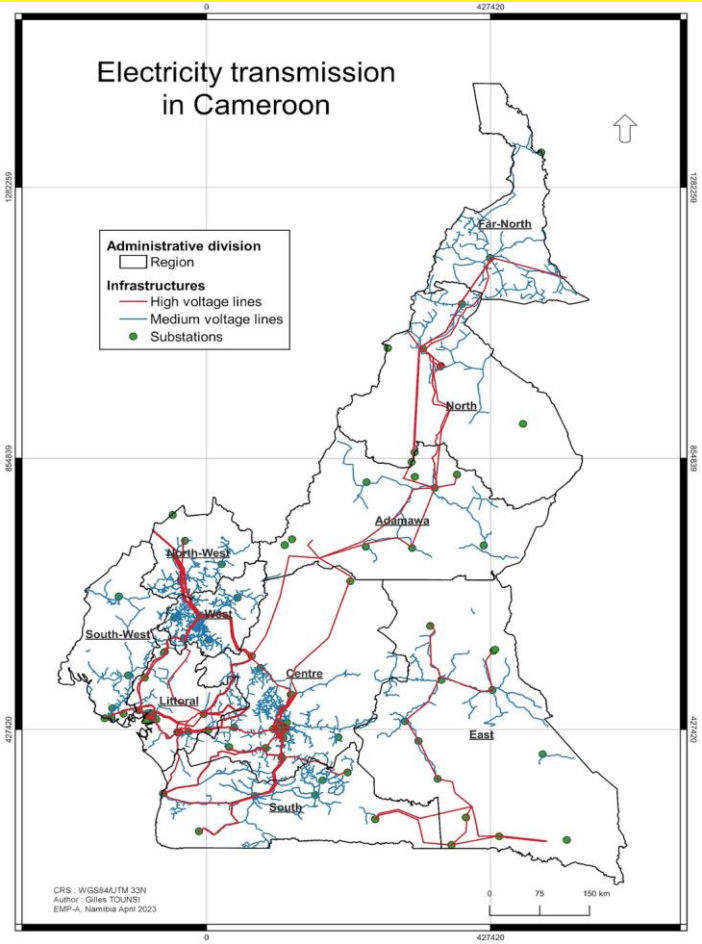
What is the least-cost solution for electricity access in Cameroon?

OnSSET

Open Source Spatial Electrification Tool

A GIS based tool developed to identify the least-cost electrification option(s) between seven alternative configurations



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Energy Modelling Platform for Africa (EMP-A) 2023

Windhoek, **Namibia**

Context and Challenge

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- **Cameroon National Electrification Rate : 63%**
  - Urban: 93% - Rural: 23% (World Bank)
- Electricity generation dominated by hydroelectricity (76%) for 72.2% of the total capacity generation (SEforALL)
- Global Horizontal Irradiation 6 kwh/m²/day in the Far North (GlobalSolarAtlas)

Timeline target for electrification rate in Cameroon per region
Source : Adapted from Rural Electrification Master Plan for Cameroon (PDER)

- **Access remains the big challenge**
- Average electricity consumption per:
  - Household: 287 kwh/year
  - Capita: 91 kwh/year (Tier 2) (World Bank)
- Only 20% of the population would actually have continuous access to electricity. (of 27 millions/2015)
- Overall mismatch between supply and demand
- Irregularity of supplies due to the low water period
- The mix of technologies is an opportunity

Addressing the challenge...

