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THE GRAND INGA PROJECT

presented by

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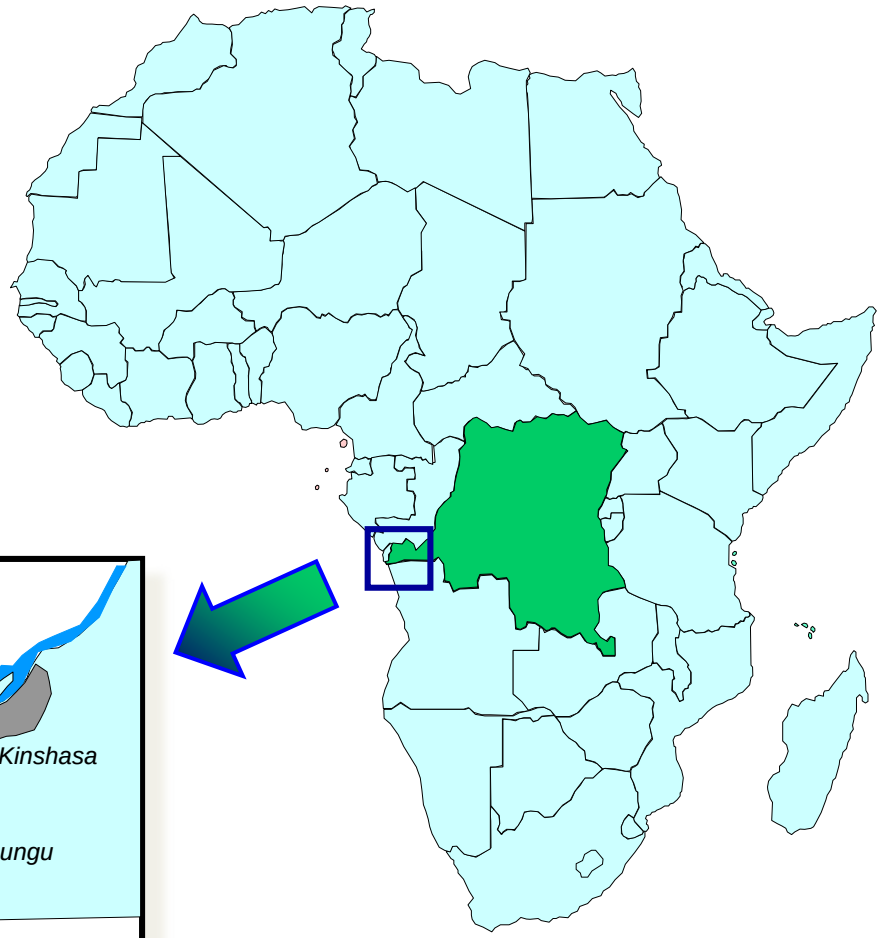
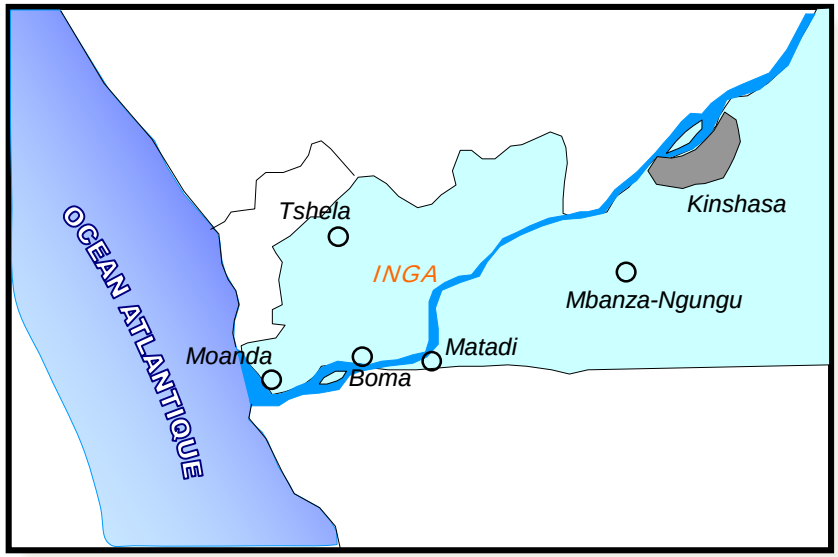
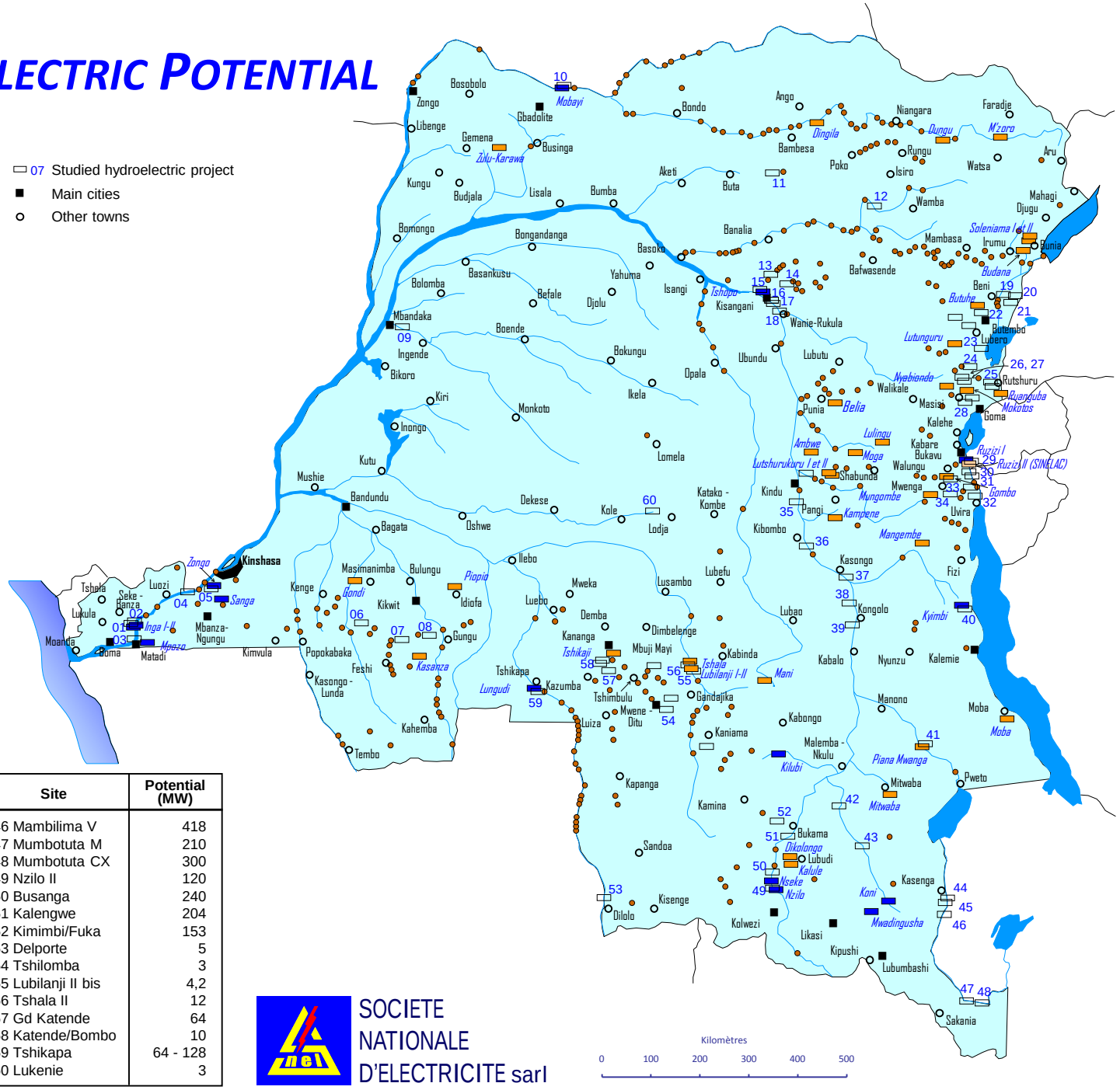
DEMOCRATIC REPUBLIC OF CONGO AND INGA SITE





