

SAFET KUBAT

**THE BALKAN DOUGHNUT:
EXPLORING PATHWAYS
TO GREEN TRANSFORMATION**

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to Green Transformation**

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The Balkan Doughnut: Exploring Pathways to Green Transformation

This research aims to develop a tailored Doughnut Economy model to address key ecological and social challenges in the Balkans. Building on Kate Raworth's original Doughnut Economy framework and modifications from the IPE (Institute for Political Ecology, Zagreb) model, a "transformative Doughnut model" has been developed for three Balkan cities: Zenica, Belgrade, and Rijeka. The essay incorporates 33 indicators, including air pollution, renewable energy usage, income inequality, and social satisfaction, to measure and balance ecological sustainability and human well-being. A replicable Balkan Doughnut model is proposed as a public policy tool to foster regional cooperation and create a unifying narrative for the Balkan region. By addressing common challenges such as ecological degradation, political divisions, and socio-economic inequalities, the model aims to inspire trust, unity, and action among citizens, cities, civil society, and academia. This interdisciplinary effort provides a blueprint for guiding the Balkans toward a more sustainable and equitable future, bridging

the gap between current unsustainable practices and a safe, just space within the “doughnut.”

Introduction

Your initial association with a doughnut would be jam or chocolate oozing out, you might have wondered about its flavor, craving a taste. If someone were to tell you that the image of a doughnut is now used as a metaphor to illustrate the socio-ecological footprint of a city, a nation, or even the entire planet, you would likely be surprised. Such symbolism is not surprising but rather confirms that symbols have historically defined us, and that the language of symbols represents a powerful geopolitical code from Copernicus – the sun at the center and Yin-Yang, to flags, the snake coiled around a staff, and most recently, the doughnut. The Doughnut Economy model was first introduced by Kate Raworth (2017), providing a different perspective on the world through circular lenses rather than the neoliberal or liberal frameworks, and questioning GDP as a measure of a society’s development. At its core, the model envisions two boundaries and a safe space that visually resembles a doughnut. The outer edge metaphorically represents the ecological ceiling or planetary boundaries and everything we have in excess, whose transgressions threaten the planet’s survival. In the early 1970s, a group of scientists known as the Club of Rome discussed the concept of limits to growth, which Rockström et al. (2009) later expanded and defined as nine planetary boundaries to describe these transgressions of planetary boundaries. Since then, six of the nine boundaries have been transgressed (Climate change, biosphere integrity, land-system change, freshwater change, biogeochemical flows, novel entities), with trends indicating little promise (Richardson et al., 2023).

To address this situation, society requires new tools to understand where we currently stand and where we are headed, along with new narratives about what development should entail and how it should be implemented. In the Doughnut model theory, the center represents a safe and just space, resembling an American-style doughnut with a chocolate-filled center. This inner

space symbolizes everything society lacks. The model defines social needs such as food, water, housing, equality, political voice, gender equity, social inclusion, mobility, education, peace, and security. This model is far from being merely theoretical, with practical applications in over 70 cities worldwide, including Amsterdam, Brussels, Copenhagen, Glasgow, Melbourne, Portland, and Leeds. Even North Macedonia uses the Doughnut model for national strategy development.

It has sparked numerous debates, from defining concepts such as green growth, degrowth, and growth in general to the proper comprehension of the Doughnut Economy model.

An alternative transformative Doughnut model has also been proposed by IPE (Institute for Political Ecology, Zagreb), which adds a third, cultural dimension alongside the biophysical and socio-economic ones, thus aligning more closely with degrowth theory (IPE, 2023). This suggests that the Balkans are becoming an intriguing testing ground for applying the transformative Doughnut Economy model. The goal is to provide a unifying narrative and practical tools for green public policy advocates, civil society, academia, and policymakers, while offering insights into the current state of Balkan societies. By analyzing three cities in the Balkans – Zenica, Rijeka, and Belgrade – the objective is to compare the Doughnut Economy models for each of these cities and provide a unifying narrative for the Balkan region as a whole, linking ecological and social transgressions. The aim is to demonstrate the disruption of socio-ecological metabolism and to highlight that, despite the morphological differences between these cities; they all share the common problem of boundary transgressions. Furthermore, it is essential to highlight the situation in the semi-periphery, a status that the Balkans undoubtedly hold, within the context of ongoing debates regarding growth, degrowth, and green growth.

