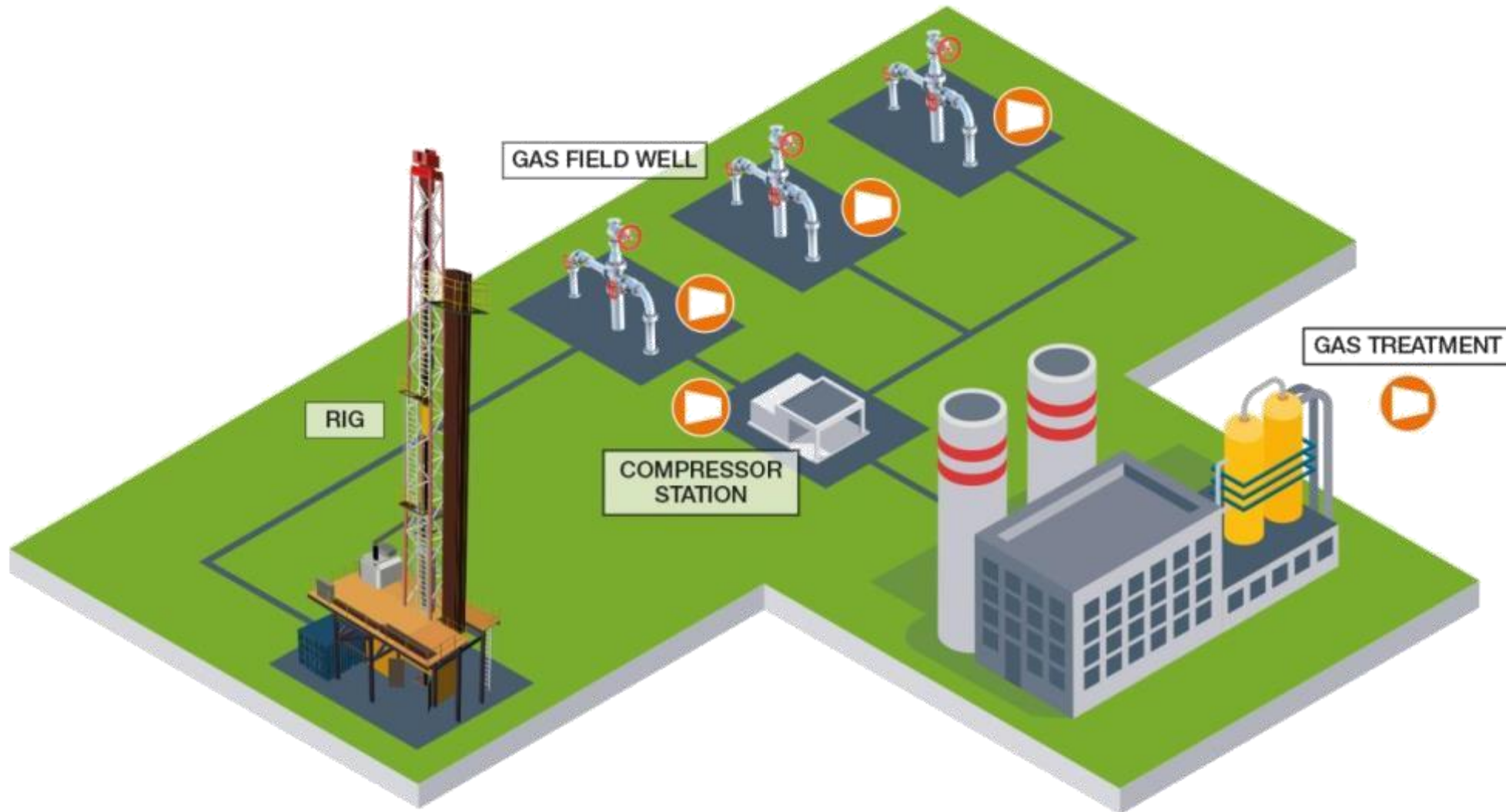


# Gas / Electric Options for Gathering & Treatment of Natural Gas

Scott Tackett

