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Research Article

Facets of Feasible: Synergic Context of Territorial-sectorial Innovation-investment Circulatory Development

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Abstract

Via Circulatory entity of processes in Natural-Anthropogenic Environment considered Territorial-Sectorial Sustainable Socio-Economic and Spatial Development facility (as Sum of Technologies), since individual communities and regions until international and global level. In context of War and systemic Energy, Economy, Safety & Environmental crisis were examined Geopolitical, Geo-economic and Security aspects of relevant structures for interregional (EcoEuroRegion) and transnational cooperation ("Green Banana"), which meet now specific challenges, e.g, of European Green Deal, priority objectives of European & Euro-Atlantic integration and of macro-regional partnership, in particular for Three Seas Initiative aims. Therefore the objective of the article is to elucidate circulatory character of the Natural-Anthropogenic phenomena wide range and to proof expediency of its displaying and peculiarities applying. The general approach is in defining in spatially-temporal and socio-economic (e.g. technologic) cycles their key circulatory phenomena and processes with their further available investigation by eligible toolkits (including GIS, Fourier methods etc.) and eligible optimization via Local, Transfrontier and Macroregional ∑s of Technologies. Their embodiment offering through systemic transfrontier projects on Mobility, Energy and application of Geo-Informational Communication Technologies also in other key sectors of win-win Ukrainian & Moldavian integration into European TEN-T, TEN-E, e-TEN, as well as for Just Transition towards EU Next Generation.

Keywords

Natural-Anthropogenic Circulatority, Territorial-Sectorial Cyclic Processes Synergy,
Eco-Spatial-Information Circulatority Perception, Territorial ∑s of Technologies, Geo-Spatial-Information Toolkits Applying,
Systemic Project's Solutions Generating, Applicability for Trans-European Vertical Corridor,
European Integration and Security Promotion

1. Introduction

Russian invasion catalyzed & sharpens Energy, Economy, Security & Climate systemic World crisis. For today its essential entity is crucially exposed by global Food problem provoked by War (In the original language of the Bible, the perception of the War מִלְחָמָה - "malhama" is grounded on the basic meaning מחל אל - "lo lehem - no bread"). At the same time comprehensive retrospective analysis of 50-years regress after cornerstone "The Limits to Growth" shows that Mankind passed light-heartedly available turns to more sustainable so-

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cio-economic and spatial development on all levels - from individual mentality till Global Security [1].

These problems generate more & more obstacles for embodiment of homo-centered social development models, which became attractive and popular in the World in last decades. Therefore, let's investigate the generic roots of this Natural-Anthropogenic global instability from the "Circulatory Development" point of view[1], after centuries of homo-centrated "Dialectical Spirale" proclamation [2]. "Circulatory" means that any event/process in Natural-Anthropogenic Environment has & summarizes periodical apparent features. Their recurrence with observable changes defined both Natural-Anthropogenic processes/events evolution & synergic sustainability of them. Most known human "projection" of these phenomena was nominated in 1988[3] as "Circular Economy".

Such look on each actual problem and their aggregates is aimed to found repeated precedents/trends allowing reveal better available & reasonable "inventional" solution(s) and necessary decision(s) for imminent occurrences & actions/technologies synergy with their causes. As well as it makes more efficient UNIDO "Technology Foresight"[4] and other homothetic approaches for permanent systemic revising and appropriate alteration of each territorial/sectorial ∑ of Technologies[5]. This can ensure quit more efficient technologic march, dynamically balanced with permanently changing Natural-Anthropogenic preconditions.

It's also important to keep in mind that Natural-Anthropogenic Environment, besides properly Bio- & Technical matters, includes also Informational, Politic &Administrative technologic aspects. And all these anthropogenic "facets" are coupled in above mentioned territorial-sectorial ∑s of Technologies. Namely these ∑s determine both current status and development potential of each Geo-Socio-Economic system[6].

2. Geo-political, Geo-economic and Information-technologic Aspects

It's easy to see that geo-policy also has circulatory character. E.g. CEE, Black Sea & Mediterranean areas through millenniums were periodically impacted by both northern-southern inroads from Greek's, Roman, Turkish, as well as Varangian's, Crusaders & Swedish raids/occupation, and by eastern – western: Persian, Hun's, Great Migration of Nations, Horde, Arabian and nowadays russian invasion, as well as Alexander the Great, Teutonic Knights, Napoleon & Hitler incursions.

2.1. Historic Preconditions

Agony convulsions of USSR, after attempts to save it by force in Tbilisi and Vilnius, were finalized in August 1991 by soldiers under command of the officer with later nickname "butcher". They killed 3 libertarians in Moscow and triggered USSR ultimate destroying process. And after 3 decades of post-USSR "stump neuralgia" invasions in Transnistria, Georgia and Ukraine, the same butcher is appointed now for killing thousands Ukrainian victims to sacrifice them on the altar of bygone empire final burial.

