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An Overview of Foreign Trade in Environmental Goods with Special Reference to India

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Abstract: *In a world grappling with the dual challenges of accelerating climate change and deteriorating international trade relations, collaborative and sustainable development has emerged as a critical pathway forward. Promoting trade in environmental goods offers a promising avenue to address both environmental and economic concerns. This study assesses India's position in the global trade of environmental goods by analyzing the growth of its exports and imports in comparison to global trends, as well as those of developed and developing countries, over the period 2000 to 2021. It applies the log-linear method in linear regression to compute the compound annual growth rate with 2000 as the base year. The findings reveal a declining share of developed countries in environmental goods exports, accompanied by a rising share from developing nations. Although India's share in global environmental goods exports remains modest at around 1%, it has recorded higher export growth relative to the world average and both developed and developing countries. Similarly, while India's share in global imports of environmental goods is slightly higher than its export share, it too is experiencing faster growth. These trends highlight India's increasing engagement in the trade of environmental goods and suggest potential for future expansion in this sector.*

Key Words: *India, India's foreign trade, environmental goods, India's trade in environmental goods.*

1. INTRODUCTION:

Amidst the wave of de-globalization and the growing trend of protectionism across economies, the world is facing another pressing challenge: climate change. The threat of climate change is no longer a distant concern but a present reality that demands urgent action. In light of these current challenges, sustainable development is seen as the way forward. Foreign trade, once hailed as an engine for growth, is now partly blamed for the increase in CO_2 emissions, primarily due to transportation and the heightened production for exports. However, there is growing consensus that trade can play a pivotal role in addressing climate change through the exchange of environmental goods, the sharing of eco-friendly technologies, and collaborative efforts. In fact, trade in environmental goods has proven to be more resilient in the face of rising protectionist sentiment in recent years (World Trade Organization 2023).

In this context, it is crucial to evaluate India's position in the global trade of environmental goods, especially considering the imminent dangers of climate change that affect India, as well as other developing nations.

2. REVIEW OF LITEREATURE:

Numerous studies have examined different aspects of trade in environmental goods (EG), reflecting its growing importance in addressing global climate change challenges. Khatun (2012) emphasized on the role of South Asian countries in trade of environmental goods and services and highlights the challenges faced by them during negotiations and discussions at the WTO level. The paper also compares the share of EG trade in total trade of South Asian countries in 2001 and 2007 and concludes that the share of EG trade is very low.

Dinda (2013), measures the trade gap for India's Climate Friendly Goods in 2008 by applying the gravity model and estimates it to be about $ 6 Billion. The study stresses on the potential of increasing exports of such goods from India through policy initiatives, such as strengthening the 'Look East' policy.

On the other hand, Jomit (2014), evaluates India's export potential for environmental goods to 58 countries through an augmented gravity model for the period 1991 to 2011. The paper concludes that the gravity model explains 70% of the variation in India's direction of exports. The country's exports respond more to distance rather than size of the economy. The study also finds that India trades more with developed countries as compared to developing countries and the country has far exceeded its' export potential with USA, UK, Germany and the UAE. There is a hence a need to diversify to neighboring countries such as Japan and China, where exports are below potential.

EXIM (2017), evaluates India's trade in environmental goods relative to the World, as per the APEC (54) list and the Friend's list of (153} items for the period 2011 to 2015. The report also classifies these goods into 4 categories based on India's comparative advantage, i.e. product champions, underachievers, growth in declining markets and losers in declining markets. The study observed that a large number of products, (29 out of 54 APEC list) fell in the underachievers' category where India could improve its competitiveness.

Gore and Meenal (2019), study the trade-off between India's exports and their environment impact and observe a positive correlation of 0.96 between export of Principal commodities and CO_2 emissions. The study thereby recommends a change in composition of the export basket towards 'green goods' through policy initiatives.

Kang (2020), studied world trade in green goods from 1980 to 2015. The study mapped the Standard International Trade Classification (Rev.2) to the Green Goods and Services Classification (GGS) as issued by the US Bureau of Labour Statistics, to categorize the industries into 'green goods' and non-green goods. It concluded that the world share of green trade had increased relative to total trade. However, green goods trade share of OECD countries was higher than non-OECD countries during the period of study.

Le Moigne et al (2024) assess the impact of carbon tax on greenhouse gas emissions and conclude
that environmental gains from trade contribute to over one-third of the total greenhouse gas emissions reductions achieved by the carbon tax. This highlights the potential for climate policies to generate significant environmental benefits through trade. As per the study, economies should be encouraged to specialize and export, based on their environmental comparative advantage.