# Gas Gathering and Treatment



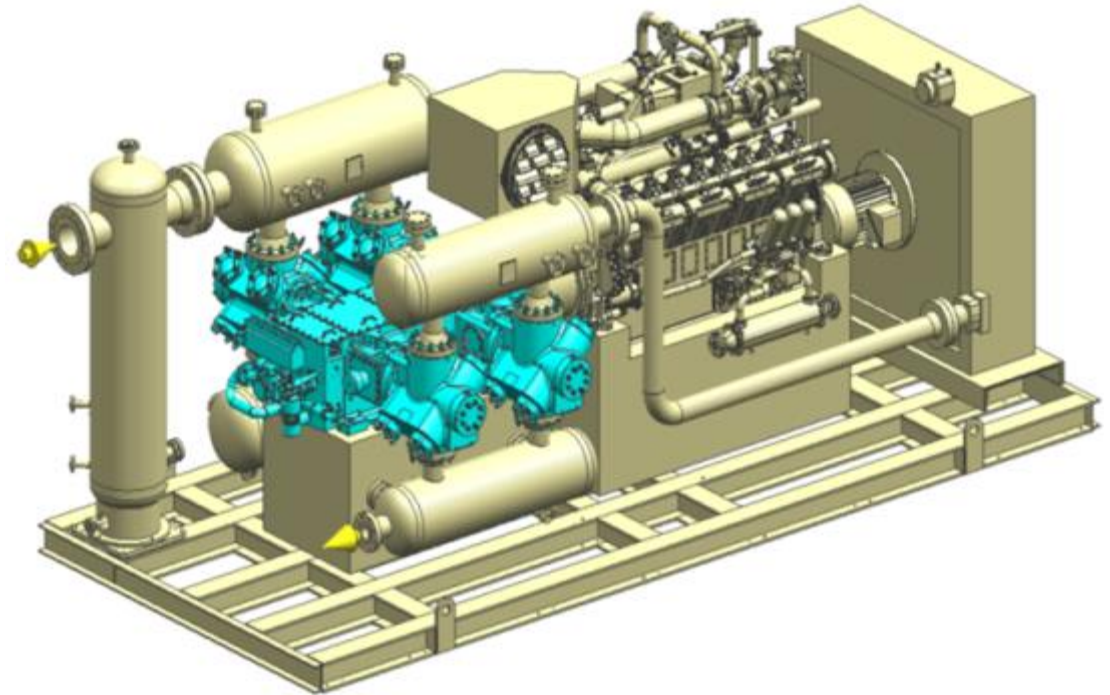
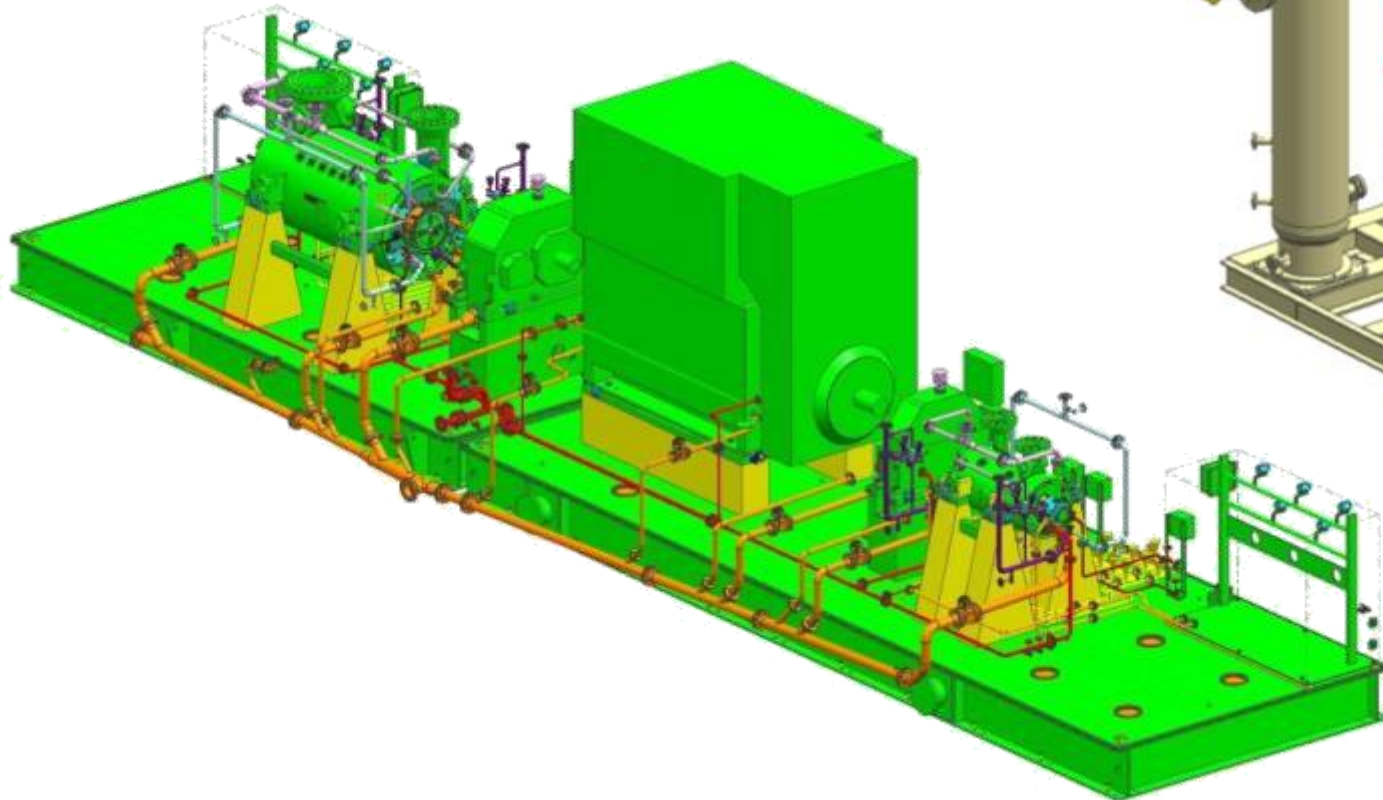
# Factors to Consider on Compressor Station Design



