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Innovation at the water, energy, and food nexus

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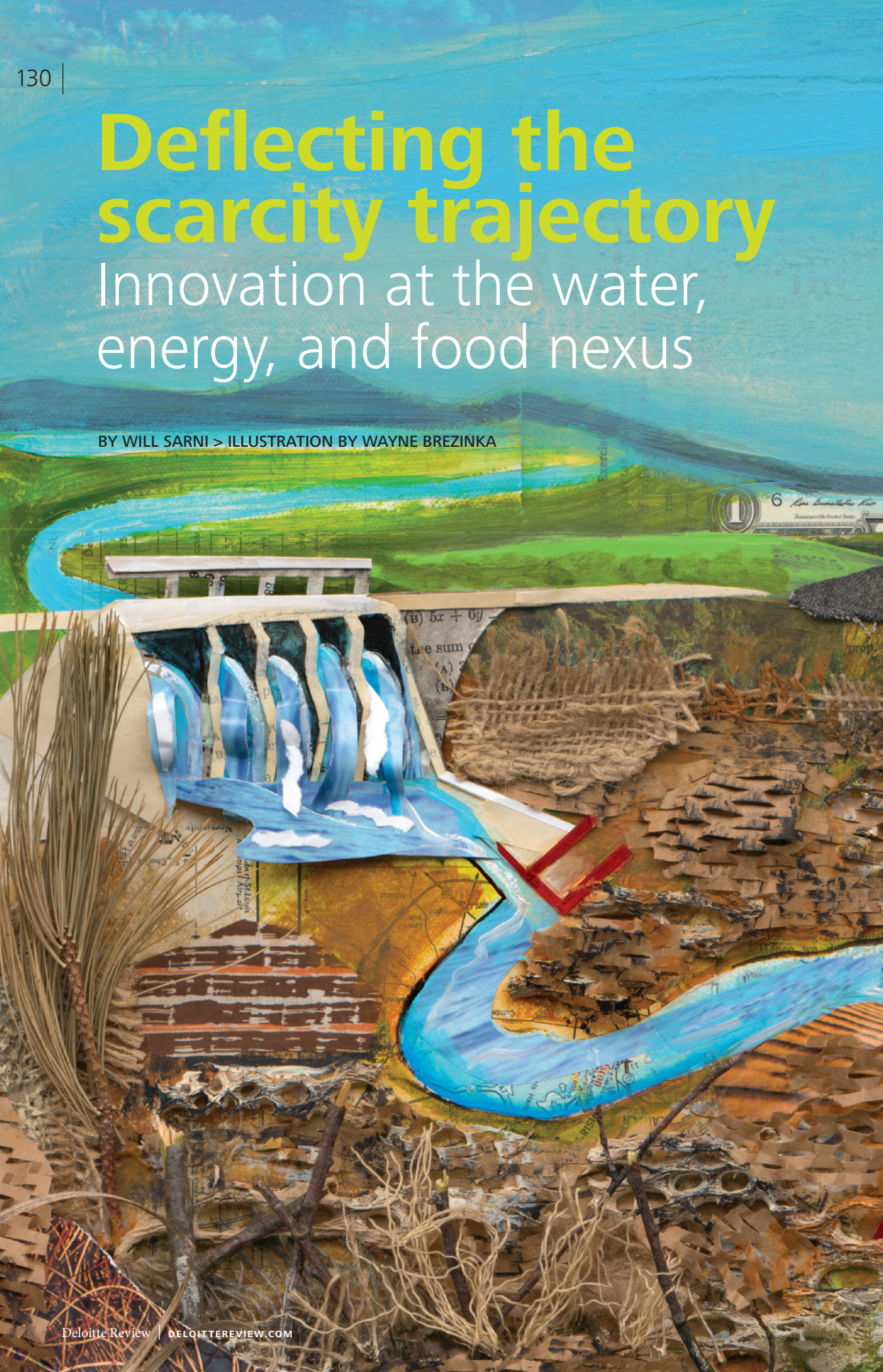

ONE OF THE GREATEST CHALLENGES OF THE 21ST CENTURY is the problem of how the public and private sectors can sustain economic development and business growth in the face of accelerating demand for water, energy, and food. "Business as usual" projections of scarcity in water, energy, and food predict a lack of these resources sufficient to sustain economic and business growth as well as an adequate standard of living worldwide. Especially troublesome is that many of the low- and medium-income economies, which many multinational companies are targeting for growth, are where water, energy, and food shortages are expected to be most acute.

