



Information Technology: Software, Media and Telecommunications

Sustainable Development Analysis Framework



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Digitalization is the source of this century’s disruptions. Whether communicating, socializing, working or consuming, software and the media are increasingly ubiquitous in our daily lives. Although Information and Communications Technology (ICT) present new problems for society, particularly in terms of respect for privacy, its widening use can also be a strong vehicle for sustainable development solutions. ICTs can drive economic development and widen access to knowledge, particularly in developing countries. These technologies also have strong potential for developing ecological and/or social innovations, such as smart cities, smart grids, and smart buildings, all of which are tools that can help us move towards sustainable development in our society.

Sectors: Software development and software as a service, media (advertisers and content providers) and telecommunications operators

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Major Sustainability Challenges for the Sector

		Environmental Impacts			Social Impacts			Financial materiality
		Climatic stability	Healthy ecosystems	Resource security	Basic needs	Well-being	Decent work	Financial materiality
Opportunities	ICTs for Sustainable Development	9	15	12	2 6 7	3 10 11		
	Access to ICTs				10	4 16		
Risks	Privacy Protection					16		
	Content and Platforms Responsibility					5 10 16		
	Human Resources					10	8	
	Environmental Impact of ICT Infrastructure	13						
	Business Ethics							
	Sustainability Governance	Governance has a potential impact on all sustainability and financial issues						

High
 Moderate
 Low

1 Sustainable Development Goal corresponding to opportunity or risk (detailed in the annex)



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Sustainability Opportunities

ICTs for Sustainable Development

ICTs are being used to develop a growing number of tools that can have a positive environmental and social impact. By enabling the emergence of various solutions, ICTs are an essential aspect of sustainable development.

Numerous examples illustrate the capacity of ICTs to offer new solutions to environmental and social challenges. The deployment of intelligent flow management systems, at the crossroads of machine-to-machine communication (M2M) and big data, is a very good example of this. Applied on a large scale in the energy and water (smart grids), transport, agriculture, construction and industrial processing sectors, these solutions account for most of the carbon emissions avoided via the ICT sector. In total, this reduction in global emissions could represent up to 12.08 GtCO₂e by 2030, enabling the stabilization of emissions level compared with 2015 (GeSI, 2015).

Other uses of ICTs which carry environmental and social benefits include the development of impact optimization software. This type of solution makes it possible to virtually test products and improve them before prototyping, thus avoiding the multiplication of prototypes, the introduction of defective models on the market and achieving the optimization of products in terms of both the environment and user health and safety.

ICTs are also applied in many different ways in the medical field: in-home medical observation, remote diagnosis, centralized management of patient data in medical institutions, modelling of biological systems, etc. These solutions act as a lever for improving patient care and supporting medical research.

The environmental and social advances made possible by new technologies generate many opportunities in all other sectors, and these represent opportunities for ICT companies that are well positioned in these new markets. This can therefore mean significant financial benefits for companies in these segments.

We favour companies who devote a significant part of their activity to the development of products and services that are sustainable solutions, provided that the environmental and/or social benefits generated can be assessed.

Key indicators

- ▶ Share of revenue generated by products/services dedicated to benefitting from these opportunities
- ▶ Environmental/social performance generated.

9.7 x

Carbon emissions avoided through ICT could add up to 9.7 times the carbon footprint of the ICT sector itself

(GeSI, 2015)

41% of people in developing countries have internet access

(ITU, 2017)

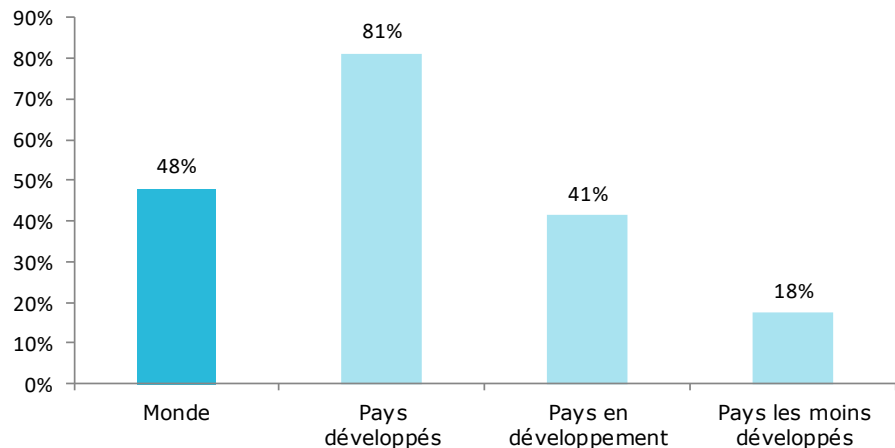
18% of people in the least-developed countries have internet access

