

FDI IMPACT ON ECOLOGICAL FOOTPRINT: SECURITY CONTEXT



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Abstract. The article presents a study that summarizes the features of foreign direct investment (FDI) and its impact on environmental: key determinants, global trends, as well as the current state and prospects of FDI mobilization in environmentally friendly sectors. Besides, the article consistently analyses the theoretical basics (advantages and disadvantages) of FDI from the perspective of ecological security.

Attention particularly is paid to new phenomena - "green" FDI. The global economy "trajectory" is changing towards sustainable development and draws increasing attention to governments, TNCs, institutional investors, and households to the need to mobilize "green" investments in low-carbon and climate-resilient infrastructure, RES development, industrial energy modernization, etc. The global trends of "green" FDI and its input notably in the renewable energy sector are considered separately.

This research presents the results of a sociological survey of executives related to the principles and prerequisites of "green" investing in Ukraine. In particular, their views and approaches to attracting and accumulating such investments. On balance, some steps on environmentally friendly FDI attraction have been formed.

Keywords: *FDI, "green" FDI, TNCs, national economic interests, environmental friendliness, ecological security, investment policy.*

Introduction

Strengthening of world economic ties, expansion of integration processes, deepening of the international division of labour and industrial cooperation, a gradual liberalization of investment activity, intensification of TNCs functioning, technological progress, increasing competition, and companies` entering in new foreign markets – the driving forces that influence international investment process intensification. At the end of the XX – the beginning of the XXI century, international investment flows have been increased at a rapid pace, exceeding the world trade`s growth rate. The FDI inflows as a percentage of gross fixed capital formation began to grow rapidly: in the 1980s it was 2-3%, in recent years it has approached 10%; in some transition economies, its share varies between 24-28% and in developing countries - 30-40% (UNCTADStat).

However, the impact of FDI is quite difficult to estimate precisely – FDI net benefits are not automatic and do not increase equally in each country, sector, or region, and its volume depends on the foreign investor. On the one hand, enterprises with FDI bring to the recipient country technical assistance that improves product quality and increases the technological level of the production process. FDI can play an important role in the promotion of environmentally friendly goods and services. On the other hand, FDI can create negative consequences, particularly in the ecology sphere: foreign investors could move environmentally dirty production capacities to the FDI recipient country or attract old and unusable technology (Markevych, 2020). Consequently, the state faces the challenge: on the one hand, it should attract FDI, but on the other hand – minimize FDI`s possible negative impact on economic security (from the ecology point of view).

Analysis of recent research studies and publications. FDI has become the object of numerous theoretical and empirical studies, many of which explain the FDI phenomenon and the factors behind its placement. Most new FDI theories extend and complement the ideas of previous scientific developments. The dynamism of the world economy, digitization, and the introduction of the sustainable development concept have contributed to the emergence of new ideas related to the attraction of desired capital or vice versa - protection country from its influx.

Until recently, the role of FDI in sustainable development and its impact on "green" growth has not discussed in an expert, scientists, or other knowledge-holders. FDI role in the ecological security system has become the subject of scientific works of foreign scientists (Gallagher K., Gray K., Fortanier F., Lyuba Z., Maher M., O'Connor S.), as well as experts from several international organizations – UNEP, OECD, UNCTAD – that have focused on the dualist impact of FDI and its security aspects.

Research methodology. The methodological basis of the scientific paper is formed by a set of general scientific and special methods, the use of which is caused by the purpose of the research. In particular: methods of analysis and synthesis – in determining the place of FDI in the system of ecological security and its impact on the national economic interests; methods of logical generalization – in determining the main benefits and risks of FDI for ecological security; method of comparative analysis and graph-analytical methods – in visualizing systemic representations of FDI in the economy; structural-functional method – in determining the directions of FDI regulation in the economic security system.

The purpose of the article is to highlight the factors, dimensions, and consequences of environmentally friendly FDI, the opportunities for its multiplication, as well as the features/practicality of such investments in Ukraine. The article is aimed at developing practical recommendations for the FDI regulation in terms of ensuring the ecological security of Ukraine.