- Site location
- Variable fuel costs (gas or electric)
- Variable load, conditions, and operating hours
- Variable compressor efficiency
- Variable fuel efficiency (heat rate)
- O&M cost
- Reliability / Availability / MTBO
- Commonality with other equipment
- Local field service support
- Environmental considerations
- Initial capital cost

# Compression Options

Centrifugal Compressors



Reciprocating Compressors

# Driver Options



Gas Turbine

5000-55000 HP



Gas Engine

1250 – 5350 HP



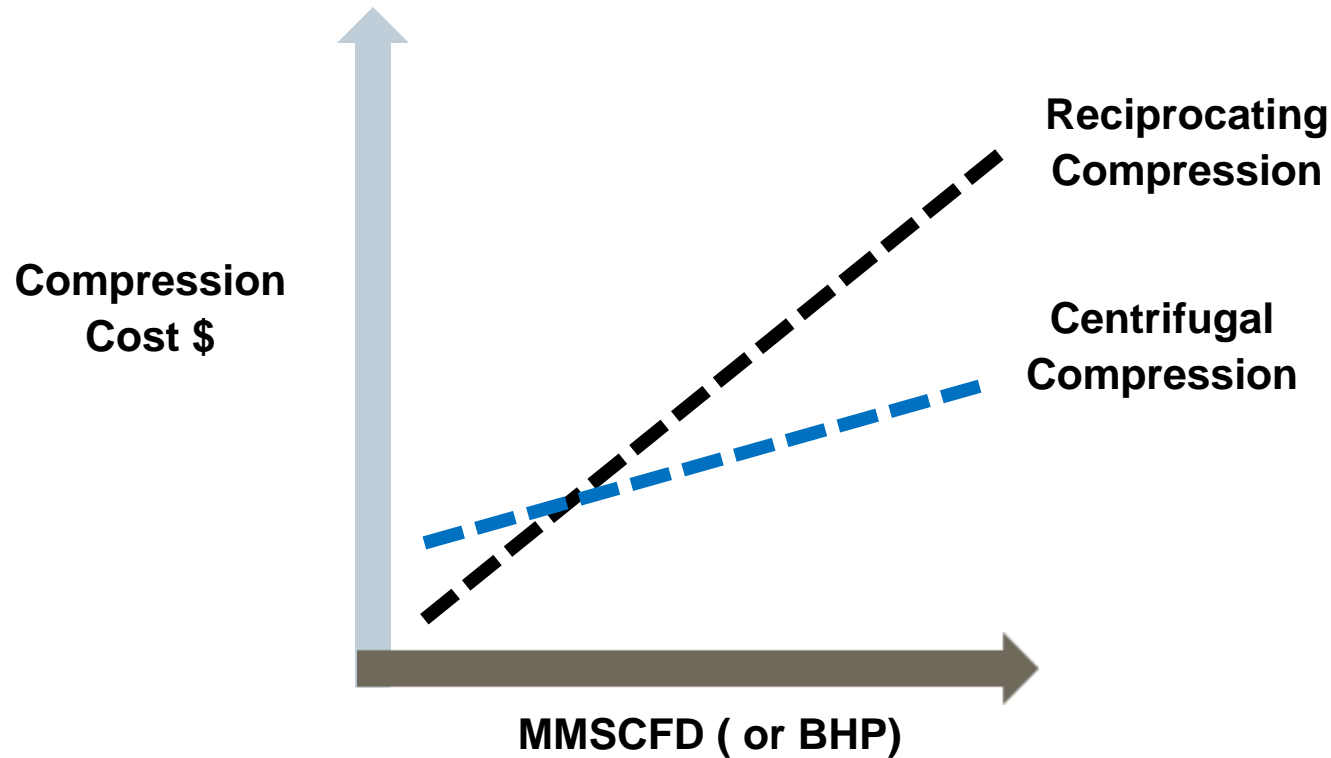
Electric Motor

1250 – 55000 HP

# Capital Cost Comparison



Centrifugal compressors offer economies of scale with larger gas gathering and gas treatment facilities (100 mmscfd+).



Example

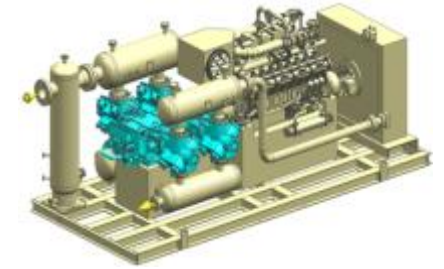
Centrifugal Solution		
Gas Turbine Model	SGT-100	SGT-400
Compressor Model	D6R8B	D12R8B
BHP	6500	20000
\$ MM	\$ 5.5	\$ 9.0
\$ / BHP	\$ 846	\$ 450

Reciprocating Solution		
Gas Turbine Model	G3516	G3608
Compressor Model	MOS	HOS
BHP	1365	2500
\$ MM	\$ 1.2	\$ 2.0
\$ / BHP	\$ 879	\$ 800