Ramizo et al (2024) studies the impact of circular trade and green trade on the environment with special reference to urbanization. The study concludes that circular trade reduces environmental degradation across all levels of urbanization. However, the impact of green trade on reducing environmental degradation differs with the level of urbanization. Highly urbanized economies benefit more from green trade as compared to less urbanized economies.

3. OBJECTIVE OF THE STUDY:

The study aims to assess India's position in the global trade of environmental goods by analyzing its growth in exports and imports relative to the world, developed and developing countries. Specifically, it seeks to evaluate India's trade performance in environmental goods, comparing growth trends and market share across these groups for the period 2000 to 2021. The study will also explore the dynamics of India's integration into the global environmental goods market.

4. DATA SOURCE, SCOPE AND COVERAGE–

Data Source -To attain the above objective, the paper uses export and import data for environmental goods from IMF dataset (2025). The identification of environmental goods by the IMF is based on OECD EUROSTAT classification and IMF Research. It aggregates 6-dgit level HS data as per HS (2017).

Scope of Study - Export data for 37 developed and 60 developing countries has been aggregated as per UN World Economic Situation and Prospects 2024 classification. Similarly, import data for 37 developed and 58 developing countries has been aggregated based on the same classification. For developing countries, only those that have consistently reported data from 2000 to 2021 are included.

5. METHODOLOGY:

The objective of this study is to analyze the export and import growth of Environmental Goods (EGs) in India, and compare its relative performance with the world, developing and developed countries over the period from 2000 to 2021.

The study therefor constructs export and import value index for India, world, developing and developed countries from 2000 to 2021 with 2000 as the base year. The Compound Annual Growth Rate (CAGR) for exports and imports has been calculated using the log-linear method through linear regression. In this model, time (t) is used as the independent variable, and the natural logarithm of export/import values is used as the dependent variable.

6. LIMITATIONS:

- Limitations include potential discrepancies or gaps in data availability, especially for developing countries, and variations in how EGs are classified across different trade data sources.
- The scope of the study is limited to the aggregate value of exports and imports. Study at a higher level of HS disaggregation has not been covered.

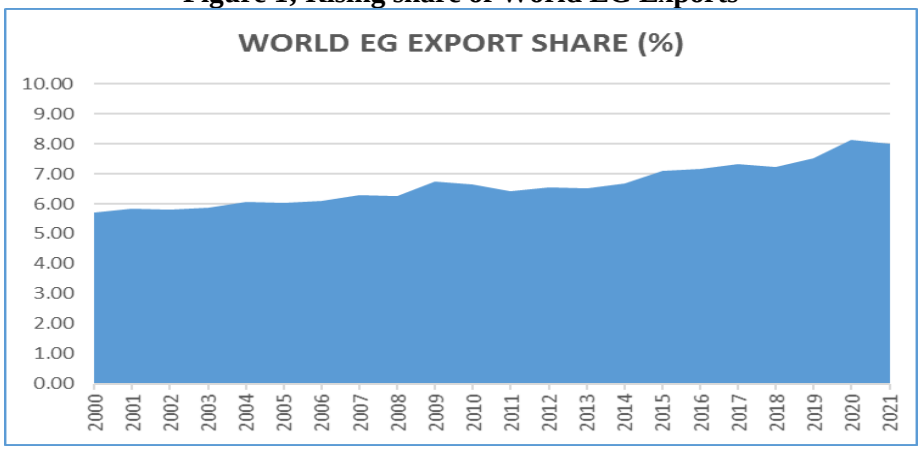
The study is divided in two sections. Section 1 will focus on exports, while section 2 will focus on imports of EGs.

Section I

7. SHARE OF ENVIRONMENTAL GOODS EXPORTS:

The world is witnessing a gradual rise in share of EG exports as a proportion of total exports (Figure 1). In the year 2000, world exports of EG stood at 5.70% (Table 1). By 2015, it had crossed 7% and by 2021, it touched a good 8% suggesting the growing importance of EGs in world production and trade.

