The economic opportunity of AI in Belgium

Capturing the next wave of benefits from *generative* AI

An Implement Consulting Group study commissioned by Google

March 2024

The economic potential of AI can be boosted further by generative AI

To capture the next wave of AI benefits across society, Belgium needs to promote innovation, invest in skills and ensure clear rules.
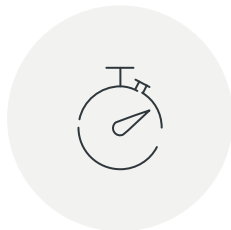
The economic opportunity

Generative AI alone could boost Belgium's GDP by

€45-50 billion

→

+9% GDP

over ten years if Belgium achieves widespread adoption.

Gains come from three sources …

Productivity boost from people working with generative AI.

Freed-up time when generative AI helps to automate our work.

Re-prioritised and re-employed time to other value-creating activities.

The job implications

64% of jobs in Belgium are estimated to work **together with** generative AI.
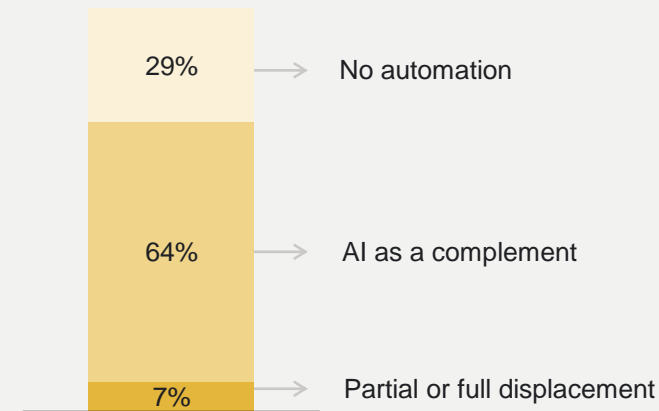
40% of Belgian workers believe that generative AI will positively impact their job.

Share of jobs exposed to automation by generative AI
% of total employment in Belgium

5 million jobs

29%	→ No automation
64%	→ AI as a complement
7%	→ Partial or full displacement

Belgium is well placed to manage the job changes from generative AI.

New jobs in the AI-powered economy are expected to replace those lost to automation, resulting in unchanged employment levels. The highly exposed jobs represent around 15% of the historical level of job changes in Belgium.

The transition is expected to be gradual, allowing workers time to adapt to new tasks and develop new skills.
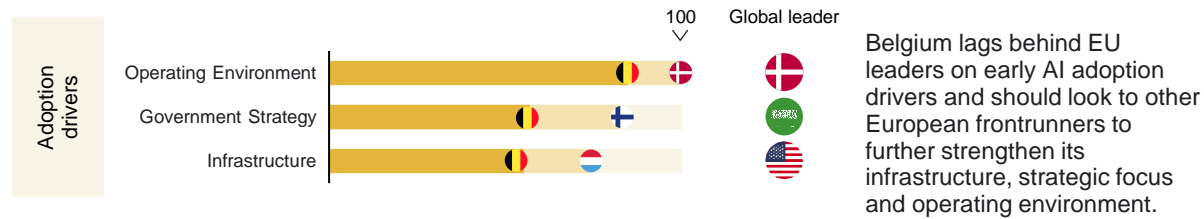
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Belgium should further leverage its strong position in research and promote upskilling and commercial uptake to maximise the benefits of AI

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AI readiness in Belgium

Belgium lags behind other small, open and digitally advanced economies when it comes to AI adoption drivers ...

Belgium's AI capacity according to the Tortoise Global AI Index
Global AI Index, score out of 100 (global leader)

Belgium lags behind EU leaders on early AI adoption drivers and should look to other European frontrunners to further strengthen its infrastructure, strategic focus and operating environment.

... and has yet to transform their research stronghold into innovation and commercialisation

Like other EU countries, Belgium lags behind globally in R&D, investment and AI-related skills, but Belgium also lags behind EU leaders on talent and innovation drivers.

Belgium   N. European frontrunners   Global maximum

Conclusions and policy implications

Belgium's future economic growth could exceed current long-term GDP forecasts. Leading banks are lifting growth forecasts from as early as 2028.

The 9% boost to GDP over ten years assumes that Belgium captures the full value of AI without delay.

Given its current gap on key drivers of AI adoption, Belgium is likely to risk a five-year delay in adopting and developing generative AI. Such a delay would reduce the potential GDP gains over ten years from 9% to 2% or from €45-50 billion to €10-12 billion.

Capturing the full economic gains requires skills, innovation and a conducive regulatory framework.
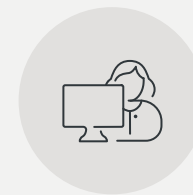
Retrain and upskill workforce

Grow R&D by local innovators

Accelerate commercial uptake

Note: The Tortoise Global AI Index is underpinned by 111 indicators collected from 28 different public and private data sources and 62 governments. Northern European frontrunners refers to nine European countries comparable to Belgium in terms of size and level of digitalisation.
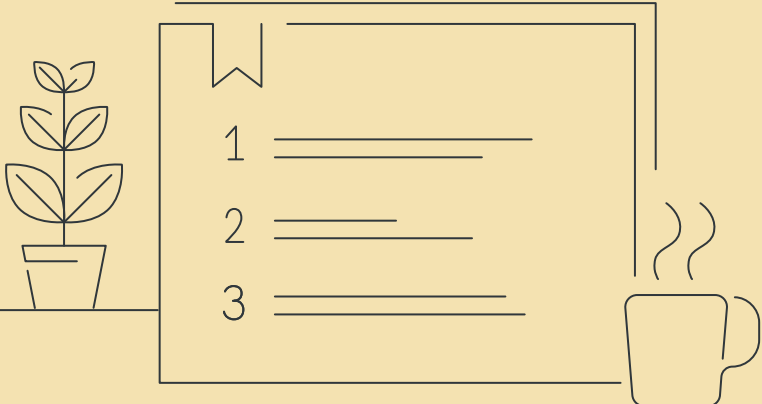
Foreword

Making AI benefit society as a whole requires an adaptive, human-centric and trustworthy approach

AI and the next wave of generative AI have the potential to be the most powerful technology in decades. Responsible AI can help solve global challenges like climate change and access to quality medical care.

AI can make countries more prosperous, productive, innovative, creative and secure. At the same time, there are plenty of pitfalls, paradoxes and tensions that decision-makers will need to navigate.

AI has evolved rapidly with the breakthrough of generative AI in 2022 and its fast adoption in 2023. This report estimates the economic potential of generative AI while recognising the significant economic potential of other types of AI.
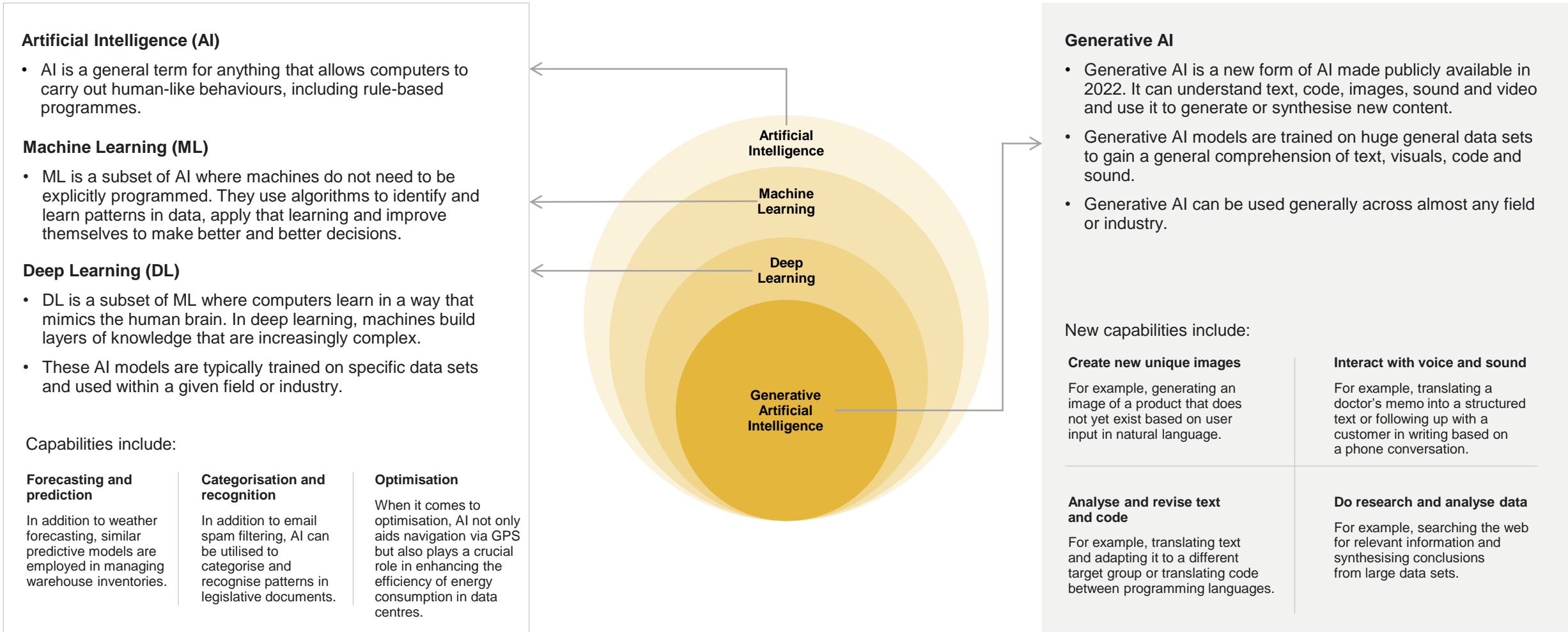
Contents

01

Introduction to AI

This report covers all types of AI with a particular focus on generative AI.

AI can help humans solve tasks faster and better – and with generative AI, machines can now understand and interact in language, sound and images

Artificial Intelligence (AI)

- AI is a general term for anything that allows computers to carry out human-like behaviours, including rule-based programmes.

Machine Learning (ML)

- ML is a subset of AI where machines do not need to be explicitly programmed. They use algorithms to identify and learn patterns in data, apply that learning and improve themselves to make better and better decisions.

Deep Learning (DL)

- DL is a subset of ML where computers learn in a way that mimics the human brain. In deep learning, machines build layers of knowledge that are increasingly complex.

- These AI models are typically trained on specific data sets and used within a given field or industry.

Capabilities include:

Forecasting and prediction

In addition to weather forecasting, similar predictive models are employed in managing warehouse inventories.

Categorisation and recognition

In addition to email spam filtering, AI can be utilised to categorise and recognise patterns in legislative documents.

Optimisation

When it comes to optimisation, AI not only aids navigation via GPS but also plays a crucial role in enhancing the efficiency of energy consumption in data centres.

Artificial Intelligence

Machine Learning

Deep Learning

Generative Artificial Intelligence

Generative AI

- Generative AI is a new form of AI made publicly available in 2022. It can understand text, code, images, sound and video and use it to generate or synthesise new content.

- Generative AI models are trained on huge general data sets to gain a general comprehension of text, visuals, code and sound.

- Generative AI can be used generally across almost any field or industry.

New capabilities include:

Create new unique images

For example, generating an image of a product that does not yet exist based on user input in natural language.

Interact with voice and sound

For example, translating a doctor's memo into a structured text or following up with a customer in writing based on a phone conversation.

Analyse and revise text and code

For example, translating text and adapting it to a different target group or translating code between programming languages.

Do research and analyse data

For example, searching the web for relevant information and synthesising conclusions from large data sets.
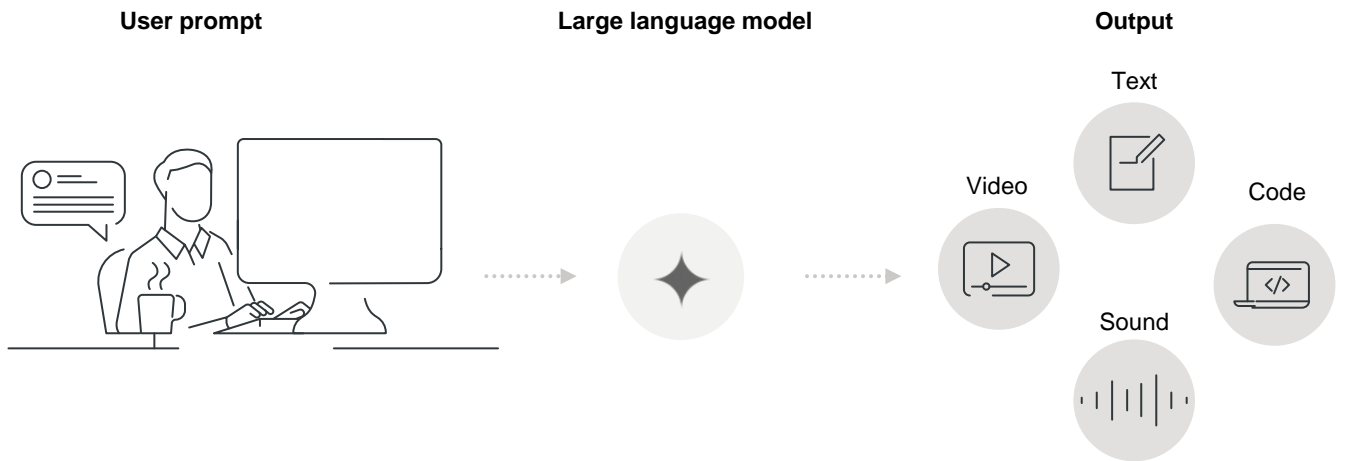
Note: An algorithm is a detailed set of instructions that a computer follows to carry out a task or solve a problem.
Source: Implement Economics based on expert interviews.

6

Recent developments have increased the capabilities and availability of AI models and have accelerated uptake

Generative AI models have strong built-in capabilities and are easy to work with …
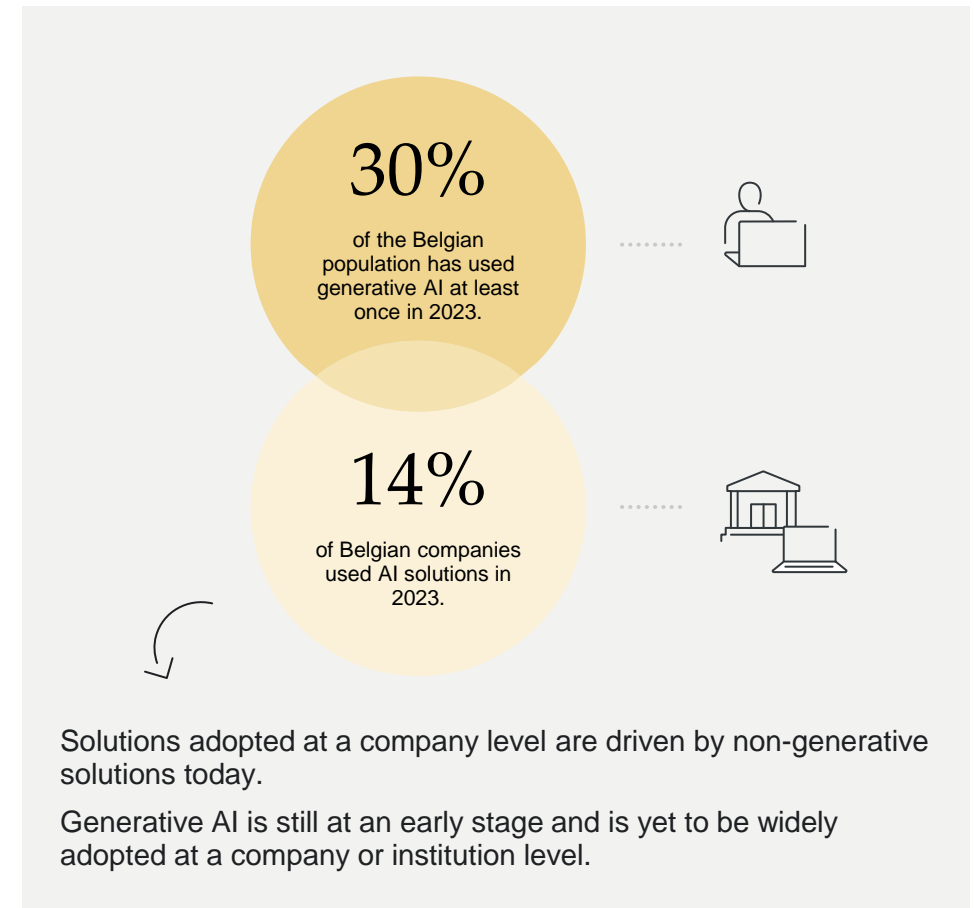
… and many users have already adopted the technology

User prompt

Large language model

Output

Text

Video

Code

Sound

30%

of the Belgian population has used generative AI at least once in 2023.

