



NTPC Dadri 5MW

NTPC Bhadla 260MW

NTPC Kawas Blending GH2 - NG

“Case Study on Green Ammonia projects”



NTPC Simhadri 25MW

Shimbhu Ki Bhurj I 250MW

NTPC Rojmal 50MW

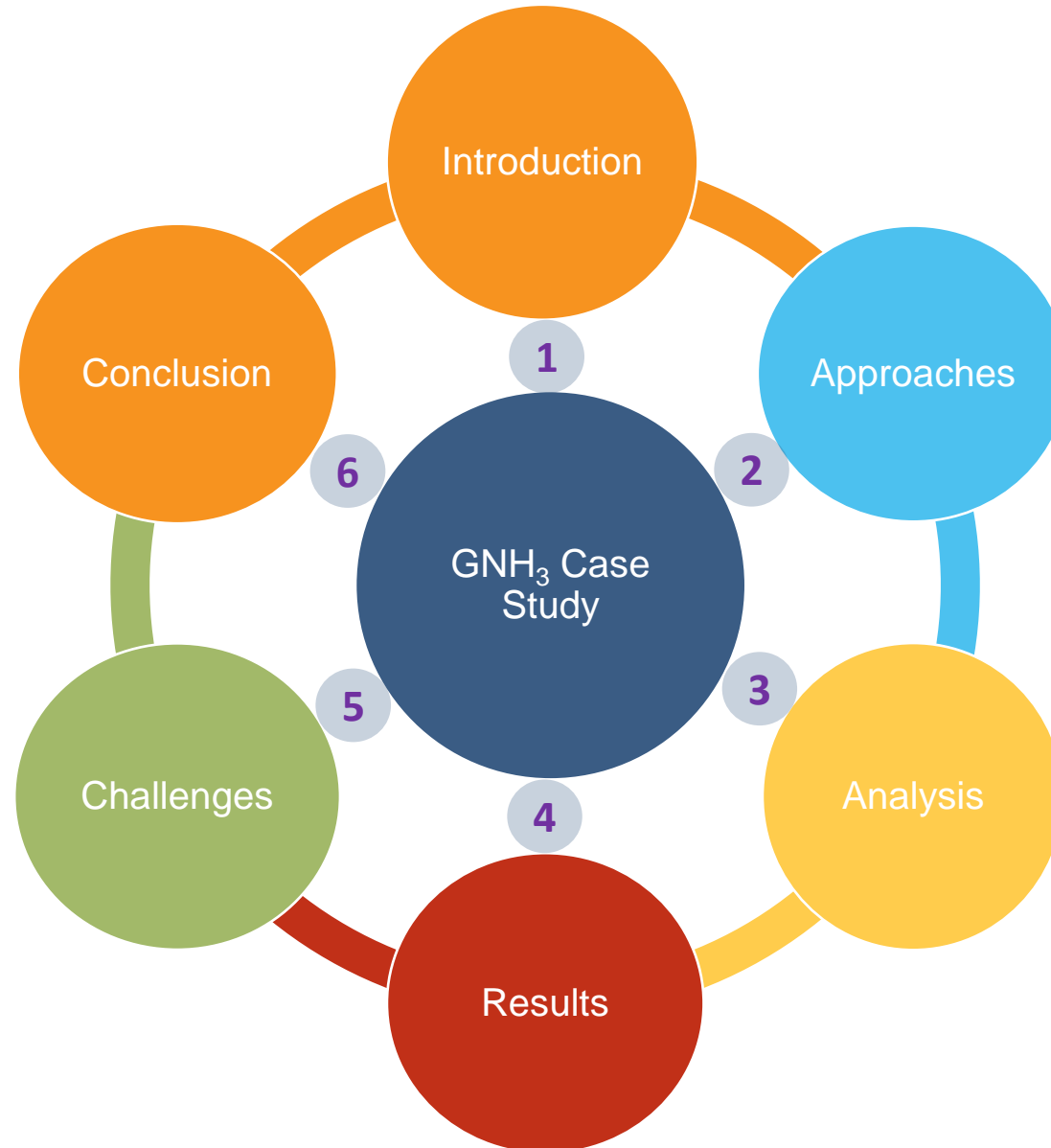
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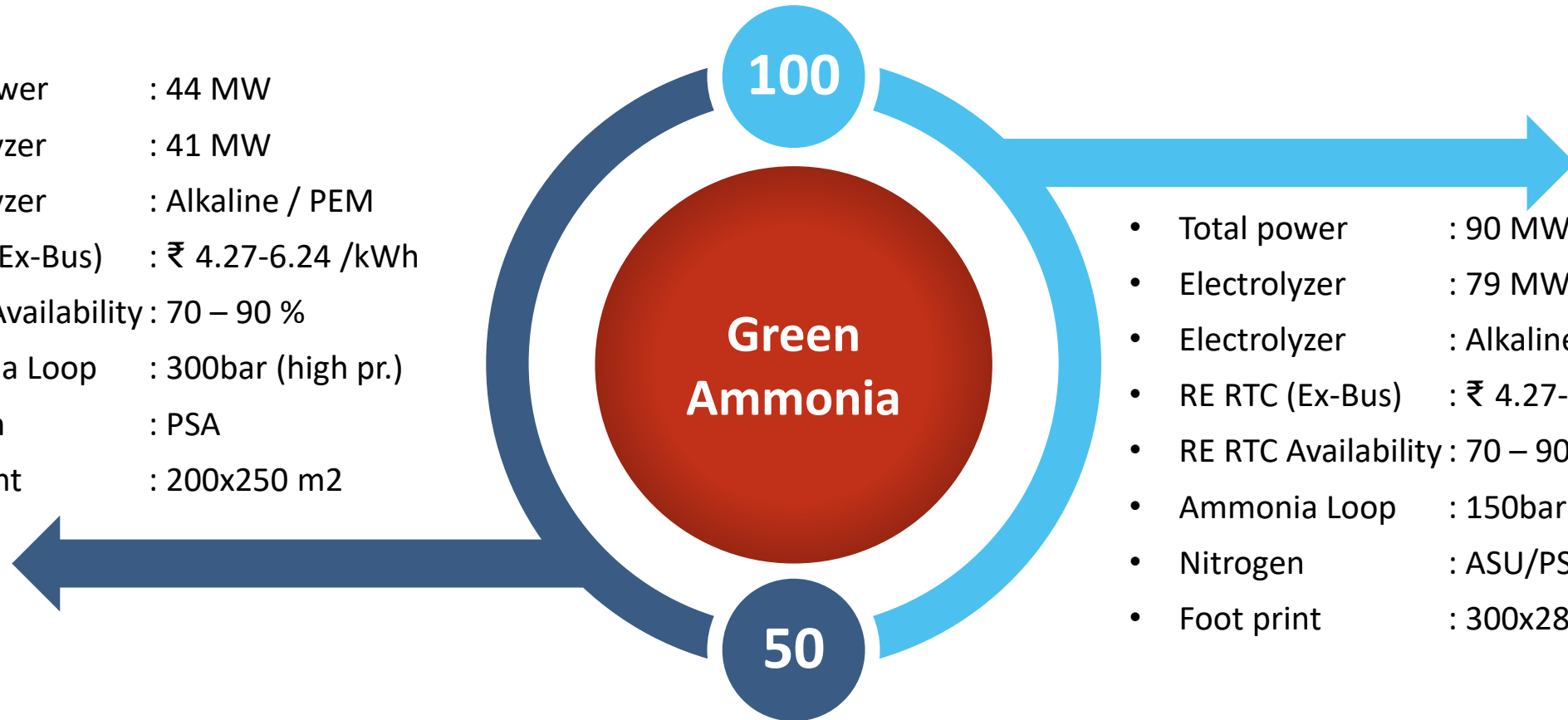


