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African Clean Energy Corridor: Regional Integration to Promote Renewable Energy Fueled Growth

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IRENA

Abu Dhabi, June 2015

Summary

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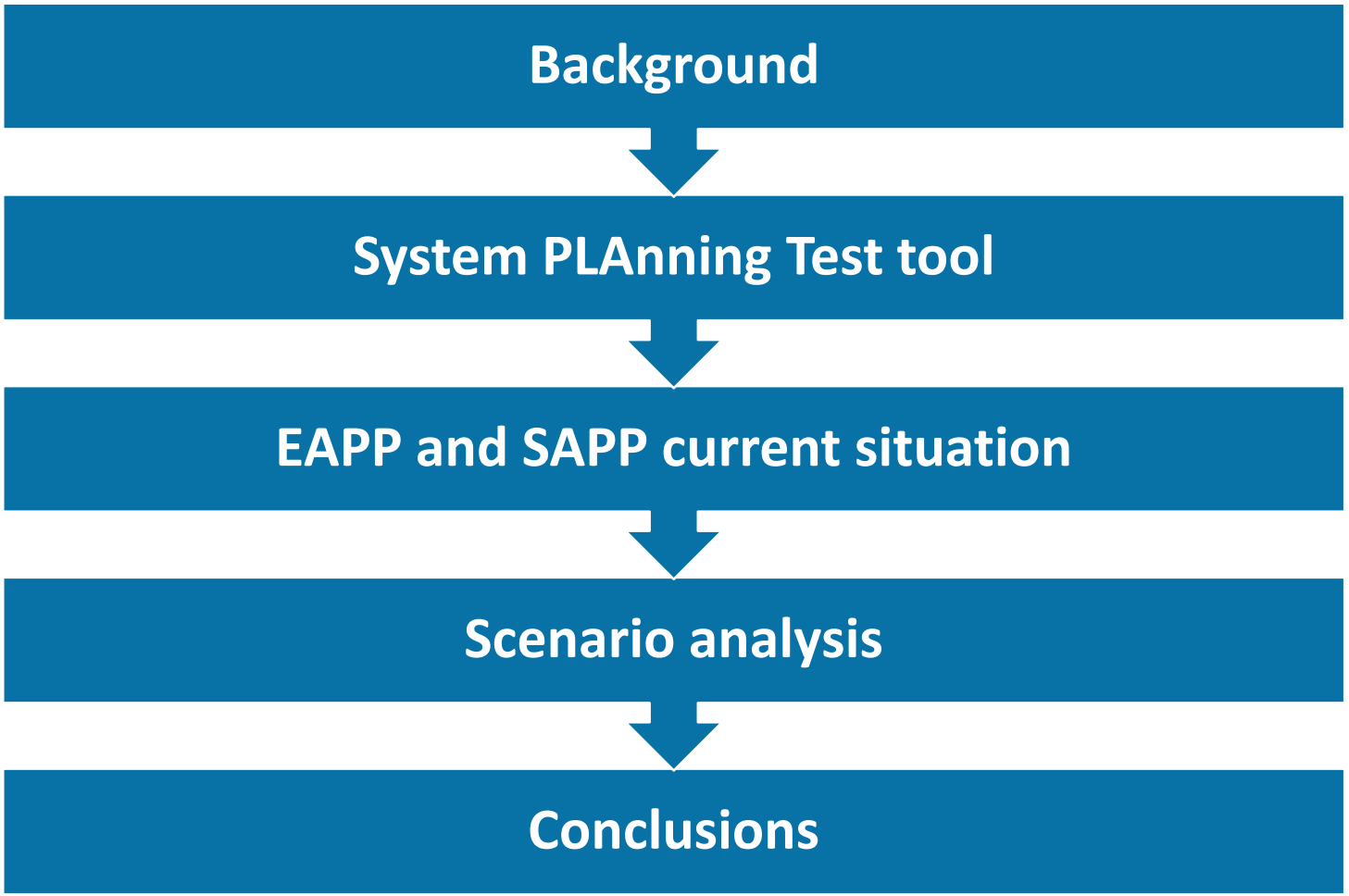

Background

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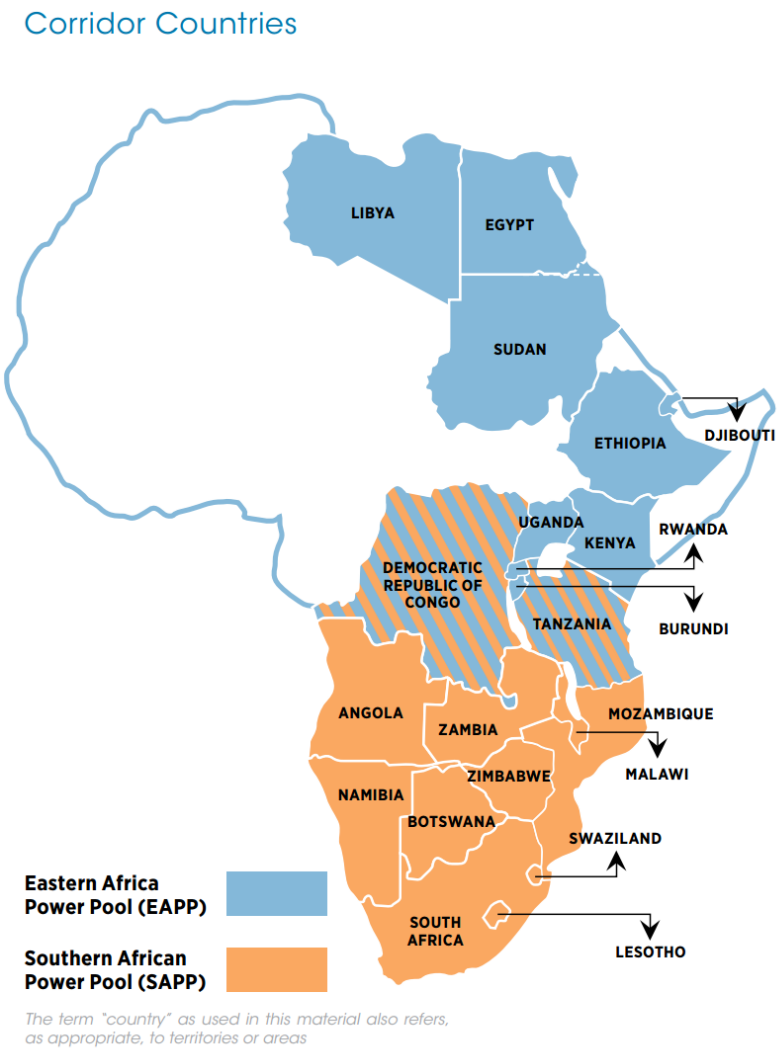
This analysis contributes to the African Clean Energy Corridor initiative endorsed by ministers from the countries of the Eastern and Southern African power pools at IRENA's Fourth Assembly in January 2014, aims to transform the current fuel mix by promoting the development of clean, indigenous, cost-effective renewable power options.



