Creating the Path to Profitability for the Reinvented Toilet

Business Model Options and Strategic Considerations
The Sanitation Technology Platform (STeP) helps innovative products and services reach the 4.5 billion people worldwide who do not have access to safely managed sanitation. STeP provides a full range of services including field testing, market intelligence, and user insights to help inventors and companies address sanitation market and user needs.

STeP is a collaboration of global experts and organizations that reduces risk and streamlines the path to market, fostering greater success for its clients. As a department within RTI International, Innovation Advisors is the implementing partner of STeP.

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About this report

This report presents seven potential business models for companies to consider as they plan their Reinvented Toilet (RT) commercialization strategies in emerging sanitation markets. This report also aims to help donors and governments understand how they might support RT market creation efforts.

In 2019, STeP and Eram Scientific, a leading sanitation technology enterprise in India, partnered to design and test new RT business model ideas. This report presents hypotheses and insights generated through this collaborative effort. Special thanks to the Bill and Melinda Gates Foundation for their support.
Going to Market with the RT:
Why Business Models Matter
The Reinvented Toilet (RT) represents a new class of sanitation technology poised for transformative impact

Over 4.5 billion people globally lack access to safely managed sanitation. Global access to safely managed sanitation has grown only 3% over the past 15 years. Business-as-usual solutions to the global sanitation crisis are proving insufficient to address this pressing challenge.

Radical, transformative change is required.

Fortunately, a new class of sanitation solutions known as “Reinvented Toilets” are emerging. These technologies represent significant advances in the science of waste processing and the engineering of waste-to-resource recovery. For example, the public/community reinvented toilet is a central processing unit that connects to one or multiple toilets to treat waste and recycle wastewater for flushing for many users. Multiple public/community RT designs are available, each with unique commercialization opportunities across multiple market subsegments, such as tourist sites, transit hubs, multi-family residential buildings, and commercial spaces.

Developed in partnership with the Bill and Melinda Gates Foundation, world-class research institutions, and pioneering companies, RTs are designed to:

- Eliminate pathogens
- Conserve water
- Operate off grid
- Lower life-cycle cost

Thus, these technologies address the limitations of incumbent technologies, such as sewerage systems, which can be expensive and water-intensive.
Reaching meaningful scale with the RT will depend as much on the business model as any technological advance.

“Recent research suggests that the single biggest factor that enables such private sector-led approaches to reach a meaningful scale in dealing with base of the pyramid (BOP) markets is *getting the business model right*. The business model—the specific combination of product, distribution, supply chain, financing, pricing, payment and sales—is often far more important in determining success than a given specific technology.”

- Michael Kubzansky, *The Importance of Business Models*
How do we define business model?

A good business model answers Peter Drucker’s age-old questions:

*Who is the customer?*

*What does the customer value?*

It also answers the fundamental questions every manager must ask:

*How do we make money in this business?*

*How do we deliver value to customers at an appropriate cost?*
We need **new** RT business models for a number of reasons

1. **Existing business models do not sufficiently address sustainability.**

   Private sector engagement in building and managing sanitation infrastructure and services stands as a recent phenomena in countries like India. As such, the search for sustainable business models continues, with the sector remaining largely dominated by government and donor-led models. Government-enabled build-operate-transfer models supply land for public toilets but not funding for long-term operational expenditures (OPEX). Government procurement methods tend to prioritize cost-savings and pay out over long timeframes, which can create cashflow issues for private businesses. Corporate social responsibility investments in public toilets often emphasize upfront capital expenditure (CAPEX) associated with new toilet construction. Toilet operators can capture user fees via pay-per-use models but not necessarily at rates sufficient to sustain high-quality service over time.

2. **Existing business models do not fully capture the value of the RT.**

   The RT takes the complex, multi-segment sanitation value chain and collapses it into a single product whereby containment equals treatment and water reuse. However, traditional business models typically focus on discrete pieces of the value chain (containment, emptying, transport, treatment, reuse/disposal) not the value chain as a whole. For example, existing business models/government-enabled market mechanisms do not incorporate robust incentives for reusing/minimizing water. While full value chain business models for container-based sanitation are gaining traction, we do not yet have proven models that both leverage high-technology solutions and capture the full sanitation value chain in an integrated, holistic way.

3. **Existing business models do not resolve the RT’s “public good” conundrum.**

   One of the most significant value propositions of the RT—treatment of fecal waste—represents a public good for which individual users and institutional buyers may be reticent to pay on their own. The responsibility of treating fecal waste typically falls to government. However, as noted previously, overreliance on government funding in the sanitation sector calls sustainability into question. Resolving the question of who will pay for on-site fecal waste processing looms large for new RT business model design efforts.
Understanding “who might pay and for what?” stands as a priority for RT business model design

The RT offers a diverse set of value propositions likely to align with different types of customers, each with unique needs, price sensitivities, and expectations. As a result, RT business models must either bring together many people and organizations to pay for both individual/institutional and public good value (a complex undertaking in a new market with a new technology) or develop a single payer who realizes the unique, multifaceted value of the RT and is willing to pay for it (which may be hard to find) (Hudson, 2019).
Designing the Future:
RT Business Model Options to Consider
The business model options presented offer RT providers and other stakeholders a starting point for design. These options also provide an invitation to **THINK BIG** about what might be achieved by the RT and the business models needed to achieve that ambitious future.

