ECOPOLIS

OUR PLANET'S FUTURE IS NO GAME

The Science behind ECOPOLIS

HABITAT Games
Serious play for Sustainable Development

- ECOPOLIS is a serious tabletop game created to generate awareness about sustainable development.
- It is centered on public policy decision-making: players (or teams) act as their country's government in a race towards sustainability.
- Its game mechanics were derived from a statistical analysis of more than 700 performance indicators for nearly 170 countries spanning 6 decades.
- An educational tool? A fun, engaging pastime? A team-building exercise? A catalyst for meaningful debate? ECOPOLIS is all of the above!

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HABITAT GAMES

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HABITAT GAMES

Race towards sustainability in this exciting game of public policy!

As your country's head of government, you want what's best for your population: good health, education, income, equality... At the same time, you are well-aware of how human activities around the world are depleting the planet's natural resources and accelerating climate change. You know we cannot go on like this, but *what can you do?*

The Underlying Theory

ECOPOLIS' game mechanics were obtained using real-world data, so players can visualize the not-so-obvious connections between public policy and human development, resource consumption, and climate change.[1]

The game's dynamic is based on the approach known as the *Sustainable Development Quadrant*,[2] which uses the **Human Development Index**[3] and the **Ecological Footprint**[4] (a measure of natural resource consumption) as proxy metrics in the **sustainability equation:**[5]

Sustainable Development	**=**	**Human Requirements + Nature's Requirements**

When we plot national values for both metrics on an XY graph, the Sustainable Development Quadrant is formed by the area where the Human Development Index is high and the Ecological Footprint per capita is globally sustainable (fig. 1). Currently, there are no countries located inside the Quadrant. Moreover, countries with higher development also tend to have higher footprints.

To improve human development while avoiding skyrocketing resource consumption is humanity's greatest challenge, the one you must face when playing ECOPOLIS.

[1] The development of ECOPOLIS was supported from the start by the International Center for Sustainable Development (CIDES) in Panama, which served as project incubator. Subsequently, it has received official support (funding and otherwise) from the Inter-American Development Bank (IDB), Panamá Secretariat for Science, Technology and Innovation (SENACYT), the Technological University of Panama (UTP), and Panama's Ministry of Environment.

[2] This approach is first described in: Boutaud, A. 2002. "Development Durable: quelques vérités embarrassantes," in *Economie et Humanisme*, 363: 4-6.

[3] The Human Development Index (HDI) is calculated by the United Nations Development Programme (UNDP). It combines health, education, and income metrics for each country to arrive at a value between 0 and 1 (higher values indicate higher human development).

[4] The Ecological Footprint (EF), calculated by the Global Footprint Network, is an indicator natural resource consumption for a given population. It is expressed in terms of land area – global hectares – needed to sustain such consumption.

[5] As described in: McDonach, K. and Yaneske, P. 2002. Environmental Management Systems and Sustainable Development: *The Environmentalist*, 22: 217-226.

