Versatile CHP Plant for Capital Region Medical Center

CampusEnergy2019

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mtu onsite energy
A Rolls Royce Power Systems Company

AGENDA

1. *Introduction*
2. *Facility Specifics*
3. *Schedule*
4. *Benefits*
5. *UMMS CHP Background*
6. *System Operation Modes*
7. *Control System*
8. *Questions & Answers*

CAPITAL REGION MEDICAL CENTER CHP
INTRODUCTION

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Senior Sales Manager – Gas Sales NA

Objective: Use a case study to demonstrate the versatility and flexibility of CHP when integrated into a health care facility using multiple operational modes.

CAPITAL REGION MEDICAL CENTER CHP
FACILITY SPECIFICS

Washington, DC metro area's leading health care facility:

- 600,000 square feet
- 205 inpatient rooms
- 45 bay emergency department
- 8 operating rooms
- 15 bed specialty pediatric ward
- 11 level main patient care tower
- 2 roof top helipads
- Level II trauma center
- Level III neonatal intensive care
- Cardiac surgery center
- Critical care ward
- $ 543,000,000 project cost

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Schedule:

• October, 2016	Regulatory approval
• November, 2017	Ground breaking
• December, 2020	Construction complete
• March, 2021	Grand opening

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CAPITAL REGION MEDICAL CENTER CHP
BENEFITS OF CHP

Benefits of CHP for health care facility:

- Infrastructure upgrade that provides return on investment through improved energy efficiency
- Adds non-critical emergency electrical capacity
- Diversifies energy supply
- Helps meet joint commission requirements for 96-hour onsite fuel storage
- Lowers emissions of CO_2 and other pollutants
- Incentives and grants available from utility and state government to offset costs
- Reduces hospital load during “PLC Days” that set the future costs of electricity based on consumption

Additional benefits of CHP for UMCRMC:

- Increase CHP operation for thermal load when gas market pricing is high
- Increase CHP operation for electric load when electric market pricing is high
- Future addition of absorption chilling for increased summer cooling load

