Watermaker to SDG 2.1

Watermaker – SDGC toward SDGs/UN 2.1

(Target 2.1: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round).

Summary

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Nexus of Water Scarcity and Hunger:

In the complex tapestry of global challenges, few issues are as intimately intertwined as water scarcity and hunger. The relentless march of climate change, burgeoning populations, and unsustainable water management practices have cast a shadow over communities worldwide, leaving them entangled in a vicious cycle of deprivation and need. At the heart of this intricate web lies the foundational problem: the scarcity of water, an essential resource that sustains life and nourishes the crops that feed nations.

Water, often referred to as the elixir of life, is a finite resource. Its uneven distribution across the globe and the exacerbation of scarcity due to climate-induced shifts have profound implications for food security. Agriculture, the backbone of many economies, is heavily reliant on water for irrigation, and the availability of this precious resource dictates the prosperity or peril of communities. In regions where water scarcity tightens its grip, the first casualty is often the ability to grow enough food to sustain the local population, triggering a perilous journey into hunger, malnutrition, and entrenched poverty.

The Global Water Scarcity Paradox: Abundance and Deprivation

As paradoxical as it may seem, our planet is predominantly covered by water, with vast oceans stretching across the horizon. Yet, this seeming abundance masks a stark reality: less than 1% of Earth's water is readily accessible for human consumption. The challenge intensifies as climate change disrupts traditional weather patterns, leading to more frequent and severe droughts in some regions and devastating floods in others. These climatic extremities further jeopardize water availability for agriculture, setting the stage for a crisis that reverberates across communities.

The impacts of water scarcity are not uniform. Vulnerable regions, often situated in arid and semi-arid zones, bear the brunt of this crisis. Sub-Saharan Africa, parts of Asia, and pockets within the Americas find themselves caught in a relentless struggle for water. The consequences ripple through every aspect of life, but none more acutely than in the realm of agriculture, where the ability to irrigate fields and cultivate crops hinges on the delicate balance of water supply.

Agriculture in the Throes of Water Scarcity: The Catalyst for Hunger

Agriculture is both a victim and a perpetrator in the intricate dance with water scarcity. Traditional farming practices, coupled with expanding populations, have often led to over-extraction of groundwater and inefficient water use. The result is a perilous dance on the edge of water insufficiency. When droughts strike or water sources dwindle, crops wither, and yields plummet. It is in this crucible that the nexus between water scarcity and hunger becomes most apparent.

Smallholder farmers, who constitute a significant portion of the global agricultural landscape, find themselves ensnared in this perilous dance. Their livelihoods hinge on the whims of precipitation and the availability of water for irrigation. In many cases, lack of access to modern irrigation technologies and sustainable water management practices exacerbates the vulnerability of these farmers. The consequence is a yield gap that undermines food production, leading to insufficient harvests and, ultimately, hunger.

As the cycle repeats itself, the economic hardships induced by agricultural losses reverberate through communities. Families dependent on farming for sustenance and income face the harsh reality of food shortages, malnutrition, and a perpetual struggle against poverty. The intricate linkages between water scarcity and hunger become a self-perpetuating cycle, each exacerbating the other in a relentless spiral.

The Poverty Trap: Water Scarcity's Enduring Legacy

Poverty and water scarcity form a symbiotic relationship, each reinforcing the other in a cycle that is challenging to break. Impoverished communities, often lacking the means to invest in resilient water infrastructure or alternative livelihoods, remain trapped in this cycle of deprivation. When agriculture falters due to water shortages, incomes dwindle, and the ability to purchase food diminishes. This, in turn, deepens malnutrition and perpetuates a cycle of ill health and diminished productivity.

Children in these communities bear a disproportionate burden. Malnutrition stunts their physical and cognitive development, perpetuating a cycle of poverty into the next generation. The scarcity of water, the lifeblood of communities, becomes a shackle that limits progress, stifles economic opportunities, and consigns communities to a protracted struggle for survival.

Climate Change: The Aggravating Factor

In this intricate dance between water scarcity and hunger, climate change emerges as a formidable aggravating factor. The warming of the planet disrupts traditional weather patterns, leading to more erratic rainfall, prolonged droughts, and extreme weather events. These climatic shifts amplify the challenges faced by communities already grappling with water scarcity.

Changing precipitation patterns directly impact agriculture, making it difficult for farmers to predict when to plant and harvest. The increased frequency and intensity of extreme weather events, such as hurricanes, floods, and cyclones, pose immediate threats to crops and livestock. The compounding effect of these climate-induced challenges further tightens the grip of hunger in vulnerable regions.

Breaking the Chains:

Addressing the nexus of water scarcity and hunger requires a holistic and multifaceted approach. It involves not only enhancing water availability for agriculture but also promoting sustainable farming practices, improving water use efficiency, and building resilience to climate change. Smallholder farmers, often at the frontline of this struggle, need support in adopting modern irrigation technologies, implementing water-conserving practices, and diversifying their livelihoods.

Moreover, investment in water infrastructure, both for agricultural and domestic use, is paramount. Efficient water management, including the recycling and reusing of water resources, can play a pivotal role in mitigating the impacts of scarcity. Community-driven initiatives that empower locals to manage their water resources responsibly contribute to breaking the cycle of deprivation.