Along with their rapidly increasing populations, countries in emerging markets will account for over 90 percent of global population growth by 2030; their rapid industrialization, urbanization, and motorization mean that these economies will contribute 70 percent of global GDP growth by 2030 and over 90 percent of the growth in global energy demand.[1]

Further complicating this challenge is that these resources are interrelated: It takes water to produce energy; it takes energy to source, treat, and distribute water; and both water and energy are required to produce food. The interdependence of these three resources is known as the water, food, and energy "nexus."[2] It is this nexus that complicates addressing these resources' scarcity independently, as actions taken with regard to one resource are likely to affect the other two. As framed by Joppe Cramwinckel of the World Business Council on Sustainable Development (WBCSD): "Water, energy and food are intrinsically interrelated: A sustainable solution for one almost always has an impact on the others."[3]

Fortunately, there are signs that many organizations are beginning to act to take us off the scarcity trajectory. Competition for water, food, and energy has driven innovation in partnerships through ecosystems of stakeholders and technologies. Beyond numerous examples of technology innovation—"precision agriculture," renewable energy, and water efficiency, reuse, and recycling technologies among them—several organizations have also innovated in the ways they work together to address this nexus issue. Collective action[4] and "aligned action"[5] have become powerful tools in activating ecosystems of stakeholders to address complex or "wicked" problems.[6]

But there is a fundamental difficulty. Good intentions notwithstanding, separate water, energy, and food ecosystems of stakeholders are unlikely to be able to address water-food-energy nexus issues at the scale and pace needed to sustain global economic development and business growth. Rather, innovation by ecosystems of stakeholders *at the nexus* is what has the potential to accelerate technology and policy solutions to address water, energy, and food requirements going forward. In other words, stakeholder ecosystems that address water, energy, and food as an interconnected system—"nexus ecosystems"—can remove us from our current scarcity trajectory and fuel business growth, economic development, and social well-being on a sustainable and resilient path.

THE NEXUS' ECONOMIC IMPACT

The significance of the water-energy-food nexus comes to life when one looks at its current and projected economic impact. Brazil, for instance, offers an example of the "ripple effect" of water scarcity on food and power production

THE SCARCITY TRAJECTORY: BUSINESS AS USUAL IN WATER, ENERGY, AND FOOD

The reasons for heightened competition for water, energy, and food are easily recognized. The world's population is increasing, and is projected to add 2 billion people over the next several decades.[9] This in itself will put significant additional pressure on water, energy, and food resources. According to the International Union for Conservation of Nature (IUCN), "By 2050, a global population of 9 billion will increase water demands by 55 percent, energy needs by 80 percent, and food demands by 60 percent."[10] Add to this the rise of the middle class in emerging economies and the associated demand for goods, and the increasing strain on the world's water, energy, and food systems becomes clear. Consider these projections:

- *Population growth*. The global population recently crossed 7 billion and is increasing by about 70 million people per year, with most of the growth in emerging economies.[11] Total global population is expected to reach 8.1 billion by 2025 and 9.6 billion by 2050.[12]
- *Energy demand*. Global primary energy consumption is projected to grow by 1.6 percent per year from 2011 to 2030, adding 36 percent to global consumption by 2030.[13]
- *Water demand*. By 2030, assuming an average growth scenario and if no efficiency gains are realized, global water requirements will grow from 4,500 billion cubic meters to 6,900 billion cubic meters—about 40 percent above current accessible and reliable supplies.[14]
- *Urbanization*. More than half of the global population now lives in cities, and increasing urbanization results in increased industrialization and increased water use.[15]
- *Food demand and changing diets*. In the last three-and-a-half decades, food consumption increased from an average of 2,370 kcal/person/day to 2,770 kcal/person/day. This growth was accompanied by significant dietary changes, as diets shifted toward more livestock products and vegetable oils and away from staples such as roots and tubers. Total food consumption globally, as measured in kcal/person/day, is projected to increase from 2,373 in 1969/1971 to 3,070 by 2050.[16]