Figure 1; Rising share of World EG Exports



Source – *IMF dataset*

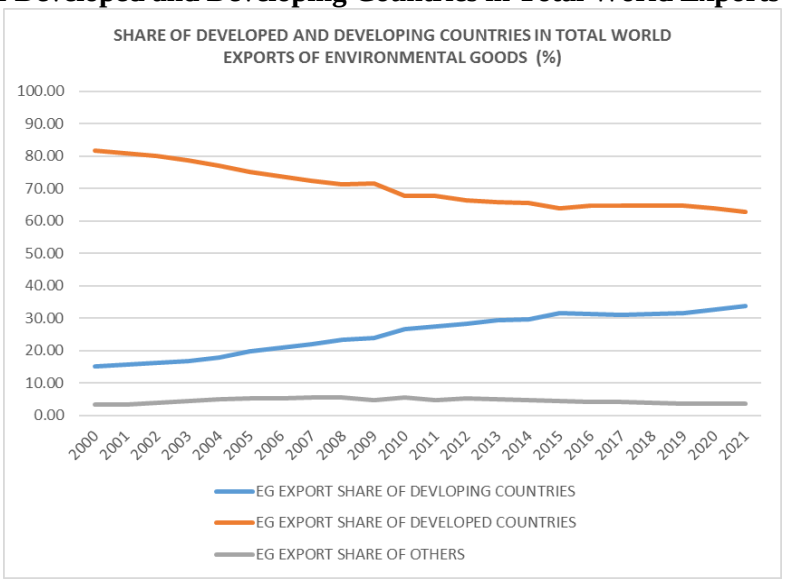
Table 1: World Export share of Environmental Goods (Percent)

YEAR	WORLD EG EXPORT SHARE (%)
2000	5.70
2001	5.84
2002	5.81
2003	5.88
2004	6.07
2005	6.03
2006	6.09
2007	6.29
2008	6.24
2009	6.74
2010	6.66
2011	6.40
2012	6.53
2013	6.51
2014	6.67
2015	7.09
2016	7.17
2017	7.32

2018	7.23
2019	7.51
2020	8.15
2021	7.99

A deeper look from the perspective of developed and developing countries throws interesting insights (Figure 2). Share of developed countries in EG exports stood at a whopping 81.67% in 2000, while that of developing countries was much lower at 15% (Table 2).

Figure 2 Share of Developed and Developing Countries in Total World Exports of EGs (Percent)



Source –*IMF Dataset and Authors Calculations*

However, by 2010, developing countries contributed to almost 1/4th of EG exports and share of developed countries had lowered to less than 70%. At the end of the decade of 2020, developing countries contributed to almost 1/3rd of EG exports in the world, while developed countries share had further fallen to about 62%. This clearly indicates the growing participation of developing countries in exports of EGs in the world.

India's Share of EG Exports:

India's share in world exports of EGs was an abysmal 0.23% in 2000, showing negligible presence in the world market. It doubled to about 0.53% by 2007, increasing to almost 1% in 2021 (Table 3). However, during the same time period, China's share in world exports of EGs had shot up by 4 times from a mere 2.86% in 2000 to 8% in 2007 and further sky rocketed to almost 20% by 2021, thereby contributing almost one fifth to the exports of EGs in the world.

Table 2; Share of Developed and Developing Countries in World Exports of EGs (%)

YEAR	EG EXPORT SHARE OF DEVLOPING COUNTRIES (%)	EG EXPORT SHARE OF DEVELOPED COUNTRIES (%)	EG EXPORT SHARE OF OTHERS (%)
2000	15.03	81.67	3.30
2001	15.62	81.01	3.36
2002	16.13	79.98	3.89
2003	16.81	78.75	4.44
2004	17.95	77.07	4.98
2005	19.75	75.11	5.14
2006	20.76	73.90	5.34
2007	22.06	72.51	5.43
2008	23.21	71.40	5.39
2009	23.79	71.61	4.61
2010	26.77	67.84	5.39

2011	27.34	67.88	4.77
2012	28.32	66.51	5.17
2013	29.25	65.76	4.99
2014	29.73	65.51	4.75
2015	31.69	63.85	4.45
2016	31.28	64.65	4.08
2017	30.96	64.85	4.19
2018	31.35	64.72	3.93
2019	31.69	64.72	3.59
2020	32.61	63.86	3.54
2021	33.76	62.70	3.55

Source – *IMF dataset and Authors calculations*

While India's share did increase, its performance pales when compared to China. In fact, China has emerged as the dominant player amongst developing country EG exporters, with shares rising from about 20% in 2000, to an impressive 60% by 2021 (Table 3). Although amongst developing nations, India's share certainly doubled from 1.55% in 2000 to around 3% in 2007, it slipped to 2.88% by 2021. Hence, while India's performance may have improved over the 2 decades, it compares poorly with China.

Table 3; India's Share in EG Exports (Percent)

YEAR	India's Share in World Exports of EGs (%)	China's Share in World Exports of EGs (%)	India's Share in Developing Countries Exports of EGs (%)	China's Share in Developing Countries Exports of EGs (%)
2000	0.23	2.86	1.55	19.05
2001	0.27	3.27	1.75	20.94
2002	0.29	3.70	1.79	22.96
2003	0.29	4.63	1.70	27.55
2004	0.32	5.70	1.76	31.77
2005	0.39	7.12	1.97	36.04
2006	0.48	8.11	2.31	39.07
2007	0.53	9.70	2.41	43.99
2008	0.66	11.01	2.83	47.46
2009	0.70	11.74	2.96	49.35
2010	0.68	13.82	2.54	51.63
2011	0.68	14.30	2.48	52.31
2012	0.71	14.19	2.50	50.09
2013	0.78	14.99	2.67	51.26
2014	0.77	15.33	2.60	51.55
2015	0.83	16.89	2.61	53.28
2016	0.86	15.85	2.74	50.69
2017	0.82	15.39	2.65	49.71
2018	0.87	15.72	2.78	50.15
2019	0.96	16.75	3.02	52.85
2020	0.89	18.28	2.72	56.06
2021	0.97	19.93	2.88	59.03