The Balkan Context

Along with the existing ethno-national, political, and corruption issues, the Balkans also face numerous global challenges, including the pressing concern of climate change, the long-stand-

ing problem of CO₂ emissions, and the persistent social imbalance and unequal wealth distribution. The Balkan countries have signed the Sofia Declaration, also known as the Green Agenda for the Balkans, committing to five dimensions aimed at achieving green transformation. Although these countries have eagerly accepted funding under the guise of green energy transitions, they frequently misuse it for projects such as highway construction, as seen in Bosnia and Herzegovina (B&H), rather than enhancing railways, which would better align with green transition initiatives. Interestingly, Balkan countries continually place energy transition in the spotlight. However, the green transition encompasses more than merely shifting to clean energy; it also includes changes in agriculture, transportation, and many other areas. The key is to suggest models that provoke questions, challenge assumptions, and above all, conduct a comprehensive socio-ecological footprint assessment of societal conditions. Based on this, existing conditions can be viewed not merely as checklists but as something far more comprehensive. How can the Doughnut Economy model help the Balkans start the green transition process, and what obstacles stand in the way? The difficulty lies in attaining sustainability in a region marked by profound social, political, and economic challenges.

The idea is to propose an alternative Doughnut Economy model that provides a unifying narrative for Balkan countries, identifying areas of surplus and deficit, and discerning where prosperity lies, both regionally and globally. This model would serve as a kind of compass, directing desired outcomes and future trajectories, while increasing the negotiating power of Balkan countries. In this context, the Doughnut Economy model's indicators highlight the issue of CBAM (Carbon Border Adjustment Mechanism) in relation to high CO₂ emissions and low GDP growth. In other European nations, the correlation between rising CO₂ emissions and GDP growth is generally positive. In the Balkans, the situation differs, characterized by an increase in CO₂ emissions without a corresponding increase in GDP. It is also essential to consider the CBAM mechanism in light of increasing CO₂ emissions, as Western Balkan countries continue to rely on electricity from "dirty" sources, specifically thermal power plants. In Bosnia and Herze-

govina, more than 63% of electricity is produced from thermal power plants. Since the carbon tax applies to electricity generation from polluting sources, B&H will be directly affected.

In practice, this means that the Balkans will face high CO₂ taxes due to their failure to transition to renewable energy sources, particularly when exporting materials to the European Union. This raises another issue: for example, B&H will have to pay double taxes because it produces steel, coke, and other materials, all of which are directly impacted by this mechanism. Balkan countries are also facing an influx of mining activities, which is especially problematic as foreign companies intend to mine in this region, where 437 different locations have already been identified. The situation is further complicated by low concession fees, along with the exploitation of non-renewable sources such as rare minerals and metals (cobalt, silver, gold, lithium, barite, etc.), and the fact that these countries have not yet implemented alternative solutions. These issues must be considered holistically. This underscores the importance of models such as the Doughnut Economy, as they provide a comprehensive perspective. Problems cannot be examined in isolation. For example, when discussing mining, it is important to consider air and water pollution, deforestation, GDP growth, and employment rates, among other factors. The Doughnut Economy model considers these indicators (factors) and integrates them into a holistic approach, providing a complete picture of the socio-ecological metabolism.

