

SYNERGIA 9n1

INNOVATED BY DR. YOUSEF ALHARR

ULTRA EFFICIENT HYBRID COOLING SYSTEM FOR A CLIMATE-RESILIENT FUTURE



Message from the Innovator

Cooling accounts for nearly 20% of the global electricity consumption, and in regions like the Middle East and North Africa (MENA), it can exceed significantly during the scorching summer months. When the temperature rises to unbearable heights, the need for cooling systems becomes a matter of survival. For a scenario without concrete action, the International Energy Agency has already painted a stark picture: a future where energy demands from air conditioners triple, a “Cold Crunch” looming on the horizon. The escalating climate crisis demands urgent action, and the energy sector stands at the forefront of this challenge.

This was the critical realization that spurred the development of SYNERGIA9n1, an ultra-efficient hybrid cooling system that not only addresses today’s immediate needs but, through its multimodal capabilities, anticipates the challenges of the future. With SYNERGIA9n1, we have created something groundbreaking — a system that can achieve 50% greater energy efficiency, which substantially lowers greenhouse gas emissions. It is adaptable, scalable, and, above all, it is the kind of innovation that our world desperately needs.



The development of SYNERGIA9n1 follows a decade of persistent efforts. This journey was not linear. It was marked by both triumphs and setbacks. There were times when it seemed like we had reached a dead end, but we did not give up on our goal to revolutionize cooling technology with low-carbon alternatives. From China and Germany, to UAE, and finally in Qatar, many prototypes were conceived and assembled, each iteration a step closer to our vision, each failure a valuable lesson. All this led to SYNERGIA9n1’s final prototype securing patents from UK, USA, China, Mexico, Saudi Arabia, Taiwan, and the World Intellectual Property Organization headquartered in Geneva, Switzerland.

As we roll out the commercial unit of SYNERGIA9n1, I want to express my deepest gratitude to the remarkable team behind this innovation, and for the invaluable support from leading entities, including the Qatar National Research Fund and the Supreme Committee for Delivery & Legacy.

As proud as I am of what we have accomplished, I am even more inspired by the work still to be done. As we look toward the future, the need for innovation will only grow stronger, and SYNERGIA9n1 is just the beginning. We are keen for its widespread adoption to support a climate-resilient future where we can look back and say, “We did our part. We made a difference.”

Yousef Alhorr

Dr. Yousef M. Alhorr

Founding Chairman, GORD.

What's SYNERGIA9n1?

The novel cooling system SYNERGIA9n1, is an ultra-efficient hybrid dedicated outdoor air system (DOAS) or also known as a condensing unit coupled with air handling unit designed to cool 100% fresh air. It can be used to cool and ventilate open and enclosed spaces with significantly lower carbon footprint compared to conventional fresh air conditioning units. Synergia is patented in numerous territories including USA, UK, Mexico, China, Taiwan, Saudi Arabia, and WIPO. It has also received several awards including the International Energy Innovation of the Year Award by the Association of Energy Engineers (AEE), Best Patent in Energy Efficiency Award by the League of Arab States (LAS), the Golden Medal of the GCC General Secretariat, and the Golden Research and Development Award by Dubai Supreme Council of Energy, UAE.

Addressing the Cooling Crisis

The global cooling crisis is no longer a distant threat but a current reality. In the Middle East, cooling can exceed 20% of total electricity consumption, becoming a matter of survival during peak summer. The SYNERGIA9n1, innovated by Dr. Yousef Alhorr and developed by the Gulf Organisation for Research & Development (GORD), is a critical response to this challenge. This novel hybrid dedicated outdoor air system (DOAS) is designed to cool 100% fresh air with a significantly lower carbon footprint than conventional units.

Applications

Offering great adaptability to meet various cooling needs, SYNERGIA9n1 can be installed in a wide range of spaces, buildings and facilities that include:



Open areas for sports, leisure, and entertainment.



Buildings of all types which are centrally air conditioned demanding fresh air ventilation.