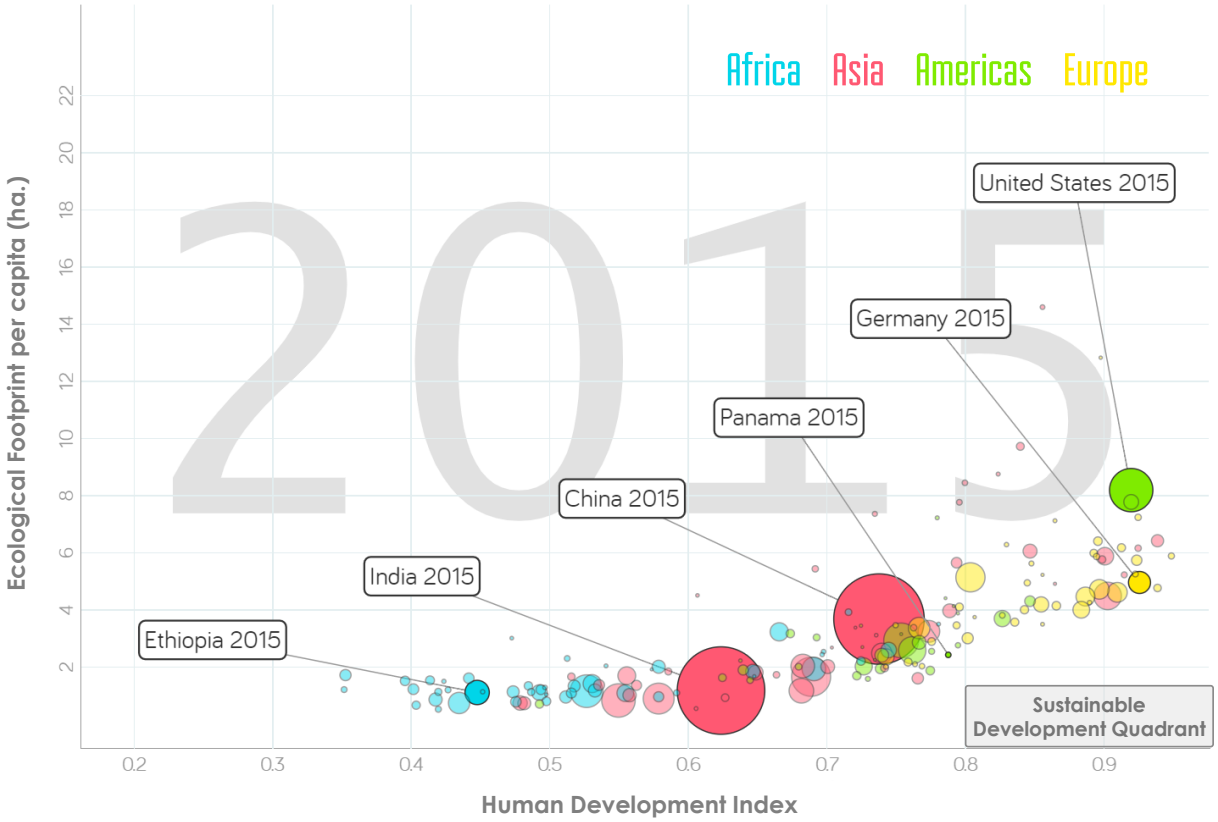


Figure 1. The Sustainable Development Quadrant

Human Development Index vs. Ecological Footprint per capita (2015). Each bubble represents a country; bubble size is relative to population size. A handful of countries have been marked for illustrative purposes. Data sources: Global Footprint Network, 2019. United Nations Development Programme, 2019.

To obtain the game mechanics, close to 700 performance metrics were compiled and analyzed for almost 170 countries; the time period comprised by the data was from 1965 to 2015 (when available). The analysis sought to determine each metric's statistical correlation with (a) Human Development Index and (b) Ecological Footprint values. The metrics cover a wide range of categories, including education, health, industry, agriculture, fishing, environment, energy, culture, infrastructure, commerce, urban planning, nutrition, demographic factors, etc.

Gameplay Overview

Number of players (or teams): 2-5
Ages: 10+
Duration: 60 min.

In ECOPOLIS, players act as their country's head government in a race towards sustainability –a space on the game board where Human Development is very high and Natural Resource Consumption is very low (globally sustainable).

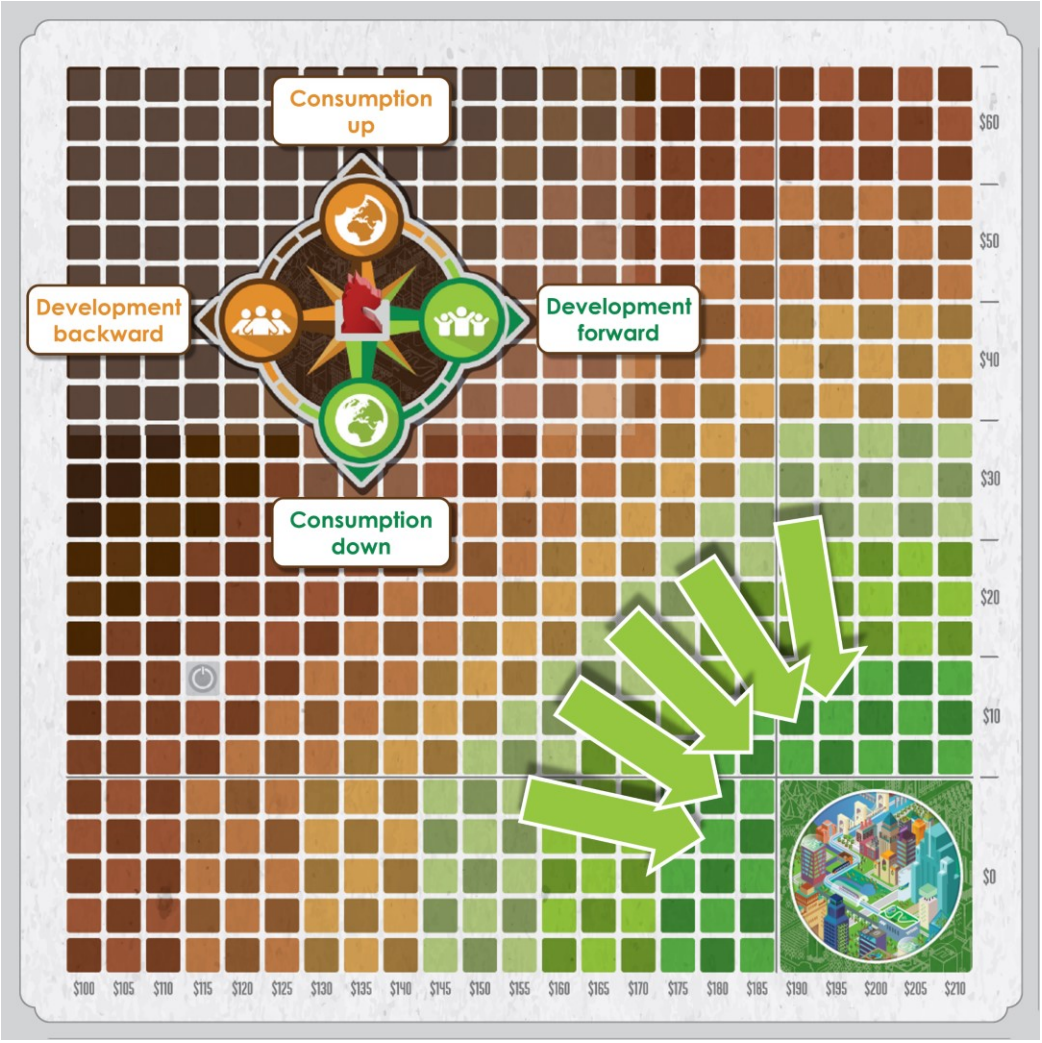


Figure 2. ECOPOLIS game board

The game board works as a grid where players can move in any direction: left-right corresponds to their level of Human Development, and up-down to their Resource Consumption. **The object of the game is to reach the Sustainability Quadrant**, located at the bottom-right corner (fig. 2).