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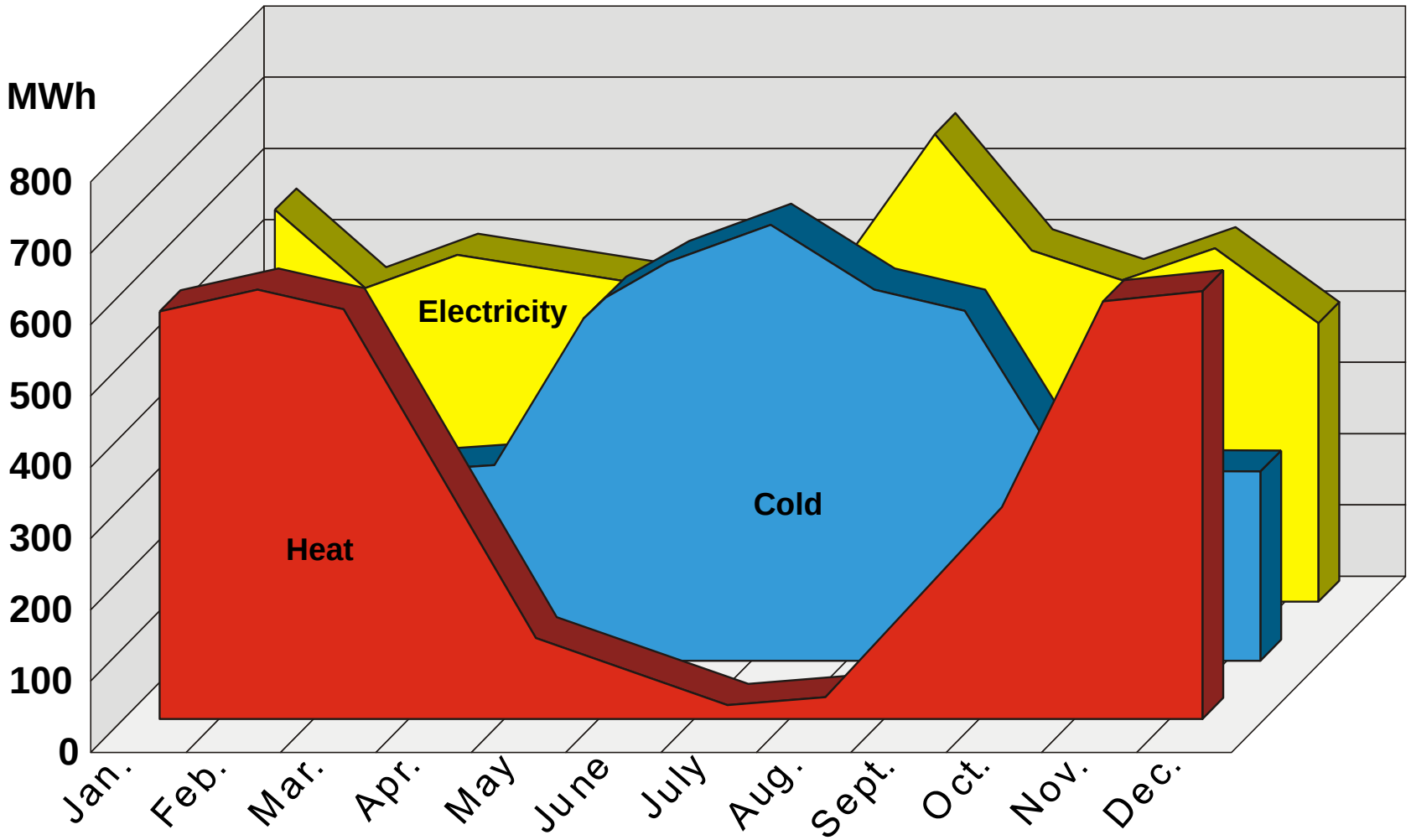
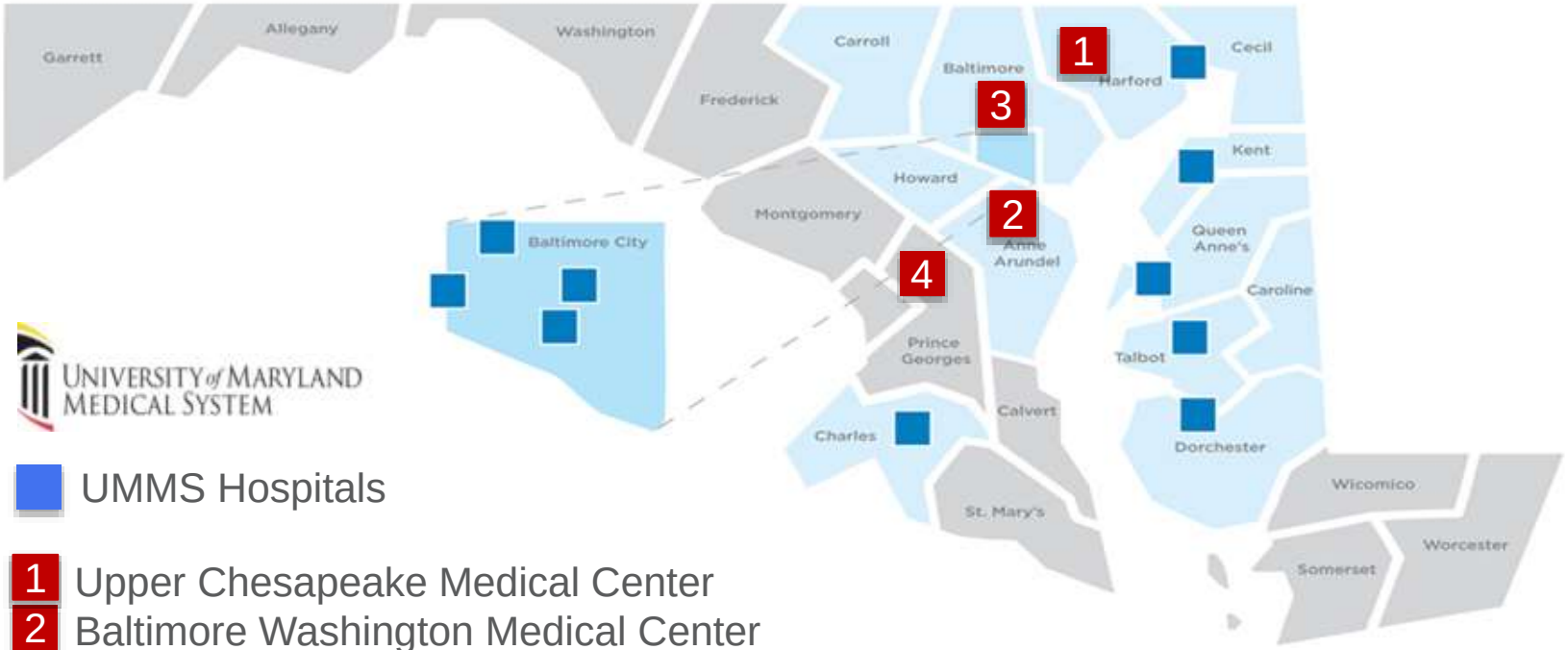
TRIGENERATION