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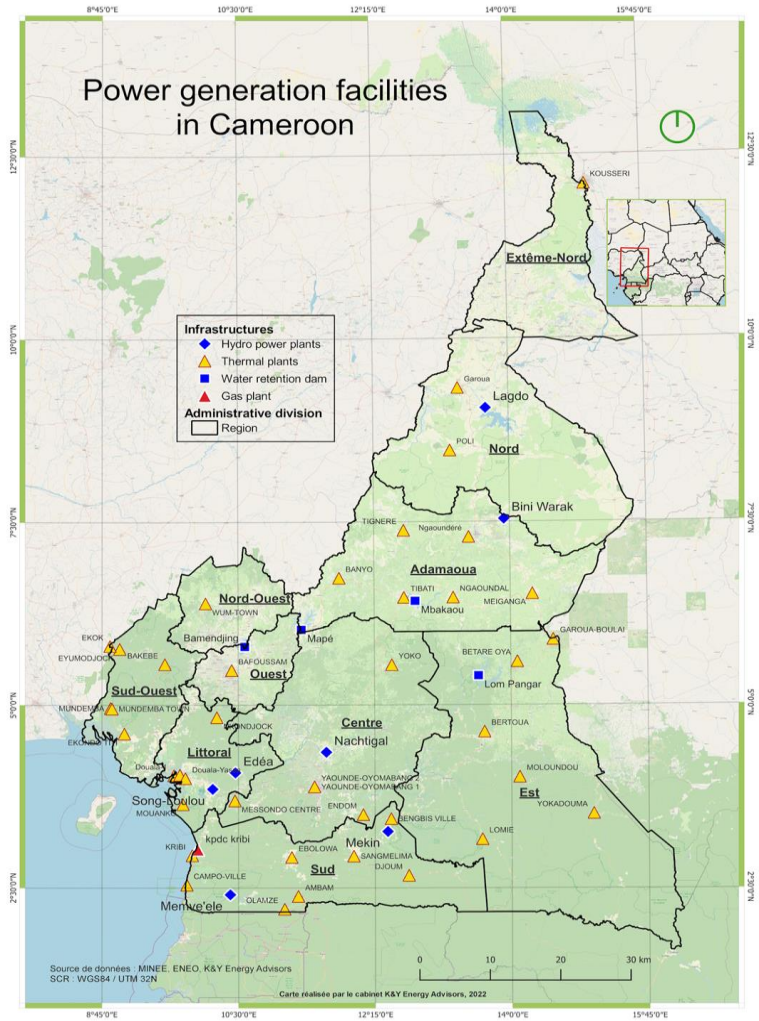
- **Based on the GEP-OnSSET model :**
  - GIS energy planning can determine the area with high demand target by analyzing GDP and Poverty indices
  - The Far North of the country is the preferred target
  - Higher GHI irradiation is experience in the Far North

What technologies are favorable to access the electricity?

Electricity production is divided into the following technologies

- Hydroelectric Power plants
- Thermal Power Plants
- Solar power plants
- Wind



Source : K&Y Energy Advisors

Solar power plant
Source : World Bank Madagascar

Kribi Thermal power plant
Source : Africa Energy Portal

Nachtigal Dam
Source : World Bank Cameroon

Scenario & Parameters

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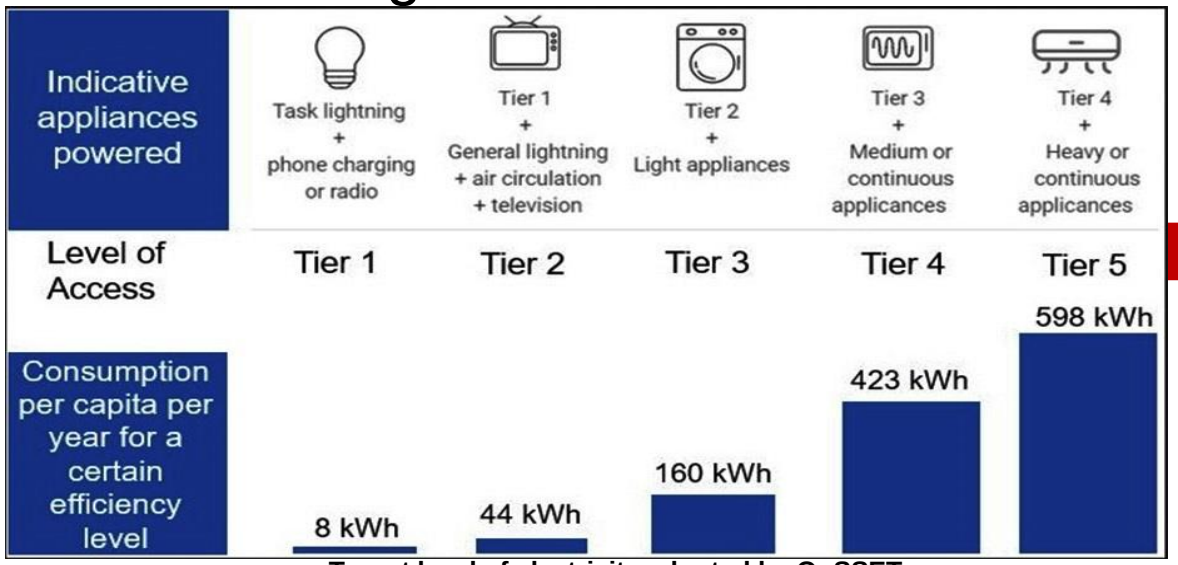
One Scenario based on the inputs