14%

of Belgian companies used AI solutions in 2023.

No or low data requirements

Generative AI models are already trained on huge data sets. This makes them readily available for many tasks without any further data needed.

Easy to use in plain language

Generative AI models can be operated using ordinary language and do not require any specific coding skills to use.

Many models are online and free of charge

Several high-performing generative AI models are available online and do not require local ML setups or infrastructure to use.

Solutions adopted at a company level are driven by non-generative solutions today.

Generative AI is still at an early stage and is yet to be widely adopted at a company or institution level.

Leveraging the full potential of AI will require further research, development and innovation

AI capabilities and requirements by level of development

	Organisational ML-based AI	Generic pre-trained models used online	Adaption of pre-trained models using APIs	Specialised fine-tuned models	Foundation models
Solvable tasks	Specific	General	General and moderately specialised	General and specialised	Most
Example	*E.g. detection of flawed products in manufacturing*	*Online chatbots, e.g. Gemini or ChatGPT*	*Organisation-level automation solution, e.g. auto-replies*	*Pre-trained model like Llama trained further on context-specific data*	*Model trained from the ground on new data, e.g. Mistral*
Requirements					
Competences for use	●	○	◔	◔	◔
Competences for integrating solution	◔	◔	◔	◔	●
Data and infrastructure	◑	○	◔	◔	●
	Pre-2022	Current fast-adopting models	Next level of adoption	Only adopted by few frontrunner organisations	New frontier of AI

- Generative AI is still in its early phase using generic pre-trained models.
- Future value creation from AI requires more advanced models than the pre-trained models that are available online today.
- Leveraging the full potential of AI technology requires more advanced and specialised models.
- This requires new organisational skills, more data, more computing power and better infrastructure.

Figure explanation

○ No requirements

● Highest requirements

Note: Training or fine-tuning generative AI models generally requires significantly more computational resources compared to classic machine learning training.
Source: Implement Economics based on OECD.

8

02

Economic opportunities from AI

The main economic opportunity in Belgium arises from humans working together with generative AI.

AI has great economic potential which can be further boosted by generative AI

How to think about generative AI:
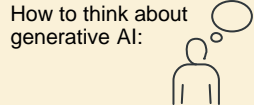
"What would you do if you had 1,000 well-trained interns ready to work for you day and night?"

AI can increase productivity

Academic studies conclude that labour productivity typically increases by 2-3 percentage points per year after firm-level AI adoption. The studies have been carried out on early adopters of AI technology and, as such, cannot be extrapolated to the general effects of AI on productivity.

Growth in labour productivity from AI adoption
Percentage points

Study	Value
Acemoglu et al. (2022)	2.0%
Zhai and Liu (2023)	2.2%
Rammer, Fernández, and Czarnitzki (2022)	2.7%
Damioli, Roy, and Vertesy (2022)	3.2%
Alderucci et al. (2022)	6.8%
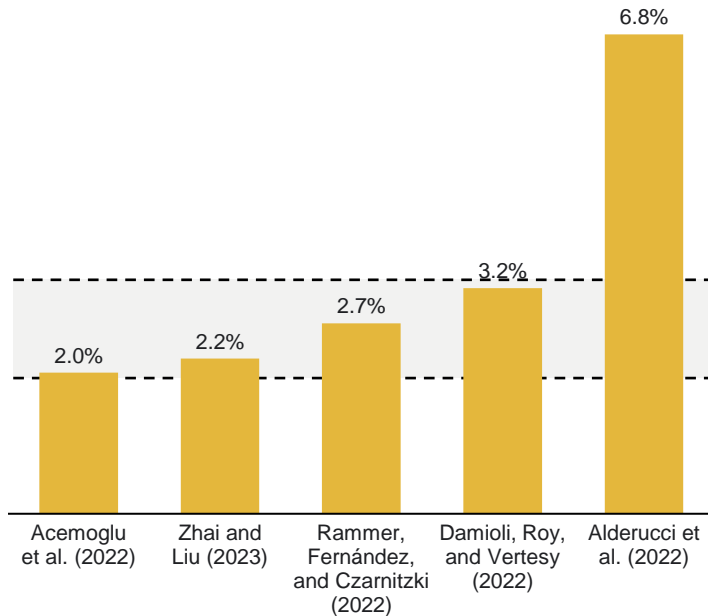
Generative AI advances automation

Generative AI can advance automation by nearly a decade because it is easier to use for individuals and organisations. However, significant uncertainty about adoption rates and speed of realisation of its benefits remain.

Automation potential
Adoption of AI technology

— With generative AI
— Without generative AI

2020 2025 2030 2035 2040 2045 2050
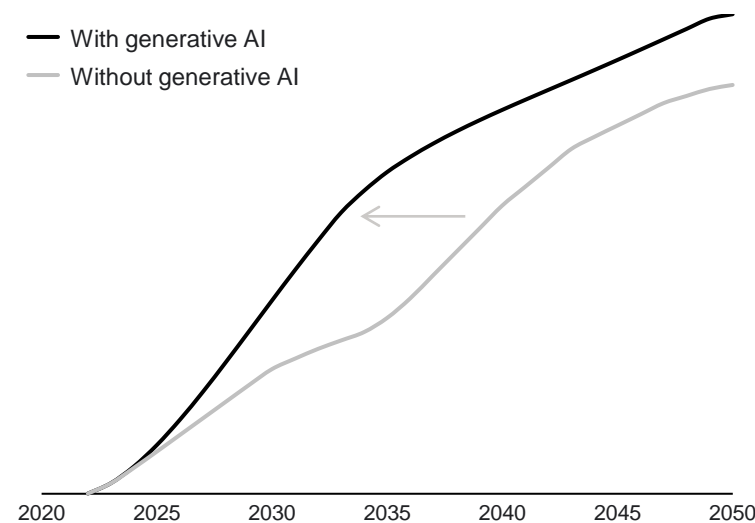
- AI has evolved rapidly with the recent break-through of generative AI. Due to its user-friendly nature, generative AI is expected to greatly accelerate the potential of AI to create economic impacts.

- Generative AI is only a part of AI's overall economic potential. Some studies estimate with some uncertainty that generative AI accounts for around one-third of the total effect of AI.

- This report estimates the macroeconomic potential of generative AI while recognising the significant economic potential of other types of AI.

Generative AI could increase Belgium's GDP by 9% in ten years

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Potential impact of generative AI on GDP in Belgium
€ billion increase from baseline GDP after a ten-year adoption period

10-12

45-50

38-40

Productivity losses from re-employment of workers are estimated to reduce the GDP boost by €2-3 billion

+9% GDP

if Belgium achieves widespread adoption within ten years.

| Productivity boost | Re-employment | Productivity loss from re-employment | GDP increase |
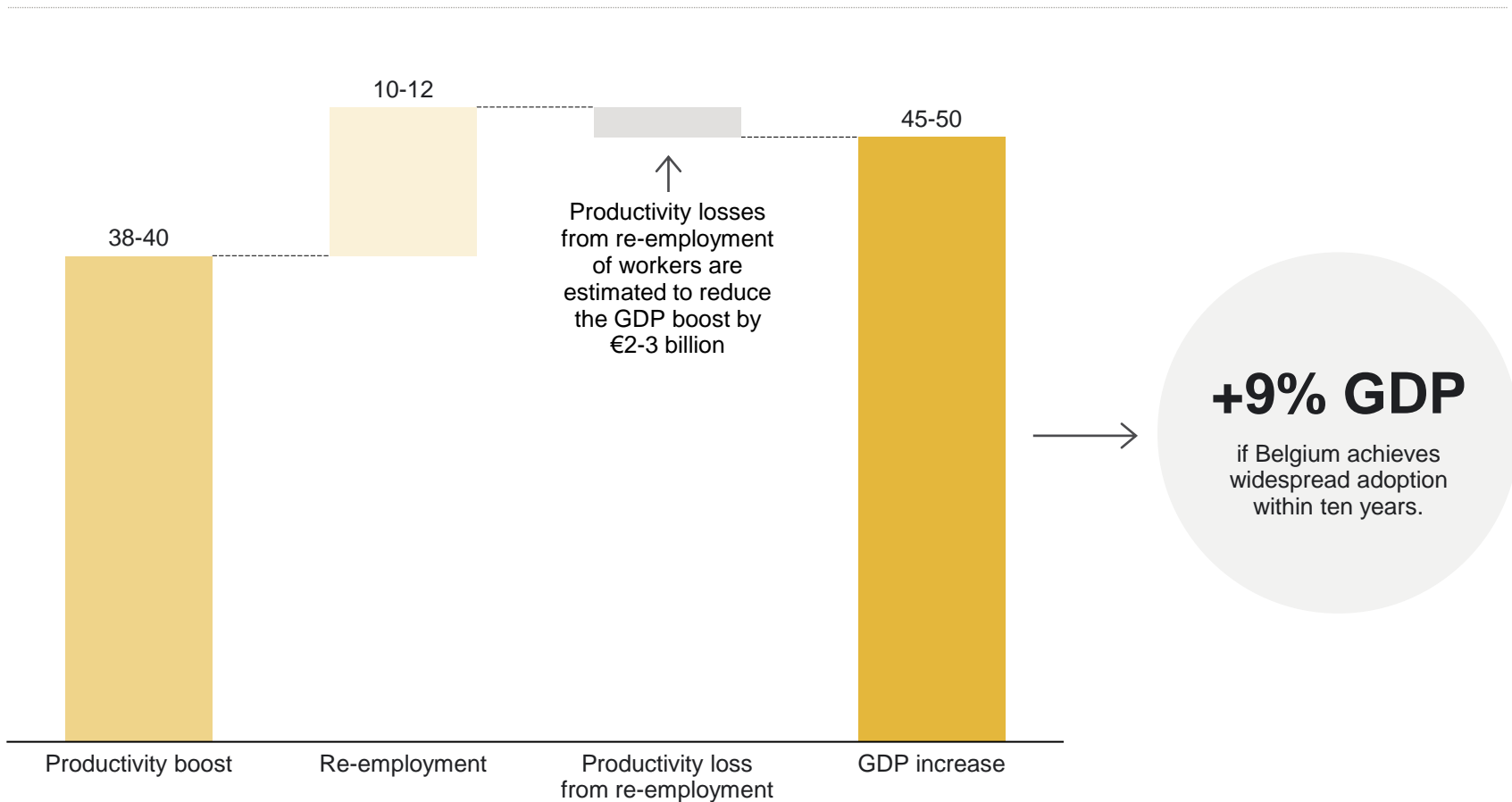
- If Belgium widely adopts generative AI, we estimate a potential increase in GDP of €45-50 billion over the next ten years.

- The dominant impact of generative AI is a productivity boost to the majority of workers (64%) by augmenting their capabilities, quality and efficiency, which is estimated at €38-40 billion for Belgium.

- The estimate includes impacts of re-employment of a small share of workers (7%), where generative AI is freeing up a significant share of work for other tasks. This is estimated at €10-12 billion in Belgium.

- The estimate accounts for the possible productivity loss associated with re-employment to other occupations. This reduces the estimate for Belgium by €2-3 billion.

- At its peak, the productivity effect of generative AI in Belgium is estimated to be equivalent to 1.6% annually.

- Generative AI is so powerful that Belgium's future economic growth could exceed current long-term GDP forecasts, and leading banks are lifting growth forecasts from as early as 2028.

Note: The estimate assumes widespread adoption of generative AI over a ten-year period. There is much uncertainty around the capability and adoption timeline of generative AI. The size of the productivity boost depends on the difficulty level of tasks that generative AI will be able to complete and the number of jobs it can automate. GDP is in 2022 levels. The average number of work activities that potentially can be performed by generative AI across all types of tasks for both complemented and highly exposed workers corresponds to 20-30%. Our estimate is the isolated potential of generative AI. The estimated boost from generative AI may not be fully additive to GDP trends, since GDP forecast already assumes a growth contribution from new technologies and generative AI may substitute some of that. Also, the boost from generative AI may be partially offset by an underlying growth slowdown.
Source: Implement Economics based on Eurostat, Bureau Fédéral du Plan, O*Net, Briggs and Kodnani (2023), BNP Paribas (2023), and Dell'Acqua et al. (2023).
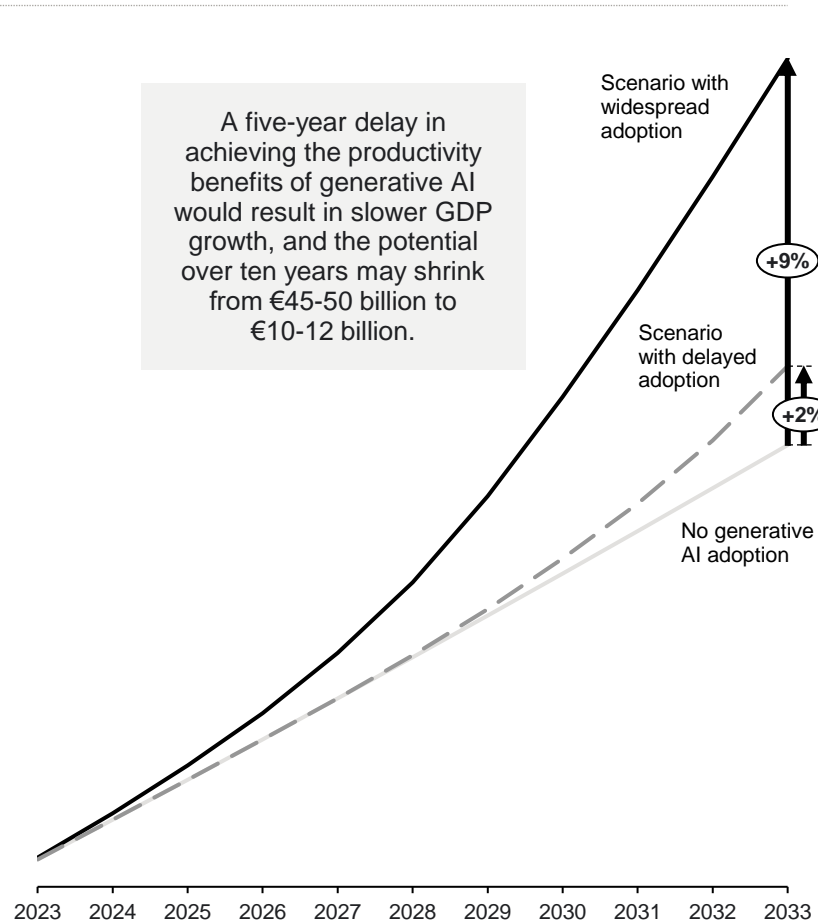
A five-year delay in the adoption of generative AI could reduce Belgium's potential GDP gains from 9% to 2%