Hospitals, surgery suites, laboratories and clean rooms.



Industrial workshops and process facilities.



Greenhouses requiring humidity and temperature control.



Barns requiring climatization and optimum air quality.

Benefits

What makes SYNERGIA9n1 truly unique is its ability to be operated in single, dual or triple modes based on the ambient weather conditions and the climatization requirements for the space to be cooled. SYNERGIA9n1 offers a wide range of benefits including:



Energy Efficiency



Multimode Operations



Reduced Carbon Footprint



Diverse Applicability



Ease of Use



High Durability



Improved Air Quality



Cost Effectiveness



Climate Smart System

How it works?

Multicore/Multimode Operations

Consolidating nine distinct solutions, SYNERGIA9n1 through its multicore configuration and adaptive multimode operation, efficiently cools fresh air, making it a sustainable solution for both indoor and outdoor mechanically ventilated spaces.

STAGE (I)

Liquid Desiccant Dehumidification: As the fresh air enters the desiccator and eliminator section comprising of purposely designed filling pads, it meets an ecofriendly pre-cooled strong liquid desiccant that removes its moisture content, thereby reducing its latent heat load.

STAGE (II)

Indirect Evaporative Cooling: The dehumidified, yet warm, air then flows through the indirect evaporative cooler where it is cooled down as it makes its way through the cross-flow plate type heat exchanger, thereby reducing its sensible heat load.

STAGE (III)


Optimized Vapor Compression: Lastly, the pre-treated air is further cooled as it enters the evaporator coil holding chilled refrigerant circulated by the compressors to the required setpoint temperature and humidity ratio.


Novelty of SYNERGIA9n1

SYNERGIA's "9n1" capability harmonizes 3 proven cooling technologies with 6 energy harvesting techniques to achieve ultra-efficient performance in terms of energy saving, carbon emissions reduction and durability.