Research results. Real-world experience shows that in an open economy, FDI is one of the major factors in the socio-economic development of the recipient country, which is intertwined with the domestic economy and

becomes an integral part of the reproduction process. FDI has several advantages: (1) accumulation of additional capital; (2) increase of production capacity; (3) transfer of new technologies and best practices in management and marketing; (4) creation of additional jobs and increase of employees' earnings; (5) augmentation of budget revenues; (6) stimulation of competition in the internal market, that contribute to lower prices and product quality improvement ; (7) provision of national economy effective integration into the world (through the expansion of critical imports and export potential), *etc.*

One of the important tasks of the international agenda - is the achievement of the UN Sustainable Development Goals (SDGs), approved in September 2015. Sustainability is a new paradigm for the development of a modern society that combines economic, social, and environmental determinants. Gradual achievements of the SDGs have begun to be implemented in the state's investment policy: through the introduction of instruments aimed at promoting FDI in sustainable development.

Because of the lack of public financial resources and the absence of sufficient private investments, "green" projects` implementation requires considerable investments. Besides, an imperfect and underdeveloped banking system in most transition and developing economies does not give an opportunity to bring these projects into life. Changing the trajectory of countries towards sustainable development increasingly draws governments' attention to the need for "green" investment mobilization in low-carbon infrastructure, clean energy production, and industrial production processes (Markevych, 2020).

Globalization and increasing TNCs' influence (TNCs are the main producers of FDI and their number since the 1970s has grown from about 7 000 to 60 000 today) have gradually shifted the focus of the sustainable development concept from the national level to the corporate. Today, an increasing number of TNCs integrate social and environmentally responsible principles in their corporate strategies through ESGs factors (Environmental, Social, Governance). The scale of sustainable investing assets is huge: at the beginning of 2018 (latest available data), sustainable investment assets (globally)

comprised \$30,7 trillion (2018 Global Sustainable Investment Review, 2019).

Taking all the above trends into consideration and countries' gradual transition to "green" growth and sustainable development, there is raised an important question: how and in what way FDI can affect sustainable development.

In recent decades, TNCs have firmly strengthened their positions and have taken an important place in the internationalization of the world economy. Their international output has grown at a faster rate comparing world gross product or world trade. Today TNCs function as autonomous economic entities that regardless of the country's

economic priorities define the strategy of their economic behaviour.

The FDI impact on the environment – both potentially positive and negative – has increased interest in the "green" FDI concept. Different international economic and financial organizations – UNCTAD, OECD, UNEP, etc. – and the specialized agencies as FDI Intelligence and Bloomberg have taken steps to identify "green" FDIs, calculate its flows and overall levels (Table 1). Understanding "green" FDI allows governments to assess the FDI influence environmental and to make a decision concerning its stimulation; potential investors - to determine whether such investments are environmentally sound.

Table 1.

Interpretation of "green" FDI

Organisation/ agency	Term	Interpretation
UNCTAD (2008) [1]	"Green" FDI	FDI combines investment that (1) focuses on high environmental standards than it is required by the host country legislation; (2) aimed at eco-friendly goods and services production. This definition applies to production processes (how/in what way such products have been manufactured) and types of goods/services (that are manufactured).
UNCTAD (2010) [11]	Low-carbon FDI	FDI in new ("greenfield") renewable energy projects (e.g. solar and wind power plants' construction, waste management, low-carbon, and technological production). UNCTAD focuses on low-carbon FDI as an important subset of "green" FDI and defines its as "the transfer of technologies, practices or products by TNCs to host countries – through equity (FDI) and non-equity forms of participation – such that their own and related operations, as well as the use of their products and services, generate significantly lower GHG emissions than would otherwise prevail in the industry under business-as-usual circumstances".
OECD (2011) [6]	"Green" FDI	FDI has been accumulating in ESG-sectors in order to reduce environmental risks, attract cleaner and energy-efficient technologies. FDI can be invested in (1) environmental goods and services. It can cover a number of sectors, which typically include renewable energy production and environmental services: water and wastewater treatment, waste management, and disposal, air pollution control, soil and water recovery, noise reduction; (2) processes that reduce environmental damage (using cleaner and/or energy-efficient technologies). Emphasis is focused on FDI in sectors that positively affect the environment: agriculture, forestry, mining, transport, construction, energy, and water management sector.
OECD (2015) [15]	"Green" FDI	FDI is primarily targeted at (1) "green" and ecology infrastructure; (2) sustainable management of natural

		resources and services; (3) environmental activity and different "green" value chains.
<i>fDi Intelligence</i> (2016) [3]	FDI in RES	New ("greenfield") FDI in solar and wind power plants, biomass production, hydropower, geothermal, offshore, and other RES.
UNEP (2017) [8]	"Green" FDI	FDI contributes to environmental and climate goals, protection, and sustainability; and neutralizes environmental or climate impacts
<i>Bloomberg New Energy Finance</i> (2017) [5]	Global investment in clean energy, low carbon services and "smart" energy technologies	"Greenfield" and M&A investment in renewable energy (e.g. biofuels, thermal power plants, wind farms, and solar power plants), clean energy services (e.g. carbon markets), and energy smart technologies (e.g. digital energy, energy efficiency, and energy savings).