These trends raise a number of issues for businesses looking for growth in emerging markets. For instance, companies could face the challenge of growing energy demand and potential supply shortfalls in countries with water shortages—as well as shortages of water itself. One only needs to look closely at the challenges in energy and water supply in emerging markets in Africa, where companies that are targeting the continent as a growth market—such as Diageo and The Coca Cola Company—are addressing resource scarcity issues, such as access to water, as part of their sustainability and business strategies.[17]

and economic impact.[7] The country is experiencing a persistent drought whose economic impacts were identified early in 2014 by the *Wall Street Journal* (WSJ).[8] According to this WSJ survey, "The biggest shock will come from food costs because the ongoing drought is pushing up the price of fruits and vegetables." The drought is projected to continue to affect the production of coffee, sugar cane, and other crops, with a resultant fallout to the country's economy. Some economists are also

concerned that the drought could start to drive up electricity prices, as power companies could be forced to use more expensive thermoelectric power plants to compensate for the dwindling reservoirs behind hydroelectric power plants. Already facing a projected 0 percent economic growth rate in 2015, the potential for water and energy rationing may reduce Brazil's growth further by 1 to 2 percent.[18]

Brazil is not alone in facing the potential economic impact of the nexus. The nexus' impact on economic growth in China was identified as early as 2011.[19] China Water Risk has been reporting on the impact of the nexus on economic growth, food and power production, and water scarcity.[20] The largest portion of China's industrial water use is for energy production, with the process of mining, processing, and consuming coal accounting for almost 20 percent of all water consumed. Chinese hydropower further complicates the issue, as China is the largest producer of hydropower in the world and plans to triple hydropower capacity by 2020. According to Ma Jun, the director of the Chinese NGO Institute of Public and Environmental Affairs, many Chinese rivers simply won't be running in 2020 if China meets its

One sign of the attention the water, energy, and food nexus has attracted from the private sector is the collaboration between Royal Dutch Shell and an advisory firm, Xyntéo, which have begun work on a new project that aims to uncover leadership behaviors that make cross-sector collaborations work—specifically, those addressing challenges around water-energy-food stress.

hydropower capacity goals.[21] Agriculture is also at risk, as it accounts for 62 percent of China's total water consumption; about two-thirds of China's arable land lies in the perennially dry north, and irrigation practices in China generally "continue to be inefficient, with less than half of the water used for irrigation actually reaching crops."[22]

One needs to only look at the state of California in the United States for a view of the *current* economic impact of the water-energy-food nexus. The state is facing severe water scarcity due to climate change[23] and increased competition for water. California's governor recently announced mandatory rationing of water to preserve supplies for agricultural, energy, commercial, and residential use.[24] By some accounts, there is only approximately one year's worth of water left in California.[25]

Water scarcity is now affecting both energy and food production in California, with measurable impacts on the state economy and on private business. According

to a recent report, the drought is estimated to drive an economic loss to the state economy of about $3 billion in 2015—an increase from about $2.2 billion in 2014.[26]

Most noticeably, the California agricultural sector has been hurt by water scarcity. According to Richard Howitt, a University of California, Davis professor emeritus of agriculture and resource economics, California's agricultural sector lost approximately 17,000 jobs in 2014 and will experience "mid-20,000" job losses in 2015. Howitt estimates that 500,000 acres were left fallow in 2014, and that this figure will likely grow by 30 to 40 percent in the current year. The USDA estimates that California suffered an 11 percent decline in acreage planted in 2014 compared with the prior year, with big agricultural production declines in crops such as corn, rice, and cotton.[27]

Water scarcity is also impacting the energy sector in California.[28] Typically, natural gas and hydropower are the state's top two sources of energy. However, as a result of water scarcity, lessened river flows have compromised the capacity to generate hydroelectricity, increasing the state's reliance on natural gas for electricity and leading to both higher prices and increased greenhouse gas emissions. According to a recent Pacific Institute report, between October 2011 and October 2014, California's ratepayers spent $1.4 billion more for electricity than in average years because of the drought-induced shift from hydropower to natural gas.[29] A longer view reveals an even more startling economic impact: Factoring in the dry years from 2007 to 2009, the total additional energy cost to the state's electricity users during the six years of recent drought was $2.4 billion.[30]

What conditions in California, Brazil, and China help point out is that energy, water, and food are inextricably linked. The nexus has real and significant impacts on economic and business growth.

