Question

Do we need Change ?
Is transformation required ?

Renewable Energy & Reduction of CO2 Emission

- The amount of carbon dioxide (CO2) emitted per unit of electrical energy consumption, (gCO2/kWh).
- Varies according to the used method for Electrical Power Generation

Energy in Steel Industry :

- The Steel Industry accounts for approximately **8-9%** of total global energy consumption.
- Within the industrial sector, Steel Industry is consuming about **19%** of industrial energy worldwide.
- Energy constitutes a **20% to 40%** of the cost of steel production.
- Fossil fuels accounts for **82 %** of the electrical energy generation (world-Energy 2022).
- Replacing a **1 MW** gas turbine with a Solar system could reduce CO2 emissions by approximately **600 tons** annually.

CO2 emission factor (gCO2/kWh)

Fossil Fuels	**Coal**	**900 - 1,100**
	Natural Gas	**350 - 500**
	Oil	**800 - 1,000**
Renewable Energy	Wind	3 - 15
	Solar	20 - 80
	Hydropower	1 – 30
Nuclear Energy	Nuclear	10 – 20
Global Emission Factors (varies by country and energy mix)		450 - 500

Average CO2 Emission Factors (gCO2/kWh)

Global	EU	G7	MENA
486	292	362	650

gCO2/kWh Emission Factors in Steel Industry

EU	MENA
320	715

Renewable Energy & Reduction of CO2 Emission

Solar Energy System Components

1. **Solar Panel**
2. **Battery Charging Controller**
3. **Battery Storage Systems**
4. **High Quality Inverter**
5. **Switching Control Panel**
6. **Smart KWH monitoring**
7. **Electricity Grid**

Electrical Load

CO2 emission factor (gCO2/kWh)

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gCO2/kWh Emission Factors in Steel Industry

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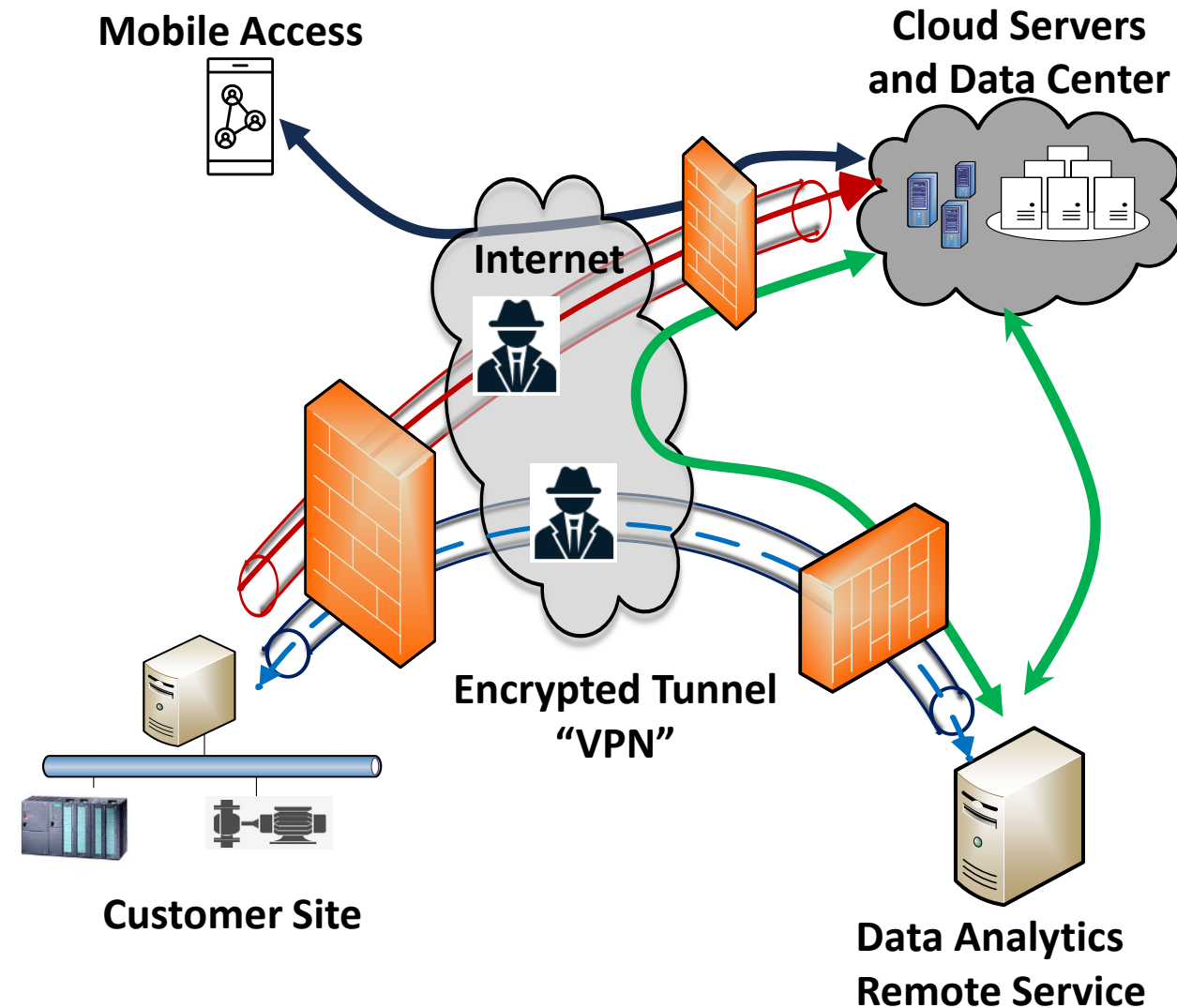# Automation Revolutions in Steel Manufacturing

