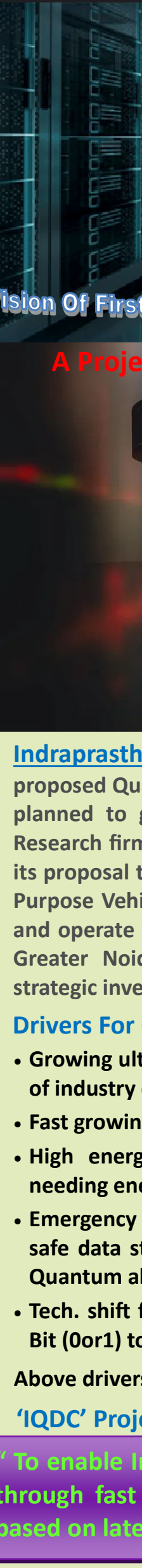


INDRAPRASTHA QUANTUM DATA CENTER (IQDC)

GREATER NOIDA, NCR DELHI, INDIA



Vision Of First Quantum Computing Data Center of India

A Project Overview Document For IQDC



Indraprastha Quantum Data Center (IQDC) is first proposed Quantum Computing Data Center of India, which is planned to get established at Greater Noida, NCR Delhi. Research firm Innogress in JV with GAN Tech. UK, submitted its proposal to state Govt. of U.P. for promoting SPV (Special Purpose Vehicle) for IQDC project with an intent to develop and operate this Quantum Computing based Data Center at Greater Noida, in collaboration with Tech. partners and strategic investors under special incentives and MoU of Govt.

Drivers For Quantum Data Center

- Growing ultra fast and high performance computing needs of industry due to fast emerging A.I. and high-end Apps.
- Fast growing data volume & storage required for industry
- High energy & space intensive classical data centers, needing energy efficient, sustainable Quantum Computing
- Emergency threat of cyber security and need for Quantum safe data storage & transfer, which can be done through Quantum algorithms and Quantum Computers (QC)
- Tech. shift from classical computing based on single state Bit (0or1) to quantum based on multiple state Qubit (0&1)

Above drivers encouraged us to plan & launch IQDC project.

'IQDC' Project Vision

" To enable India's and World's Digital Economy growth through fast and sustainable computing infrastructure based on latest Quantum Computing Technologies "

About IQDC Project

- ◆ **IQDC Project Mission:** To establish a Quantum Computing based Data Center which can host upto/over half of the present World's computing power and data storage capacity* through energy efficient, environment friendly and high-performance Quantum Computers.
- ◆ **IQDC Project Scope:** Planning, Designing, Engineering, Launching, Creating, Developing, Hosting and Operating a Quantum Computing based Data Center through a proposed SPV (Special Purpose Vehicle), Indraprastha Quantum Data Center Pvt. Ltd., Greater Noida in collaboration with Tech. Partners and investors.
- ◆ **IQDC Proposed Futuristic Design Specs:** Ambition to scale upto/over 1 Million Qubit* Quantum Computing Data Center to deliver upto/over 5000 EFLOPS* equivalent computing power and 2 Zettabytes* (2000 Billion Gigabytes) of storage capacity in a decade time with the help of Quantum and Hybrid Computing Architecture and associated technologies to be spread over 5 Acres of space constructed for housing Quantum Computers along with quantum grade control, measurement and cooling systems.
- ◆ **IQDC To Host Quantum Computers:** To host at least 2 Quantum Computers* with Classical Computers for optimum performance.
- ◆ **Target Quantum Computing Technologies:** Superconducting/ Photonics/Trapped ion Tech. for QPUs. IQDC to host Universal Gate, Analog/Annealing type of Quantum Computers. These QC Techs. shall be sourced through our Technology Partners.
- ◆ **IQDC Project Capex:** \$300M Project Capex is envisaged, to be raised through PE investors. Incentives shall be claimed from Govt.