When designing and experimenting with new business models, **mindset matters**. Successful RT providers will exhibit these attributes:

- **Creative outlook**: Ask “How might we...” and “What if...”
- **Appetite for experimentation and learning**: See business model ideas as a series of hypotheses to be validated
- **Sense of optimism**: Focus on what’s possible instead of what’s stopping us
- **Long view of scalability**: Understand creating new markets takes time and requires the efforts of many
The RT business model options presented are meant to provoke and inspire

The following pages present seven potential business models for companies to consider as they plan their public/community RT commercialization strategies. The options presented are not comprehensive; they represent a subset of the many options RT providers might consider when designing new business models. STeP offers these options as a starting point for further ideation, experimentation, and refinement.

<table>
<thead>
<tr>
<th>Business Model Example</th>
<th>Core Business Model Innovation</th>
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<tr>
<td>(1) Advertising model</td>
<td>Leverages public infrastructure as an advertising asset</td>
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<td>Revenue stream (generates new ways for customers to pay for value)</td>
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<td>Value proposition (opens up new ways to deliver value)</td>
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Five common characteristics informed our design of the RT business model options offered

The business model options presented uphold some common characteristics STeP believes to be critical for successful RT business models.

- **Market-driven**, putting private sector actors in the driver’s seat but not precluding engagement by government and/or donor actors;
- **Creative**, moving beyond status quo approaches and harnessing a full array of options (e.g., digital technologies, different payment schemes) being introduced to the sanitation sector;
- **Suited to emerging markets**, where price sensitivities and diversity of norms, preferences, and contextual realities greatly impact business success;
- **Flexible**, enabling different types of customers to access and pay for the specific value they seek;
- **Amenable to asset-intensive/infrastructure offerings**, because the RT is a CAPEX intensive product and purely service-driven and/or digital product business models will not fully address RT providers’ needs.
Finding business models that work requires context-specific design and validation

Business models are highly context-specific.

Generalizable, idealized business models might be useful to discuss in the abstract. But the success of a business model is directly tied to an organization’s comparative value, core skills and offerings, organizational culture, customer needs, market context, and other factors. In the sanitation sector, factors such as cultural norms and user preferences exhibit a lot of influence over business success.

Take these ideas as inspiration but don’t stop there.

We invite you to create something unique that fits your company and your context. Indeed, specific features of different models presented here could be combined into creative alternatives. Some RT providers may implement multiple business models owing to distinctions in locations and user populations. Many really great ideas haven’t even been identified yet.
Tips for reading the business model profiles

1. Nine building blocks comprise business models (see below). For each option presented, innovation within a single business model building block drives the rest of the model. We define this core innovation for each.

<table>
<thead>
<tr>
<th>Nine Business Model Building Blocks</th>
<th>(Osterwalder and Pigneur, 2010)</th>
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<tr>
<td>Customer Segments</td>
<td>For whom are we creating value? Who are our most important customers?</td>
</tr>
<tr>
<td>Value Propositions</td>
<td>What value are we creating? Which customers’ problems are we helping solve?</td>
</tr>
<tr>
<td>Distribution Channels</td>
<td>Through which channels do our customers want to be reached?</td>
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<tr>
<td>Customer Relationships</td>
<td>What relationships are we establishing with each segment?</td>
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<tr>
<td>Revenue Streams</td>
<td>What value are customers willing to pay for? For what do they currently pay?</td>
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<tr>
<td>Key Resources</td>
<td>What are the most important assets required to make our business model work?</td>
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<td>What important actions must we take to make our business model work?</td>
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<tr>
<td>Key Partners</td>
<td>Which partners and suppliers leverage our model? Who do we rely on?</td>
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<tr>
<td>Cost Structures</td>
<td>What are the most important costs inherent in our business model?</td>
</tr>
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For each option presented, we provide visual depictions of who/what makes the model work and how they interact. See below for a legend to help you navigate the visuals.

- **Customer** whose investment enables the RT provider to deliver value.
- **RT Provider** that develops, sells, and installs the RT; may also maintain and service the RT.
- **Key Asset** that serves as a focal point for customer-RT provider interaction.
How it works:

A municipality enters into a contract with a sanitation enterprise to install, operate, and maintain public toilets on government land in exchange for the right to advertise on the toilet installation.

An advertising agency places ads on or around public toilets and provides the sanitation enterprise with revenues that can offset or potentially cover the costs of installing and maintaining the toilets.

