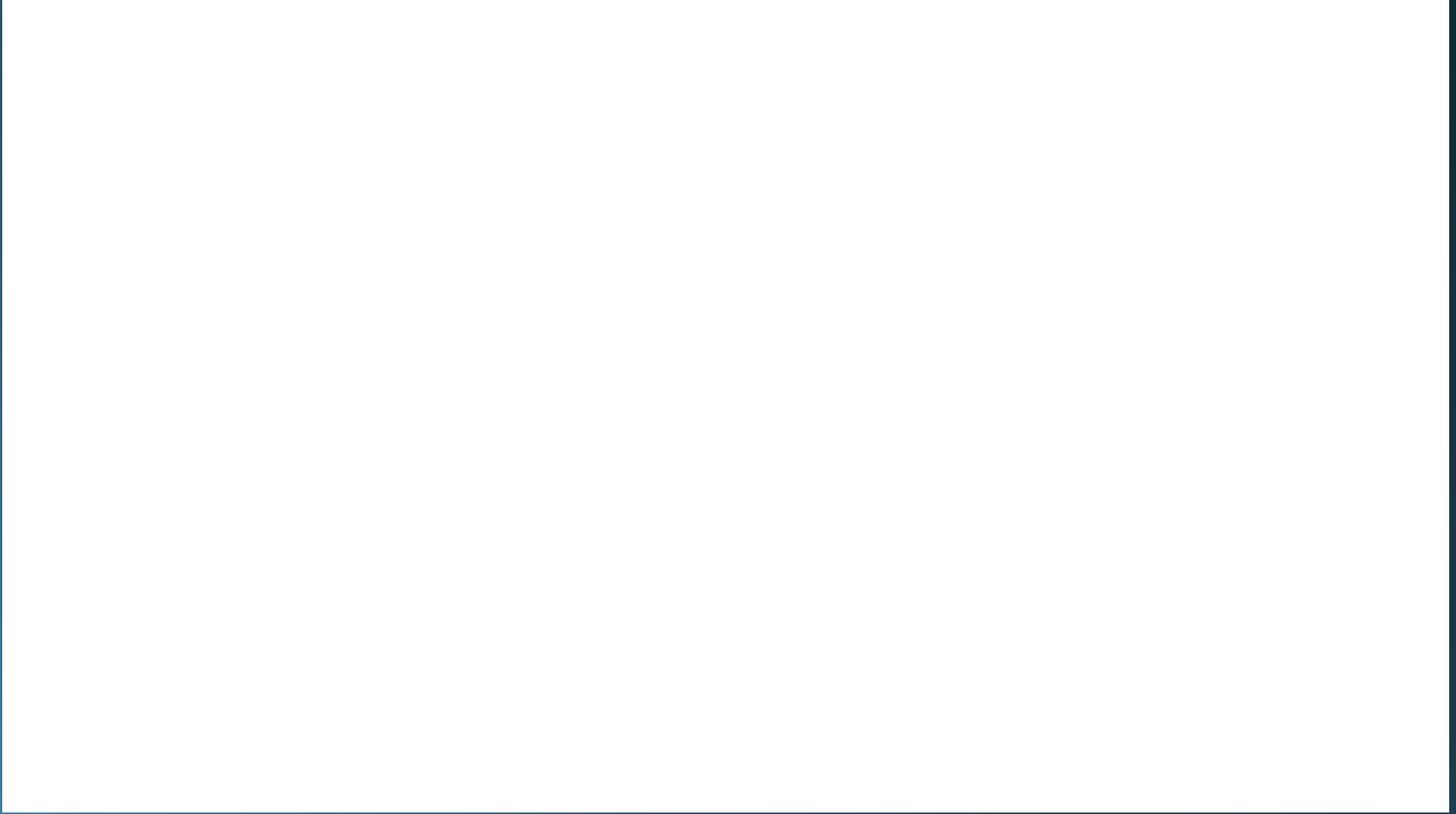


# The Asian Renewable Energy Hub

Nyangumartamili  
wagal pa janyja

20 October 2020



Video: <https://youtu.be/ln6JNi1NH1Q>



# GREEN AMMONIA PRODUCTION & EXPORT

Feasibility Study conducted in 2019 by German technology company thyssenkrupp.