(ITU, 2017)

S Access to ICTs

For non-OECD countries, access to ICTs is a major economic and social development issue. In developing countries, nearly 60% of the population still lacks internet access. This figure rises to over 80% in the least-developed countries (ITU, 2017), while the illiteracy rate is still at an average of 12% among young people and 20% among adults (UNESCO, 2012). It is also estimated that a 10% increase in broadband penetration among these populations is accompanied by a 1.4 percentage point increase in GDP (World Bank, 2009).

Figure 1: Share of the population with internet access in 2017



Source: Mirova / (ITU, 2017)

The digital divide is also an issue in mature economies, although de facto affecting a smaller part of the population. Indeed, rural areas remain poorly connected. 15% of the population does not yet have internet and 5% of internet users have a speed of less than 10 Mbit/s (ITU, 2017). Furthermore, the difficulty of accessing ICTs is an additional disadvantage for the elderly, those on low incomes and those with disabilities.

Solutions for bridging the digital divide and harnessing ICTs for development are multiple. In particular, we encourage the extension of fixed and mobile coverage in less well-fitted areas and the development of products and services dedicated to the needs of the most deprived populations (low-cost offers, mobile banking services, mobile education services, disabled access, etc.). We promote companies that are significantly involved in developing and providing these types of solutions, particularly in developing countries.

Key indicators

- ▶ Share of turnover generated in emerging and developing countries
- ▶ Share of turnover generated by products and services dedicated to promoting access to ICTs
- ▶ Number of users of the products and services that provide greater access to ICTs

Exposure to Opportunities

Indicator considered:		
% of revenues generated in emerging countries % of revenues generated from ICTs for sustainable development % of revenues generated from ICT access solutions		
High exposure	>50%	An analysis of the company's strategy and investments will complement these quantitative elements.
Significant exposure	Between 10% and 50%	
Low or no exposure	<10%	
Negative exposure	No product or service in the ICT sector is currently considered as negatively impacting a sustainable development issue	

Environmental and Social Risk

S Privacy Protection

Privacy protection is recognized as a fundamental right by the Universal Declaration of Human Rights, adopted by the United Nations in 1948, but the emergence of ICTs raises new questions about the limits and boundaries of the right to privacy. The ICT industry collects an ever-increasing amount of data on the users of these technologies, a phenomenon which is explained by a double trend.

On the one hand, there is the increasing incorporation of connected objects into our daily lives (smartphones, tablets, smartwatches, etc.), in cars (from GPS to more sophisticated solutions for assisted driving), in buildings (smart meters, sensors, etc.), and integration on a larger scale (smart grids, smart cities, etc.). This equipment and the associated software and platforms collect a growing amount of data related to their users (geolocation, consumption habits, personal interests, political inclinations, etc.).

On the other hand, the internet plays an ever more central role in mainstream life and culture. For example, the digitization of payment, of communications and administrative management methods, etc. generate a migration of personal information towards dematerialized media.

In short, ICT companies are the recipients of an exponential mass of information about users of connected products and digital services. The use of such data may pose a risk to privacy, in particular:

Data theft. Companies' responsibility to ensure the security of their users' data lies in the proper training of their employees and the implementation of measures to prevent human error. Certain breaches in databases are due to employees being insufficiently aware of the risks or, less frequently, malicious. However, the vast majority of these breaches result from external attacks exploiting security flaws in companies' hardware and software. Cyber-security is all the more critical as the mass of user data grows exponentially and cyber attacks intensify. In other words, there are more attacks and each attack targets more data than ever before. These attacks are a real risk for companies but also and above all, for users whose data is obtained illegally (moral and/or financial harm). Data security is therefore a prerequisite for privacy. In order to preserve individual liberty, appropriate data security solutions must accompany the development of these technologies.

