4. The Environmental Performance of Visegrad Countries in Composite Indicators

The previous chapter focused on the environmental performance of Visegrad countries from the perspective of specific environmental issues. The aim of this chapter is to analyse the environmental performance of Visegrad countries across several environmental areas, as measured by composite indicators. These indicators aggregate several aspects into a single number that is easier to interpret than a set of separate indicators, but also more susceptible to criticism for arbitrary methodology (for a general guide on constructing composite indicators, see OECD, 2008b; for a critical perspective, see Ravallion, 2010). We also extend the question of transboundary environmental performance beyond the area of Visegrad countries themselves. In the following three sections of the chapter, we analyse and compare the environmental performance of Visegrad countries using three composite indicators – the environmental component of the Commitment to Development Index (ECDI), the Environmental Performance Index (EPI) and the Ecological Footprint (EF). Each section briefly describes the indicator and compares the results for Visegrad countries, both with each other and with other countries. While the EPI and the EF are universal indicators constructed for wide groups of countries (generally all countries with available data), the ECDI is applied to a much narrower group of countries. For a comparison of results, we therefore use the lowest common denominator, i.e., a group of 26 developed countries as defined by the ECDI. Though the main emphasis is on a comparison of Visegrad countries with similar (that is, developed) countries, we also show their position among the full groups of countries for which the other two indicators (the EPI and the EF) were calculated.

The indicators analysed differ in three aspects. Firstly, the ECDI attempts to measure the impact of rich countries on the global environment, and may therefore be perceived as an indicator of external environmental performance. The other two indicators are broader, considering both global and local environments. Secondly, though all the three indicators are of an aggregate character, the first two differ from the Ecological Footprint. The ECDI and the EPI are composite indices which are constructed from several independent indicators with different units that are transformed onto a common scale. The Ecological Footprint is an aggregate indicator with specific methodology that is not composed of independent indicators with different units. Finally, though all the three indicators are of an environmental nature, the Ecological Footprint concept is also used as a measure of environmental sustainability. Beyond the comparison of Visegrad countries' results, the chapter also discusses the methodological differences between the indicators and how they affect the results for (Visegrad) countries.

4.1 The environmental component of the Commitment to Development Index

The Commitment to Development Index is a composite indicator that attempts to measure how rich countries affect, positively or negatively, the prospects for development of poor countries. It was developed by the Center for Global Development in 2003 (see Birdsall and Roodman, 2003) and has been updated annually since then (for the latest results, see CGD, 2013). The CDI goes beyond the measurement of foreign aid and includes six other policy areas of rich countries – trade, investment, migration, security, technology, and the environment. Though the environmental component is only one part of the wider indicator (CDI), it can serve as an independent indicator and it will be treated here as such. Being a composite environmental indicator, it is a relevant indicator for the aim of this chapter. The ECDI is specific in that it only measures the environmental performance of *rich* countries and does it solely from the perspective of *global* environmental resources.

Table 4.1: Environmental component of the CDI – structure

Group (weight)	Indicator	Weight
Global climate (60%)	(1) Greenhouse gas emissions plus fossil fuel production per capita (tonnes of CO_2 equivalent)	10%
	(2) Average annual change in greenhouse gas emissions per unit PPP GDP, last 10 years (percentage)	15%
	(3) Gasoline taxes (PPP USD per litre)	15%
	(4) Ratification of the Kyoto Protocol	10%
	(5) Consumption of selected ozone-depleting substances per capita (tonnes of ozone-depleting potential)	10%
Fisheries (10%)	(6) Fishing subsidies per capita (USD)	5%
	(7) Ratification of the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks	5%
Biodiversity and global ecosystems (30%)	(8) Completeness of required reporting to multilateral treaties relating to biodiversity (0–2 points)	15%
	(9) Value of tropical timber imports per capita (USD)	15%

Source: Based on Roodman (2011)

Until 2012, the CDI has been calculated for a group of countries defined by their membership in the Development Assistance Committee of the OECD, except Luxembourg – 22 countries in total. In 2012, the author of this chapter calculated the ECDI for the four Visegrad countries for the period 2003–2011, thereby enlarging the group to 26 countries. The new version of the CDI, published in the autumn of 2012, includes the Visegrad countries and Luxembourg. However, we use CDI 2011 since it is more comparable to the other two indicators regarding the years of the underlying data, and because the EF is not calculated for Luxembourg.