Adoption of generative AI
%

Scenario with widespread adoption

Scenario with delayed adoption
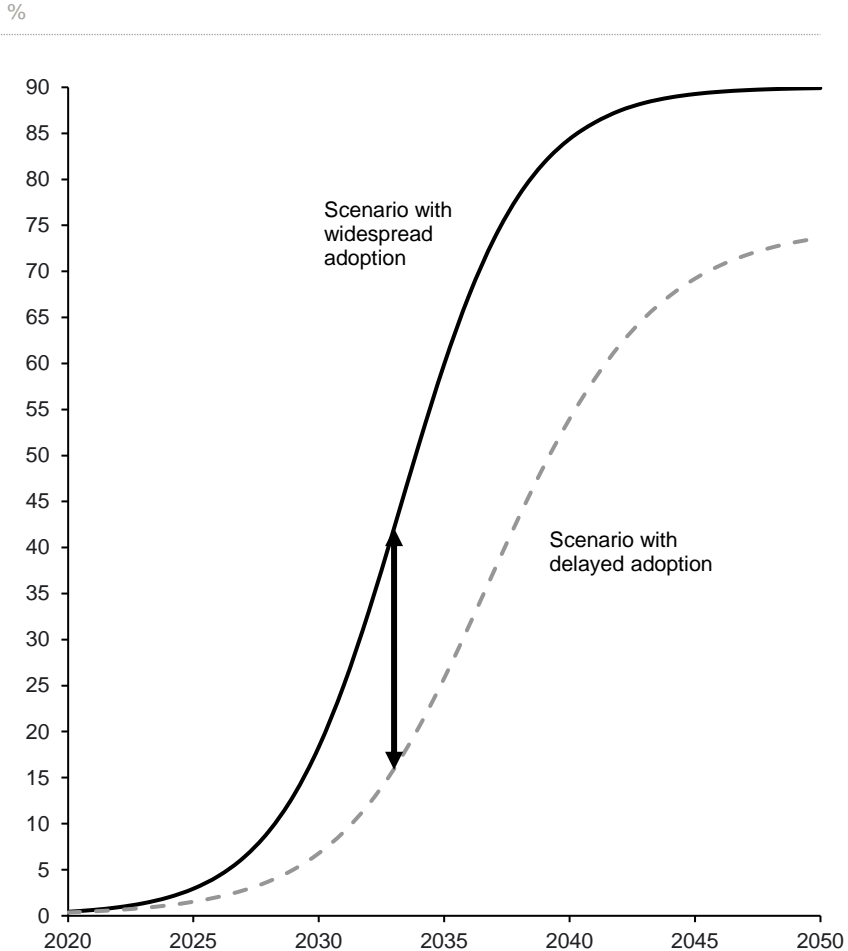
Potential impact of generative AI on GDP in Belgium
Index, 2023=100

A five-year delay in achieving the productivity benefits of generative AI would result in slower GDP growth, and the potential over ten years may shrink from €45-50 billion to €10-12 billion.

Scenario with widespread adoption

+9%

Scenario with delayed adoption

+2%

No generative AI adoption

- Generative AI is a new general-purpose technology and will take time to adopt.

- Our estimate of Belgium's GDP potential from generative AI is reliant on the widespread adoption and development of the new AI technology within the next ten years.

- A five-year delay in capturing the benefits of generative AI is estimated to reduce the GDP growth potential in ten years from 9% (€45-50 billion) to only 2% (€10-12 billion).

- Belgium can enhance the welfare and GDP contribution from generative AI by ensuring that policies are in place to capture the benefits in line with leading countries (see section 6).

Note: GDP figures are expressed in 2022 levels. The leftmost figure shows generative AI adoption expressed as a percentage of work activities exposed to automation by generative AI.
Source: Implement Economics based on Eurostat, Briggs and Kodnani (2023) and O*Net.

12

Generative AI models have the potential to boost SME AI adoption to new levels, but regulatory uncertainty and lack of skills can stand in the way

SMEs lag behind larger corporations on AI adoption

Belgian SMEs account for
~61% of total employment

Like other European countries, Belgian SMEs are slower to adopt AI compared to large enterprises.

48%

13%

of large Belgian enterprises adopted AI in 2023.

of Belgian SMEs adopted AI in 2023.

The gap in AI adoption between SMEs and large enterprises reflects a general challenge in the EU, and overall, Belgian enterprises perform well on AI adoption:

#5 Belgium ranks 5th in the EU on AI adoption by SMEs.

#4 Belgium ranks 4th in the EU on AI adoption by all enterprises.

Generative AI could boost SME AI adoption …

No or low data requirements means that SMEs can readily use generative AI for many tasks without any further work needed.

Ease of use in plain language means that SMEs can use many generative AI models without the need for coding skills.

Free online availability means that SMEs do not need to invest in new computing power or new infrastructure to use generative AI.

… but SME uptake can be slowed down because …

Lack of broader skills required to fully leverage the potential of new generative AI technologies can hamper uptake.

Regulatory uncertainty around generative AI can increase implementation risks and compliance costs, notably for SMEs lacking in-house legal capabilities.

Note: According to the classification by the European Commission, SMEs are defined as enterprises with 1-249 employees, and large enterprises are defined as enterprises with 250+ employees. The percentage of total employment accounted for by SMEs is based on 2022 data.
Source: Implement Economics based on the European Commission and OECD (2024).

03

Key sectors benefitting from AI

Some sectors are expected to gain more from generative AI, mostly owing to the types of tasks performed.

AI can boost productivity across all sectors – exceeding historic levels

Productivity boost from generative AI
% productivity growth p.a. at peak

Average productivity growth per worker in Belgium over the last ten years.
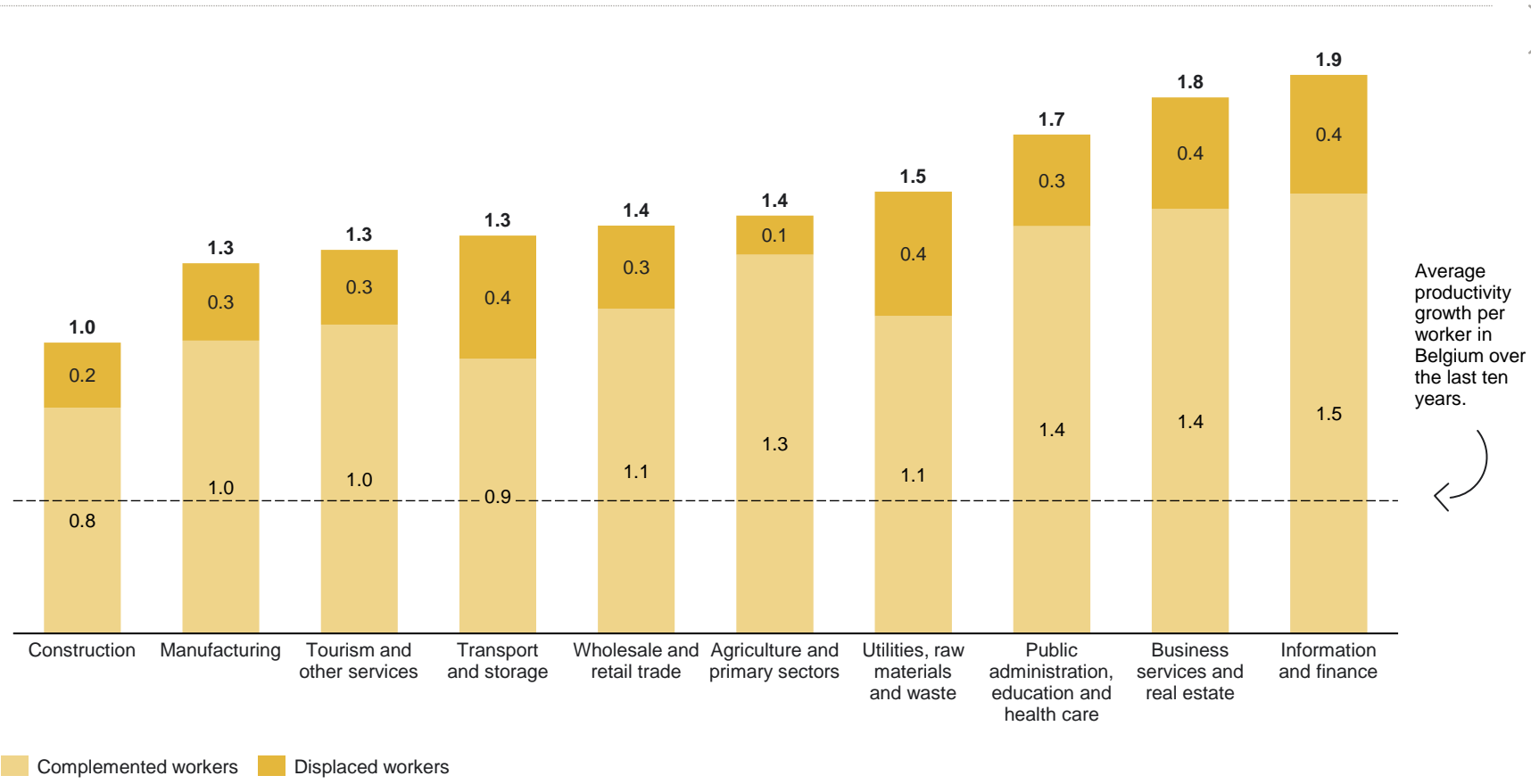
- The complementary role of generative AI prevails in most industries, meaning that most occupations are estimated to use AI to augment and improve human capabilities.

- In contrast to past automation, such as robots, generative AI has the ability to boost productivity in the service sector.

- This is estimated to provide a much-needed boost to service sector productivity, which has historically been difficult to increase.

- Displacement mainly occurs where administrative and repetitive knowledge-based tasks make up a large part of the work activities.

Complemented workers   Displaced workers

Note: Sectors are aggregated according to NACE categorisation. "Information and finance" is a combination of information, communication, financial and insurance activities. Gains in labour productivity map one-to-one to GDP if total employment (as here) is assumed constant and the capital stock increases to match productivity improvements. The estimates take into account that the growth impact of generative AI may not be fully additive to the current GDP trend. First, AI-related gains may substitute for growth that would otherwise occur in a non-AI baseline. Second, underlying productivity growth has slowed over the past decades. The estimated boost from generative AI may be partially offset by an underlying growth slowdown.
Source: Implement Economics based on Eurostat, OECD and O*Net.

15

85% of generative AI's economic potential lies in service sectors, while manufacturing and other sectors can also benefit from other types of AI

Gross value added by sector
€ billion

- ▪ Gross value added in 2022   ▪ Increase from generative AI after a ten-year period

Sector		
Knowledge-intensive business services *e.g. finance, legal, science and information*	20	
Public administration, education and health care	10	**85% of potential**
Trade, transport and tourism *e.g. wholesale trade, storage and accommodation*	10	
Manufacturing, construction, energy and water	7.5	
Agriculture and primary sectors *e.g. electricity, water supply, mining and agriculture*	<0.5	

Chart x-axis: 0 20 40 60 80 100 120 140 160 180

Generative AI has the potential to boost value added in knowledge-intensive business services by around **€20 billion**, e.g. by generating content, assisting in research and automating complex data processing. The impact of other types of AI in these sectors is limited to automating repetitive tasks.

Generative AI can benefit the public sector with an estimated **€10 billion**, e.g. through personalised tutoring in education, diagnostic support and patient interactions in healthcare, and automatic document handling and preparatory decision-making in public administration. Other types of AI also have potential in the public sector.

Although the trade, transport and tourism sector has a small percentage impact from generative AI, it still presents a significant economic potential of an estimated **€10 billion** due to its large size. The sector can, for example, benefit from enhanced customer service through responsive chatbots and the processing of legal documents or contracts.

Generative AI has the potential to increase productivity in manufacturing and construction by around **€7.5 billion**, although the percentage impact is assessed to be smaller than in other sectors. Other types of AI are expected to have a significant impact on these sectors, e.g. through supply chain optimisation and automation of manual processes for specific tasks.

Generative AI can, for example, facilitate predictive maintenance by processing operational reports and predicting potential system failures, thereby supporting an estimated potential of up to **€0.5 billion.**

Note: Sectors are aggregated as follows: "Knowledge-intensive business services": NACE sectors J-M. "Public administration, education and healthcare": NACE sectors O-R, U. "Trade, transport and tourism": NACE sectors G-I, N, S-T. "Manufacturing, construction, energy and water": NACE sectors C-F. "Agriculture and primary sectors": NACE sectors A-B.
Source: Implement Economics based on Eurostat.

04

Job implications of AI

Generative AI will introduce job changes in Belgium – the nature and degree of which depend on economic and demographic factors.
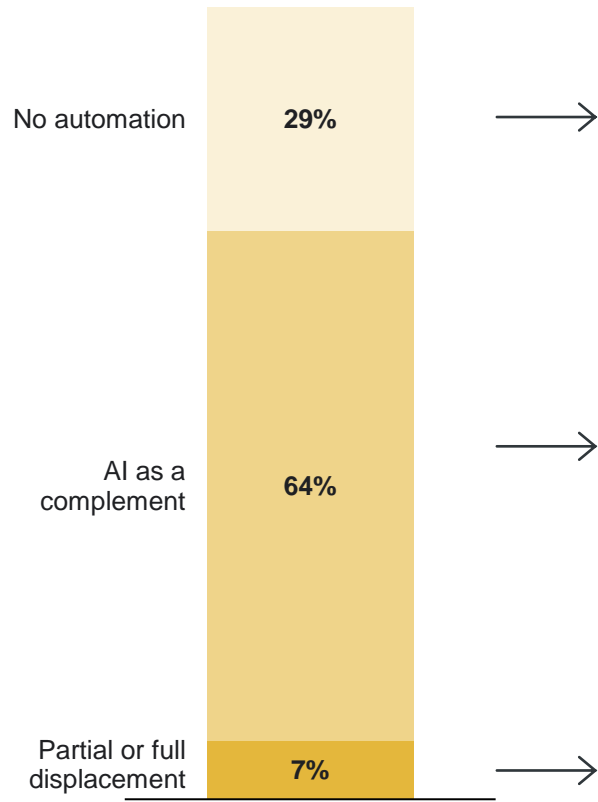
Generative AI augments most jobs

Share of jobs exposed to automation by generative AI
% of total employment in Belgium

5 million jobs

No automation — **29%**

AI as a complement — **64%**

Partial or full displacement — **7%**

~ 1.4 million jobs unlikely to be exposed to automation

An estimated 29% of jobs in Belgium are likely to remain largely unaffected by generative AI. These jobs include manual labour, outdoor tasks, such as construction and cleaning, and human-to-human tasks, such as personal care and food services.

~ 3.2 million jobs likely to be augmented by generative AI

Most jobs (64%) are expected to be assisted by generative AI by automating a limited share of their tasks and helping to create content (text, code and images), collaborating with workers on complex problems and contributing to product design.

Unlike previous waves of automation that mainly impacted manual workers, generative AI is expected to primarily affect office-based professionals.

~ 0.4 million jobs likely to be fully or partially displaced

A small share of jobs (7%) are expected to have over half of their work activities exposed to automation by generative AI, e.g. in occupations such as clerical support workers, contact centre salespersons and translators. These workers are likely to see their jobs fundamentally change and may need to be re-employed in new occupations.

