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Overview

INSTITUTIONAL PERSPECTIVES ON THE PRODUCTIVE USE OF RESOURCES

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Abstract
There is increasing evidence that climate change is a growing social and economic burden. Moreover, the 17 Sustainable Development Goals (SDGs) are at risk of falling short of their intended targets. The difficulties will only be made worse as the climate and economic burdens grow. A growing literature suggests that the problems largely stem from the non-productive use of resources which erode our social and economic well-being—especially over the long haul. These huge inefficiencies include the non-productive use of capital, materials, water, food, and especially energy. One assessment notes that, depending on how we ignore global ecosystems or, more hopefully, how we might build up a more healthy and resilient environmental capacity, "the global value of ecosystem services can decline by $51 trillion/yr or increase by $30 trillion/yr" by the year 2040 (with values in 2007 dollars). At the same time, moving to a smarter and more productive use of all resources requires a larger number of institutional changes. Such changes range from the use of new metrics to assess future opportunities to an array of policies and perspectives that promote these changes. In this special issue we review a number of different ways that institutional changes might create opportunities in which all resources might be managed more productively. While no single special issue can cover all elements of the necessary institutional changes, nor can even a series of books on the topic, this is another step forward to open up thinking more along the lines of human and cultural dimensions toward a better understanding of how resources might be more productively used for social and economic benefits.
Keywords: resource productivity, energy productivity, energy and climate policies, institutional change.
JEL: O21, O31, Q20, Q43.

Introduction

There is growing unease among scientists, policy analysts, business and community leaders as well as citizens around the world. More than 11,000 scientists in 153 countries—ranging from Morocco, Egypt and Cameroon to Russia, China and the United States—warn that the Earth "clearly and unequivocally faces a climate emergency". They provide six broad policy goals that must be met to address that emergency [Ripple et al., 2019]. The established business consulting firm McKinsey & Company notes that, in addition to climate change, there are other sustainability issues which are also at critical tipping points. They indicate that the planet can no longer support either our current levels of consumption, or our current approaches to production. As an example of the scale of waste in our consumption patterns, McKinsey indicates that the value of fast-moving consumer goods which are thrown away, across the globe, is $2.6 trillion each year[1]. At the same time, the United Nations Environment Programme (UNEP) found that the global use of materials more than tripled over a four-decade period 1970 through 2010, with annual global extraction of resources growing from 22 to 70 billion tonnes. As a result of both the waste associated with the use of materials, and the enormous scale of that waste, the mostly inefficient use of materials adds to the growing burden of climate change. However, the problem is bigger than that, as the huge amount of waste also adds higher levels of acidification and eutrophication of soils and water bodies, increased loss of biodiversity, and more soil erosion together with a growing amount of air pollution. All of this adds up to significant impacts on human health and quality of life. Moreover, it will ultimately lead to the depletion of certain natural resources and will cause supply shortages for critical materials in the short and medium terms[2].

While health, climate and environment problems are driven by current patterns of material production and consumption, there are also many assessments that point to large-scale and meaningful solutions. As already noted, the 11,000 scientists highlighted six broad policy goals to mitigate both short- and long-term climate risks. McKinsey highlights the very large opportunities and economic and social returns that might follow a growing pattern of sustainable investments. The UNEP report, emphasizing Global Material Flows and Resource Productivity, underscores opportunities for the large-scale decoupling of material use and related environmental impacts from economic growth strategies. It suggests that such strategies will be "instrumental for ensuring future human well-being based on much lower material throughput". The study

[1] Sustainability at a Tipping Point. McKinsey & Company, 2019. https://www.mckinsey.com/business-functions/sustainability/our-insights/sustainability-at-a-tipping-point.

[2] Global Material Flows and Resource Productivity. Assessment Report for the UNEP International Resource Panel, 2017. https://www.resourcepanel.org/file/423/download?token=Av9xJsGS.

further notes that many regions and countries have already begun efforts to "substantially increase the material efficiency of their economies and to reduce the overall level of material use". These nations include the European Union, Russia, Japan and China, among many others.