3 COOLING TECHNOLOGIES


 LIQUID DESICCANT DEHUMIDIFICATION


 INDIRECT EVAPORATIVE COOLING


 VAPOR COMPRESSION CYCLE

6 ENERGY HARVESTING TECHNIQUES


 CONDENSER ADIABATIC COOLING

 REFRIGERANT DESUPERHEATING

 VFD OPERATED CONDENSER FANS

 CONDENSATE WATER RECOVERY

 REFRIGERANT WASTE HEAT RECOVERY

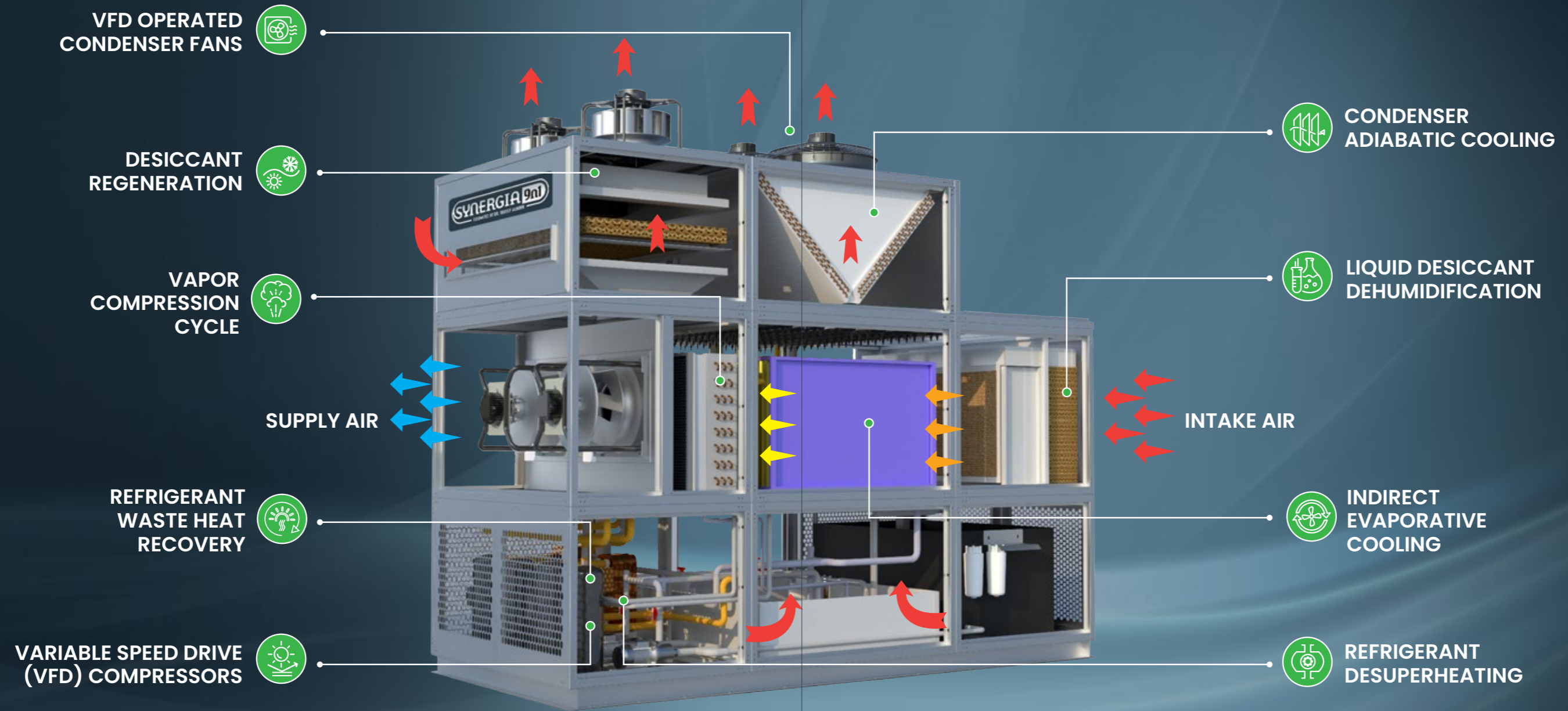
 VARIABLE SPEED DRIVE (VFD) COMPRESSORS

IoT Enabled Unit Control System

The operation of SYNERGIA9n1 with its underlying solutions is orchestrated through a proprietary coded programmable logic controller (PLC) utilizing internet of things (IoT) devices such as sensors and meters which seamlessly connect to the internet, enabling them to collect, exchange, and act upon data via purposely developed online device management system. The two-way communication command facilitated by the dedicated online portal allows the operator to monitor and control the unit remotely, in addition to providing health check and troubleshooting capabilities leading to lower operations and maintenance costs.



First-of-its-kind System



International Recognitions



Energy Innovation of the Year 2022 award by the Association of Energy Engineers (AEE), USA



Best Patent in Energy Efficiency Award in 2024 by the League of Arab States (LAS).