CAPITAL REGION MEDICAL CENTER CHP NETWORK

CHP Installations at UMMS Hospitals



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UMMS Hospitals

1. Upper Chesapeake Medical Center
2. Baltimore Washington Medical Center
3. St. Joseph Medical Center
4. Capital Region Medical Center (2020)

CAPITAL REGION MEDICAL CENTER CHP
FINANCIAL REVIEW OF PREVIOUS CHP

Costs of CHP at Baltimore Washington Medical Center:

- Base Bid - $ 7,100,000
- Additional Scope for Chiller Accommodation - $ 1,000,000

Incentives & Grants:

- BGE (gas & electric utility) - $ 1,750,000
- Maryland Energy Administration - $ 446,700

Projected Annual Savings: $ 765,000

- Cost Savings from Electrical Grid - $ 1,250,000
- Additional Natural Gas Costs - $ 485,000

Projected Annual Efficiency - 75.7%
(vs 35% for grid power)

Estimated Payback Period - 7 years

CAPITAL REGION MEDICAL CENTER CHP
FINANCIAL ANAYSIS OF CHP

Costs of CHP at UMCRMC:	
• Costs to Include CHP in project -	$ 4,000,000
Incentives & Grants:	
• PEPCO (electric utility) -	$ 2,100,000
• Maryland Energy Administration -	$ 500,000
Projected Annual Savings:	$ 765,000
• Cost Savings from Electrical Grid -	$ 1,250,000
• Additional Natural Gas Costs -	$ 485,000
Projected Annual Efficiency -	75 - 80% (vs 35% for grid power)
Estimated Payback Period -	1.8 years

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ELECTRICAL OPERATION MODES

. **Normal Mode Operation**: Paralleling switchgear main bus fed by:

- (3) – 500 MVA utility feeders (150 kW min import each)
- (1) - 2.0 MWe CHP genset
- Distribution switchboards, panelboards, & MCC feed all downstream loads

Emergency Mode Operation: Paralleling switchgear senses loss of 2 utility feeders and begins the following automatic sequence:

- Opens all utility breakers
- Opens CHP breaker. CHP goes into idle/cooldown mode
- Starts 2.0 MWe emergency gensets. The first emergency genset to reach 90% of nominal voltage and 58 HZ will close its breaker onto the paralleling switchgear main bus segment. The second emergency genset to reach 90% of nominal voltage and 58 HZ will synchronize with the main bus then close onto the main bus segment. Generator bus tie breaker will close after both bus segments are synchronized.
- ATS's will switch to emergency bus.
- Distribution switchboards, panelboards, & MCC feed all downstream loads
- After synchronizing to main bus, CHP breaker closes on main bus and ramps up load

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ELECTRICAL OPERATION MODES

Storm Preparedness Mode Operation: SPM key switch in paralleling switchgear placed on AUTO position allows the following sequence when it senses loss of 2 utility feeders:

- Starts 2.0 MWe emergency gensets. The first emergency genset to reach 90% of nominal voltage and 58 HZ will close its breaker onto the paralleling switchgear main bus segment. The second emergency genset to reach 90% of nominal voltage and 58 HZ will synchronize with the main bus then close onto the main bus segment. Generator bus tie breaker will close after both bus segments are synchronized.
- ATS's will switch to emergency bus.
- Distribution switchboards, panelboards, & MCC feed all downstream loads
- After synchronizing to main bus, CHP breaker closes on main bus and ramps up load.