To move along the board, players need to invest their **National Income**[6] in different **Public Policy cards** available to them. Each card will have unique effects on a country's Human Development and Resource Consumption (fig. 3).

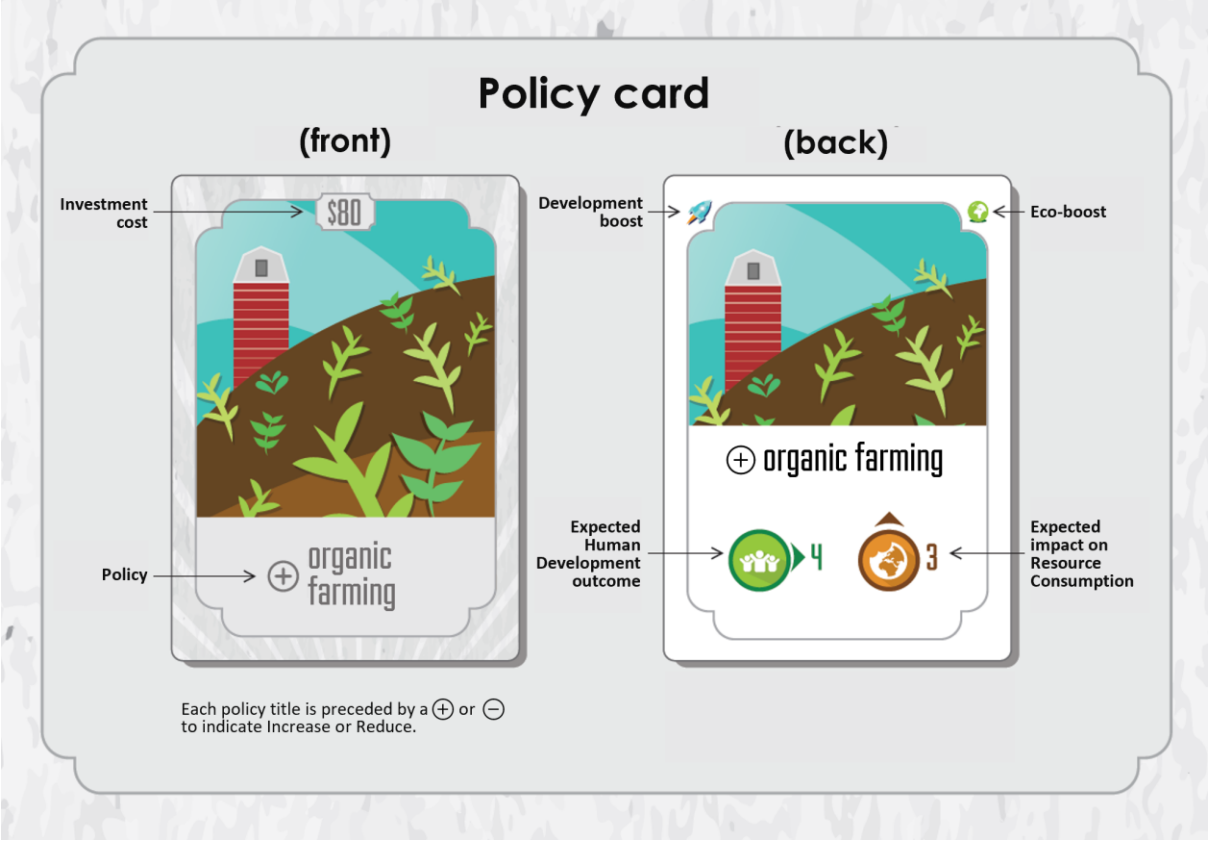


Figure 3. Policy cards

When playing the *Increase Organic Farming* card, it is likely that Human Development will move forward, and somewhat likely that Resource Consumption will increase as well. Outcome/impact values range from 0 (no correlation) to 6 (highest correlation).

[6] A player's National Income is collected at the end of each turn. It is determined by the player's position on the board: the higher a player's Human Development, the more income s/he receives.

The key to winning the game lies in thinking very carefully before deciding which Policy card to play. Will your country's human development increase or decrease? Will it lead to your population consuming more, or less resources?

On each turn, players will be able to **negotiate International Cooperation**. Here, players who are interested in the Policy card that you are going to play enter a bidding contest to share in the benefits of said Policy. This allows active players to generate additional income, passive players to move outside their turn (and benefit from desired Policies at a reduced cost), and both to work towards the common goal of achieving global sustainability – this is especially helpful in **cooperative game mode**.[7]

During the course of the game, players are also able to:

- **Invest in new research** to expand the number Policy cards available to them.
- Play **Event cards** (fig. 4), which represent random occurrences that have no investment cost and can impact their path in positive or negative ways (e.g., a natural disaster hits, you receive foreign aid, etc.).
- Accrue and play **Booster cards** (fig. 5) to enhance their Policies' performance or – occasionally – hinder an opponent's progress (recycle more, export pollution, etc.).
- Accrue and exchange **Eco-credits** to reduce Consumption at a later time.

Figure 4. Sample Event Card

Figure 5. Sample Booster Card

[7] ECOPOLIS has several alternate game modes with varying levels of complexity.

The Analysis that feeds the game

ECOPOLIS will always be a work in progress. We are constantly looking for (1) updated data and (2) better ways to analyze such data to refine the correlations that feed the game. The analysis[8] conducted was methodologically sound, and we ended up using only metrics that yielded statistically significant correlations in the game.