Case Studies “Zenica, Belgrade, Rijeka”

The development of a Balkan Doughnut model presents an alternative approach to addressing socio-ecological inequalities, serving as a guide for shaping desired trajectories for the cities and countries examined in this study. The Balkans region requires urgent and drastic measures that will not only halt ecological collapse but also enable sustainable economic and social development. This study presents Doughnut Economy models for three Balkan cities – Zenica, Rijeka, and Belgrade – through a comparative analysis. The choice of Zenica, Rijeka, and Belgrade as case studies for the development of the Balkan Doughnut Economy model is both strategic and deliberate, reflecting the socio-eco-

nostic, cultural, and ecological diversity of the Balkan region. These three cities represent distinct urban typologies, industrial, coastal, and metropolitan contexts — facilitating a robust assessment of the model's adaptability and applicability across the Balkans. Zenica exemplifies the challenges faced by post-industrial cities, particularly those grappling with severe pollution and socio-economic vulnerabilities. Rijeka, with its experience of European Union integration, is navigating transitions in tourism, industry, and cultural revitalization. Belgrade, as a regional hub, embodies the complexity of a large metropolitan center with intricate political and economic dynamics. Despite their contextual differences, all three cities share common socio-ecological challenges, such as air pollution, biodiversity loss, and socio-economic inequalities.

The approach grounded in the Doughnut Economy model facilitates the identification of both ecological and social surpluses and deficits within the socio-ecological metabolism. It provides a unifying narrative that is applicable across the Western Balkans. This model bridges local realities with regional and global sustainability imperatives, offering a practical tool for policy design, strengthening cross-border cooperation, and fostering a shared vision for a sustainable and just Balkan region. While these cities differ in terms of culture, politics, tourism, economy, and other aspects, the Doughnut presents a unifying narrative for all three. Rather than focusing on differences, it offers a common framework with harmonized indicators. This transformative Doughnut Economy model, referred to as the "Balkan Doughnut Economy," consists of three segments and portrays the cities through biophysical, socio-economic, and cultural dimensions, as well as 33 indicators, with each segment including 11.

The biophysical segment is described through the biodiversity theme, the air pollution and climate change theme, and 11 indicators. The biodiversity theme includes indicators such as forest cover, protected areas, land use, and open green spaces.

Air pollution encompasses indicators such as the number of days exceeding PM10 particle limits in a year, the annual average of

SO₂ emissions, and PM₁₀ emissions. Climate change is measured using CO₂ emissions per capita (tons per year) and temperature changes.

The socio-economic segment of the Balkan Doughnut encompasses themes related to resources and living standards. The resource theme is measured through indicators such as household water availability (%), water quality (percentage of potable water per capita), sewerage availability, waste production per capita (kg), recycling rates, employment, wages, healthcare, and housing. The living standards dimension is assessed through a set of indicators that capture key aspects of societal well-being. These include levels of educational attainment, internet accessibility, per capita water consumption, the proportion of the population engaged in waste collection practices, and the share of renewable energy in total energy consumption.

The cultural dimension is conceptualized through the democracy theme and the healthy living and corruption theme. The relevant indicators within the democracy theme include gender equality, voter turnout, institutional trust, job satisfaction, and overall life satisfaction. The theme encompassing corruption and healthy living is operationalized through indicators such as population mobility, average vehicle age, dietary imbalances related to excessive fatty food consumption, perceived levels of corruption, household income, and the prevalence of overwork.

The visual model of the Balkan Doughnut Economy is divided into three segments, with indicators showing whether there is too little, too much, or optimal well-being. Each indicator is based on primary and secondary research data, which are displayed in the tables below. After determining the indicators (denoted by X values), thresholds are established for each indicator, marked as T (top) or B (bottom). Depending on the results, the outer or inner boundary ultimately determines the positioning of a specific indicator within the doughnut. The letter "r" represents the range, indicating the safe space. Once the mechanism is established, the mathematical formula $IV = (x - B \text{ or } T) / r$ is applied. The goal is to calculate the Index Value (IV), which is plotted on the Doughnut

after mathematical processing, representing a positive or negative transgression, and situating each indicator relative to the safe space. The results are visualized on the Doughnut chart, segmented into three predefined areas. Red edges indicate excesses and deficiencies, while green marks the safe thriving space. I have also colored the indicators corresponding to Sustainable Development Goals (SDGs), aligning each indicator with its relevant SDG target. Although this model is transformative, the colorization of indicators merely illustrates the degree of transformation rather than defining rigid categorizations.