THE OPPORTUNITIES: INNOVATION IN "NEXUS ECOSYSTEMS" AND TECHNOLOGIES

The water-energy-food nexus is becoming an explicit focus issue among many NGOs as well as public-sector and private-sector businesses, which see an opportunity to help enable economic development and business growth in addressing nexus issues. At a global level, the United Nations' 2015 Sustainable Development Goals include three that focus specifically on food, water, and energy.[31] Organizations including the World Bank,[32] IUCN,[33] and the World Economic Forum[34] have called for action to address the nexus stress. The voice of the private sector is also being heard through organizations such as Aquafed,[35] WBCSD,[36] and through individual actions such as efforts by The Coca-Cola Company[37] and Royal Dutch Shell.[38]

Nexus ecosystems

One area of innovation in addressing nexus stress is the emergence of "nexus ecosystems" explicitly focused on water, energy, and food issues, adopting a variety of strategies to drive economic development, business growth, and social well-being despite the nexus stress.[39] In several ways, the watershed event in catalyzing action on the nexus was the November 2011 international conference organized by the German federal government, "The Water Energy and Food Security Nexus: Solutions for the Green Economy," as a specific German contribution to the UN Conference on Sustainable Development held in Rio in 2012. This conference established the "Water, energy food resource platform,"[40] maintained by the German Federal Government and supported by stakeholders such as the World Economic Forum, WWF, and The International Food Policy Research Institute, to identify approaches to address the nexus stress. Following the Bonn platform's establishment, other water, energy and food nexus ecosystems, such as the Food, Energy, Environment, Water Network or "FE2W," have emerged.[41]

The private sector is also emerging as a force in establishing and activating the water, energy, and food nexus ecosystems. In many cases, multinationals can be a catalyst for designing, funding, and scaling nexus ecosystems. Scaling these water, energy, and food nexus ecosystems can involve bringing in other stakeholders such as multinationals, NGOs, foundations, and regional or global banks to promote leading practices in water, agriculture, and energy management coupled with the deployment of innovative technologies.

One sign of the attention the water, energy, and food nexus has attracted from the private sector is the collaboration between Royal Dutch Shell and an advisory firm, Xyntéo, which have begun work on a new project that aims to uncover leadership behaviors that make cross-sector collaborations work—specifically, those addressing challenges around water-energy-food stress.[42] The innovation in this project is its focus on changing leadership behaviors at the intersection of energy and agricultural production. The project's goal is to investigate why collaborations can be difficult and sometimes fail, and identify the leadership behaviors that can make them work.

Water funds: Addressing the choke point

The availability of water, or its scarcity, is the "choke point" for agriculture and energy production. As a result, water scarcity is typically the focus for addressing the nexus stress. One way that water users have collaborated in efforts to manage water wisely is to create "water funds," which provide incentives to upstream "water providers"—including rural communities of farmers and ranchers—for adopting practices that help preserve adequate water for drinking, agricultural use, and

energy production and commercial use downstream. While these funds tackle water as a choke point, they are really addressing the nexus stress, as increasing the availability of water increases capacity for energy, agriculture, and commercial uses.

The Nature Conservancy (TNC) is one of the leading NGOs in developing and scaling water funds,[43] which attracts investment from companies such as SABMiller. An example is the efforts of TNC and SABMiller (whose Bavaria brewery, Cerveceria del Valle, is located near the city of Cali, Colombia) in Colombia. The Water for Life and Sustainability Fund established near Cali, addresses water conservation along the Cauca River, from which SABMiller's Cerveceria del Valle brewery draws water for beverage production. The Cauca River Valley is Colombia's largest sugarcane-producing area, and demand for water for irrigation, a growing population, and industrial use threatens to outstrip supply. The Cauca River is also increasingly contaminated as a result of run-off from sugarcane production, erosion from deforestation for cattle ranching and small-scale agriculture, and a lack of access to modern sanitation in some poor communities.

