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POLICY BRIEF

INTEGRATED POLICIES TO IMPROVE THE ENERGY–WATER–FOOD SYSTEM NEXUS TO ACHIEVE THE SDGS

Task Force 10

SUSTAINABLE ENERGY, WATER, AND FOOD SYSTEMS

Authors

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موجز السياسة

سياسات متكاملة لتحسين رابطة نظام الطاقة-المياه-الغذاء من أجل تحقيق أهداف التنمية المستدامة

فريق العمل العاشر

نُظم الطاقة المستدامة والمياه والغذاء

المؤلفون

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ABSTRACT

The challenges posed by the water–food–energy nexus have been well documented. Demand for all three of these crucial elements of human growth is increasing, driven by a rising global population, rapid urbanization, changing diets, and economic growth. However, an integrated approach to technological, institutional, and policy innovation is missing in the context of achieving the Sustainable Development Goals (SDGs).

The proposed strategy in this policy brief relies on three pillars: (1) improvements in the measurement and promotion of better policies and investments for integrated energy, water, and food security; (2) the assessment of the institutional constraints and determinants of the inequalities between leading and lagging countries and the speed of adjustment that will bring convergence among them; and (3) the facilitation of renewable energy technologies as an environmentally sustainable supply of energy, with substantial positive spill-over effects in the water and food sectors.

The suggestion is to promote policies to (1) facilitate which determinants are best suited to enhance the convergence of policy process, such as economic diversification, subsidy removal, and liberalization through a multisectoral approach; and (2) support increasing electricity access using alternative sources of energies in remote rural areas in Asia, Africa, and Latin America through integrated Official Development Assistance (ODA) and Foreign Direct Investment (FDI).

تم توثيق التحديات التي تفرضها رابطة الطاقة-المياه-الغذاء توثيقًا جيدًا على مدى العقود الماضية. يتزايد الطلب على هذه العناصر الثلاثة الجوهرية للنمو البشري مدفوعًا بتزايد التعداد العالمي للسكان، وتسارع مظاهر التمدن، وتغيّر سبل الحمية الغذائية، والنمو الاقتصادي. وعلى الرغم من ذلك، يُفتقد وجود نهج متكامل للابتكار التقني والمؤسسي والسياسي في سياق تحقيق أهداف التنمية المستدامة.

تعتمد الاستراتيجية المُقترحة في ملخص السياسة هذا على ثلاث ركائز: ١. تحسينات في قياس وتعزيز سياسات واستثمارات أفضل للأمن المتكامل للطاقة والمياه والغذاء. ٢. تقييم القيود والمحددات المؤسسية للتباينات بين البلدان الرائدة والمتأخرة وسرعة التعديل الذي سيؤدي إلى التقارب بينهم. ٣. تيسير تقنيات الطاقة المتجددة بصفتها مورد طاقة مستدامًا بيئيًا بآثار إيجابية مستدامة وممتدة في قطاعات المياه والغذاء.

نقترح في هذا الملخص تعزيز سياسات من أجل: ١. تيسير أنسب المحددات لتعزيز تقارب العملية السياسية، كالتنوع الاقتصادي ورفع الدعم والتحرر عبر نهج متعدد القطاعات. ٢. دعم زيادة إمدادات الكهرباء باستخدام مصادر طاقة بديلة في المناطق الريفية النائية في آسيا وأفريقيا وأمريكا اللاتينية عبر المساعدة الإنمائية الرسمية المتكاملة والاستثمار الأجنبي المباشر.

CHALLENGE

Demand for water, food, and energy—three crucial elements of human growth—is increasing, driven by the rising global population, rapid urbanization, changing diets, and economic growth.

The challenge of managing the demand and supply in the water, energy, and food sectors simultaneously, which are closely interconnected, will be exacerbated in the near future if we continue business-as-usual.

An integrated approach to technological, institutional, and policy innovation is missing in the context of achieving the Sustainable Development Goals (SDGs).

Links and tradeoffs between the water-energy-food nexus and SDGs

An integrated approach to the water-energy-food (WEF) nexus is appropriate for complying with the SDGs, informing sector planning, policy, and technology decisions. It also balances the potential tradeoffs and synergies in their production and use in the context of finite and often stressed natural resources assets, and the challenges of climate change. More broadly, it addresses some of the key SDG imperatives, such as meeting the growing demands for food, rapid urbanization, changing diets, and economic development through equitable and sustainable consumption. However, progress towards most of the SDGs is directly related to the sustainable use of resources such as food, water, and energy (see Figure 1).