The CDI embraces seven components (with the same weights), each of which consists of several indicators (with different weights). Nine indicators contribute to the ECDI, each of them having between 5% and 15% weight and belonging to one of three groups – global climate, fisheries, and biodiversity and global ecosystems. The structure is summarised in Table 4.1.

The three groups are legitimate though disagreement may arise about the weight of each group in the whole component. The dominant weight (50%) is given to climate change since it is considered the major global environmental challenge with disproportionate impacts in developing countries. It is also an environmental problem caused predominantly by developed countries' historical and current greenhouse gas (GHG) emissions. The results for the four Visegrad countries are summarised in Table 4.2. We present data for four out of nine indicators where the Visegrad countries differ (these are indicator values before standardisation) and the standardised scores and ranking for the component as a whole.

Table 4.2: Environmental component of the CDI – results

Country	(1) GHG emissions + fossil fuels	(2) Change in GHG emissions	(3) Gasoline taxes	(8) Biodiversity reporting	ECDI score	ECDI ranking
Czech Rep.	19.8	−4.1%	1.28	1.54	7.7	5
Slovakia	7.3	−5.9%	1.37	1.51	8.6	1
Poland	14.8	−4.6%	1.33	1.27	7.8	4
Hungary	7.1	−4.0%	1.47	1.46	8.1	3
V4 average	12.2	−4.7%	1.36	1.45	8.0	3
Average	20.1	−3.0%	0.92	1.31	6.3	14
Best result	2.0 SWE	−6.6% NOR	1.47 HUN	1.67 ESP	8.6 SVK	SVK
Worst result	121.5 NOR	−0.5% AUS	0.13 USA	0.75 GRC	2.3 KOR	KOR

Sources: Author's calculations based on Roodman (2011), BP (2011), UNFCCC (2011a, 2011b), USCB (2011), WB (2011), IEA (2012), EEA (2011), OECD (2012b, 2010), UN (2011a, 2011b), CBD (2011), CITES (2011a, 2011b, 2005), CMS (2011a, 2011b, 2011c), RCW (2009a, 2009b, 2007).

Notes: (i) See Table 1 for precise description of each indicator; (ii) Average values are not weighted by population. Average rankings do not reflect average scores, but are calculated as arithmetic means of rankings.

The global climate group consists of climate change (50%) and stratospheric ozone depletion (10%). The first indicator combines domestic GHG emissions (including land use, land-use change and forestry sector) and fossil fuel production (i.e., it accounts for carbon content of fossil fuels that will be released into the atmosphere when they are used), both calculated as carbon dioxide (CO_2) equivalent in per capita terms. The indicator therefore gives responsibility for emissions, both to countries where fossil fuels are used (burnt), and where they are extracted. The Visegrad countries' average is significantly lower than the average for the whole group of developed countries (though this is affected by the very high fossil fuel production in a few countries such as Norway). Visegrad countries excel in the change in GHG emissions per unit of GDP. During the relevant ten-year period (1999–2009), Visegrad countries decreased the emission intensities of their economies at an average annual rate of 4.7%, compared to a 3.0% average for the whole group. Slovakia is the Visegrad leader with a 5.9% average annual reduction. Visegrad countries also show the highest gasoline taxes in PPP USD (1.36 per litre), which are significantly higher than the group average (0.92). All the four countries have also ratified the Kyoto Protocol. The fifth indicator measures the consumption of three groups of substances that deplete ozone, in per capita terms. Since the European Union records these statistics as a group, all the EU countries are ascribed the average per capita consumption of total EU consumption. Given the small (or negative) volumes of consumption in most developed countries, this indicator in fact penalises only South Korea and, to a lesser extent, the United States.