Source – *IMF dataset and Authors calculations*

However, keeping China aside, if one looks at the share of Top 10 developing country exporters, one observes, that apart from China, the share of other countries is less than 10%. In fact, India ranks 7th in the list for 2021, raising hopes for the country (Table 4).

Table 4: Top 10 EG Exporters amongst Developing Countries in 2021 (Percent Share)

Rank	Country	2021 (% Share)
1	China, P.R.	59.03
2	Mexico	6.59
3	Hong Kong	6.18
4	Singapore	4.97
5	Malaysia	3.64
6	Thailand	3.38
7	India	2.88
8	Türkiye, Rep. of	2.67
9	Vietnam	2.50
10	Brazil	1.22

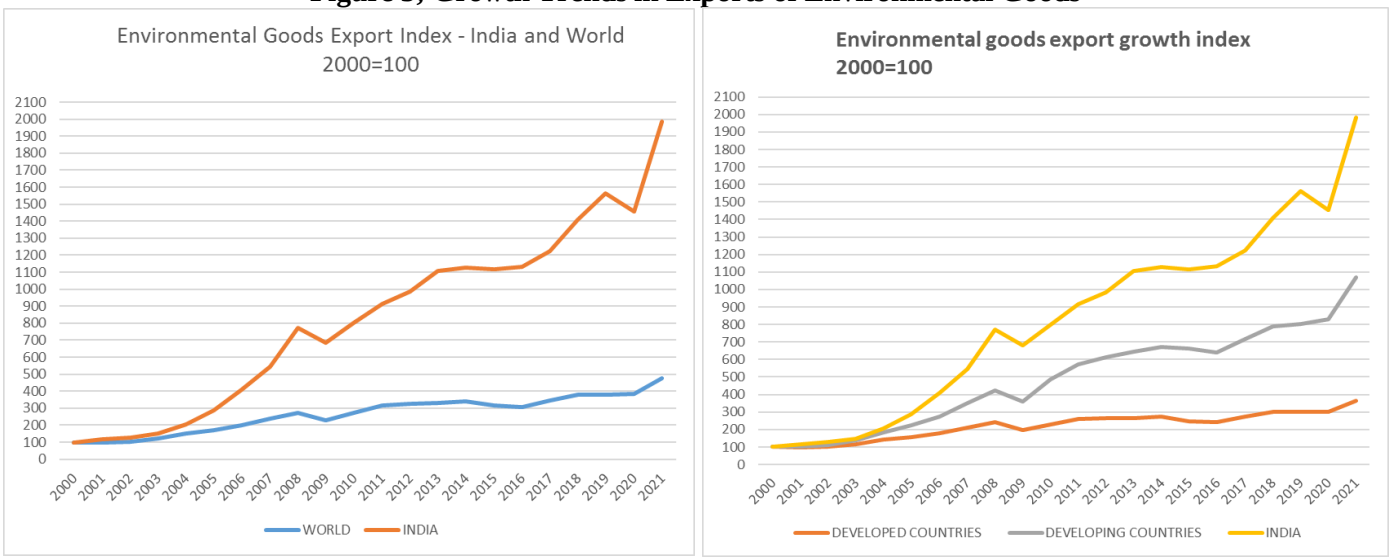
Source – *IMF dataset and Authors calculations*

In addition, as far as share of EGs in India's total exports is concerned, it has again doubled in the past two decades. It stood at 2.03% in 2000, touching about 3% in 2006 and settling at 4.34% by 2021 (IMF dataset). This suggests the growing importance of EGs in India's export basket and increasing demand for EGs in the world.

8. GROWTH TRENDS IN EXPORTS OF EGs –

World exports of EGs have grown at a CAGR of 7.24% for the period from 2000 to 2021. Interestingly, export growth from developed countries has been below average at 5.85%, while developing countries has displayed an above average growth of 11.66% (Table 5). India's exports of EGs on the other hand has outdone the world, developed and the developing countries with a growth of 14.69% (Figure 3).