Case of Zenica: The Legacy of Industrialization

Known as the steel heart of Bosnia and Herzegovina, the city of Zenica embodies the region's industrial past. While the steel industry has historically provided an economic foundation, it has also contributed to severe air pollution, land degradation, and public health crises. The city's socio-economic structure remains deeply intertwined with the survival of this industry, creating a complex dynamic between economic growth and ecological sustainability. Applying the Doughnut model to Zenica involved identifying key deficiencies in the social foundation and overshoots of the ecological ceiling. For instance, air quality data reveal significant transgression, especially regarding particulate matter levels. Efforts to diversify the economy beyond steel production and transition to cleaner energy sources are crucial. Community-driven initiatives could play a pivotal role in improving both the environmental and social conditions of the city.

Table 1: Representation of indicators, segments, themes, and findings in Zenica as a preparation for the development of the Doughnut model

Zenica				
Segment	Themes	Indicator	X	Value
Biophysical	Biodiversity	Forest Area	62	% forest coverage
		Protected Area	0	% protected area
		Land use	0,28	% land use
		Green Spaces	25	m ² of green spaces per capita
	Air Pollution and Climate Change	PM 10 emission – number of days with exceeded air quality standards	102	PM 10 – number of days with exceeded air per year
		S02 Emissions	62	Annual average value in mg/m ³ – highest measured at one measuring station
		PM 10 Emissions	47	Annual average value in mg/m ³
		Temperature Change	1,8	Temperature change/per year
		CO2 Emissions	4,78	t/per capita/year
		Water Availability	98,3	% of households
		Water Quality	83,8	% drinkable water/ per year
Socio- economic	Resources	Sewage Availability	69	% of households
		Municipal Waste	298	Waste quantity/per capita/per year
		Recycling	8	% of recycled material
		Employment and Salary	1307	Average salary

Segment	Themes	Indicator	X	Value
Socio- economic	Resources	Healthcare	868	Number of hospital beds/ 100 000
		Housing	12	Cost of rented housing per m ² /BAM
		Education	14,2	Expected years of education
	Living standard	Internet Access	94	% of households with internet access
		Water Consumption	226	Daily water consumption per capita
		Waste Collection	6	% of population not included in waste collection
		Renewable Energy	37	% of renewable energy in Zenica
		Gender Equality	25,8	% of women in the city council
Cultural	Democracy	Democratic Participation	44,09	% voter turnout
		Trust in Institutions	16	% of trust
		Job Satisfaction	7,1	Value 10>1
		Life Satisfaction	5,7	Hapiness Index
	Healthy life and corruption	Mobility	270	Number of registered vehicles/on city level/ per 1000
		Age of Vehicles	18	Average age of vehicles/ city level
		FF	71,63	Fatty food imbalance
		CPI	35	Corruption Index (TI)
		Household Income	994	Monthly in BAM
		Overtime Work	41	Number of weekly working hours

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Case of Belgrade: Metropolitan Challenges

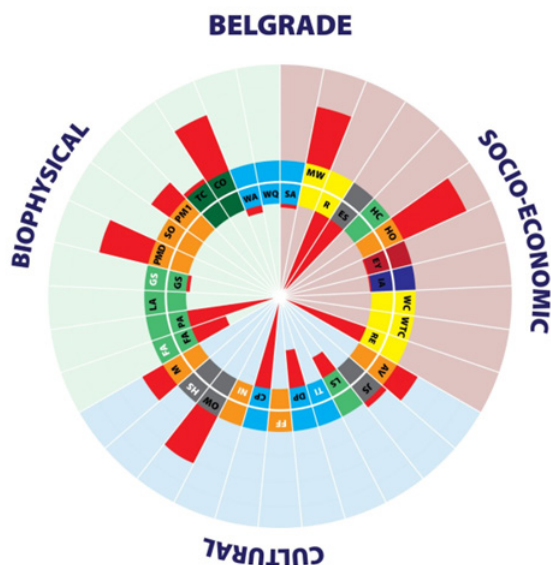
Belgrade, the capital of Serbia, is a city of contrasts. As a metropolitan center, the city faces issues of urban sprawl, inadequate waste management, and increasing energy demands. The disparities between affluent urban neighborhoods and marginalized peri-urban areas highlight broader socio-economic inequalities prevalent in the region. The Doughnut model framework for Belgrade emphasizes unmet social needs, such as affordable housing and access to quality public services, alongside ecological overshoots in areas like air pollution and waste accumulation. Strategies for Belgrade could include investments in public transportation systems to reduce reliance on private vehicles, as well as the introduction of circular economic practices to improve waste management. Additionally, participatory urban planning processes could bridge the gap between policy and community needs