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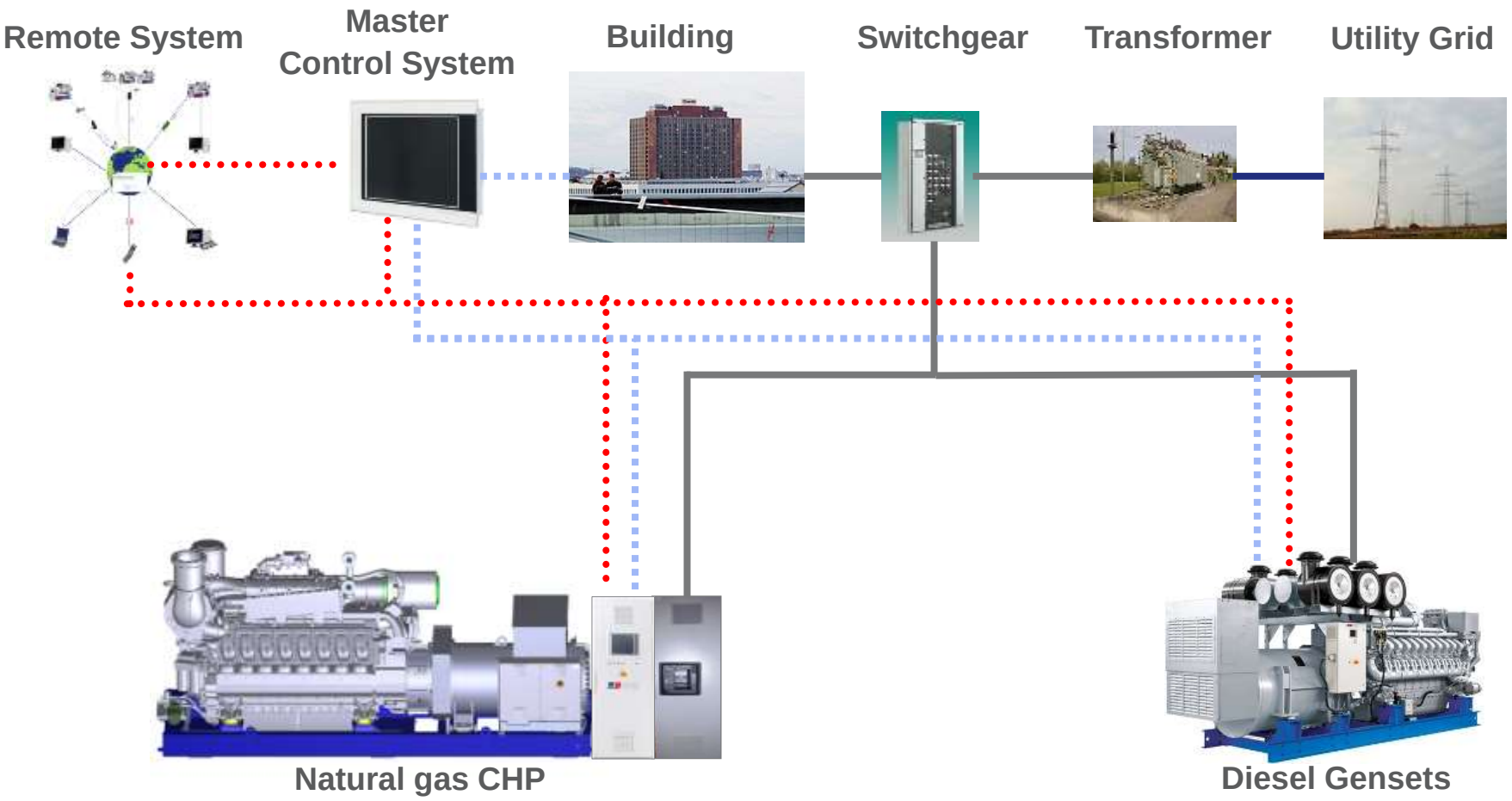
CHP CONTROL SYSTEM