Proposed Hosting Facilities At IQDC

- Enterprise Grade High Performance Computing through hosted Quantum Computers– Compute handled by 100% Quantum M/Cs
- Enterprise Grade High Performance Computing through hosted Hybrid Computers (Classical+Quantum)-Compute on Hybrid M/Cs
- Enterprise Grade High Performance Computing through Cloud based Quantum Computers– IQDC + Partners QCaaS resources
- Enterprise Grade High Performance Computing through Cloud Hybrid Computers– IQDC + Partners Hybrid resources
- Enterprise Grade, energy efficient, and Quantum safe data storage on hosted Quantum and Hybrid Machines (M/Cs)
- Enterprise Grade, energy efficient, and Quantum safe data storage on Cloud Quantum and Hybrid Machines
- Classical and Quantum interfaces and secure data exchange hubs
- Quantum Data Centre and QC Centre of Excellence (CoE)
- Quantum Computing and Quantum Encryption based use cases, apps. design, simulation and hosting
- Other Co-location, Co-hosting services and other facilities



* Indicative data, likely to change at DPR stage

QC Capabilities and Services Development At Proposed CoE

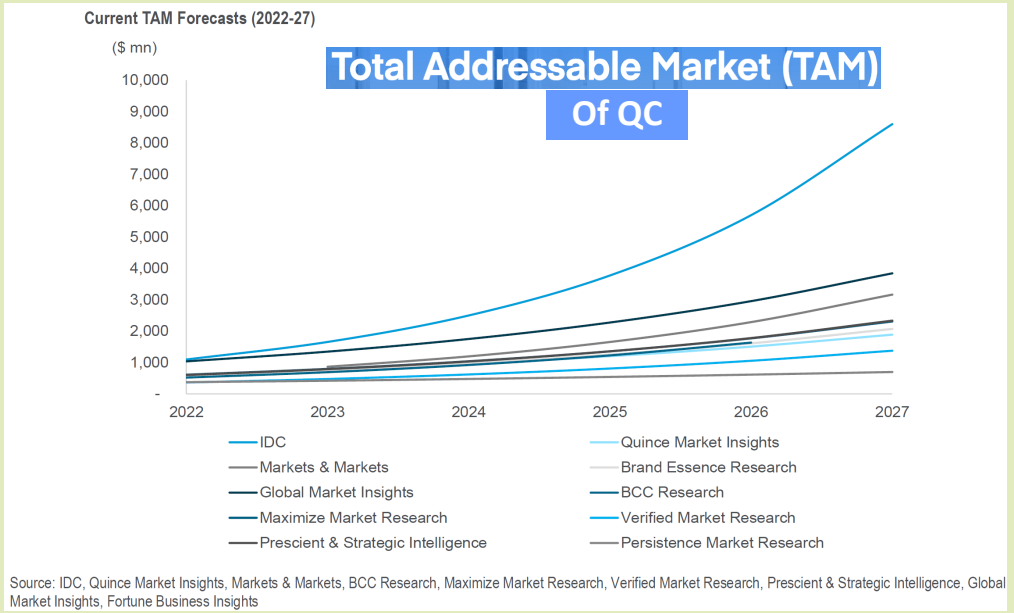
- Post-Quantum Cryptography (PQC), Quantum Key Distribution (QKD), Quantum Safe Data Management, Data Transformation Services, Tools
- Quantum Algorithms, Quantum Software, Quantum to Classical Interfaces Development and Testing Services and Tools
- Quantum A.I. (Artificial Intelligence) and M.L. (Machine Learning) Services & Tools, QC R&D Sand Box and Prototyping Services and Tools
- Quantum Error Correction, Measurement and Control Services & Tools
- Quantum Simulation and Quantum Optimization Services & Tools
- Automated Hardware Optimization Tool
- Quantum Compute Platforms, Development & Testing Services & Tools
- Quantum Software as a Service (SaaS), Quantum Computing-as-a-Service (QCaaS) , Quantum Hardware as a Service (HaaS)
- Quantum Data Quality, Risk & Compliance Management Services, Tool
- Quantum to Classical / Classical to Quantum Interface, Apps. & Data Transformation and Migration Services and Tools
- Quantum Data Center & QC Training and Skill Development Services
- QC Datacenter Benchmarking, Governance, Quality Control & Best Practices Services and Tools

Typical Use Cases To Be Hosted At IQDC

- **Logistics and Supply Chain:** Network Design Planning, Route Planning, Quantum Simulation, Fleet Optimization, Traffic Optimization, Warehouse Optimization, Inventory Allocation, Dynamic Inventory Allocation, De-Carbonization
- **Pharma and Life Sciences:** Discovery and manipulation of molecules, Drug discovery, Molecular simulation, Protein modelling, Genomic sequencing
- **Defense and Security:** Intelligence, Surveillance, and Reconnaissance (ISR), Early Warning and Sensing, Quantum Imaging & Navigation, Cyber Security, Secured Communication, Quantum Cryptography, Quantum Key Distribution
- **Finance and FinTech:** Financial modeling, Quantum algorithms to price financial instruments, Option pricing, Portfolio risk management, Investment portfolio optimization, trade optimization, Anti fraud, Anti money laundering
- **Health Care:** Clinical trial plans & optimization, Precision medicine
- **Clean Tech:** Weather Forecasting, Solar Capture, Solar conversion, New Material Discovery for Energy Efficiency & Cleantech., Better Solar Cells, Better Battery development