HYDROELECTRIC POTENTIAL



Legend

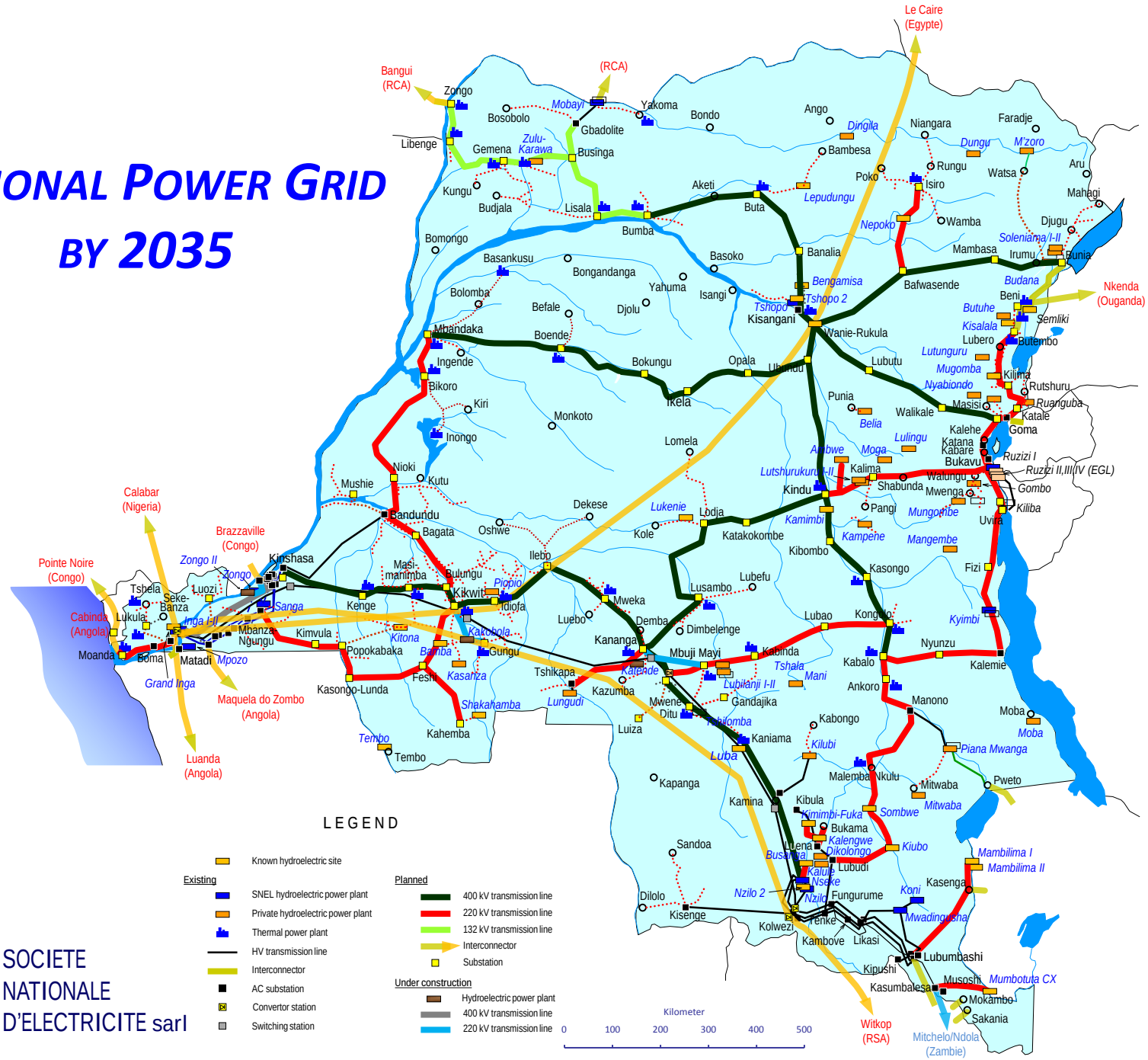
- Water falls or rapids
- Existing SNEL power plants
- Existing private power plants
- 07 Studied hydroelectric project
- Main cities
- Other towns