International cooperation and collaboration are equally critical. As climate change is a global challenge, solutions must transcend borders. Knowledge sharing, technology transfer, and financial assistance to vulnerable regions can foster a collective response to the intertwined challenges of water scarcity and hunger.

In the labyrinth of interconnected global challenges, water scarcity and hunger stand as formidable adversaries. The intricate dance between the two creates a nexus that perpetuates poverty, stifles development, and threatens the well-being of communities worldwide. Breaking this cycle requires a concerted effort—a recognition that water is not merely a resource but a lifeline that sustains both agriculture and the communities it serves.

As the world grapples with the consequences of climate change and the pressing need to achieve sustainable development goals, addressing the fundamental challenges of water scarcity and hunger becomes imperative. It is a call to action that demands innovative solutions, collective efforts, and a commitment to a future where no community is ensnared in the vicious cycle of water hunger and poverty. The journey toward a hunger-free world begins with recognizing the profound implications of water scarcity and taking decisive steps to ensure that water, the elixir of life, becomes a source of sustenance rather than a harbinger of deprivation.

Sustainable Developmental Goal 2.1 (SDG 2.1)

Sustainable Development Goal 2.1 (SDG 2.1) stands as a beacon of hope and a moral imperative in the global pursuit of a more equitable and sustainable world. This goal, intricately woven into the fabric of the 2030 Agenda for Sustainable Development, articulates a profound commitment: to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture. While the aspiration is noble, the journey toward realizing SDG 2.1 is fraught with multifaceted challenges, chief among them being the scarcity of water.

Water, the essence of life, is a linchpin for the achievement of numerous Sustainable Development Goals (SDGs). However, its scarcity poses a formidable obstacle, especially concerning SDG 2.1. The goal is not merely about putting an end to hunger but ensuring sustainable practices that foster food security and nourish communities over the long term.

The scarcity of water emerges as a pivotal hindrance in this quest. Access to an adequate and reliable water supply is fundamental for agricultural activities, as crops require substantial amounts of water for growth and development. Insufficient water availability, exacerbated by factors such as climate change, population growth, and inefficient water management, directly undermines efforts to enhance food security.

In essence, SDG 2.1 becomes intricately entwined with SDG 6 (Clean Water and Sanitation) due to the inextricable link between water availability and food production. The agriculture sector is both a consumer and a custodian of water resources. While it utilizes water for irrigation, livestock, and crop cultivation, it also plays a pivotal role in watershed management and water conservation. This duality underscores the complex interplay between water and hunger, creating a nexus that demands nuanced solutions.

The challenge of water scarcity is not confined to isolated pockets; it reverberates globally, affecting regions with diverse climates, landscapes, and socio-economic conditions. The increasing frequency and intensity of droughts, coupled with erratic rainfall patterns, present formidable challenges to agricultural productivity. In regions already grappling with poverty and food insecurity, water scarcity becomes a compounding factor, perpetuating a cycle of deprivation that is challenging to break.

In addition to water scarcity, several other hindrances hinder the realization of SDG 2.1:

1. Climate Change Impacts: Climate change exacerbates existing challenges, altering traditional weather patterns and increasing the frequency of extreme weather events. Unpredictable rainfall, prolonged droughts, and heatwaves directly impact crop yields, making it difficult for communities to achieve food security.

2. Population Growth: The relentless growth of the global population places additional stress on food production systems. With more mouths to feed, the demand for food escalates, intensifying the pressure on already strained agricultural practices.

3. Inefficient Agricultural Practices: Conventional agricultural practices, characterized by excessive use of water, chemical inputs, and monoculture, contribute to soil degradation and water depletion. Shifting toward sustainable and water-efficient farming methods is essential for achieving SDG 2.1.

4. Lack of Access to Technology and Resources: Smallholder farmers, who form the backbone of agriculture in many developing regions, often lack access to modern technologies, seeds, and efficient irrigation systems. Bridging this technological divide is crucial for enhancing agricultural productivity.

5. Global Economic Disparities: Economic disparities on a global scale contribute to unequal access to resources, including water. Impoverished communities face heightened vulnerabilities, and breaking the cycle of hunger requires addressing systemic inequities.

Addressing the challenges associated with SDG 2.1 necessitates a holistic and integrative approach. Water scarcity, being a linchpin challenge, requires targeted strategies to ensure sustainable water management and efficient agricultural practices. The following key strategies can pave the way forward:

1. Sustainable Water Management: Implementing robust water management practices involves optimizing water use efficiency, preventing wastage, and promoting responsible irrigation methods. Investing in water infrastructure, such as reservoirs and rainwater harvesting systems, enhances water availability for agriculture.

2. Climate-Resilient Agriculture: Promoting climate-resilient agricultural practices involves developing crop varieties that withstand environmental stresses, implementing agroforestry, and adopting precision farming techniques. These strategies enhance the resilience of agriculture to climate change impacts.

3. Technological Innovation: Harnessing technological innovations, such as precision agriculture, drip irrigation, and climate-smart farming techniques, empowers farmers to maximize yields while minimizing resource use. Providing access to these technologies is essential, especially for smallholder farmers.

4. Empowering Smallholder Farmers: Focusing on the needs of smallholder farmers, who constitute a significant portion of the global agricultural workforce, is paramount. This involves providing access to credit, training in sustainable farming practices, and facilitating market access for their produce.