Baseline inputs

Analysis

- Electricity per technologies
- Technologies per region
- Technologies costs for Off-Grid



Target level of electricity adopted by OnSSET
Source : Global Tracking Framework, 2015

- Population (2020): 25.216 millions
- Population (2030): 33.766 millions
- Bottom-up high demand target by GDP Poverty.
- 2020 Urban Ratio Start Year 57%
- 2030 Urban Ratio End Year 67%
- Residential Demand Targets*
  - tier_1 = 48
  - tier_2 = 276
  - tier_3 = 1012
  - tier_4 = 2667
  - tier_5 = 3771
- * **tier per kwh/household/year**

Results maps

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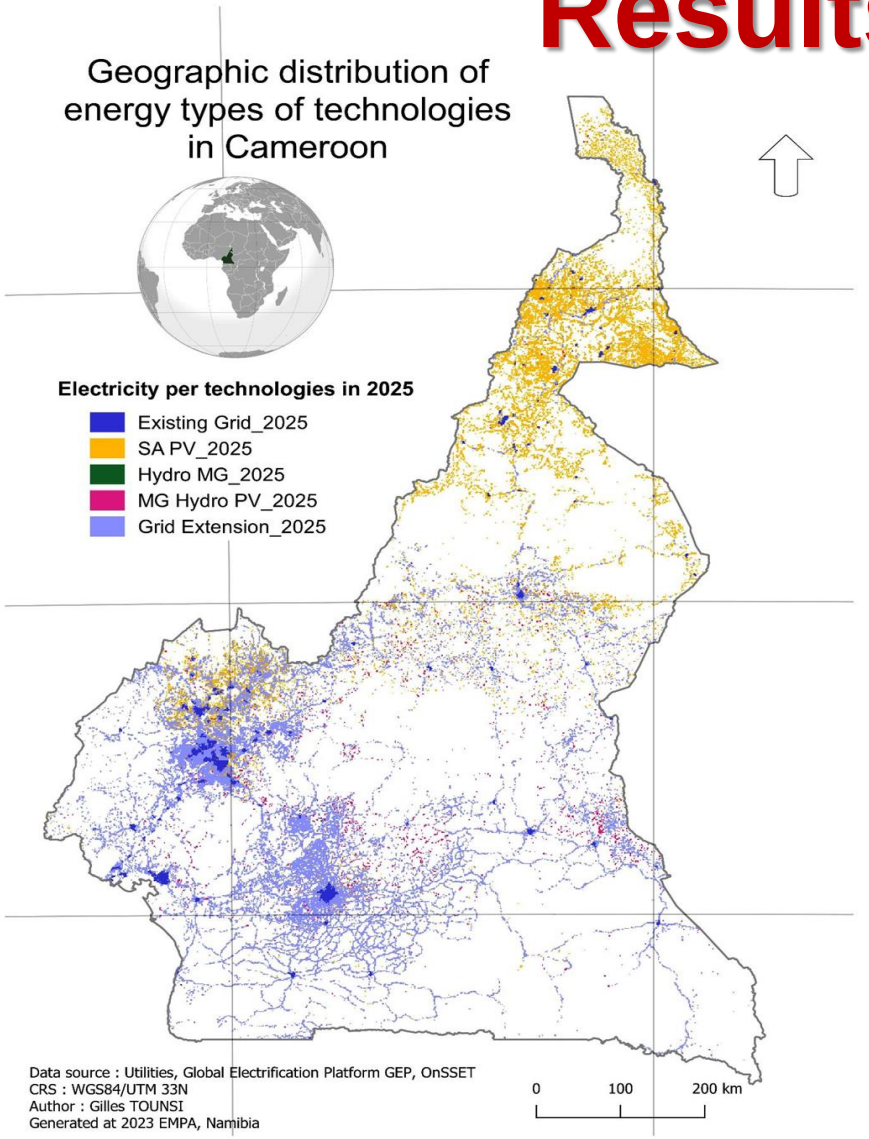
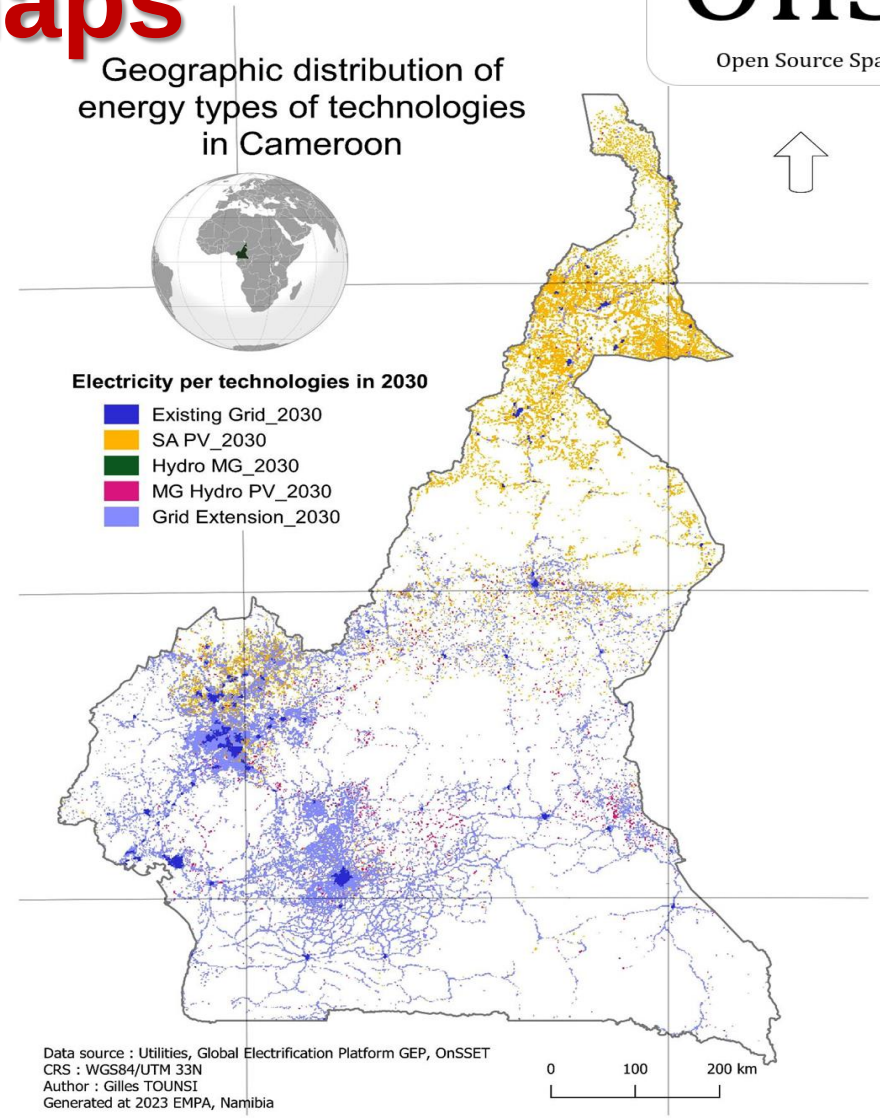