Site	Potential (MW)
01 Grand Inga	43.800
02 Inga IX	1.500
03 Matadi	12.000
04 Pioka	22.000
05 Zongo II	150
06 Kitona	12
07 Bamba	12
08 Kakobola	10,5
09 Ruki	5,3
10 Mobayi II	17,5
11 Lepudungu	3
12 Nepoko	134
13 Bengamisa	15
14 Babeba	20 - 50
15 Tshopo II	17
16 Kisangani	460
17 Wagenia	20 - 50
18 Wanie Rukula	530 - 688
19 Semliki	28
20 Ruwenzori I	6
21 Ruwenzori II	6
22 Kisalala	7,5
23 Muhuma	25
24 Mugomba	40
25 Rutshuru	4
26 Ngingwe	3
27 Binza	5
28 Osso	3
29 Panzi	42
30 Sisi	205
31 Kamanyola	240 - 390
32 Kiliba	15
33 Ulindi	30
34 Mwenga	9,5
35 Kamimbi	14
36 Kibombo	13
37 Kitete	21
38 Mwanangoye	46
39 Portes d'Enfer	36
40 Kyimbi II	25,8
41 Piana Mwanga II	8,4
42 Sombwe	186
43 Kiubo	66
44 Mambilima I	124
45 Mambilima II	201

Site	Potential (MW)
46 Mambilima V	418
47 Mumbotuta M	210
48 Mumbotuta CX	300
49 Nzilo II	120
50 Busanga	240
51 Kalengwe	204
52 Kimimbi/Fuka	153
53 Delporte	5
54 Tshilomba	3
55 Lubilanji II bis	4,2
56 Tshala II	12
57 Gd Katende	64
58 Katende/Bombo	10
59 Tshikapa	64 - 128
60 Lukenie	3