5. International Cooperation: Recognizing the global nature of the challenges associated with SDG 2.1, fostering international cooperation is imperative. This includes knowledge sharing, technology transfer, and financial support to vulnerable regions facing water scarcity and food insecurity.

In the labyrinth of challenges associated with SDG 2.1, water scarcity emerges as a formidable adversary. However, it is essential to view this challenge not in isolation but as part of a complex web of interconnected issues. As the world collectively strives to end hunger and achieve food security, addressing water scarcity becomes pivotal.

The imperatives of sustainable water management, climate-resilient agriculture, technological innovation, and empowering vulnerable communities underscore the multifaceted nature of the solutions needed. The journey toward SDG 2.1 demands a recalibration of our relationship with water, recognizing it not just as a resource but as a critical determinant of the well-being of communities and the health of our planet.

In navigating the path forward, a collective and unwavering commitment to sustainability, equity, and resilience is paramount. As we grapple with the challenges of water scarcity, let us forge a path that ensures no one is left behind in the quest for a hunger-free world. The realization of SDG 2.1 is not merely an aspiration; it is a moral imperative that beckons us to cultivate a future where every individual has access to nutritious food, and no community is ensnared in the vicious cycle of hunger and deprivation.

Solar Desalination Geoassisted Continuous (SDGC):

In the tapestry of global goals for sustainable development, perhaps none is as fundamental and far-reaching as Sustainable Development Goal 2.1 (SDG 2.1): ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. At the heart of this monumental task lies a crucial resource — water. As water scarcity continues to pose a formidable challenge to agricultural productivity, a beacon of innovation emerges in the form of the Solar Desalination Geoassisted Continuous (SDGC) device also known as the Watermaker.

Water scarcity stands as a pervasive impediment to the realization of SDG 2.1. In numerous regions across the globe, communities grapple with insufficient water resources for agriculture, leading to reduced crop yields and food insecurity. The intricate connection between water availability and food production forms the crux of the challenge, necessitating innovative solutions that go beyond conventional methods.

The SDGC is not merely a device; it is a transformative force designed to address the complex interplay between water scarcity and hunger. At its core, the SDGC is a sophisticated desalination technology, meticulously crafted to desalinate seawater, brackish water, and industrial process water. What sets it apart is not just its capacity to produce freshwater but its commitment to sustainability, harnessing renewable energy sources in a continuous and efficient manner.

At the heart of the SDGC is a large, thermally insulated tank, meticulously designed to efficiently desalinate seawater, brackish water, and industrial process water. This tank, available in various shapes such as a parallelepiped, cylindrical, or elliptical form, serves as the epicenter of the device. Its substantial volume allows for significant water storage, a critical aspect for ensuring continuous freshwater production.

The tank's design isn't arbitrary; it considers the environmental conditions and operational efficiency. Whether in a parallelepiped form for simplicity or a cylindrical shape for enhanced thermal dynamics, the tank is a testament to the adaptability of the SDGC across diverse settings. Generators, arranged in horizontal or inclined slopes, further contribute to the tank's effectiveness, ensuring optimal performance in various environments.

Heating Means - First Heat Exchanger: Initiating the Evaporation Symphony

A critical element of the SDGC is the first heat exchanger, strategically positioned near the free surface of the water within the tank. This heat exchanger is not a mere conduit for warming the water; it's a linchpin in a larger system connected to a heat transfer fluid. This fluid is powered by renewable energy sources, including solar, geothermal, photovoltaic, or wind energy.

The first heat exchanger's role is to initiate the evaporation process. As renewable energy powers the heat transfer fluid, heat is transferred to the water near the surface, kickstarting the transformation of liquid water into vapor. This orchestrated dance of renewable energy and evaporation marks the beginning of the freshwater production process.

Cooling Means - Stretched Metal Sheets: A Dual Role in Temperature Symphony

Above the free water surface, stretched metal sheets serve as the cooling means in the SDGC. These sheets play a dual role in the temperature symphony within the device. Firstly, they facilitate the condensation of steam generated during the evaporation process. Secondly, they engage in continuous heat exchange, releasing latent heat as steam condenses.

This dual role is pivotal. As steam condenses, it releases latent heat, influencing the reduction in temperature of the cooling means. Simultaneously, this latent heat elevates the temperature of the water in the tank's depth. It's a delicate interplay of temperature dynamics orchestrated to optimize the desalination process.

Additional Heat Exchangers: Enhancing Efficiency in Heat Transfer

To augment the efficiency of heat transfer, the SDGC incorporates additional heat exchangers. A second heat exchanger is positioned above the free surface, and a third heat exchanger is positioned below it. These components play a pivotal role in efficiently transferring heat from the condensed water to the tank's water, contributing to the overall effectiveness of the desalination process.

The second and third heat exchangers act as intermediaries, ensuring that the heat extracted during condensation is effectively utilized in the continuous cycle of evaporation and condensation. Their strategic placement optimizes the heat exchange process, maximizing the device's freshwater production efficiency.

Conveying System: Streamlining Condensed Water Extraction

Efficiency isn't confined to heat exchange; the SDGC features a conveying system designed to streamline the extraction process of condensed water from the cooling means. This system diligently collects the condensed water, ensuring a seamless and efficient extraction process for further use.