How and why it might apply to the RT:

Imagine shifting the costs of Reinvented public toilets from end-users and governments to private sector advertising agencies. Municipalities can facilitate the shift by providing land and allowing RT providers to contract with advertisers to advertise at RT installations.

Revenues from the advertising sales would represent long-term, private sector-driven revenue streams supporting the installation and operation of RTs at no direct cost to the municipality.

Additionally, as advertisers likely will pay a premium to associate their brands with clean high-tech public toilets, this model can create a market mechanism that incentivizes both RT technology adoption and delivery of public goods such as recycled water and treated waste.

Advertisers may prefer RT technology compared to incumbents, as the off-grid nature of the RT allows for the toilets to be sited regardless of utility hookups access, thus opening new opportunities for RT providers and advertisers alike.

Analogs to the advertising model may include leveraging consumer-facing businesses (e.g., convenience stores) who seek to offer high-quality restrooms for customers to increase footfall and sales.
Example:

In 1964, French advertising company JCDecaux pioneered a new business model for financing the construction and maintenance of bus shelters through advertising sales. Since then, they have expanded their model globally to include bus shelters, public toilets, city map displays, and defibrillator dispensers.

In San Francisco, they adopted their model to the San Francisco Automatic Public Toilet Program. Under the program, contractors provide and operate self-cleaning public toilets at no cost to the city. In exchange for the toilets, the city allows the contractors to install public service/advertising kiosks. Currently, 25 self-cleaning toilets in San Francisco are supported by revenues generated at 70 kiosks. Street cleaning requests in neighborhoods with self-cleaning toilets have dropped by a third.

JCDecaux’s India office has installed and regularly maintains advertising sites at bus stations, airports, and other transit hubs in Delhi, Chennai, and Bengaluru.

Key Features:

Value Proposition: Advertisers likely will value the RT value proposition of reduced logistical and siting constraints. Without requiring utility hookups or sewerage pipes, RTs may be sited in currently hard-to-reach locations to generate ad revenue (although this may vary based on RT design specs). Advertisers also may value associating their brand(s) with clean, high-tech, eco-friendly public toilets, as well as aligning on public sanitation goals.

Revenue Streams: Fueled by advertising revenues, the model can provide sustained operations at no direct cost to municipalities (although indirect cost through land grant likely will be required).

Customer Segments: There is strong customer segment alignment between the two key customers—advertisers and municipalities tendering public toilets—with both focused on serving users at high footfall locations.

Remaining Issues:

Target audience: Depending on the products/services they promote, advertisers may seek to target public toilets in high-income urban areas rather than those in poorer areas.

Addressing upfront capital needs: This model requires that companies find other financing to pay for upfront manufacturing and distribution costs, given advertising revenue will begin flowing once toilets are installed.

Required expertise: Facilitating advertising contracts may not be a core competency of firms that currently provide public toilets.

References:

History of JCDecaux
JCDecaux: The Invention of a New Business Model
San Francisco Automatic Public Toilet Program
How it works:

Instead of paying to own a product (e.g., a light bulb) customers pay for the service that the product provides (e.g., light).

The product distributor retains ownership of the product, focusing on maximizing performance instead of capturing direct product sales.

How and why it might apply to the RT:

Imagine a scenario in which, instead of buying the product, RT customers pay the RT provider a regular “pay for performance” fee for which customers access a comprehensive set of RT services (e.g., system design, installation, maintenance, upgrades, etc.).

RT customers would avoid having to pay upfront CAPEX cost, a potentially high barrier to adoption for the RT, with CAPEX and OPEX charges accounted for in the fee/contract period calculation. This model is particularly aligned with customers that manage large facilities requiring regular, uninterrupted service, such as malls, transport centers, public/governmental complexes, etc.

Moving away from one-time product sales, RT providers would be incentivized to provide long-lasting products and ensure high-quality, uninterrupted service over the contract period, as they are paid based on how well their products work.

At the end of the contract period, RT providers would receive their RT products back to be reused, refurbished, or recycled, opening further opportunities to benefit the company.
Example:

Philipps Chief Executive Officer Frans van Houten and Architect Thomas Rau pioneered the concept of selling light as a service. In this model, customers pay for lighting services instead of lightbulbs and lighting equipment. Customers pay for the light used and Philipps “handles the entire lighting service – design, equipment, installation, maintenance, and upgrades.” (Atlas of the Future, 2019).

Via this model, companies are incentivized to install energy-saving lighting (which often costs more than traditional options). This aligns with Philipps’ incentives, with the model emphasizing “planning for longevity” instead of transactional product sales (Ibid). Indeed, Philipps notes that because they use very energy efficient products, customers’ energy savings “are often so high that they exceed the entire cost of the new lighting.” (Philipps, 2017). Importantly, Philipps retains ownership of their equipment, meaning they control maintenance schedules and decide when products need to be replaced.

Early adopters of this model include a Schiphol Airport and High Tech Campus Eindhoven in the Netherlands. Thomas Rau went on to found Turntoo, a platform dedicated to growing use of this business model and its offshoots.

