North Rukwa: A unique, prolific helium producing system.

noble HELIUM

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He
$1s^2$
helium

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No reserves have been assigned in connection with the Company's property interests to date, given their early stage of development. Unrisked Prospective Helium Volumes have been defined. However, estimating helium volumes is subject to significant uncertainties associated with technical data and the interpretation of that data, future commodity prices, and development and operating costs. There can be no guarantee that Noble Helium will successfully convert its helium resource to reserves and produce that estimated volume.

Competent Person's Statement

The prospective volumes are for helium, which are not hydrocarbons. However, Netherland, Sewell & Associates, Inc. have used the definitions and guidelines set forth in the 2018 Petroleum Resources Management System (**SPE-PRMS**) approved by the Society of Petroleum Engineers as the framework to classify these helium volumes as "prospective". The SPE-PRMS is specifically designed for hydrocarbons, which helium is not, however the principles and methods for hydrocarbon gas resource estimation are directly applicable to helium gas volume estimation.

The prospective helium volumes included in this presentation should not be construed as petroleum reserves, petroleum contingent resources, or petroleum prospective resources. They represent exploration opportunities and quantify the development potential in the event a helium discovery is made. The information in this presentation which relates to prospective helium volumes is based on, and fairly represents, in the form and context in which it appears, information and supporting documents prepared by, or under the supervision of, Alexander Karpov and Zachary Long .

Alexander Karpov is an employee of Netherland, Sewell & Associates, Inc. Alexander Karpov attended Texas A&M University and graduated in 2001 with a Master of Science Degree in Petroleum Engineering, and attended the Moscow Institute of Oil and Gas and graduated in 1992 with a Bachelor of Science Degree in Petroleum Geology. Alexander Karpov is a Licensed Professional Engineer in the State of Texas, United States of America and has in excess of 26 years of experience in petroleum engineering studies and evaluations. Alexander Karpov has sufficient experience to qualify as a qualified petroleum reserves and resources evaluator as defined in the ASX Listing Rules.

Zachary Long is an employee of Netherland, Sewell & Associates, Inc. Zachary Long attended Texas A&M University and graduatedin2005 with a Master of Science Degree in Geophysics, and attended the University of Louisiana at Lafayette and graduated in 2003 with a Bachelor of Science Degree in Geology. Zachary Long is a Licensed Professional Geoscientist in the State of Texas, United States of America and has in excess of 16 years of experience in geological and geophysical studies and evaluations. Zachary Long has sufficient experience to qualify as a qualified petroleum reserves and resources evaluator as defined in the ASX Listing Rules.

Alexander Karpov, Zachary Long and Netherland, Sewell & Associates, Inc. have each consented to the inclusion in this presentation of the matters based on this information in the form and context in which they appear.

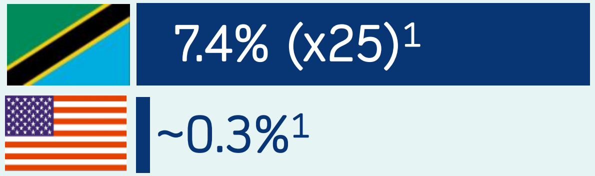
Recap:
Why North Rukwa / Nyasa Fairway?

01

Probably the world's most prolific helium province (100% NHE acreage).

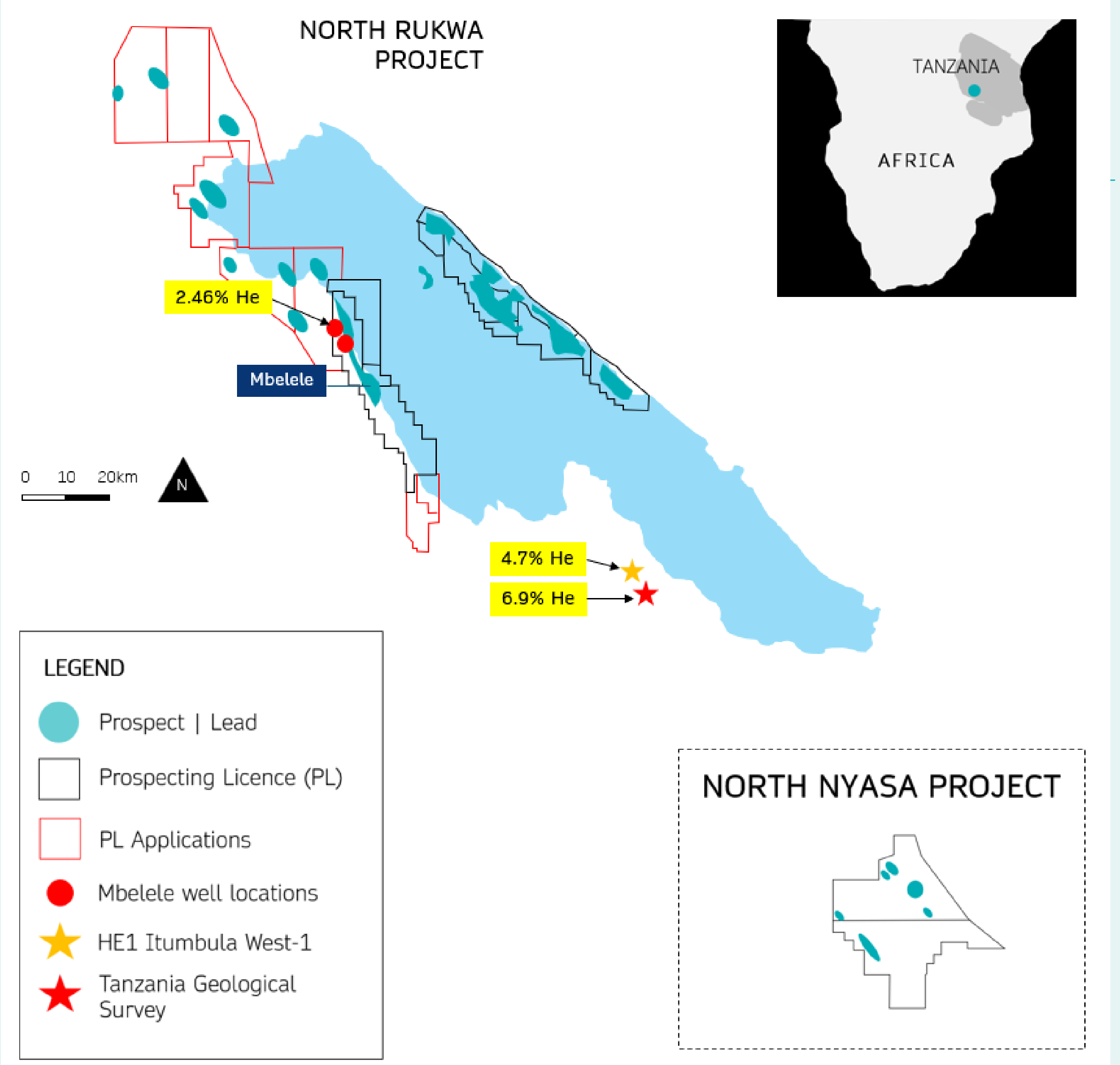
[1] 0.3% is average of all USGS He occurrences (N>16,000). 7.4% is the average of Tanzanian Type-II (crustally derived, minor methane) Helium measurements from Tanzanian hot springs and recent wells.