This fund, driven by SABMiller and a range of other stakeholders, will address the nexus stress by providing water for drinking, agriculture, water and power utilities, and manufacturing, including the SABMiller brewery. The model pools money from downstream water users (such as municipalities, water and power utilities, and companies) and donors into a fund that is used to pay upstream stakeholders who have the ability to impact water quantity and quality, such as farmers, ranchers, community organizations, and environmental groups, and to implement projects and practices to address the community's water, energy, and food needs. The stakeholders and funders for the Cauca River fund aim to reach a total of $15 million; so far, nearly $4.5 million has been raised. Nearly $500,000 has been invested in an endowment fund.[44]

The operation of this fund delivers benefits to both the downstream water users, who save money on water supply and/or treatment, and the upstream water providers, who receive support in implementing sustainable agricultural and ranching practices as well as for developing infrastructure, such as septic systems, designed to protect water quality. The 65 projects funded to date have increased participating families' incomes by 30–65 percent, set aside 7,801 hectares for conservation and protection, and isolated and protected 554 springs, among other accomplishments.[45] For downstream water users, the fund represents a financially sustainable, long-term opportunity to address the root causes of identified water risk, as opposed to using typically more-expensive "end of pipe" approaches. It also gives stakeholders opportunities to build relationships with the private sector, government authorities, civil society, and communities.

Taking aim at the nexus: Electricité de France

The efforts organized by Electricité de France, known as The EDF Group, illustrate the synergies possible when water, energy, and food are addressed as an interconnected system. Working with two major local irrigators, EDF was able to devise a solution for allocating water between energy generation and irrigation for agriculture through a process of valuing water, creating a mutually beneficial economic agreement for the stakeholders.

The Serre-Ponçon dam and reservoir, designed, commissioned, and operated by EDF, is located in the Durance and Verdon River system in southeast France. The system, which includes 21 hydropower plants, enables the production of 6.5 billion kilowatt-hours per year of renewable electricity and an output of 2,000 megawatts within 10 minutes. It supplies drinking water and water for industrial purposes to an entire region and irrigates over 150,000 hectares of farmland. The reservoir has guaranteed storage of 450 million cubic meters of water in the summer, allowing a total annual withdrawal of about 1,800 million cubic meters.[46]

Through the late 1990s, EDF had been dividing the water of the reservoir among the area's water users based on standing legal and regulatory guidelines. However, by the early 2000s, it became clear that the existing guidelines were not enough to

prevent overuse. EDF realized that, unless the reservoir's users could be persuaded to reduce their water consumption, it would face a risk of business deoptimization due to the lack of enough water to generate power during periods of peak demand. To restore flexibility in water use and maintain financial margins, and to provide for future water demand from other users, EDF needed a way to more effectively allocate water between energy generation and irrigation and to develop appropriate incentives to encourage water savings.[47]

To this end, EDF developed and signed a Water Saving Convention—an agreement between EDF and the area's two main agricultural irrigators—in which the irrigators agreed to reduce their water usage, and EDF agreed to remunerate the irrigators for the amount of water saved.[48] The key feature of the convention, which

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was built upon the existing agreements in place governing water allocation, was the establishment of a financial incentive for the irrigators to reduce water use. This provision offers the irrigators an incentive to change their practices, and allows them to freely revise their objectives every year with clear knowledge of the economic consequences of their choices.

EDF developed an approach for valuing the water by linking it to the value of the energy it could produce per cubic meter, based on current and projected future energy prices in France. This valuation drove the calculation of the benefits of adjusting water uses for each stakeholder and the level of remuneration for the irrigators' water savings, enabling EDF to clearly demonstrate identified benefits of adjusting water use. The money EDF pays to the irrigators would seem to represent a relatively modest investment for a highly valued return: the ability to continue to generate power with a lower risk of business disruption.

Because this agreement requires the irrigators to use water more efficiently, the agricultural stakeholders working with EDF have adopted innovative technology

and leading practices in water management to help reduce their water demands. Since 2003, when the convention was first signed, approximately 30 percent of the water savings have come from changes in behavior and management, and approximately 70 percent from water-efficient technology (mainly new devices for regulating water intake in the gravity canal).[49] Together, these efforts have led to a reduction in annual agricultural consumption of water from 325 million cubic meters from 2000 through 2006 to 235 million cubic meters today. Meanwhile, EDF has benefited from the ability to time the generation of power from the water saved to allow it to generate and sell more electricity during peak periods of demand, when electricity prices are higher.[50] The environment also experiences less stress, as about 84 percent of the water saved is used to maintain natural ecosystems.[51]

Following the positive results of the original Water Saving Convention, a new agreement was signed in 2014 at the end of a dialogue that also involved the Rhône-Méditerranée-Corse water agency.[52] Its objective is to apply the same approach more holistically to the whole river Durance basin, with stakeholders committing to implement water savings for the long term.