50 TPD

- Total power : 44 MW
- Electrolyzer : 41 MW
- Electrolyzer : Alkaline / PEM
- RE RTC (Ex-Bus) : ₹ 4.27-6.24 /kWh
- RE RTC Availability : 70 – 90 %
- Ammonia Loop : 300bar (high pr.)
- Nitrogen : PSA
- Foot print : 200x250 m²

100 TPD

- Total power : 90 MW
- Electrolyzer : 79 MW
- Electrolyzer : Alkaline / PEM
- RE RTC (Ex-Bus) : ₹ 4.27-6.24/kWh
- RE RTC Availability : 70 – 90 %
- Ammonia Loop : 150bar (low pr.)
- Nitrogen : ASU/PSA
- Foot print : 300x280m²



1 Ammonia Loop

- **KAAP plus™** (KBR Advanced Ammonia Process plus) with Ruthenium catalyst
- **Tsubame BHB** – Synthesis by Electride Catalyst (Small scale onsite pilot)
- **CASALE / LINDE** – Low Pressure cycle, Turn down – 10%
- **Stami carbon** – High Pressure cycle 300bar, Low Refrigeration, Compact, High single pass yield at 22% against 17%, Turn down – 30%
- **Thyssenkrupp** offers fully modularized 50TPD and 300 TPD
- **Topse** – SOEC based

2 Electrolyzer

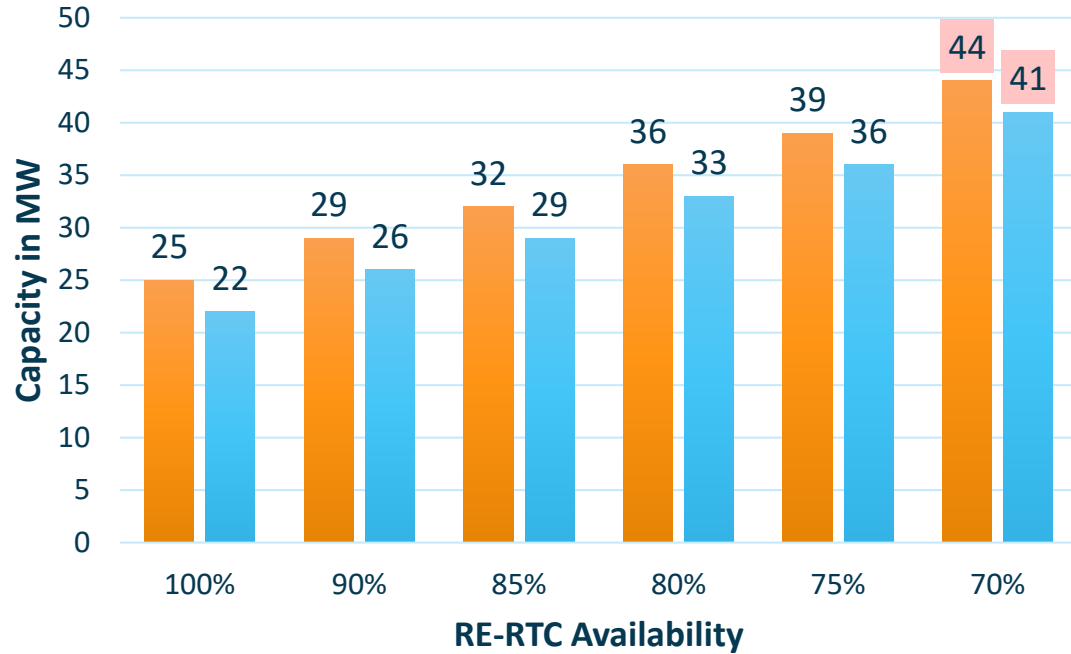
- Alkaline
- PEM
- AEM
- SOEC

3 Nitrogen

- Pressure Swing Absorption (PSA) up to 50TPD (1500 Nm³/hr.)
- Air Separation Unit (ASU) >100 TPD and larger