While the UNEP study and the McKinsey assessment—indeed all of the studies we have reviewed—point to many different innovations and system-level changes as "keys to mapping out and implementing a new economic reality for businesses, people, and the environment"[3], there may be one critical weakness which limits those many opportunities. The review of those recent assessments or "indicator studies" point to technology and investment patterns as the means to solve or resolve the different health, environmental and economic burdens which might be associated with current production and consumption patterns. The big problem is that very little of the discussions explore the role and costs of governance and/or the social and behavioral elements of the many requisite policies and programs that will be necessary to drive these positive outcomes. In this special issue, with a series of seven invited journal articles, we review what institutional insights and arrangements might mean if we are to fully and successfully deploy an optimal mix of technologies and investments that can enable a set of desired outcomes. Indeed, the needed changes are "less a matter of technological innovation, but more a matter of changing behavior and culture at organizational, governmental, and societal levels" [Barinova, Laitner, 2019; Reed, Dion, 2018]. The various sections of this paper, and the other papers briefly summarized here, lay out perhaps a half-dozen institutional perspectives that can help deploy new and more productive resources in ways to assist in the meeting of desired policy goals.

The section that immediately follows reinforces the need for large-scale policy responses—whether nationally or globally. Following that discussion, the next section summarizes insights from three papers on the need for new metrics to better understand the source and scale of social, environmental, and economic threats. A subsequent section then highlights another three papers which outline new ways of seeing opportunities and emphasizes how a better understanding of uncertainty can strengthen smarter choices. The last paper then examines the role of a fully funded staff and program support to ensure an optimal mix of productivity improvements; it also discusses a series of key steps to ensure institutional successes. The final section in this overview draws initial conclusions and suggests some next steps forward.

1. Understanding the Resource Context

As already mentioned in the introduction, there have been many recent publications which underscore the social and economic impera-

[3] Sustainability at a Tipping Point.

tive, as well as the diverse set of benefits associated with transforming our current patterns of production and consumption. [Kubiszewski et al., 2017] highlight, for instance, the critical role of natural capital in also maintaining our social and economic well-being. In 2011, for example, the variety of nature's services generated a value of more than $120 trillion of economic benefits globally. Depending on how we ignore and degrade the global ecosystems, or how we build up a more healthy and resilient environmental capacity, "the global value of ecosystem services can decline by $51 trillion/yr or increase by $30 trillion/yr" by the year 2040 (with values here in 2007 dollars).

[Ekins, Hughes, 2017], in a different way, raise serious concerns about current patterns of production and consumption as they impact "the ability of the planetary resource base to meet the material and energy needs of the global economy and human societies". [Sachs et al., 2019] report that meeting all 17 Sustainability Development Goals (SDGs) will require deep transformations in every country. Market forces alone, they suggest, will not achieve the SDGs. Rather, "directed transformations are needed to develop the technologies, promote the public and private investments, and ensure adequate governance mechanisms needed to achieve the time-bound goals". This point is consistent with insights offered by the World Bank[4] and [Barinova, Laitner, 2019], among others. Equally important, about two thirds of the targets underlying the 17 SDGs can only be reached with the full engagement of local and regional governments.

As Black & Veatch examine issues and trends affecting both the water industry[5] and the electric industry[6], the company advises that climate change will increase the number and frequency of extreme weather events. That prediction, it explains, "paired with an expanding global population and increased urbanization, is reason enough for the industry to evolve its collective approach" to water and energy issues.

As early as 2011, McKinsey indicated that the capital required to implement what it called the global "resource productivity opportunity in full" could be on the order of $17.1 trillion between 2011 and 2030 (at current 2011 market prices). The good news was that the array of benefits would more than offset the costs [Dobbs et al., 2011]. According to Goldman Sachs[7], the push to curb climate change is already reshaping the energy industry. Their research estimates that a shift to a low-carbon economy that limits global warming may require up to $30 trillion in

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[4] World Development Report 2015: Mind, Society, and Behavior. Washington, DC, World Bank, 2015. https://elibrary.worldbank.org/doi/book/10.1596/978-1-4648-0342-0.