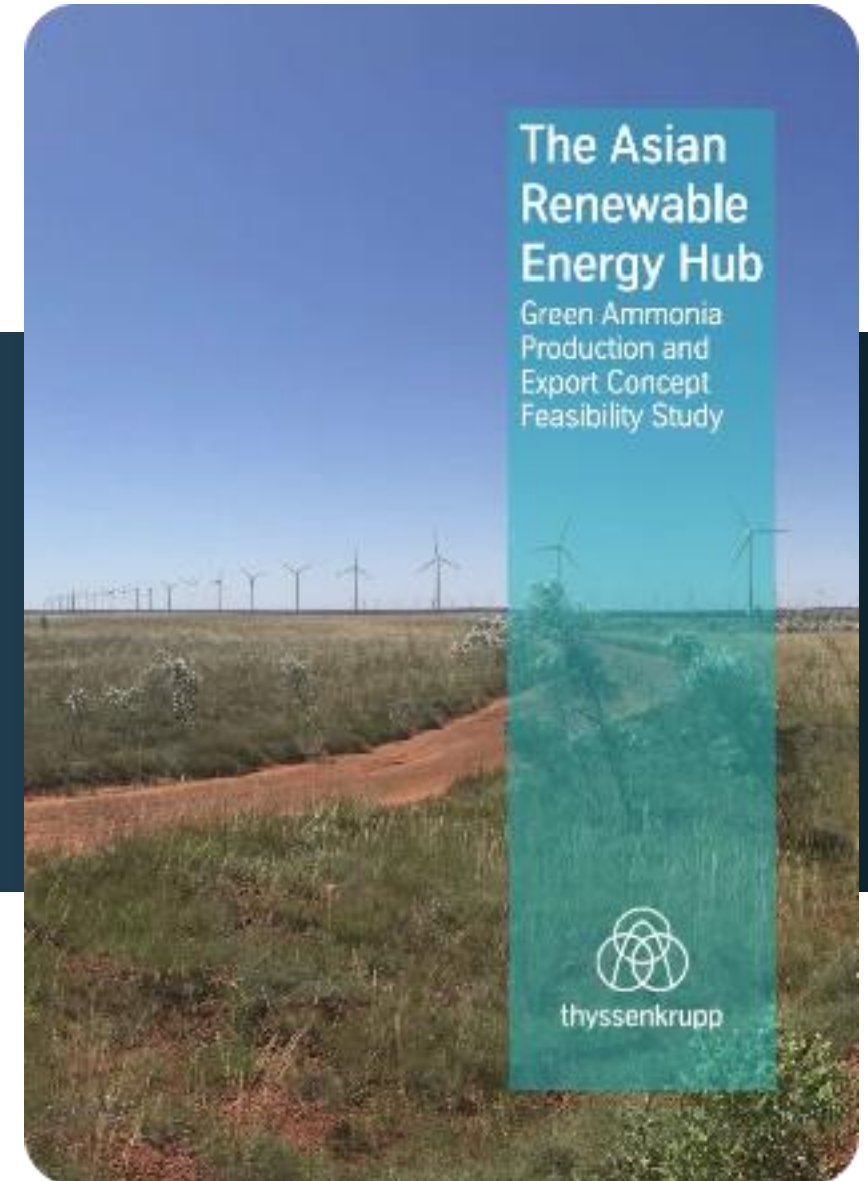
<b>16GW</b>	wind generation
<b>+ 10GW</b>	solar generation
<b>14GW</b>	of electrolyzers
<b>1.75 million</b>	Tpa of green hydrogen
<b>9.9 million Tpa</b>	green ammonia (27,000 Tpd)