IRENA Planning Resources

Global Atlas, Zoning analysis, Technology briefs, Sectoral Roadmaps, Renewable Cost Alliance

Least cost investment planning - SPLAT

Grid study (power sector only)

Project Navigator, Renewable Readiness Assessment, Abu Dhabi Fund for Development

Development of planning tools

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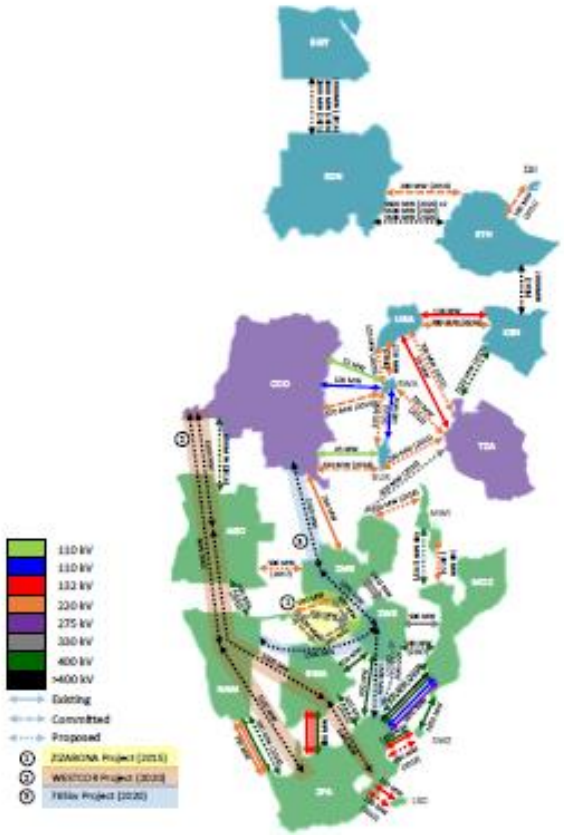
SPLAT

Approach

- Least-cost optimization tool for African power pools (MESSAGE framework)

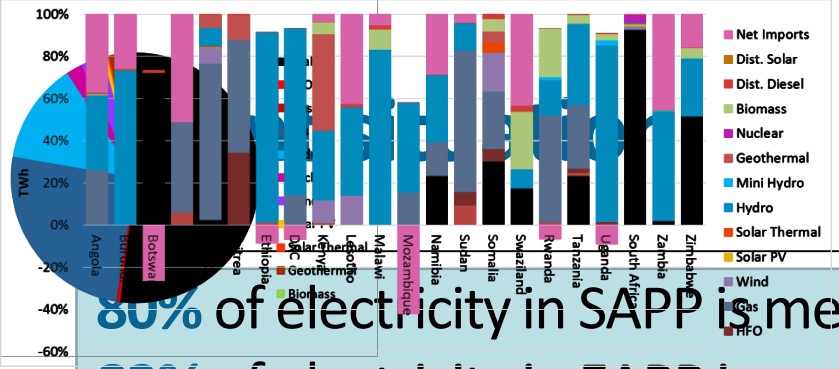
Builds on

- Power sector infrastructure database
- IRENA RE database
- Can be extended to cover the whole energy sector



Consistent with regional master plans

Made publically available for the ACEC region and beyond



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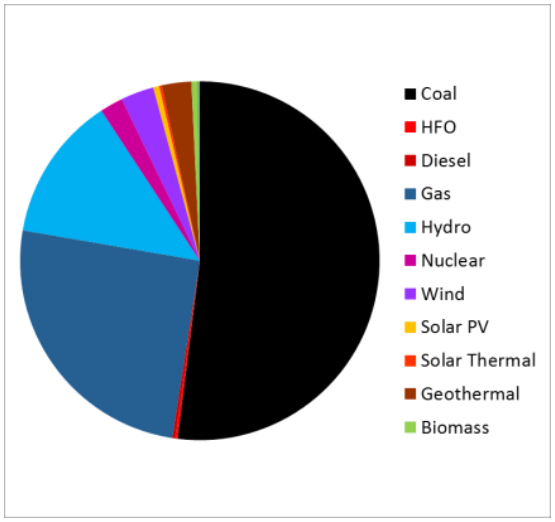
80% of electricity in SAPP is met by Coal