[5] Black & Veatch. Strategic Directions: Water Report, 2019. https://pages.bv.com/rs/916-IZV-611/images/SDR_Water_2019.pdf.

[6] Black & Veatch. Strategic Directions: Electric Report, 2019. https://pages.bv.com/rs/916-IZV-611/images/SDR_Electric_2019.pdf.

[7] The Shift to Clean Energy. Goldman Sachs, 2019. https://www.goldmansachs.com/insights/pages/the-shift-to-clean-energy.html.

clean energy infrastructure investments by 2040. The Rocky Mountain Institute (RMI) offers a compelling investment strategy that can transition the global economy through an array of low-carbon solutions. The analysis notes that $2 trillion in annual investments could yield $2.8 trillion in returns by 2030 and $7 trillion by 2050, annually, while reducing greenhouse gas emissions by 90 percent over the same time frame[8].

A 2008 McKinsey survey of 3,199 executives around the world found that only one in three transformation programs actually succeeded, commenting that studies over the past 10 years revealed remarkably similar results [Aiken, Keller, 2009]. [Reed, Dion, 2018] build on this insight to suggest that, if they are to be done well, energy and sustainability management programs must evolve from creating and attempting episodic efforts to including sustainability and energy programs in a mission-driven culture of sustained organizational change. [Dunlop, 2019], focusing on energy efficiency services and opportunities, notes that the topic is "a complex concept which is represented in diverse fields including engineering, economics, energy, computer sciences, environmental sciences, mathematics and physics". Yet, she also notes that the "social sciences literature on energy efficiency, however, remains significantly underrepresented, comprising just 2.6% of the total energy efficiency literature found in this study". She comments that there is "a need to further disentangle what is meant by energy efficiency from a social sciences perspective, including, critically, its conceptual foundations and practical applications". [Ehrhardt-Martinez, Laitner, 2008] observe that integrating social drivers can be an effective basis for designing more effective policies and programs. Despite observing that "technological innovation and economic incentives will continue to have an impact on individual behavior", they also suggest that individuals respond to social cues and behave in ways that might be called "socially rational". Instead of purely rational economic actors, they argue that "individuals are likely to behave and make decisions as *rational social actors* (emphasis added) who determine what is and isn't an 'appropriate' behavior by gleaning cues from their observations and interactions within their sphere of social influence". To the extent that new metrics can capture and support the ways in which social rules, resources and context shape individual patterns of energy consumption, policies and programs are likely to become much more effective.

From a different perspective, [Barinova, Laitner, 2019] focus on the role of institutions and innovations in shaping future energy policy in Russia. They argue that to maintain a robust and sustainable economy in the long term, countries should, indeed, increase overall resource productivity, but the priority policy measures that should be under-

[8] Seven Challenges for Energy Transformation. Rocky Mountain Institute, 2019. https://rmi.org/seven-challenges-report.

taken are those which are aimed more specifically at institutional improvement in Russia and elsewhere.

While there is no one volume, or even one large set of books, that can adequately reflect that many institutional, social, and cultural elements which might support the smarter and more productive use of resources—especially as enhanced productivity contributes to the achieving of the 17 Sustainable Development Goals—in this special issue, as already noted, we invited seven papers to explore three elements of prospective institutional change. These include new metrics, new opportunities, and the need for what one paper calls "purposeful effort".

2. Role of New Metrics

Conceptually, metrics—at times referred to as Key Performance Indicators—are a useful way to inform consumers, businesses, and governments so that they can both assess current environmental and economic conditions, and take useful steps to correct and improve a given situation; or, in the case of meeting the 17 SDGs and their underlying 169 targets, to provide a broader context of overall well-being. Zemtsov and his colleagues [Zemtsov et al., 2020] create a new context in which to utilize what is known as the Environmental Kuznets Curve to evaluate the environmental or "eco-efficiency in Russia" in the last two decades. In the economic literature, the Kuznets Curve can help a country or region determine whether its growth or economic development can facilitate the reduction of environmental pressures within that nation or region [Stern, 2017]. In this paper, the authors found that eco-efficiency, on average, declined in the first half of the 2000s in the regions of Russia, but grew from 2008 on. Their econometric calculations show that regions with high and low levels of economic development in Russia are more efficient, while economic growth did not lead to an increase in environmental efficiency.