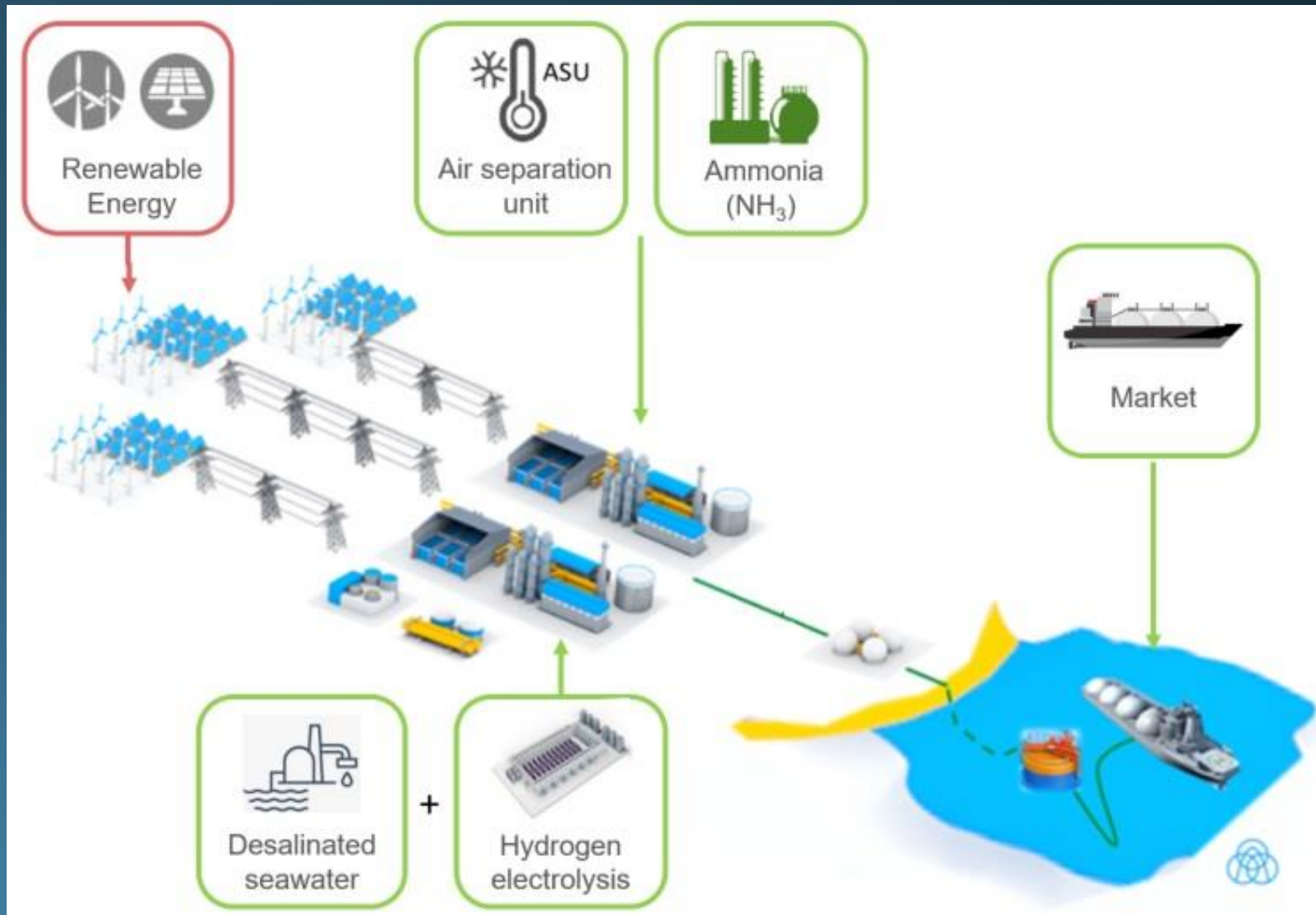
## Export of green ammonia:

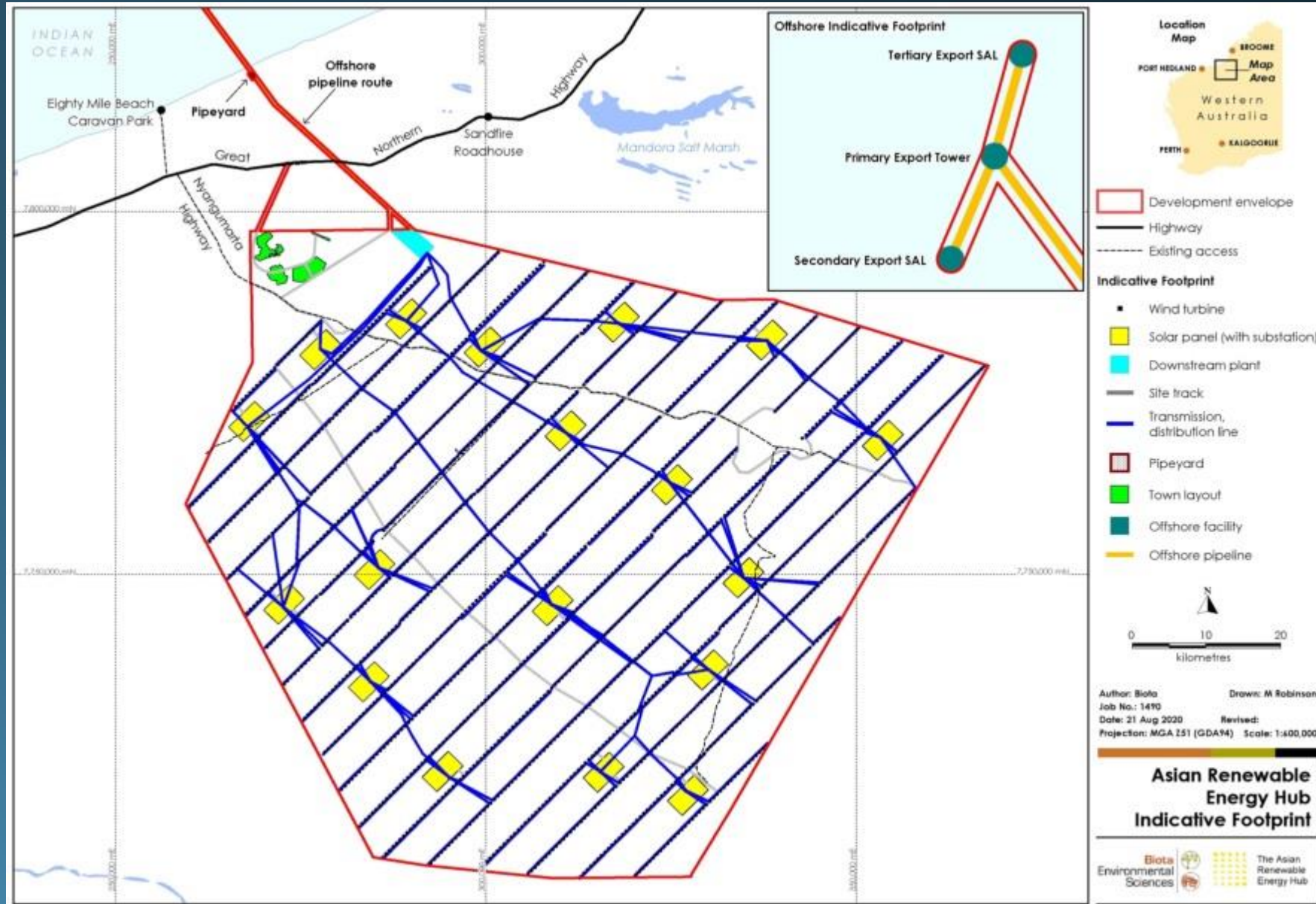
Long term price certainty.  
Long term fuel supply certainty.  
No carbon risk.

## Western Australia:

Investment security  
and low geopolitical risk.







# GREEN AMMONIA PRODUCTION DRIVERS

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Green ammonia production is very different from brown/blue ammonia production

## **Matching Upstream variable generation to Downstream process requirements**

- Choose a site with solar and wind, and windy at night
- Combine wind, solar and electrolysis in the right proportions
- Maximise the dispatchable loads (desalination, electrolysis etc)
- Use enough (but not too much) hydrogen storage
- Ammonia synthesis "rocks and pebbles"

## **The benefits of massive scale**

- Allows faster global decarbonisation
- Reduces upstream variability
- Increases the ability to use alkaline electrolyzers (cheaper and longer life than PEM)
- Reduces LCoA and delivery risks through successive implementation phases (start small and grow big)
- Increases flexibility with multiple ammonia synthesis trains ("rocks and pebbles")
- Localise manufacturing / maintenance facilities
- Automation / robotics efficiencies
- Gives confidence to large emerging markets that supply can scale with demand
- Allows servicing of multiple offtake markets and sector coupling







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