QC Market Insights And IQDC Market Potentials

- As per International Data Corporation (IDC) forecast for the world-wide quantum computing market, it is projected that customer spend for quantum computing to grow to \$8.6B in 2027 with a 6-year compound annual growth rate (CAGR) of 50.9% over the 2021-2027 forecast period.
- According to another report published by Allied Market Research, the global enterprise QC market is estimated to reach \$18.33B by 2030, witnessing a CAGR of 29.7% from 2021 to 2030.
- The global Quantum Computing-as-a-Service (QCaaS) market is expected to reach \$4B by 2025 and \$26B by 2030 witnessing a 80% CAGR from 2021, according to Quantum Insider research.



- As per BCG estimate, Quantum Computing could create value of \$450B to \$850B in the next 15 to 30 years.
- As per McKinsey estimates, the till date announced public/govt. investments in quantum computing are nearly \$30 Billion+.
- As per '5 Jewels Research' estimate large scale Digital (Bits) to Quantum (Qubits) Tech. Migration to happen, and this Transition from Digital to Quantum Tech. could be 50 Times bigger in opportunity size compared to what we had in Y2K.



"For many critical problems, classical computing will run out of steam in the next decade and we will see quantum computing take over as the next generation of performance-intensive computing." IDC

QC Market And Opportunities In India

- India announced a National Quantum Mission (NQM) with a total budgetary outlay of \$1B to be invested over 7-8 years.
- As per NASSCOM report, Quantum Tech. in India across industries could potentially add a value upto \$310B by 2030.

Data Center (DC) Market And Opportunities In India

- According to Avendus Capital, India's classical Data Centres are set to grow at an impressive 40% CAGR. By 2025, the data centres will reach a staggering 1700 MW capacity, backed by estimated investment worth \$5B. **Noida is 4th largest DC hub.**
- As per Statista Market Research, India's revenue in the classical Data Centre market is projected to reach \$7.83B in 2023, growing with a CAGR of 4.31%, expected to touch \$9B by 2027.

At IQDC, our goal is to create over half a billion dollar worth QC-Data Center opportunity by offering QC + Hybrid hosting & services



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Uttar Pradesh Government Signs MoU for Quantum Computing Data Center in India

February 7, 2023 by [staff](#)

07th Feb. 2023, New Delhi/Noida/Lucknow, India — Today, Uttar Pradesh Government signs a MoU with Innogress for setting up India's first quantum computing data center, 'IQDC' (Indraprastha Quantum Data Center), at Greater Noida, U.P. proposed in JV with GAN Tech. UK.

Recently U.P. Government attracted many Data Center projects, particularly in Noida/Greater Noida area, but this is first time a new data center is proposed on innovative Quantum Computing Technology. So far, all data centers in India are based on classical computing technologies, which (classical computing) having own technological and performance related limitations. Data Centers based on classical computing shall have huge energy and space requirements, and at the same time having huge information security risks due to recent Quantum Computer based algorithms discovered by Chinese scientists which is believed to be good enough to break RSA based data encryption, hence leaving the present day classical data centers vulnerable to Quantum Computer based security attacks.

Commenting on recent proposal sent to state Govt. of U.P. under U.P. GIS2023 for setting up India's first Quantum Computing Data Center at Gr. Noida, Founding Partner of [Innogress](#), Sumant Parimal, said "Present Data Centers likely to hit redundancy in future due to performance / speed, energy, space and data security concerns, as the whole computing and data storage architecture are based on classical computing which are bits (0,1) based built on semiconductor chips. However, Quantum Computers built on quantum chips performs computation and storage of information using Qubits, which are much faster in speed and stores higher volume of data on same chip size and requires lesser energy for performing computing. Quantum Computing technology is recent innovation and fast evolving and having capabilities to sustain future A.I. (Artificial Intelligence) applications and emerging Apps. higher computing resource requirements".