Note: Based on 2022 employment data. In accordance with Briggs and Kodnani (2023), "No automation" are occupations with less than 10% exposure, "AI as a complement" are occupations with 10-49% exposure and "partial or full displacement" are occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Implement Economics based on Eurostat and O*Net.

The AI-powered economy is expected to create new jobs and ensure full re-employment of potentially displaced workers

Share of jobs exposed to automation by generative AI
% of total employment in Belgium

● Partial or full displacement   ● AI as a complement   ● No automation

7% of Belgian jobs are estimated to be highly exposed to generative AI, leading to some job closures.

↓
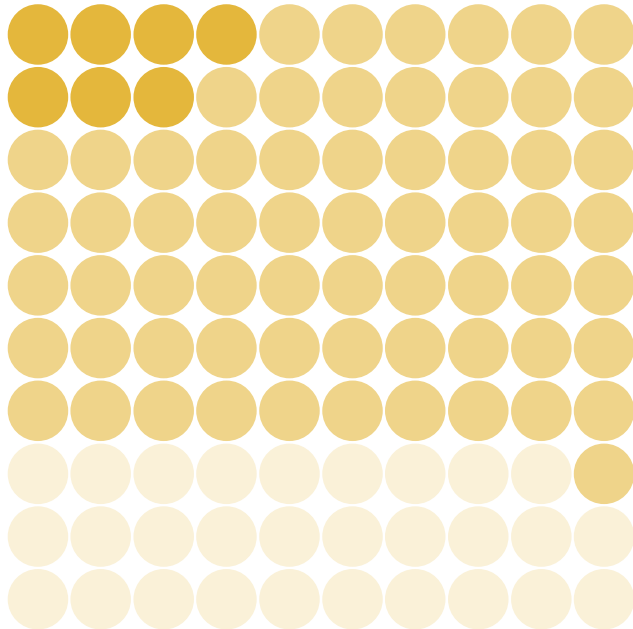
At the same time, 64% of jobs are expected to see a boost in productivity. This will create new jobs due to:

I

Increase in general demand for goods and services

With higher GDP growth, the AI-powered economy will demand more labour across a wide range of occupations and skill levels.

II

New tasks and jobs created

Widespread use of AI will also create new jobs such as AI prompt engineers, AI content creators and data trainers – and create jobs we cannot preconceive.

III

Demand within occupation

Generative AI will also make highly exposed occupations, such as translators, more efficient, and hence at lower costs, which in turn can increase the demand for those occupations.

Even with accelerated and broad adoption of generative AI over a ten-year period, only around 20,000-35,000 persons in highly exposed job are estimated to need re-employment per year, which is low compared to historical averages
(see page 22).

- The job development in Belgium over the next decades will depend on a range of factors.
- The isolated impact of generative AI depends on the speed of adoption and size of the productivity boost relative to the size of the displacement effect for the jobs that are highly exposed to generative AI.
- This report assumes full re-employment of displaced workers over a ten-year period. This means no net change in total employment or unemployment.
- This assumption builds on the large size of the productivity boost compared to the relatively small share of displaced jobs. This suggests that the demand for new jobs will be sufficiently strong to create jobs for those exposed.
- Furthermore, economic theory suggests that long-term employment is determined by the labour supply and skill mix of the workforce.
- The short-term job impacts will depend, among other things, on the flexibility of the labour market as well as re-training and skilling opportunities for workers.

3.2 million jobs are expected to be complemented by AI – mainly highly educated professionals and technicians

Jobs complemented by generative AI
Thousand jobs

Legend: ■ University or similar ■ High school or similar ▫ Less than high school

Zooming in on the **64% (3.2 million) of jobs complemented by generative AI.**

University or similar: 63%
High school or similar: 29%
Less than high school: 7%

Chart categories (with job examples):
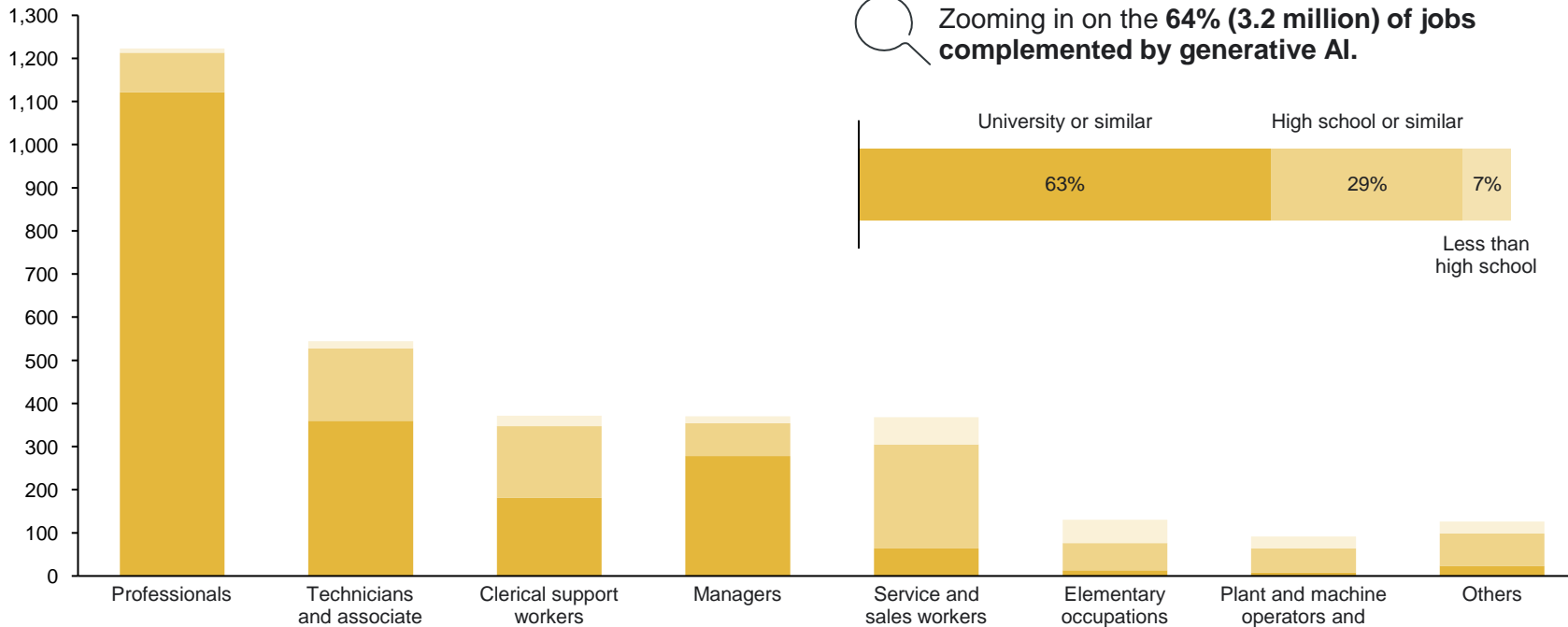
Category	Examples of jobs include:
Professionals	Research, analysis and advising services (including legal)
Technicians and associate professionals	Engineering technicians, robot controllers and air traffic safety technicians
Clerical support workers	Secretaries, record keepers and information suppliers
Managers	Executives and supply and general managers
Service and sales workers	Caterers, housekeepers and travel agents
Elementary occupations	Cleaners, washers and delivery
Plant and machine operators and assemblers	Train drivers and machinery operators
Others	Police services and farmers

Y-axis: 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000, 1,100, 1,200, 1,300

- Generative AI is estimated to augment the capabilities of around 3.2 million jobs in Belgium at full adoption and around half of these over a ten-year period.

- Of the complemented workers, 63% are estimated to hold higher educational attainment, such as lawyers, scientists and engineers.

- Generative AI can perform complex cognitive tasks and complement human abilities, creating opportunities for individuals to work with generative AI to create new content and free up time for other tasks.

- Unlike previous waves of automation, generative AI is less relevant in jobs carried out by those with lower levels of educational attainment.

Note: Based on 2022 employment data.
Source: Implement Economics based on Eurostat and O*Net.

Around 0.4 million Belgian jobs are highly exposed to generative AI, but the AI-powered economy will help create new jobs

Jobs highly exposed to generative AI
Share of jobs in occupation exposed

Occupation	Share exposed	Number
Clerical support workers	33%	**210,000**
Technicians and associate professionals	10%	75,000
Professionals	3%	45,000
Service and sales workers	2%	10,000
Elementary occupations	2%	10,000
Others	1%	15,000

(X-axis: 0% – 100%)
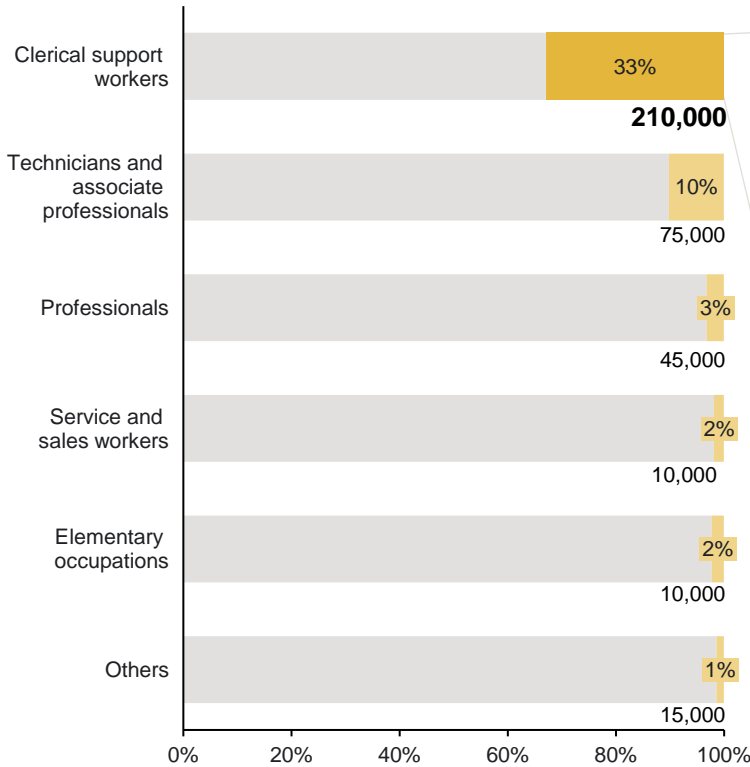
Highly exposed jobs in total ~ 370,000

Example: Belgian clerical support workers and job transition

Of the 210,000 highly exposed clerical support workers, only around half are assumed to be affected by generative AI over ten years, and all of these are assumed to be employed either outside or within the occupation.

Most are expected to be re-employed in other occupations due to:

I — **Increase in general demand for goods and services** due to increased income in the AI-powered economy, leading to job opportunities in other sectors.

II — **New tasks and jobs created**, arising from the introduction of generative AI.

A smaller share is expected to be employed *within* occupation because:

III — **Not all highly exposed workers will be displaced.** Some will continue to hold employment with new tasks replacing the exposed tasks.

Increased demand within occupation due to the increase in productivity and lower costs.

The proportion of employment within occupations and in new occupations is uncertain.

210,000

Within occupation — **Re-employed**

- Around 0.4 million jobs in Belgium are estimated to be highly exposed to generative AI at full adoption, and around half of these are expected to be affected over a ten-year period.

- This report assumes full re-employment of displaced workers. This means no net change in total employment or unemployment.

- The Belgian economy is thus assumed to be able to sustain at least the current level of employment in the coming 10-15 years as also predicted by EU forecasts from CEDEFOP.

- Clerical support workers, technicians and service and sales workers are highly exposed to generative AI and up to a third of these jobs are expected to see significant change.

- The transition is likely to be gradual, allowing workers time to adapt to new tasks and skills.

- Through three channels, the AI-powered economy will gradually lead to new jobs and support employment within the occupation or re-employment in other sectors.

- Historically, worker displacement from automation has been offset by the creation of new jobs, and the emergence of new occupations following technological innovations accounts for the vast majority of long-run employment growth.