With a centrifugal solution, the larger the plant, the less the \$/MMSCFD capital cost.

# Comparison of Technologies (100 MSCFD Facility)

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	Gas Turbine	EMD Recip	EMD Centrif	Gas Engine
Capex	◆◆◆◆◆	◆◆◆◆	◆◆◆	◆◆
Maintenance	◆◆◆	◆◆◆◆	◆◆◆◆◆	◆◆
Fuel cost	◆◆◆	N/A	N/A	◆◆◆
Train Efficiency	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆
Redundancy	◆◆	◆◆◆◆	◆◆◆◆◆	◆◆◆
Emissions	◆◆◆◆◆	N/A	N/A	◆◆◆◆
Installation Costs	◆◆◆◆◆	◆◆◆	◆◆◆	◆◆
Local service	◆◆◆	◆◆◆◆	◆◆◆◆	◆◆◆◆◆
Fuel flexibility	◆◆◆◆◆	N/A	N/A	◆◆

# Summary

So what's the right answer?

- Well it depends.....do you have a reliable grid?
- In a project where capex is heavily evaluated a gas turbine compressor set has significant merit.
  - Large power blocks
  - Fuel flexibility near the wellhead
- In a market where redundancy is heavily evaluated a gas engine reciprocating package has significant merit
  - Smaller power blocks
  - Accessibility to parts and service





Siemens introduces the SGT-A45 mobile unit  
Fast Power. Superior value. Trusted technology.