Table 2. Overview of indicators, segments, themes, and findings in Belgrade as a preparation for the Doughnut Model visualization

Belgrade				
Segment	Themes	Indicator	X	Value
Biophysical	Biodiversity	% Forest Area	19,18	% forest coverage
		Protected Area	1,89	% protected area
		Land-use	NA	% land use
		Green Spaces	23	m ² of green spaces per capita
	Air Pollution and Climate Change	PM 10 emission – number of days with exceeded air quality standards	61	PM 10 – number of days with exceeded air per year
		SO2 Emissions	13	Annual average value in mg/m ³ – highest measured at one measuring station

Segment	Themes	Indicator	X	Value
Biophysical	Air Pollution and Climate Change	PM 10 Emissions	34	Annual average value in mg/m ³
		Temperature Change	1,92	Temperature change/per year
		CO2 Emissions	4,26	t/per capita/year
		Water Availability	94,61	% of households
		Water Quality	/	% drinkable water/per year
Socio- economic	Resources	Sewage Availability	89,13	% of households
		Municipal Waste	360	Waste quantity/ per capita/per year
		Recycling	17,70	% of recycled material
		Employment and Salary	1640	Average salary
		Healthcare	350	Number of hospital beds/ 100 000
		Housing	19,5	Cost of rented housing per m ² / BAM
		Education	14,6	Expected years of education
Cultural	Living standard	Internet Access	92,9	% of households with internet access
		Water Consumption	230	Daily water consumption per capita
		Waste Collection	100	% of population not included in waste collection
		Renewable Energy	21,17	% of renewable energy

Segment	Themes	Indicator	X	Value
Cultural	Democracy	Gender Equality	41	% of women in the city council
		Democratic Participation	42,2	% voter turnout
		Trust in Institutions	NA	% of trust
		Job Satisfaction	7,06	Value 10>1
		Life Satisfaction	5,94	Hapiness Index
	Healthy life and corruption	FF	79,09	Fatty food imbalance
		Mobility	438	Number of registered vehicles/on city level/ per 1000
		Age of Vehicles	17,50	Average age of vehicles/ city level
		CPI	NI	Corruption Index(TI)
		Household Income	NI	Monthly in BAM
		Overtime Work	41,53	Number of weekly working hours



Graph 2: Transformative Doughnut Model for Belgrade²

² The Belgrade Doughnut model reveals a significant socio-ecological imbalance, with only six indicators in a state of well-being and four unanalyzed. At the same time, 23 indicators have exceeded safe limits. Ten indicators transgress the outer boundary of the Doughnut, indicating an excess across all three dimensions: four in the biophysical segment, two in the socio-economic segment, and four in the cultural segment. Meanwhile, the inner boundary of the Doughnut highlights 13 indicators with negative shortfalls, pointing to deficiencies in these dimensions. Specifically, there are three shortfalls in the cultural segment, four in the biophysical segment, and six in the socio-economic segment. Among the four indicators reflecting well-being, two belong to the biophysical segment, two to the socio-economic segment, while none are present in the cultural segment. Overall, the socio-ecological metabolism of Belgrade is severely disrupted.