The conveying system is a testament to the holistic approach of the SDGC. It not only focuses on the evaporation process but ensures that the condensed water, laden with the promise of freshwater, is efficiently collected and directed for further utilization. This comprehensive system contributes to the overall effectiveness of the device.

Level Control Mechanism: Ensuring Continuous Operation

To maintain a consistent water level within the tank, a level control mechanism is incorporated into the SDGC. This mechanism includes a level relief device and a valve under its control. This isn't a mere feature for convenience; it's a vital component that plays a crucial role in ensuring the device's continuous operation while optimizing its efficiency.

The level control mechanism prevents fluctuations in water levels, guaranteeing a steady operation of the SDGC. It contributes to the reliability of the device, a crucial factor in regions facing persistent water scarcity issues. The continuous operation ensures a steady production of freshwater, aligning with the goals of SDG 2.1.

The Symphony in Action: SDGC Operation Sequence

Understanding the structure and components of the SDGC is incomplete without exploring its operational sequence. The device follows a meticulous sequence to transform seawater, brackish water, or industrial process water into freshwater. Let's step into the operational symphony of the SDGC:

1. **Heating Initiation:** The operation begins with the initiation of heating near the water surface. The first heat exchanger, powered by renewable energy, transfers heat to the water, initiating the evaporation process.
2. **Evaporation Process:** As the water near the surface absorbs heat, it transforms into steam, laden with the promise of freshwater. Convective motions in both the water and steam optimize heat exchange, contributing to increased evaporation rates.

3. **Condensation and Heat Exchange:** The steam encounters the cooling means, represented by stretched metal sheets. These sheets facilitate the condensation of steam, releasing latent heat. This process not only condenses the steam back into liquid form but also influences the cooling means' temperature reduction and elevates the temperature of the water in the tank's depth.

4. **Efficient Heat Transfer:** Additional heat exchangers, strategically positioned above and below the free surface, contribute to the efficient transfer of heat from the condensed water to the tank's water. This enhances the overall effectiveness of the desalination process.

5. **Condensed Water Collection:** The conveying system comes into play, diligently collecting the condensed water from the cooling means. This streamlined extraction process ensures the efficient collection of freshwater for further use.

6. **Continuous Operation:** The level control mechanism, featuring a level relief device and a valve, plays a vital role in maintaining a consistent water level within the tank. This not only guarantees a continuous operation but also optimizes the device's efficiency.

   In essence, the SDGC operates as a synchronized symphony, where each component plays a vital role in the efficient and continuous production of freshwater. Its innovative design, incorporating renewable energy sources, efficient heat exchange processes, and a comprehensive conveying system, positions the SDGC as a transformative solution to address water scarcity.

Advantages of the SDGC Structure and Mechanism: A Holistic Approach to SDG 2.1

The SDGC's structure and mechanism offer a myriad of advantages, aligning with the objectives of SDG 2.1. Let's explore how the innovative design and operational features contribute to its effectiveness and make it a promising technology for achieving global food security:

1. Sustainable and Renewable Energy Integration: The reliance on renewable energy sources, particularly solar and geothermal energy, aligns with global efforts to transition away from fossil fuels. This integration ensures a continuous and sustainable operation, reducing the environmental impact associated with traditional energy sources.

2. Continuous Operation and Reliability: Unlike conventional desalination methods that might be intermittent, the SDGC operates continuously. This reliability is essential, especially in regions facing persistent water scarcity issues. The continuous operation ensures a steady supply of freshwater for agricultural activities.

3. Closed-Loop System for Water Conservation: The closed-loop system minimizes water wastage, aligning with responsible water management practices emphasized in SDG 2.1. Water conservation is a crucial element in the SDGC's design, reflecting a commitment to sustainable and responsible freshwater production.

4. Climate-Resilient Technology: The SDGC's low-temperature regimes and reliance on renewable energy make it inherently climate-resilient. As climate change introduces uncertainties in global weather patterns, the SDGC's adaptability positions it as a resilient solution to ensure freshwater production even in changing environmental conditions.

5. Low Operating Costs: Economic viability is a critical factor for the widespread adoption of any technology. The SDGC's low operating costs, achieved through the efficient use of renewable energy and optimized heat exchange processes, make it an economically feasible solution for small communities.

6. Efficient Heat Exchange and Evaporation: The SDGC's mechanism optimizes heat exchange and evaporation processes, leading to higher efficiency in freshwater production. Accelerated evaporation rates ensure significant freshwater yields with minimal energy consumption, contributing to sustainable and resource-efficient agriculture.

7. Versatility in Water Sources: Designed to desalinate various water sources, from seawater to brackish water and industrial process water, the SDGC is a versatile solution applicable in diverse settings. This adaptability enhances its potential impact in addressing water scarcity on a global scale.

8. Minimal Environmental Impact: In comparison to traditional desalination methods that often involve fossil fuel combustion, the SDGC minimizes its environmental impact. The use of renewable energy and a closed-loop system reduces greenhouse gas emissions, aligning with SDG 15 (Life on Land).

9. Support for Local Water Independence: By relying on locally available and renewable energy sources, the SDGC empowers communities and regions to achieve water independence. This reduces dependence on centralized water infrastructure and distant water supplies, contributing to SDG 6.1 (Clean Water and Sanitation).