In a different way, Cornelis [Cornelis, 2020] used metrics to examine the idea of how "energy poverty"—which usually occurs when households are unable to secure the necessary level and quality of domestic energy services—affects the environmental, health, and socioeconomic well-being of households more broadly. She notes that energy efficiency is an often-overlooked strategy that can help solve both climate and social or economic distress and emergencies.

On the other hand, [Browne et al., 2020] have proposed a method to identify "free-riders" in a way that also incentivizes nations to move to a carbon-free economy. Their assessment framework is seen as a complement to so-called "top-down" policy agreements. Browne and his colleagues develop a framework that uses three readily measured metrics, or parameters, of the country's economy to identify free-riding

behavior among countries: carbon intensity, rate of change in the carbon intensity, and per capita GDP. They then propose a simple formula to calculate trade sanctions against a free-riding country that could be used in bilateral actions to incentivize carbon emissions reductions.

As suggested previously, metrics or indicators provide a means to evaluate the performance of a program or an economy—in this case, achieving a variety of socioeconomic, environmental, and climate goals. The authors here offer different means to extend assessments beyond such traditional economic metrics as per capita income, levels of education, employment rate, or the age and growth of a region's population. Whether eco-efficiency, energy poverty, or moving to a carbon-free economy is concerned, these papers are among the many efforts necessary to assess and improve both the social-economic and the environmental-climate performance of national or regional economies. W. Edward Deming was undoubtedly correct when he commented, "It is wrong to suppose that if you can't measure it, you can't manage it—a costly myth" [Deming, 1994]. At the same time, however, if we are not aware of new ways to assess and evaluate both problems and opportunities, it will be hard to create positive momentum on the productive use of resources. These tools offer at least a positive step in that direction.

3. Exploring New Opportunities

Whether through narratives or case studies, it is helpful for community and business leaders as well as policymakers to see and understand new opportunities and solutions to better manage resources toward a more productive social and economic outcome. One way to approach unknown but future estimates of opportunities is to explore what are often referred to as "thought experiments" or "Fermi problems", rather than a precise estimate of costs. When it is difficult to know exactly what might be otherwise looked for or analyzed, a Fermi calculation can incorporate the multiplication of several estimated factors, which, as it turns out, is likely to be more reasonably accurate than first supposed. This is because there are probable factors that are estimated too high, while other factors are estimated too low. Assuming there is no consistent bias in the estimated factors, such errors will partially, if not more completely, cancel each other out [Von Baeyer, 1993]. In this approach we are effectively modelling "for insights, not numbers" [Huntington et al., 1982]. Laitner and his colleagues [Laitner et al., 2020] help open thinking by proposing a thought experiment to see if some combination of energy efficiency and renewable energy can displace the use of fossil fuels in Russia, which is a major producer of those resources, and they pose the question of whether it can be done in a way that might strengthen the overall Russian economy. As they note, the "overall economic impact of this transformation is hard to quantify".

On the one hand, decarbonization requires an initial set of large-scale policy, program, and research and development expenditures. It will also entail higher upfront investments in energy efficiency and alternative energy resources. Yet, although they find that such a transition will create an initial burden on the economy, their analysis indicates that "the additional infrastructure investments will also stimulate economic activity, reduce future energy expenditures, and also provide an array of other non-energy benefits". They also note "additional effects that are consistent with the officially announced long-term goals of modernization and reducing the Russian economy's dependence on revenues from energy and raw material exports".

Taking a different approach, [Berdin et al., 2020] consider the "successes and mechanisms to support the development of renewable energy in leading countries", and identify "the primary economic and social national goals of this process". Using what is called the "RU-TIMES" model, they show that "the development of renewable energy successfully coexists with the long-term goals of countries on CO_2 emissions in the energy sector and makes a significant contribution to their achievement". On the one hand they conclude that Russia is "making considerable efforts to follow the global trend, but lags behind the leading countries in terms of support and the scale of renewable energy production". At the same time, they note that support for greater generation efficiency, support for export transactions, and giving preference to large volumes of production to reduce prices and facilitate localization can greatly improve long-term prospects for the development of solar and wind generation in Russia.