Case of Rijeka: A Maritime Perspective

Rijeka, located on the Adriatic coast of Croatia, offers a maritime perspective on the discussion of green transformation. Historically a port city, Rijeka has undergone significant changes in its economic structure, transitioning from a focus on heavy industry to one centered on tourism and services. However, challenges such as coastal pollution, climate change risks, and the management of sustainable tourism persist, necessitating innovative development approaches. The integration of the Doughnut model in Rijeka emphasizes preserving its maritime ecosystem while fostering inclusive economic development. Initiatives such as marine life protection projects and sustainable tourism frameworks are essential. Furthermore, Rijeka could leverage its strategic position to promote regional cooperation on marine protection and climate adaptation strategies.

Table 3. Overview of indicators, segments, themes, and findings in Rijeka as a preparation for the Doughnut Model visualization

Rijeka				
Segment	Themes	Indicator	X	Value
Biophysical	Biodiversity	Forest Area	40	% forest coverage
		Protected Area	3,35	% protected area
		Land use	0,35	% land use
		Green Spaces	16	m ² of green spaces per capita
	Air Pollution and Climate Change	PM 10 emission – number of days with exceeded air quality standards	1	PM 10 – number of days with exceeded air per year
		SO2 Emissions	18	Annual average value in mg/m ³ – highest measured at one measuring station

Segment	Themes	Indicator	X	Value
Biophysical	Air Pollution and Climate Change	PM 10 Emissions	28	Annual average value in mg/m ³
		Temperature Change	1,9	Temperature change/per year
		CO2 Emissions	2,6	t/per capita/year
	Resources	Water Availability	100	% of households
		Water Quality	100	% drinkable water/per year
		Water Healthcare	NA	% of regularity
		Sewage Availability	98,63	% of households
		Municipal Waste	445	Waste quantity/ per capita/per year
		Recycling	30	% of recycled material
		Employment and Salary	2300	Average salary
		Healthcare	NA	Number of hospital beds/ 100 000
		Housing	19,5	Cost of rented housing per m ² / BAM
		Education	15	Expected years of education
Socio- economic	Living standard	Internet Access	99	% of households with internet access
		Water Consumption	256	Daily water consumption per capita
		Waste Collection	100	% of population not included in waste collection
		Renewable Energy	33,13	% of renewable energy

Segment	Themes	Indicator	X	Value
Socio- economic	Democracy	Gender Equality	45,16	% of women in the city council
		Democratic Participation	37,55	% voter turnout
		Trust in Institutions	/	% of trust
		Job Satisfaction	7,15	Value 10>1
		Life Satisfaction	5,54	Hapiness Index
Cultural	Healthy life and corruption	Mobility	608	Number of registered vehicles/on city level/ per 1000
		Age of Vehicles	14,66	Average age of vehicles/ city level
		FF	118,32	Fatty food imbalance
		CPI	50	Corruption Index (TI)
		Household Income	NI	Monthly in BAM
		Overtime Work	38,64	Number of weekly working hours

The chart is a circular sunburst diagram representing the distribution of 1000 tweets. The outer ring shows the total count for each sub-sector, and the inner rings show the breakdown of these counts into individual tweets. The segments are color-coded by topic: red for 'Health', yellow for 'Economy', green for 'Environment', blue for 'Society', and orange for 'Policy'.

Category	Sub-Category	Topic	Count
BIOPHYSICAL	ENVIRONMENT	ENVIRONMENT	100
		HEALTH	50
		ECONOMY	50
		SOCIETY	50
		POLICY	50
	HEALTH	HEALTH	100
		ECONOMY	50
		SOCIETY	50
		POLICY	50
		ENVIRONMENT	50
SOCIO-ECONOMIC	HEALTH	HEALTH	100
		ECONOMY	50
		SOCIETY	50
		POLICY	50
		ENVIRONMENT	50
	ECONOMY	ECONOMY	100
		HEALTH	50
		SOCIETY	50
		POLICY	50
		ENVIRONMENT	50
CULTURAL	HEALTH	HEALTH	100
		ECONOMY	50
		SOCIETY	50
		POLICY	50
		ENVIRONMENT	50
	ECONOMY	ECONOMY	100
		HEALTH	50
		SOCIETY	50
		POLICY	50
		ENVIRONMENT	50

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The Balkan Doughnut Model in Action

Applying the Doughnut model to Zenica, Belgrade, and Rijeka requires adjusting its principles to suit the specific characteristics of each city. The model's dual focus on meeting human needs and respecting ecological boundaries provides a framework for assessing and designing interventions.