Figure 3; Growth Trends in Exports of Environmental Goods



Source – *IMF dataset and Authors calculations*

Since, 2006, one observes a steady rise in exports of EGs from India. In 2009, there was a slight dip, only to pick up right until. 2020. Even after a dent in 2020 during the pandemic, by 2021, EG exports from India were back on track. Government policy push such as the National Action Plan on Climate Change (2008), rising governmental support, increasing FDI in green tech and growing awareness and demand for these goods in the world market have aided the rise in India's exports of EGs. In contrast, EG export growth from developed countries has been quite flat and sluggish.

Table 5: Compound Annual Growth of EG Export Value Index (2000-2021)

	Growth in Exports of EGs CAGR (%)
World	**7.24**
Developed Countries	**5.85**
Developing Countries	**11.66**
India	**14.69**

Source – *IMF dataset and Authors calculations*

Hence, with increasing demand for EGs in the world, India can capitalize on this emerging trend and increase its EG presence in the international market. The UNCTAD report 2023, reinforces the booming market for green tech and estimates it to be about $ 2.1 trillion by 2030. This is however possible only if the country reduces its 'implicit' behind the border constraints such as weak infrastructure and institutions, since these have had a greater negative impact on India's EG exports rather than 'explicit' beyond the border constraints such as partner country tariffs (Nguyen and Kalrajan 2015)

Section II

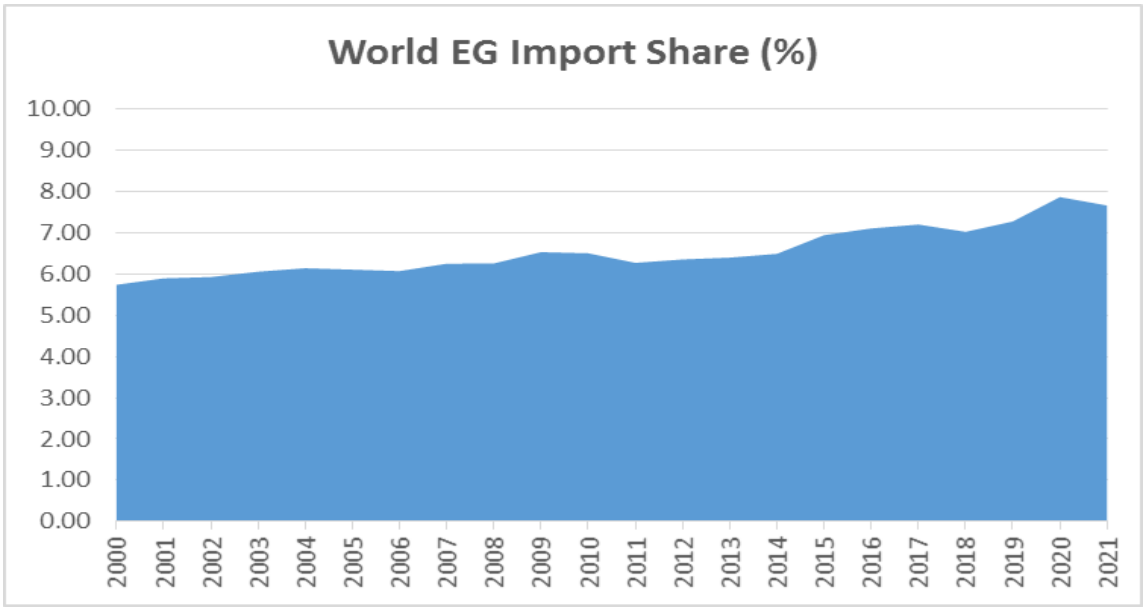
This section dwells on the imports of Environmental Goods. It will explore India's import demand via-a-vis the world, developed and developing countries. This will provide a holistic view of India's trade in the category.

9. SHARE OF ENVIRONMENTAL GOODS IMPORTS:

It is quite obvious that when world exports of EGs are rising, simultaneously world imports will also rise as world exports should ideally equal world imports. Minor discrepancies in actual figures may arise due to incomplete sharing

of data by countries. Nonetheless, the share in world imports of EGs has increased from 5.74% in 2000 to 7.67% in 2021 (Figure 4)