QATAR STEEL
قطر ستيل

Continuous Improvement End-Less Process

- **1st Industrial Revolution (Late 18th Century)**

  ❑ Introducing machines to replace the manual manufacture, reduce effort and save human energy using Water and Steam Engine Machines

  ❑ Revolutionizing steel production, Start using Coke in Blast Furnace (Henry Bessemer)

- **2nd Industrial Revolution (Late 19th Century)**

  ❑ The industry began to exploit the electricity in the industry.

  ❑ Large increase in iron production

  ❑ Depend on Iron for the infrastructure and Coal as source of energy

- **3rd Industrial Revolution (Late 20th Century)**

  ❑ Automation, Robotic, computerization, PLC

  ❑ Depend on Iron for the infrastructure and Cool as source of energy

  ❑ Robotic in measuring of HAZARD systems

- **4th Industrial Revolution (Late 20th Century)**

  ❑ (known as Industry 4.0), it has arrived to reshape manufacturing through a deep harnessing of data.

  ❑ Analytics, predict, control, and optimize operations.

  ❑ Digital transformation, AI, IoT, and smart factories
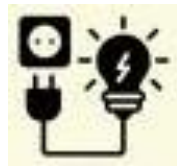
The Synergy of AI, Cloud Base and Cybersecurity

- ## Cloud-Base :
  - *Real Time Data Access*
  - *On-Demand Global Accessibility.*
  - Integration, Analysis and Data Sharing.
  - *Historical Data Storage.*
  - *Cost Efficiency.*

- ## Cybersecurity & Challenges :
  - Data Privacy.
  - Compliance with Standards.
  - Regulatory Requirements
  - Multi-Layer of Security.
  - System Integrity.

Mobile Access

Cloud Servers and Data Center

Internet

Encrypted Tunnel "VPN"

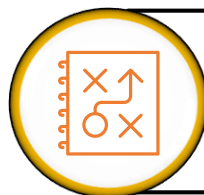**Customer Site**

Data Analytics Remote Service

Artificial Intelligent (AI) in Steel Industry

With thanks to 4.0 revolution and the implementation of huge models of sensors and measurement devices with open communication protocols, AI involves machine learning, processing, and data analytics to perform tasks that typically require human intelligence.
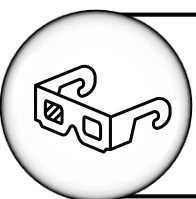
Prediction

- Equipment failures before they occur.
- Maintenance costs.
- *Production Quality*
- *Energy requirements and Emissions.*
- *Steel Market Situation & Products diversification*

Process Optimization

- Optimize the Process Parameters.
- Productivity and Quality Improvement.
- Waste Reduction.
- Energy Distribution and S/S Manipulation.
- Emission Control

Customer Service

- AI-powered chatbots.
- Virtual assistants
- Handle customer inquiries efficiently, providing 24/7 support

(Not yet fully applied in Steel industry)

What's Next ?!!

Ethics and Responsibility :

Another focus of next is the ethical use of technology, data privacy, and ensuring that AI and automation enhance the quality of life.

Emphasis on Sustainable :

- Use Renewable Energy
- Invest in **smart sensors** and automation to optimize energy use.
- Develop products that consume less energy over their lifetime.
- Implement energy management systems that monitor usage and reduce inefficiencies across operations.
- Monitor KPI, compare with benchmarking and publish regular **Sustainability Reports**

What's Next ?!!

QATAR STEEL

Question

Do we need Change ?
Is transformation required ?

Change Today ,
Sustainable Tomorrow