Job changes from generative AI are small compared to historical averages

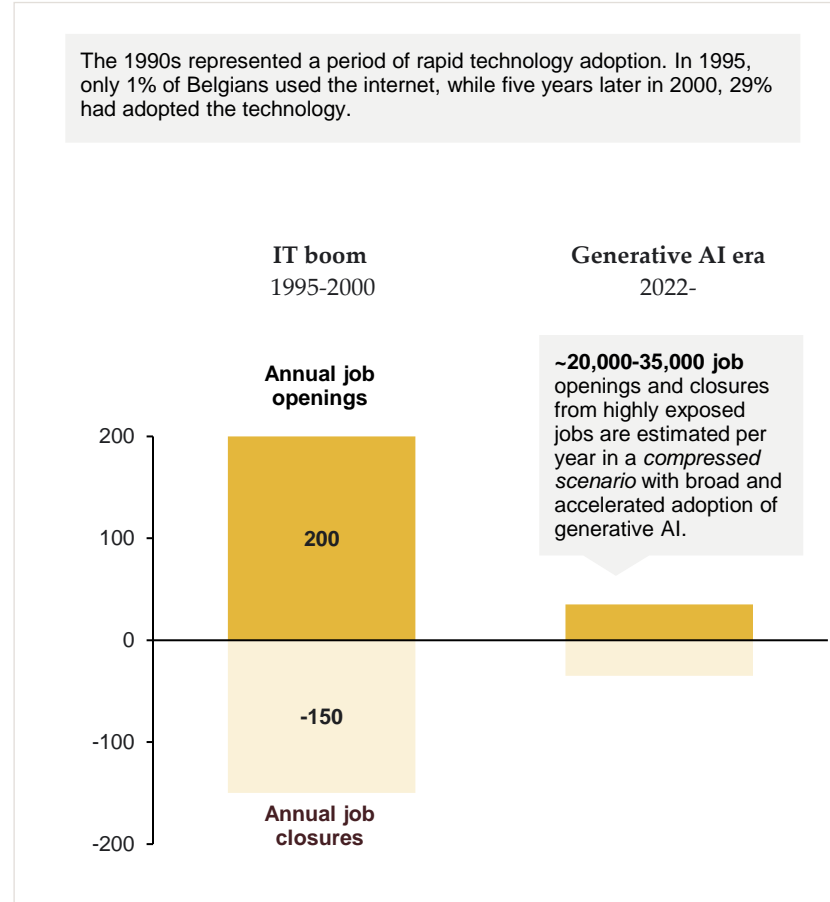**Change in employment across Belgian sectors, 2008-2022**
Thousand jobs
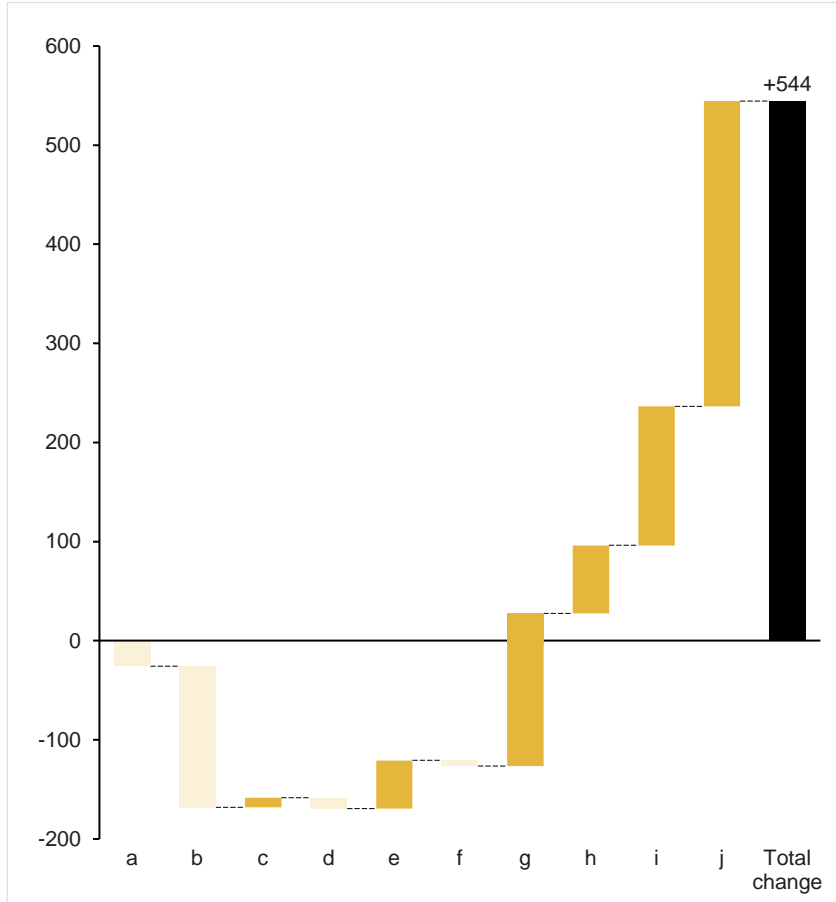
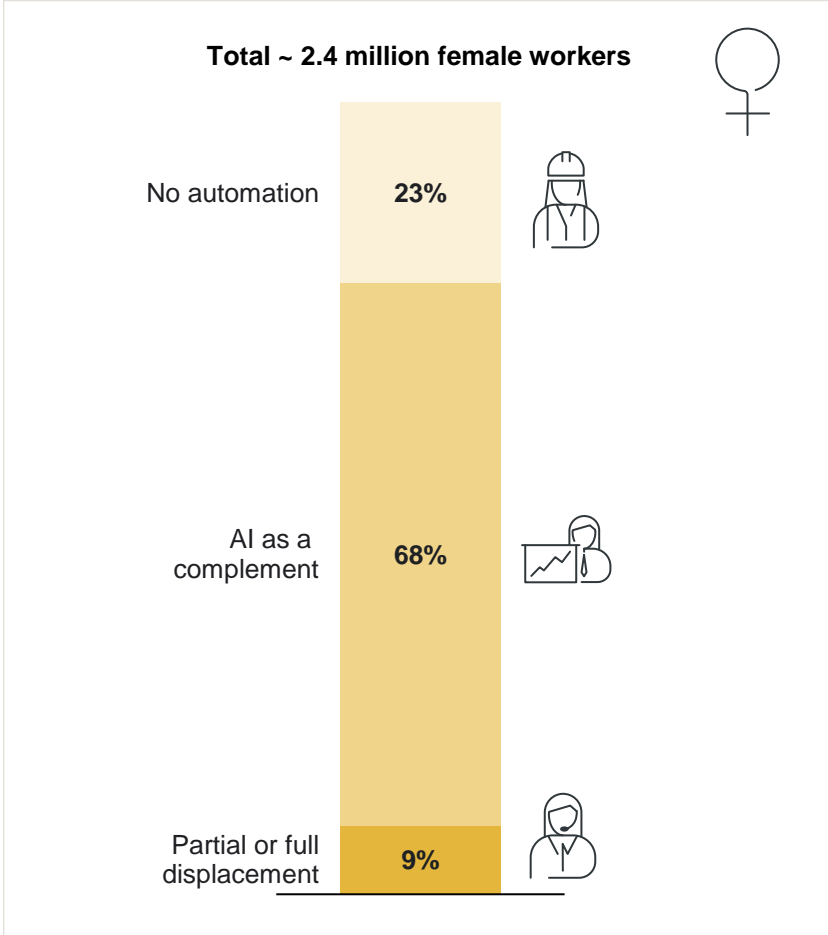**Job development during the 1990s IT boom in Belgium**
Thousand jobs

The 1990s represented a period of rapid technology adoption. In 1995, only 1% of Belgians used the internet, while five years later in 2000, 29% had adopted the technology.

IT boom
1995-2000

Generative AI era
2022-

Annual job openings

~20,000-35,000 job openings and closures from highly exposed jobs are estimated per year in a *compressed scenario* with broad and accelerated adoption of generative AI.

200

-150

Annual job closures

- The Belgian economy has added more than 540,000 jobs over the last 15 years. A few sectors, including manufacturing and agriculture, have contracted, while most other sectors, including tourism, business services and the public sector, have added significant amounts of new jobs.

- In addition, numerous new jobs are being created and closed each year *within* each sector to adapt to changing needs and demands.

- During rapid IT adoption in the 1990s, the Belgian economy created around 200,000 new jobs and closed only 150,000 jobs annually during the same period.

- We estimate that the jobs highly exposed to generative AI can lead to 20,000-35,000 annual job openings and closures over the coming ten years. This is around 15% of the historical average number of job openings in Belgium.

- The labour market effects stemming from generative AI's impact on highly exposed jobs are thus small compared to historical levels of job changes.

- To avoid underestimating the possible job impacts of generative AI, these estimates are in a *compressed scenario* with broader and more accelerated adoption of generative AI than in our estimates of the GDP impacts.

Note: a. Agriculture and primary sectors; b. Manufacturing; c. Utilities, raw materials and waste; d. Construction; e. Wholesale and retail trade; f. Transport and storage; g. Tourism and other services; h. Information and finance; i. Business services and real estate; j. Public administration, education and healthcare.
Our GDP estimate makes conservative assumptions around the scope of tasks for generative AI and the speed of adoption as in the base scenario in Briggs-Kodnani (2023a). The *compressed scenario* used to gauge the potential job market implications assumes faster adoption (full adoption over ten years) and/or more broad application of generative AI (as in the Briggs-Kodnani scenario with "more labour displacement").
Source: Implement Economics based on Eurostat, World Bank and ECB.

A higher share of female workers are estimated to be affected by generative AI – both regarding potentially positive and negative impacts
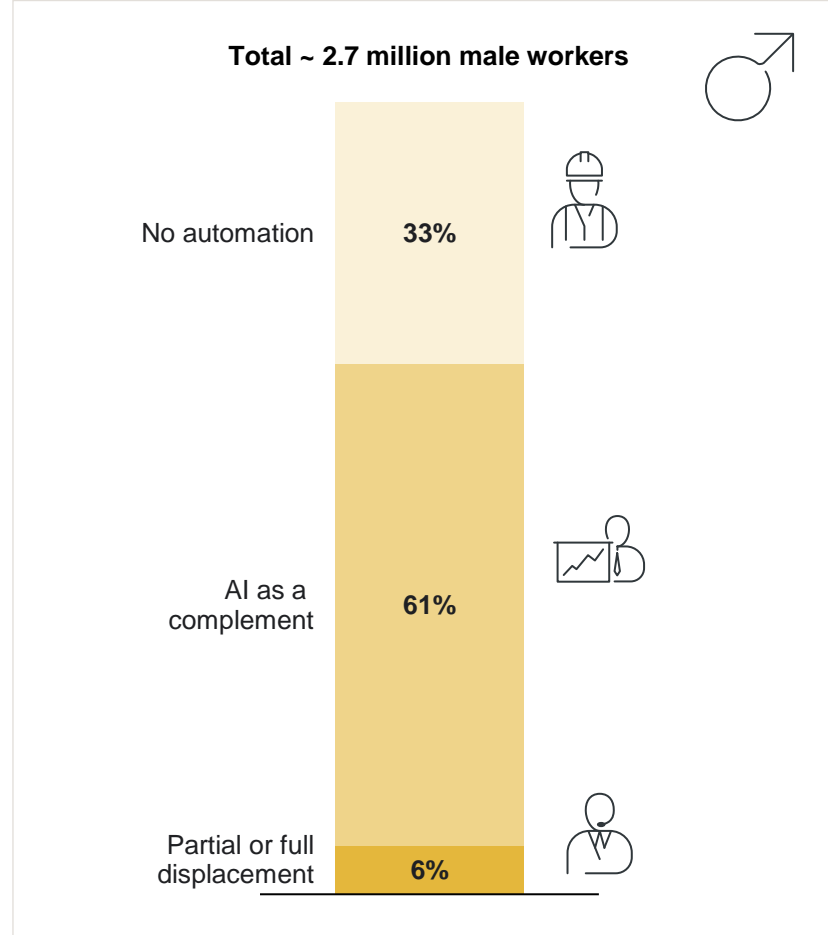
Share of female jobs exposed to automation by generative AI
% of total employment among female workers

Total ~ 2.4 million female workers

No automation — **23%**

AI as a complement — **68%**

Partial or full displacement — **9%**

Share of male jobs exposed to automation by generative AI
% of total employment among male workers

Total ~ 2.7 million male workers

No automation — **33%**

AI as a complement — **61%**

Partial or full displacement — **6%**

No automation

- 23% of female workers and 33% of male Belgian workers are in jobs with limited exposure to generative AI. These are, for example, manual, outdoor and human-to-human jobs.

Complemented jobs

- 68% of female workers are expected to see generative AI complement their current job, whereas the share is only 61% for male workers. Female workers are, to a higher degree than men, employed in jobs such as teachers and lawyers, where generative AI is expected to augment human capabilities and make workers more productive.

Potentially displaced jobs

- 9% of female workers and 6% of male workers in Belgium are currently in jobs such as clerical work, call centre workers and technicians that are likely to be highly exposed to automation by generative AI and hence more at risk of seeing their current job being fully or partially displaced by the new technology.

Note: Based on 2022 employment data. In accordance with Briggs and Kodnani (2023), "No automation" are occupations with less than 10% exposure, "AI as a complement" are occupations with 10-49% exposure, "Partial or full displacement" are occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Implement Economics based on Eurostat and O*Net.

76% of Belgian workers see productivity-enhancing effects of generative AI, and 40% expect AI to positively impact their job

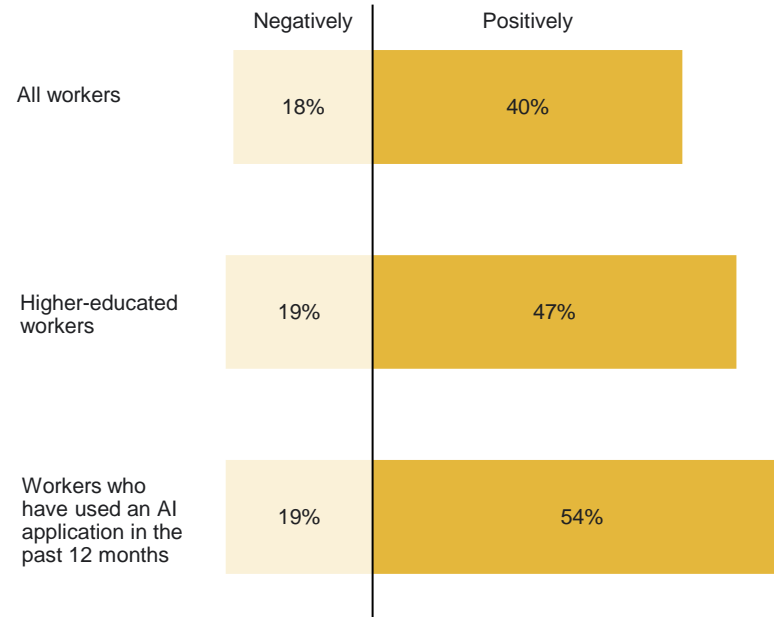## Workers think that generative AI makes them more productive

Generative AI will help improve my productivity at work
Workers who agree, %

NO	DK	BE	FI	LU	NL	SE
84%	81%	76%	76%	75%	70%	66%

Avg. 75%
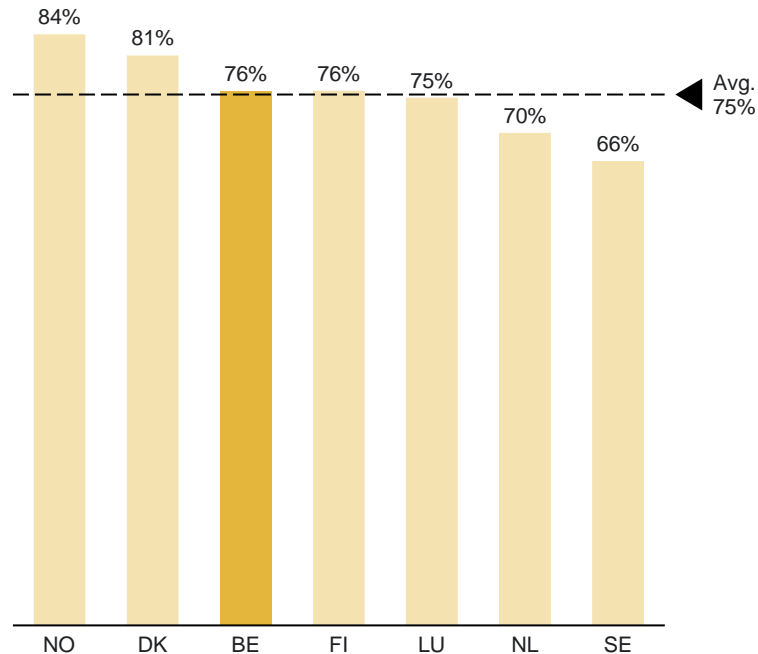
Workers think that AI will positively impact their job

How will AI impact your job?

	Negatively	Positively
All workers	18%	40%
Higher-educated workers	19%	47%
Workers who have used an AI application in the past 12 months	19%	54%

- Polling conducted by Public First shows that 76% of Belgian workers think that generative AI will help them be more productive. This is on par with the average of other European countries.

- A recent Ipsos survey on attitudes towards AI reveals that 40% of workers in Belgium expect AI to have an overall positive impact on their job while only 18% expect a negative impact.

- The positive expectations are more pronounced for higher-educated workers with 47% expecting a positive job impact.

- Workers who have used an AI application in the past 12 months have the most positive expectations with 54% expecting AI to positively impact their job in the future.

Note: Public First survey conducted in summer 2023. Nationally representative consumer and business polling. Survey respondents include Sweden (SE), Denmark (DK), the Netherlands (NL), Belgium (BE), Luxembourg (LU), Finland (FI) and Norway (NO).
Source: Implement Economics based on Public First country surveys and Ipsos survey.

24

Workers need more than just digital upskilling for effective use of generative AI, and there is a widespread need for re-skilling

Multiple skills are needed to leverage generative AI …

Skill needs in the age of AI (incl. both generative and traditional)
OECD

Skills …	Type of skills	Examples
… for developing and maintaining AI systems.	Specialised AI skills	Machine learning capabilities and knowledge
	Data science skills	Data analysis and visualisation, cloud computing and programming
	Other cognitive skills	Create problem-solving
	Transversal skills	Social skills and management skills
… for adopting, using and interacting with AI applications.	Elementary AI knowledge	Principles of machine learning
	Digital skills	Ability to use computer/smartphone
	Other cognitive skills	Analytical skills, critical thinking and problem-solving
	Transversal skills	Creativity, communication, teamwork and multitasking

… and European workers express a widespread need for re-skilling

What will you do in the next five years as a result of AI?
% of respondents who are employed and think that AI will slightly or completely transform the way they do their job.