"Aligned action": Water and energy utility collaboration

The 2013 report *Conservation synergy: The case for integrating water and energy efficiency programs by Western Resource Advocates* (WRA) makes the case that joint efficiency programs between energy and water utilities are often characterized by "higher participation rates, increased customer satisfaction, coordinated and complementary program design, and an improved reputation for working smarter—not harder."[53] WRA describes several case studies where energy and water utilities have collaborated to reduce energy and water use. One potential benefit of joint conservation programs is that many consumers find it easier to participate in consolidated programs that enable them, with a single action (such as buying a more efficient washing machine), to capture the combined benefits of reduced energy and water use. Potential benefits to the utilities include reduced demand, which can reduce the need to increase capital investments to bolster supply.

Several of the collaborations described in the WRA report illustrate the enhanced results that joint action can prompt. For instance, in 2008, the investor-owned, California-based utility PG&E worked with several water agencies in California to offer a rebate program for high-efficiency clothes washers. The collaboration enabled the program to offer consumers higher rebates than had been possible when each utility was running its own separate program. In 2013, the rebate ranged from $100 to $125, with $50 of the rebate coming from PG&E and the rest coming from the water utility. PG&E has seen a 63 percent increase in customer participation since the water utilities joined the program, and the water utilities have seen a 30

percent increase in their customer participation. The program has since expanded to include 41 water agencies (municipal, regional, and private utilities).[54]

In another example, three Texas utilities—Austin Water Utility, Texas Gas Service, and Austin Energy—collaborated in 2011 to develop a Multifamily Energy and Water Efficiency Program. The program, funded in part by the US Department of Energy, is designed to help conserve water, electricity, and gas. The program provides resource efficiency home improvements for multifamily residential dwellings. It is projected to upgrade approximately 1,900 multifamily units, resulting in approximately 4.7 million kilowatt-hours of energy savings and 10 million gallons of water savings per year.[55]

One of this program's key innovations is its holistic approach to resource efficiency, which targets not one but three resources. This helps overcome the "split incentive" problem that commonly stymies upgrade projects, in which the property owner incurs the cost of the upgrade but the renter earns the resource-efficiency benefits. In this case, the three-pronged approach to efficiency created enough benefit for the property owners, in the form of potentially enhanced property values and the market appeal of a building with lower operating costs for tenants, for them to participate in the program.

Technology innovation at the nexus

Technology innovations that strive to address the nexus stress in an integrated manner are also emerging. Such technologies typically aim to increase water conservation by power utilities and agricultural businesses through means such as dry-cooling thermoelectric power plants, using renewable energy sources (for example, wind and solar), and leveraging information and communications technologies (ICT) to foster more efficient and effective use of water and energy for agricultural, residential, and commercial needs.

A few technology incubators and accelerators specialize in developing technologies to address the water, energy, and food nexus. For example, Imagine H2O is an organization that promotes nexus technology innovation in areas of agriculture, water efficiency, wastewater reuse, and energy and resource recovery. It offers an "accelerator program" to help competing entrepreneurs turn their plans into scalable technologies and become part of the nexus ecosystem.[56] Imagine H2O's funders include financial institutions such as Wells Fargo, technology companies such as Autodesk, NGOs such as Berkeley Energy and Resources Collaborative, and organizations such as AgTech Silicon Valley.

The technologies themselves[57] are being deployed by multiple water and wastewater utilities, agricultural companies, and energy companies. One example of their use is from KB Homes in California, which uses a system developed by an

Imagine H2O competition winner, Nexus eWater, in its new 3.0 home design in El Dorado Hills, CA.[58] Nexus eWater has developed a technology to help save water and energy, the Nexus eWater Recycler, that can reduce domestic water usage by 34 percent, reduce sewage flows by 70 percent, and produce hot water with 75 percent less energy than conventional technologies.[59] Designed as a combined water purification and heating system, the Nexus eWater Recycler recycles grey water to a quality which is safe to use on lawns and in toilets while simultaneously extracting the waste heat in grey water and concentrating it in a hot water tank.

A PATH FORWARD

What needs to change to derail the scarcity trajectory? For the public and private sectors, addressing the water-energy-food nexus generally comes down to two major focus areas: nexus ecosystems and technology innovation.