Brody, Eshchanov, and Golub [Brody et al., 2020] tackle a different resource issue, that of optimizing Uzbekistan's investment in water irrigation technologies. Uzbekistan has been one of the largest cotton producers in the world. Yet, the irrigation water needed for these high production levels has been delivered by the massive diversion from rivers which naturally flowed into the Aral Sea. This, in turn, was the main cause of the rapid decline of the Aral Sea, which today is only 10% of its original size. In their paper, the authors explore the use of real options analysis (ROA) to look for optimal investment strategies in more efficient irrigation technologies, especially in light of variable climate and policy uncertainties. Under three different global warming scenarios (low, medium, and high), and depending upon the region, potential crop losses range from a low of 3% in one region to potentially 50% losses in cotton production under the high warming scenario. Most of the projected losses range from 10 to 30%. The authors' use of ROA assessments indicate that, in the long run, the conversion to a more efficient drip irrigation would enable the Uzbekistan government to reduce the financial risks by changing its water, energy and land policies.

4. Ensuring Institutional Success

The first six papers explore both key performance metrics and analytics which create new opportunities for the deployment of more productive and cost-effective investments in climate-friendly resources. If such investments succeed, then both the international climate goals and the 17 SDGs are more likely to be met. Yet, [Lebot, Weiland, 2020] point to a critical need if the world economy wants to ensure an optimal scale and mix of necessary resources that enable the desired outcome. As their assessment indicates, it will take an adequately funded set of smart policies and effective programs to drive the optimal scale of necessary investments. As they comment in their paper, "it will take purposeful effort, guided by smart policies and programs, to drive the necessary activities and investments to achieve optimal, large-scale benefits". And that purposeful effort will require a sizeable expenditure to catalyze the necessary scale of investment. Following a review of more than 150 studies, they construct a scenario which might reduce global energy consumption by 40 percent by the year 2050. To achieve that global reduction, they estimate that, over the period 2020 through 2050, the global economy will require on the order of €200 billion per year to be spent on programs, policy costs and incentives. This level of effort, supported also by private sector initiatives, can drive a necessary €1,200 billion investments to lower energy bills by an annual savings of €2,900 billion. The net annual savings might then be on the order of €1,500. In short, it takes money to make money. In other words, it takes program and policy efforts to drive the investment which, in turn, creates the savings (even as those effects also reduce greenhouse gas emissions).

Overall Conclusion

The evidence is compelling: new metrics that inform, new narratives that explore opportunities which might have been previously overlooked, together with an adequately funded set of policies and programs—all can go a very long way to ensure a robust and sustainable economy through the greater use of energy and resource productivity. Hence, there is a very big need for financing mechanisms that benefit from large-scale energy bill savings, but that also provide funding support for smart policies and programs that are more likely to guarantee the kind of returns that will enable the 17 Sustainable Development Goals to succeed, as well as smart climate and smart social-economic solutions to emerge. The need is there, the opportunity is there, and the returns can be generated at scale—but only if the appropriate choices are made, supported by new metrics, and new narratives of the opportunities, as they are all adequately supported by programs and policies to stimulate investments which can achieve the desired outcomes.