I will have to re-skill or take some type of course

Country	%
France	37%
Spain	35%
Sweden	33%
Belgium	30%
Netherlands	26%
Germany	18%
Poland	14%

Avg. 28%

I will have to learn how to use AI

Country	%
Spain	50%
Sweden	43%
Poland	36%
Netherlands	36%
Belgium	36%
Germany	33%
France	29%

Avg. 38%
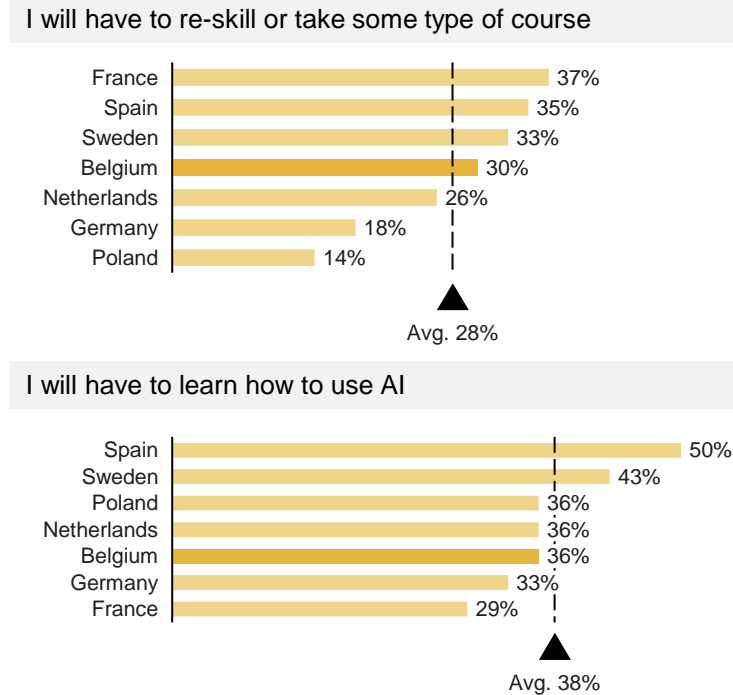
- Generative AI adoption and usage requires limited digital skills relative to earlier advancements in information and communication technology (ICT) due to its ease of use via normal language prompts.

- However, fully leveraging generative AI requires skills beyond basic digital skills, i.e. creative, managerial and analytical skills.

- Of the Belgian workers indicating that AI will completely or slightly change their job, 30% expect to have to re-skill or take some type of course within the next five years as a result of AI, corresponding to around 700,000 employees in Belgium.

- In 2023, only 59% of Belgians aged 16-74 had basic digital skills, but it was required in 90% of professional roles.

- OECD studies based on companies in Estonia and the Netherlands suggest that companies that provide ICT training for their employees on average have 3-5% higher growth in their annual labour productivity.

- The literature highlights that companies that combine technology/ICT adoption with employee training have higher implementation and financial success.

Source: Implement Economics based on OECD, the European Commission, Ipsos Survey, Eurostat, Mosiashvili and Pareliussen (2020), Borowiecki et al. (2021), Gal et al. (2019) and Andrews et al. (2016).

Early studies suggest that generative AI can help close the skills gap for those with the lowest skill levels

Grades with and without generative AI

Estimated mean grade on 2nd task
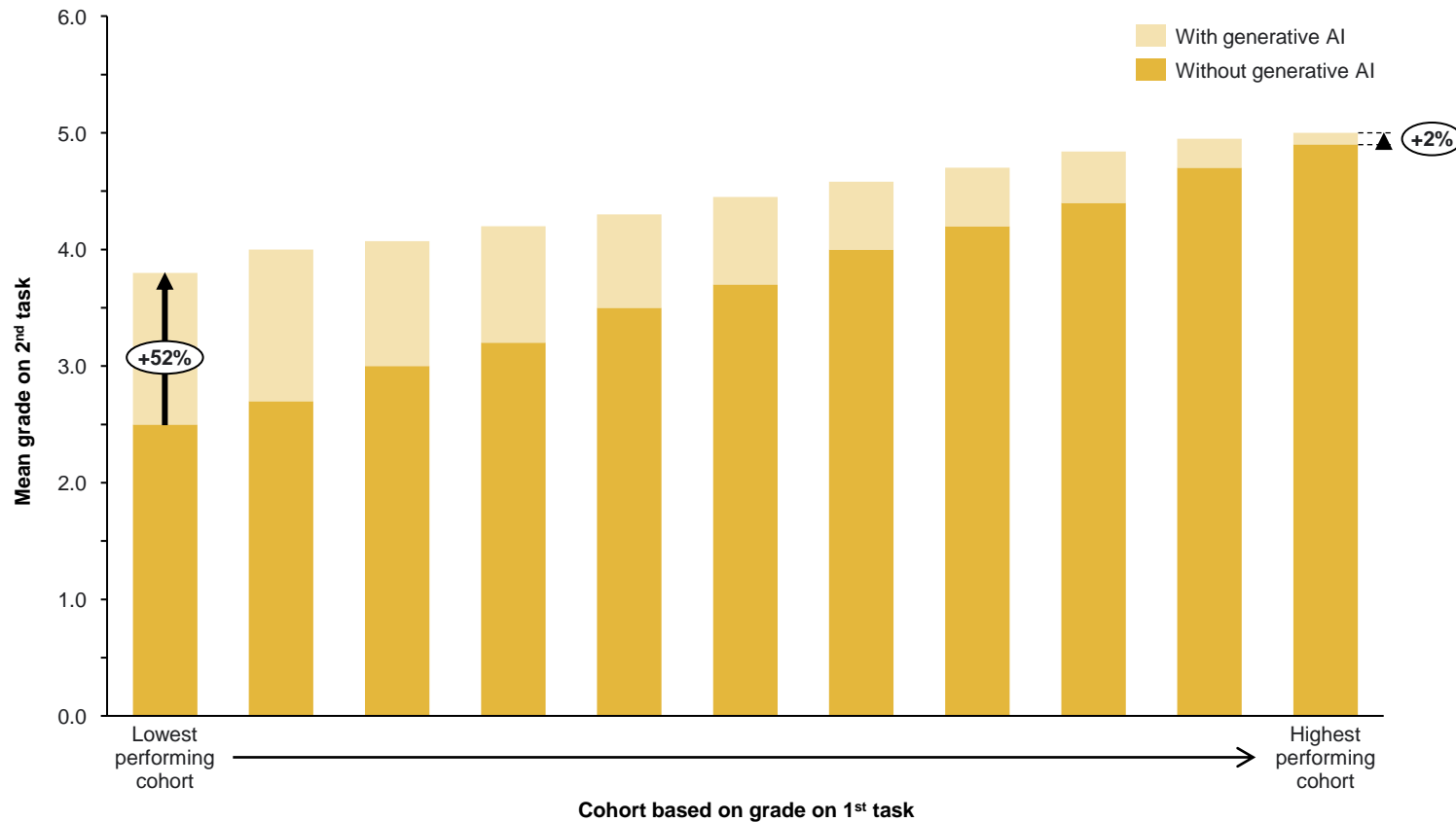
- AI requires a broad skill set to reap the benefits. However, AI as a tool can itself augment the performance of human skills.

- Furthermore, generative AI can help close the skills gap by increasing the performance of those with the lowest skill levels.

- An experimental study by Noy and Zhang (2023) tested candidates' writing skills with and without access to generative AI.

- The results showed that, on average, all candidates were able to boost their grades on a written task with the use of generative AI – in this case, a large language model.

- The AI augmentation effect was largest among those with the lowest performance on the first task.

- The lowest-performing group increased their average grade by more than 50% when allowed to interact with a large language model, whereas the best-performing group increased performance by 2%.

- This study is an early indication that generative AI has the potential to boost skills for everyone *and* reduce skill inequalities in the labour market.

Note: The graph shows mean estimates for cohorts.
Source: Implement Economics based on Noy and Zhang (2023), Brynjolfsson et al. (2023) and Dell'Acqua et al. (2023).

05

AI's impact on societal challenges

AI can help with some of Europe's most pressing societal challenges.

AI can play a key role in addressing climate change

50% of Belgians say that they support AI tools being used to help them make more environmentally sustainable choices in their lives.

60% of Belgians support AI tools being used to reduce carbon emissions by managing energy use.

Public First poll

Belgium's net greenhouse gas emissions, 2020
MtCO$_2$e

25-30%

AI and other digital solutions help to reduce …

107

-22 **Transport emissions**
60-70%
E.g. support the shift to electric cars with smart apps

-21 **Heating emissions**
40-50%
E.g. support the transition to smart heat pumps and help save energy

-32 **Manufacturing emissions**
10-15%
e.g. use of artificial intelligence to drive energy efficiency and productivity

-9 **Agriculture emissions**
20-25%
e.g. use of real-time data and algorithms for precision farming

-20

-4

Digitally enabled
Other reductions

Emissions | Transport | Buildings | Manufacturing | Agriculture | Power and other | LULUCF | Net zero 2050

- Artificial intelligence and other digital solutions are expected to enable 25-30% of the CO$_2$ emission reductions required for Belgium's climate goals of net carbon neutrality by 2050.
- AI and other digital technologies can play a significant role in decarbonising the energy sector by supporting the transition to flexible energy utilisation and smart grids.
- Large gains also arise from facilitating the electrification of vehicles, where AI and other digital solutions are crucial to optimising the charging of EVs, providing cleaner and cheaper solutions for consumers.
- In manufacturing, AI and other digital solutions can help optimise energy efficiencies as well as reduce overproduction by more accurately forecasting demand.
- Agricultural emissions can also be reduced by AI and other digital solutions, where machine learning algorithms allow precision farming practices that are more eco-friendly and reduce consumption of, for example, fertilisers.

AI can help optimise spending on inpatient and preventative care in Belgium

Belgium spends approximately 10% of its GDP on healthcare in line with the EU average. Inpatient care amounts to almost 40% of all health spending in Belgium, which is significantly above the EU average. However, spending on preventative care is lower than the EU average.

A growing elderly population, rising healthcare costs and staff shortages pose challenges to the sustainability of the healthcare system.

More hands are needed

- Although the number of doctors and nurses in Belgium has increased significantly in the last 10 years, staff shortages remain a challenge with a growing and ageing population.
- Scarcity of healthcare professionals leads to lower quality services, including longer waiting times and overworked professionals.

Better treatment and care is required

- An ageing population requires more healthcare services and specialised care.
- Rising living standards drive up societal expectations for healthcare services.
- Chronic diseases are becoming more challenging and rare diseases more common.

Belgian hospitals recognise AI's potential but await strong strategic commitment.

95% *of hospital management and staff consider AI to be an important topic for hospitals.*

84% *anticipate AI to contribute to hospital activity management.*

The nationwide coalition AI4Belgium spearheads a collaborative vision for AI in the Netherlands, including the use of AI in healthcare.

Additionally, AI4Belgium estimates a minimum investment of €1 billion by 2030 to enhance AI utilisation in public services, including healthcare.

AI is particularly promising in Belgium for optimising inpatient services, cutting costs in inpatient care and transforming preventive healthcare.

AI can help free up and optimise critical resources by …

- Automating tasks in healthcare administration, e.g. appointment scheduling.
- Recording and summarising appointment notes, referral information and care plans
- Faster and more accurate screening and decisions by physicians.
- Enabling physicians to undertake remote consultations.

AI can help improve how we treat patients by …

- Analysing and enhancing medical images, enabling faster detection of diseases and injuries.
- Improving detection of complex and rare diseases with training data sets and smarter diagnostic tools.
- Predicting individual treatment responses by analysing different patient data.
- Enabling the development of targeted therapies.
- Tracking health issues and accidents through wearable devices and sensors.

77% *anticipate AI to contribute to research.*

81% *anticipate AI to contribute to early diagnosis.*

41% *consider AI to be a current strategic priority in their establishment.*

Public First poll **51%** of Belgians support AI tools being used to track their medical data.

Note: Hospital survey data is based on survey conducted in April 2021 and priorities may have changed since then.
Source: Implement Economics based on AI4Belgium, Public First, OECD/European Observatory on Health Systems and Policies and EY consulting

06

AI readiness in Belgium

Belgium's capacity to leverage the potential of AI can be evaluated based on several factors and compared to European and global frontrunners.

In assessing Belgium's AI readiness, we compare with other small digital frontrunner countries in Northern Europe

- In assessing Belgium's AI readiness, we can compare Belgium to a comparable group of small, digitally advanced and open European economies.

- Big economies, such as the United States, have an advantage when it comes to scale – i.e. absolute AI capacity, including the amount of commercial activity, availability of funding and volume of R&D.

- Common indicators, such as the Tortoise Global AI Index, compound both **scale** and **intensity** (AI capacity relative to population or GDP).

- As a small country, Belgium cannot compete on scale on, for example, the absolute amount of AI-related R&D investment. Belgium will be dependent on EU-wide initiatives.

- Therefore, Belgium should work for initiatives at EU level, especially in the areas of R&D investment, regulation and digital infrastructure.

The digital frontrunners of Northern Europe

Finland
#1 in DESI in 2022

Denmark
#2 in DESI in 2022

The Netherlands
#3 in DESI in 2022

Sweden
#4 in DESI in 2022

Norway
#5* in DESI in 2022

Ireland
#5 in DESI in 2022

Luxembourg
#8 in DESI in 2022

Estonia
#9 in DESI in 2022

Belgium
#16 in DESI in 2022

Note: Ranking within the EU is shown. *) When we include Norway, it ranks #5 in DESI in the region.
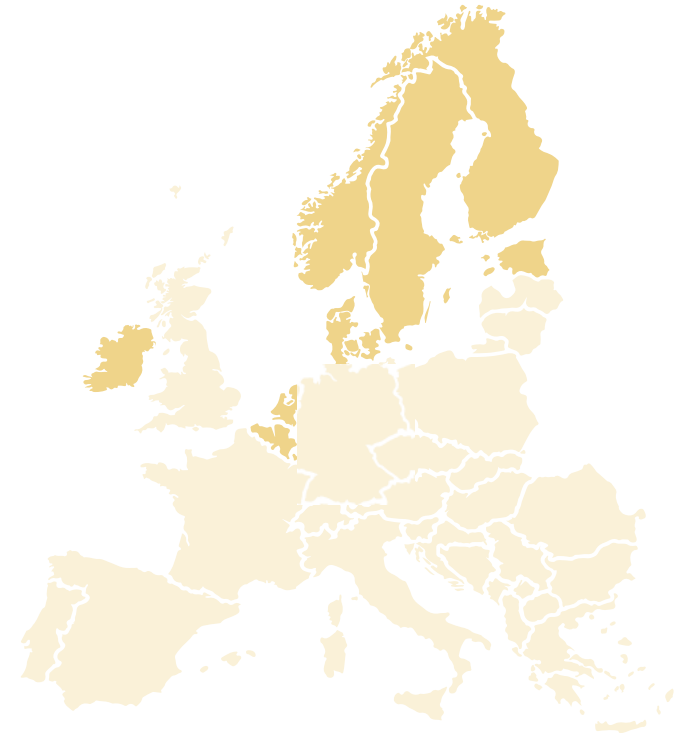
AI adoption in Belgian enterprises is above the EU average but still far from the EU 2030 target of 75% adoption

Adoption of AI in 2023
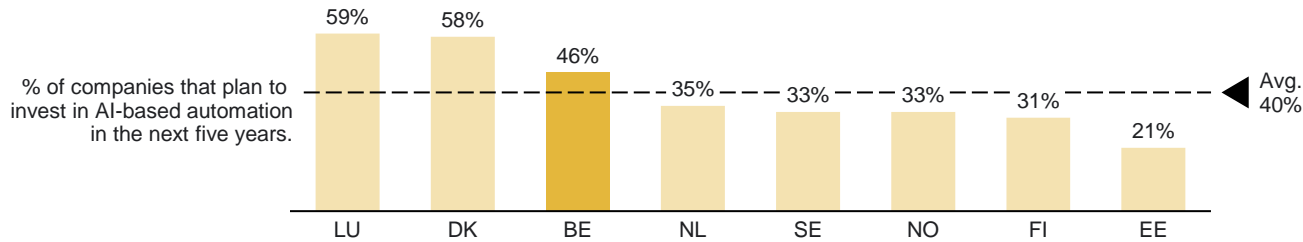% of enterprises using at least one type of AI technology