Average helium percentage



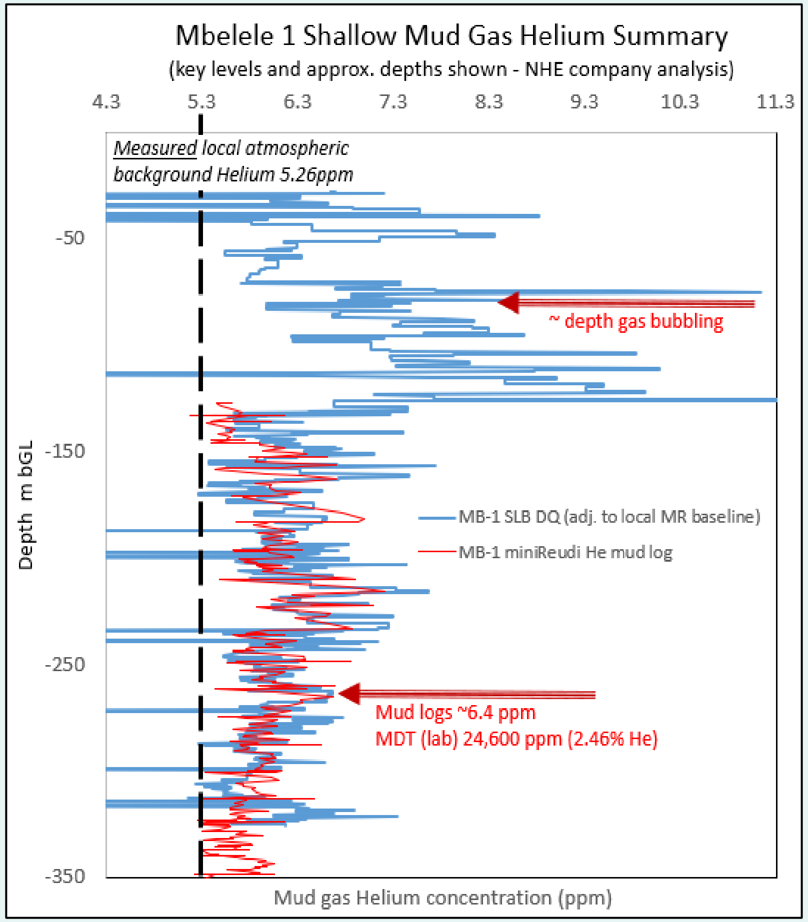
Maximum helium percentage

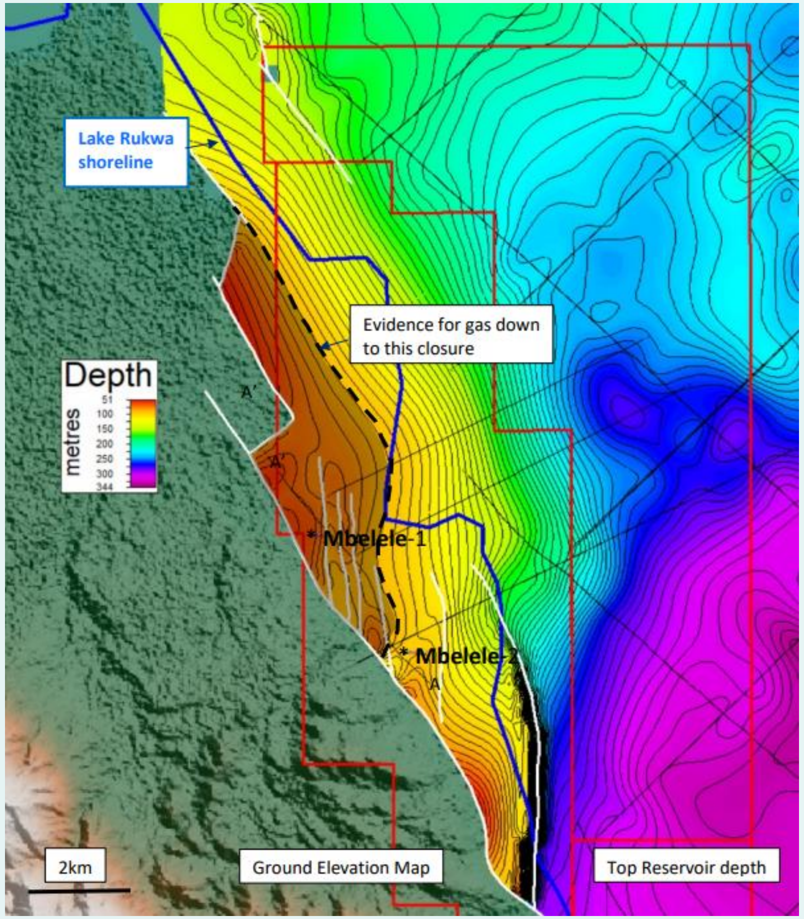
New, proprietary NHE work indicates very significant increase in He% with depth



Recap: Original Mbelele shallow appraisal: data points.