10. Technological Innovation and Global Relevance: The SDGC represents a significant innovation in desalination technology. Its global relevance is underscored by its potential to provide freshwater in regions where traditional methods may be impractical or environmentally unsustainable. As a forward-looking technology, the SDGC contributes to global efforts to achieve SDG 9 (Industry, Innovation, and Infrastructure).

In summary, the SDGC's structure and mechanism present a holistic and innovative approach to freshwater production, addressing the intricate challenges posed by water scarcity. By incorporating renewable energy, optimizing heat exchange, and ensuring a closed-loop system, the SDGC emerges as a transformative solution with the potential to revolutionize water access and contribute significantly to the achievement of SDG 2.1.

SDGC and SDG 2.1: Watermaker for Small Communities

Water scarcity, a critical global challenge, directly impacts food security and agricultural productivity, forming a vicious cycle with poverty. In pursuit of Sustainable Development Goal 2.1 (SDG 2.1), which aims to end hunger and ensure access to safe, nutritious food, innovative solutions like the WaterMaker play a pivotal role. This technology addresses water scarcity and empowers local communities, particularly in arid regions, to achieve sustainable agriculture and enhance food security.

WaterMaker Case Studies: Transforming Communities

1. Agricultural Transformation in a Semi-Arid Region: In a semi-arid region where irregular rainfall and limited freshwater hindered agricultural productivity, the WaterMaker became a beacon of hope. By harnessing the abundant moisture in the air, this innovative technology generated a consistent supply of freshwater for irrigation. This enabled increased agricultural productivity, diversified crops, and improved resilience to climate variations, directly contributing to SDG 2.1's goal of enhancing food security.

2. Urban Agriculture in Water-Stressed Cities: Water scarcity in urban areas, exacerbated by population growth and competing water demands, posed a significant threat to localized agriculture. Implementing WaterMaker solutions allowed communities to irrigate rooftop gardens and vertical farms with locally produced freshwater. This reduced dependence on external water sources, improved access to fresh produce, and increased community resilience to disruptions in the global food supply chain.

3. Post-Conflict Agricultural Rehabilitation: In regions emerging from conflict, where agricultural infrastructure is damaged, the WaterMaker played a vital role in post-conflict agricultural rehabilitation. Powered by renewable energy sources, it provided a decentralized and quickly deployable solution to supply freshwater for reclaiming arable land. This accelerated the recovery of local agriculture, increased food self-sufficiency, and contributed to SDG 2.1 by rebuilding food systems in post-conflict areas.

Affordability and Local Implementation: A Roadmap to Sustainability

1. Cost-Effective Design:

The WaterMaker's design prioritizes cost-effectiveness without compromising efficiency. Using simple materials and mechanisms, it ensures that the technology remains accessible to small communities with limited financial resources. The emphasis on affordability aligns with the goal of making sustainable solutions widely applicable, especially in regions where financial constraints may impede technological adoption.

2. Local Construction and Assembly:

Simplicity in design translates into ease of local construction and assembly. The WaterMaker's components are straightforward, enabling communities to leverage their skills and resources for building and maintaining the device. This reduces dependence on external expertise, fostering a sense of ownership and self-sufficiency within the community.

3. Community Engagement:

The involvement of community members is integral to the success of WaterMaker projects. Workshops and training programs can empower locals with the knowledge needed to construct, operate, and troubleshoot the device. This engagement not only enhances the sense of ownership but also ensures the sustainable operation of the WaterMaker, aligning with SDG 2.1's emphasis on community-driven solutions.

4. Microfinancing and Community Support:

To address the initial setup costs, microfinancing initiatives, supported by local governments or non-governmental organizations, can provide financial assistance. Additionally, community-driven support and collaboration play a crucial role in alleviating financial burdens. A collective effort can be fostered to combat hunger, with communities actively participating in the financing and support mechanisms for WaterMaker projects.

Overcoming Operational Challenges: A Blueprint for Long-Term Success

1. Capacity Building:

Training programs focused on technical skills and device operation are instrumental in overcoming operational challenges. Empowering community members with the knowledge required for efficient WaterMaker management ensures the sustainability of the project.

Knowledge transfer becomes a cornerstone for the long-term success of WaterMaker initiatives.

2. Maintenance Strategies:

Proactive maintenance strategies prevent potential issues and extend the lifespan of WaterMaker devices. Regular check-ups, coupled with community involvement in troubleshooting, contribute to the device's long-term functionality. Establishing routine maintenance practices ensures that the technology remains a reliable source of freshwater for communities over an extended period.

3. Community-Led Water Management:

Establishing community-led water management committees promotes responsible water usage and conservation. Community-driven initiatives enhance the sustainability of WaterMaker projects, aligning with SDG 2.1's emphasis on responsible resource management. By actively involving the community in water management, the technology becomes an integral part of local efforts to achieve food security.

In conclusion, the WaterMaker stands as a transformative technology in the journey towards achieving SDG 2.1. Through case studies illustrating its impact on agricultural transformation, urban agriculture, and post-conflict rehabilitation, it's evident that this innovative solution has the potential to break the cycle of water scarcity and hunger.

Moreover, the affordability and local implementation aspects of WaterMaker projects provide a roadmap to sustainability. By prioritizing cost-effectiveness, engaging local communities, and leveraging microfinancing initiatives, the technology becomes not just a solution but a community-driven endeavor. The emphasis on community engagement, capacity building, and maintenance strategies ensures the long-term success of WaterMaker initiatives.