75% compass target for 2030

Forecast 2030 at current trajectory

15%	15%	14%	13%	10%	9%	8%	8%	5%
DK	FI	BE	NL	SE	NO	IE	EU	EE
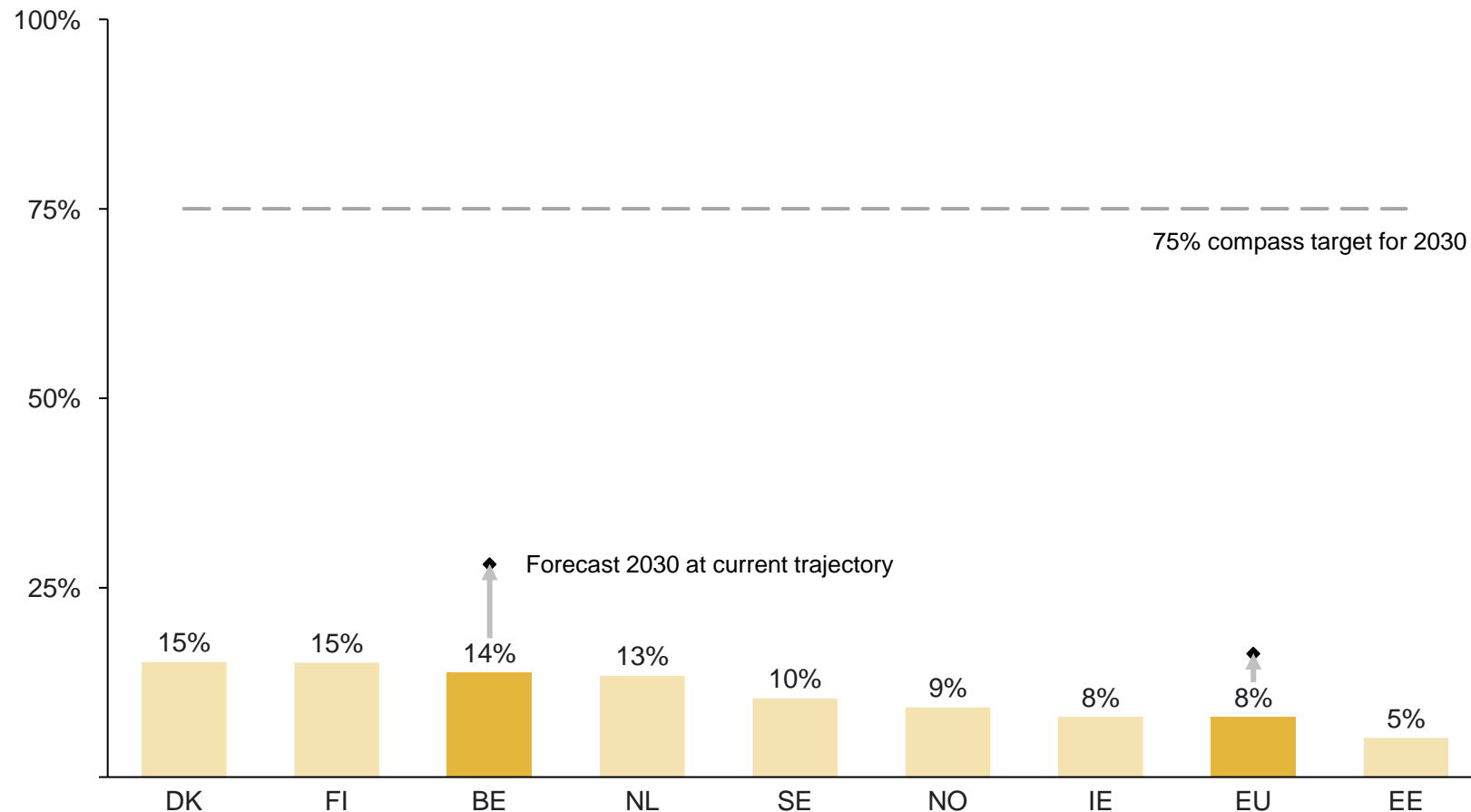
- Belgium ranks third among the Northern European frontrunners on AI adoption by enterprises. 14% of Belgian companies had adopted at least one type of AI technology in 2023.

- In its most recent assessment, the European Commission concludes that the EU is set to fall significantly short of its target on AI adoption for 2030.

- If we assume the same pace of adoption as the EU average, there is a risk that Belgium will fall short of the 2030 target.

- Firm-level adoption data underestimates actual use in business settings (see page 7) as many instances of individual-level AI use are not captured.

Note: Current adoption is from 2023 and includes enterprises with ten or more employees, excluding financial services. Forecast for 2030 is based on European Commission-forecasted AI adoption.
Source: Implement Economics based on Eurostat and the European Commission.

32

New survey data points to accelerated adoption but not enough to reach full potential

IM_

Survey responses from companies on their five-year outlook on generative AI

% weighted average of enterprises, 2023

Planned firm-level adoption of AI automation

% of companies that plan to invest in AI-based automation in the next five years.

	LU	DK	BE	NL	SE	NO	FI	EE
	59%	58%	46%	35%	33%	33%	31%	21%

Avg. 40%

Expected productivity boost from generative AI

% of companies that think that generative AI will significantly improve the productivity of their business in the next five years.

	LU	DK	BE	SE	NL	FI	NO	EE
	58%	51%	37%	29%	28%	24%	22%	18%

Avg. 33%
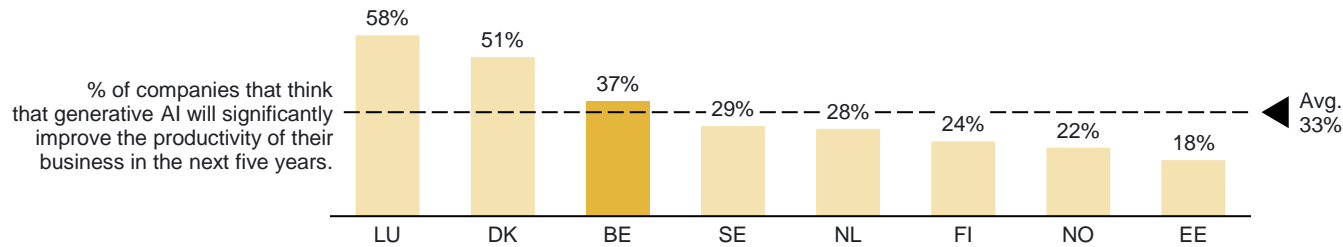
Survey responses from workers on their five-year outlook on generative AI

% weighted average of employees, 2023

Expected use of generative AI at work

% of workers who already use or expect to use generative AI tools in their job in the next five years.

	BE	NO	DK	NL	LU
	49%	44%	43%	35%	35%

Avg. 41%
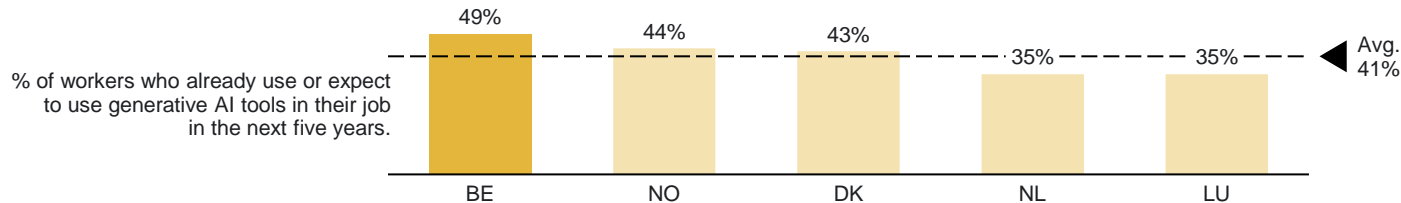
- According to polling by Public First, 46% of companies in Belgium claim that they plan to invest in AI-based automation in the next five years. This is higher than the Northern European frontrunner average of 40%.

- 37% of Belgian companies anticipate significant productivity impacts from generative AI on their business in the next five years, which is slightly above the Northern European frontrunner average of 33%.

- 49% of all surveyed Belgian workers already use or expect to use generative AI tools in their jobs within the next five years, again higher than the Northern European frontrunner average of 41%. Another survey by Ipsos found that 30% of the Belgian population has already used generative AI at least once in 2023.

- While this generally suggests a fast pace of adoption, AI adoption is still in an early phase, and more complementary innovations, investments and commercial ventures in AI are needed to capture the full economic potential.

Note: Public First survey conducted in summer 2023 and Q1 2024 for Estonia. Nationally representative consumer and business polling. Respondents of the survey include Sweden (SE), Denmark (DK), the Netherlands (NL), Belgium (BE), Luxembourg (LU), Finland (FI), Norway (NO) and Estonia (EE). Worker responses are not available for Finland, Sweden and Estonia.
Source: Implement Economics based on Public First country surveys and Ipsos.

Drivers of AI adoption suggest that Belgium could lift its strategic efforts and digital infrastructure investments to strengthen its foundation for broad AI adoption

IM_

Belgium's AI capacity according to the Tortoise Global AI Index

Global AI Index, score out of 100 (global leader)

Legend: Belgium | N. European frontrunners | Global maximum

Belgium ranking

		Global leader	N. European frontrunners	Global
AI adoption drivers	Operating Environment	85	8	24
	Government Strategy	57	7	36
	Infrastructure	55	9	43
AI innovation drivers	Talent	27	7	26
	Research	22	4	14
	Commercial	7	9	25
	Development	5	8	25
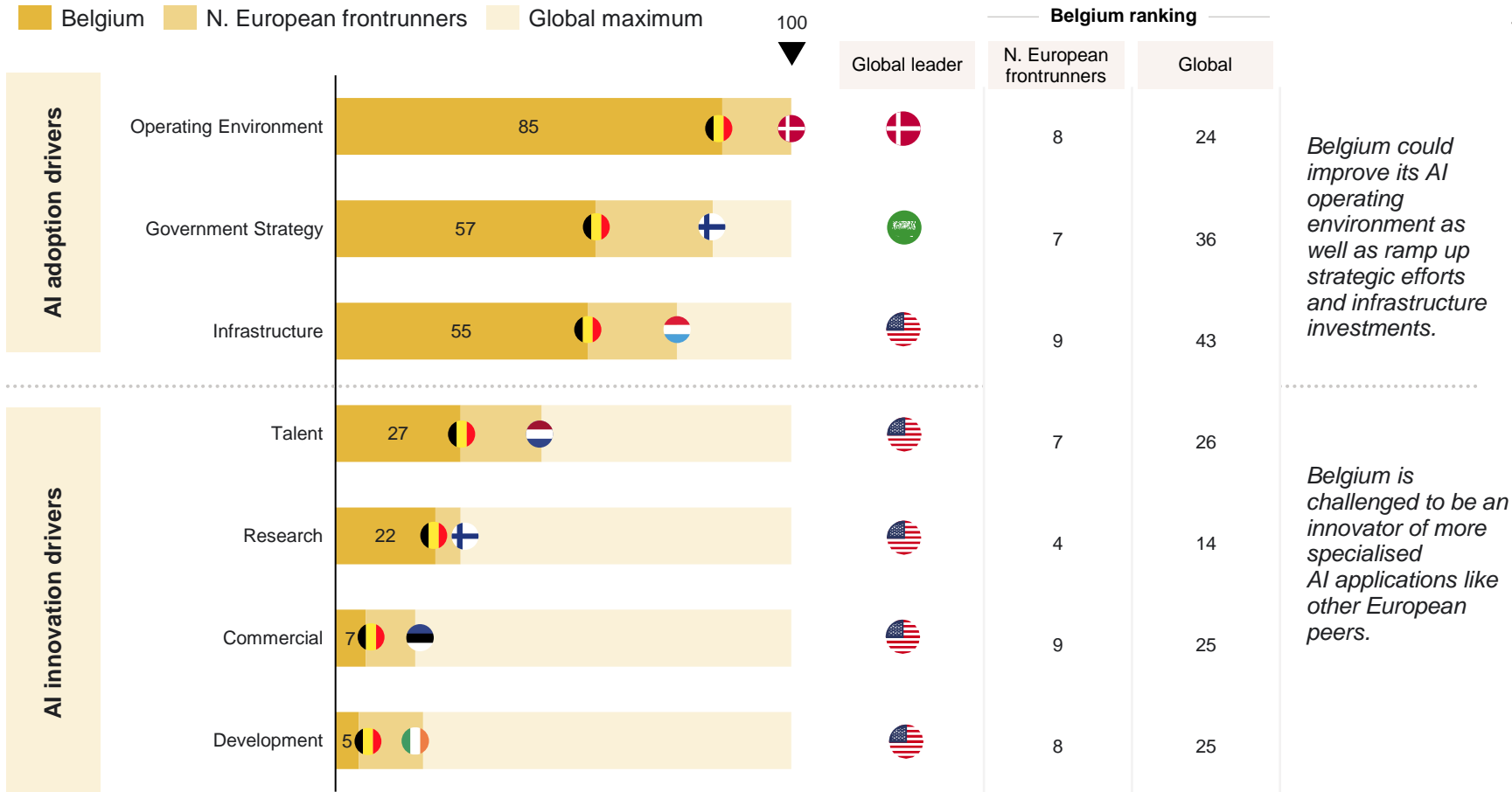
Belgium could improve its AI operating environment as well as ramp up strategic efforts and infrastructure investments.

Belgium is challenged to be an innovator of more specialised AI applications like other European peers.

- Belgium is behind the Northern European frontrunners on the foundational AI adoption drivers that ensure a safe and reliable AI-ready environment.

- Belgium could benefit from stronger strategies, improvements in its data and AI operating environment and further investments in digital infrastructure to strengthen foundational drivers.

- Additionally, more specialised AI applications (e.g. foundational and fine-tuned models) and the realisation of full productivity gains will require a cohesive and competitive innovation ecosystem that is conducive to development and commercial uptake.

- Similar to the other Northern European frontrunners, Belgium lags behind globally on complementary innovations, investments and AI-related skills. Here, the United States is far ahead globally, which is largely due to scale in AI capacity.

- In AI research, Belgium performs comparatively well both globally and in the Northern European context.

- Current gaps suggest that Belgium is at risk of losing its frontrunner position and needs to focus on strengthening its strategic efforts in AI and AI-related innovation drivers.

Note: The Global AI Index looks at seven sub-pillars for AI capacity: talent (availability of skilled practitioners in AI solutions, including IT and STEM graduates, data scientists, AI professionals etc.), infrastructure (download speed, supercomputing capabilities etc.), operating environment (regulation, cybersecurity etc.), research (AI publications and citations etc.), development (fundamental platforms and algorithms etc.), government strategy (national funding commitments to AI etc.) and commercial ventures (AI startup activity, investments etc.).
Source: Implement Economics based on Tortoise Media.