At the same time, it is still not possible to give an unambiguous assessment of FDI effect in recipient countries. As an economic phenomenon, FDI could have both positive and negative effects. There is no consensus concerning the FDI impact on the realization of the host countries' national economic interests. It depends also on the country's legislative, political, financial, and cultural peculiarities. In order to understand the "positive" and "negative" sides of FDI in the host country, it is extremely important to determine its impact on the national economic interest with regard to ecology (Table 2).

Table 2.

**FDI impact on the environmental-economic aspects
of the host country**

<i>Benefits</i>	<i>Threats</i>
<ul style="list-style-type: none"> ➤ Modernization and automatization of existing production lines that help to conform to world quality requirements. ➤ Establishment of environmentally friendly and safe enterprises aimed at reducing greenhouse gas emissions. ➤ Development of resource- and energy saving, improvement of energy efficiency level. ➤ Increase of innovative development through the expansion of innovative products manufacturing. ➤ Implementation of energy conservation and widespread use of RES. ➤ Development of resource-saving, science-intensive, and environmentally friendly technologies. 	<ul style="list-style-type: none"> ➤ Placement of environmentally hazardous, harmful, and energy-intensive industries in the host country that may pose a threat to ecological security. ➤ Limitations of the recipient country to evolve technologically because of the availability of "second-hand" technologies (TNC affiliates have relatively older technology). ➤ Possible irrational use of natural resources and excessive exploitation (it depends on the legislative framework). ➤ Possible environmental pollution (it depends on the legislative framework).

The threat to the environment may not be felt immediately, but risks can be accumulated and may lead to environmental catastrophes, which will take enormous costs and time. The findings show that FDI can have a different (positive and negative) impact on the host country's economy and different effects on the state's ecological status. Let us see in detail.

Improving environmental quality. FDI can have great potential for solving both energy and environmental issues. Investing in new ("greenfield") renewable capacities increases the availability of using renewable energy and concurrently reduces its cost to consumers. Such investment can be a guarantee of an improvement (or invariability) of the environmental performance (for instance, through forest conservation or restoration projects, or investment in adaptation or enhancing the local infrastructure resilience). Finally, FDI can be a channel for promoting best practices: FDI can transfer critical technology to local businesses in order to manage and mitigate environmental impacts. Indeed, one of the main advantages of FDI is that it could facilitate technology transfer and

give an opportunity for the host country to move from a less efficient and highly polluting phase of development to a “clean” and resource-efficient one. TNCs' decisions regarding industrial and energy production process modernization can exacerbate mitigation or reduce negative environmental impact.

GHG emissions reduction. FDI can have a significant impact on GHG emissions through its mobilization into effective methods of energy production and consumption. An important role plays the decisive of top management (whose activities are related to fossil fuel extraction) regarding equity “reorientation” in low-carbon R&D. Such measures as production upgrades or switching to alternative fuels can also be taken into consideration in order to reduce GHG emissions. Finally, investments in technologies that capture GHG emissions or facilitate the transition to alternative fuels from carbon-based sources have also a positive impact on climate change in the long term.

Some researchers identify channels through which FDI influence environmental (Gallagher & Lyuba, 2007): (1) transfer of clean technologies – more efficient and less polluting; (2) technological leapfrogging – transfer of pollution control technologies; (3) transfer of best environmental management practices to TNC`s affiliates and suppliers. Mostly, these channels have a positive impact (*Fig. 1*), although it is considered that FDI may influence the formation of negative footprints in the recipient country.