As we navigate the complexities of achieving SDG 2.1, the WaterMaker emerges as a catalyst for change. Its ability to transform atmospheric moisture into freshwater, coupled with its accessible design and community-centric approach, positions it as a beacon of hope for communities grappling with hunger exacerbated by water scarcity. The WaterMaker, with its innovative solutions and commitment to sustainability, represents a key player in reshaping the future of global food security.

Conclusion:

In the pursuit of Sustainable Development Goal 2.1 (SDG 2.1), which aims to end hunger and ensure access to safe, nutritious food, the Solar Desalination Geoassisted Continuous (SDGC) device emerges as a transformative and hopeful solution. This conclusion delves into how the SDGC, through its affordability, manageability, and role in agricultural prosperity, becomes a source of hope for local small communities, marking a significant stride towards sustainable food security.

The SDGC represents a beacon of hope for small communities grappling with water scarcity and the challenges of achieving SDG 2.1. By harnessing renewable energy sources and employing an innovative desalination process, the device addresses the fundamental issue of freshwater scarcity. Its ability to adapt to various water sources, including seawater, brackish water, and industrial process water, makes it a versatile and reliable source of freshwater for communities worldwide.

One of the distinguishing features of the SDGC is its affordability, a critical aspect in making sustainable technologies accessible to communities with limited financial resources. The device's design prioritizes cost-effectiveness without compromising efficiency. By utilizing simple materials and mechanisms, the SDGC ensures that the economic barriers to adopting such technologies are minimized. This affordability factor aligns seamlessly with the broader agenda of sustainable development, ensuring that even communities with modest means can benefit from this transformative solution.

The SDGC's design not only focuses on affordability but also emphasizes ease of management. The simplicity of its structure allows for local construction and assembly, reducing dependence on external expertise. This aspect is crucial in ensuring that communities can take ownership of the SDGC, fostering a sense of self-sufficiency and empowerment. Workshops and training programs can further equip local residents with the knowledge needed to operate and maintain the device effectively, making it a community-driven solution.

Agricultural prosperity, facilitated by the continuous and reliable freshwater supply provided by the SDGC, has a profound impact on the economic stability of local communities. As the device enables the cultivation of crops in arid regions, it becomes a catalyst for economic growth. Increased crop yields and diversified agricultural practices contribute not only to food security but also to the generation of income for communities. The economic stability resulting from agricultural prosperity has a ripple effect on the overall well-being of the community, aligning with the broader objectives of sustainable development.

The primary goal of SDG 2.1 is to ensure food security for all, and the SDGC plays a pivotal role in achieving this objective. By providing a continuous and sustainable source of freshwater for irrigation, the SDGC contributes directly to enhanced food production. The versatility of the device allows it to be applied in various settings, from coastal regions struggling with seawater intrusion to arid areas dealing with brackish groundwater. This adaptability ensures that communities facing diverse water challenges can find a tailored solution in the SDGC, addressing the multifaceted nature of food security.

In essence, the SDGC embodies a vision for a sustainable future where local communities are empowered to overcome the challenges of water scarcity and food insecurity. Its role in achieving SDG 2.1 extends beyond providing a technical solution; it represents a holistic approach that considers the socio-economic context of communities. By addressing the intricacies of water availability, affordability, and economic stability, the SDGC stands as a testament to the transformative power of technology when aligned with sustainable development goals.

In conclusion, the SDGC is not just a technological innovation; it is a source of hope and transformation for communities striving to achieve SDG 2.1. Its affordability and manageability make it accessible to communities that need it the most. The agricultural prosperity it facilitates contributes to economic stability, lifting communities out of the cycle of poverty and food insecurity. As the SDGC becomes a cornerstone for sustainable water solutions, it symbolizes progress in addressing one of humanity's most pressing concerns. The vision of a future where every community has access to safe, nutritious food is within reach, thanks to the SDGC and its commitment to making sustainable development a reality.

J W T

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http://www.expotv1.com/ESCP_NUT_Team.pdf
*Offers extensive support on **Energy** and **Water Cycle,** verse **IP_S DGs /UN***

Bibliography/Conclusion

Any reference to people and things is purely coincidental, as well as creative/imaginative and aimed at the common good (both in fiction and non-fiction/disclosable texts).

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Watermaker from SDGC (source) :

Patent:

SDGC , **https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2016162896** (sea and process water solar desalination); view1

Italy: GRANT

http://www.expotv1.com/LIC/MISE_0001429306_SDGC.pdf, ... mean "INDUSTRY (useful), NEW (no make before), INVENTIVE (teach some things)".

Abstract/Description - Patent:

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http://www.expotv1.com/ESCP_Patent.htm

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Summary – Applications (to SDGs)

SDGC

https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2016162896

Water – great efficiency in DESALINING with renewable sources. SDGC is dedicated to desalination (of sea water, brackish water or bodies of water to be reclaimed), has the advantage of using only renewable energy and with performance indices comparable to Reverse Osmosis (dependent on fossils); the system is scalable from small to large installations, offering the possibility of implementing distributed **& pervasive** and counteracting critical logistics issues (often a serious problem). An infrastructural supply of "fresh" water towards the general plant engineering industry and in particular that for the production of hydrogen. Drastic action towards the Inorganic load, contributing to the performance on " **Water cycle** ".