34

07

The way forward to capture the benefits of AI

Belgium can consider several options to capture the benefits and navigate the dilemmas of AI.
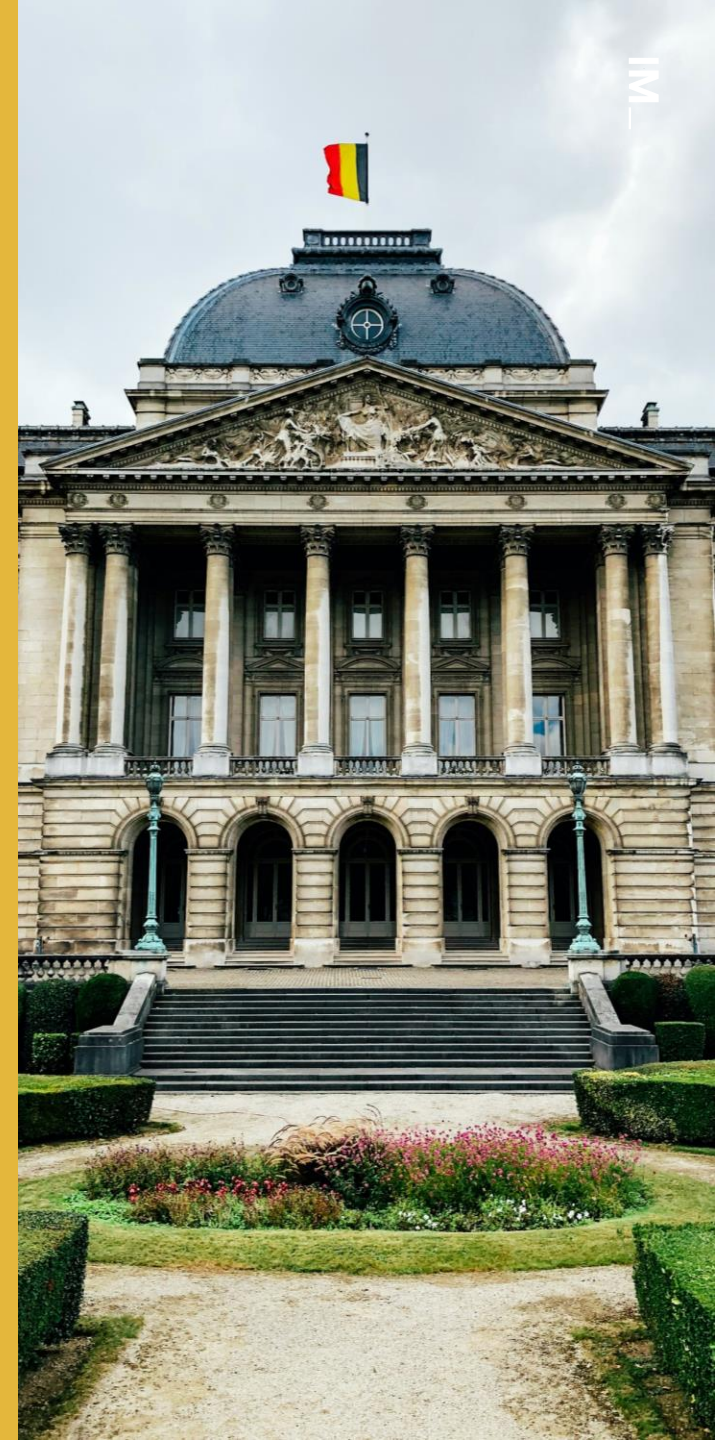
Potentials, pitfalls and paradoxes

AI has the potential to be the most powerful technology in decades

- AI enables us to do things better and work more efficiently. It also enables us to do better things. With AI, we can focus on the best parts of our jobs and leave the rest to AI. Yet, AI is still in its infancy and how it is applied is highly uncertain.
- To make AI benefit humans and society as a whole will require pursuing the potentials, avoiding the pitfalls and navigating the paradoxes.

- The future of AI should *not* be reduced to a simple one-dimensional question: Should we have more AI or less AI — or even ban AI?
- AI is not a fixed thing with a predetermined future that can come quickly or slowly. AI is new, **uncertain** and malleable and will require wise choices by all stakeholders across business, governments and civil society.

Potentials

- The estimated economic potential assumes **widespread adoption** of generative AI within ten years.
- The estimate includes both narrow **labour-saving** impacts and broader **value-creating** impacts that enable workers to do something novel or powerful.
- It assumes that AI lives up to its promise of being the most radical **technological breakthrough** in decades.
- Moreover, we estimate that AI will **complement the majority of workers** and free up time to spend on non-routine, creative and inventive tasks.
- The result is an economy not simply at a higher level of productivity, but at a **permanently higher growth rate**.

Pitfalls

- Displaced workers might end up in **less productive jobs** (than already assumed).
- AI may end up being **less promising** or less ready to bring to market than initially hoped.
- Time to market may be **challenged by a legal regime** not designed for AI.
- Companies may **miss out on the benefits** of AI due to a lack of competences or failing to change organisations and habits.
- National regulators, driven by any number of concerns, may **impose strict regulations** that slow the speed of AI development.
- **Regulatory uncertainty** and lack of clarity on future rules may delay the uptake.

Paradoxes

- How can policies encourage the types of AI that complement human labour and best prepare those at risk of losing a job to AI?
- What choices will encourage the development of AI that companies of all sizes can access instead of just the largest ones?
- What kind of investment in AI research and development might unleash the most interesting new ideas, innovations and applications in support of overall societal value?
- What kind of high-performance computer infrastructure is needed to power the new technology and how is that best provided?

Unlocking the AI opportunity by creating trust *and* preserving the incentive to invest

The benefits of new waves of technology do not come automatically. As with past waves of technology, it takes time for people to trust the technology. Regulators across the world are set to ensure the safety of the technology while achieving its benefits. The EU's AI Act aims to lead on this. In the urgent efforts to achieve broad-based trust, regulators may create fragmentation, misalignment and uncertainty about future rules, which can hamper investment and adoption.

Developers and early technology adopters will need clarity on future rules. Clarity is needed regarding, for example, the requirements for transparency in the functioning of the generative AI models, the data used to train them, issues of bias and fairness, potential intellectual property issues, possible privacy violations as well as security concerns.

To navigate these choices, this report offers five perspectives:

Enable innovation and invest in AI research and development	Create a conducive and aligned AI regulation	Promote widespread adoption and universal accessibility	Build human capital and an AI-empowered workforce	Invest in AI infrastructure and compute power
• Invest in long-term public AI research and encourage private investment in basic and applied research at national and EU level. • Foster industry, government and university innovation partnerships to undertake pre-commercial AI research projects. • Support innovation on top of already developed foundational models and findings, e.g. by leveraging the new EU AI innovation package. • Make AI tools available to entrepreneurs and scientists so they can use AI in support of other discoveries and innovations. • Support international research collaboration, technology transfer and international movement of researchers.	• Avoid siloed approaches to AI regulation to minimise the risk of misalignment and fragmentation by increased international co-operation. • Ensure copyright rules that support innovation and creativity and preserve the incentive to generate new content. • Adopt a risk-based approach to AI regulation to provide clarity to developers, adopters and users about which uses are disallowed. • Encourage privacy and security principles so that individuals' personal data is safeguarded.	• Promote widespread adoption and universal accessibility by helping governments, small businesses and all sectors of the economy adopt and use AI. • Lead with the public sector adoption of AI solutions, which may require overcoming procurement roadblocks that often appear when public entities aim to adopt new technologies. • Create a national strategy to spur AI adoption across all industries and all sizes of businesses. • Give small businesses an "AI jumpstart" through technical assistance, training and guidance to help them understand and leverage AI for their businesses.	• Build an AI-empowered workforce by investing in human capital, education and training systems. This means treating AI as a core component of the education system. • Focus training and upskilling on areas where AI enhances and augments the capabilities of workers so that workers are trained to work together with the new technology. The aim should be to improve the marginal productivity of workers rather than replace them. • In those selected types of jobs where AI risks displacing workers, efforts should be devoted to re-skilling workers for other jobs. • Ensure a flexible labour market and continuous lifelong training enabling new opportunities in the labour market.	• Ensure the right incentive and regulation for public and private entities to invest in AI infrastructure and compute capacity such as graphics processing and supercomputers needed to drive the powerful AI models. • Enable trusted cross-border data flows in trade agreements and ensure regulatory interoperability and non-discrimination in the EU. • Support the building of cross-border AI infrastructure and subsea cables through initiatives such as the G7 partnership for global infrastructure and investment. • Reduce electricity emissions from data centres by promoting ambitious decarbonisation strategies such as 24/7 Carbon-Free Energy.

Note: For more details on policies, see OECD AI principles, OECD AI Observatory, EU's ethic guidelines for trustworthy AI, EU's AI innovation package, Google's AI principles and paper on "An Opportunity Agenda for AI". For more details on carbon-free energy and digital decarbonisation, see the European perspective and global perspective.

Belgium can draw on policy choices of European digital frontrunners

Belgium can draw on best-practice initiatives from Northern European frontrunners

	Operating environment	Infrastructure	Talent	Research	Development	Commercial
Indicator						
Northern European leaders	🇩🇰	🇫🇮	🇳🇱	🇫🇮	🇮🇪	🇪🇪

Best practice

Operating environment

Denmark is a **pioneer in enforcing transparency and ethical use of AI** and has introduced principles and tools to ensure responsible AI deployment. The tools are aimed at building trust in AI technologies.

Example: Guide for responsible use of generative AI

- Formal ethics and safety guidelines for using and implementing AI publicly and privately.
- *Datavejviseren*: A platform that provides access to all public data sources.
- *Sprogteknologi*: Supports the development of AI solutions in Danish.

Infrastructure

Finland is home to one of the **fastest supercomputers** in the world called LUMI. Up to 20% of the LUMI supercomputer's capacity has been reserved for European industry and SMEs, including access to the LUMI user support team, enabling companies to take advantage of high-performance computing for innovation and development activities.

Example: Poro LLMs

- A family of open LLMs built and trained on the LUMI supercomputer.
- With its advanced capabilities with low-resource languages, Poro will be built to handle all 24 languages of the EU.

Talent

The Netherlands is nurturing and growing AI **talent through targeted and joint undertakings by industry and research institutions.**

Example: Kickstart AI

- Host AI super challenges to solve societal issues and promote talent globally.
- Create joint industry-academia appointments, adding 25 new positions to enhance education and training.
- Promote a national AI course, aiming to reach 170,000 people.

Research

Finland's long track record in AI research is a testament to its **world-renowned universities** offering a variety of AI courses/programmes, active industry-academic collaboration and innovative startups with roots in universities and research.

Example: AI for Business programme (2018-2021)

- Funding targeted for all-sized companies and research institutions for AI R&D projects.
- Aimed to increase AI expertise and build global ecosystems and research collaborations.

Development

Ireland attracts global tech companies for its **competitive, pro-business environment and strong industry-academic research credentials**, ensuring that innovative researchers, companies and entrepreneurs that are developing and using AI are connected to each other.

Example: Lero, The SFI Research Centre for Software

- Brings together 200 researchers in Ireland, covering a wide range of software development related to AI.

Commercial

Estonia recognises itself as being an **implementation leader** for startups and AI applications. The national AI strategy (2019) outlines 12 initiatives to accelerate AI uptake in companies, incl. different funding measures and 9 initiatives to increase R&D.

Example: AI & Robotics Estonia (AIRE)

- Supports Estonian industrial companies in adopting smart digital solutions in the field of AI and robotics.
- Provides funding and expertise through training and consulting as well as by connecting companies with service providers.

Belgium can capture the AI potential with a balanced set of choices

Grow R&D by local innovators

Enable **innovation** and invest in AI **research and development**

Dilemma

> **Ensuring performance of AI technology in a Belgian context**
>
> *and*
>
> **Driving application of leading global AI technology**

Recommendation

- Belgium is doing relatively well in AI research compared to European peers, with funding and initiatives found across national, regional and local levels. Yet the application of this research towards the creation of new, marketable products that could benefit businesses is somewhat limited.
- Programmes aimed at creating closer ties between academia and industry could ensure that research breakthroughs are coupled with industry demands. Inspiration could be drawn from Finland's AI for Business programme, providing funding and support for companies in corporation with academia.

Accelerate commercial uptake

Promote widespread **adoption** and universal accessibility

> **Encouraging AI-based business models in tech-focused startups**
>
> *and*
>
> **Facilitating AI adoption in traditional, established companies**

- AI adoption by enterprises in Belgium is on par with European peers. However, Belgian AI startups struggle with funding, and SMEs are hesitant to adopt AI, partly due to regulatory ambiguity and limited understanding of AI applications.
- Targeting SMEs, the bulk of Belgian businesses, is key to achieving Belgium's AI potential. These efforts should aim to provide clear regulatory guidelines and enhance AI knowledge at management level. The Danish Industry Foundation, providing support, guidance and funding for AI projects in SMEs could serve as inspiration.

Retrain and upskill workforce

Build **human capital** and an AI-empowered workforce

> **General AI upskilling across population**
>
> *and*
>
> **Targeted re-skilling of groups affected by AI**

- Belgium faces an urgent AI talent gap. National and regional programmes are in place to bolster STEM skills and facilitate adult reskilling for AI specialisation. Yet there is a growing demand for managers with AI competence to lead organisational transformation, indicating a need for broader AI integration and general upskilling.
- Building on initiatives in the National Convergence plan from 2022, Belgium could invest further in national upskilling programmes to integrate AI skills in non-STEM fields. Inspiration could be drawn from the Netherlands' successful National AI course.

Note: For more details on policies, see National Convergence Plan 2022, OECD AI Observatory and Google's policy paper on "AI Opportunity".

08

Annex

Modelling the impacts of generative AI in Belgium.

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Modelling the economic opportunity for Belgium

IM

Overview of the methodological approach to calculating economic growth and productivity impact from generative AI

The economic effects are calculated in the following steps

1   **Automation potential of work activities:** First, the exposure to generative AI is calculated by breaking down the automation potential of 39 different work activities/tasks in the occupational task database O*NET. The database includes an estimate of the share of each activity (e.g. getting information, performing administrative activities etc.) that can be automated by generative AI (if the activity is above level 4 on an O*NET-defined scale of difficulty 1-7, no automation potential is assumed).

2   **Mapping automation potential of work activities to occupations:** The automation potential of the work activities is mapped in ten European industry aggregates in two sub-steps. First, the 39 work activities for 900 US occupations are mapped using importance-average activities for each occupation, providing an estimate of the share of each occupation's total workload that AI has the potential to automate. Secondly, this number is projected from US to European occupations through the European Commission's crosswalk between ESCO and O*NET and finally compiled into aggregated occupations (using the sub-occupation employment). This leaves us with the three shares that describe how big a share of the work activates for each occupation is expected to see: No automation, AI complement and Likely replacement.

3   **Quantifying productivity gains in each sector:** Generative AI is assumed to affect the productivity of the work activities for each occupation as follows (see section 3 for further details). The "No automation" share of work activities is assumed to be unaffected by generative AI. "AI complement" work activities experience a productivity boost from automation. "Likely replacement" is the share of work activities in a sector that is expected to be entirely automated/replaced. These workers are expected to be re-employed in slightly less productive jobs. The three effects are calculated across sectors and scaled by each sector's value added to determine the full productivity potential/generation of new jobs from generative AI across the economy, once the technology adoption peaks.

4   **Aggregate GDP impact:** Based on the estimated increase in labour productivity resulting from AI adoption, the result is aggregated to an overall GDP. Only part of the total long-run productivity increases from generative AI is expected to materialise in the economy during the initial ten-year period of technology adoption following an S-curve adoption trajectory.

- The method used to calculate productivity and GDP effects of generative AI in this paper is in line with the methodology developed by Briggs and Kodnani (2023) in "The Potentially Large Effects of Artificial Intelligence on Economic Growth".

Note: Methodology is based on Briggs and Kodnani (2023).
Source: Implement Economics based on the European Commission, Eurostat and O*Net.

Disclaimer

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The purpose of this Report is to assess the economic opportunity of generative AI in Belgium.

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