The other two groups of indicators are fisheries and biodiversity. Visegrad countries show very good results in both the fisheries indicators, due to their low fishing subsidies per capita (three countries show zero subsidies, while Poland provides less than one fifth of the average of all the 26 countries) and their ratification of the United Nations fisheries agreement. The final group consists of two biodiversity indicators. The first indicator covers four major multilateral agreements on biodiversity, such as the Convention on Biological Diversity. Unlike the Kyoto Protocol, it does not assess ratification, but evaluates whether a country produces regular reports under each of the agreements and whether the reports are complete and submitted on time (a country can obtain 0–2 points for each of the four agreements and the points for all the agreements are then averaged). Visegrad countries have somewhat better reporting than the group average with only Poland lagging. The final indicator measures the imports of tropical timber per capita. Since some countries (such as Belgium) probably serve as an entry point for imports to other European destinations and record extremely high imports per capita, the methodology gives all the European countries the average value (USD 7.2 per capita).

The values of individual indicators are standardised on a scale with an average of 5.0 in the base year (2008), with higher standardised values indicating better results. The final value of the ECDI is a weighted average of standardised values ('scores') of individual indicators. Two conclusions can be made with respect to the final results of the ECDI. Firstly, there is a significant margin between the average scores of the EU countries (7.3) and other countries (4.3). None of the 18 EU countries is below the 25th percentile (6.0), while seven out of eight non-EU countries fall below this percentile. This conclusion is robust and reveals significant differences in politics and behaviour related to global environmental challenges between

the two groups of countries. The superior results for EU countries are probably influenced by the coordinated environmental policy of this entity.

Secondly, Visegrad countries show very good results (average 8.0) which are above all the countries' average (6.3), and they also occupy four out of the first five places in the ranking. None of the Visegrad countries is below the 75th percentile (7.4). Their combined average is also not below the average in each of the nine indicators, which indicates no weak point in their performance. It is not common wisdom, however, that the Visegrad countries are so good at protecting global environmental resources. In the final paragraph of this section, we will look at whether Visegrad countries' excellence in the ECDI can survive a critical analysis of the methodology, and in the following two sections of the chapter, we will see whether it is confirmed by other environmental indicators.

When examining the results for the Visegrad countries within the group of EU countries, we find that the differences between the two groups (4 Visegrad countries and 14 other EU countries) are due to a few indicators only. Two international agreements (indicators 4 and 7) have been ratified by all the EU countries and two indicators (5 and 9) are averaged across all the EU/European countries. The differences in the final scores need to lie in the remaining five indicators, while in two of them (1 and 8) the differences between the two groups are small. Therefore, only three indicators (2, 3, and 6) contain most of the differences between the Visegrad countries and the other EU countries. The Visegrad countries show a faster decrease in GHG emissions per unit of GDP in 1999–2009 (−4.7% versus −2.9%), have higher taxes on gasoline (PPP USD 1.36 versus 1.00 per litre) and lower fishing subsidies (USD 0.06 versus 0.94 per capita). In all the three indicators, the differences can also be explained in other ways than by the Visegrad countries' environmental priorities. Low marine fishing subsidies are caused by the fact that three of the four Visegrad countries are landlocked, and without a marine fishing fleet. The high gasoline taxes in *purchasing power parity* are mainly affected by the lower price level of the Visegrad countries compared to more wealthy EU members. The faster decrease in GHG emissions per unit of GDP is a real achievement of the Visegrad countries and should not be underestimated. However, this achievement should still be seen in the context of the economic and political transformations of these countries which started in 1990. The high emission intensity of the economies that persisted, even at the turn of the millennium, allowed these countries to decrease the emission intensity of their economies in times of economic growth, while their total emissions have not been steadily decreasing (at least until 2007).

4.2 Environmental Performance Index

The Environmental Performance Index (EPI) was constructed in 2006 by the two environmental centres at Columbia University and Yale University (Esty et al., 2006). It was preceded by the Environmental Sustainability Index (Esty et al., 2005), which is no longer publicised and updated. The EPI is updated biannually, so the most recent update comes from 2012 (Emerson et al., 2012). The index consists of 22 indicators that are grouped into 10 policy categories, and all the categories belong to one of two objectives. The structure of the EPI is summarised in Table 4.3.