Project:

SDGC – Solar Desalination Geoassisted Continuous

Objective : Launch an assembly and testing site (procedures and manuals) for the production of SDGC tanks (of assorted cuts and functions, reclamation of water bodies or production for food purposes).

Target: Prefabricated and container companies, hydromechanics , financial investors, operators in the fresh water sector, purification operators

The project aims to activate a production site, from design to assembly (pro delivery and rapid assembly), with the development of production-oriented procedures agreed with the client (based on the available inputs) and the destinations of the outputs produced. The solutions rely on standard products from the water management and prefabricated market (including containers), assembled and tested with a view to optimizing distillation using solar energy and support from thermal gradients. In collaboration with internal and external laboratories, it will act as remote support for the installations in charge (EPC - Engineering , Procurement and Construction).

Summary: This invention talks about how a machine can remove salt from sea water, salt water or water that comes from factories. This machine can use energy that comes from the sun, wind or underground. To remove salt from water, you need to make the water turn into steam and then turn it back into water (all at usual thermal conditions, for example how dew is produced). We plan to proceed as follows:

• put the water in a closed tank where the steam will be produced;
• heat the water near the surface, so it produces more steam;
• causes the steam to become water again, encountering colder surfaces (expanded metal arranged in a fan), adjacent to parts to which they will release the heat to even colder but liquid parts, fueling the convective motions in the liquid part, which then traces and reiterates the process;

• collects the condensed water, without salts, in suitable reservoirs and from which it is taken.

The machine is a well-insulated tank, into which water is introduced in continuous processes. Inside the tub there are devices that heat the water to make it steam. There are also means that turn the steam back into water and that collect the water without salt, transferring the energy by-passing critical areas (the key to conservation and reduced need for energy). These means are made like this:

• the tank is filled with water up to a certain point (approximately 2/3), so the condensation process is completed in the empty space above;

• the half -radiators, which heat the water , are close to the surface of the water and will be powered by natural sources (possibly supported by heat pumps);
• the means that create water vapor are on the surface of the water and heat in a limited way, inside the water, thus giving off a lot of heat;

• from the proposed reservoirs, the condensed water (which arrives by gravity and free of any salt) is taken from the coldest surfaces encountered, similar to the temperature regimes of storm processes in the tropics.

The machine uses the available renewable energy well , both solar and environmental conditions, fueling convective motions, both in the aerial and liquid parts, taking care not to lose energy, thanks to adequate insulation and prepared exchangers; The machine can use both energy that comes from the sun, wind or underground, and energy that comes from other sources. This machine is used to make clean (distilled) water, useful for many things: for factories, for plants, for animals and also for people (suitably integrated with the desired salts for drinking and nothing for industries, which they like even less – hard waters). This machine can help remove countless impurities resulting from many industrial and anthropic processes in general. In an indirect way, therefore, to remedy many ongoing social disparities in many communities .

SDGs / UN_en - SDGs / UN_it Full Strategy to
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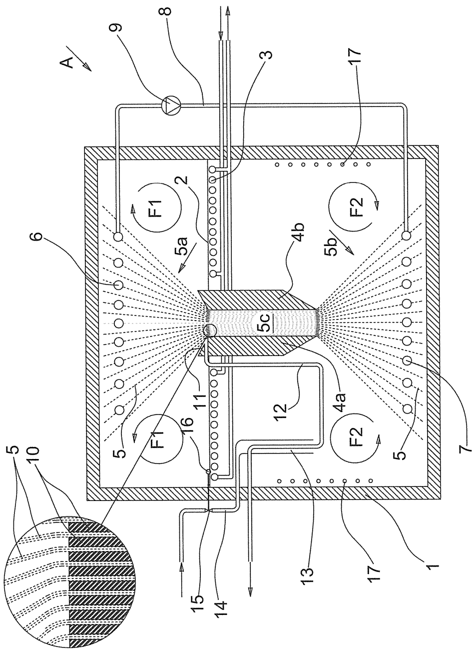

Fig. 2

IASR International Application Status Report

Received at International Bureau: 14 June 2016 (14.06.2016)

Information valid as of: 13 September 2016 (13.09.2016)

Report generated on: 28 September 2023 (28.09.2023)

(10) Publication number: (43) Publication date: (26) Publication language:

WO 2016/162896 13 October 2016 (13.10.2016) English (EN)

(21) Application number: (22) Filing date: (25) Filing language:

PCT/IT2016/000090 11 April 2016 (11.04.2016) Italian (IT)

(31) Priority number(s): (32) Priority date(s): (33) Priority status:

MI2015A000505 (IT)09 April 2015 (09.04.2015) Priority document received (in compliance with PCT Rule 17.1)

(51) International Patent Classification:

B01D 5/00 (2006.01); B01D 1/00 (2006.01); B01D 1/30 (2006.01); C02F 1/14 (2006.01)

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(54) Title (EN): METHOD FOR THE CONTINUOUS DESALINIZATION AND DEVICE FOR THE IMPLEMENTATION OF SAID METHOD

(54) Title (FR): PROCÉDÉ POUR LA DÉSALINISATION CONTINUE ET DISPOSITIF POUR LA MISE EN ŒUVRE DUDIT PROCÉDÉ

(57) Abstract:

(EN): This invention refers to a method and a device for desalinating sea water, brackish water or from industrial processes. The device is suitable to use renewable energy sources such as solar or geothermal energy. The device is of the type that includes a tank (1) for the containment of the water to desalinate, in which there are heating means fitted to cause the evaporation of said water to desalinate, cooling means fitted to favour the subsequent condensation of the steam and means fitted to the collection of the condensed water and it is characterized in that: said tank (1), fitted to contain said water to desalinate, is filled up to a certain level (2); said heating means, for evaporating said water include a first heat exchanger (3), immersed in the water to desalinate and positioned nearby said level (2); said cooling means (5a), fitted to cause the condensation of the steam, are in heat exchange connection with the heating means (5b), immersed in said water to desalinate, said heat exchange simultaneously causing: a) the reduction of the temperature of said means (5a), therefore the suitable conditions for the condensation of the steam; b) the increase in temperature, into the depths, of said water to desalinate.

(FR): La présente invention concerne un procédé et un dispositif de désalinisation d'eau de mer, d'eau saumâtre ou provenant de processus industriels. Le dispositif est approprié pour l'utilisation de sources d'énergie renouvelable, telles que l'énergie solaire ou géothermique. Le dispositif est du type comprenant un réservoir (1) pour le confinement de l'eau à dessaler, dans lequel se trouvent un moyen de chauffage conçu pour provoquer l'évaporation de ladite eau à dessaler, un moyen de refroidissement conçu pour favoriser la condensation ultérieure de la vapeur et un moyen conçu pour collecter l'eau condensée, et est caractérisé en ce que : ledit réservoir (1), conçu pour contenir ladite eau à dessaler, est rempli jusqu'à un certain niveau (2); ledit moyen de chauffage, conçu pour provoquer l'évaporation de ladite eau à dessaler, comprend un premier échangeur de chaleur (3) immergé dans l'eau à dessaler et positionné à proximité dudit niveau (2); ledit moyen de refroidissement (5a), conçu pour provoquer la condensation de la vapeur, est en liaison d'échange thermique avec le moyen de chauffage (5b) immergé dans ladite eau à dessaler, ledit échange de chaleur provoquant simultanément : a) la baisse de la température dudit moyen (5a), et par conséquent les conditions appropriées pour la condensation de la vapeur; b) l'augmentation de la température, dans les profondeurs, de ladite eau à dessaler.

International search report:

Received at International Bureau: 12 September 2016 (12.09.2016) [EP]

International Report on Patentability (IPRP) Chapter II of the PCT:

Not available

(81) Designated States:

AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

European Patent Office (EPO) : AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR

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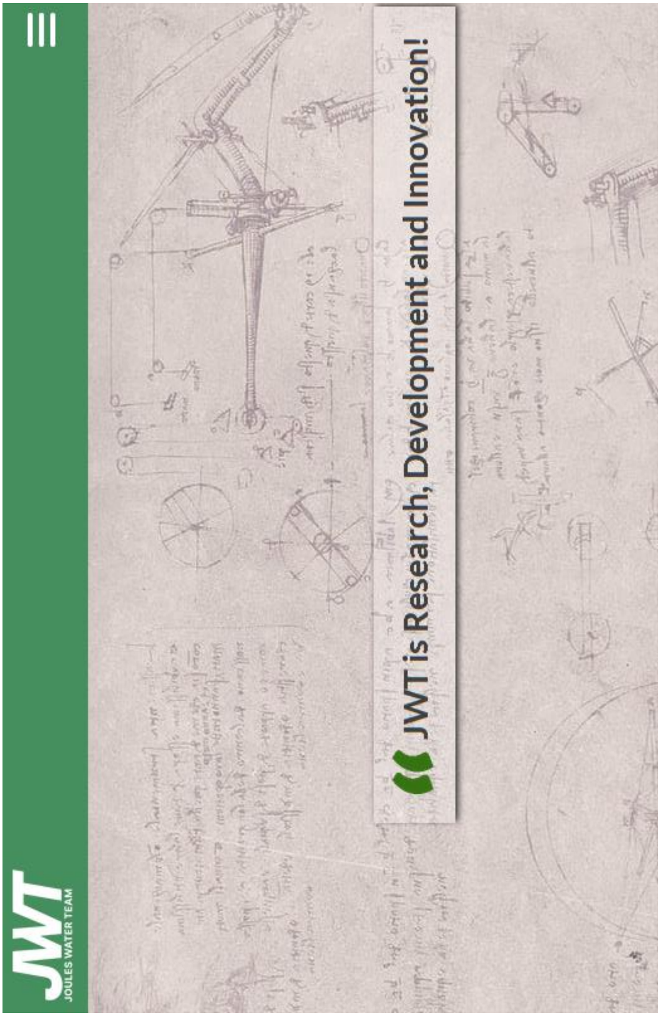
Eurasian Patent Organization (EAPO) : AM, AZ, BY, KG, KZ, RU, TJ, TM

Declarations:

Declaration made as applicant's entitlement, as at the international filing date, to apply for and be granted a patent (Rules 4.17(ii) and 51bis.1(a)(ii)), in a case where the declaration under Rule 4.17(iv) is not appropriate

Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv)) for the purposes of the designation of the United States of America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