Key Features:

Value Proposition: This model emphasizes the value-added service that a product provides. In the case of the RT, that means water recycling and fecal waste processing, among other benefits.

Revenue Streams: This model removes upfront investment barriers to customers, replacing product sales with a regular contract/rental fee that covers CAPEX and OPEX over the contract lifetime.

Customer Relationships: The product-as-service model offers the opportunity to deepen customer relationships via ongoing engagement with large, marquee customers versus many discrete, one-time transactions. This model lowers risk of adoption for customers, given responsibility for the product remains with the RT provider.

Remaining Issues:

Valuing RT service offerings: Customers must value on-site water recycling and fecal waste processing services for the full RT value to be captured via a product-as-service model. This issue connects to the public good conundrum highlighted earlier.

Addressing upfront capital needs: A product-as-service fee-based model requires that companies find other financing to pay for upfront manufacturing/distribution costs, given CAPEX is paid over a contract period instead of via a one-time transaction.

References:

New business models in the circular economy
Pay-per-lux: Let there be (intelligent) light
Selling light as a service: Case study from the Ellen MacArthur Foundation
Civic Crowdfunding Model

Core innovation: revenue stream

How it works:
Crowdfunding combines two modern resources: (1) web-enabled crowdsourcing, which harnesses the creative problem-solving power of networks, and (2) microfinance, which leverages small investments by many to achieve big results.

“Civic crowdfunding” leverages citizen investment in public goods (e.g., parks, public transportation infrastructure), enabled by dedicated online platforms such as Citizinvester and Spacehive.

How and why it might apply to the RT:
Imagine a scenario in which an RT provider and a local community partner to solicit funding support for installing and operating RTs in an underserved area. Facilitated by an online civic crowdfunding platform, individual and institutional contributors from around the world could pledge donations to locate one or many RTs in the partnering community.

In another scenario, a municipal government, philanthropic donor, and/or other investor could partner with multiple communities to run a large-scale civic crowdfunding campaign, aimed at installing RTs in multiple locations. A matching scheme could be employed, whereby additional funding kicks in once certain crowdfunding thresholds are met.

Civic crowdfunding campaigns work best when strong community engagement and leadership features heavily in the planning and implementation. Community buy-in for the investment, in this case the RT, is non-negotiable. As such, even the design and initiation of a civic crowdfunding campaign by communities helps demonstrate demand, which can be used to focus RT providers’ commercialization efforts as well as government/donor investments.
Launched in 2009, Ioby.org (meaning “In Our Backyards”) became the first crowdfunding platform dedicated to organizing and funding civic projects, including community-based infrastructure. Since then, more than 1,200 civic crowdfunding platforms have launched around the world.

Ioby.org serves as a donation-based platform emphasizing resident-led investment in civic infrastructure such as community centers, parks/gardens, bike lanes, and public pools. To date, the platform has facilitated over US$6.4 million in donations, supporting over 2,000 projects across the United States. For example, over 500 crowdfunders raised over US$60,000 to install a protected bike lane in Memphis, Tennessee. A little goes a long way in Ioby.org’s model: the median donation is US$35.

Incorporating local knowledge and building strong community-based networks around crowdfunded projects serves as a key facet of Ioby.org’s work. Ioby.org co-locates customer relations specialists in each of their five focus cities where historic disinvestment in communities persists. These specialists focus on building networks of community leaders and helping them refine their marketing and implementation plans once they are ready to seek capital for their civic projects.

Key Features:

Value Proposition: Civic crowdfunding of public infrastructure offers an emerging avenue to address the basic, unmet, and shared needs of communities. The RT’s value proposition of providing high-quality sanitation solutions for underserved communities aligns well with this model.

Revenue Streams: A variety of financing and funding techniques can be employed to support civic crowdfunding, including traditional donations, reward-based donations (whereby contributors receive rewards for giving and sharing the opportunity with others), interest-free and low-interest loans, pre-sales, and “regulation crowdfunding” enabling debt and equity investments (particularly popular for projects with predictable revenue streams).

Key Partners: As noted, best practice points to the need for a strong community champion who can be the face of the crowdfunding campaign and rally community support for the initiative. Terrific marketing of the opportunity on available civic crowdfunding platforms is a must.

Issues to be Addressed:

Serving poor communities: Affluent communities likely will have residents contribute to campaigns, rather than just faraway strangers; this may be harder for poor communities to achieve given competing needs for limited resources. A tiered approach to government matching of crowdfunding campaigns could help address this gap.

Addressing OPEX: Such a campaign may align better with organizing a big fundraising push to install an RT but less so with addressing ongoing OPEX needs. Establishing an RT OPEX Trust Fund during the crowdfunding campaign could help address this issue.