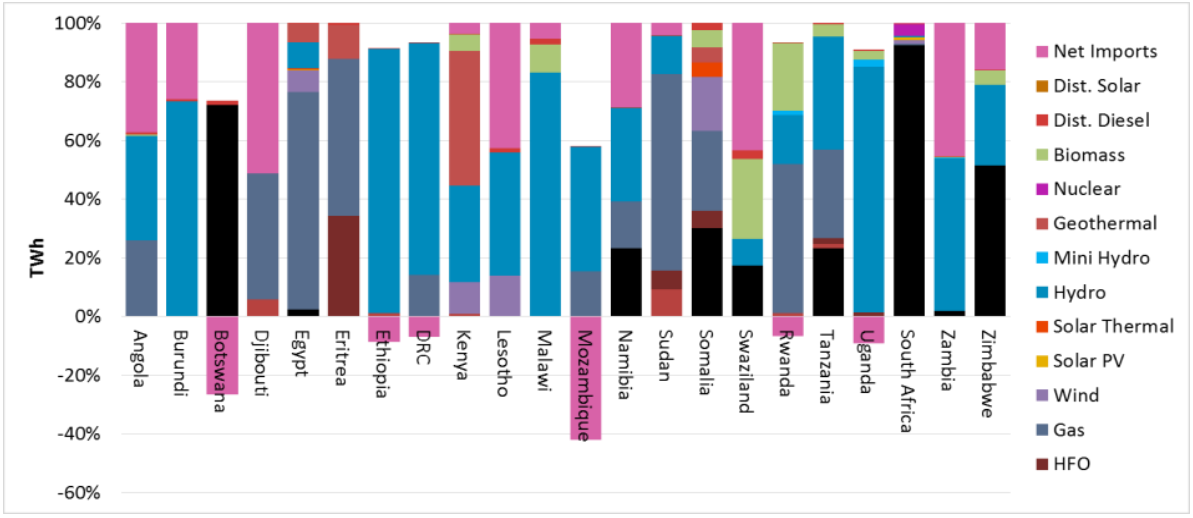
82% of electricity in EAPP is met by Gas

This pattern is likely to continue in the absence of transformative change.

Electricity supply in the region



Electricity supply by country



Scenario definitions

Reference

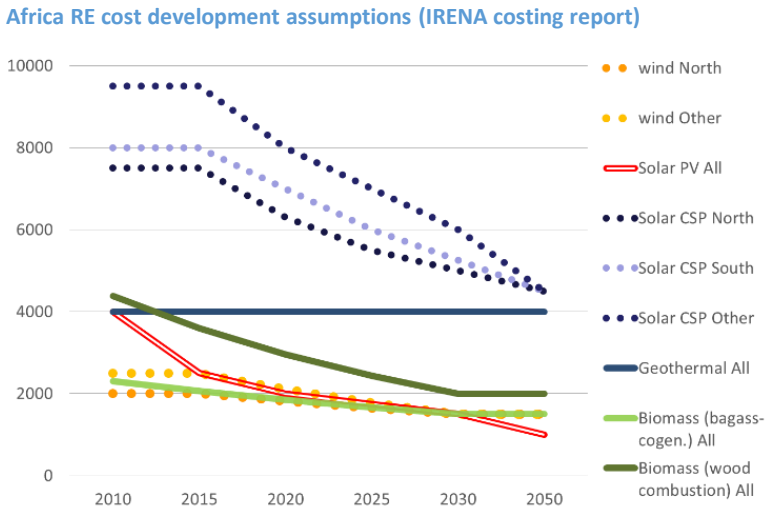
» Consistent with Master plan assumptions:

- Demands
- Fuel prices
- Dry year hydro

» Transmission limited to existing and committed projects

ACEC

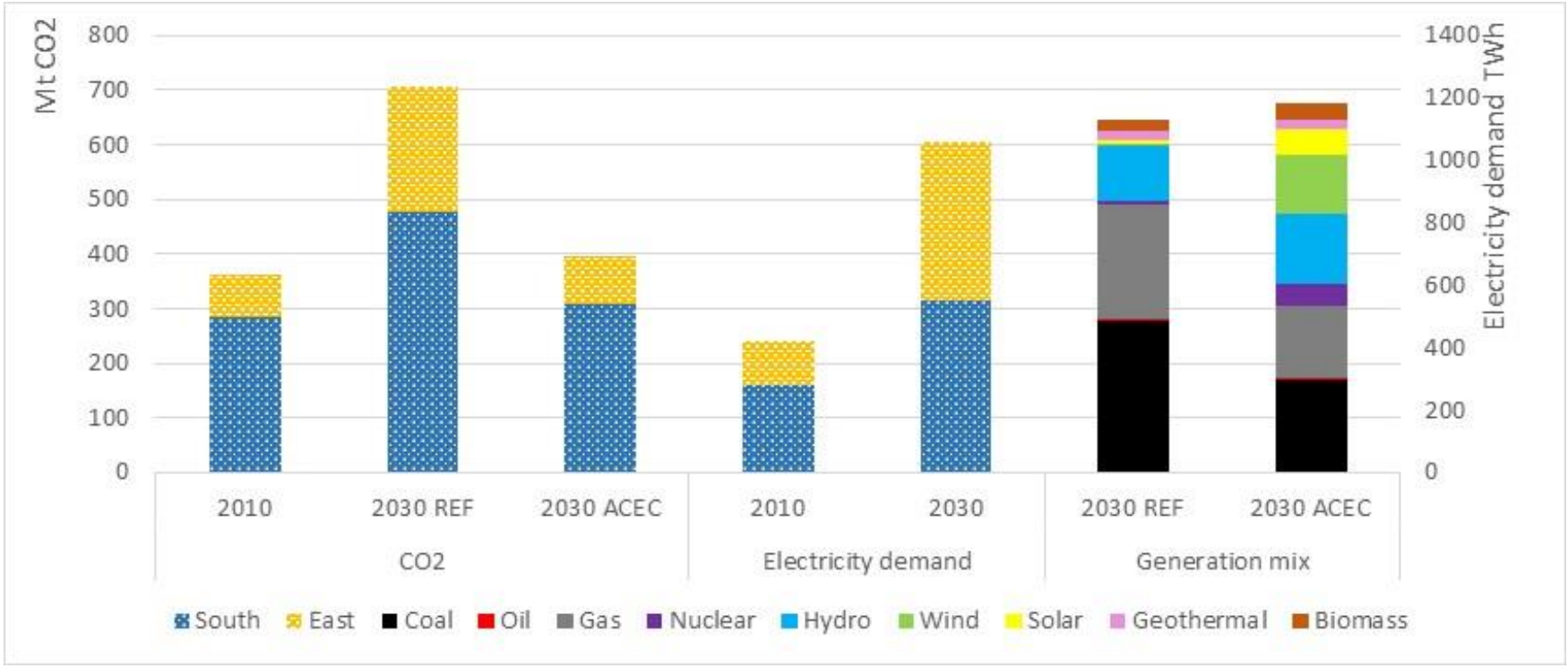
» Include decreasing RE cost trends



» Include a planned transmission projects

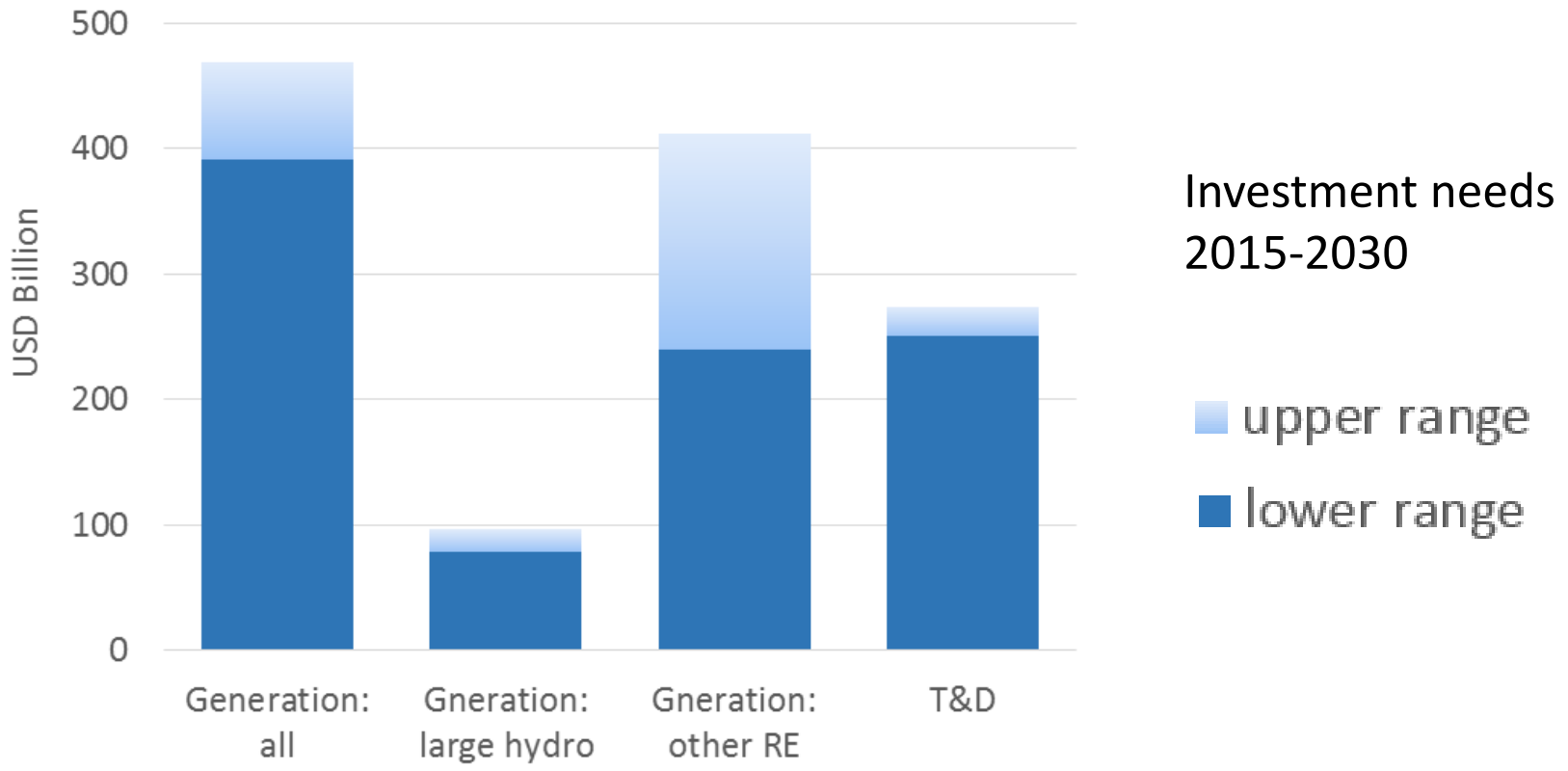
ACEC scenario analysis

- Demand is expected to **triple** by 2030
- CO2 emissions would be cut by **half**
- Share of RE would double under the ACEC scenarios



ACEC scenario analysis

Investment needs from 2015 to 2030 across different scenarios:
USD 20-25 Billion per year in generation and additional US 15 Billion for T&D