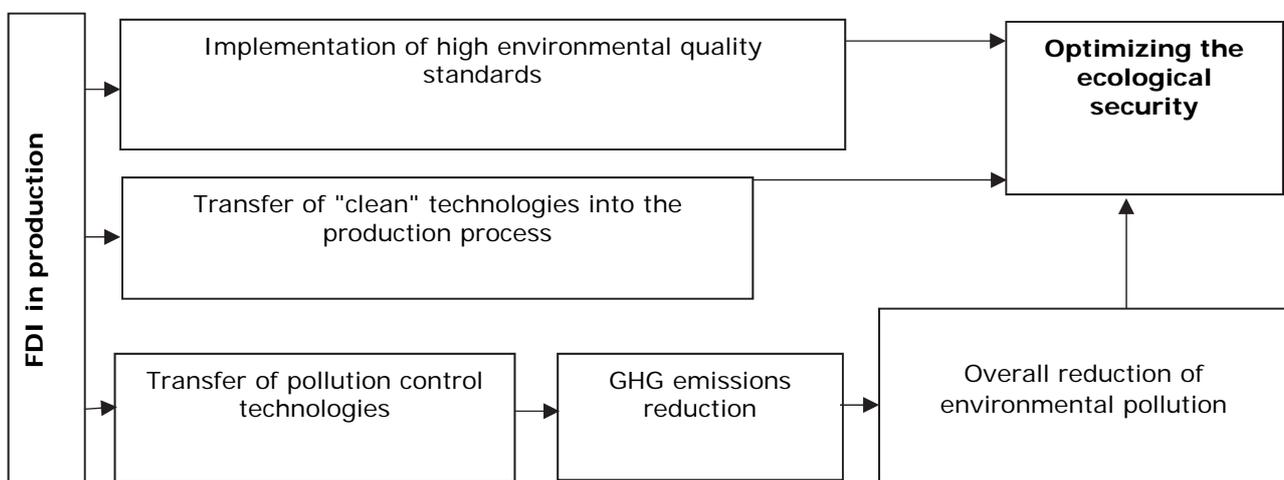


Figure 1. FDI influence the ecological security

Thanks to attracting and effectively using “green” FDI, host countries could avoid an energy crisis, thereby, could construct its energy security on an environmentally sustainable basis (as a result – reduction of GDP energy intensity). In particular, FDI contributes to:

- ✓ the introduction of large-scale deployment of new technologies that improve the efficiency of fossil fuel production and processing;
- ✓ the attraction of energy-saving technologies that have a positive impact on the reduction of the energy component in the cost of the final product in metallurgical, chemical and machine-building industries;
- ✓ the replacement of obsolete equipment at thermal power plants by new ones with a higher efficiency ratio.

Sometimes, FDI can establish negative environmental footprints. In the absence of proper environmental protection measures, the unfair behaviour of foreign-capital companies may have adverse effects on the host country. Negative consequences may arise provided that: (1) foreign-invested enterprises relocate environmentally “dirty” production capacity or; (2) FDI in the form of technology is old and unusable. Such consequences may occur in jurisdictions that have a lack of stringent environmental regulations and requirements.

According to the theory of the “pollution haven effect” (Gray, 2002), FDI is “looking for” areas where environmental standards are distorted. TNCs' decision to locate their manufacturing facilities abroad is driven by a desire to reduce the cost of environmental compliance. At the same time, according to the “regulatory cooling” hypothesis (Fortanier & Maher, 2001), not all countries have the desire to impose rigorous environmental standards, because governments are afraid of losing its

competitive advantage in attracting FDI among countries. Today, the negative environmental impact of FDI in recipient countries (mainly in developing countries) is a rarity.

Consequently, the national interest of the recipient country related to FDI attraction should be aimed not only at the tactical stance of profit increasing but also at a far-sighted philosophy of social responsibility that would not harm the environment.

An analysis of FDI impact on the environment components leads to the conclusion that FDI is an important source of funding for the transmission of technology between countries. However, the impact of "green" FDI is extremely difficult to assess precisely, since the net benefits of such investment are not automatic and do not increase equally for each country, sector, or region, and its volume depends on the foreign investor. Moreover, little is known about the FDI contribution to "green" growth. The limited understanding of the FDI role in "green" growth is largely explained by the lack of availability of relevant data at the international level. "Green" FDI is considered to emerge in areas where its environmental impact (energy efficiency, pollution control, and reduction, waste disposal) is the largest.

At the macroeconomic level, the FDI impact on the recipient countries' environment is determined by the structure of the sectors to which FDI is invested, as well as conditions of intensive pollution of industries (what is extremely difficult to calculate). The most relevant areas for GHG emissions that contribute to global warming and have a negative impact on the environment are agriculture, mining, manufacturing, transport, and construction.