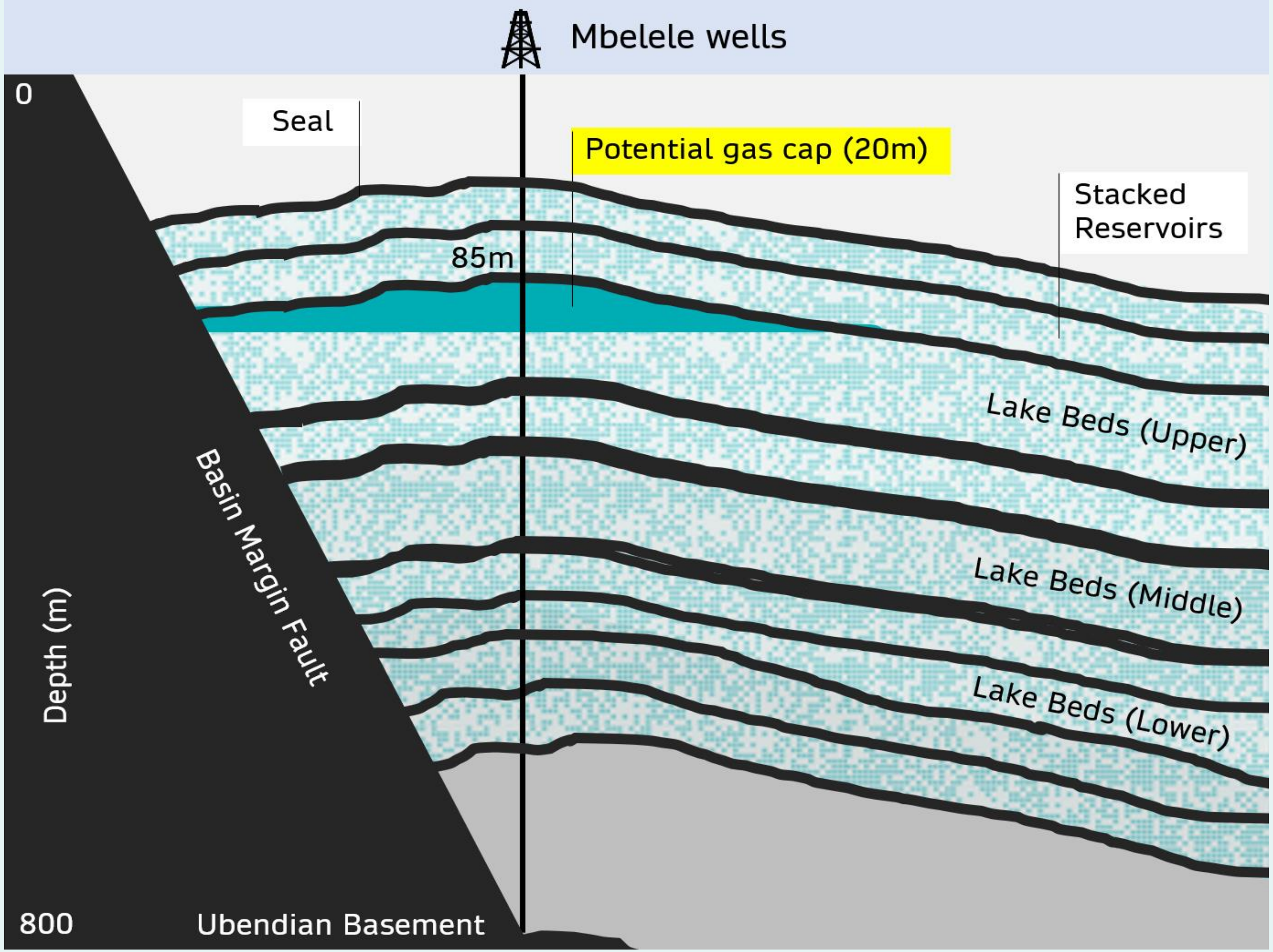
- Not a typical O&G type target
- Gas bubbling in mud returns from ~80m.
- Gas bubbling ceased on mud weight increase.
- Pressure change from mud weight increase indicative of ~20m gas column.
- Helium significantly above background in mud gas ~75m to 125m.
- Modelling shows commercial flow potential.





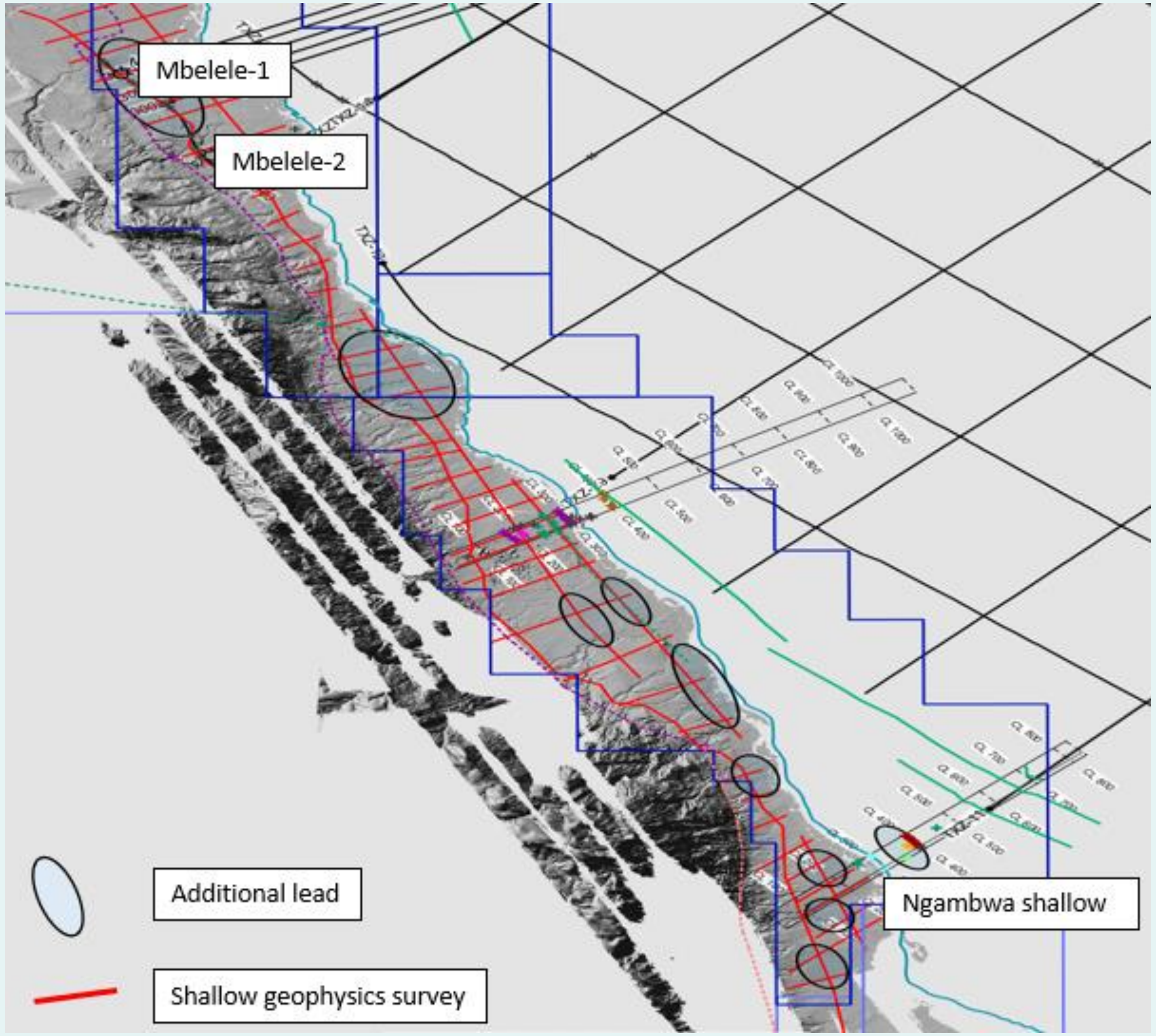
Recap: Mbelele shallow appraisal: probable free gas cap.