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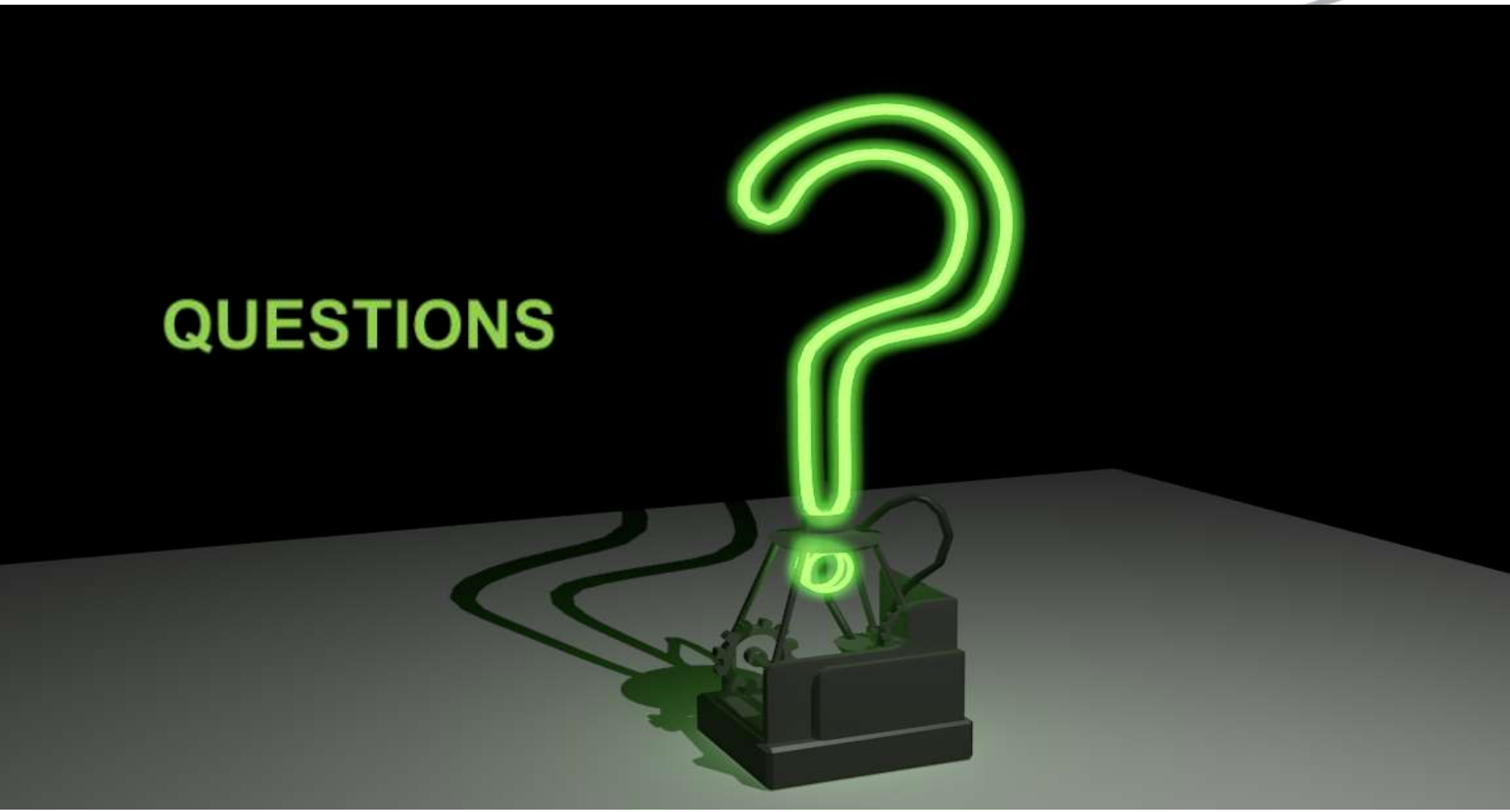
QUESTIONS & ANSWERS



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Thank you for your attention !

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