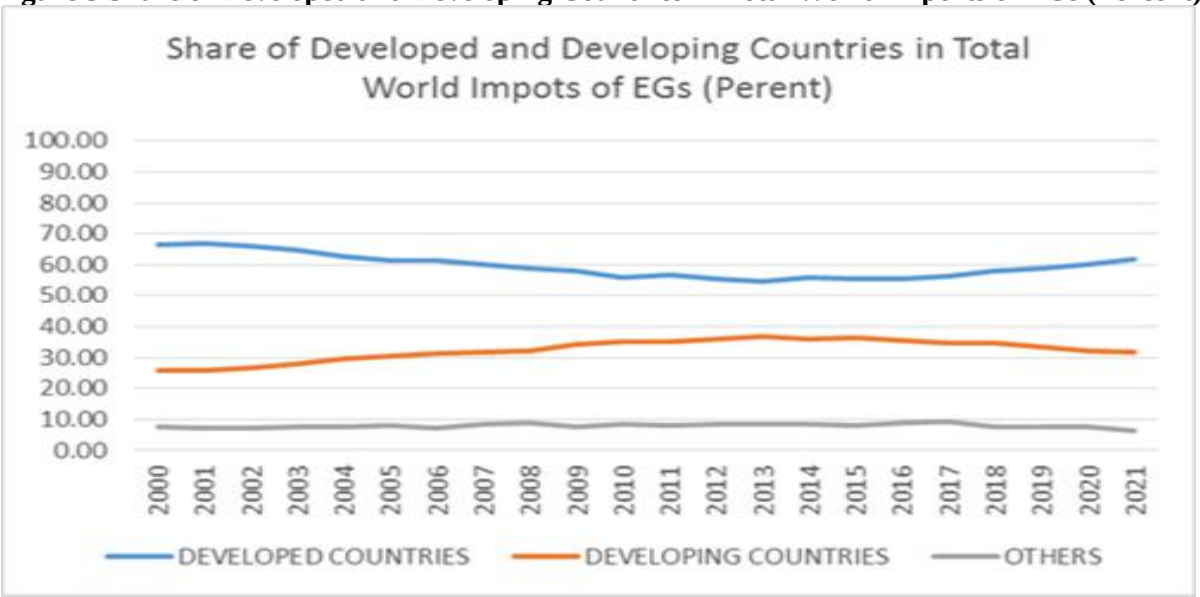
Figure 4 Increasing Share of EG Imports in the World



Source – *IMF dataset*

It is noteworthy to observe at this juncture, that unlike the declining share of EG exports of developed countries, their share in imports has fallen quite slowly, suggesting a stable demand for these goods in those markets (Figure 5)

Figure 5 Share of Developed and Developing Countries in Total World Imports of EGs (Percent)



Source – *IMF dataset and Authors calculatins*

EG import share of developed countries in 2000 stood at 66.62% (Table 6). It dropped to less than 60% by 2007, but surged back to 62% by 2021, indicating their intent towards cleaner and greener technology and goods. On the other hand, share of developing countries in EG imports did not rise as rapidly as their exports. At 25.75% in 2000, it took a one quarter share in world imports. This rose to more than 30% by 2005, crossing 36% by 2013, but again reversed the trend by dropping to less than 35% in 2017, only to settle lower at 31.72% in 2021. Hence, in comparison to exports, their import share has not seen a substantial rise.

Table 6; Share of Developed and Developing Countries in World Imports of EGs (%)

YEAR	EG IMPORT SHARE OF DEVELOPED COUNTRIES (%)	EG IMPORT SHARE OF DEVLOPING COUNTRIES (%)	EG IMPORT SHARE OF OTHERS (%)
2000	66.62	25.75	7.63
2001	66.86	25.98	7.16
2002	65.98	26.80	7.22
2003	64.75	27.81	7.44
2004	62.50	29.75	7.75
2005	61.42	30.67	7.90
2006	61.39	31.22	7.39
2007	59.92	31.61	8.48
2008	59.04	32.20	8.77
2009	58.18	34.28	7.54
2010	56.00	35.33	8.67
2011	56.90	35.09	8.01
2012	55.44	35.97	8.59
2013	54.72	36.83	8.45
2014	55.91	35.80	8.29
2015	55.58	36.50	7.92
2016	55.40	35.51	9.09
2017	56.16	34.73	9.11
2018	57.94	34.64	7.42
2019	58.99	33.47	7.53
2020	60.19	32.32	7.48
2021	61.98	31.72	6.30

Source – *IMF dataset and Authors calculations*

India's Share of EG Imports:

India's share in world imports of EGs was slightly higher than its export share at 0.59% in 2000. It crossed 1% by 2005 and doubled to 2.03% by 2016. Since then it hovered around 2% right until 2021 (Table 7). Hence, in comparison to exports, India's share in world imports of EGs has certainly been higher. China's import share on the other hand, has been much higher and increased much faster. In 2000, it stood at 4.68%, only to cross 14.63% in a decade. However, it witnessed a slowdown post 2015, falling to 10.77% by 2021. Therefore, in comparison to China, India's share in imports of EGs is comparatively lower.

Within, developing countries, while India's share did see a jump from 2.29% in 2000 to almost 6% by 2021, China's share soared from 18.18% in 2000 to 42% by 2005. By 2011, it however, saw a steady fall and plummeted to 33.96% in 2021. Yet, China is the top-most importer of EGs within developing nations (Table 8). Other countries in the top 10 list have a much smaller share with the 10th country, Indonesia having an import share of less than 3%, with India taking the 4th position. It is noteworthy that India's rank as an importer is much higher as compared to an exporter of EGs amongst developing countries.