Abusive use of data by companies. The processing of user data represents a major opportunity for software and media companies. They have the ability to better understand the behaviour of their users and refine their products and services accordingly, but also to monetize this data through targeted advertising activities. Whether for internal use (refining one's own products and services) or external use (data resale or marketing of a targeted advertising service based on this data), data collection has become widespread on websites, applications and connected objects. However, these practices are rarely accompanied by a sufficient degree of transparency towards users. The latter often have only a partial understanding of how their data is used and limited power to act on how data is collected and the use made of it. The risk of invasion of privacy is particularly high among companies that collect a large amount of information (photos, videos, geolocation, etc.) and whose "free" business model relies on

1.2 zettabytes

It is the amount of data exchanged on the internet in 2016. It is likely to triple by 2021

(Cisco, 2017)

> 9 billion

It is the number of data records lost or stolen since 2013

(Breach Level Index, 2017)

1995

It is the date on which the EU ratified the "right to be forgotten" in its Data Protection Directive

(EUR-Lex, 1995)

the monetization of user data (social networks, mobile video game applications, etc.). It should also be noted that many of these companies still offer only a limited possibility of erasing old data, a problem that directly echoes the subject of the right to privacy and that has given rise to regulatory considerations, particularly in the European Union with the European Data Protection Directive, including the notion of the "right to be forgotten".

Abusive use of data by public authorities. Numerous requests for access to personal data are made by government agencies to ICT companies. These requests are often linked to criminal cases (robberies, kidnappings, etc.), but have tended to increase in number, change in nature and create more tension in the context of the fight against terrorism. ICT companies must therefore ensure that such requests comply with international conventions and the legal framework before they are acted upon. This problem is particularly acute when demand comes from non-democratic regimes, as demonstrated for example by government repression facilitated by the use of user data during the "Saffron revolution" in Iran in 2007 (Faris, 2012).

Business practices regarding the management of fundamental freedoms are regularly called into question by the general public, while regulatory frameworks develop differently depending on geographical area (more flexible in the United States versus stronger in Europe). It is important that ICT companies address these issues and put in place measures to ensure that the fundamental rights of users are respected. Although there have been a large number of controversies, their financial impact has not been significant. An increasing number of fines and organizational changes are being imposed on internet giants. At the same time, the mass of users and data collected continues to grow, so that companies' revenues are only marginally affected.

In terms of private data preservation, companies are encouraged to detail investments made in cybersecurity, practices put in place and attacks suffered.

With regard to privacy, good practice remains rare. We encourage companies, particularly those that rely on data monetization, to make sure their users are in a position to make a well-informed and proactive choice about the type and use of information collected, as well as having the opportunity to erase any private information about themselves.

The implementation of chargeable alternatives where services are not based on data monetization or advertising provides another possible solution to this problem.

Key indicators

- ▶ Existence of a policy on data security and privacy (type of data and sources of collection, type of use and possible sharing with third parties)
- ▶ Investment in and IT teams dedicated to cybersecurity, default opt-out settings for user data collection, setting up a procedure to erase private information
- ▶ Existence of chargeable alternatives without advertising
- ▶ Periodic reporting on cyber attacks suffered/avoided and their impact, reporting on government requests concerning the transmission of user data

S Content and Platforms Responsibility

Internet companies, media, advertisers and game developers have a responsibility to limit the social risks associated with the platforms and content they distribute. This responsibility functions at several levels.

User protection. Companies must be able to protect their users from violent content, predators or indoctrination.

The risk of disinformation. The main social networks and news feeds risk spreading and amplifying false information and thereby participating in users being misinformed. "Fake news" is widely shared through these platforms, to the point that many governments and regulators are concerned about it. This problem also affects more traditional media (television, radio, newspapers), although they are often recognized as reliable sources of information. On another level, search engine and social network algorithms present the risk of skewing their users' access to information and thus distorting their perception of reality. The purpose of these algorithms is to prioritize content according to the data in each profile, with the risk of progressively "locking" the user in a bubble of similar information. This issue echoes the reflections on net neutrality, a concept based on the idea that access to information must be free and unbiased. To limit this risk, companies must limit the prioritization of content to its relevance (language, subject, etc.), without incorporating other factors (profiling of personal and political interests for example) or, at the very least, allow the user to define the criteria used to filter the content he/she will receive.