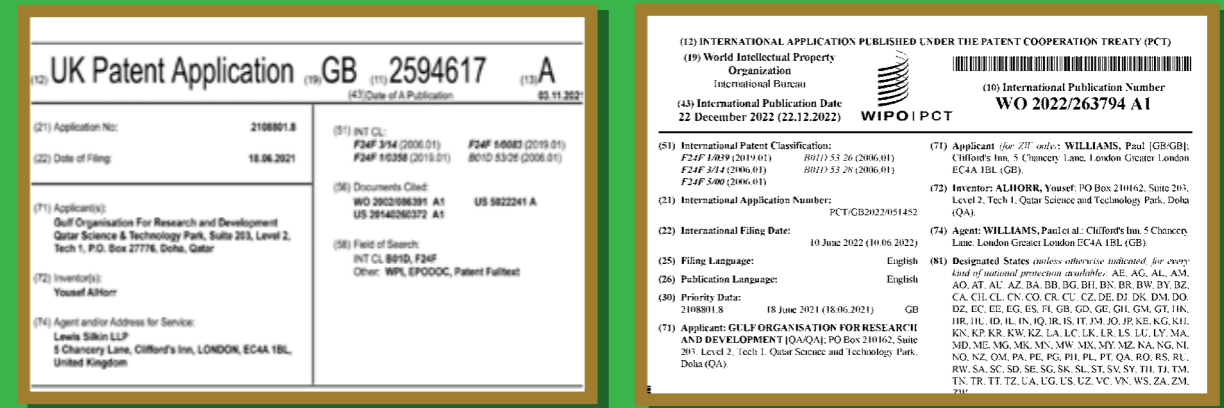


Best Research and Development Award of 2025 by Dubai Supreme Council of Energy.



General Secretariat of the Gulf Cooperation Council (GCC) Award and Gold Medal at the 15th International Invention Fair of the Middle East

Patent Protection



GRANTED PATENTS
(WIPO Switzerland, UK, USA, China, Mexico, Saudi Arabia and Taiwan)

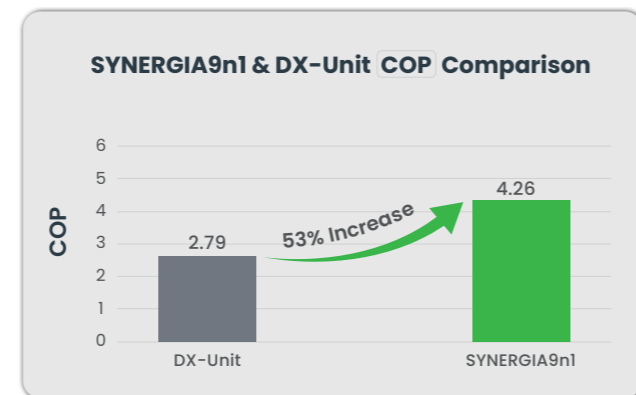
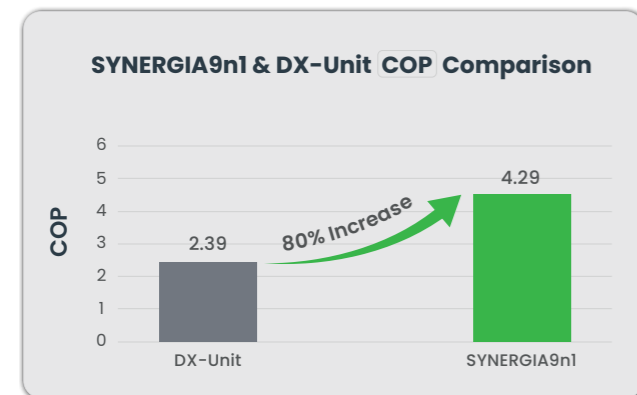
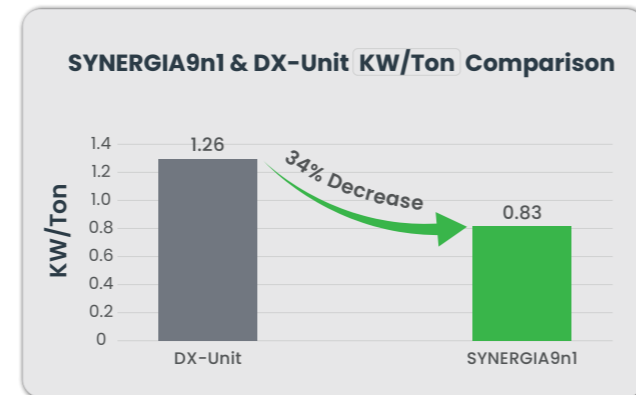
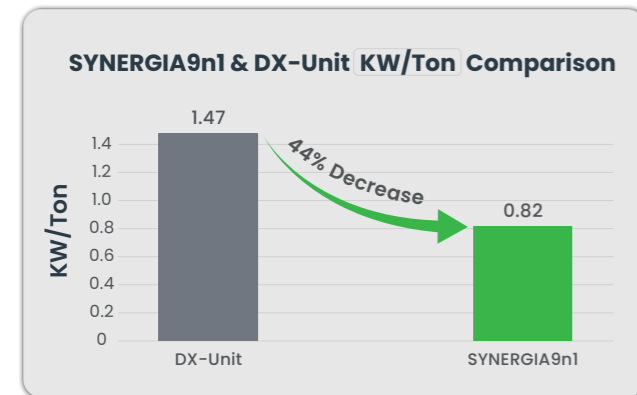
SYNERGIA9n1 VS Conventional DOAS (DX-Unit) Performance Comparison