SOCIETE NATIONALE D'ELECTRICITE sarl

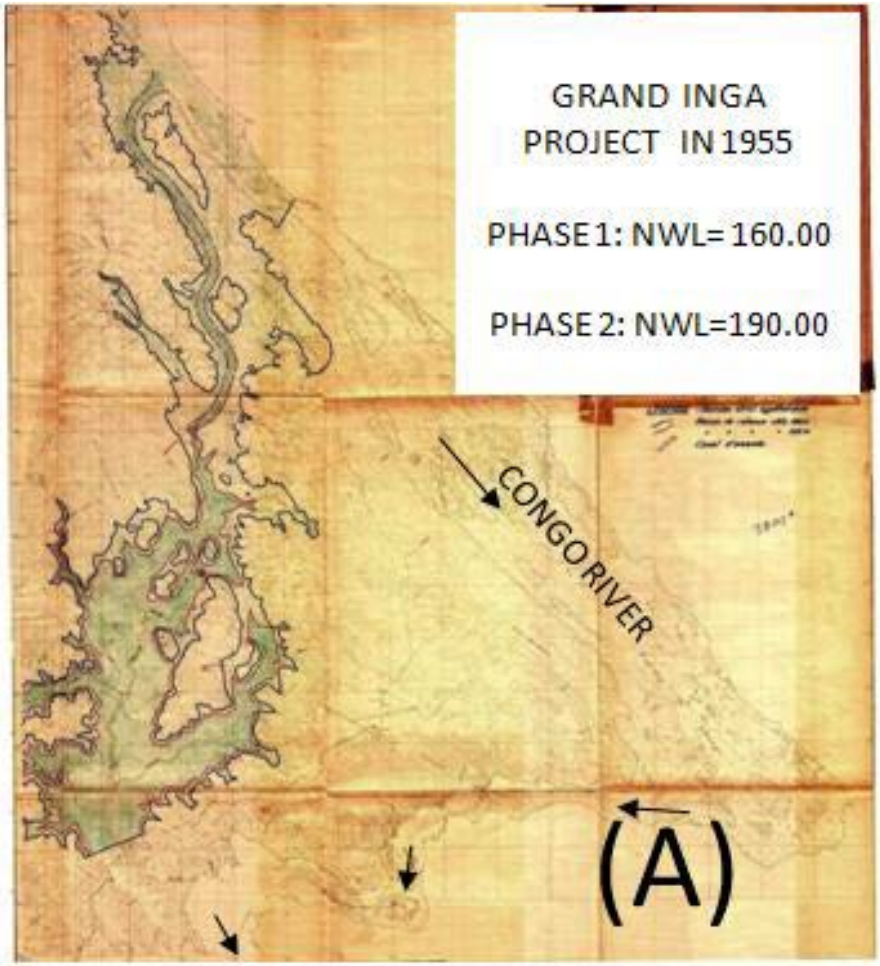
NATIONAL POWER GRID BY 2035

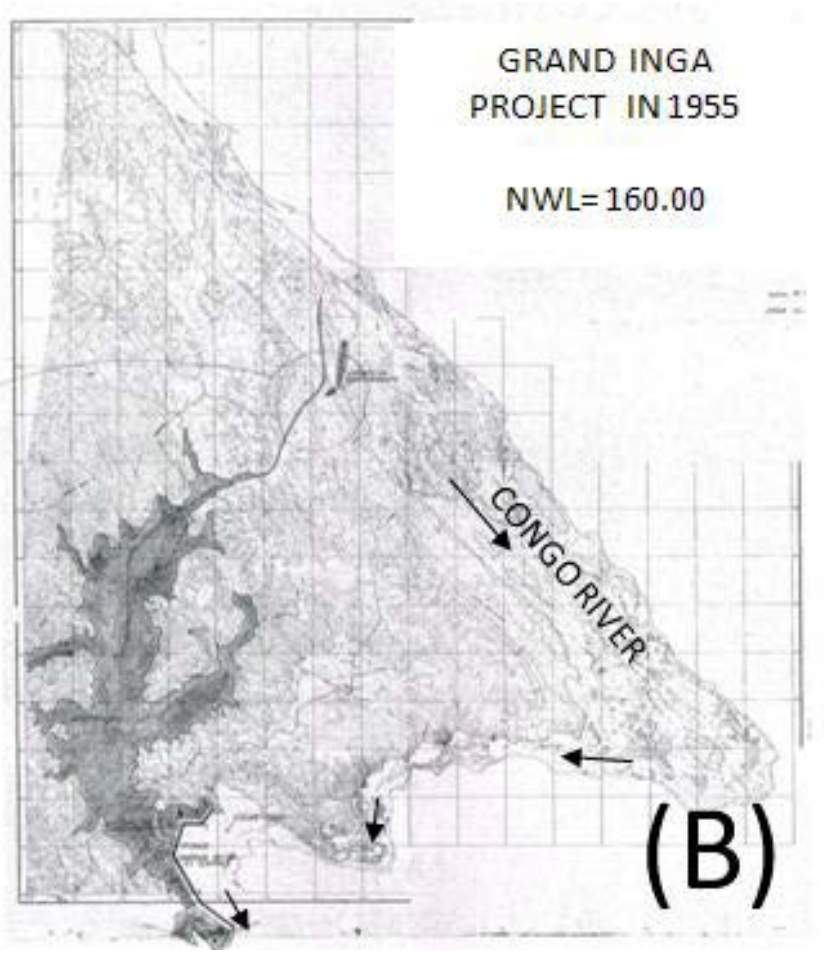