Electrolyzer Capacity and Contracted Power Demand

**50TPD GNH₃
Capacity - RE RTC**

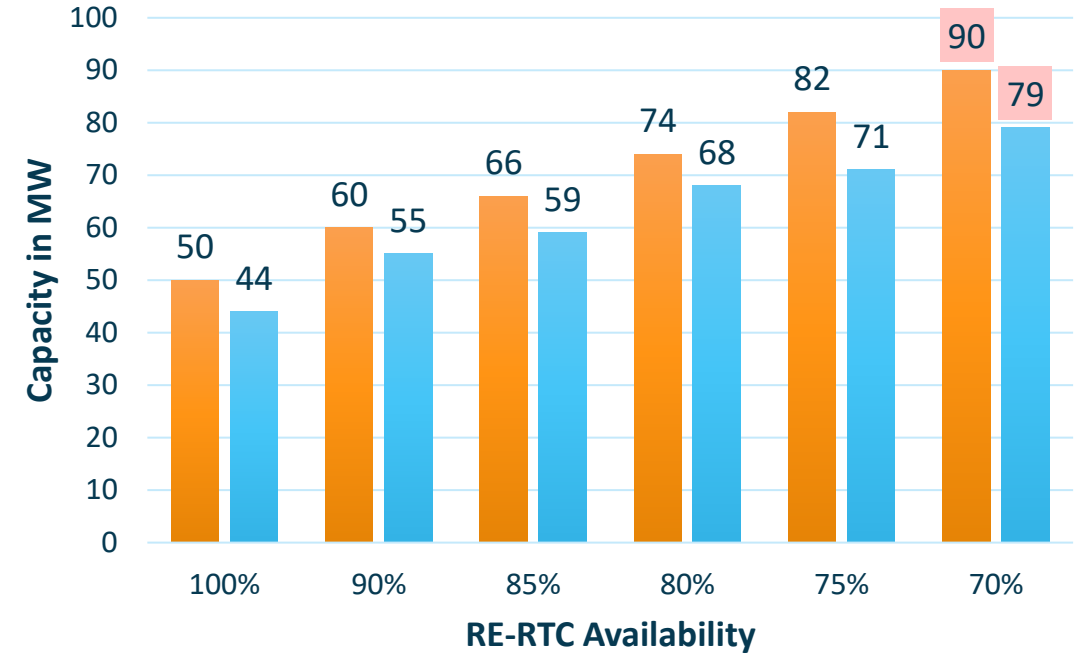


■ Total Contract Power (MW) ■ Electrolyzer Capacity (MW)

RTC tariff

- For 70% - ₹ 4.27/kWh
- For 75% - ₹ 4.82/kWh
- For 80% - ₹ 5.34/kWh
- For 85% - ₹ 5.81/kWh
- For 90% - ₹ 6.24/kWh