Dry-Hot Summer Weather Condition:

Date :9/9/2025 Time: 12:00 noon
DBT: 45.8 °C WBT: 25.8 °C

Humid-Hot Summer Weather Condition:

Date: 25/8/2025 Time: 12:00 noon
DBT: 41.5 °C WBT: 31.2 °C



Psychrometric chart

Desiccant Dehumidification

Sensible Cooling (Desiccant + Indirect)

SYNERGIA 9n1
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Ultra Efficient Hybrid Cooling System

GARD

Core Value Proposition

The SYNERGIA9n1 transforms your conventional dedicated outdoor air system (DOAS) from a cost center into a strategic asset through dual financial streams:

Significant Tariff Savings:

By achieving a world-class efficiency of 0.85 kW/ton, a 37% improvement over the conservative 1.35 kW/ton market baseline, the unit directly slashes your monthly utility bills. In high-ambient environments like Qatar, this translates to massive reductions in power charges.

Passive Income from Carbon Credits:

Every unit is a candidate for gaining Carbon Credits. By drastically lowering energy consumption and utilizing the new Low Global Warming Potential (GWP) refrigerant R454B (offering a 78% GWP reduction over R410A), your facility can generate carbon credits that can be traded or used to meet ESG targets.

Intelligent VSD Performance:

Featuring a lead Variable Speed Drive (VSD) compressor, the system modulates to match actual demand, ensuring peak efficiency during shoulder months (March, April, November and December).

ECONOMIC FEASIBILITY (Illustration Only)

Table 1: Potential Annual Energy & Tariff Savings

Country	Avg. Commercial Tariff (USD/kWh)	Baseline Annual Cost	Synergia9n1 Annual Cost	Annual Tariff Savings
UAE	\$0.110	\$49,418	\$31,115	\$18,303
Kuwait	\$0.081	\$36,389	\$22,911	\$13,478
Bahrain	\$0.077	\$34,592	\$21,780	\$12,812
Oman	\$0.065	\$29,201	\$18,386	\$10,815
Saudi Arabia	\$0.061	\$27,404	\$17,254	\$10,150
Qatar	\$0.036	\$16,173	\$10,183	\$5,990

Calculations based on a 50-Ton installation with a 10-month operational duration including 6-month peak loads.

Table 2: Potential Annual Carbon Credit Revenue

Parameter	Annual carbon Credit	Monetary Value (USD)
Energy-Based Credits	75	\$225
Refrigerant-Based Credits	2.5	\$7.5
Total Annual Carbon Revenue	77.5	\$232.5

Calculations based on a conservative carbon credits value of \$3.00/ton

A future-proof cooling system for climate-conscious businesses

ABOUT GORD

SYNERGIA9n1 is an innovation of the Gulf Organisation for Research & Development (GORD), which is an RDI entity recognized among leading organizations in the global sustainability milieu. Headquartered in Qatar Science and Technology Park, GORD drives the transformation of societies, industries, and the built environment by influencing corporate ethos, fostering innovation, and developing capacity to enable low-carbon sustainable growth for present and future generations. The organization's key operations include R&D, standards setting, green buildings certification, accreditation services, voluntary carbon markets, performance testing, knowledge dissemination, 3D prototyping and advisory services on sustainability and climate change for governments, non-government, public and private sector organizations in line with Qatar National Vision 2030 and United Nations Sustainable Development Goals (SDGs).



Explore SYNERGIA9n1



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