Table 4.3: Environmental Performance Index – structure

Objectives	Policy categories	Indicators (examples)
Environmental health (30%)	Environmental health (15%)	Child mortality (15%)
	Air – effects on human health (7.5%)	Particulate matter (3.75%)
	Water – effects on human health (7.5%)	Access to drinking water (3.75%)
Ecosystem vitality (70%)	Air – ecosystem effects (8.75%)	SO_2 per capita (4.38%)
	Water resources – ecosystem effects (8.75%)	Change in water quantity (8.75%)
	Biodiversity and habitat (17.5%)	Biome protection (8.75%)
	Agriculture (5.83%)	Agricultural subsidies (3.89%)
	Forests (5.83%)	Forest loss (1.94%)
	Fisheries (5.83%)	Fish stocks overexploited (2.92%)
	Climate change and energy (17.5%)	CO_2 per USD GDP (6.13%)

Source: Abridged by the author from Emerson et al. (2012)

Since the structure of the EPI is extensive, we will not analyse the individual indicators but rather focus on the overall structure of the index and a comparison with the ECDI. First, the EPI has a wider scope than the ECDI. Not only does it embrace both local and global environmental issues, it also includes indicators that are not generally considered environmental. This is the situation with some indicators under the heading of "environmental health", such as child mortality and access to drinking water. Child mortality has a significant weight in the whole EPI (15%, while on average there is less than 5% per indicator), but it is difficult to argue that the nature of the indicator is environmental. Child mortality has no relation to environmental factors in rich countries, and even though this link is valid for poor countries, it is questionable whether it indicates environmental 'performance'.

This leads us to the second difference in the ECDI. The EPI was constructed for a much larger group of countries, compared to a small group of the most developed countries in the case of the ECDI. This affected the methodology of the EPI (e.g., the selection of indicators was limited to those with data for the majority of the world's countries) and also the overall EPI scores so that the final scores of most developed countries lie within a relatively narrow range. This is because the EPI is calculated for a group of countries that is not only larger (132 versus 26 countries) but more heterogeneous with a much wider range of values in many indicators. For example, the range of GHG emissions per capita (especially if land use, land-use change and the forestry sector are not included) is much wider when comparing both developed and developing countries (EPI) than in a narrower group of developed countries (ECDI).

Since the Visegrad countries share some similar characteristics (especially compared to the wide range of countries included in the EPI), their EPI scores are not very different.

Thirdly, the EPI is based on "outcome-oriented indicators" (and uses policy indicators where outcome indicators are not available), while the CDI as a whole is advertised as a policy index. In reality, the EPI and the CDI include both types of indicators though with different emphasis. Within the CDI, it is especially the environmental component that uses more outcome indicators compared to the other components of the index. Finally, the two indices differ in their methods of standardisation. While the CDI (all indicators, components and the final index) is scaled to a fixed average of 5 without fixed minima and maxima, EPI indicators are standardised on a fixed scale of 0–100 (determined by the country with the worst result and a target value) but without a fixed average.

Since the focus of this chapter is on the environmental performance of Visegrad countries relative to other developed countries, the ranking of countries can be more important than the scores. Therefore, beyond the comparison of EPI scores, we also compare the ranking of Visegrad countries, mainly within the group of 26 developed countries, i.e., without taking into consideration the scores and ranking of other countries. The results are summarised in Table 4.4.

Table 4.4: Environmental Performance Index – results

Country	Environmental health score	Ecosystem vitality score	EPI score	EPI ranking
Czech Republic	96.0	51.4	64.8	12 (18)
Slovakia	94.4	54.7	66.6	9 (12)
Poland	89.2	52.4	63.5	15 (22)
Hungary	93.8	41.4	57.1	24 (45)
V4 average	93.4	50.0	63.0	15 (24)
Average	96.9 (65.7)	49.8 (47.6)	63.9 (53.1)	14 (67)
Best result	100.0	69.6 CHE	76.7 CHE	CHE (1)
Worst result	89.2 POL (12.3 COD)	38.5 AUS (14.8 KWT)	56.6 USA (25.3 IRQ)	USA (49)

Source: Author's calculations based on Emerson et al. (2012)

Notes: (i) Average, best and worst results are measured within a group of 26 developed countries. The numbers in brackets show results in the group of 132 countries for which the EPI was calculated. Five (nine) countries score 100 in the environmental health component. (ii) Average values are not weighted by population. Average rankings do not reflect average scores, but are calculated as arithmetic means of rankings.