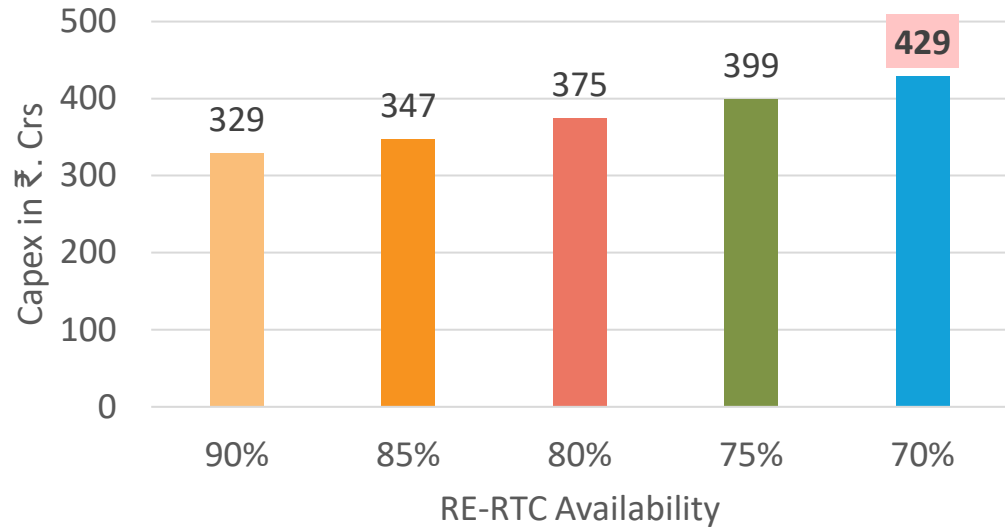
**100TPD GNH₃
Capacity - RE RTC**



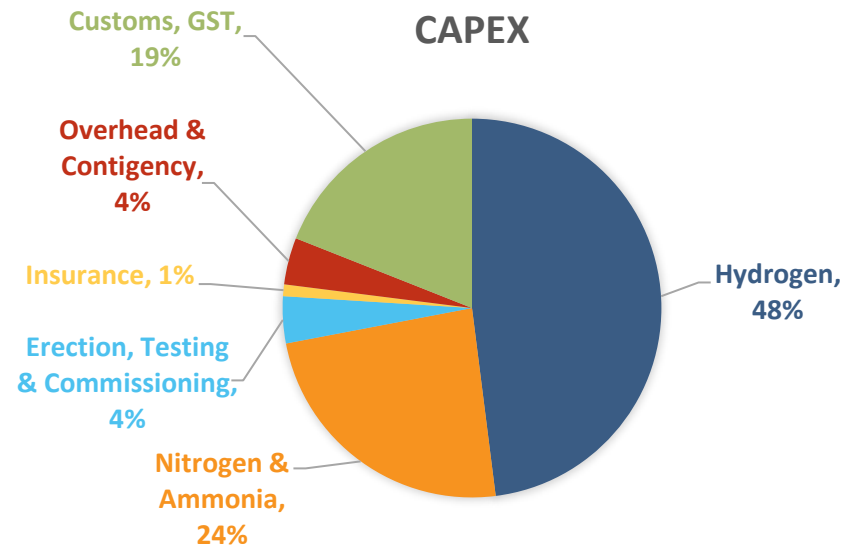
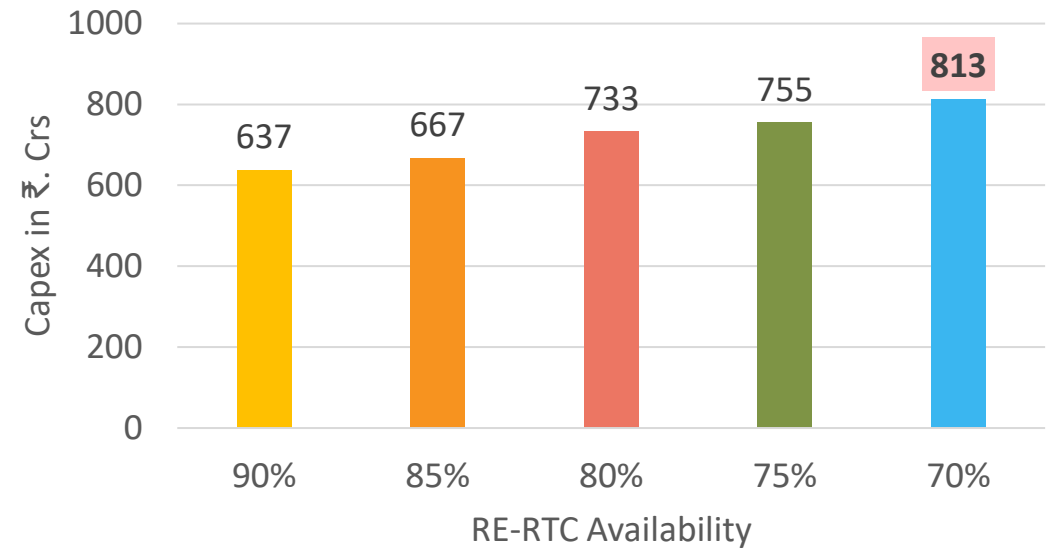
■ Total Contract Power (MW) ■ Electrolyzer Capacity (MW)