As with any game that tries to model reality to some extent, simplifying assumptions need to be made. Still, we believe that the game's overall goal – to illustrate the different impacts that certain policies can have on Human Development and Resource Consumption – has been far exceeded.

Methodology

The objective of this analysis was to detect statistically significant correlations between different performance indicators or metrics and (a) the Human Development Index (HDI), calculated by the United Nations Development Program (UNDP), and (b) the Ecological Footprint (EF) per capita, calculated by the Global Footprint Network. Annual country values were used in each instance.

The following steps were followed to carry out the analysis:

1. Compiling the metrics to be analyzed

Close to 700 performance metrics were compiled for almost 170 countries, spanning a time period comprised from 1965 to 2015 (when available). The metrics were selected to cover a very wide range of categories, including education, health, industry, agriculture, fishing, environment, energy, culture, infrastructure, commerce, urban planning, nutrition, demographic factors, etc.

2. Creating country rank lists for each metric

For each individual metric, the countries were ranked according to their value, from the highest to the lowest (1 to n).[9] To be able to analyze historical progress, the difference in value between the start year and the end year of the periods considered[10] was calculated, and the countries were ranked according to their total progress. All gross metrics were converted to per capita values, or percentage of total area, as appropriate, to be able to make objective comparisons between nations (and thus create rank lists for analysis).

[8] Analysis conceived and conducted by Andrés Tarté, M.Sc.

[9] The purpose of using rank lists instead of gross values to determine correlation is to avoid potential bias caused by outliers.

[10] Subject to data availability, the time periods considered were: 1965-2015, 1965-2010, 1965-1980, 1980-2015, 1980-2000, 2000-2015, 2000-2010, and 2010-2015, as well as present-day (2015).

3. Calculating the Pearson Correlation Coefficient (r)

The statistical correlation between each pair of metrics was determined by calculating the Pearson Correlation Coefficient (r), a linear function used to measure the degree of relationship between two quantitative and continuous variables. If both variables tend to increase together, their correlation is positive and yields a value between 0 and +1.0. On the contrary, an inverse relationship between the variables would yield a negative correlation coefficient, between 0 and –1.0.

The Pearson Correlation Coefficient (r) is obtained using the following formula:

$$r = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{X_i - \bar{X}}{s_X}\right)\left(\frac{Y_i - \bar{Y}}{s_Y}\right)$$

Where:

- X_i is the country's rank
- $\bar{X}$ the arithmetic mean of the sample
- s_X the standard deviation of the sample
- n is the number of countries in the sample

For each pair of metrics analyzed, only the countries present in both rank lists were considered; these are the countries that make up the sample (n).

Figure 6 illustrates how Pearson's *r* is calculated for the metrics *Meat Consumption per capita* and *Ecological Footprint per capita* between 2000 and 2010. The correlation coefficient obtained (r = 0.468) is not the strongest, but it is significant, nevertheless. It indicates that countries that increased their meat consumption per capita between 2000 and 2010 have tended to increase their Ecological Footprint to a certain degree as well (this makes sense because we know that meat production requires a lot of natural resources, such as water, land, and energy).

Country	Meat Consump. per capita (annual kg) 2000	Meat Consump. per cápita (annual kg) 2010	Increase	Rank
Albania	73.7334	161.6326	87.8992	1
Trinidad and Tobago	108.7506	190.0738	81.3232	2
Myanmar	26.304	103.4076	77.1036	3
Latvia	101.38	178.237	76.857	4
Vietnam	64.664	141.1648	76.5008	5
Oman	93.3518	165.1946	71.8428	6
Russia	109.2164	179.0864	69.87	7
Croatia	97.7084	167.003	69.2946	8
Kazakhstan	112.203	180.6482	68.4452	9
Lithuania	134.6162	202.3764	67.7602	10

Pearson Correlation Coefficient
r = 0.468

Country	Ecological Footprint per capita (ha.) 2000	Ecological Footprint per capita (ha.) 2010	Increase	Rank
Trinidad and Tobago	3.594	9.648	6.054	1
Kuwait	3.790	9.131	5.342	2
Qatar	10.484	14.203	3.718	3
Kazakhstan	2.287	5.549	3.262	4
Oman	3.279	5.425	2.146	5
Saudi Arabia	3.772	5.660	1.888	6
Surinam	2.200	3.831	1.631	7
Cayman Islands	5.579	7.204	1.625	8
China	1.920	3.359	1.439	9
Turkmenistan	3.831	5.241	1.410	10

Figure 6. Example of analysis using Pearson's *r* and country rank lists

The rank lists shown in this figure only show the top 10 countries. The entire list contains 154 countries (n) for each metric.
Data sources: Global Footprint Network, 2019. *National Footprint Accounts 2019* and Food and Agriculture Organization of the United Nations (FAO), 2017. *Food Balance Sheets (FBS)*.

4. Determining the statistical significance of the Correlation Coefficients

How a correlation coefficient is interpreted depends on context and purpose. A coefficient of 0.9 may be considered very low if one is verifying a physical law using high-quality instruments, but the same coefficient could be considered extremely high in the social sciences, for example.

Statistical significance for the Pearson correlation coefficient (r) is determined using a table of *critical values* that uses the sample size (n), the correlation coefficient (r), and the desired *alpha level* $P(H_0)$. The alpha level indicates the probability of being wrong when we say that a correlation that has been found is real. Table 1 presents the critical values for samples sizes between 35 and 1000.