References:

Funding Municipal Infrastructure: Integrating Project Finance and Crowdfunding

Crowdfunding Our Cities: A Dissertation Study

Will Crowdfunding Become a Big Deal in India? Wharton School report

Ioby.org website
Cross-Subsidization Model

Core innovation: revenue stream

How it works:
A sanitation enterprise makes a commitment to subsidize projects for highly price-sensitive customers with the profits from less price-sensitive customers.

Less price-sensitive customers finance the scaling of RT technologies, enabling a quicker access to economies of scale for RT providers.

How and why it might apply to the RT:
Imagine a world where one exported RT unit to a high or middle income economy generates enough profit to cross-subsidize the installation of five RT units in an emerging market such as India at sustainable profitable margins for the RT provider.

The product sold to both groups of customers could be identical, or the higher-priced product could include luxury, high-end features and materials unrelated to the core RT treatment technology.

Although the profitable sale and maintenance of domestic RTs may be achievable in low-income communities without cross-subsidy, thin profit margins could cause cashflow problems for RT providers. These cashflow problems could slow their journey to scaling RT technologies and benefiting from economies of scale in production.

Cross-subsidization could allow less price-sensitive customers to mitigate cashflow problems faced by RT providers and effectively finance the scaling of RT technologies.

A formal commitment by the RT provider—potentially monitored by a third-party—can ensure highly price-sensitive customers at the Base of the Pyramid are not forgotten in the model.
Example:

Aravind Eye Hospitals in South India may be the most widely recognized implementer of this model in the emerging market context. They offer the same product—eye surgery and eye health services—to all customers, with payment based on income levels.

The model allows Avarind to serve 50% of their patients free of cost or at steeply subsidized rates, with cross-subsidization provided by clients with higher incomes.

Scale is a critical feature of the Avarind model. Their hospitals provide over 450,000 eye surgeries and procedures a year, allowing them to benefit from economies of scale.

Since the model’s inception, it has been adopted by 200 similar organizations across the world. It also played a key role in the creation of Deutsche Bank’s Eye Fund I, which is dedicated to lending to those organizations that adopt the Avarind cross-subsidy model and includes explicit Base of the Pyramid impact targets in their financing documents.

Key Features:

Revenue Stream: Net profit margins are made sustainable through differential pricing by customer type, as higher margins generated from less price-sensitive customer revenues cross-subsidize the lower (but still net positive) margins generated from highly price-sensitive customers.

Cost Structure: The RT provider can more rapidly access economies of scale in production without grant financing, offering an avenue to drive down materials costs, for example.

Value Proposition: Less price-sensitive customers may see added value in being a part of the cross-subsidization model as a social benefit.

Key Partners: Existing monitoring organizations measuring organizational fidelity to impact commitments, like B Lab or sophisticated impact investors, could help reduce the cost of implementing a credible cross-subsidy model.

Issues to be Addressed:

Linear scale-up: Until economies of scale enable RT providers to achieve a sustainable margin sans cross-subsidization, scaling in price-sensitive markets likely will be linear in nature and potentially slower in price-sensitive markets.

High transaction cost to address OPEX in cross-subsidization model: Operations and maintenance are critical aspects of sanitation installations, but including OPEX in the model may add complexity and increase implementing costs.

Validation of product-market fit: Clarity about achievable price points in different markets is required to define this model.

Additional Resources:

Investing in Cross-Subsidy for Greater Impact
Avarind Eye Hospital’s Story
Cross-subsidization in the electricity sector (starting from page 28)
B Lab, a nonprofit offering B Corp Certification
How it works:
A company opens a Customer Experience Center to build awareness of product and/or industry advances and strengthen customer relationships. These centers emphasize intimate customer relationships and “show not tell” marketing approaches, a method gaining traction among high-tech companies as a way to boost business-to-business (B2B) and business-to-government (B2G) sales.

How and why it might apply to the RT:
Imagine a dedicated RT Experience Center where top customer prospects from business and government see first-hand how the RT works and the transformative potential it holds. For novel, high-tech products like the RT, the demonstration effect proves especially important in building buzz and quelling doubt.

RT providers should expect a sizable amount of customer education as the product gains market traction. The RT Experience Center would provide a dedicated space to educate customers, build demand, and generate sales via one-on-one interaction between the RT provider and customers.

Everything from the layout to the décor to the audio-visual technology used will reinforce core messages of innovation. In this way, an RT Experience Center also will provide a key asset for expanding brand recognition, hosting media and events, and driving new product development by hearing directly from customers about their needs.

The Experience Center need not be focused singularly on the RT. Such a center could be used to demonstrate other complementary products and services offered by the RT provider or other relevant companies featured within the center.
In 2017, Kohler—a global leader in the design and manufacturing of kitchen and bath products—opened the Kohler Experience Center in downtown Manhattan, New York. The Center houses fully-functioning displays of Kohler’s entire product line, with the aim of providing deep immersion for individual users and trade professionals in Kohler’s multiple product lines. Additional Kohler Experience Centers can be found in San Paolo, Shanghai, Singapore, and other global locations.