- Starting around 85m.
- Structure approximately 9km by 4km.
- Estimated 20m free gas column.
- Very high permeability and excellent porosity ie very high flow potential.
- Structure completely onshore of Lake Rukwa and easily accessible.
- *But, does this type of shallow-gas environment occur elsewhere?*
  - And note … *Tip of the iceberg* – deeper, richer targets under NHE licence (*to be pursued later*)

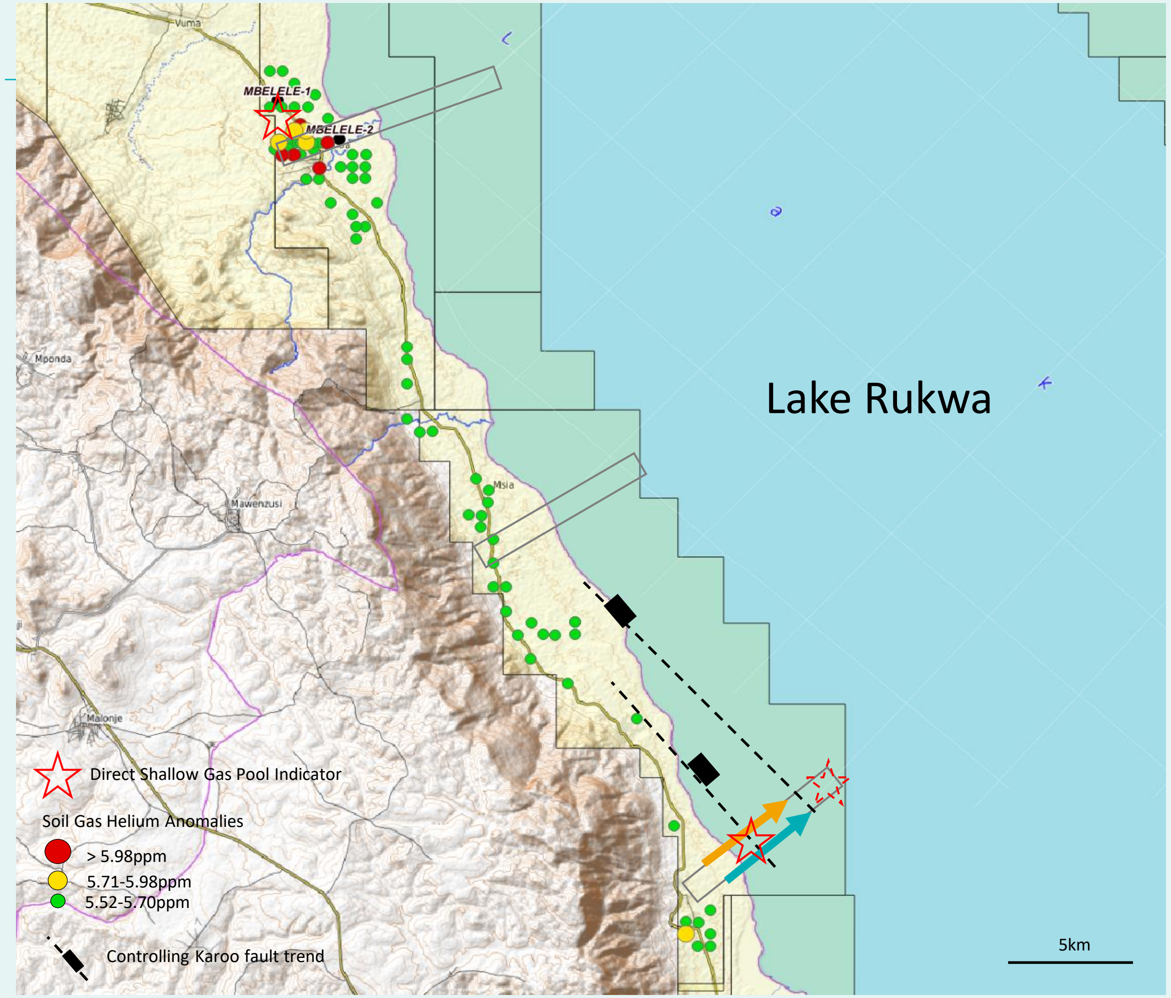


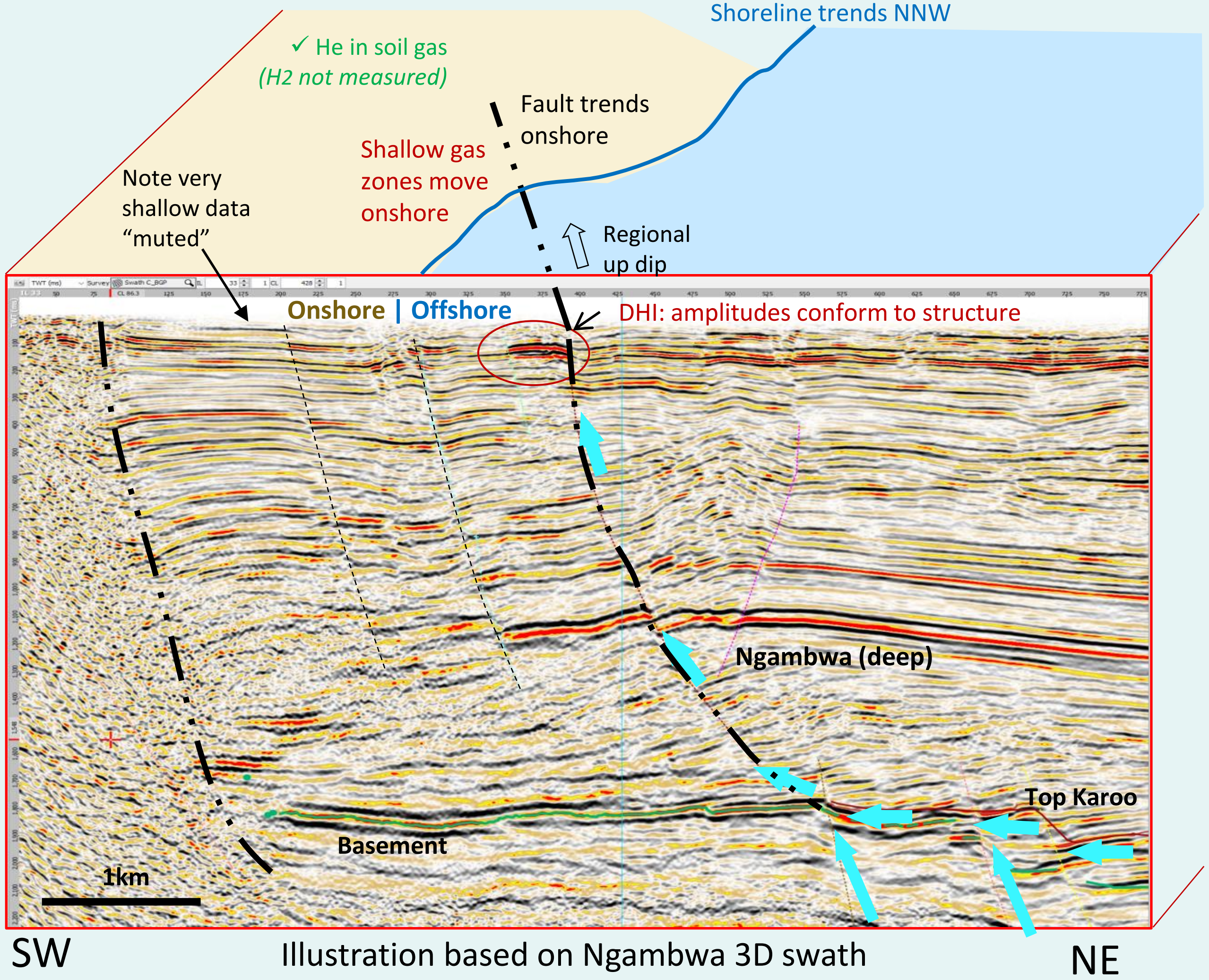
Potential Additional Targets (a very *gassy* lake margin)