Electricity per technologies in 2025
Source : GEP-ONSSET Output



Electricity per technologies in 2030
Source : GEP ONSSET Output

Results graphs

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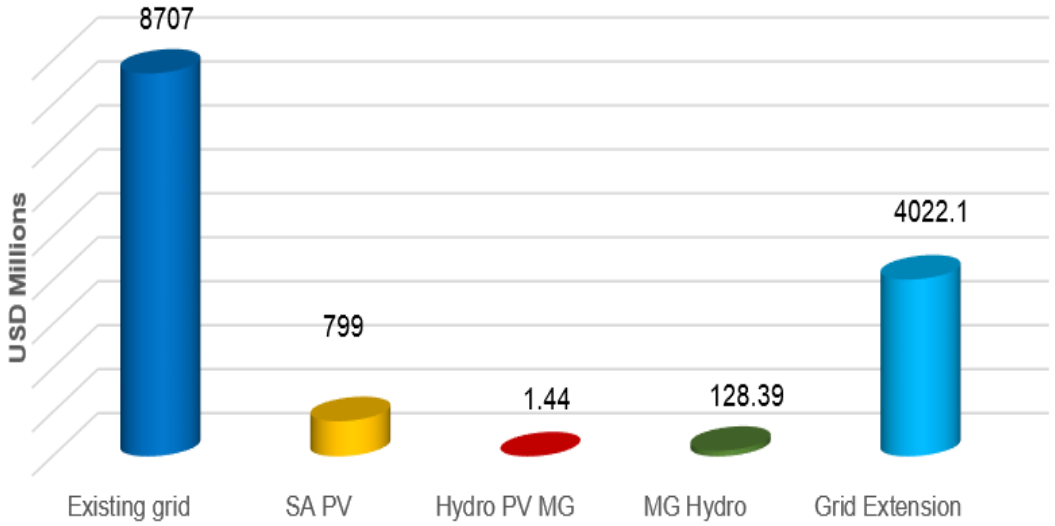
Total investments in 2030
13.659 Millions USD

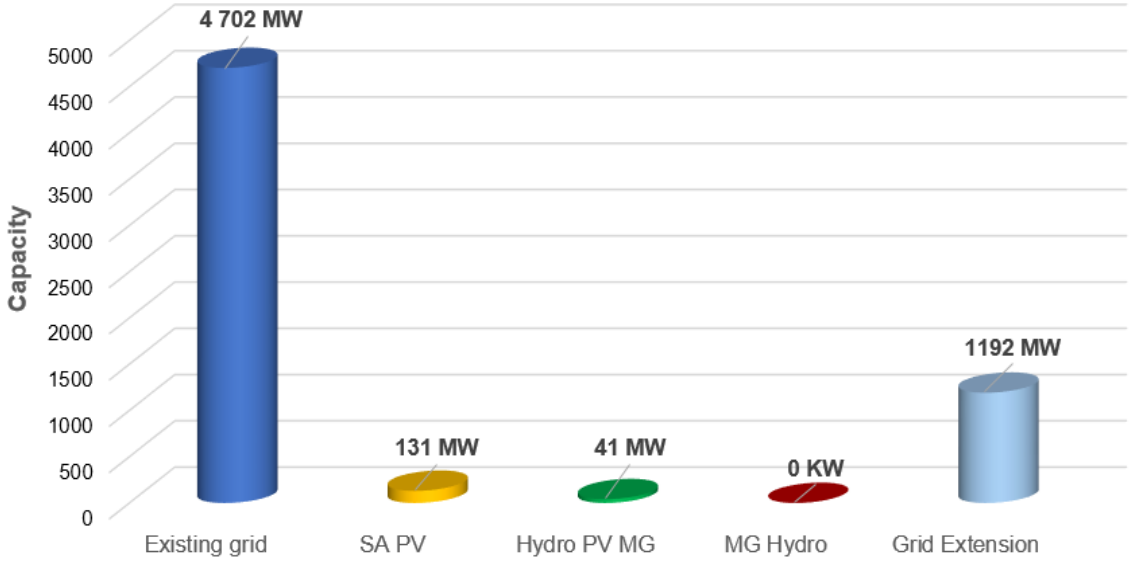
Existing grid : USD 8707.9 M
SA PV : USD 799 M
Hydro PV MG : USD 1.44 M
MG Hydro : USD 128.39 M
Grid Extension : USD 4022.11 M