In 2010 the World Bank published the first statistic information about "sustainable" FDI. According to the report, the levels of investments in sustainable development (RES, recycling, and low-carbon processing) amounted to approximately \$90 bln (UNCTAD, 2010). In 2016 the OECD's Working Group on International Investment Statistics attempted to improve the "green" FDI dimension (O'Connor, 2016) using the "green" FDI stocktaking method. Based on this methodology, the UK has estimated the accumulated "green" FDI in 2013: such FDI amounted to £8.1 bln or 0.8% of the overall FDI.

However, today flows statistics in sectors related to SDGs (in emerging economies) are provided by UNCTAD (Table 3).

Table 3.

**FDI flows to developing countries related to SDGs
(by sectors), \$bln**

	<i>Number of economics</i>	<i>2012-2014 (average)</i>	<i>2015-2017 (average)</i>
Water, Sanitation, and Hygiene	10	0,40	0,42
Food and agriculture	38	19,4	15,4
Health	23	1,9	1,4
Education	19	0,5	0,3
Energy sector	39	13,9	20,1
Transport infrastructure	41	11,0	10,0
Telecommunications	33	7,0	19

Source: formed according to [16]

In the absence of complete and detailed information on sustainable FDI (its flows), the argument regarding the FDI contribution to a particular industry may not be perfect. For instance, the largest volume of FDI in the energy sector that has been accumulated in developing countries - more than \$20 bln – may not conform to "greening" criteria. This is partly because investment in this sector includes flows to the "dirty" extractive industries. It concerns the electricity sector, as it involves the production of electricity generated from conventional energy sources (e.g. gas, coal, oil) and nuclear fuel. In this regard, FDI in the energy sector is probably overestimated.

The most open and comprehensive statistic on FDI flows related to sustainable development - is FDI to the renewable energy sector. Overall, RES investment competes with fossil fuel investment in several countries. According to the 2019 fDi Intelligence ranking, the number of FDI projects in the renewable energy sector has reached its highest level since 2008 [4]. In total, in the world, more than 360 projects (Table 4) were registered, with a total capital investment of \$82.4 bln.

Table 4.

**Top 10 destination countries for FDI in renewable energy by project numbers
2015-2018**

<i>Country</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>
USA	13	33	19	36
Spain	0	1	1	23
Vietnam	6	8	10	23
Australia	4	14	25	20
Mexico	6	21	27	19
UK	31	25	20	15
Brazil	12	9	8	12
India	28	23	3	12
Japan	22	20	9	12
France	5	3	7	11
Other	188	176	126	181
<i>Total</i>	<i>315</i>	<i>333</i>	<i>244</i>	<i>364</i>

Source: formed according to [4]

In June 2017, when President Trump's administration announced its intention to withdraw from the Paris Agreement, the number of FDI projects in the RES sector reduced by 42%. In 2018 the number of projects increased again to 36 (the cost of the announced projects was nearly \$6.7 bln) and even exceeded the record number of projects in 2016.

Among the sectors, the largest number of projects are concentrated in solar and wind power sectors. In the hydropower sector, only 2.57% of total FDI in the RES sector was invested in 2018. \$27.2 bln was invested in the wind industry – one-third of the world's investment in the RES; \$25.3 bln was invested in the solar sector. The biomass project number increase caused by the significant development of technologies in this area.

Today, there is a need to develop an expanded information base on the scope and trends of "green" FDI in order to pursue the goals of "green" economy policy. In particular, countries need to publicize more information about FDI in sectors: renewable energy, water, and waste management, wastewater treatment, sustainable agriculture and forestry, education, and health.

As mentioned above, the country's national economic interest regarding FDI attraction should be targeted not only at achieving profit increase but also at a far-reaching philosophy of social responsibility that would promote environmental protection. In this regard, countries try to encourage "green" FDI through providing different investment incentives: income tax rate

reduction, tax breaks (application of income tax zero rates to a company that works, for instance, in the renewable energy sector), tax benefits and accelerated depreciation, duty exemptions on imported equipment, *etc.*