CAPEX

50TPD GNH₃
CAPEX – RE RTC

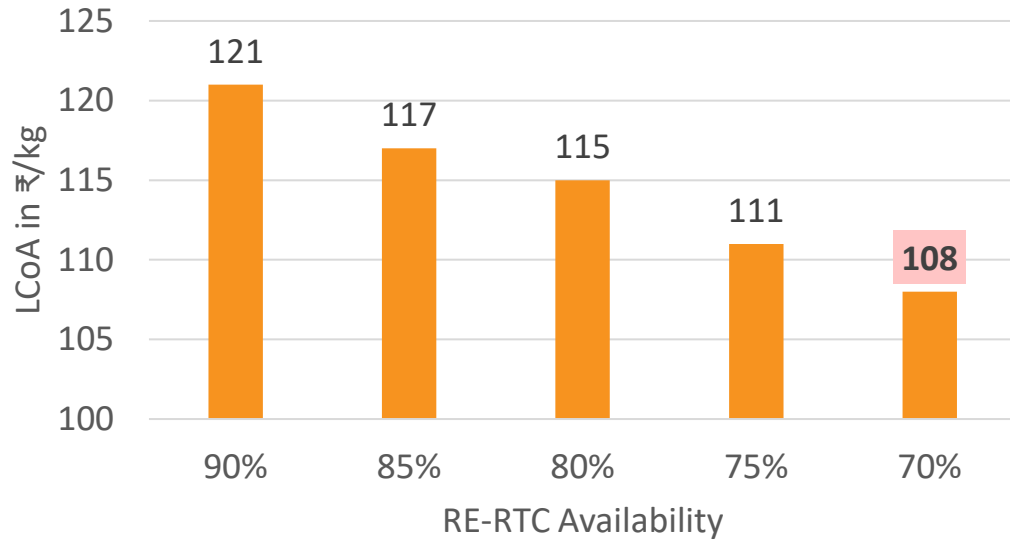


100TPD GNH₃
CAPEX – RE RTC

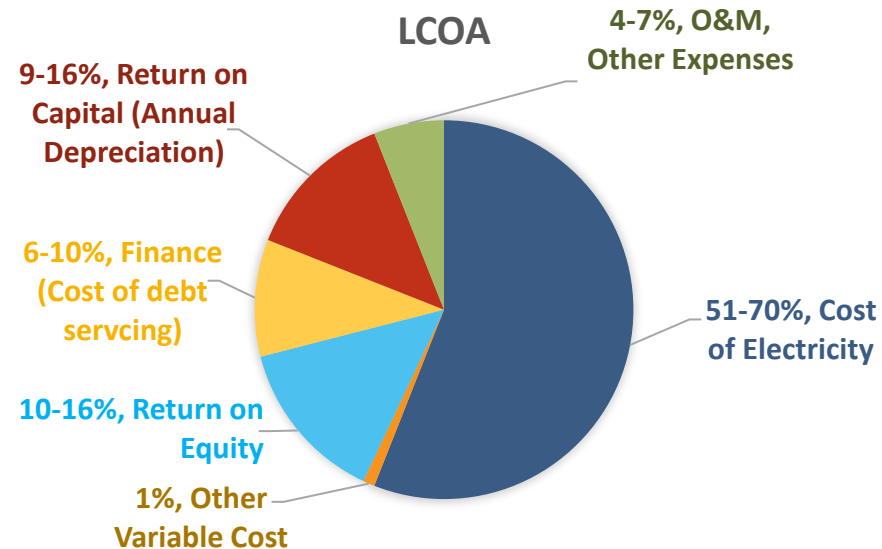
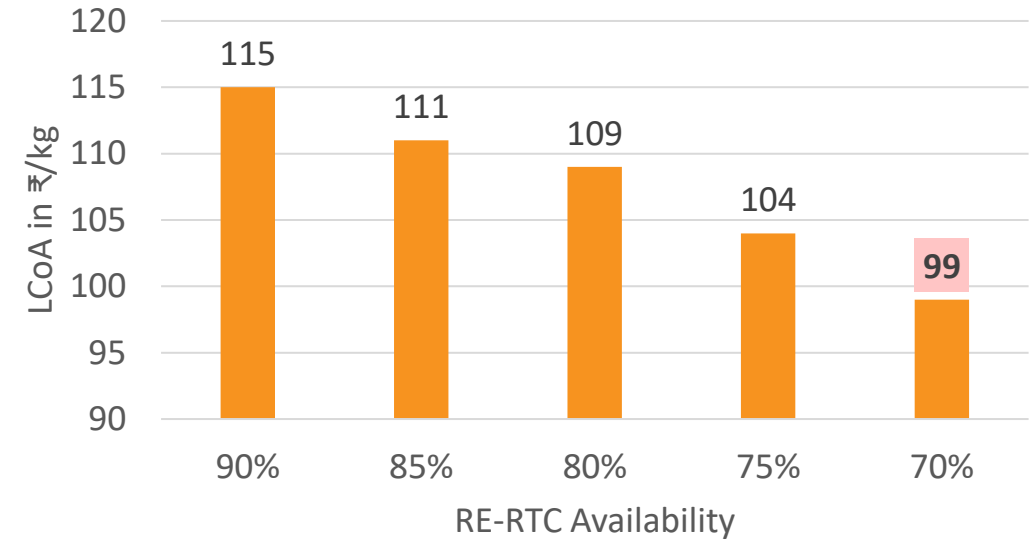