In practice, the integrated WEF approach relies on three pillars. First, it helps to identify the potential tradeoffs at the level of resource constraints when designing policy strategies (e.g., SDG targets related to food security, bioenergy, thermal power, and capacity additions). Second, it supports the identification and development of solutions that positively benefit multiple SDGs (e.g., hunger, climate change, and sustainable consumption and production). Third, it better connects the SDGs in their implementation through a process that avoids a silo approach. In addition, there are close inter-linkages between the WEF nexus and climate action, and therefore, also with the implementation of the Paris Agreement (Hoff 2011).

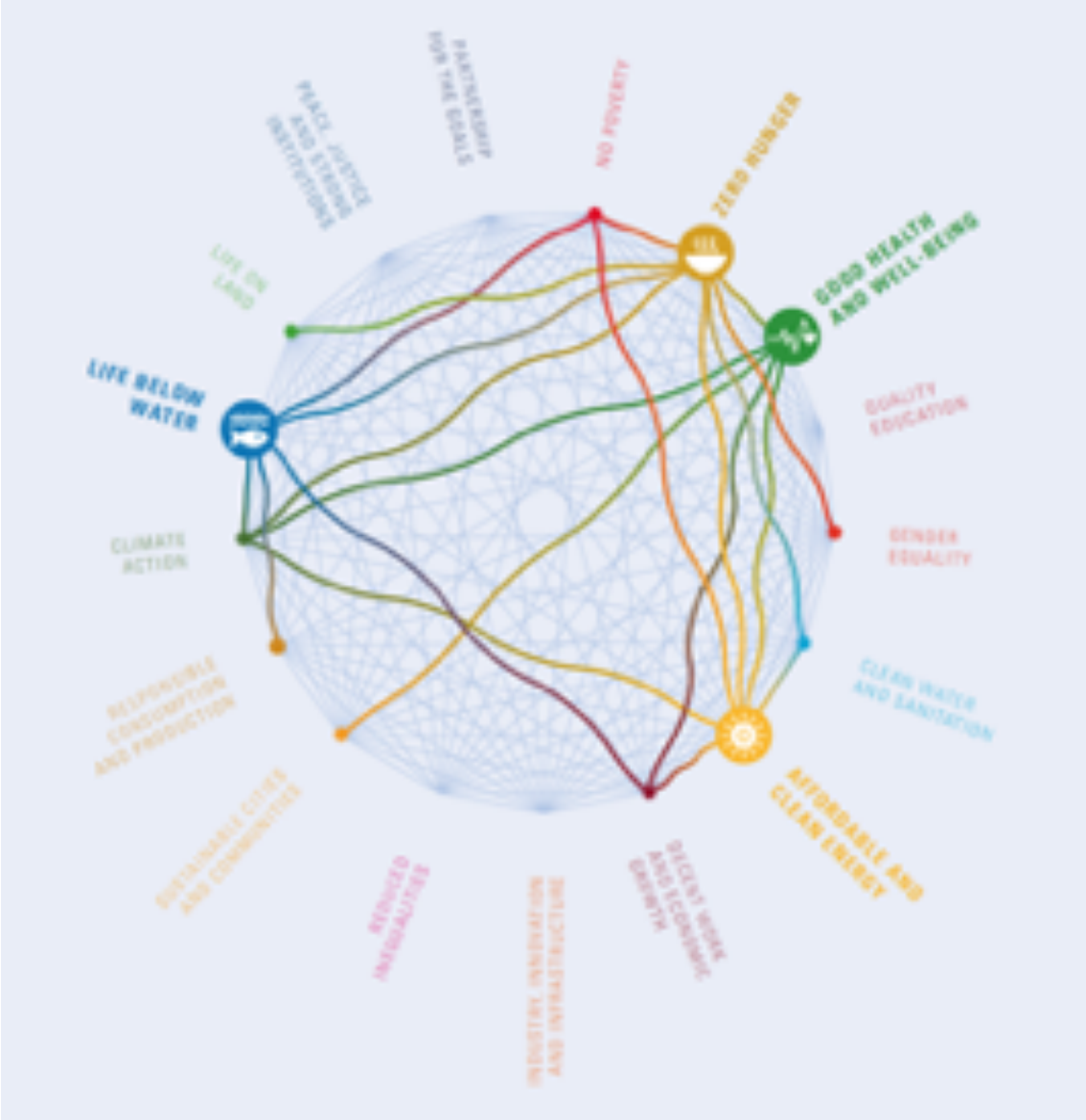

Figure 1. **Connecting the water–energy–food nexus to the SDGs.**
Source: **Ringler et al. (2017).**

Policy integration challenges and diverging opportunities

While the trends that provide an impetus for adopting a WEF nexus approach are global in nature, the implications and challenges vary across the different developmental contexts.