On the other hand, in order to ensure economic security, governments impose foreign equity restrictions in certain sectors. The restriction indicators are based on a calculation of the OECD's FDI Regulatory Restrictiveness Index. According to the Index, regulatory constraints are quite low in some leading developed and developing countries, with the exception of some sectors. FDI is rather limited in electricity and agriculture. Developing countries generally have a high level of FDI restrictions, while North American and European countries have a low level, and this applies to a large extent to the "green" economy sectors. Closed sectors for foreign investors may indicate their "strategic" nature, which has to be controlled by the government. For instance, in Ukraine, the OECD FDI Restrictive Index is higher than its average in OECD member countries but lower than in the non-OECD countries, and in 2018 was 0.124 (OECD FDI Regulatory Restrictiveness Index – OECD). The most closed sectors of the domestic economy for foreign investors are the transport, defence, air and sea transportation, real estate, and media sectors.

In order to understand the attitude of different enterprise managers to the "green" investment in Ukraine, we decided to hold a sociological survey. In particular, management expressed its views and approaches to attracting and accumulating a "green"

investment. An expert survey had been conducted by the Razumkov Center's Sociological Service during the 12th September – 9th October 2019 within the framework of the project: "Green" Investments in Sustainable Development: International Aspect and Ukrainian Realities". The survey was conducted in 22 regions of Ukraine and Kyiv, which provided a fair geographical representation of respondents (80 respondents send their answers) (Centr Razumkova, 2019).

One of the first questions concerned the concept of sustainable development, in particular: «Do you carry out a "green" investment in your enterprise?». Two-thirds of respondents - 75% - reaffirmed that they carry out a "green" investment, which remains the main topic in their daily investment practice. The result indicates the consistency of Ukrainian business with the global trend of increasing attention to environmental issues, the energy efficiency introduction, and modernization measures.

The survey's results showed that the overwhelming majority of respondents were aimed at investing in energy-saving technologies' introduction – 52.5%, industrial modernization – 42.5%, and energy modernization – 40% (question: "In what measures do you carry out a "green" investment?"). This result indicates, primarily, the investors' desire to reduce energy consumption and utility bills in the short and medium-term, and, more importantly – in the case of modernization – to develop modern, dynamic, and high-tech products with value-added.

37.5% of respondents identified the importance of investing in the disposal of hazardous waste (that includes medical waste, plastic products, petroleum residues, organic waste, gas and dust emissions, etc.) because of generating and accumulating waste during manufacturing processes.

This result underscores the popularity of "green" investing, despite the many obstacles that stand in the way. Companies gradually adopt business strategies that aim at resource efficiency maximization and clean production through the implementation of an R-strategy (Reduce, Recycle, and Reuse). This strategy redirects an enterprise's cash flows (profits) into the maximization of energy efficiency and raw material use, expanding the greener materials use, and modernization of line production in order to prevent environmental pollution.

Along with financial gain, there is a growing public perception that short-term commercial and entrepreneurial interests should not outweigh long-term environmental considerations. Companies that keep up environmental standards and requirements assume responsibility for future environmental impacts, which in turn can lead to significant costs at the first stages of the investment process, but in the future – it will improve the environment and may increase business profitability. It is important that companies that have already reached the required level of environmental friendliness can attract new environmental investment much more quickly (thanks to their practical experience) from the outside.

Conclusions

Due to the scale and its growth in the recent decade, FDI has become an important source of funding. Besides, such investment has the potential to transfer clean technologies and practices that make a contribution to environmental progress directly. There are reasons to hope that "green" FDI has a positive contribution to the economic growth of most countries around the world. Nevertheless, in order to achieve real breakthrough (receive more benefits), it is important to formulate an accurate and sustained definition of "green" FDI and increase commitments related to solving the environmental problems by foreign investors. FDI can be a useful financial tool to set up enabling conditions for environmentally sound economic and social development.

It is advisable to develop tools for the "green" FDI policy. Steps that can help to attract such investment include:

- ✓ harmonization of initiatives that help to promote and embed FDI in line with the global SDGs and the Paris Agreement requirements (this includes scrutiny of strategic orientation of FDI recipient country policy and its investment position);
- ✓ focusing attention on a "green" reinvestment;
- ✓ increasing the FDI efficiency as a channel of transmission of "green" technologies;

- ✓ stepping up the Investment Promotion Agencies work which means the identification of sectors for "green" FDI attraction with the purpose of further economic recovery.

What is more, government policy, financial technologies (fintech), and emerging market practices (such as "green" banking or climate risk disclosure) can also create additional opportunities and expand the "green" FDI demand.

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