**SIEMENS**  
*Ingenuity for life*



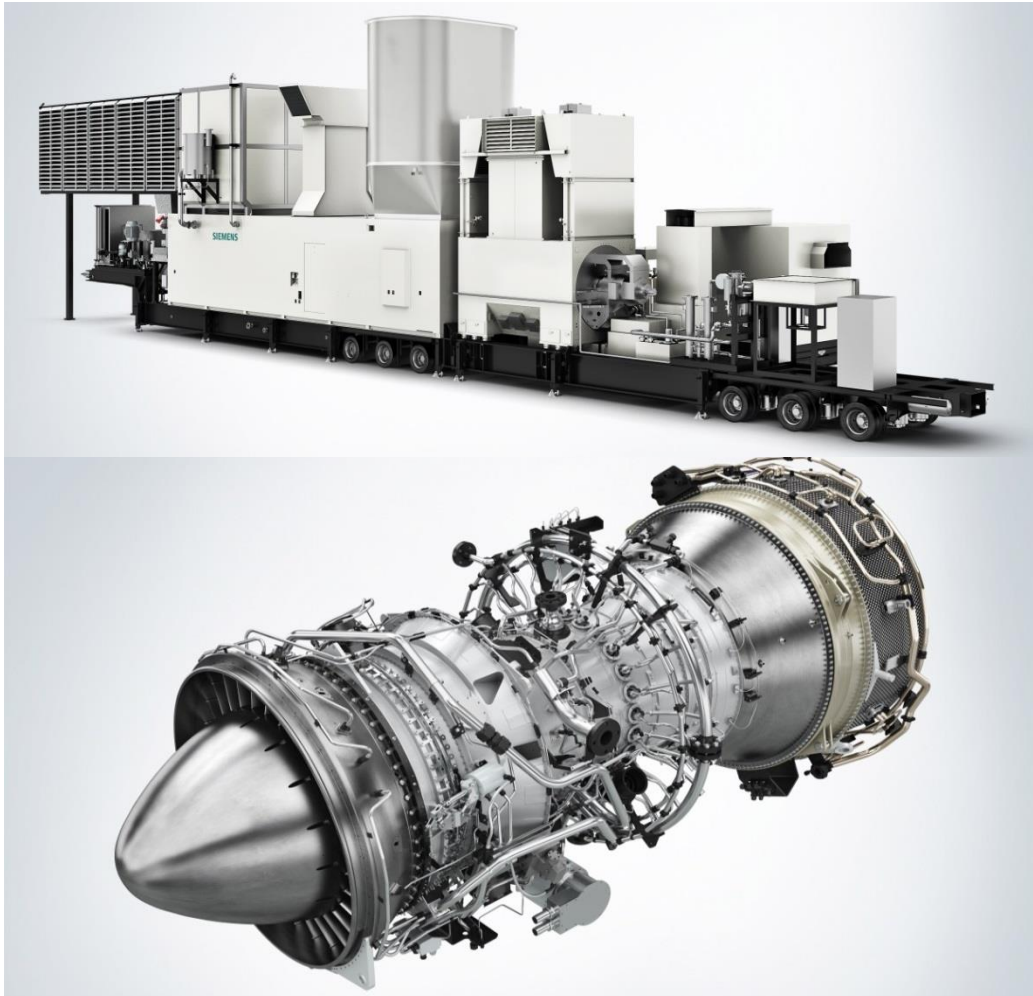
**Up to 44 MW<sub>e</sub>**

**Production launched: November 2017**

# SGT-A45 Mobile Unit

Fast Power. Superior Performance. Trusted technology.

**SIEMENS**  
*Ingenuity for life*



## Fast Power

- ✓ 2-weeks installation
- ✓ Mobile by road, air or sea
- ✓ Minimal site interfaces and preparation

## Cost-effective power solution

- ✓ 44 MW<sub>e</sub> (ISO) with outstanding power density
- ✓ CAPEX savings with fewer units (\$/kW)
- ✓ Performance optimized for hot climates