All above mentioned antique, medieval, as well as following British, Spanish & further western & eastern colonial activities had Resource-Economic origination. And its modern trends are focusing in strategic USA opposition with China. Both these focal countries expressed bilateral desire for mutually acceptable solutions on Climate, Food, Energy & War challenges proclaimed 14.11.2022 on Bali G20 Summit.

Therefore, keeping in mind these and other threats to Mankind survival, circulatory approach can be helpful for most meaningful West - East competition's pendulum[7]. Such search for mutually acceptable decisions from both authoritarian-centralized & democratic-multilateral points of view on progress became very actual after last changes in China and elections in USA against the War in Ukraine background.

From historic retrospective of Resource-Economic & Socio-Politic interests and their balancing (which, *inter alia*, determines equilibration between Peace & War), now are especially important appropriate lessons, for instance, of Westphalian System (1648). Then, Münster & Osnabrück Treaties after 30-years of most devastated war in Europe, defined National Sovereignty & Supremacy as "balancing damper" for the following centuries, e.g. permanent ad hoc strategic unions/agreements unfolding, such as Vienna Congress (1815), Alliance of Three Emperors (1873-1886), League of Nations (1919), Yalta/Potsdam (1945), acting UN etc.

2.2. Transfrontier Balancing

In 1980 Madrid Convention with additional Protocols've completed this balancing interacting approach by Inter-Territorial, Interregional and International Transfrontier Cooperation[8]. It was an important step to "dialectic" revitalization of the initial Provinces & Polises role for Centralized-Decentralized Development Management[9]. Its topical necessity has been manifested both by foundation of the EU Committee of

1 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Circulatory_Develoment_feasibility.pdf

2 https://www.laprogressive.com/education-reform/weaving-the-dialectical-spiral

3 Kneese, Allen V. (1988). "The Economics of Natural Resources". Population and Development Review. 14: 281–309

4 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Technology_Foresight_2002.pdf

5https://irbis-nbuv.gov.ua/cgi-bin/ua/elib.exe?Z21ID=&I21DBN=UKRLIB&P21DBN=UKRLIB&S21STN=1&S21REF=10&S21FMT=online_book&C21COM=S&S21CNR=20&S21P01=0&S21P02=0&S21P03=FF=&S21STR=ukr0006252 P. 82

6 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Sustainable_development_and_spatial_planning_TM_2003.pdf

7http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Territorial-Sectorial_Transfrontier_Cooperation_under_Green_Deal_for_Circulating_Economy.pdf

8 https://comeuroint.rada.gov.ua/uploads/documents/29228.rtf

9http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/On_way_to_Wider_Europe_of_Regions.pdf

Regions and by Linz Declaration of 21.03.2002 "Future Regional Policy, Cohesion and Community initiatives"[10]. For aims of this article is most important, that namely regional/provincial level still remains basic, which brings together popular/electorate interests from individual, commune, district and municipal level, as well as from business roots, with facility of upper State, International & Global aegis[11].

2.2.1. Macroregional Peculiarities

Simultaneously with this, EU & CoE regionalization policy after USSR & Warsaw Treaty "destroyka", in CEE & NIS countries started European & Euro-Atlantic integration processes (both consequent & ad hoc [2]). Owing to this, scientists in Western Ukraine (former Austrian Lands of Galicia, Bukovina and Transcarpathian Oblast)'ve started since the first years of UA independence with systemic investigations in mentioned spheres. They shown specific core peculiarities around Geographic Centre of European Continent: a) common Carpathian determinants with nowadays Ukraine & EU/NATO neighbors in transfrontier river basins of main Danube tributaries Tisa, Prut, Siret and also Dnister/Nistru & Vistula, as well as of Energy & Communications corridors bypass & across mountains and b) developed in XVIII-XX cent. joint "bottom" of all nowadays 8 Carpathian countries (including Western Ukraine) on the basis of Alpine experience, up to last attempts to establish EU Strategy for Carpathian region[12]. They were reflected in Carpathian Convention, its sectorial Protocols[13] & in EU Council Conclusions on EU Strategy for Danube Region (EUSDR)[14].

2.2.2. International Projects Approach

"Ab ovo" these initiatives had been discussed in 1993 with governmental delegations of US (as core NATO & UN canvass "precursor") & France (as key EU Member most similar to Ukraine on its population, square and State structure). Those consultations were continued in April 1994 on the Workshop with EU-CEE/NIS delegations in Špindlerův Mlýn on Polish-Czech border. This and following bilateral coordination with appropriate Austrian, French, Bavarian, Italian, all neighboring and other EU/NATO countries/regions, made possible initial projects of USAID, EU TACIS/PHARE, WBRD, CoE, UNIDO/UNEP, British Council, GTZ, GEF, NATO Science series etc. Outcomes of those projects were correlated with own specific trials on circulatory Economy, Security, Energy, Transport, Wood-Forestry, management of Waters & Risks, as well as of Resources & Wastes etc., with synergic involvement of Civil Society both in professional & community forms. Their results allowed[15]:

1) To propose pendulum balanced development strategy for core activities and their Life Cycles, which are determined by sectorial-territorial Strengths & Weaknesses, answering Opportunities & Threats (like a tilting dolls)'ve used for SWOT analysis & applied for historic Bukovinian Cluster of the "Europe of Regions" further progress[16];
2) To reflect some of principal items in decisions on core Forums and Summits[17], as well as in mentioned EU Council Conclusions [3[and the last EU Parliament Act[18];
3) To embody certain selected initiatives into entire system of euroregions (created on basin's and/or territorial-sectorial principles[19]) along UA border with EU/NATO neighbours and partners[20]; as well as to "lock" this cross-border cooperation "belt" by pilot Euroregion "Upper Prut", appointed[21] for "experimental elaboration of Trans-frontier Cooperation facility as core element of European Integration & Regional Policy development". *Inter alia*, this've provoked Governmental decisions on joining interior and transfrontier interregional cooperation[22] with clustering perspectives[23];
4) To implement this groundwork into CEE/NIS agreed principles for Transfrontier Cooperation[24], which were further summarized for ENPI programming[25], as well as EU Regional Policy[26] and macroregional cooperation facilitation, e.g. through following EU EGTC and CoE EGC Transfrontier Cooperation toolkits[27];
5) To provide these international elaborations "penetration" into conformable UA lawgiving and political steps, since first concepts of National Regional Policy[28], regional development strategy[29] and above mentioned Ukrainian legislation [4], which was in parallel matched with EU

10http://www.noe.gv.at/noe/Internationales-Europa/13_Konf_RC_Beilage07.2E.pdf
11 http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/Scope%20of%20Transfrontier%20Cooperation.pps
12 http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/TFC%20GIS%20regions.pdf https://decentralization.gov.ua/uploads/library/file/293/Mountain-areas.pdf P.33
13 http://www.carpathianconvention.org/convention/protocols/
14 https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/EN/genaff/121511.pdf (item 18)
15 https://static1.squarespace.com/static/6103f6d3da1cb774d37c27c2/t/687f3f966f7c33629d983068/1753169826354/EUSDR_and_3SI_common_interests.pdf
16 http://ecoresource.ddns.net/DocLib/Bukovinian%20cluster.pdf
17 http://www.gsbs.org.ua/?p=1513
18 https://www.europarl.europa.eu/doceo/document/TA-9-2022-0327_EN.pdf
19 https://dcsf.danubestrategy.eu/sites/default/files/Media/Zinoviy%20S.BROYDE%20-%20Basins_%26%20Territorial%20Strategies.pdf
20 http://isig.it/wp-content/uploads/2012/11/SWOT-1-Analysis-and-Planning-for-Cross-border-Co-operation-in-Central-European-Countries-2010.pdf
21 http://zakon4.rada.gov.ua/laws/show/59-2002-%d1%80
22 http://ecoresource.ddns.net/DocLib/Broyde%20-%20EUSDR%20Confernce%20Univesity%20Chernivtsi.pdf slide 18
23 https://zakon.rada.gov.ua/rada/show/vra46661-09 http://comeuroint.rada.gov.ua/uploads/documents/29476.pdf
24 http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/CEI%20TFC%20WG_Warsaw%2011%2004%202001.doc
25 http://www.europarl.europa.eu/document/activities/cont/201306/20130603ATT67192/20130603ATT67192EN.pdf 3.3
26 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/EU-Ukraine_regional_policy_co-operation_Proceedings_EU_Open_Days_2010_P_65.jpg
27 http://www.carpathianconvention.org/2013/05/28/workshop-towards-a-eu-strategy-for-the-carpathian-region-committee-of-the-regions-cor28-05-2013-brussels-belgium/
28 https://zakon.rada.gov.ua/laws/show/341/2001
29 https://drive.google.com/file/d/1s-PRFXfb4VNPRSsb9q-w26FxDYtHzGBC/view

Commission[30] and Parliament[31] on the eve of ENPI and for following Eastern Partnership[32] & macroregional strategies, to become summarized in EU-UA Association Agreement (Title V, Chapter 27), up to UA[33] & EU [5[legal acts and nowadays Ukrainian EU candidate & Three Seas Initiative (3SI) partner status[34];

6) To initiate Transregional and Trans-sectorial Technology transfer, using all available instruments from intergovernmental till people to people[35], e.g. exercising EU Best Available Technique (BAT) approach[36];
7) To offer "Green Banana" macroregional interaction structure[37] for today EU/NATO eastern interior & outer space (former Warsaw Treaty area). It based on experience of the main previous EU development zones along the former axes of confrontation in Europe ("Blue Banana" along the Siegfried and Maginot lines and "Red Banana" along former Iron Curtain). And now it totally answers the aims of EU "Connecting Europe Facility" (CEF), as well as to new transnational 3SI objectives[38];
8) To integrate these elaborations into EUSDR foundation[39], approval[40], planning[41], concretization[42] and further perfection[43].

