods and habits, Elia makes sure everyone works safely.

02 Operational & safety excellence

Feedback, open dialogue and regular communication within and between teams are all absolutely vital if Elia's ambitious targets on safety, efficiency and operational quality are to be met. As such, this project has two pillars: operational dialogue and continuous improvement.

Operational dialogue

entails implementing appropriate communication systems for ensuring that planned activities can be carried out safely, efficiently, punctually, and with the highest possible level of quality.

Continuous improvement,

on the other hand, entails researching and developing solutions to operational problems.



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**STÉPHANE OTTO,
SAFETY MANAGER AT ELIA**

“WE CANNOT AND MUST NOT COMPROMISE ON SAFETY. INVESTING IN SAFETY IS NOT A COST BUT A MARK OF RESPECT FOR THE PEOPLE YOU WORK WITH.”

03 Operational & Safety Excellence with DSO

Elia shares a great many high-voltage substations with distribution system operators. In view of this fact, Elia and its colleagues in the distribution sector decided to launch a project to enhance safety. The project is based on an action plan split into four priorities: knowledge of each other's organisations, stronger cooperation through operational dialogue, clear definition of roles, responsibilities and operating limits, and improved collaborative procedures, particularly as regards earthing coordination.

04 Safety For Contractors

In response to the energy transition, Elia is undertaking the most ambitious investment programme in its history. Between 500 and 800 subcontractor technicians are currently working on Elia projects to that end. Elia, in cooperation with its contractors, is striving to ensure that they, too, have optimal safety and zero accidents.

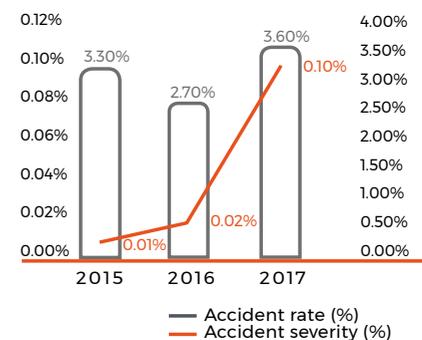
The Safety for Contractors programme was launched on 30 March 2017, at the second Elia Contractors' Day. The event was attended by over 120 participants, who took a keen interest in the new safety project.

The Safety for Contractors project focuses on three main areas:
 – introducing new collaborative approaches,
 – establishing new training for contractors' work supervisors,
 – developing a new qualification and evaluation process for selecting our contractors.

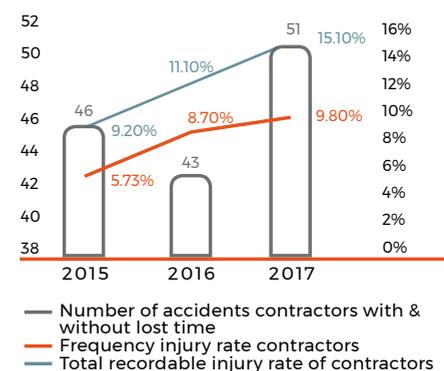
05 Safety Leadership

In 2017, Elia wanted to strengthen its corporate culture so that it would become second nature to all staff. With this in mind, it launched a programme aimed at structurally implementing a management style that encourages employees to report risky behaviour and to work safely. Every manager must inspire and set an example, while also creating a climate of trust in which all employees adopt safety-oriented attitudes and behaviour and never compromise on safety.

ACCIDENT RATES (BELGIUM)



CONTRACTOR ACCIDENTS (BELGIUM)





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WALTER GEELEN,
MAINTENANCE & COMMISSIONING
SOUTH AT ELIA

“SAFETY REMAINS OUR TOP PRIORITY. OUR GOAL IS ZERO ACCIDENTS. WE AIM TO ACHIEVE THIS BY PUTTING THE RIGHT SKILLS IN THE RIGHT PLACES AND FOCUSING ON GOOD OPERATIONAL DIALOGUE BETWEEN TEAMS AND ON CONTINUOUS IMPROVEMENT. IN 2017, A NUMBER OF TEAMS NOTCHED UP 300 DAYS OF WORK WITHOUT AN ACCIDENT (WITHOUT INCAPACITY FOR WORK). SOME TEAMS HAVE EVEN REACHED 1,000 DAYS OF WORK WITHOUT AN ACCIDENT!”