Before we analyse the performance of Visegrad countries, it is worth looking at the big picture first. Out of the 132 countries included in the EPI, *all* the 26 developed countries are among the first 50 countries, with an average EPI score of 63.9 compared to 53.1 for all the countries. According to the index, rich countries tend to have better environmental performance than poor countries. It needs to be said, however, that the good position of the developed countries is significantly affected by the indicators grouped under the heading of "environmental health". The EPI average score of 63.9 for the group of 26 countries is made up of the average score 96.9 for environmental health and 49.8 for ecosystem vitality.

Regarding Visegrad countries, with the exception of Hungary there is relatively small variability among their EPI scores. What is interesting, however, is the position of the Visegrad countries as a group in the EPI *vis-à-vis* their position in the ECDI. Their average score (63.0) is close to the 26 countries' average (63.9), with two countries above average and two countries below. None of the Visegrad countries is above the 75th percentile (68.3) with highest-ranking Slovakia being only 9th with a score of 66.6. This is in stark contrast to the ECDI, where the Visegrad countries were at the top of the table with the highest scores and ranking. The only similarity is the position of Slovakia as the leader of the group.

What is behind such difference between the Visegrad countries' results in the ECDI and the EPI? The main differences are twofold. Firstly, on average the Visegrad countries lag behind other developed countries in the environmental health component (93.4 versus 96.9). Indicators within this component relate to *human* health and are often associated with the overall socio-economic level of development of a country. For example, the average child mortality (probability of a child's dying between their first and fifth birthdays) among the Visegrad countries is 0.0012 compared to the group average of 0.0009, which gives scores of 91.4 and 95.6 respectively. In contrast, the average scores for the ecosystem vitality component for Visegrad countries and other developed countries are only marginally different (50.0 versus 49.8), Visegrad countries being better in some indicators (e.g., all the three indicators related to forests) and worse in others (e.g., several SO_2 and CO_2 indicators). The second reason is the methodology of the ECDI, which has an implicit bias in favour of countries with certain characteristics, such as landlocked status and low price levels.

4.3 Ecological Footprint

The EF, arguably the most popular aggregate environmental indicator, is an indicator of human consumption of renewable resources. Though the EF represents an original method of quantification of human use of natural resources, it builds on older concepts that relate human consumption of natural resources to the limited capacity of the natural environment. Before the term EF was coined, its authors used the term "appropriated carrying capacity" (Rees, 1992), clearly linking it to the concepts of "carrying capacity" (Hardin, 1976) and "human appropriation of net primary production" (Vitousek et al., 1986). The methodology was first presented in the book *Our Ecological Footprint* (Wackernagel and Rees, 1996) and has evolved over time. For a current methodology and results, see Borucke et al. (2013); for an overall review of the indicator, see Syrovátka (2007).

The EF measures the area of biologically productive land and water that is needed for the production of renewable resources consumed by the human population. The EF indicator can be applied either independently as a measure of human demand on natural resources, or jointly with an indicator of "biocapacity" (i.e., the area of biologically productive land and water available for a given population) as an indicator of sustainability. By comparing the two indicators, we can assess whether a given population lives within the carrying capacity of its environment (the EF is lower than the biocapacity) or not (the EF exceeds the biocapacity). Both the indicators are measured in global hectares (gha), a unit that represents hectares of bioproductive area with a world average productivity. By dividing the EF and biocapacity by the population, the results can be shown in per capita terms. To assess Visegrad countries' environmental performance comprehensively, we show both the interpretations of the Ecological Footprint concept. The results are summarised in Table 4.5.

Table 4.5: Ecological Footprint – results

Country	EF per capita (gha)	EF per capita ranking	Ecological balance per capita (gha)	Ecological balance per capita ranking
Czech Republic	5.3	$16_{(132)}$	–2.6	$12_{(125)}$
Slovakia	4.7	$9_{(122)}$	–1.8	$8_{(116)}$
Poland	3.9	$2_{(106)}$	–1.9	$10_{(121)}$
Hungary	3.6	$1_{(103)}$	–0.9	$7_{(94)}$
V4 average	4.4	$7_{(116)}$	–1.8	$9_{(114)}$
Average	$5.3_{(2.8)}$	$14_{(75)}$	$-1.1_{(0.0)}$	$14_{(75)}$
Best result	$3.6_{\text{HUN (0.5 PSE)}}$	$\text{HUN}_{(103)}$	$8.5_{\text{CAN (26.9 GAB)}}$	$\text{CAN}_{(5)}$
Worst result	$8.3_{\text{DNK (11.7 QAT)}}$	$\text{DNK}_{(146)}$	$-5.8_{\text{BEL (–9.6 QAT)}}$	$\text{BEL}_{(145)}$