10. GROWTH TRENDS IN IMPORTS OF EGs:

Imports of EGs in the world have grown at a CAGR of 6.92% for the period 2000 to 2021 (Table 9). For the same period, as in case of exports, CAGR of developed countries have slightly lagged behind at 6.23%, while developing countries have experienced an above average growth of 8.27%. In case of imports of EGs, the difference between developed and developing countries growth is much lesser, as compared to exports. India's growth in imports of EGs has been above average at 13.49%, beating the world as well as the developed and developing countries growth (Figure 6). Hence, while share in world imports is not very high, one can see the increased pace of imports and hence greater participation in the commitment towards mitigation and prevention of climate change. Especially from 2008, India's imports of EGs have seen a rapid rise and since then it has steadily diverged from the import growth of the developing

countries on average. India's policy push towards climate action and solar missions led to larger imports of such goods on the back of inadequate manufacturing capacities, push towards green infrastructure, and decline in prices of these goods for e.g. solar panels further encouraged imports.

Table 7: India's Share in EG Imports (Percent) Countries in 2021 (Percent Share)

YEAR	India' Share in World Imports of EGs %	China's' Share in World Imports of EGs %	India's Share in Developing Countries Imports of EGs (%)	China's Share in Developing Countries Imports of EGs (%)
2000	0.59	4.68	2.29	18.18
2001	0.61	5.62	2.33	21.62
2002	0.66	7.47	2.46	27.88
2003	0.74	10.06	2.65	36.18
2004	0.80	12.52	2.67	42.07
2005	1.02	12.90	3.32	42.07
2006	1.06	13.09	3.38	41.92
2007	1.23	12.86	3.90	40.67
2008	1.41	12.61	4.37	39.17
2009	1.79	13.45	5.23	39.22
2010	1.53	14.63	4.32	41.39
2011	1.79	14.16	5.11	40.35
2012	1.80	13.83	4.99	38.46
2013	1.62	14.20	4.39	38.54
2014	1.58	13.67	4.42	38.20
2015	1.84	13.41	5.04	36.75
2016	2.03	12.47	5.72	35.12
2017	1.97	12.37	5.66	35.61
2018	2.05	12.48	5.90	36.03
2019	2.02	11.53	6.03	34.45
2020	1.66	11.58	5.15	35.84
2021	1.96	10.77	6.18	33.96

Source – *IMF dataset and Authors calculations*

Table 8: Top 10 EG Importers amongst Developing

Rank	Country	2021 (%) Share
1	China, P.R	33.96
2	Mexico	10.15
3	Hong Kong	7.31
4	India	6.18
5	Vietnam	5.32
6	Singapore	5.23
7	Thailand	4.88
8	Brazil	4.04
9	Türkiye, Rep. of	3.44
10	Indonesia	2.93

Source – *IMF dataset and Authors calculations*

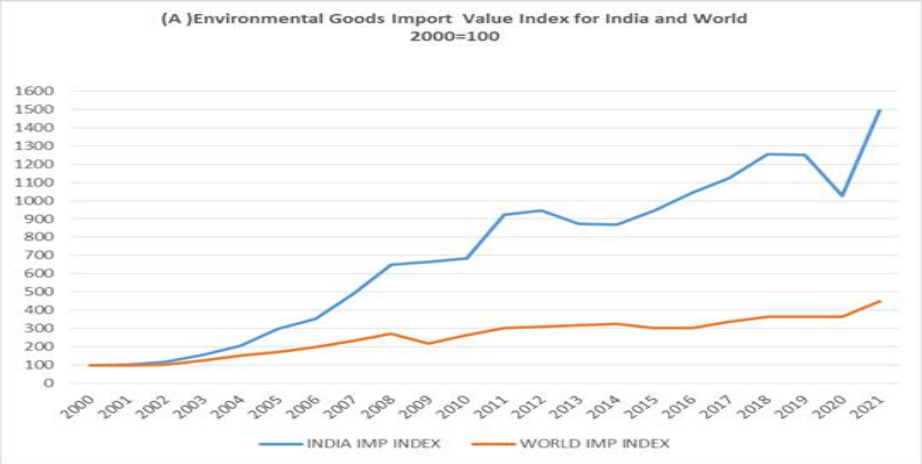
Table 9: Compound Annual Growth of EG Import Value Index (2000-2021)

	Growth in EG Imports CAGR (%)
World	6.92
Developed Countries	6.23
Developing Countries	8.27
India	13.49