SAFETY WEEKS

Each year, Elia organises Safety Weeks for its staff in May and September in an effort to raise their awareness about the importance of safety. The programme included various communications, training sessions and team exercises, designed to ensure that everyone got involved and took the messages on board.

In May 2017, we discussed psychosocial risks and explained our comprehensive prevention plan for 2016-2020, as well as the importance of the safety culture within Elia. In September, the spotlight was on non-negotiables, i.e. behaviours that we no longer wish to see in the company. First aid training was also offered to our staff.

NUMBER OF STAFF INJURED WITH AT LEAST ONE DAY OF LOST TIME (BELGIUM)



NUMBER OF FATAL OCCUPATIONAL ACCIDENTS BY GENDER (BELGIUM)



AWARENESS CAMPAIGN HIGHLIGHTING THE DANGERS OF ELIA FACILITIES

Safety is always Elia’s top priority, both for our own staff and for outside parties who work on or near our facilities. In 2017, the company continued its awareness campaign highlighting the risks for those working near its electrical infrastructure.

“As a result of this campaign, there was a sharp drop in the number of incidents during work near high-voltage lines in 2017. However, there are still instances of work being carried out without notifying Elia. As this is not only a safety issue but also a legal obligation, we urge anyone who is planning work to contact Elia beforehand so that safety measures can be communicated. More information is available on the website or from Elia’s Contact Centre.”

Céline Ghyselen, Contact Centre Manager at Elia



306

NEW INSTALLATIONS PUT
INTO SERVICE IN 2017

Managing our assets

ASSET MANAGEMENT EXCELLENCE

The Asset Management Excellence (AMEX) programme aims to ensure that every piece of equipment is worked on at the most appropriate time. To this end, Elia devises appropriate strategies for each category of assets depending on their age, condition and importance for the grid. These customised strategies help Elia to improve efficiency, boost asset reliability and optimise the need for outages, whilst continuing to prioritise safety.

The aim of the AMEX programme is to help us better understand our assets so that we can take the right decisions in terms of managing equipment life cycles (design, maintenance, decommissioning, etc.) whilst optimising risks and costs. AMEX launched in early 2016 and will run for several years.

In 2017, the first round of work (wave 1) led to significant cost reductions (e.g. retrofitting transformers). Tailored maintenance policies are also easing the workload and allowing new activities to be developed.

The study phase for cables, batteries and diesel generators (wave 2) was completed in 2017, and that for digital protection devices and gas-insulated systems (wave 3) is being finalised. Wave 4 (overhead lines and older-generation protection devices) started in October 2017 and will conclude in the first half of 2018. The fifth and final wave will take place in the second half of 2018 and 2019 and will cover telecoms, metering, medium-voltage substations and buildings.

ASSET CONTROL COMMAND (ACC)

Elia is one of the first system operators in Europe to have a control centre for its assets. All dynamic data (i.e. data that changes over time) relating to our assets is sent there. This allows informed asset management decisions to be taken. For example, each asset is given a 'Health Index' indicator which has a bearing on the scheduled maintenance activities.

MAINTENANCE & COMMISSIONING

The maintenance activities of Elia contribute significantly to our common goal of continuously delivering an outstanding service to all our customers. Additionally, in the current tariff period, Elia has the ambition to achieve an unprecedented level of investments in the high voltage grid compared to previous years.

In 2017, 306 new installations have been put into service, which is an increase of 10% on 2016 levels.



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STÉPHANIE HAMMER,
AMEX MANAGER
AT ELIA

“OVERALL, THE AMEX PROGRAMME WILL REDUCE MAINTENANCE COSTS BY SEVERAL MILLION EUROS A YEAR ON A LIKE-FOR-LIKE BASIS. AS WELL AS CUTTING COSTS, THE FIRST WAVE OF THE AMEX PROJECT HAS EASED THE WORKLOAD IN THE FIELD AND FREED UP STAFF TO FOCUS ON NEW ACTIVITIES.”