- ✓ Yes - The right conditions shallow gas occur onshore along the western margin
- ✓ 8 *shallow* onshore potential targets identified.
- Low-cost, "*best tech*" strategy is key
  - Quick low-cost shallow geophysics program - mature to drillable.
  - Plan to drill up to 5 shallow target including Mbelele.
  - Sufficient time to complete field work and drill this dry season.



Mbelele shallow-gas: not 'one of a kind'

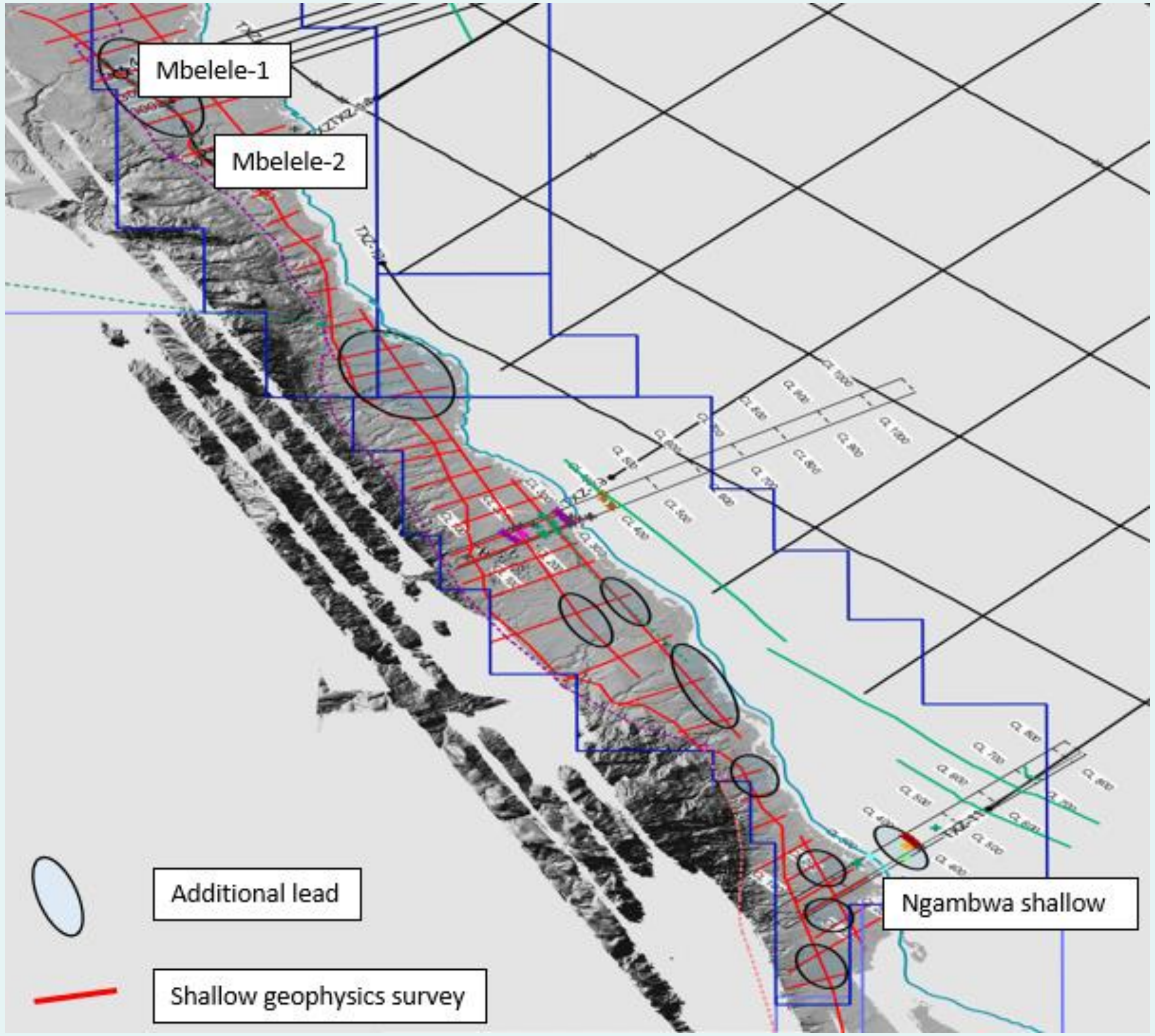




Required Field Work

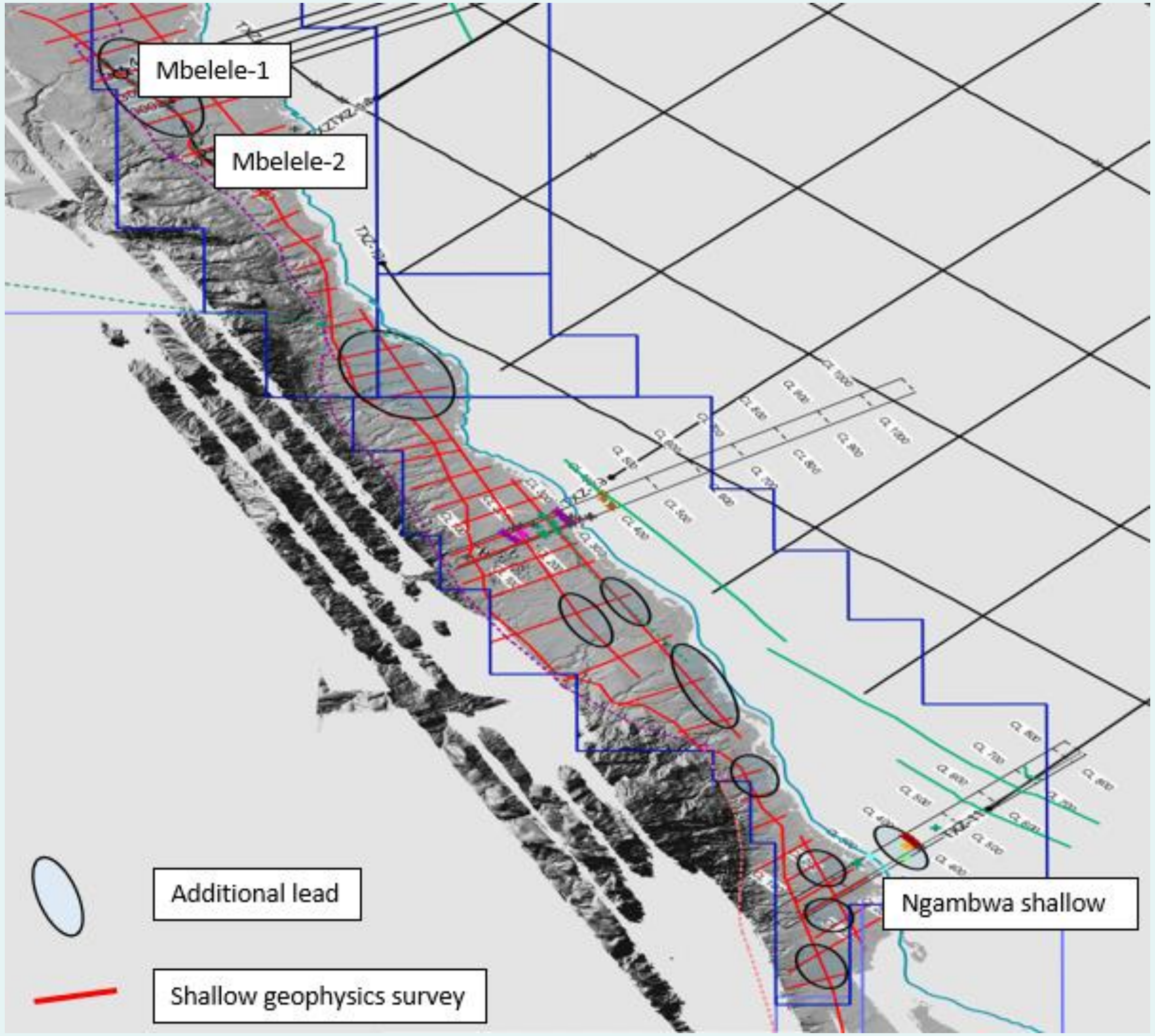
Not like conventional O&G (cheaper, quicker)

- Two complimentary methods (all onshore)
  - Shallow seismic (refl. & refr.)
  - Electrical resistivity
- Simple, quick and low-cost using existing local team and equipment.
- Team from University of Dar es Salaam will mobilise to field in August.
- Work will confirm target potential and optimal well site locations.
- Contracting in-progress for *specially tailored*, low-cost drilling / testing



Drilling & Testing

- *Final* target definition after geophysics.
- Site prep minimal.