The social impact of content. For developers of this type of content (including advertisers or music and series producers), it is above all a question of fighting against the promotion of negative messages: banalization of discrimination, anorexia, sexualization of young adolescents, etc. The aim is to prevent the spread of negative messages. For broadcasters, the key point is the adequacy of content in terms of user maturity. Therefore, children's content must be subject to increased vigilance and advertising practices addressed (directly or indirectly) at this audience should be avoided.

Psychological dependency on media and platforms. On this subject, criticism was directed first at television and later the video game industry. Dependency is mainly linked to the cognitive appeal of media that is all-encompassing (sound/image), and interactive in the case of video games, and that is a vehicle of attractive content (emotional loads, information content, entertainment, etc.). Video games are particularly relevant here because of the continuity of their content, which can reduce awareness of time. The development of online platforms further increases this problem by increasing the accessibility of content via smartphone applications. Users of online social networks are even more exposed to the risk of psychological dependence. In addition to presenting similar factors (interactivity, attractive content, almost uninterrupted accessibility), social networks are also developed on the basis of algorithms that ensure optimal suitability for the user's tastes and accentuate certain dependency-generating social patterns.

The general public regularly raises concerns over ICT companies relating to the social responsibility of their platforms and content. Beyond the problem of reputation, certain controversies such as that of "fake news" or the promotion of extreme thinness in advertising have led some regulators to strengthen their framework, with operational repercussions for the

companies concerned. However, these controversies still pose only a relatively small financial risk at this stage.

Companies developing platforms and content must implement appropriate measures to protect their users: automated filtering, flagging options and a dedicated team to process alerts.

The mechanisms to be put in place regarding false information are similar. As far as platform neutrality is concerned, it is important to understand how companies incorporate this problem from the design stage of their algorithms.

Companies are also encouraged to systematize their approach to content's social responsibility and provide appropriate access management tools. Good practice includes proactively limiting advertising directed at children.

Finally, we encourage companies to take into account and act on the risk of psychological dependence when it comes to their platforms and services from the design stage onwards (periodic alerts in video games, prevention messages, etc.).

Key indicators

- ▶ Existence of a systematic approach to the quality of content and platforms
- ▶ Establishment of mechanisms to identify and control undesirable content
- ▶ Incorporation of the concept of neutrality by design
- ▶ Commitments and practices on the social impact of children's advertising content
- ▶ Development of signalling and content control tools (PEGI, parental control)
- ▶ Incorporation of dependency risk by design and preventive communication

S Human Resources

The ICT sector has been the subject of several controversies regarding its human resource management practices: offshoring, working conditions in call centres, burnout, harassment, etc. Telecommunications companies, due to market concentration, have been particularly affected by restructuring in recent years and the consequences of this have been serious.

However, we are witnessing a similar trend within software as a service companies. These companies are driven by technological innovations to adapt their models in order to gain advantages when it comes to new solutions related to digitization.

Controversies related to difficult working conditions in telecommunications have sometimes had a serious financial impact on certain companies. However, outside this specific sector, human resources issues do not yet give rise to significant financial risk.

Faced with these risks, companies in this sector can put in place appropriate policies to ensure that all their employees benefit from good working conditions, and that restructuring is either prevented or at least managed responsibly. We expect to see human resources policies aimed at controlling

Key indicators

- ▶ Share of employees located in countries with less regulation and measures to promote fair working conditions
- ▶ Number of employees working in call centres

the age pyramid, supporting the development of employees' career paths and their employability, as well as encouraging social dialogue. Companies are encouraged to create optimal working conditions for the well-being of their employees. During restructuring, it is also important to ensure the quality of support (training, compensation, etc.). Transparent communication is also needed to assess performance.

and measures to ensure good working conditions

- ▶ Annualized attrition rate
- ▶ Restructuring: number of people concerned, share of beneficiaries of mitigation measures (early retirement, training and job-search assistance, etc.), compensatory measures, etc.

E

Environmental Impact of ICT Infrastructure

3.8%

It is the expected annual increase in CO₂ emissions in the ICT sector, mainly related to infrastructure. The overall average for all sectors combined is 1.5%

(GeSI, 2012)

The widespread use of digital communication modes, the increasing use of online data storage (cloud) and the development of intelligent machines and networks (internet of things, smart grid, etc.) require the deployment of adapted telecommunications networks and imply an exponential increase in the volume of existing digital data. This volume is expected to reach 44 zettabytes in 2020, ten times more than in 2013. This generates a significant increase in the energy consumption of network and storage infrastructure, which is now responsible for increasing CO₂ emissions in the ICT sector, faster than the average for other sectors.