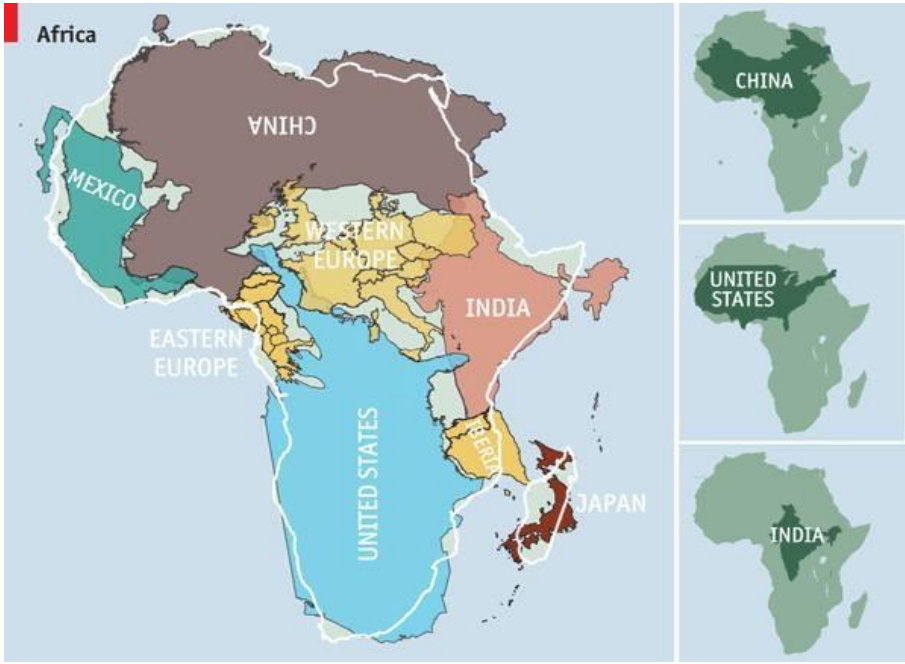
Key insights

» **Renewable energy sources could potentially meet 40%-50%** of power needs in the EAPP and SAPP region by 2030, with half of this coming from non-hydro renewables.

» **Reduced carbon emissions**
CO2 emissions would be cut by half

» **Improved supply security**
Renewable energy deployment would diversify the energy mix, improving supply security and making economies more resilient to fuel price volatility.

» **Expanded regional trade**
Larger markets for electricity trade will enable countries to benefit from increased power exports, lower-cost power imports, and a more complementary supply mix.



» **More investment and jobs**
Renewable power deployment at regional scale, potentially exceeding 120 GW by 2030, will provide new investment opportunities and create new jobs.

Thank you

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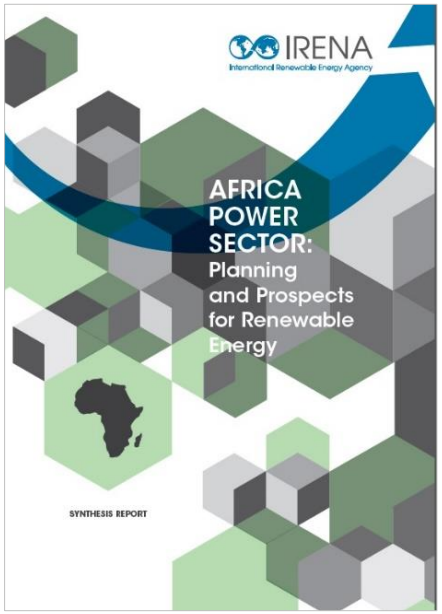