Alpha level	0.100	0.050	0.010	0.001
n	Critical values			
35	0.283	0.334	0.430	0.532
40	0.264	0.312	0.403	0.501
45	0.248	0.294	0.380	0.474
50	0.235	0.279	0.361	0.451
60	0.214	0.254	0.330	0.414
70	0.198	0.235	0.306	0.385
80	0.185	0.220	0.286	0.361
90	0.174	0.207	0.270	0.341
100	0.165	0.197	0.256	**0.324**
200	0.117	0.139	0.182	0.231
300	0.095	0.113	0.149	0.189
400	0.082	0.098	0.129	0.164
500	0.074	0.088	0.115	0.147
1000	0.052	0.062	0.081	0.104

Table 1. Critical values for Pearson's *r*

Source: Adapted from https://www.statisticssolutions.com/table-of-critical-values-pearson-correlation/

The sample size (n) from the example shown in figure 6 is 154. In table 1, this would fall between 100 and 200; we pick 100 just to be on the safe side. The Pearson Correlation Coefficient (r) found in the example (r = 0.468) is greater than the most critical value of 0.324. Therefore, we can say with more than 99.9% certainty (alpha level: 0.001) that the correlation found between Meat Consumption and Ecological Footprint is statistically significant.

Results

All the metrics selected to shape ECOPOLIS' game mechanics were found to be statistically significant (with confidence above 99%). Each selected metric was converted into a *Policy card*, and their correlation coefficient with the Human Development Index (HDI) and the Ecological Footprint per capita (EFpc), respectively, was proportionately translated into a given number of spaces of associated movement on the game board – the higher the correlation coefficient, the larger the movement granted by the Policy.

The metrics used in the game are listed in the following pages, along with data sources, sample size (number of countries), Pearson Correlation Coefficients found with both the HDI and the EF, and time periods covered.

Metric: People using at least basic drinking water services (% of population)

Data source: World Bank World Development Indicators

Time period: Increase between 2000-2015

Number of countries in sample (n): 172

Correlation (r) with Human Development Index: 0.451

Correlation (r) with Ecological Footprint per capita: 0.239

Metric: Road Density: Km of road per 100 sq. km of land area

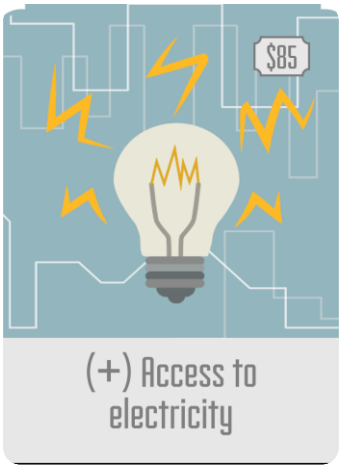
Data source: International Road Federation

Time period: last year available for each country, ranging between 2002 and 2007)

Number of countries in sample (n): 113

Correlation (r) with Human Development Index: 0.600

Correlation (r) with Ecological Footprint per capita: 0.415



Metric: Access to electricity (% of population)

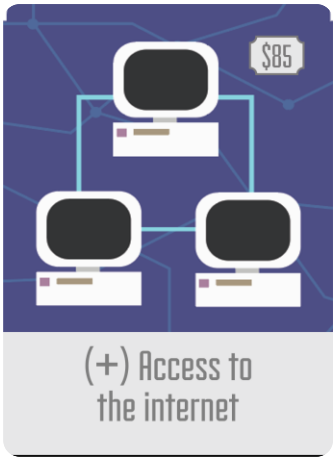
Data source: World Bank World Development Indicators

Time period: 2015

Number of countries in sample (n): 173

Correlation (r) with Human Development Index: 0.875

Correlation (r) with Ecological Footprint per capita: 0.784



Metric: Individuals using the Internet (% of population)

Data source: World Bank World Development Indicators

Time period: 2015

Number of countries in sample (n): 172

Correlation (r) with Human Development Index: 0.938

Correlation (r) with Ecological Footprint per capita: 0.861

Metric: Terrestrial and marine protected areas (% of total territorial area)

Data source: World Bank World Development Indicators

Time period: 2015

Number of countries in sample (n): 172

Correlation (r) with Human Development Index: 0.168

Correlation (r) with Ecological Footprint per capita: 0.083

Metric: Cropland under organic management (km^2) divided by Permanent cropland area (% of land area)

Data source: World Resources Institute

Time period: 2003

Number of countries in sample (n): 77

Correlation (r) with Human Development Index: 0.651

Correlation (r) with Ecological Footprint per capita: 0.639

Metric: Total water withdrawal per capita (m^3 per person per year)

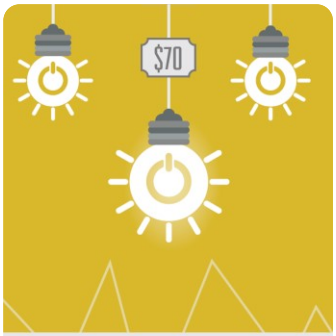
Data source: UN Food and Agricultural Organization (FAO)

Time period: 2015

Number of countries in sample (n): 121

Correlation (r) with Human Development Index: 0.477

Correlation (r) with Ecological Footprint per capita: 0.386



Metric: Electric power consumption (kWh per capita)

Data source: World Bank World Development Indicators

Time period: Increase between 2010-2015

Number of countries in sample (n): 131

Correlation (r) with Human Development Index: 0.421

Correlation (r) with Ecological Footprint per capita: 0.530

Metric: Paper and paperboard Consumption (Prod + Imports - Exports) (tonnes) per capita