- Drilling each well ~2-3 days and 2-3 days to relocate to next well.
- 2 specialised, low-cost well-heads, to measure gas flow & composition on order.
- Testing estimated* <10 days (off-rig).
- Team from University of Dar es Salaam will undertake on-site testing.
- Cost efficiency gain from multiple targets.
- Mob & De-Mob cost unchanged, turnkey per well price being agreed.
- Gas compositional analysis more comprehensive (and more challenging).

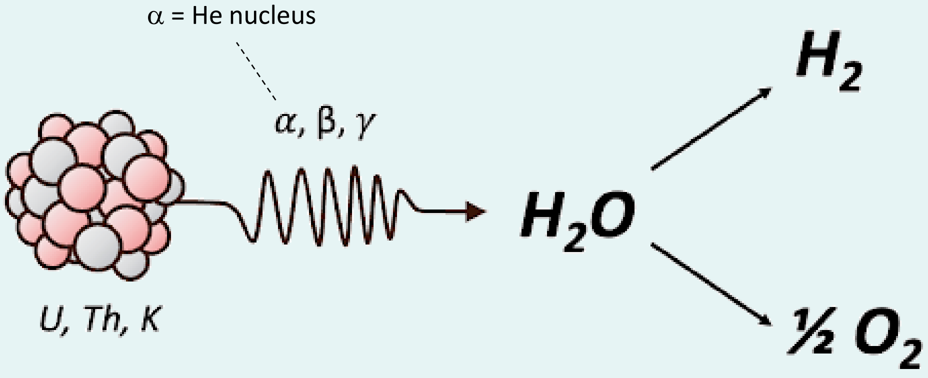


* Test duration required is highly uncertain until wells are drilled.

What about Natural or “White” Hydrogen ?

(piecing it all together)

Basic generation processes He & H2



Hydrogen from Natural Radiolysis[2]

Must have …

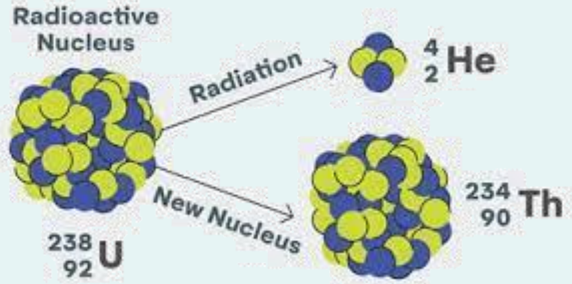
- ✓ Natural radioactivity
  - ✓ Basement <u>and</u> sediment
- ✓ Time++
- ✓ Groundwater++
- ✓ Advective flow / gas migration

Ref. NHE, U. Oxford basin modelling report

The usual Helium[1]

Must have …

- ✓ Uranium / Thorium
- ✓ Time++
- ✓ Groundwater
- ✓ Pressure, depth, temp.
- ✓ Advective flow / gas migration



Hydrogen from "Serpentinisation"[3],[4]