For network infrastructure, we favour companies that invest in upgrading their mobile network equipment to optimize energy efficiency and utilization, as well as in the use of renewable energy. With regard to data centres, we promote efforts such as the consolidation of storage centres, measures to improve energy efficiency (free cooling, etc.) and the use of renewable energies.

Key indicators

- ▶ Trends in the energy efficiency of infrastructure
- ▶ Share of renewable energy consumed
- ▶ Carbon impact

G

Business Ethics

As with all sectors, business ethics is an important issue and ICT companies must be able to prevent the risk of bad practice (corruption, fraud, etc.).

However, this industry is particularly exposed to competition regulation issues. In a context of concentration of players (telecommunications and the media), and even oligopoly for internet companies, companies are often the subject of controversies related to the infringement of intellectual property rights or the abuse of a dominant position. The emergence of regulations on net neutrality - which diverge from one geographic region to another - further reinforces these tensions. Some companies denounce unequal treatment in access to internet bandwidth or their visibility on search engines.

Because of its strong propensity to generate intellectual property-related revenue, the software and corporate net segment is also subject to particularly aggressive tax optimization strategies. The shortfall for governments is such that regulators are gradually tackling the issue. Despite

considerable legislative developments, the sector continues to be very opaque on this issue vis-à-vis other stakeholders.

We encourage companies to detail their business ethics policies. The risk assessment on this subject is essentially based on a detailed analysis of companies' controversies and reactions.

It is also essential for companies concerned to communicate transparently on their tax optimization strategies.

Key indicators

- ▶ Litigation in progress and fines paid
- ▶ Significant ethical controversies and corporate responses
- ▶ Annual report detailing income earned and actual tax rates by country

G Sustainable Development Governance

The integration of sustainable development strategy into governance structure is essential for the ICT industry, which is likely to support the transition towards a sustainable development model for our societies, but which also carries strong risks in terms of social, societal and governance questions.

We encourage companies to set up governance bodies dedicated to implementing corporate responsibility and incorporating the interests of all stakeholders, as well as aligning the interests of executives with long-term business development.

We also pay close attention to companies' approaches to value distribution, which should be carried out in a way that is fair to all of the company's stakeholders.

Key indicators

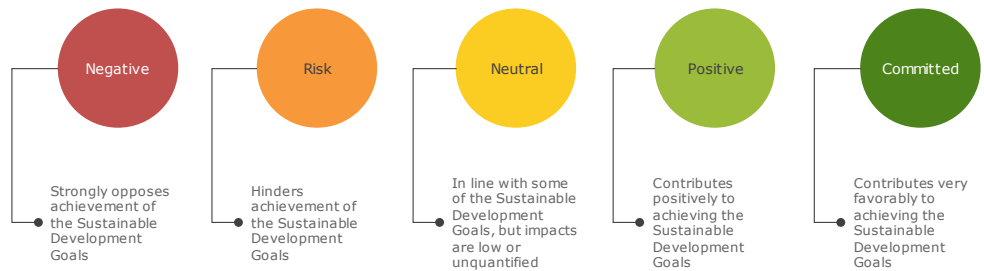
- ▶ Quality of the sustainable development approach
- ▶ A director or board committee specifically responsible for CSR matters.
- ▶ Incorporation of non-financial criteria into the variable compensation of executives
- ▶ Equity in value distribution

Risk Assessment

Criteria	
Positive	<p>Does not meet the criteria for switching to "Risk" AND</p> <ul style="list-style-type: none"> - Satisfactory privacy protection policy and reporting - Advanced practices in terms of content/platforms responsibility - Satisfactory human resources management - Comprehensive policy to reduce the environmental impact of network or storage infrastructure.
Neutral	All other cases
Risk	<ul style="list-style-type: none"> - Practices deemed insufficient and reaction deemed inappropriate in response to controversies over users' privacy OR - Reaction by the company to repeated social controversies deemed insufficient or inappropriate OR - Reaction by the company to repeated ethical controversies deemed insufficient or inappropriate