Data source: UN Food and Agricultural Organization (FAO)

Time period: Increase between 2000-2010

Number of countries in sample (n): 163

Correlation (r) with Human Development Index: 0.246

Correlation (r) with Ecological Footprint per capita: 0.297

Metric: Meat - Food supply quantity (kg/capita/yr)

Data source: UN Food and Agricultural Organization (FAO)

Time period: Increase between 2000-2010

Number of countries in sample (n): 154

Correlation (r) with Human Development Index: 0.133

Correlation (r) with Ecological Footprint per capita: 0.468

Metric: Fishing Ground Ecological Footprint per capita

Data source: Global Footprint Network

Time period: Increase between 1980-2000

Number of countries in sample (n): 103

Correlation (r) with Human Development Index: 0.239

Correlation (r) with Ecological Footprint per capita: 0.399

Metric: Cost of business start-up procedures (% of GNI per capita)

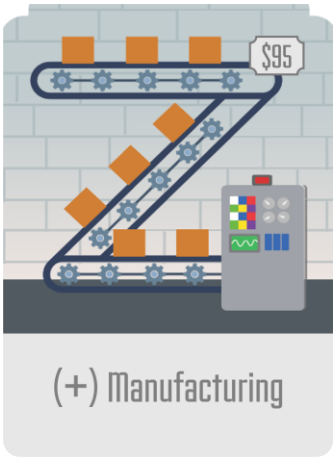
Data source: World Bank World Development Indicators

Time period: Increase between 2010-2015

Number of countries in sample (n): 150

Correlation (r) with Human Development Index: -0.279

Correlation (r) with Ecological Footprint per capita: 0.149



Metric: Industry (including construction), value added (current US$) per capita

Data source: World Bank World Development Indicators

Time period: Increase between 1980-2000

Number of countries in sample (n): 90

Correlation (r) with Human Development Index: 0.496

Correlation (r) with Ecological Footprint per capita: 0.290

Metric: Military expenditure (current USD) per capita

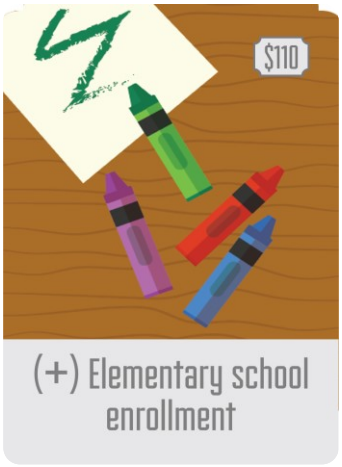
Data source: World Bank World Development Indicators

Time period: HDI 2010-2015 / EFpc 1980-2000

Number of countries in sample (n): HDI 129 / EFpc 101

Correlation (r) with Human Development Index: -0.315

Correlation (r) with Ecological Footprint per capita: 0.287



Metric: School enrollment, primary (% gross)

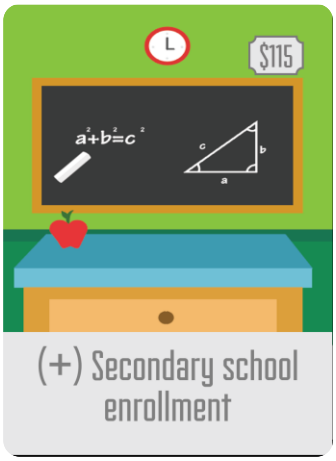
Data source: World Bank World Development Indicators

Time period: Increase between 2000-2015

Number of countries in sample (n): 125

Correlation (r) with Human Development Index: 0.472

Correlation (r) with Ecological Footprint per capita: 0.133



Metric: School enrollment, secondary (% gross)

Data source: World Bank World Development Indicators

Time period: Increase between 2000-2015

Number of countries in sample (n): 102

Correlation (r) with Human Development Index: 0.609

Correlation (r) with Ecological Footprint per capita: 0.241

Metric: School enrollment, tertiary (% gross)

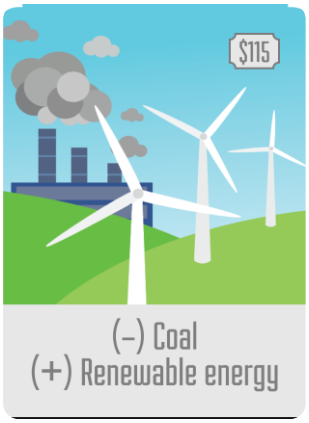
Data source: World Bank World Development Indicators

Time period: HDI 1980-2000 / EFpc 2000-2010

Number of countries in sample (n): HDI 71 / EFpc 89

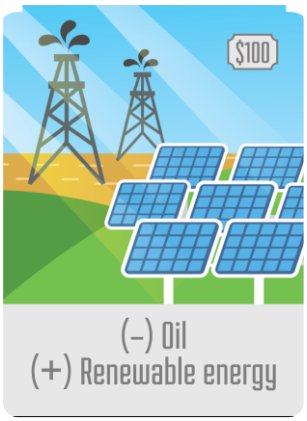
Correlation (r) with Human Development Index: 0.416

Correlation (r) with Ecological Footprint per capita: 0.273



This policy is about switching energy sources for electricity generation. In theory, a population's Human Development will not be affected by this – they will still have the same access to the same amount of electricity.*

The impact on the Ecological Footprint was assessed and weighed from the US Environmental Protection Agency's Carbon Dioxide Emissions Coefficients. For home and business uses, coal emits 95.74 kg of CO_2 per million BTU.