2.2.3. Answering Cohesion Policy

These achievements are fully conform to the last EU Council decision on the Cohesion Policy[44] aimed to "avoid artificial fragmentation and duplication of investments, the place-based approach that takes into account territorial specificities of the regions as an essential element, special attention to the specificities and the support of regions, less-developed ones in particular, suffering from various structural or permanent imbalances, regardless of their origin, cross-border, transnational and interregional cooperation for the Member States and their regions, as well as for Neighbourhood countries and countries using the Instrument for Pre-Accession Assistance, contribution of cohesion policy to the embedding of macro-regional strategies; harmonized implementation of rules among various EU programs that contribute to similar objectives in order to avoid unnecessary administrative burden for all stakeholders".

In the same way Circulatory Development approach applying'll make more durable Ukrainian "institutional memory" in the process of reforms & integration.

2.3. Security and Resilience Issues

Safety & Sustainability notions have even more obvious circulatory appearances then above described socio-economic and geo-political aspects of Natural-Anthropogenic phenomena & processes, comprehending wide range of them – from our palpitation till natural & manmade disasters perception. At the same time their nature is based on repeated hazards happening or/and their risk frequency assessment, e.g. on Universe level[45]. Accordingly to this, each mentioned activity/process has immanent evident and/or unobvious elements, which determine circulatory character of its development.

2.3.1. Environmental-Economy-Security Management Vision

Therefore, from the very beginning & in parallel to above described activities, such elements were taken into consideration – since education[46] till regional development, international collaboration[47] & standardization[48]. Those researches were coordinated by the Chair of Environmental Engineering & Resource Conservation of Chernivtsi University & National Centre "Ukrecologia" (Since 1994 – Centre "Ecoresource"). After wide discussion[49] was made first attempt to shape them as ECAT (Environmental Centre for Administration & Technology)[50] under EU Program LIFE (unfortunately wasn't valid at that time for Ukraine). Then, this initiative was redefined both for post-USSR boundary regions Security promotion[51] and Environmental Standardization[52].

2.3.2. EcoEuroRegional Model

On this scientific ground, Presidents of Ukraine, Romania & Moldova in 1997 agreed such approach as a pattern of EcoEuroRegion for Sustainable Socio-Economic & Spatial Development in Carpathian – Danube – Black Sea region &

30 http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/EU-UA_Counci_l11_03_2002.pdf
31 http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/EU_UA_PARL_COOP_COMM_Final_Statement_2003.rtf
32 http://ecoresource.ddns.net/DocLib/Contribution%20EaP%2BEUSDR%20CER2009.pdf
33 http://zakon2.rada.gov.ua/laws/show/1537-19
34 https://www.youtube.com/watch?v=4cGeJ8q3_vo&t=1174s
35 http://ecoresource.ddns.net/DocLib/Brochure%20III%20CEI-Bucovina%202008.pdf
36 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Wastes_Treatment_and_BAT_revealing.pdf
37 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Logistic_challenges_in_Green_Banana_en.pdf
38 http://buk-visnyk.cv.ua/arhivy 2022, Nr 3, P. 37
39 http://epl.org.ua/wp-content/uploads/2015/05/EPL__8_48_2010.pdf
40 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Declaration_of_the_%20Bucharest_Summit_on_Danube_%20(8th_November_2010).pdf
41 http://danube.org.ua/uploads/plan_dij.pdf
42 https://moldovainvest.eu/en/magazine/zinovy-broyde-eco-resource-a7-highway/
43 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Last_UA_proposals_to_final_draft_EUSDR_Action_Plan.doc
44 https://data.consilium.europa.eu/doc/document/ST-14481-2022-INIT/en/pdf
45 https://environmentalrisks.danube-region.eu/content/uploads/sites/7/2025/10/Ukrainian_lessons_for_European_Security_02_07_2024-_compressed.pdf
46 http://ecoresource.ddns.net/DocLib/ECOSPEC.rtf
47 http://ecoresource.ddns.net/DocLib/%D0%A0%D0%B0%D1%81%D0%BF%D0%A7%D0%9E%D0%94%D0%90%20%D0%AD%D0%BA%D0%BE%D0%BF%D0%BE%D0%BB%D0%B8%D0%B3%D0%BE%D0%BD%201993.pdf
48 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Standardization_in_Environmental-Resource_sphere_RU_EN.pdf
49 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Safety_yesterday_and_for_tomorrow_1995.pdf
50 http://ecoresource.ddns.net/DocLib/UA-AT%20Protocol041295.pdf
51 http://ecoresource.ddns.net/DocLib/Safety%201996.pdf
52 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Environmental_Management_Standardization.pdf

transfrontier river basis[53]. It was proclaimed[54] & supported on Bucharest Summit "Environment and Sustainable Development in the Carpathian and Danube Region" on 30.04.2001. At the same time EcoEuroRegion's ideas & developments (after discussions in EU Water Management and NATO Water Security Centers in Nancy in 1997) were represented and supported in 1998-2007 by the EU Commission & Parliament, Scientific and Environmental Affairs Division & Civil Emergency Planning Committee of NATO[55]. Further it was canvassed with US EPA & MIT, in EU core Bolzano & Seville scientific centers, on special conferences /forums, e.g. of EU Environmental Regional Policy[56] & of CoE/CEMAT[57]. Following developments in frameworks of EUSDR, Carpathian Convention, CEI etc[58], investigated different Σs of Technologies, which face mentioned on the beginning of this article "Horsemen of Apocalypse". Besides those of them, that immediately concern War, Food & Energy issues, the most urgent seems accelerating Climate overheating on the Earth[59] which origin is still in discussion[45].