Source: Author's calculations based on GFN (2012)

Notes: (i) Average, best and worst results are measured within a group of 26 developed countries. The numbers in brackets show results in the group of 149 countries for which the EF was calculated. (ii) Occupied Palestinian Territories (PSE) show the lowest EF, which is partly caused by missing data for some components of the total EF. Other countries with the lowest EFs are Timor-Leste and Afghanistan. (iii) Ecological balance is calculated as a country's biocapacity minus its EF. A positive number represents a reserve, a negative number shows a deficit. Ranking is constructed so that the highest reserve corresponds to the first ranking and the highest deficit to the last ranking.

Assessing Visegrad countries solely in terms of their EFs, they have, on average, lower demands on renewable resources than the whole group of developed countries (4.4 gha versus 5.3 gha, all data per capita). Hungary and Poland have the lowest EFs not only within the Visegrad group but they are top performers among all the 26 developed countries. Hungary's EF (3.6 gha) is only half that for the United States (7.2 gha), while the Czech Republic's (5.3 gha) is somewhere in between. Clearly, there are significant differences in consumption

demands in different countries. Once we extend this to all the 149 countries, the range is even wider, starting from around 0.5 gha and going up to 11.7 gha. What is interesting, however, is the position of developed countries (relative to the positions of other, mostly developing, countries) in the EF *vis-à-vis* their position in the EPI. While in the EPI, all the 26 developed countries were among the first 50 countries, *none* of these countries are among the first 100 countries in the EF. It is difficult to reconcile the results where a group of 26 developed countries have the top 'environmental performance' in the world (EPI), yet they consume the highest amounts of renewable resources (EF).

As for the second interpretation of the EF concept, most developed countries again rank at the bottom of the table (though a few countries with large areas relative to their populations, such as Canada and Australia, rank very high). All the Visegrad countries show an ecological deficit (rather than a reserve), having higher demands on renewable resources than can be provided by the biologically productive area of their respective territories. In fact, only 6 out of the 26 developed countries show an ecological reserve. Should the EF concept be interpreted as an indicator of sustainability, then most of the developed countries do not live within the carrying capacities of their environments and are not on a sustainable trajectory.

The EF concept looks intuitive and is appealing as a communication tool for showing human demands on nature. However, both the concept of the EF and its methodology are challenged (see van den Bergh and Verbruggen, 1999). First, the EF is based on the current technological level and does not reflect technological progress. This is mainly the case with the carbon footprint – fossil fuel use is converted to bioproductive area using an area of forest needed to sequestrate emitted CO_2. This arguably overestimates the EF since it does not consider other options for conversion of fossil fuel use to a bioproductive area, options that might be expensive yet economical in terms of required bioproductive area. The second challenge relates to the question of whether the EF concept has a meaningful application at a lower than global level. More specifically, given the unequal distribution of the world population and natural resources, it is questionable whether we should really expect Japan to live within its biocapacity of 0.6 gha (all data per capita). With a moderate EF (4.2 gha), Japan shows an ecological deficit (3.6 gha), while Canada shows a large surplus (8.5 gha) even with the fourth highest EF (6.4 gha) among the 26 developed countries. Indeed, it would be difficult for Canada *not* to live within its large biocapacity (14.9 gha).

How do the results of the EF compare with the results of the other two indicators for Visegrad countries? We do not see any discernible pattern in Visegrad countries' results and ranking in the three indicators. None of the Visegrad countries is either the first or the last out of the four countries in all the four indicators (or just three if we consider only one of the two interpretations of the EF), nor are the results very similar. For example, Hungary is second in the ECDI and first in both the interpretations of the EF, but fourth in the EPI. Slovakia is first in the ECDI and the EPI, but cannot compete with Hungary in the EF (all rankings within the four Visegrad countries). The EF has one distinctive feature that makes it different from the other two indicators. While the two indices can be interpreted only in a relative sense (they are standardised so that the performance of one country is affected by the performance of other countries), the EF has a meaningful interpretation both in the absolute and relative sense. Therefore, according to the EF concept, all the four Visegrad countries show an unsustainable

consumption of renewable resources, given the biological productivity of their areas, irrespective of the fact that most of the other developed countries are unsustainable as well.