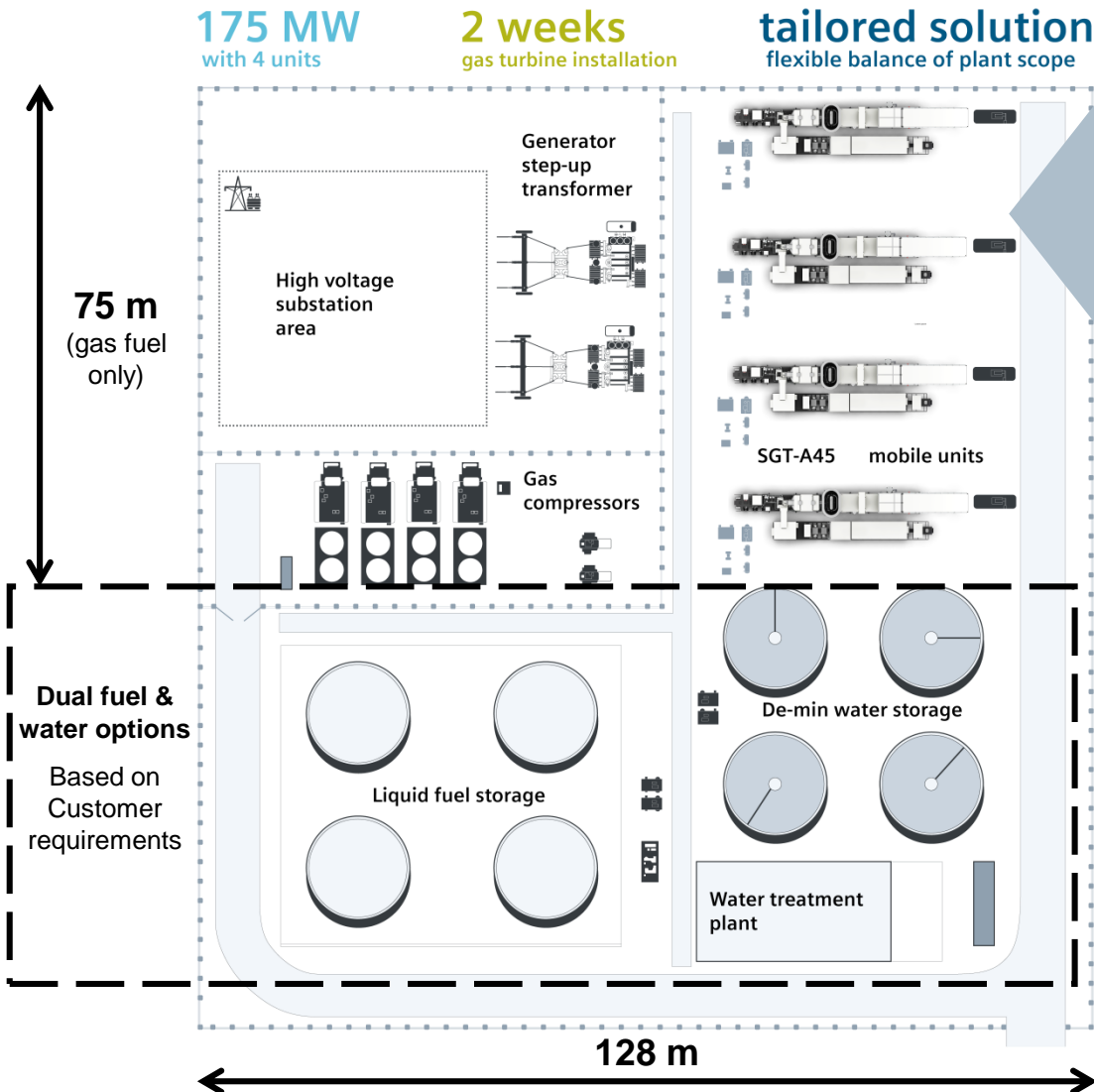
## Superior value in operation

- ✓ OPEX savings with high fuel efficiency
- ✓ Liquid and gas fuel with same service interval
- ✓ Proven turbomachinery in industrial package

## Flexible, dependable technology

- ✓ 50 Hz or 60 Hz
- ✓ Emissions as low as 25 vppm NO<sub>x</sub>
- ✓ Fast start (< 8 mins) and no “hot lock-out”

# Reference Plant 175 MW (ISO) – 4x SGT-A45 units



**Truck access for GT installation**

One side only – Balance of Plant installation can proceed undisturbed in parallel

**175 MW (ISO) in 1 hectare (2.5 acres)**  
(gas fuel only without water injection)

**High mobility options for Balance of Plant**



Thank you!

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