Designed to “connect and inspire” the Kohler Experience Center also offers a new global specification service. Architects and designers working on international projects are able to source products and resolve complex project needs, facilitated by on-site Kohler experts. This service also is available virtually to global customers.

Building customer awareness and brand loyalty serves as a key motivator behind the Kohler Experience Centers. As Larry Yuen, Kohler Company President said: “We recognized a tremendous need across the industry for a deeper knowledge and insight into how our products work...[Our goal] is to provide design professionals with both the ability to source and resolve all plumbing needs on a global scale” (Kohler, 2017).

Examples:

Value Proposition: Customer Experience Centers are well-aligned with companies offering novel, high-technology products that benefit from a demonstration effect and may require sizable customer education and demand creation investments, such as the RT.

Revenue Streams: By focusing on top customer prospects and high-quality customer experiences, Customer Experience Centers aim to help companies close the deal faster and drive repeat sales. They do not necessarily generate standalone revenue outside of formal B2B or B2G sales channels, although on-site merchandise sales and/or add-on experience charges could be explored.

Key Resources: To amplify the wow factor, Customer Experience Centers often incorporate open spaces, modern furnishings, and cutting-edge audio-visual technologies. Additionally, expanding the products and services showcased beyond the RT might expand customer appeal and offer other sales opportunities.

Issues to be Addressed:

Upfront capital investment: Sizable outlays for space, technology, etc., to outfit an Experience Center will be required, especially since such centers often rely on achieving very positive first impressions.

Highly skilled salesforce: Engaging high-potential B2B and B2G customers face-to-face in a very personal way requires a sophisticated set of marketing and sales skills that extend beyond typical sales calls.

References:

Introduction to Customer Experience Centers by Holt Environments

Press release announcing the initial Kohler Experience Center in New York, NY

Overview of General Electric’s Customer Experience Centers, focused on showcasing the potential of additive manufacturing
Toilet Engine Model

Core innovation: value proposition

How it works:
A company retrofits existing public/commercial infrastructure with new back-end waste-to-resource technology, thus lowering the burden of cost and construction to replace the existing infrastructure. The same back-end waste-to-resource technology can be installed in new builds to optimize resource use and enable on-site treatment, collapsing the waste-to-resource value chain.

How and why it might apply to the RT:
Consider an example in India. The Swachh Bharat Mission funded the construction of over 450,000 shared public and community toilets between 2014 and 2018 (Hindustan Times, 2018). However, severe water crises across the country have called the sustainability of shared toilet infrastructure into question (The Times of India, 2019).

A plug-and-play Reinvented Toilet Engine offers a potential solution. The toilet engine product would be modular, allowing you to deploy one or multiple units to serve the water recycling and waste processing demands of a variety of existing facilities and buildings, as well as new builds. The compact, modular nature of the Reinvented Toilet Engine would allow different configurations accounting for spatial constraints, expected footfall, fecal sludge production rates, etc.

Potential benefits abound. Users would benefit from uninterrupted service; shared toilet operators would benefit from consistent footfall and happy users; municipalities would benefit from improved water management and fecal waste treatment.
Example:

Biopolus—a multi-disciplinary technology development and urban planning firm—created a modular, expandable water treatment and management system for complex urban environments. The design could be considered a water treatment engine for existing urban infrastructure.

Utilizing patented Metabolic Network Reactor (MNR) technology, these urban metabolic hubs called BioMakeries also recover value resources—energy, nutrients, minerals—from wastewater and organic waste. BioMakeries can be scaled and configured to fit the desired size and architectural requirements of a space, ensuring that these platforms integrate fully into the urban environment.

The first European BioMakery opened in 2018 at Koningshoeven Trappist Abbey and Brewery. According to the Ellen MacArthur Foundation, “the plant treats industrial wastewater from the brewery and municipal wastewater from the Abbey. The water is reused on-site for irrigation and local aquifer recharge” (2019).

BioMakeries can be supplemented with urban farming and community engagement modules, thus creating “open and integrated spaces for sustainable urban living” (Biopolus, 2018).

Key Features:

Value Proposition: A modular, plug-and-play Reinvented Toilet Engine model would offer a unique, new-to-the-world value proposition poised to address the water recycling and waste processing needs of both incumbent toilet facilities/large buildings and new construction.

Revenue Streams: This model could be amenable to different types of revenue streams, such as direct purchase, lease-to-own, or rental schemes. Varying price sensitivities of potential customer segments likely will dictate which revenue stream(s) make the most sense. Additionally, pay-for-performance schemes (whereby customers would pay based on how much water is recycled or how much waste is processed) represent a potential option, although monitoring use will be a primary requirement.

Key Activities: A robust installation, quality control, and maintenance operations will be needed to manage a sizable network of Toilet Engines. Training sanitation workers (e.g., pit emptiers) potentially displaced by the RT could offer a win-win scenario.

Issues to be Addressed:

Multiple, diverse payers: This model relies on many smaller transactions among many payers (all with diverse needs and price sensitivities) that may prove difficult to manage.