Taking all the three indicators together, is there something Visegrad countries can do to improve their environmental performance? Though there are more points of intersection between the indicators, GHG emissions seem to be the most essential. A strong policy towards decreasing GHG emissions, both in terms of GDP and total population, will bear fruit in all the three indicators. Also, unlike some factors affecting the EPI and the EF, GHG emissions cause damage that is important not only from an environmental perspective in general but it is a *prima facie* case of global externality, and therefore important from the point of view of international equity. Though all the three indicators focus on GHG emissions, they differ in how they conceive the concept of environmental performance in GHG emissions.

According to the EPI, one of the main shortcomings of Visegrad countries (relative to other developed countries) lies in the high emission *intensities* of their economies. In all the emission indicators that are related to economic variables (CO_2 per GDP, CO_2 per kWh of electricity, but also SO_2 per GDP), Visegrad countries have lower scores on average than other developed countries. At the same time, it is true that they have been reducing the GHG intensities of their economies at a faster *rate* than other developed countries, as one of the ECDI indicators reveals. Both the ECDI and the EPI also complement GHG intensity with emissions *per capita*. GHG emissions per capita are also essential for the third indicator since the carbon footprint is a dominant part of the total EF. Visegrad countries have, on average, lower GHG emissions per capita and carbon footprints per capita than other developed countries. All the three indicators differ significantly in terms of assigning *responsibility* to emissions. While the ECDI counts both types of producers' emissions (producers of fossil fuels and producers of GHG emissions), the EPI assigns responsibility only to producers of GHG emissions, and for the EF the responsibility lies with the final consumer. It is beyond the scope of this chapter to discuss the implications of these approaches (emissions versus their change, per capita versus per GDP, and allocation of responsibility), but it should be noted that they produce quite different pictures of countries' environmental performance. Regarding the comparison of Visegrad countries, the Czech Republic may be considered a GHG laggard since it has the worst performance in almost all the indicators related to GHG emissions, not only relative to Visegrad countries but also to the average of all the developed countries.

* * * *

In this chapter, we attempted to analyse and compare the environmental performance of Visegrad countries using three composite indicators. These indicators do not point in the same direction in their assessment of Visegrad countries, both individually (within the group of Visegrad countries) and as a group (within the group of developed countries). We do not see any discernible pattern in Visegrad countries' results and ranking in the three indicators. For example, while Hungary shows the lowest EF and the lowest ecological deficit (the former not only among the Visegrad countries, but also within the whole group of 26 developed countries), it has poor results in the EPI. Neither is there a similar pattern in the position of the Visegrad group in the three indicators. While the ECDI ranks Visegrad countries on top

of other developed countries, the EPI shows a more mixed picture, with three countries around the average and one at the bottom of the table. As for the EF, Visegrad countries have lower EFs (i.e., higher rankings) but higher ecological deficits than average (this still translates into higher rankings since the low average deficit is caused by a few countries with large reserves). Though it still might be argued that the average picture of the Visegrad countries based on the three indicators is rather positive, we would be cautious in this interpretation of results.

The difference between the Visegrad countries' results in these indicators can be ascribed to the fact that they measure different concepts of environmental performance. At the same time, the results themselves are an artefact of contentious methodologies of the indicators. Regarding the ECDI, its capacity to differentiate between countries, at least for EU members, relies on a few indicators. Visegrad countries' high scores in some of these indicators explain their superior results in the whole component though it is difficult to argue that they are primarily a product of strong environmental policy. As for the EPI, combining indicators that measure ecosystem vitality with human health indicators (conditioned upon environmental factors in developing rather than developed countries) is bound to be contentious. The EF rests on a pessimistic assumption of the current technological level when calculating the carbon footprint, while the ecological deficit/reserve applied at a lower than global level as a measure of environmental sustainability is no less contentious. However, it is the only indicator that is based on consumer rather than producer responsibility.