SOCIETE NATIONALE D'ELECTRICITE sarl

HISTORY OF THE SITE DEVELOPMENT STUDIES

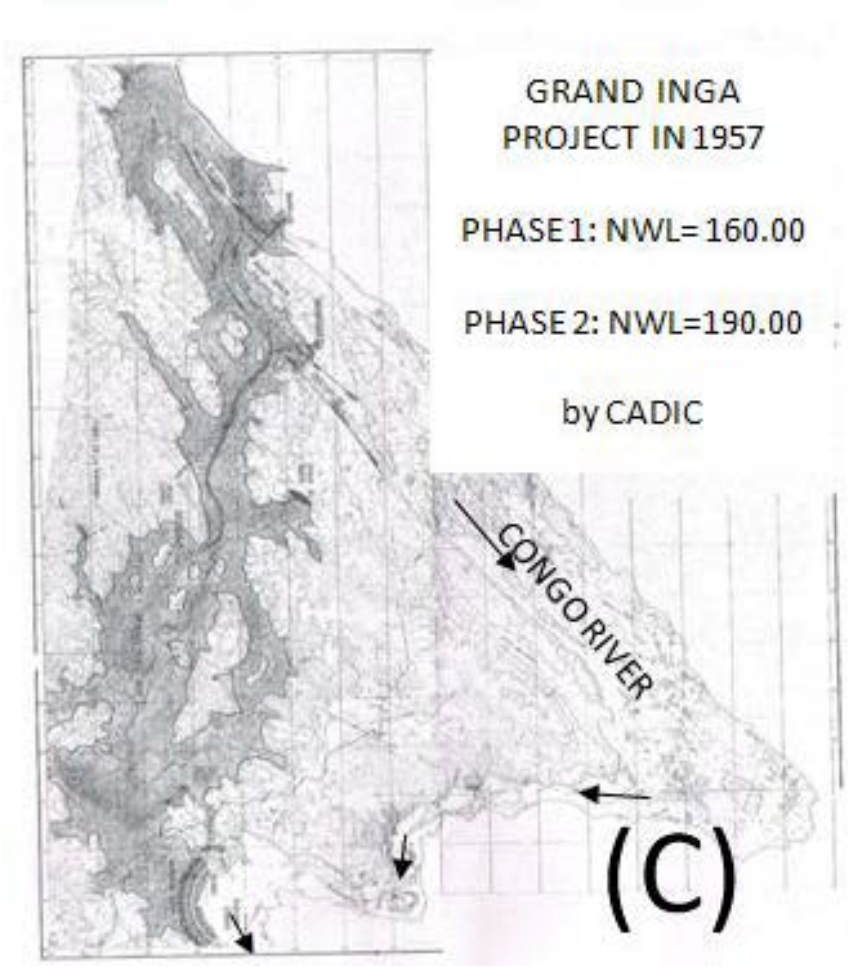
1955