For low-income countries (LICs), the highest priority is to simultaneously close the large energy, water, and food security gaps. Access to technologies, knowledge, and finance are key for setting up viable business models and develop integrated nexus solutions—particularly in agriculture—to help accelerate progress toward the SDG goals of poverty reduction and zero hunger.

Emerging large economies are witnessing rapid economic growth. Therefore, there is increased consumption of goods and services per capita, including in the water, energy, and food sectors. A focus on resource use efficiency and good governance will ensure an adequate, inclusive, and sustainable supply of water, energy, and food under the nexus framework.

Industrialized countries within the Group of Twenty (G20) have higher per capita resource demands and larger carbon footprints that increase the pressure on resources. In this case, the challenge is to reduce their footprint substantially while ensuring adequate economic growth.

Given the different position of country groups with respect to the WEF nexus, favoring convergence in WEF patterns is a policy priority. The identification of the factors, trends, and policy measures, inducing the closure of gaps among regions is a key aspect of the overall strategy.

PROPOSAL

To design a credible proposal plan, there are important tradeoffs to be considered. By preventing global temperatures increasing above unsustainable levels, climate policies may improve water, energy, and food security. Such policies may prevent desertification and mitigate its consequences for agriculture activities and facilitate access to water. In addition, climate policies can indirectly help to achieve more equitable access to energy owing to new technologies such as off-grid electrification in LICs. However, water resources can negatively impact or be impacted by energy resources. In large parts of rural developing economies in South Asia, Sub-Saharan Africa, and Latin America, the switch from solid biomass to clean fuels for cooking energy is a part of the solution to reduce poverty and hunger and create jobs. An additional important aspect to consider is the gender issue, because facilitating access to water and energy may reduce the traditional burden on women of water collection and cooking within the household. In this way, women's increased access to water and energy favors their increased participation in other income generation activities. The WEF nexus approach can, therefore, help to align the implementation of the SDGs.

Due to its importance for the SDGs, the WEF nexus approach has recently received increasing attention in international initiatives such as Sustainable Energy for All and the World Economic Forum, international financial institutions (the World Bank, Asian Development Bank, African Development Bank, and IRENA), governments (e.g., German Development Cooperation and Japan International Cooperation Agency), the private sector (e.g., WBCSD, Royal Dutch Shell, and Coca Cola) and support from the research/academic sector (e.g., IFPRI, ERIA, and SEI).

In addition to the awareness of the international dimension of the WEF nexus, incentives to collaborate are necessary. Fragmentation is sometimes compounded by international and bilateral development support and the different priorities of the line ministries, which often hinders collaboration with other sectors and long-term planning (WBCSD 2015).

Many transnational companies offering WEF nexus solutions in the global food value chains are mostly innovative and early-phase enterprises with one distinct, common problem, namely access to adequate finance, primarily because of market imperfections on the supply side of funds. To attract investment and enlarge their business or build scale, these entities need de-risking mechanisms and enablers of access to further significant finance. WEF nexus decisions are based more on financial rather than technical factors (Scott 2017; Weitz et al. 2017). This is because the current reality of combined increased resource demand and resource scarcity, as well as SDGs

impacts, means that decisions on the production and use of WEF resources entail tradeoffs between potential winners and losers. For these reasons, aspects related to stakeholder differences in knowledge and information and, ultimately, power, often prevail in WEF nexus decision making. Therefore, going beyond the tradeoffs and synergies of WEF nexus issues and a better understanding of the nature of stakeholder interaction in dealing with these issues is necessary.

The WEF nexus approach is expected to face significant challenges in tapping into financial resources provided by local, national, and international financing institutions due to the existing fragmentation by narrowly defined sectors and activities. Water-stressed regions that are subject to significant additional stresses from climate change would benefit the most. The nexus approach could justify preferential access for these countries to international public funds.

Nexus solutions may require rethinking the international public finance architecture in support of SDGs, as well as a reconsideration of current practices of local and international financial institutions, including in terms of financial reengineering. The effects at the national and sub-national levels to build financial engineering and financial management capacities are required to enable integrated solutions to emerge in practice.

Owing to the nature of the WEF nexus, that is, cross-sectoral and focused on key resources for people's livelihoods, ensuring policy coherence and good global governance are crucial for its sound and fair implementation. Until very recently, implementation focused primarily on technical solutions, whereas governance has not received much consideration, particularly in the context of the institutions governing the water, energy, and food sectors. In addition, six years into the adoption of the SDGs, truly integrated policy approaches are not yet common, except in certain niche practices and academic studies. Opportunities are being missed, as a significant part of WEF infrastructure is being built at an accelerated rate in LICs. COVID-19 has made things worse. Hence, as the connection between WEF and SDGs is essentially local and can move at various geographical levels to exploit the interrelated aspects, a multilayer approach should be adopted to analyze the nexus.