2.3.3. Conformity to European Green Deal Paradigm

This thermal overload (accordingly to map've published in New-York Times on 15.01.2020 & confirmed by many other sources) demonstrates most threatening phenomena in Arctic - Siberia area. But directly affected greatest World countries stilln't even pay appropriate attention to this urgent global problem. At the same time, among all areas of dense population on the Planet, the most strong temperature growth was monitored around Geographic Centre of Europe, covering common space of EUSDR, "Green Banana", EcoEuroRegion and 3SI. For Ukraine, permanent character of this phenomenon namely in western & northern regions was confirmed also by the National Space Agency & Hydro-Meteorology Centre[60].

Owing to this, immediately after European Green Deal proclamation, our elaborations were proposed for implementation into decentralized communes & regions territorial development strategies. In accordance with international & national requirements to Strategic Environmental Assessment, it foresees compulsory transfrontier consultations, as the obligatory stage of these acts[61]. Their role is also stressed by EU "systemic solutions for circular economy territorial deployment"[62].

Therefore, answering to nominated challenges and conclusions of above briefly explained developments, the core part of this publication is devoted to Synergic Technologic approach[63], proposed for outlined problems systemic resolution.

2.4. Appropriate Synergic Solutions in Vertical Trans-European Corridor

For actual needs, ex ante solutions should be grounded on the available facility for their embodiment via concrete projects, provided by certain financing tools. Besides before unthinkable changes under the War & mentioned systemic global crisis, it's already obvious urgent necessary for more synergic and consequent application of such powerful EU Structural toolkits as e.g. CEF, Next Generation & Just Transition, IPA & Interreg etc. Advancement to resilience & recovery of Ukraine will provide "Marshal's Plan" accordingly to principles of Lugano on international co-financing & public-private partnership (PPP), impacted also by previous experience vision[64].

For synergic coherence of these two waves – Technologic and Financial-Economic at their "interference maxima", from the Circulatory Development point of view can be proposed following systemic initiatives as flagship projects. Such vision for European Green Deal've started by initial discussion by the special UA Governmental Working Group[65], but following COVID and War misfortunes overshadowed it.

By now, appropriate media for such interference is outlined by the common priorities of CEF, 3SI & EUSDR: I. Transportation, II. Energy and III. Information-Communication Technologies (ICT). For them already exist respective EU networking in TEN-T, TEN-E and following e-TEN systems. At the same time, the establishment acts of the pilot Euroregion "Upper Prut"'ve foreseen in 2000 as core objectives: "a) development of transport & communications infrastructure on the levels of Trans-European corridors and local traffic; b) development of energetic infrastructure on the levels of state systems and local sources; c) creation and collective use of modern information systems". Using this frame of systemized legal & public decisions and appropriate scientific & practical elaborations[66], were composed the following proposals, which coordination're analyzing today both with Ukrainian and appropriate international bodies accordingly to Ukrainian Prime-minister's errand of 15.09.2022.

2.4.1. Mobility Issues

Modern rejuvenation & development of multimodal freight

53 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/EcoEuroRegion_1997_1999.pdf
54 http://www.cdep.ro/pdfs/greenlight.summit/kuchma2.pdf
55 http://ecoresource.ddns.net/DocLib/NATOeng.pdf
56 https://www.encoreweb.bayern.de/documents/results_of_encore_conferences/resolutions/doc/villach_resolution_2001_en.pdf
57 https://rm.coe.int/168048955c P. 119
58 http://www.gsbs.org.ua/wp-content/uploads/UA-for-EUSDR-opportunities-strategic-initiatives-condditions-1.pdf
59 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Green_Safety_for_Economy_overheating_the_Planet.pdf
60 https://tsn.ua/ru/ukrayina/v-ukrgidrometcentre-nazvali-regiony-ukrainy-gde-bolshe-vsego-izmenilsya-klimat-2182045.html
61 http://comeuroint.rada.gov.ua/news/main_news/72980.html
62 https://ec.europa.eu/info/files/circular-economy-11_en
63http://www.carpathianconvention.org/2014/03/12/third-meeting-of-the-carpathian-convention-working-group-on-adaptation-to-climate-change/
64 https://www.idm.at/wie-der-westen-der-ukraine-helfen-kann/
65 https://www.kmu.gov.ua/en/news/dmitro-kuleba-oficijno-napravit-yes-propoziciyi-ukrayini-shchodo-uchasti-v-yevropejskij-zelenij-ugodi
66 https://www.academia.edu/44879699/ P.211