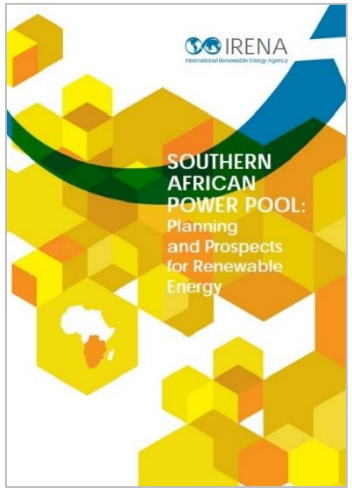

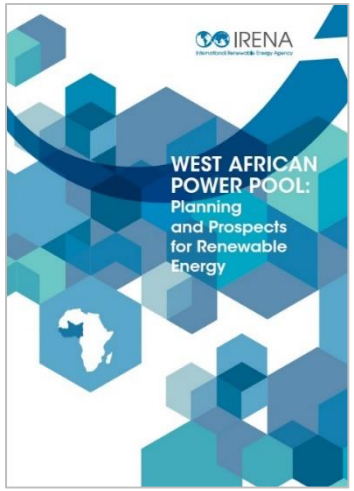

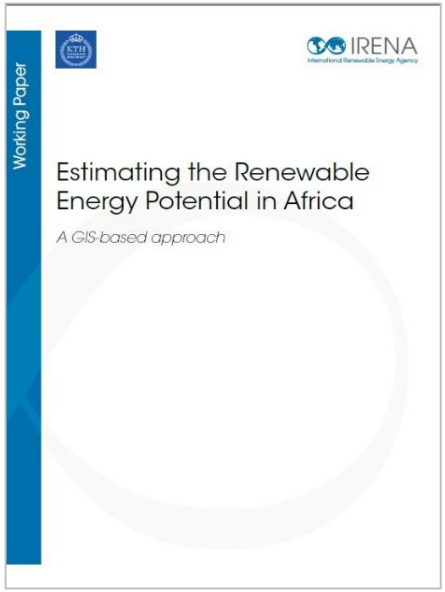

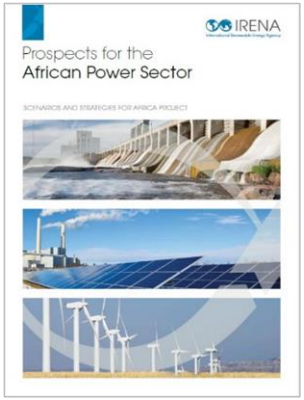

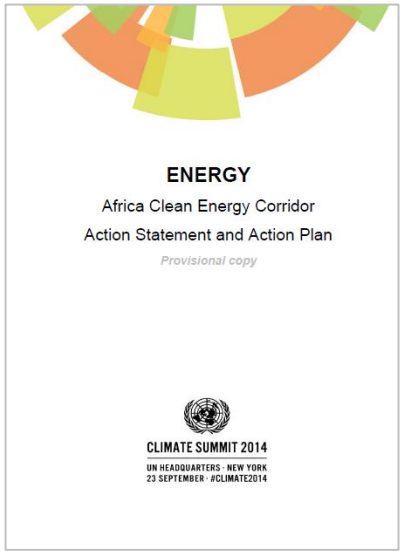

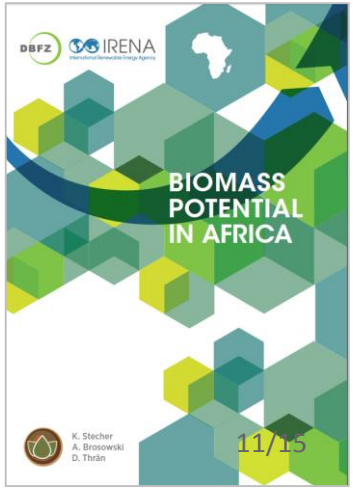

Good planning will …

Bring stability in future policy direction

- Consensus based, country endorsed

Reduce uncertainties on project selection

Facilitate financing

- Provide confidence
- Reduce processing time
- Faster and efficient evaluation and appraisal
- Accelerate service delivery

Supporting slides

Continental Investment potential

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		N	W	C	E	S	Africa
Power Generation in 2030 (TWh)	Total	1050 - 1052	215 - 247	110 -124	576	623 - 626	**1,829 - 2,210**
	Hydro	10	70 - 71	55 - 57	129	92 - 139	**261 - 393**
	Other renewable energy	167-469	44 - 69	30 - 44	254	120 -175	**279 - 861**
Installed capacity in 2030 (GW)	Total	230 - 318	63 - 72	31 - 36	187	148 -160	**431 - 620**
	Hydro	3	19	14 - 15	32	25 - 34	**72 - 94**
	Other renewable energy	51-146	13 - 22	10 - 15	79	50 - 73	**94 - 288**
Investment, 2015-2030 (billion USD)	Total	236-403	89 - 108	38 - 46	197	174 - 203	**424 - 796**
	Hydro	2	36 - 37	19 - 20	36	26 - 44	**82 - 130**
	Other renewable energy	92-275	31 - 49	19 - 27	147	116 - 380	**196 - 787**
	T&D	184-189	48 - 52	24 - 25	121	87 - 90	**220 - 362**

More graphs

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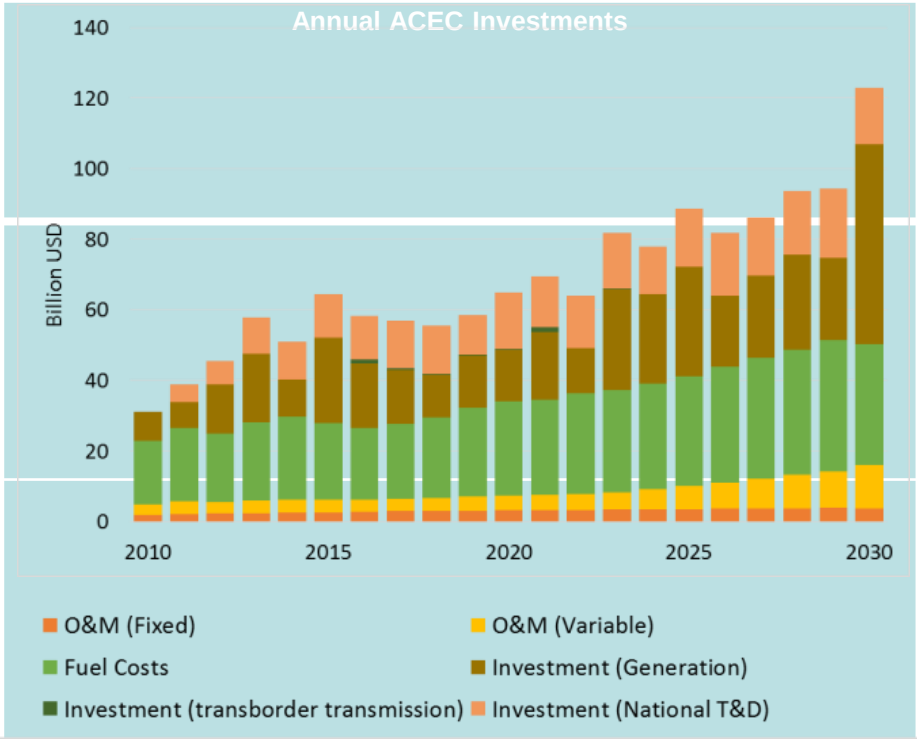