References

1. Aiken C., Keller S. The Irrational Side of Change Management. *McKinsey Quarterly*, April 2009.
2. Barinova V., Laitner J. A. Examining the Critical Role of Institutions and Innovations in Shaping Productive Energy Policy for Russia. *Journal of Environmental Studies and Sciences,* 2019, vol. 9, no. 1, pp. 54-66.
3. Berdin V. K., Kokorin A. O., Potashnikov V. Y., Yulkin G. M. Renewable Energy Development in Russia: Potential Capacities and Practical Steps. *Ekonomicheskaya politika [Economic Policy]*, 2020, vol. 15, no. 2, pp. 106-135.
4. Brody M., Eshchanov B., Golub A. Approaches to Optimize Uzbekistan's Investment in Irrigation Technologies. *Ekonomicheskaya politika [Economic Policy]*, 2020, vol. 15, no. 2, pp. 136-147.
5. Browne J. B., Villarreal D., Lackner K. S., Brennan S. Incentivizing a Carbon-Free Economy: A Method to Identify Free-Riders. *Ekonomicheskaya politika [Economic Policy]*, 2020, vol. 15, no. 2, pp. 68-85.
6. Cornelis M. Energy Efficiency, the Overlooked Climate Emergency Solution. *Ekonomicheskaya politika [Economic Policy]*, 2020, vol. 15, no. 2, pp. 48-67.
7. Deming W. E. *The New Economics for Industry, Government, Education*. Cambridge, MA, The MIT Press, 1994.
8. Dobbs R., Oppenheim J., Thompson F., Brinkman M., Zornes M. *Resource Revolution: Meeting the World's Energy, Materials, Food, and Water Needs.* McKinsey Global Institute, McKinsey Sustainability and Resource Productivity Practice, 2011.
9. Dunlop T. Mind the Gap: A Social Sciences Review of Energy Efficiency. *Energy Research & Social Science,* 2019, vol. 56.
10. Ehrhardt-Martinez K., Laitner J. A. Dollars or Sense: Economic Versus Social Rationality in Residential Energy Consumption. In: *Proceedings of the 2008 ACEEE Summer Study on Energy Efficiency in Buildings*, 2008, pp. 82-97.
11. Ekins P., Hughes N. *Resource Efficiency: Potential and Economic Implications*. A Report of the International Resource Panel of the United Nations Environment Programme, 2017. https://www.resourcepanel.org/sites/default/files/documents/document/media/resource_efficiency_report_march_2017_web_res.pdf.
12. Huntington H., Weyant J., Sweeney J. Modeling for Insights, Not Numbers: The Experiences of the Energy Modeling Forum. *Omega: The International Journal of Management Science,* 1982, vol. 10, no. 5, pp. 449-462.
13. Kubiszewski I., Costanza R., Anderson S., Sutton P. The Future Value of Ecosystem Services: Global Scenarios and National Implications. *Ecosystem Services,* 2017, vol. 26, part A, pp. 289-301.
14. Laitner J. A., Lugovoy O., Potashnikov V. Cost and Benefits of Deep Decarbonization in Russia: A Thought Experiment. *Ekonomicheskaya politika [Economic Policy]*, 2020, vol. 15, no. 2, pp. 86-105.
15. Lebot B., Weiland M. Policies and Programs Critical for Greater Energy Efficiency. *Ekonomicheskaya politika [Economic Policy]*, 2020, vol. 15, no. 2, pp. 148-167.
16. Reed J. H., Dion J. P. *Accelerating Sustainability: Integrating Context, Behavior, Technology, and Culture in Organizations,* 2018. https://theresourceimperative.com/wp-content/uploads/2018/07/Accelerating-Sustainability-Context-Behavior-Culture-Technology-06062018-Final.pdf.
17. Ripple W. J., Wolf C., Newsome T. M., Barnard P., Moomaw W. R. World Scientists' Warning of a Climate Emergency. *BioScience,* 2019, vol. 70, no. 1, pp. 8-12.
18. Sachs J., Schmidt-Traub G., Kroll C., Lafortune G., Fuller G. *Sustainable Development Report 2019*. N. Y., Bertelsmann Stiftung and Sustainable Development Solutions Network, 2019.
19. Stern D. I. The Environmental Kuznets Curve after 25 Years. *Journal of Bioeconomics*, 2017, vol. 19, no. 1, pp. 7-28.
20. Von Baeyer H. C. *The Fermi Solution: Essays on Science*. N. Y., Random House, 1993.
21. Zemtsov S., Barinova V., Kidiaeva V., Lanshina T. Ecological Efficiency and Sustainable Regional Development in Russia During the 20 Years of Resource-Based Growth. *Ekonomicheskaya politika [Economic Policy],* 2020, vol. 15, no. 2, pp. 18-47.