& passenger transport infrastructure to/from & through 3SI countries, both in Baltic – Mediterranean and "Silk Way" directions bypass and across Ukrainian Carpathians were recommended by 14 EUSDR counties[67], EU Commission[68] &. WBRD[69]. These connections along & across transfrontier river basins & mountains reconstitute historic ways of inroads & trading. On this ground Western Ukrainian rails & roads network was built in XIX cent. by European countries in "Danube Monarchy" with focal junctions in Lviv & Chernivtsi[70]. These rails construction was the first in Ukraine & they still remain most dense in the country. They answered lessons of Crimea War 1853-1856 (very similar to actual russian invasion). On historic cross-roads near Geographic Centre of Europe the single Trans-European North-South connection bypass Carpathians has 5 west-east network arms across them, and 3 of these branches are in Ukraine[71]. They are the shortest mountain rails directed from Adriatic ports to Constanţa & Odessa across Austria, Serbia, Hungary & Slovakia, Ukrainian Rahiv, Kolomyja, Chernivtsi & Larga, Romanian Timiş, Maramureş, Suceava, Iaşi and Moldavian Chişinau, Balţi, Oknitsa. In last decades these connections were completed by air, pipe-, power- & communications lines. As it's reflected in EUSDR Railway Review (2021)[72], after 80 years of operation as important part of European normal railways 1435 mm and core Military Mobility role in two World Wars[73], Ukrainian segment was altered by USSR into 1520 mm for the Warsaw Treaty & Council for Mutual Economic Assistance needs.

Therefore, recommended revitalization of these Trans-European connections answers today common interests of EU, 3SI & NATO countries & partners[74]. And this promotes aforesaid financial toolkits use for Ukrainian transport network step-by-step re-integration into EU/NATO & UNECE TEM/TER multimodal TEN-T, Railway Freight (RFC) & AGTC corridors[75], answering EU Commission, TRACECA, Romanian[76] & Polish[77] vision. Preliminary investigations with Vienna TINA - Transport Strategies and iC-Group've shown that this revitalization should foresee well composed transitional solutions with combined 1435 & 1520 mm railways. As initiated steps can serve prolongation of such superposed/combined 1435/1520 mm lines from areas of their operation in all main EU/NATO- UA railway border crossing points to regional centers in Lviv, Chernivtsi, Uzhgorod & also from areas of Kovel-Helm. Iaşi-Ungheni & Reni-Galaţi-Giurgiulești, with creation of modern multimodal "dry ports" in Ukraine & Moldova. Such manner of reintegration will catalyze consequent Central, Southern & Eastern Ukraine "crescendo" integration into EU TEN-T/RFC.

Answering mentioned challenges, EU Commission changed on 27.07.2022 Indicative Maps for Ukrainian & Moldavian transport systems integration with EU TEN-T /RFC[78].

And by common decision with European Investment Bank (EIB) of 21.10.2022 JASPERS Institution was appointed to provide prefeasibility study for existence railways reconstruction to provide freight & passenger transit without changing the wheels from Krakow (Poland) through Ukraine and Romania to Chişinau[79]. On one hand, this resumes solution of XIX cent. to restore most optimal route, which construction on Austrian & Romanian territory was financed by English Bank in Chernivtsi. On the other hand, for nowadays needs, e.g. nominated on 10.11.2022 by J.Borrell - EU High-Representative on Security and Defense[80], complete transit from Baltic TEN-T corridors "North Sea - Baltic" ("Rail Baltica") to Mediterranean/Black Sea area should be provided bypass Belarus through Suwalki – Kovel, And therefore, JASPERS investigation should also include evaluation for euro-rail 1435 mm between Lviv & Kovel. For such issues comprehensive examination, both to Ukrainian government, Moldova & JASPERS already sent proposal on participation of national and regional experts in mentioned prefeasibility study for maximal consider territorial, sectorial and strategic peculiarities, as well as potential of connections reconstruction, answering mentioned Systemic Crisis and also European Green Dear challenges[81].

Numerous "nested" projects can be realized in framework/under support of different facilities available now for Ukraine – from EU CBC & sectorial programs till future Marshall's Plan embodiment[82]. Such projects should ensure win-win Food & Military Mobility, Energy Resource & post-war Ukraine rebuilding equipping and other Freight & Passengers transport circulatory flows infrastructural providing. Thus, in mentioned prefeasibility study JASPERS has to investigate modern revitalization of built in XIX c. connections to bring European 1435 mm traffic from Poland through Lviv – Chernivtsi –Suceava with following continuation not only through Iasi to Ungheni – Chişinau and further to Odessa. Using strategic Romanian railways, should be assured transfer to Mediterranean, Middle East & Adriatic areas[75] answering recommendations [6] and [7].