"Keeping these latest Tech. innovations in mind, we at Innogress in collaboration with our UK Partner GAN Tech. UK Ltd. and prospective investors, proposing to setup India's first Quantum Computing Data Center, Indraprastha Quantum Data Center, at Gr. Noida U.P. under framework of incentives launched by U.P. Govt. during ongoing U.P. Global Investors Summit2023 prog. We are aligning our proposed Quantum Tech. Data Center Project 'IQDC' with the vision of Hon'ble CM of U.P. and Hon'ble PM of India for developing U.P. and India as innovative Technologies hub. Our proposed data center is going to be quantum safe and going to enable high performance computing requirements of New India," Parimal said.



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India to Build its First Dedicated Quantum Computing Data Center

Uttar Pradesh Government Signs MoU with Innogress



John Potter
February 15, 2023



The government of Uttar Pradesh and Innogress are building India's first quantum computing data center Getty

The government of the Indian state of Uttar Pradesh has signed an agreement with global research company Innogress to build India's first quantum computing data center.

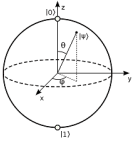
Innogress will build the Indraprastha Quantum Data Center (IQDC) in Greater Noida, Uttar Pradesh, as a joint venture with UK technology company GAN Tech.

Uttar Pradesh has attracted multiple data center projects in recent years but this is the first time a new data center has been proposed dedicated to quantum computing. To date, India's data centers have been dependent on energy-intensive classical computers.

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U.P. Govt. Signs MoU For India's First Quantum Computing Data Center 'IQDC'

IQDC In News



Quantum Computing Report

by GQI



Indian State Government Signs MoU with Innogress to Set Up a Quantum Data Center in Greater Noida, Uttar Pradesh, India

Innogress will work with partner GAN Tech. UK. to set up a quantum data center in Greater Noida. Noida is short for New Okhla Industrial Development Authority and is a satellite city of [Delhi](#) and is a part of the National Capital Region (NCR) of India. The data center will be called 'IQDC' standing for Indraprastha Quantum Data Center. It will join several other classical data centers that have been set up in the Noida/Greater Noida area. Innogress also has another project to set up a quantum technology park called the [Greater Karnavati Quantum Computing Technology Park \(GKQCTP\)](#) in the Gujarat state of India. That project is planned to host 10-15 firms working to develop various areas of quantum tech and will include facilities for materials processing, R&D, manufacturing, and other activities. Additional information about the MoU to construct the quantum data center is available in an article posted on the *India Education Dairy* website [here](#).

February 8, 2023



South Asia News

Uttar Pradesh Government Signs MoU with Innogress for India's First Quantum Computing Data Center

The Uttar Pradesh Government signs a memorandum of understanding (MoU) with Innogress for setting up Indraprastha Quantum Data Center (IQDC), India's first quantum computing data center, at Greater Noida.

Recent years have seen the Uttar Pradesh government has attracted multiple data center projects, especially in the Noida/Greater Noida region, but this is the first time a new data center has been proposed using cutting-edge quantum computing technology.

All data centers in India up to this point have been built using traditional computing technologies, which have their own set of performance and technological constraints. Due to recent Quantum Computer based algorithms discovered by Chinese scientists, which are believed to be good enough to break RSA based data encryption, the existing classical data centers are vulnerable to Quantum Computer based security attacks. As a result, data centers based on classical computing will have enormous energy and space requirements.

Quant

Die Regierung von Uttar Pradesh unterzeichnet eine Absichtserklärung für ein Quantencomputing-Rechenzentrum in Indien





Indraprastha Quantum Data Center (IQDC)

UNDER

UTTAR PRADESH

DATA CENTER POLICY



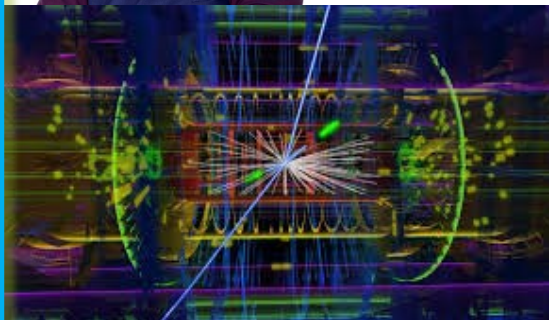
IQDC Promoter, Innogress in JV with Gan Technologies, UK, now seeking Quantum Computing Tech. Partners, Strategic Business Partners and Strategic PE Investors for creating India's first Quantum Computing Data Center at Greater Noida, U.P. India

POINT OF CONTACT



'IQDC' Lead Promoter: Mr Sumant Parimal, Founder of 'Innogress', Globally Recognized, Forbes Featured A.I.-Tech.-Business Leader
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