Minimizing spoilers: By nature, innovation disrupts the status quo. Thoughtful engagement of actors that may be disrupted by the Reinvented Toilet Engine—water haulers, pit emptiers, fecal sludge treatment plant operators, etc.—will need to begin well before the product goes to market.

Additional Resources:

“We Can’t Waste a Drop.” India is Running Out of Water.

Overview of Decentralized BioMakeries (urban metabolic hubs)

Biopolus website
How it works:
First applied in the US energy sector, this model was designed to enable customers to access energy efficient and distributed solar technologies as default options offered by utilities. When well-executed, customers benefit from expanded options with no change to their monthly bill; communities make progress toward energy savings goals; technology providers gain market access; and utility companies preserve revenues they might have lost to customers going off grid.

How and why it might apply to the RT:
In this model, a utility company would offer basic and premium RT packages for new construction residential and commercial facilities, such as large-scale real estate developments, universities, and technology parks. Real estate developers, for example, could “design in” RT systems as an alternative to sewerage pipes and/or on-site sewage treatment plants.

Ideally, bill neutral financing would be designed to meet the RT revenue and cost realities. For example, customers (e.g., real estate companies, homeowners associations) would pay a monthly fee for the basic RT package that would sum over time to equal or be less than what customers otherwise would pay for utility hookups and lifetime water/waste processing costs. In this way, customers avoid expensive upfront installation costs, but the utility has a path to cost-recovery over time.

RT providers would offer full-service customer education and RT installation services, explaining all options to customers. Utility companies would manage billing, quality control, usage monitoring, etc. Depending on the RT provider’s capabilities, such companies may also provide ongoing maintenance of the RT or subcontract day-to-day servicing to another provider.

This model also could be applied to household-level RTs in which individual households would be the primary customer.
Example:
In 2014, the City of Fort Collins, Colorado (US), faced a challenging predicament. The city council had just voted to reduce greenhouse gas (GHG) emissions by 80% by 2030. Enabling residents to adopt distributed solar and energy efficiency products and services was critical to achieving this ambitious target. Without thoughtful engagement of the utility and new business model design, this move might trigger a “utility death spiral,” whereby the utility loses customers and revenue in the transition to off grid and more efficient offerings (Ellsmoor, 2019).

Wrestling with these tensions, the city partnered with The Rocky Mountain Institute (RMI) to design a new business model. They started by asking two questions: How can we help customers participate in distributed solar/energy efficiency efforts? How can we roll out these options without disrupting/destroying revenue? In their design efforts, they realized they needed to “seamlessly weave together various products, services, financing tools that had never been integrated” (Mandell and Campbell, 2015). The Integrated Utility Services Model was born.

Initial economic analysis of the model conducted by RMI found that with 60% adoption among residences and small businesses, the model would achieve net savings for customers, new revenue for the utility, and accelerated reduction of GHG emissions for the community, all while creating jobs and building a path to sustainability for all those involved (RMI, 2014).

Key Features:

Value Proposition: This model would necessitate the creative bundling of various offerings, including a package of basic and premium RT products and services; a high-quality intake, customer education, and installation process led by the RT provider; a platform for organizing interactions between the utility, RT providers, subcontractors, customers, financial institutions, etc.; and on-bill financing that balance new costs with water savings/waste processing credits.

Key Partners: This model puts the municipally-owned utility front and center to achieve economies of scale and drive high customer adoption. Identifying emerging market utilities with the foresight to anticipate the potential “utility death spiral” and the appetite to engage on a new technology will be key. Additionally, partners associated with early adopters such as green real estate developers and Smart Cities in India could serve as emerging market analogues to Ft. Collins in the example provided.

Key Resources: Field and pilot-tested RTs that prove resilient amidst a host of operating environments will be required. Utilities require technologies they can trust, if they are expected to promote them to their entire customer base.

Issues to be Addressed:

Market mechanisms for valuing water savings and waste processing: Ensuring the financial viability of this model in the context of the RT stands as a critical need. In the United States, a mature electricity market with mechanisms for selling electricity back to the grid exists. In emerging markets such as India, water and sanitation markets are not as mature. Pricing water and downstream waste processing savings in the face of insufficient or nonexistent data likely will prove challenging.

Additional Resources:
- Integrated Utility Services: A New Business Model for Fort Collins Utilities
- A new utility business model profitably embraces efficiency and solar
- The New Age of Electricity
A particular RT provider’s needs, context, and status of operations will impact suitability of RT business model options

RT Provider 1
Our company has sufficient resources to make initial CAPEX investments but we want CAPEX plus OPEX to be paid by the customer over time.

Attractive options might include:
- **Advertising model** with ad revenues covering CAPEX and OPEX over time
- **Product-as-a-service model** with customers paying a regular fee for performance

RT Provider 2
Our company has strong relationships with the local municipality and utility that we want to continue leveraging in our business.