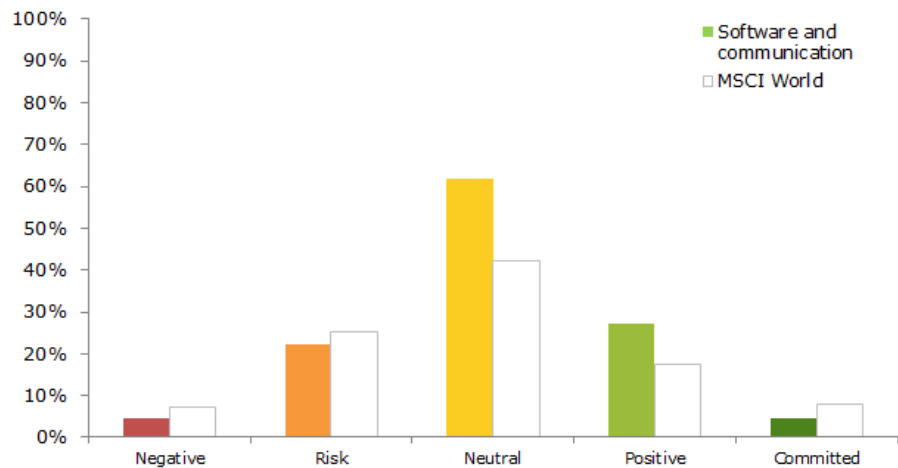
Opinion Breakdown

Based on this framework of analysis, a “Sustainability Opinion” on a six-level scale is defined for each issuer.



The following figure illustrates the distribution of Sustainability Opinions on the companies in the software and communication sector compared to the MSCI World Index.

Figure 2: Opinions on Sustainable Development in the Software and Communication sub-sector vs. MSCI World Index



Source: Mirova, 2017

Over half of the companies in this sub-sector have a Sustainability Opinion of “Neutral” as their product portfolio is usually fairly diverse, with no clear trend towards increasing the portion that provides access to ICT-for-all or supports the development of sustainability solutions in other industries.

“Committed” and “Positive” companies are those which exposure to these sustainability solutions is significant and quantifiable, and/or have a convincing approach to addressing the main environmental, social and governance risks in their own operations and throughout their supply chain. It should be noted that numerous companies in this sub-sector have a rather limited exposure to sustainability risks as their operations do not require manufacturing processes (either directly or indirectly).

“Risk” and “Negative” companies are mainly those exposed to greater sustainability risks due to their business lines (telecommunication infrastructure, sales of hardware devices, etc.).

Conclusion

The ICT sector is a strong vehicle for economic and social development for all populations, particularly those in emerging countries. It is also the breeding ground on which many solutions to the challenges of sustainable development, which concerns all other sectors of activity, are being developed. The players positioned in these markets are therefore favoured within the framework of a responsible investment policy.

Companies are also assessed on their management of the risks inherent in their activities. Typically, for software and communication companies, the following risks are taken into account: respect for privacy rights, responsibility for content and platforms, working conditions and human resources management, reducing the environmental impact of network and storage infrastructure, and business ethics. In the "business as usual" activities (i.e. those not positioned on pre-defined key opportunities), good management of these risks, which guarantee the sustainability of activity, may represent a favourable differentiating criterion.

Conversely, a company presenting opportunities in its business portfolio, but also shortcomings in the management of its main risks, may be excluded from our investments. Finally, a lack of public information on risk management will require us to make contact with the company. A commitment approach will enable us to obtain the information that is lacking in our analysis, or to encourage the company to be more transparent.

Sustainable Development Goals

- | | |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 1. End poverty in all its forms everywhere |
|  | 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture |
|  | 3. Ensure healthy lives and promote well-being for all at all ages |
|  | 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all |
|  | 5. Achieve gender equality and empower all women and girls |
|  | 6. Ensure availability and sustainable management of water and sanitation for all |
|  | 7. Ensure access to affordable, reliable, sustainable and modern energy for all |
|  | 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all |
|  | 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation |
|  | 10. Reduce inequality within and among countries |
|  | 11. Make cities and human settlements inclusive, safe, resilient and sustainable |
|  | 12. Ensure sustainable consumption and production patterns |
|  | 13. Take urgent action to combat climate change and its impacts |
|  | 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development |
|  | 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss |
|  | 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels |
|  | 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development |

<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

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MIROVA

French Public Limited liability company with board of Directors

Regulated by AMF under n°GP 02-014

RCS Paris n°394 648 216

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