NICK DE DECKER,
PROGRAM MANAGER AT ELIA

“USING CONNECTED CHECK-LISTS, OUR TECHNICIANS CAN LOG THE CONDITION OF EQUIPMENT IN RECORD TIME. THIS INFORMATION IS SENT DIRECTLY TO THE ASSET MANAGER, WHICH KNOWS IMMEDIATELY WHICH TOOLS NEED TO BE REPAIRED OR REPLACED. IN ADDITION, THE NEW AUTOMATIC SYSTEM FOR DETECTING VISITORS ENTERING AND LEAVING OUR SUBSTATIONS ENHANCES SECURITY AND EFFICIENCY.”



7 lines

ELIA FITTED DYNAMIC LINE RATING EQUIPMENT ON SEVEN NEW 380 KV LINES IN 2017.



OPTIMISING TRANSMISSION CAPACITY

Elia is continuing to invest in the development and use of Dynamic Line Rating in partnership with Ampacimon. This technology enables more accurate assessment of the actual transmission capacity on lines on which it is fitted. This capacity can then be optimised independently of the weather conditions. Elia fitted Dynamic Line Rating equipment on seven new 380 kV lines in 2017.

In addition, Real Time Thermal Rating (RTTR) equipment was installed on the Koksijde-Slijkens line. This technology calculates the line’s maximum transmission capacity in real time and is due to be rolled out in 2018.

Modern Way Of Working

Launched in 2016, the Modern Way of Working (MWOW) programme aims to digitalise, automate and improve the tasks performed by technicians using new technologies. These technologies allow field work to be done faster and more efficiently while also enhancing safety and quality.

Elia uses a range of methods to digitalise work in the field, including connected equipment (PCs, smartphones and smart devices), new mobile applications and the overhaul of current processes.



A reliable grid 24/7

CRISIS MANAGEMENT

Elia regularly holds crisis drills simulating risk situations with the various stakeholders as preparation for managing real problems on the grid. These drills serve to test and improve the tools and processes in place and to ensure optimal communication between the various internal departments and the external units involved in the crises. Both Elia employees and external partners (ARPs, distribution system operators, transmission system operators, etc.) take part in the exercises.

STEPS TO AVOID POWER SHORTAGES

Elia can detect a risk of power shortage up to seven days in advance (D-7). When Elia notifies the government of this risk, a technical briefing is organised on the same day. A consultation meeting is then held the next day to decide on the measures to be taken to reduce demand. One day before the risk is due to materialise (D-1), Elia must confirm to the government that the shortage is actually imminent. If all the measures taken are not sufficient to prevent the shortage, Elia is mandated to activate one or more tranches of the load-shedding plan (depending on the deficit). This measure is a last resort.

So far, Elia has not had to deal with a shortage, thanks to effective preparation and close cooperation with other system operators and partners. However, the procedure is designed to enable the problem to be dealt with as efficiently as possible.

BLACK START SERVICE FOR COPING WITH BLACKOUTS

In the event of a total blackout on the grid, Elia needs to gradually restore the power supply in predefined stages. If neighbouring electricity transmission grids are not available, Elia can rely on various generating units that are capable of performing a black start. These units can start without an external electricity supply, allowing the gradual restoration of power to the grid. This service is covered by a black start contract (black start being an ancillary service) between Elia and the power generators. In 2017, Elia conducted two tests to ensure that this service was operating correctly. The first took place at Ham on 7 July and the second at Herdersbrug on 30 September, and both were successful.

REFURBISHMENT OF ELIA'S NATIONAL CONTROL CENTRE

On Thursday 19 October 2017, the Federal Energy Minister Marie Christine Marghem opened Elia's newly modernised National Control Centre (NCC). The upgrade was needed to cope with the growing integration of renewable energy, which is making system operation parameters (international flows, generation and consumption) less predictable and more volatile. The NCC therefore required better facilities for viewing the increasingly complex and large volumes of data. Among other improvements, operators now have a more ergonomic view thanks to a large wall of screens combining a view of the normal operating grid with an overview of renewable energies. Security and access controls have also been strengthened with the introduction of new technologies and additional protections.