Several hindering factors in WEF nexus decision-making need to be resolved to design a credible proposal plan: (i) the limited information undermining evidence-based decision-making due to the frequent lack of reliable and updated data on the status of the WEF sectors at the local level, and often also at the national level, in particular

in the LICs in Asia, Africa, and Latin America (Scott 2017), (ii) an insufficient awareness of the benefits of using the WEF nexus approach by relevant sector players, (iii) an inadequate account of externalities due to low or no pricing of water and energy use, in particular in both LICs and high-income countries (HICs; Sarni 2015), and (iv) the lack of motivation to coordinate by relevant sectoral bodies, because the transaction costs of coordination are perceived to be higher than the benefits (Keskinen et al. 2016).

The operational proposal plan consists of the following recommendations:

- Adopt an integrated solutions approach to provide nutritional security to rural areas by enhancing the synergy among the policy areas related to the SDGs. This could be accelerated by enacting a mandate to relevant research centers and international organizations. This would help to analyze the convergence of the per capita consumption of food, water, and energy, and define appropriate policy prioritization for relevant strategies, such as economic diversification, opening to foreign trade, subsidy removal, liberalization, and the strengthening of inflow of foreign direct investment.

- Provide public financial support to increase electricity access in remote rural areas in Asia, Africa, and Latin America through integrated ODA and FDI policies that create competition among the providers of distributed solar and other renewable energy systems.

- Empower local governments in delivering a package of support—access to electricity plus the means to use it, such as lighting, irrigation, refrigeration, and cold storage of harvested products—to generate larger energy and food-dietary security benefits for rural communities.

- Increase awareness of the potential unintended consequences of widespread energy technology adaptation. Examples of such adaptation are more rapid depletion of groundwater resources associated with low-cost electrical irrigation pumping at community levels through the nexus approach in meeting the SDG targets.

- Establish a permanent observatory of policies that are most appropriate to accelerate convergence across the policy areas. Under a multi-level, monitoring, reporting, and verification (MRV) framework, empower local governments to implement policies to enhance rural development and serve urban electricity, and food supply needs when selecting the sites for power generation. This warrants a government-academic community partnership to construct scenarios that quantify the relative efficacy of the determinants of convergence and the ranking of influencing policies. The international policy coordination is geared to maximize the results for a given cost of implementation.

- Establish a program finalized to mitigate, compensate, or share the range of action coordination risks, such as SDG certification and risk guarantees. This is because the WEF nexus approach is expected to face significant challenges in tapping into financial resources provided by local, national, and international financing institutions due to the existing fragmentation by narrowly defined sectors and activities.

REFERENCES

Hoff, Holger. 2011. “Understanding the Nexus.” Background Paper for the Bonn2011 Nexus Conference. https://www.sei.org/mediamanager/documents/Publications/SEI-Paper-Hoff-UnderstandingTheNexus-2011.pdf.

Keskinen, Marko, Joseph H. A. Guillaume, Mirja Kattelus, Miina Porkka, Timo A. Räsänen, and Olli Varis. 2016. “The Water-Energy-Food Nexus and the Transboundary Context: Insights from Large Asian Rivers.” Water 8: 193. https://doi.org/10.3390/w8050193.

Ringler, Claudia, Ludovic Mollier, Frédérique Seyler, and Jean-Luc Chotte. 2017. “Linking up the SDGs: The Key to Food and Nutrition Security.” International Food Policy Research Institute. https://www.ifpri.org/blog/linking-sdgs-key-food-and-nutrition-security.

Sarni, Will. 2015. “Deflecting the Scarcity Trajectory: Innovation at the Water, Energy, and Food Nexus.” Deloitte Review Issue 17. https://www2.deloitte.com/content/dam/insights/us/articles/water-energy-food-nexus/DUP1205_DR17_DeflectingtheScarcityTrajectory.pdf.

Scott, Andrew. 2017. “Making Governance Work for Water–Energy–Food Nexus Approaches.” CDKN Working Paper, June 2017. https://cdkn.org/wp-content/uploads/2017/06/Working-paper_CDKN_Making-governance-work-for-water-energy-food-nexus-approaches.pdf.

WBCSD. 2015. “Co-optimizing Solutions: Water and Energy for Food, Feed, and Fiber.” https://www.wbcsd.org/Programs/Fod-and-Nature/Water/Resources/Co-optimizing-Solutions-water-and-energy-for-food-feed-and-fiber-Main-Report-Separate-Chapters.

Weitz, Nina, Claudia Strambo, Eric Kemp-Benedict, and Måns Nilsson. 2017. “Closing the Governance Gap in the Water-Energy-Food Nexus: Insights from Integrative Governance.” Global Environmental Change 45: 165–173.

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