Source – *IMF dataset and Authors calculations*

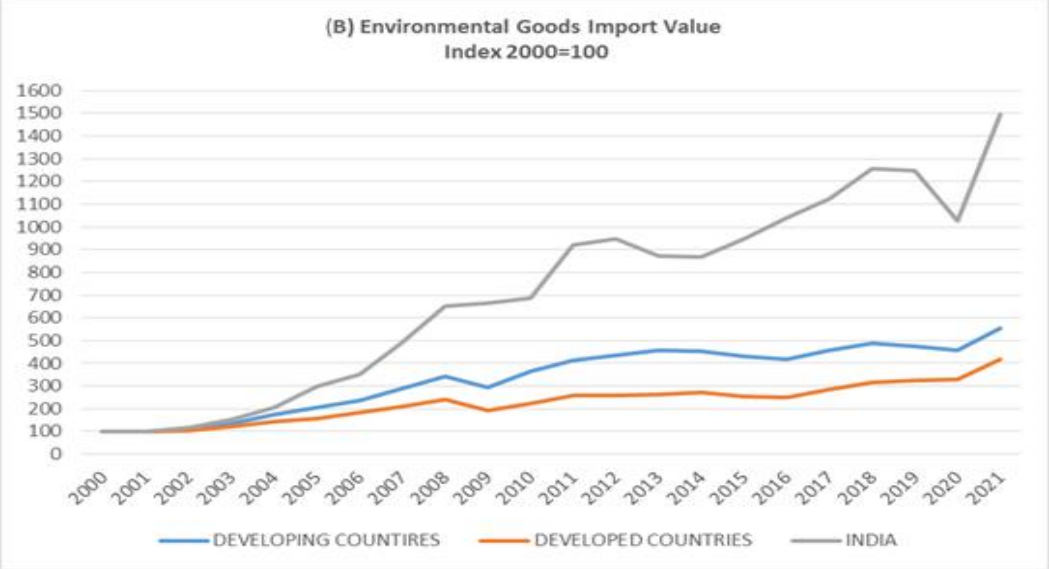
Thus, as the above factors propels further import demand for EGs, India is seen as an emerging market for these goods in the international arena (United Nations Conference on Trade and Development, 2023). Hence, as more and more companies and the government look at adopting sustainable practices, Indian imports are poised to rise and this will have to be met by promong exports.

Figure 6 A; Growth Trends in Imports of Environmental Goods



Source – – *IMF dataset and Authors calculations*

Figure 6 B; Growth Trends in Imports of Environmental Goods



Source – – *IMF dataset and Authors calculations*

11. CONCLUSION:

As the perils of climate change loom large, mitigating this challenge is no longer an option, but the only means of survival. Although, developing countries like India are not the originators of this crisis, the impact is felt on all. In this context, the paper seeks to assess India's position relative to the world, developed and developing countries with respect to trade in environmental goods from 2000 to 2021. It evaluates the share of EG exports and imports for the world, developed, developing countries and India, and computes value indices with 2000 as the base year. It further calculates the CAGR for the value indices for the period 2000 to 2021 using the log-linear method.

Results, indicate that the share of EGs, in world trade is gradually increasing, with the developed countries being the dominant player in EG exports in 2000. However, by 2021, EG export share of developed countries declined, while that of developing countries increased. While India's share in world exports of EGs accelerated from 0.23% in 2000 to 1% by 2021, it is quite low in comparison to China, which is a dominant exporter of EGs. However, as far as the growth of EG exports is concerned, India beats the world average and also that of developed and developing countries with a

CAGR of 14.69%. While India appears to be recognizing the emerging opportunity in this sector, it still has significant ground to cover before it can be considered a serious global supplier in this category. The growing calls for higher tariffs trade wars and protectionist measures worldwide, further complicate this challenge. Therefore, India needs to adopt a proactive approach by forging bilateral agreements with other nations within the framework of the WTO, alongside a stronger emphasis on research and development in this sector.

A look at the import picture for EGs suggest that while the share of developed countries has fallen, the drop is not as much as that of exports. On the other hand, developing countries have not seen a huge rise in the share of EG imports. In comparison to EG exports, India's share in world imports of EGs is much higher at about 2% suggesting the growing demand for these goods within the country, in the wake of government policy and increasing pollution levels. Even in terms of growth, EG imports from India have grown at a CAGR of 13.49% which is again higher than the growth in world, developed and developing countries imports.

Thus, while imports of EGs are likely to rise further owing to various factors mentioned above, it is crucial for the country to promote exports of EGs. In fact, apart from China, shares of other developing nations are still less than 10% and India still has an opportunity to take advantage of increasing global demand for environmental goods and benefit from the opening of this 'green window', as emphasized by UNCTAD.

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