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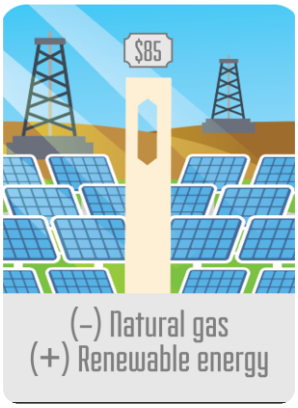
The impact on the Ecological Footprint was assessed and weighed from the US Environmental Protection Agency's Carbon Dioxide Emissions Coefficients. For home and business uses, fuel oil emits 74.14 kg of CO_2 per million BTU.



This policy is about switching energy sources for electricity generation. In theory, the population's Human Development will not be affected by this – they will still have the same access to the same amount of electricity.*

The impact on the Ecological Footprint was assessed and weighed from the US Environmental Protection Agency's Carbon Dioxide Emissions Coefficients. For home and business uses, natural gas emits 52.91 kg of CO_2 per million BTU.

* Of course, people living in the vicinity of power plants *are* affected by them, but these are too few to influence the correlation at a national scale. Also, climate-related impacts from burning fossil fuels *do* affect us all, but these effects are global and are not felt in equal measure everywhere, regardless of whether a country switches to renewables or not.

Metric: School enrollment, primary (gross), gender parity index (GPI)

Data source: World Bank World Development Indicators

Time period: HDI 2000-2015 / EFpc 1980-2015

Number of countries in sample (n): HDI 122 / EFpc 92

Correlation (r) with Human Development Index: 0.433

Correlation (r) with Ecological Footprint per capita: 0.138

Metric: Mortality rate, under-5 (per 1,000 live births)

Data source: World Bank World Development Indicators

Time period: Increase between 2000-2015

Number of countries in sample (n): 169

Correlation (r) with Human Development Index: -0.617

Correlation (r) with Ecological Footprint per capita: -0.223

Metric: Prevalence of undernourishment (% of population)

Data source: World Bank World Development Indicators

Time period: HDI 2000-2015 / EFpc 2010-2015

Number of countries in sample (n): HDI 103 / EFpc 152

Correlation (r) with Human Development Index: -0.496

Correlation (r) with Ecological Footprint per capita: -0.325

Metric: Fertility rate, total (births per woman)

Data source: World Bank World Development Indicators

Time period: HDI 2010-2015 / EFpc 2000-2010

Number of countries in sample (n): 171

Correlation (r) with Human Development Index: -0.240

Correlation (r) with Ecological Footprint per capita: 0.079

Metric: Urban density (% of urban population / % of urbanized area)

Data source: World Bank World Development Indicators

Time period: HDI 2000-2010 / EFpc 1980-2000

Number of countries in sample (n): 143

Correlation (r) with Human Development Index: 0.291

Correlation (r) with Ecological Footprint per capita: -0.313

Metric: Population living in slums (% of urban population)

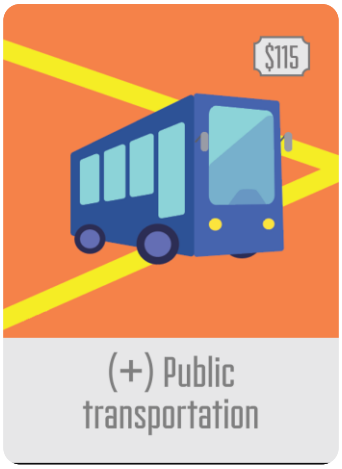
Data source: World Bank World Development Indicators

Time period: Increase between 2015

Number of countries in sample (n): 78

Correlation (r) with Human Development Index: -0.800

Correlation (r) with Ecological Footprint per capita: -0.561



Metric: Rail passenger transport (Passenger-km) / population

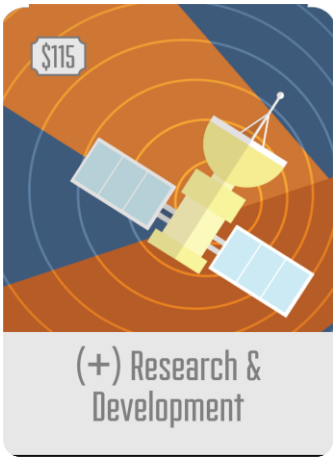
Data source: Organization for Economic Co-operation and Development (OECD)

Time period: HDI 2015 / EFpc 2010-2015

Number of countries in sample (n): HDI 47 / EFpc 46

Correlation (r) with Human Development Index: 0.662

Correlation (r) with Ecological Footprint per capita: -0.193



Metric: Research and development expenditure (% of GDP)

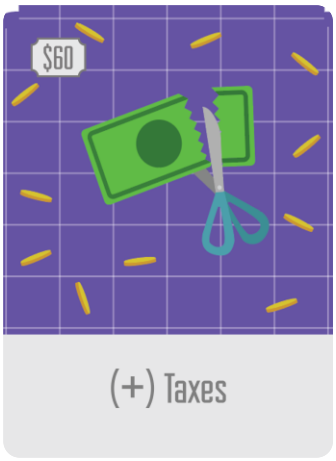
Data source: World Bank World Development Indicators

Time period: HDI 2015 / EFpc 2000-2010

Number of countries in sample (n): HDI 85 / EFpc 58

Correlation (r) with Human Development Index: 0.654

Correlation (r) with Ecological Footprint per capita: -0.226



Metric: Total tax and contribution rate (% of profit)