67 http://ecoresource.ddns.net/SiteAssets/SitePages/%D0%9D%D0%BE%D0%B2%D0%B8%D0%BD%D0%B8/RecomLetter1B.jpg
68 http://ecoresource.ddns.net/SiteAssets/SitePages/%D0%9D%D0%BE%D0%B2%D0%B8%D0%BD%D0%B8/EU_Commissioner_Kallas_answer.pdf
69 http://ecoresource.ddns.net/SiteAssets/SitePages/TFC/Letter_WBRD.pdf
70 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Western_and_Eastern_Synergies_UA_Transport_System.ppsx
71 https://comeuroint.rada.gov.ua/uploads/documents/29422.pdf
72 https://transport.danube-region.eu/e-materials/publications/
73 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/UA-AT_History_Commission_Conclusion.pdf
74 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/3SI=TEN-T+UA.jpg
75 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/TEN-T_and_contrailer_links_bypass_and_across_Carpathians.ppsx
76 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/RO_President_suggestion_19_09_2002.pdf
77 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/PL_UA_RO_Railway.jpg
78 https://www.consilium.europa.eu/en/meetings/tte/2022/12/05/
79 https://www.eib.org/en/press/all/2022-413-european-commission-and-eib-initiate-feasibility-study-to-better-connect-ukrainian-and-moldovan-railway-networks-with-eu
80 https://www.eeas.europa.eu/eeas/security-and-defence-package-remarks-high-representativevice-president-josep-borrell-press_en
81 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Territorial-Sectorial_Transfrontier_Cooperation_under_Green_Deal_for_Circulating_Economy.pdf
82 https://iardi.org/wp-content/uploads/Public-recommendations-2023.pdf

This "umbrella" system of strategic projects allows, in parallel to JASPERS study, start immediately with first steps, such as just done restoration of connections by 1520 mm rail in UA Transcarpathian & RO Maramureș regions. But more important &'simple will be low/without cost docking of regular trains[83] running from Kyjv, Lviv to Chernivtsi (as well as from Poland, Hungary & Slovakia) and from Bucharest & Iasi (likewise Moldova) to Suceava, even without noticeable schedules changes. Short time passengers exchange on Vadul-Siret, Ungheni, Przemysl & Chop border stations will be provided by their non-stop control on station-to-station blocks, e.g. from/to Chernivtsi (35 km) & Suceava (50 km).

At the same time there are preconditions for prompt start with multimodal (container & contrailer) traffic, using rail/road/airports "spiders", for instance both in Chernivtsi for 5 rail-autoroads vectors and in Suceava for 4 such directions.

2.4.2. Energy Problems

Same approach will be likewise available for Power circulating (environmentally sound Energy Production, Accumulation, Utilization & Saving[84]), having initial Austrian support [8]. More then 20 years pilot Euroregion "Upper Prut" proposed [85] Energy (both electric & gas) transfer from Eastern-North to Southern-West. Actual situation requires these flows urgent redirection by existent infrastructure reverse in the following ways:

1) Utilization of largest in Europe Dnister/Nistru Hydropower-accumulated potential[86] for prospective perfection of TEN-E power system security and actual operability of its new UA & MD branches under russian ruinous attacks, using previous experience of neighbour UA-SK-PL-HU-RO Burshtyn Energy Island & RO-MD Stânca - Costești;
2) Commutation of high pressure pipeline Bohorodchany-Anan'ev in the shortest way with Romanian Gas System for: a) additional interconnection with UA one, in the middle between deficient operating Khust - Satu Mare & Orlivka – Isaccea; b) summer gas accumulation in Carpathian storages (exhausted former deposits) and c) Northern Moldova supplying from pumping stations Drochia & Șoldănești, using experience of Iasi-Ungheni solution for its central part.

At these strategic initiatives (taking into account universal character of JUSPERS activity for such projects embedding in EU Member and Candidate states) appropriate team cooperation for prefeasibility investigations will allow to pave more prompt way for embodiment of other common strategic projects mentioned in this article.

3. Spatially-Sectorial-Information Circulatory Implementation Solutions

Digitalization is a common priority for any principal project perfect planning & implementation, as well as for synergic Sustainable Socio-Economic & Spatial Territorial-Sectorial Development and Security providing[87]. Namely Geo-Information Systems (GIS) and Geo-Spatial Data exchange can guaranty integrity of Territorial-Sectorial Circulatory Development - since single communes till macro-regions, as well as from individuals up to Global level, as well as simultaneous information manipulation avoidance. Accordingly to Law "On National Geo-Spatial Data Infrastructure" Ukraine is joining EU Programs "Digital Europe" and "Digital Single Market". And namely GIS Technologies should secure "interoperability and integration of geo-spatial data, obtained from different sources, as well as openness of geo-spatial data & metadata". Such approach applying for mentioned common priorities creates necessary & ample conditions to spread it for any territorial-sectorial aspects which, *inter alia*, embrace all 17 objectives of UN Sustainable Development[88] Therefore it mast become a background both for above mentioned Transport & Energy priorities [9] following realization in 3SI., as well as for any other objective of Circular Economy [10].