The Doughnut economy model can be likened to visiting a doctor. After the anamnesis and establishment of a diagnosis, treatment follows. In this analogy, the anamnesis relates to a socio-ecological footprint and assessment, taking into account the city's historical context, architectural heritage, and geographic, political, and social specificities. Based on this, the unifying indicators—akin to blood test results or, in medical terms, a complete blood count—are determined. The anamnesis also includes a review of past diagnoses, which in this context means analyzing strategic documents, studies, reports, and action plans.

Subsequently, all necessary findings must be collected to establish a diagnosis and identify key indicators that will enable a therapeutic approach. In the case of the Doughnut model, this involves conducting a socio-ecological footprint analysis and collecting relevant indicators through primary and secondary research. Based on the data, a final diagnosis can be made, and an appropriate intervention can be formulated.

Socio-Ecological Status of Cities

Research shows that the socio-ecological conditions in Zenica, Belgrade, and Rijeka present significant challenges. Out of the 33 indicators analyzed, Rijeka and Belgrade each have seven indicators reflecting well-being, while Zenica has six. Zenica has 26 indicators exceeding limits, Belgrade 23, and Rijeka 21. Belgrade has three, Rijeka has five, and Zenica has one indicator with unavailable data.

Socio-economic foundations: For all three cities, ensuring a strong social foundation, including adequate housing, education,

healthcare, and social equity, is a pressing concern. In Zenica, efforts to diversify the economy beyond steel production are crucial for reducing unemployment, improving living standards, and enhancing air quality. Belgrade must address urban inequalities through investments in public services and affordable housing. Rijeka's challenge lies in balancing its growing tourism industry with the needs of local communities. Across the 11 socio-economic indicators analyzed, all three cities exhibit a high degree of deficiency. Zenica has two indicators reflecting well-being, Rijeka has four, and Belgrade has three. The most significant transgressions are observed in renewable energy use, democratic participation (low voter turnout), and low recycling rates.

Biophysical ceiling: Navigating ecological boundaries

Respecting the ecological ceiling requires mitigating environmental degradation while fostering sustainable economic practices. The situation in Zenica, a city reliant on coal and heavy industry, highlights the urgency of transitioning to cleaner energy sources and adopting circular economy principles. Belgrade faces challenges related to air pollution and waste management, requiring robust regulatory frameworks and civic engagement. Rijeka requires comprehensive climate adaptation strategies to safeguard its natural heritage. In the biophysical segment, Zenica and Belgrade show transgression in eight indicators, while Rijeka shows exceedances in six indicators. The most pressing issues include air pollution, CO₂ concentrations, and low levels of protected areas.

Cultural segment: In the cultural segment, the most significant exceedances are observed in indicators of corruption, distrust in institutions, and dissatisfaction with life and work. The Doughnut model for all three cities points to alarming levels of institutional distrust and high corruption. Zenica exhibits the most significant cultural segment deficiency, with nine indicators exceeding thresholds and only one – fatty food imbalance – reflecting a state of well-being. Zenica also has the lowest percentage of women represented in the city council, where Belgrade and Rijeka fare significantly better. Interestingly, Rijeka records a high fat intake in its diet, which can be linked to higher CO₂ emissions and waste production in a direct correlation.

Conclusion and Recommendations: The Path Toward Green Transformation Through the Doughnut Economy Model

Considering the opportunities and challenges of implementing the Doughnut Economy model in the Balkans, the cities of Zenica, Belgrade, and Rijeka demonstrate transformative potential for sustainable and inclusive practices. These cities represent the broader regional struggles with ecological degradation, socio-economic inequality, and poor urban governance, making them ideal candidates for pioneering green transformation approaches.