$3Fe^{2+}$ *(in olivine)* $+ 4H_2O \rightarrow Fe_3O_4$ *(magnetite)* $+ 4H_2$

Must have …

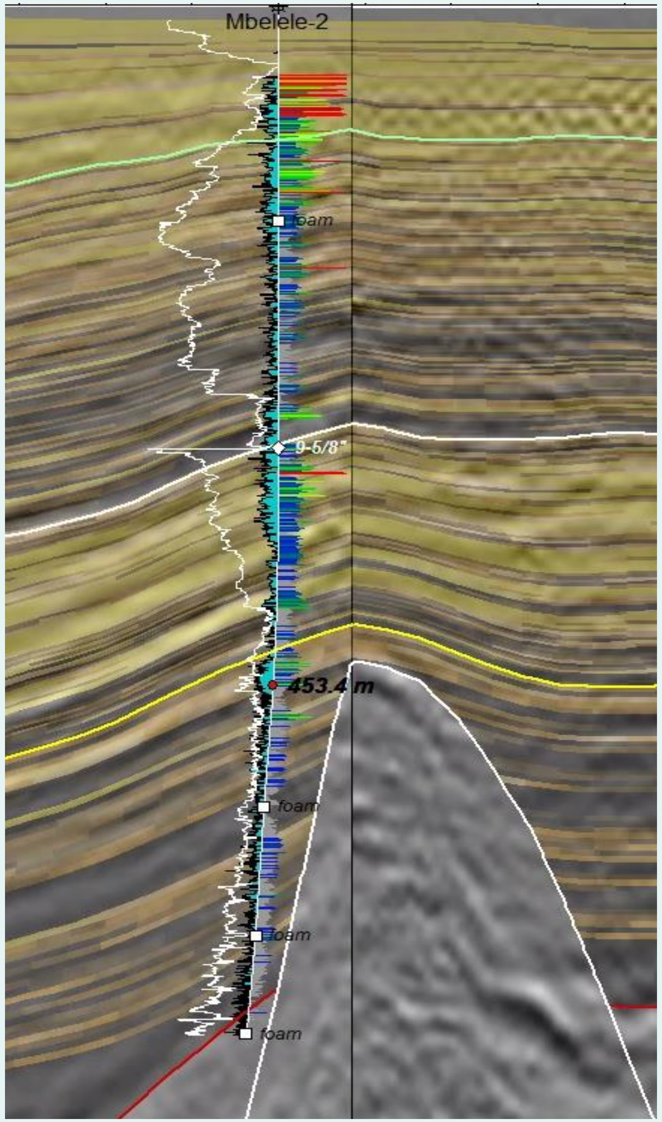
- ✓ Old ocean plate (*reworked*)
- ✓ Fe-Mg rich, ultramafic (mafic) rocks
- ✓ Temp & pressure (burial, tectonic stress, geoth. gradient)
- ✓ Groundwater++
- ✓ Complex geochemistry => serpentine + H2 liberation
- ✓ Advective flow / gas migration

Ref. Outcrop, geophysical studies, geochemical research[4]

[1] Image source: after American Chemical Society www.acs.org/greenchemistry/research-innovation/endangered-elements/
[2] Image source: after Moise, 2024, Stanford Univ. http://large.stanford.edu/courses/2024/ph241/moise2/
[3] E.g. after Klein et al. (2013). Compositional controls on hydrogen generation during serpentinization of ultramafic rocks
[4] E.g. Boniface & Schenk (2012); Kazimoto et al (2015); Evans et al (2012); Heilman et al (2019); Sleep et al (2004).

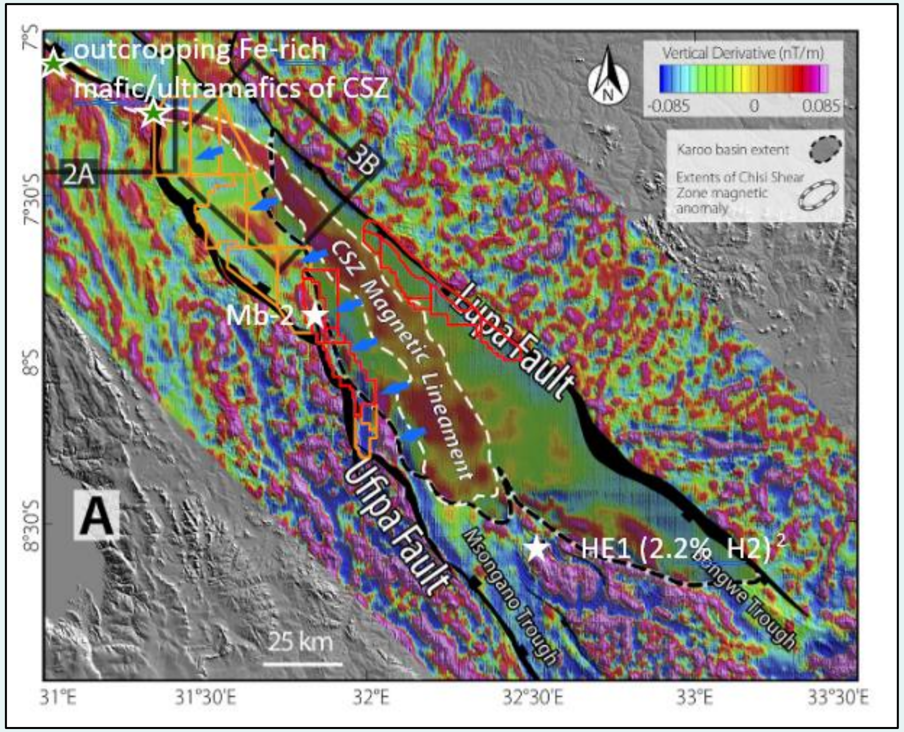
Double Hydrogen Potential

- Very favourable geology for natural or "White" hydrogen.
- Significantly above background Hydrogen readings in both Mbelele 1 & 2 mud-gas.
- Up to 2,000 times atmospheric from (highly diluted) mud-gas readings.
- Highest in permeable reservoirs.
- Precise H2 percentage unknown.
- Two key mechanisms …
  - I. Natural Radiolysis[2].
  - II. Serpentinisation[4].



Mbelele-2 mud-gas log - Hydrogen

- ✓ The right basement terrains continue under the modern lake.
- ✓ Ongoing H2 generation feasible.
- ✓ Active migration focus to *gassy* western lake margin.
- ✓ Local structures and seals.



Magnetic axial anomaly - Chisi Shear Zone[3,4]

[1] HE1 RNS 5/2/2024.
[2] Ref. NHE, Univ. Oxford proprietary basin modelling report
[3] After Kolawole et al 2021. Structural Inheritance Controls Strain Distribution during early continental rifting, Rukwa Rift.
[4] NHE analysis: mafic / ultramafic of the greater Ubendian belt (e.g. Lenoir et al 1994 and others) outcrop confirmed to the north. Magnetic anomaly & shear zone trend into the north of the lake.

Value in hydrogen?

- ✓ H_2 a core ingredient of NH_3 & Urea
  - (usually from converting CH_4 to H_2 "Grey")
- ✓ Standard, scalable technology

- *Example*: Urea => N_2 based fertilizer
  - Est. 90% imported, 2021[1],[3]
  - Tanzania uses too little …
    - 15.9 kg/ha vs. 50kg *(recomm.)*
    - Imports? 228,000 tpa
    - Needs? 822,000 tpa
  - Local sales prices (2021 -> 22) [1],[2]
    - Urea US$ 300/t –> $900/t
    - DAP fertlzr. US$ 550/t –> $960/t

Would it be price competitive ?

✓	White[5]	Green[4]	Grey[6]
Prod. cost US$/kg	$0.50 - $1.00	$3.00 - $7.50	*$0.98 - $2.93*

Near zero CO_2

What about scale?

- ✓ Modular plant 50 tpd Urea[7]
- ✓ 50 tpd Urea => ~2.1 mmscf/d H_2[8]

Do we also have the right geology (to flow)?