Technologies Investments cost in 2030
Source : GEP-OnSSET Output

Total Capacity in 2030
6.066 MW

Existing grid : 4702 MW
Grid Extension : 1192 MW
SA PV : 131 MW
Hydro PV MG : 41 MW
MG Hydro : 0 MW



Capacity generated in 2030
Source : GEP-OnSSET Output

Results Table (1000s of people)

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Region	Grid densification	Solar-home systems	Mini-grids	Grid extension
Adamaoua	306.0	31.0	NaN	307.0
Centre	2884.0	39.0	NaN	465.0
Est	204.0	20.0	0.0	246.0
Extrême - Nord	798.0	164.0	8.0	574.0
Littoral	2688.0	10.0	1.0	203.0
Nord	689.0	81.0	0.0	385.0
Nord - Ouest	678.0	49.0	0.0	428.0
Ouest	812.0	31.0	NaN	420.0
Sud	169.0	13.0	1.0	160.0
Sud - Ouest	634.0	19.0	5.0	292.0

Table : Technologies per region
Source : Python GEP-ONSSET Generator

Conclusions and Policy Insights

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- Least costs technologies depend to the environment.
- Cameroon Far North region has a potential for GHI irradiation.
- Investments cost are planned with off-grid Solar Stand Alone Systems.

Note : Cameroon does not recognize the off-grid technologies such as Solar Home System and Mini Grid PV as a lever of electrification rate

- Customs duties exemptions & VAT exemptions.
- Advocacy with NREA (including the financial support UE/WB….)
- Off-grid technologies represent an opportunity to increase the national rate with the inclusion NGO's, Minigrid & off-grid developers, civil society….
- Credit loans should be available for SME's involving in the field of energy, particularly renewable energy.

Future Work

- Start the capacity building of Global Electrification Platform (Comoros)
- My Goal : continue to share the practice of the tool with Gov., Decision-makers and the private sector

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OnSSET
Open Source Spatial Electrification Tool

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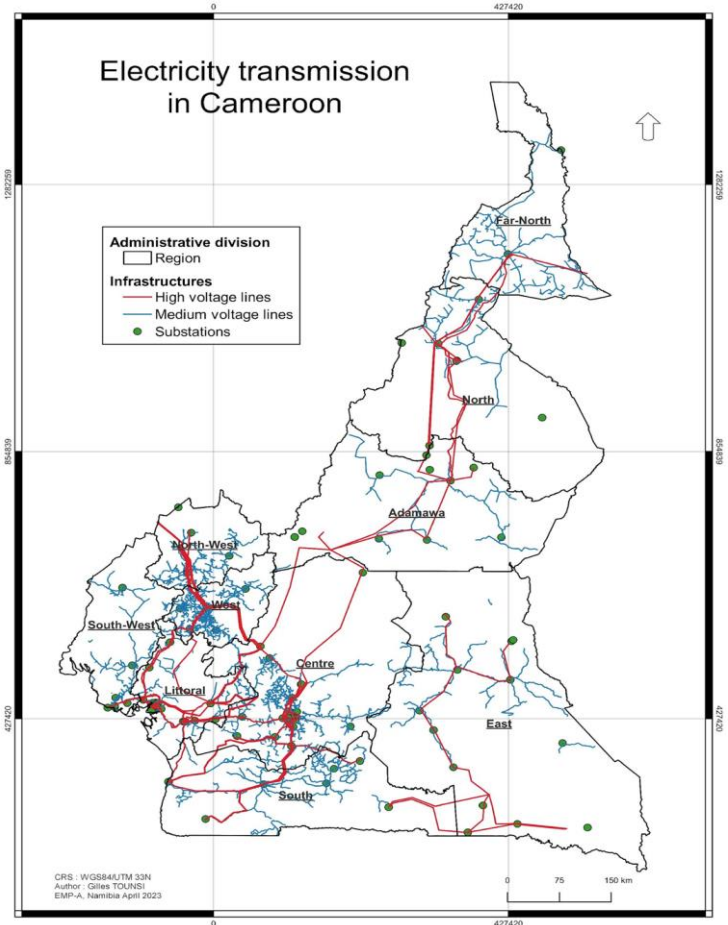

Source : K&Y Energy Advisors

THANK YOU !

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