Levelized Cost of Ammonia

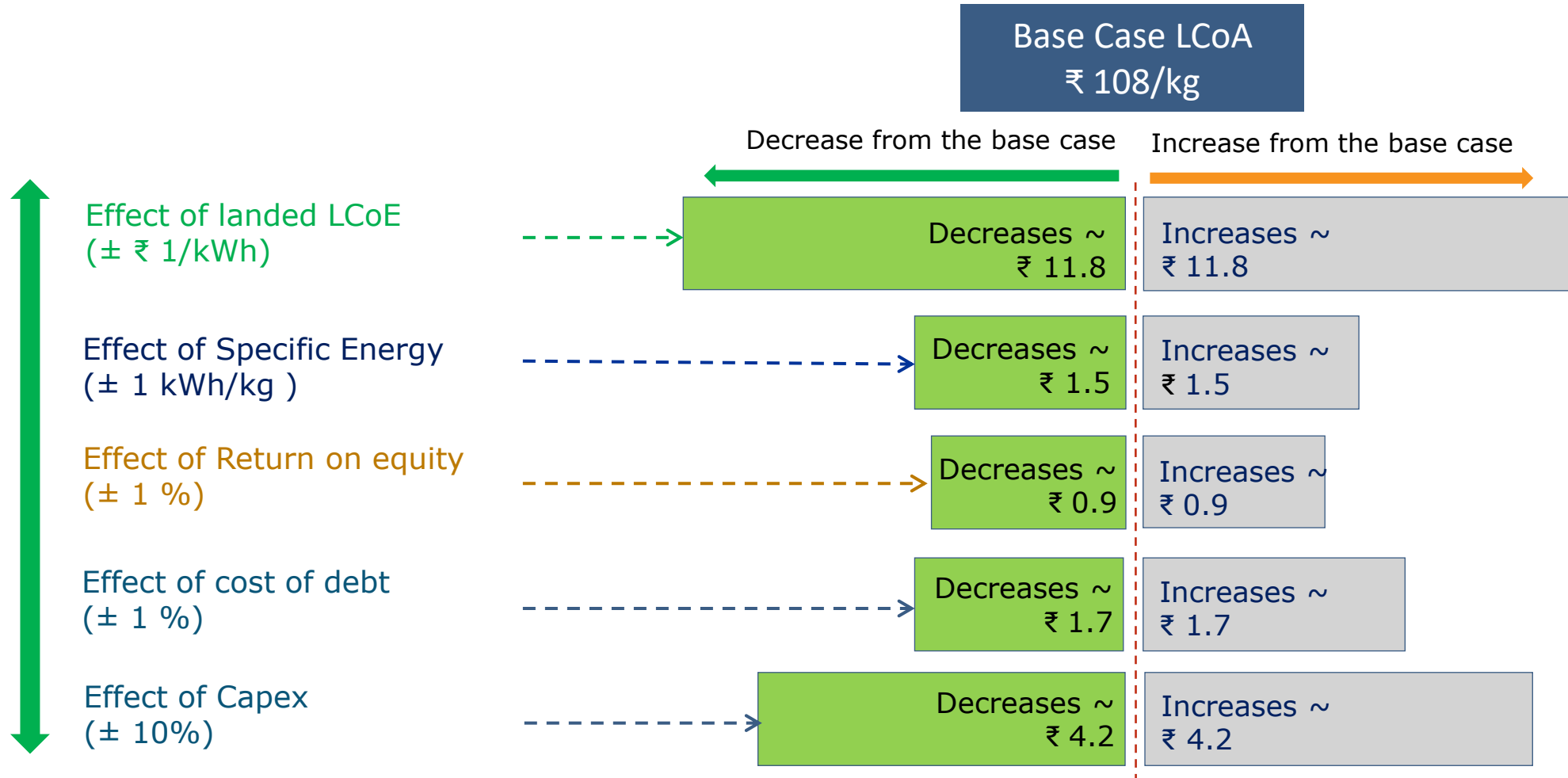
50 TPD - LCoA



100 TPD - LCoA



Sensitivity Analysis



Effect of few other parameters:

- Reduction in GST from 18%
- Exemption of custom duty

Key Challenges

1

Long lead time on hydrogen technology components

2

High initial investment cost for Manufacturing setup

3

Demand and cost of the critical raw materials and final product

4

Renewable Energy - Round the Clock (RE-RTC)

5

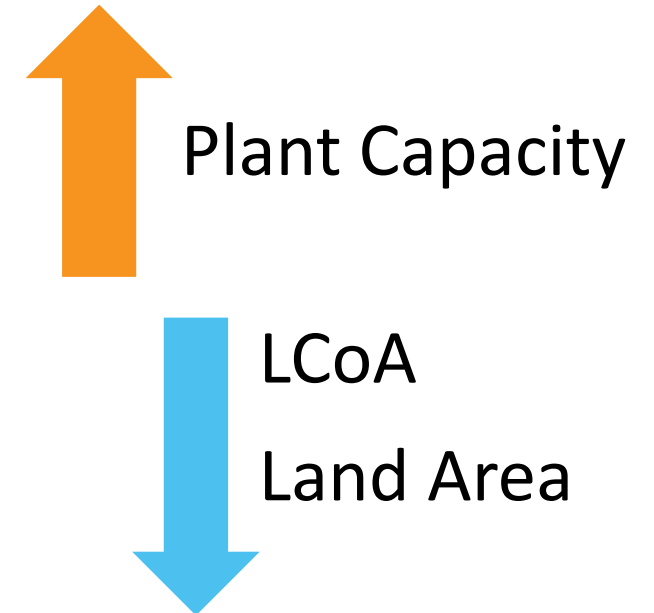
High CAPEX and OPEX on Green Hydrogen Application

6

Lack of R&D facilities , Technological invention, Codes and Standards

Conclusion

Parameter	50 TPD	100 TPD	1000 TPD
Total power (MW)	44 MW	90 MW	685 MW
Electrolyzer (MW)	41 MW	79 MW	623 MW
Electrolyzer Type	Alkaline	Alkaline	Alkaline & PEM
RE RTC (Ex-Bus) (₹ / kWh)	4.27-6.24	4.27-6.24	4.0-6.24
RE RTC Availability (%)	70 – 90	70 – 90	70 – 90
Ammonia Loop	300bar (high pr.)	150bar (low pr.)	150bar (low pr.)
Nitrogen	PSA	ASU / PSA	ASU
Land area	9	17	100
Capex ₹ in Cr.	429	813	8000
LCoA ₹ / kg	108	99	95





Migratory Birds at NTPC Dadri



Thank You



NTPC Ramagundam

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