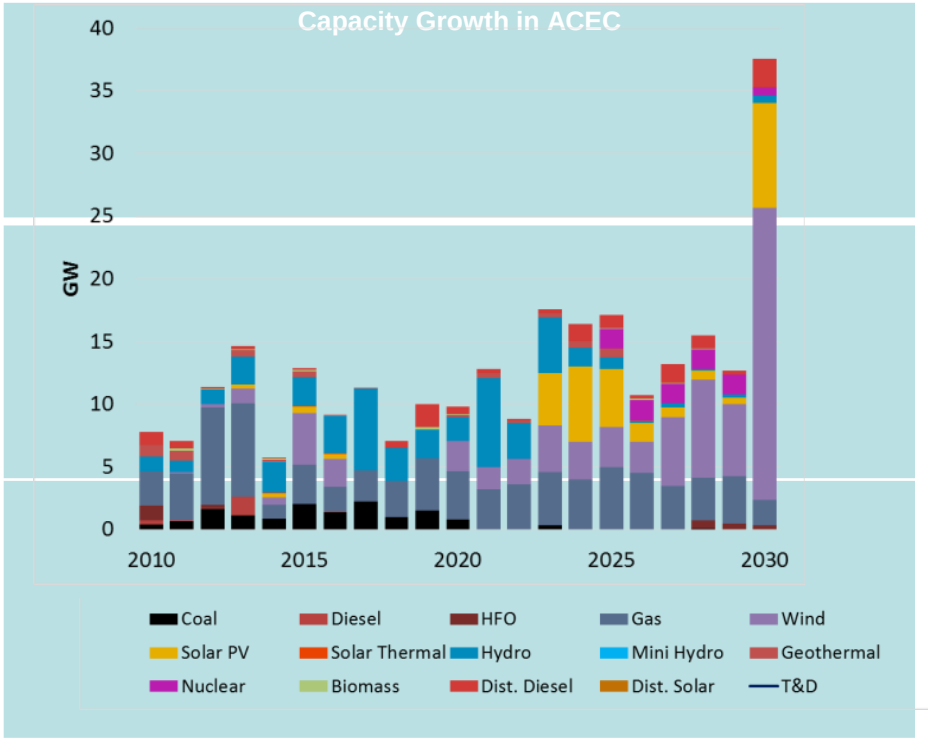

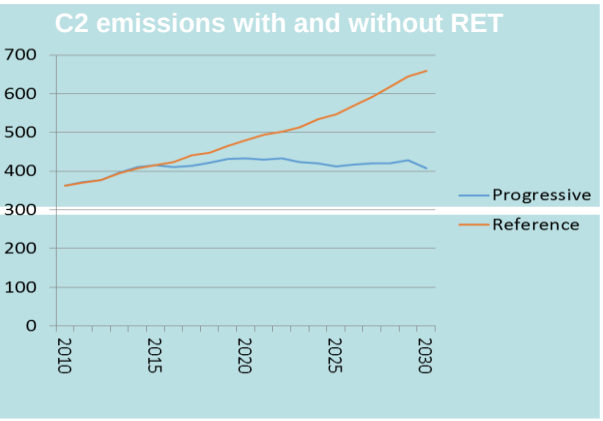

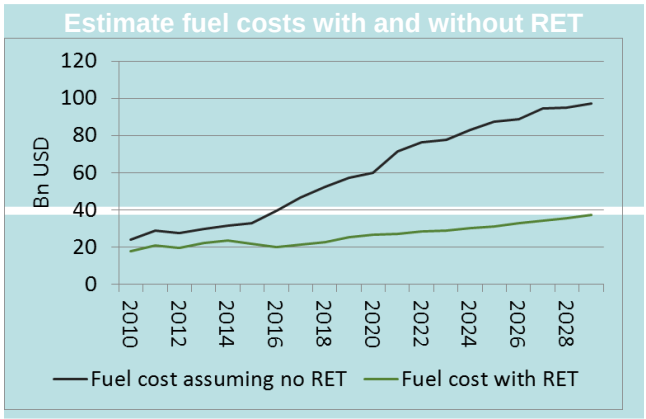

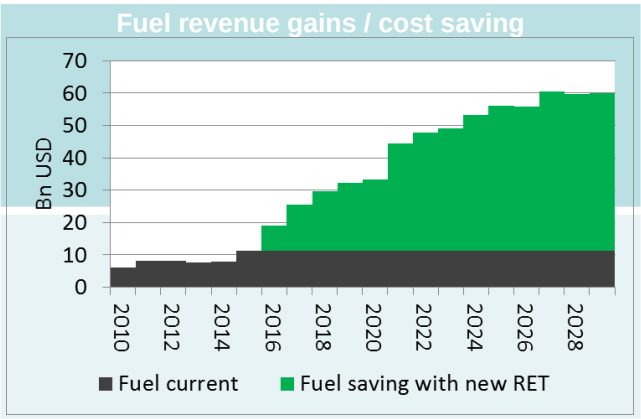

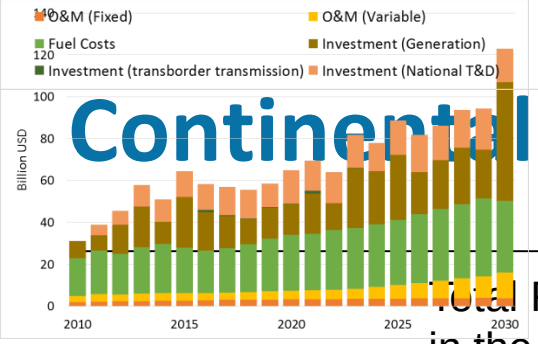

Continental prospects

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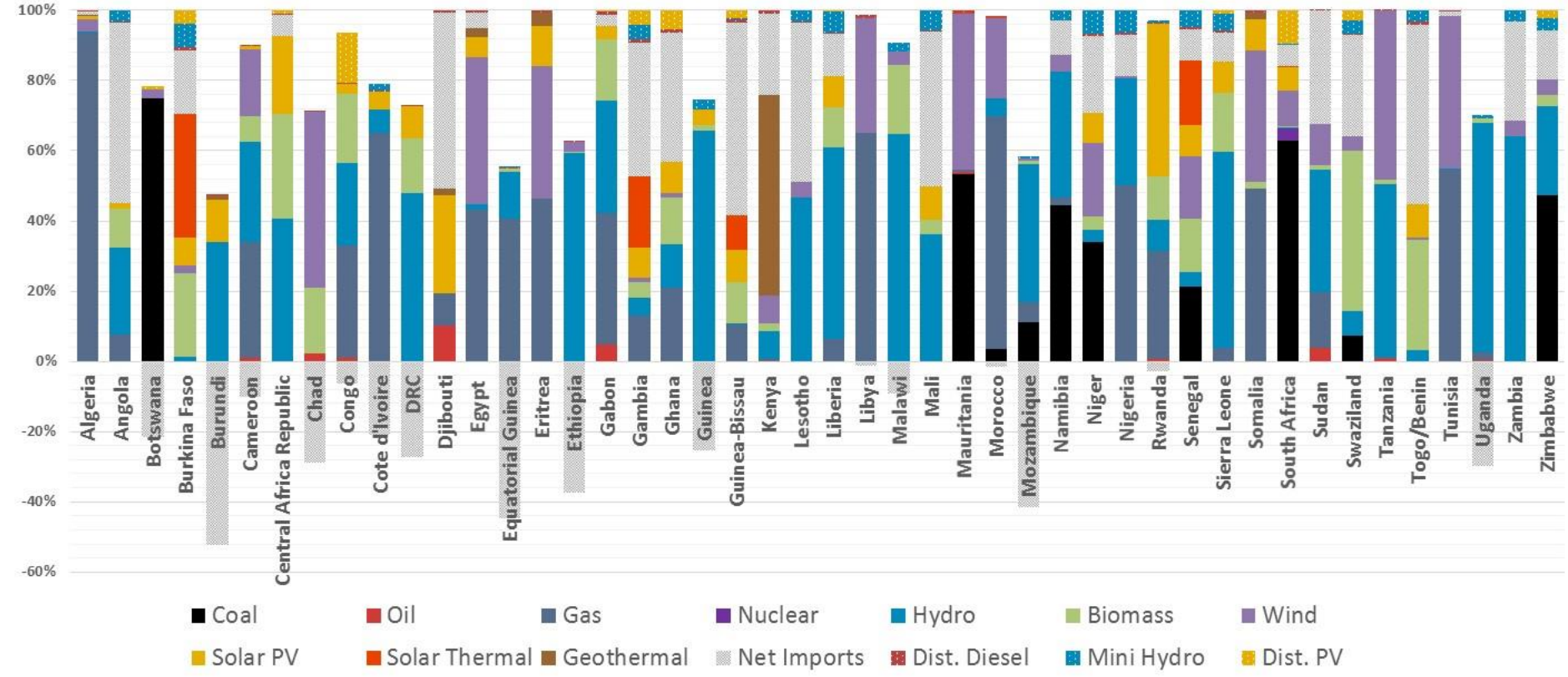
Total RE share in power generation would reach **53%**
in the continent with non-hydro RE representing **15%**

Generation mix by source in 2030



Investment data

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TABLE 1: INVESTMENT NEEDS IN POWER GENERATION IN ACEC COUNTRIES

	Capacity addition between 2015 and 2030 (GW)	Investment needs between 2015 and 2030 (billion)	Expected electricity demand in 2030
South Africa	33-66	106-132	414
Angola	1-4	4-8	18
Botswana	0.8-2	1-4	7
DRC	8-12	14-25	36
Lesotho	0.2-0.2	0.4-0.5	1.2
Malawi	0.5-0.5	0.8-0.9	3.3
Mozambique	3-4	5-9	8
Namibia	0.7-2	2-2	6
Swaziland	0.2-0.9	0.4-3	1.7
Zambia	3-7	9-16	33
Zimbabwe	2-3	5-6	20
Egypt	60-102	85-136	373
Burundi	0.4-0.5	0.6-0.8	1.9
Djibouti	0.2-0.3	0.3-0.3	0.9
Eritrea	0.2-0.4	0.2-0.6	1.1
Ethiopia	10-17	11-20	25
Kenya	6-6	12-12	31
Rwanda	0.2-0.5	0.2-0.7	2.2
Somalia	0.3-0.4	0.3-0.6	1.2
Sudan	3-5	8-10	50
Uganda	2-2	4-7	7
Tanzania	3-6	4-13	16-21
Total ACEC	132-241	260-405	18

TABLE 2: INVESTMENT NEEDS IN RENEWABLE POWER GENERATION IN ACEC COUNTRIES

	Capacity addition between 2015 and 2030 (GW) Hydro	Capacity addition between 2015 and 2030 (GW) Other RET	Investment needs between 2015 and 2030 (billion) Hydro	Investment needs between 2015 and 2030 (billion) Other RET