"With the challenges of the energy transition and the growing integration of renewable energy, our operators have an increasingly complex job. The refurbished NCC provides them with the best conditions and tools to accomplish their core task of managing the security and balance of the electricity network."
Filip Carton, Head of the National Control Centre



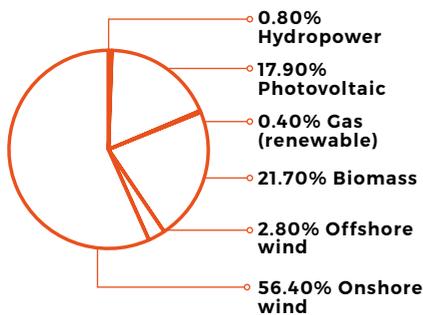
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WHAT HAPPENED AT 50HERTZ?

53.4%

FEED-IN OF RENEWABLE ENERGY IN 50HERTZ'S CONTROL AREA IN 2017



53.4% renewable energy

50Hertz is one of the global leaders in integrating renewable energy. On average in 2017, 53.4% of power in 50Hertz's control area was generated from renewable energy sources (RES), and this was primarily from onshore wind.

Wind record on 28 October 2017

On 28 October 2017, autumn storm Herwart achieved a new wind feed-in record. Around 1pm on that day, 50Hertz integrated no less than 14,266 MW of wind energy: 13,934 MW from onshore wind and 332 MW generated offshore.

10th System Security Conference

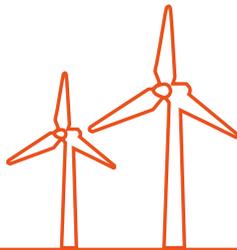
50Hertz held its 10th System Security Conference in November 2017. The most prominent agenda items at the conference were the EU's Clean Energy Package, exchanges of electricity at European level, critical grid situations and data exchange.

An optimised redispatching platform

The redispatching processes at 50Hertz were optimised to better deal with grid congestion problems. Combined with additional investments in grid infrastructure, such as the 380 kV South West Interconnector completed in September 2017, savings of no less than €181 million in redispatching costs were achieved between start of operations of the first system in 2015 and 31st December 2017.

Grid losses

In 2017, the grid losses of 50Hertz amounted to 2.4 TWh. The average grid losses of the extra-high voltage level were 231.7 MW and the substation accounted for 43.5 MW. 50Hertz has planned the first 400 kV, ultra-high voltage DC transmission line (HVDC) in its grid area, the 'SüdOstLink' between Saxony-Anhalt and Bavaria. This technique is better suited than conventional three-phase technology to transfer large quantities of electricity as it facilitates optimum control targeted over long distances, which results in low network losses.



Promoting the right safety behaviours

Six reportable occupational accidents occurred at 50Hertz. The targets set for accident frequency and severity rates were not yet achieved in 2017. Every accident was assessed in detail, and work safety measures were adopted and put in place to prevent future occupational accidents.

A full set of measures will be implemented in 2018, and workplace safety will once again be prioritised to increase employees' awareness of safe behaviour.

...not forgetting contractors

Our occupational health and safety standards also apply to contracted companies working on 50Hertz construction sites. Our partners must therefore sign up to instructions on guaranteeing occupational safety and environmental protection, which are a mandatory part of our tenders and contract awards. In 2017, we made these instructions more

specific and transparent. During the contracting process and later via IT-supported construction monitoring by specially trained 50Hertz employees, we ensure that our suppliers comply with 50Hertz's strict safety requirements.

The number of work-related accidents in contracted companies declined in 2017. However, the 16 recorded accidents involving contracted companies are still more than 50Hertz would expect. Consequently, an Agreement on Quality Assurance on 50Hertz Construction Sites is included as an additional part of new contracts concluded from 1 July 2017. This allows us to carry out inspections without any restrictions. In 2018, we will be launching an internal communication campaign to further raise awareness among our workforce.

The quality assurance agreement for 50Hertz worksites forms part of new contracts concluded after 1 July 2017. This includes an unlimited right for 50Hertz to perform inspections and a system for reporting deviations from required standards.



Accidents at 50Hertz	2015	2016	2017
Accident rate ¹	3.0	2.0	4.5
Accident severity rate ²	0.05	0.16	0.23



(1) Accident rate: Number of occupational accidents requiring at least 1 day off work x 1,000,000 / total number of hours worked.

(2) Accident severity rate: Number of lost-time days resulting from occupational accidents expressed in calendar days x 1,000 / total number of hours worked. Occupational accidents also include accidents that occur during travel and commuting.

No fatal accidents were recorded between 2015 and 2017.