As mentioned above, "interference maxima" [11] in this common Σ of ICTs allows propose flagship project's initiatives [12] for 3SI and post-war Ukraine, e.g.:

1) *EU Directives on Waters and Flood Risks Management agreed implementation* in transfrontier river basins, following results of largest common East Avert project[89];
2) *Recovery of Carpathian Forests*, as choice-less source of potable water in macroregion under Global. Climate change, with simultaneous revival of whole Wood-Processing circulatory sector, basing on modern clustering Σ of Techologic Life Cycles[90];
3) *Implementation of GIS-oriented Σ of Technologies* for urban territories renewal, based on accounting & applying of fit kinds of Waste as building elements for these areas reconstruction, using developed & tested in Bukovina legal/normative/information basis for Wastes & Best Available Technologies (BAT) Management [13], aimed their further use for Eastern Ukrainian cities & communes, destroyed by the War, revitalization;
4) *ICT-basis utilization* for providing on-line Transfrontier Consultations, foreseen by UNECE/EU/UA legislation on Strategic Environmental Assessment[91]
5) *Transfrontier Green Infrastructure Geo-spatial plan-*

83 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/RO_UA_HU_SL_CBC_trains.ppsx
84 http://ecoresource.ddns.net/DocLib/Systemic%20Energy%20territorial%20cycles-1993.pdf
85 http://prismua.org/wp-content/uploads/2022/08/EUSDR3SI_on_UA-RO_Prizma28072022.pdf (slides 17-21)
86 https://drive.google.com/drive/folders/17Lnng2a5zvI9MjgdJSH0UEmr0h1n2EEy?usp=sharing (Energy)
87 http://ecoresource.ddns.net/SiteAssets/SitePages/EUSDR/Safety_for_UA_RO_MD_Transfrontier_Cooperation_on_EU_and_NATO_border_2001.pdf
88 https://sdgs.un.org/goals
89 https://environmentalrisks.danube-region.eu/mdocs-posts/ua_proposals_for_eusdr_pa5sg_17062021
90 http://www.carpathianconvention.org/2013/09/04/fourth-meeting-of-the-wg-on-sustainable-forest-management/
91 http://comeuroint.rada.gov.ua/uploads/documents/29550.pdf

ning implementation for Agro-Industrial sector of Euro-region [14].

6) *Geo-informational maintenance of the Touristic-Recreational activity* with simultaneous protection and efficient use of multiethnic cultural heritage [15].

4. Conclusion

Concord of Circulatory Development vision, as a determining trait of Evolution and Technologies Synergy in Natural-Anthropogenic Environment, with bottom-up systemic projects, grounded on geo-political preconditions and geo-spatial information exchange, promotes Territorial–Sectorial progress since communes till macroregional and global level.

Under the War and comprehensive Energy, Economy, Food, Security and Climate crisis it allows, on one hand - to intensify win-win multilevel decision making processes, and on the other hand – to provide their more resilient innovative-investment embodiment.

5. Recommendations

For Ukrainian (and also Moldavian) European and Euro-Atlantic integrative course from military to socio-economic conquest, proposed options can serve both for interior progress achievement and for common Just Transition to Next Generation together with other partners, in particular in EUSDR & 3SI joint area.

Abbreviations

3SI	Three Seas Initiative
BAT	Best Available Technique/Technologies
AGTC	European Agreement on Important International Combined Transport Lines and Related Installations
CEE	Central-Eastern Europe
CEF	Connecting Europe Facility
CEI	Central European Initiative
CEMAT	Council of Europe of Ministers Responsible for Spatial Planning
CoE	Council of Europe
EIB	European Investment Banke
EUSDR	EU Strategy for the Danube Region
GEF	Global Environment Facility
GIS	Geo-Information System
GTZ	Deutsche Gesellschaft Für Internationale Zusammenarbeit GmbH
ENPI	European Neighborhood and Partnership Instrument
EPA	Environment Protection Agency
ICT	Information-Communication Technology
IPA	Instrument for Pre-accession Assistance
JASPERS	Joint Assistance to Support Projects in European Regions
LIFE	EU Program for the Environment and Climate Action
MIT	Massachusetts Institute of Technology
NIS	New Independent States
RFC	Railway Freight Corridor
TEN-E	Trans-European Networks for Energy
e-TEN	Trans-European Telecommunications Networks
TEN-T	Trans-European Transport Network
TRACECA	Transport Corridor Europe-Caucasus-Asia
UNECE	United Nations Economic Commission for Europe
UNECE TEM/TER	UNECE Trans-European Motorway & Trans-European Railway Projects
UNIDO	United Nations Industrial Development Organization
WBRD	World Bank for Reconstruction and Development
Σ	Sum of Technologies

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The author declares no conflicts of interest.

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