Attractive options might include:
- **Civic crowdfunding** with a government match
- **Toilet Engine Model** building off of existing shared toilet operations
- **Integrated utility services model** leveraging existing relationships to create a new platform for RT commercialization

RT Provider 3
Our company has a strong global presence, but this is our first time entering an emerging market with a new product.

Attractive options might include:
- **Cross-subsidization model** leveraging ongoing operations in less price-sensitive markets
- **Customer Experience Center** enabling focused brand building and customer engagement in a new geography
Looking Beyond Business:
Critical Partnerships to Enable RT Market Success
Reaching meaningful scale with the RT requires a systems-based approach and a shared vision for change

“Business and human endeavors are systems...we tend to focus on snapshots of isolated parts of the system. And wonder why our deepest problems never get solved.”

Peter Senge in The Fifth Discipline: The Art and Practice of the Learning Organization
Individual companies’ efforts are necessary but not sufficient to achieve RT market creation on their own

**RT Developers/Providers** are well-positioned to:

- Set a vision for achieving desired business outcomes at scale
- Drive technological and business model innovation
- Generate evidence of market and community demand
- Set a scaling timeframe
- Ensure effective financial management and accountability practices
- Build team capacity to deliver results
- Exert market leadership and influence
- Monitor and evaluate organizational progress

**Philanthropic donors and other funders** are well-positioned to:

- Set a vision for achieving desired development impact
- Understand and share explanation of the development problem to be addressed
- Exhibit risk appetite and tolerance
- Set an investment timeframe
- Provide financial and non-financial support to market actors
- Exert market leadership and influence
- Establish feedback loops and institutional learning mechanisms

**Governing bodies and institutions** are well-positioned to:

- Set national and global development goals
- Stimulate market and community demand (e.g., via awareness campaigns, procurement processes)
- Introduce external incentives (e.g., subsidies/taxes, competitions)
- Provide supporting resources (e.g., financial, infrastructure, resources such as land) to market actors
- Raise the profile of supporting champions
- Establish conducive policy and regulatory frameworks
- Enable a stable, secure environment in which to conduct business

*Source: International Development Innovation Alliance, 2017*
Creating a robust market for the RT means moving on many, reinforcing fronts in a strategic, coordinated way

New markets are not born overnight.

Achieving meaningful scale via new market creation requires the long-term, collective efforts of government, donors, and private sector actors alike. It also requires strategic and coordinated scaling strategies that grow both up (vertically) and out (horizontally).

Horizontal Scale Strategies focus on expanding and replicating access to a new product and/or service in different locations or by different groups. Examples include:
- Using local testing and demonstrations to showcase potential
- Ensuring local opinion leaders are well informed
- Facilitating business model adaptation and technology localization
- Targeting underlying behaviors and norms that underpin adoption

Vertical Scale Strategies focus on making market systems and enabling environments more conducive to integrating new technologies. Examples include:
- Strengthening the business enabling environment
- Supporting supply and demand-side investments
- Aligning market actors to support sector-wide scaling
- Facilitating financial service provision for market actors

Source: Brand et al., 2015
How might businesses navigate this terrain? STeP is here to help!

**Featured Resource:**
In early 2019, STeP published a report entitled “Business Model Insights for Community and Public Toilets in India” featuring case studies from shared sanitation and adjacent sectors like health and agriculture.

**Support Offered:**

- STeP’s online Resource Center represents a living library of RT market resources, such as country-specific market intelligence reports and incumbent technology landscapes.

- Not sure where to start? STeP welcomes the chance to have a conversation with you and your team so that we might highlight the resources most relevant to your needs.

- On a fee-for-service basis, STeP experts in technology commercialization and market systems development can work with your team to size potential markets, analyze the competitive landscape, facilitate business model design, conduct customer discovery interviews, and advise on go-to-market strategy.

**Example: Business Model Design with Eram Scientific**

In 2019, STeP partnered with Eram Scientific, a leading sanitation technology enterprise in India, to identify and test potential business model ideas for the RT. During a two-day design workshop, STeP facilitated Eram’s senior leadership team as they brainstormed and prioritized specific RT business model hypotheses.

A follow-on customer discovery process, led by Eram with support from STeP, aimed to validate and strengthen the business model ideas surfaced in the workshop. Final outputs of this work will inform both Eram’s RT commercialization strategy and broader RT market development efforts.
To learn more:

STeP accelerates innovations in sanitation by connecting partners, facilitating field testing, and supporting commercialization.
Please visit us at: stepsforsanitation.org.

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RTI International is an independent, nonprofit research institute dedicated to improving the human condition. We combine scientific rigor and technical expertise to deliver solutions to the critical needs of clients worldwide. RTI Innovation Advisors serves as the implementing partner of STeP.
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Section II: Designing the Future: RT Business Model Options to Consider

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**Toilet Engine Model:**


**Integrated Utility Services Model:**


**Section III: Looking Beyond Business: Critical Partnerships to Enable RT Market Success**