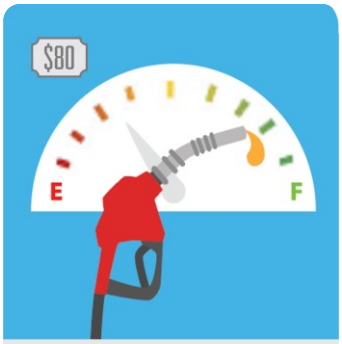
Data source: World Bank World Development Indicators

Time period: 2015

Number of countries in sample (n): 165

Correlation (r) with Human Development Index: -0.150

Correlation (r) with Ecological Footprint per capita: -0.194



(–) Fuel consumption

Metric: Fossil fuel energy consumption (% of total)

Data source: World Bank World Development Indicators

Time period: HDI 2000-2010 / EFpc 1980-2000

Number of countries in sample (n): HDI 125 / EFpc 102

Correlation (r) with Human Development Index: 0.227

Correlation (r) with Ecological Footprint per capita: 0.342

(–) Wood consumption

Metric: Forest land Ecological Footprint per capita

Data source: Global Footprint Network

Time period: Increase between 2010-2015

Number of countries in sample (n): 126

Correlation (r) with Human Development Index: 0.061

Correlation (r) with Ecological Footprint per capita: 0.277

(–) Income inequality

Metric: GINI index

Data source: World Bank World Development Indicators

Time period: 2015

Number of countries in sample (n): 71

Correlation (r) with Human Development Index: -0.552

Correlation (r) with Ecological Footprint per capita: -0.532

Metric: Corruption Perceptions Index

Data source: Transparency International

Time period: 2015

Number of countries in sample (n): 159

Correlation (r) with Human Development Index: 0.774

Correlation (r) with Ecological Footprint per capita: 0.719

Testimonials

"ECOPOLIS stimulates the search for solutions to nationwide issues, taking into account their social, political and economic interconnections. By playing collectively, we explore challenges that may seem daunting, and find answers that otherwise might elude us."

MICHELLE MUSCHETT
Former Minister of Social Development
of Panama

“I would love to see this game become the 21st century *sustainable* alternative to a game like Monopoly.”

DR. HUGH S. GORMAN
Social Sciences Department Chair and
Professor of Environmental History and Policy
Michigan Technological University, U.S.

"ECOPOLIS fascinates me because it allows us to learn about sustainability from different perspectives, considering both the pros and cons of each play in real life. Both young and old become engaged discussing relevant topics throughout the game."

NYASHA WARREN
Educator and teaching consultant
Praxia Educational Consultants, Panama

"ECOPOLIS is not only fun, but stimulates interactive communication, questions and insights to the inter-relationships of complex factors that impact the sustainability of communities or countries."

DR. RUSSELL MULLEN
Professor, Sustainable Agriculture
Iowa State University, U.S.

"This game accomplished what none of my lectures could: to make students want to stay in the classroom after we have run out of time."

DR. MANUEL QUINTERO
Professor of Macroeconomics
Universidad Santa María La Antigua (USMA), Panama

"I personally enjoyed the game very much and observed it to be an excellent tool for active-learning. It has great potential to promote better understanding of the complex development and environmental problems facing our world today."

DR. DAVID W. WATKINS
Professor of Civil and Environmental Engineering
Michigan Technological University, U.S.

"Simply the best tool for raising awareness and teaching about environmental matters."

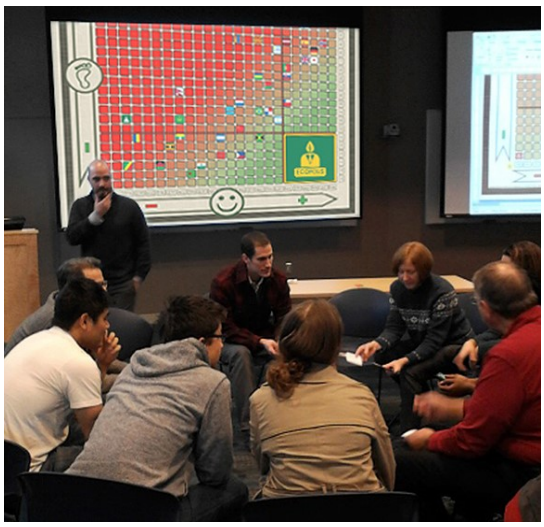
IVIETT SERRANO
Senior Consultant for Social Innovation
Projects with Purpose, Panama

"This game should be in every Mayor's Office and every Ministry. Planning and implementing sustainability *is* possible"

RAISA BANFIELD
Former Deputy Mayor of Panama City, Panama

"Truly a game-changer. ECOPOLIS will have a greater global impact in this generation than Monopoly during the previous century."

Dr. Emilio Sempris
Former Minister of Environment of Panama



ECOPOLIS Workshop at Michigan Tech

Game session with Corporate Social Responsibility leaders

Game session with the finalists of the National Public Speaking Competition

ECOPOLIS at the Biomuseum's Bio-Sunday

ECOPOLIS

OUR PLANET'S FUTURE IS NO GAME

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ECOPOLIS Credits
Game design: Andrés Tarté
Art design: Stephanie Sanz
Graphic design: Luis F. Sosa

HABITAT Games originated in Panama with the goal of promoting ecological thinking and a culture of sustainability through game-based learning.

Its development has been possible, in part, thanks to support from:

IDB Inter-American Development Bank

CIDES Centro Internacional para el Desarrollo Sostenible International Center for Sustainable Development

HABITAT Games supports the Sustainable Development Goals