- ✓ High porosity-perm formations
- ✓ Required gross-gas flows in range of NHE estimates
  - *Uncertainty on H2%*

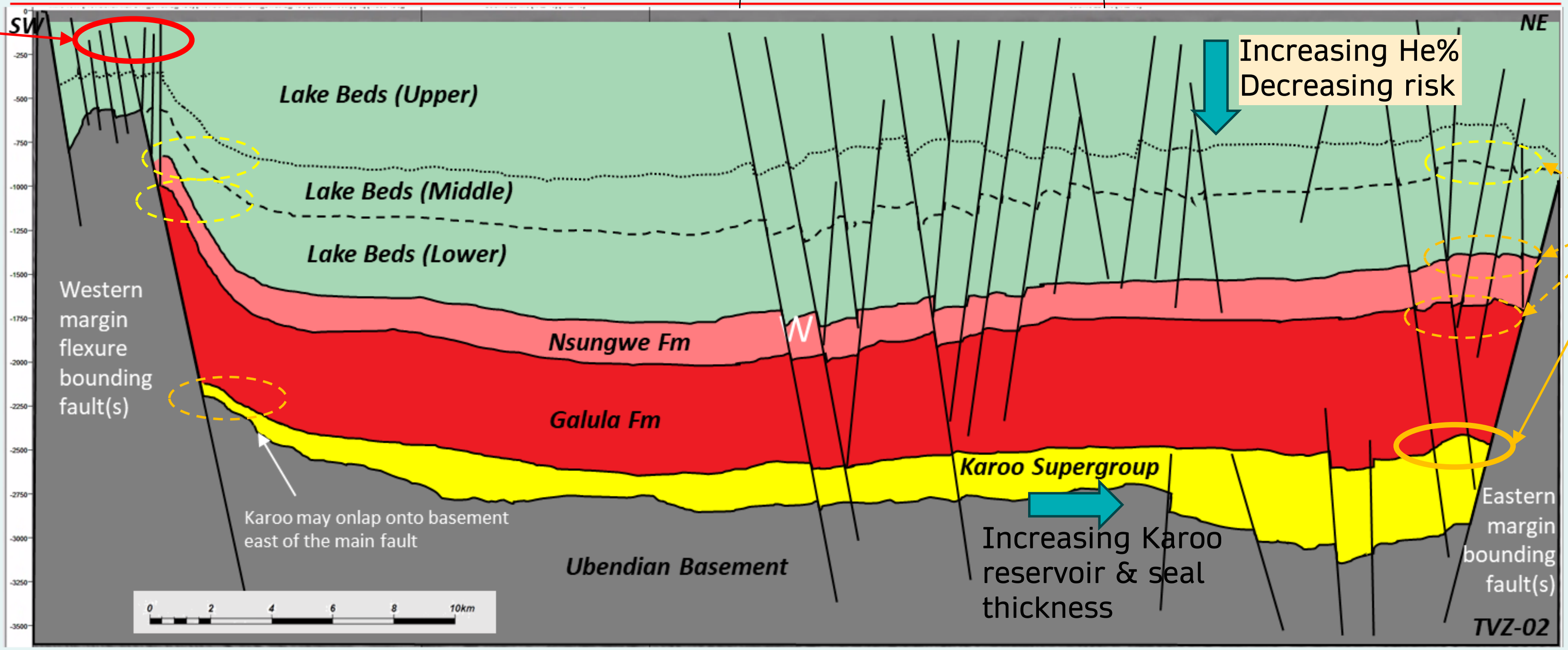
[1] Source: Fertilser use & 2021 (pre-invasion) prices in Tanzania. www.tanzaniainvest.com/fertilizers. DAP = di-ammonia phosphate. [2] Source: 2022 (post invasion) prices from "Africa Fertilzer" (mid-range, excl. major government subsidy). [3] source: www.thecitizen.co.tz (27/07/2024)
[4] IEA (Sept 2023) Global Hydrogen Review & Hydrogen Europe's "Clean Ammonia in Europe" 2023 report. [5] Rystad Energy (13/03/2024). The white gold rush and the pursuit of natural hydrogen.
[6] Bloomberg NEF (Aug 2023). Green Hydrogen to Undercut Gray Sibling by End of Decade. NB natural gas accounts for ~50-70% of total Urea production costs and emissions ~200kg CO2/t (NHE analysis, Farm Bureau, IFA, IPCC). [7] Example: small scale Stamicarbon LAUNCH MELT, Thyssenkrupp Uhde (50-1200 tpd), URECON 2006, Proton Venture (~55 tpd)
[8] Assume 100kg H2 for 1 tonne Urea & 1 kg H2 = 424 scf. [9] Development concepts are multiple wells. Shallow gas targets => very low-cost drilling.

Recap: full fairway cross-section with 4 x stacked plays (colours)

2024 => the shallow “*gassy*” western margin … *still a small fraction of the whole*

Chisi Shear Zone[1]
(magnetic anomaly)

Multiple shallow gassy margin appraisal targets



Chilichili Prospect

2 x Play Areas in this setting

#1 West Rukwa (offshore)

3 NW Rukwa (onshore)

2 x Play Areas in this setting

#2 East Rukwa (offshore)

4 Nth Nyasa (onshore)

Rukwa-Nyasa Helium Play Fairway **Portfolio of opportunities**

[1] After Kolawole et al 2021. NHE mapped trend from surface outcrop of hydrogen prone basement rocks at depth.

Updated “*gassy* margin” appraisal plan

WHAT ARE WE GOING TO DO (updated & expanded):

- Finalise locations for ~5 shallow gas appraisal targets.
- Drill and test as guided by new geophysics – starting with Mb-1.
- Specially designed well-head that will allow us to undertake the required test work.

HOW ARE WE GOING TO DO IT (cost effectively):

- Contracting with a low-cost Tanzanian drilling rig.
  - Likely turnkey not day-rate structure.
  - Simple mobilisation & de-mobilization (spread across 5 wells).
- UDSM engaged to undertake on-site compositional testing.

WHEN ARE WE GOING TO DO:

- Mobilize new, shallow geophysics team to field in August.
- As soon as new targets become clear, mobilise rig.
- Drill and flow tests in “leap-frog” campaign - September / October.
- Undertake He & H_2 gas testing on site (prelim.) *and* careful QA at in-country lab.

Longer Term Opportunity

POST SUCCESSFUL SHALLOW GAS APPRAISAL:

- Finalise design and commercial arrangements (~6 months):
  - Field development plan.
  - Gas separation and liquification plant (GSLP) design.
  - Off take agreement.
- Construct and install (~18 months):
  - GSLP.
  - Drill Wells and field development.

Field development will be low cost (similar cost structure to appraisal), with GSLP funded by Off Taker and repaid through gas sales.

RUKWA-NYASA HELIUM PLAY FAIRWAY:

- Planning in progress for a comprehensive seismic and drilling program for the eastern margin of the basin beginning in 2025.
- Discussions underway with potential farm-in partners to fund the program.
- Revised resource estimate in progress.

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