As case studies reveal, localized efforts can serve as a model for other cities in the Balkans and beyond, emphasizing the importance of place-specific strategies. However, the successful implementation of this model is not without its challenges.

The path to achieving a sustainable Doughnut Economy in the Balkans is fraught with political, social, and economic obstacles. Local governments often lack the institutional capacity and resources to initiate significant reforms. Fragmented political agendas hinder regional cooperation, and international actors have yet to fully prioritize the Balkans as an area for innovation in sustainable policies. Overcoming these obstacles requires a high-level strategy involving local, regional, and international stakeholders.

Recommendations for Achieving Green Transformations

Strengthening regional cooperation for sustainability. Collaboration among cities like Zenica, Belgrade, and Rijeka should be institutionalized through cross-border networks and shared policy platforms. These networks can encourage knowledge transfer, promote collective learning, and ensure coordinated actions on common challenges such as air pollution, water management, and energy transitions.

Promoting participatory governance models. Inclusive decision-making mechanisms are crucial for building trust and en-

sureing the success of sustainable initiatives. Citizen assemblies, modeled on successful experiments in Europe, should be established to engage communities in planning and implementing green policies directly.

Focusing on urban-rural synergies. Policies should prioritize reducing disparities between urban centers and rural areas. Investments in green infrastructure, renewable energy, and sustainable agriculture in rural areas can complement urban sustainability goals while addressing issues of rural underdevelopment.

Leveraging international support and funding. Global institutions such as the EU and the UN should play a proactive role in supporting Doughnut Economy initiatives in the Balkans. Targeted funding mechanisms, capacity-building programs, and technical assistance should be mobilized to enable local authorities to implement transformative policies.

Enhancing accountability and transparency. Tackling corruption and ensuring transparent governance are key to the successful implementation of the Balkan Doughnut Economy transformative model. Civil society organizations and investigative journalism initiatives should be supported in monitoring public transactions, especially in green projects, and in holding policymakers accountable.

Embedding sustainability in regional development policies. National and regional development strategies should integrate Doughnut Economy principles. This includes prioritizing ecological restoration, circular economic practices, and socially inclusive development in strategic planning documents.

The Path Toward Green Transformation Through the Balkan Doughnut Economy Model

The successful implementation of the Doughnut Economy in the Balkans could set a precedent for green transformation across the region. By addressing interconnected challenges of ecological degradation, economic inequality, and political inefficiency,

cities like Zenica, Belgrade, and Rijeka can become models of sustainable development. However, this vision can only be realized through sustained engagement, bold policies, and collaboration at higher levels. The Doughnut Economy model offers a unifying narrative for green societal transformation, defining themes and indicators that highlight the absence of a safe and just space. The model not only provides concrete guidelines for implementing green policies but also serves as a tool for their execution. Through its illustrative and innovative approach, it defines 33 distinct indicators encompassing various domains of green public policies.

This holistic approach envisions ecological, social, and cultural dimensions within a single framework, making the Doughnut Economy model not only relevant but also essential for achieving a sustainable future in the region. The Balkans have the opportunity to redefine their future toward a fairer, more equitable, and sustainable path. By adopting the Doughnut Economy model, the region can become a leader in the global movement for green transformation. Through the application of the Doughnut model in Zenica, Belgrade, and Rijeka, it is clear that all these cities possess high potential for sustainable transformation.

Although significant challenges exist, including socio-economic inequalities, ecological boundaries, and cultural barriers, their commitment to applying the Doughnut model can serve as an example for other cities in the Balkans. If these cities dedicate themselves to integrating sustainable policies and achieving socio-ecological balance, they can create a unifying narrative aimed at initiating broader civic mobilization. The language of the “doughnut economy” is not intended solely for government institutions, cities, or civil society, but primarily for citizens. Through its philosophy and visual representation, it calls for a shift away from individualism, promoting redistribution and a higher quality of life.

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