South Africa	0-0.2	8-51	0-0.5	21-96
Angola	0-0.5	0.2-4	0-1	0.7-6
Botswana	-	0.1-0.2	-	0-0.3
DRC	0-0.5	0.3-4	0-1	1-8
Lesotho	-	0-0.01	-	0-0.1
Malawi	-	0-0.1	-	0.1-0.2
Mozambique	0-1	0.1-1	0-3	0.3-4
Namibia	-	0-0.2	-	0.2-0.4
Swaziland	-	0-0.1	0-0.1	0.1-0.3
Zambia	-	0.2-3	-	1-6
Zimbabwe	0-0.2	0.2-1	0-0.4	0.8-3
Egypt	-	12-58	0.2-0.2	30-95
Burundi	0.3-0.3	0.1-0.2	0.5-0.5	0.1-0.3
Djibouti	-	0-0.1	-	0.1-0.1
Eritrea	-	0-0.2	-	0-0.4
Ethiopia	10-16	0-0.9	11-19	0-1
Kenya	0.4-0.5	3-4	1-1	8-9
Rwanda	-	0-0.3	-	0-0.5
Somalia	-	0-0.2	-	0-0.3
Sudan	3-3	0.1-2	6-7	0.2-4
Uganda	1-2	0-0.04	4-6	0.2-0.3
Tanzania	0.8-3	0-5	2-4	0.1-10
Total ACEC	13-26	20-137	21-43	54-244

- ACEC context –
  - Background – SE4A, Access, Regional cooperation, RE deployment
  - This was prepared for UN climate summit to put some numbers on the potential CO2 mitigation and cost implications
  - The analysis is based on SPLAT – What is SPLAT, Power Infrastructure Databases, Global Atlas, Costing, calibrated to Master plan
  - Long-term planning, scenario analysis (1 Slide)
  - Scenario definition (1 slide, main assumptions and transmission change
    - Demand from master plans
    - Costs of RE decreasing in one case
    - All policy conditions are favourable
    - Hydro dry year assumption
    - Grand inga limited to INGA 3
    - CO2 tax of 25 USD
  - Analysis, Demandx3, emissions/2, RE share, costs
  - Massive investment zone, reaching access rates,