Nexus ecosystems. Organizations can work to establish new ecosystems around the water-energy-food nexus and drive better performance with current ecosystems.

- ***Establish and/or participate in "nexus ecosystems" of stakeholders.*** Organizations can join several nexus ecosystems such as the World Business Council on Sustainable Development.[60] Joining nexus ecosystems and, more importantly, participating in and contributing to nexus solutions can help organizations develop practical answers to the business and social problems the nexus presents.
- ***Activate ecosystems through goals and measurement.*** To have a meaningful impact, organizations should do more than just identify and participate in nexus ecosystems. They should help drive ecosystem participants to agree on a set of goals and quantify the impact of their actions, a process that can be undertaken as part of "aligned action."
- ***Look for ways to engage in aligned action.*** Aligned action, like collective action, brings together a group of diverse stakeholders around a common vision. However, aligned action is usually understood to encompass a broader, more disparate group of stakeholders who work toward a set of shared goals through complementary as well as collaborative efforts. Ecosystems featuring aligned action are often characterized by a shared narrative for change and an understanding that the actions that arise out of that shared narrative will vary based on the needs of each network. Aligned action can be an effective approach when the problem is not well understood or diffuse; it can bring unusual stakeholders together to drive change by integrating disparate perspectives.

- ***Scale solutions and quantify impact.*** While in some cases it may be enough to pilot a nexus solution, the real goal is to scale the solution and to quantify its impact. Stakeholders tend to make significant investments of time and capital, and as with any investment, the return should be quantified. Impact can be measured across economic, environmental, and social dimensions and "fed back" to stakeholders to facilitate adjustment of their strategies and focus areas.
- ***Reinvest in or reinvent the nexus ecosystem.*** Reinvestment may be warranted when an investment has had a quantifiable impact and the nexus stakeholders are satisfied that their aligned action goals are being achieved. If not, then ecosystem participants should examine and, if necessary, reinvent the ecosystem, which may entail changes in factors such as geographic location, incentives, and stakeholders.

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- ***Engage nexus stakeholders to help establish incentives and public policies to do more with less.*** An example of a nexus ecosystem effectively engaging with policymakers and technology implementation is the 2030 Water Resources Group (2030WRG).[61] 2030WRG is a global nexus ecosystem of competitors collaborating in a pre-competitive space, along with NGOs and the public sector, to address strategic "choke points" related to the water-energy-food nexus. 2030WRG routinely works with the public sector to implement public policy changes to address the nexus stress: For example, in Karnataka, India, 2030WRG stakeholders are pursuing projects with local governments, the private sector, civil society, and development agencies to strengthen water resource laws, institutions, and policies,

as well as to encourage public-private partnerships focused on water resource management.[62]

Technology innovation: Organizations can pursue integrated technology programs to link water and energy conservation programs and to develop incentives to increase agricultural and resource productivity.

- ***Rethink resource use.*** Technologies now exist that can enable organizations to take a sophisticated approach to resource "reduce, reuse, recycle." For instance, it is now possible to capture and reuse wastewater sludge to recover resources and generate energy,[63] and to treat wastewater for potable and non-potable uses.[64]
- ***Explore ICT in addressing nexus issues.*** The use of ICT to drive more efficient and effective resource use is spreading among innovators in nexus ecosystems.[65] ICT applications at the nexus can now be used to collect data remotely, from orbit (such as the NASA GRACE satellites now collecting data on global water resources)[66] or in the field through the use of drones.[67] They can also empower individuals with mobile applications to, for instance, help organizations crowdsource information about water flow and condition to monitor pollution and improve water management.[68] Digital connectivity, which includes remote sensing, machine-to-machine communication, and digital applications, is also emerging as a driver for smarter, precision agriculture, whether it takes the form of traditional agriculture companies buying data and information companies or agriculture machinery companies embedding smart sensors into their products.

Shortfalls of water, energy, and food can sabotage economic and business growth as well as compromise social well-being. It is, however, within our power to combat scarcity by taking action at the nexus. Working together, and taking advantage of technological advances, the public sector, private sector, and NGOs can develop approaches that offer the hope of a sustainable and prosperous future.

Simply put, to quote Peter Drucker, "The best way to change the future is to create it." DR

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