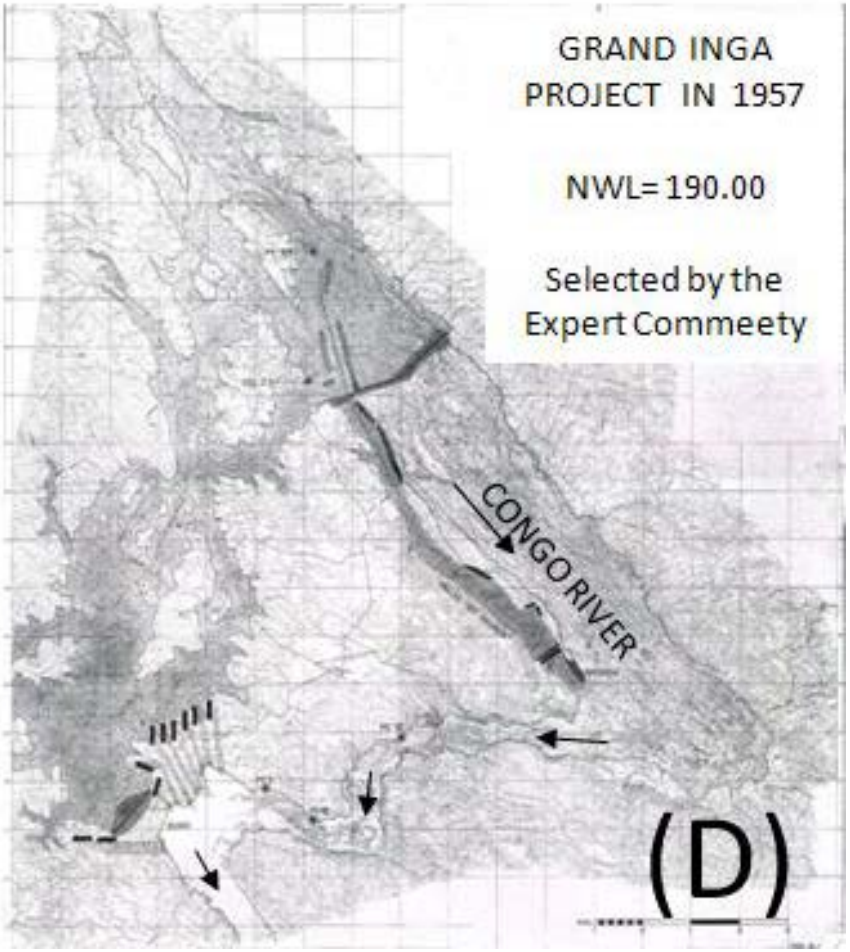




HISTORY OF THE SITE DEVELOPMENT STUDIES

1957

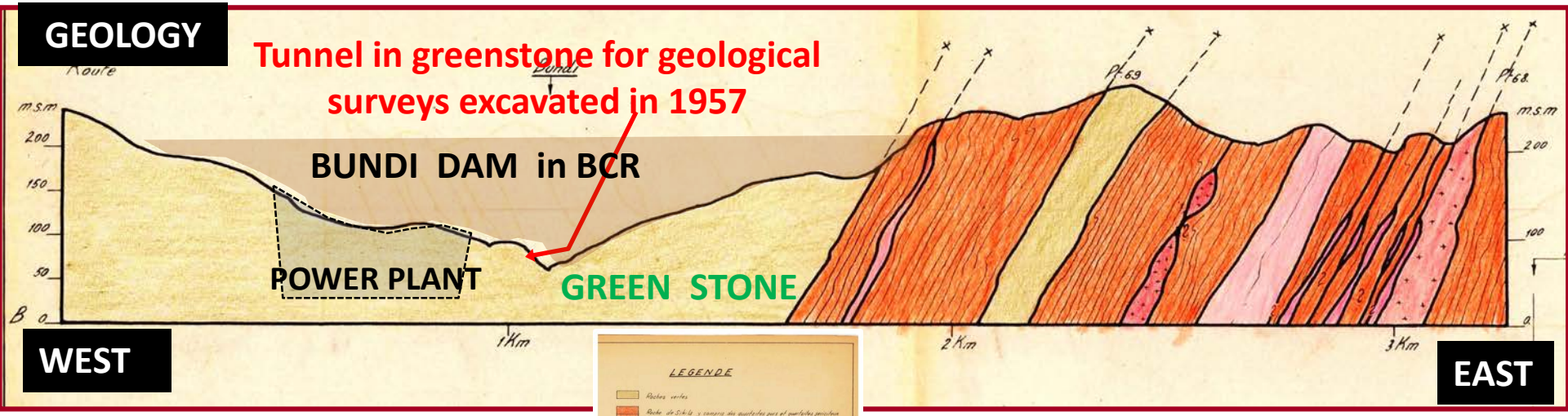


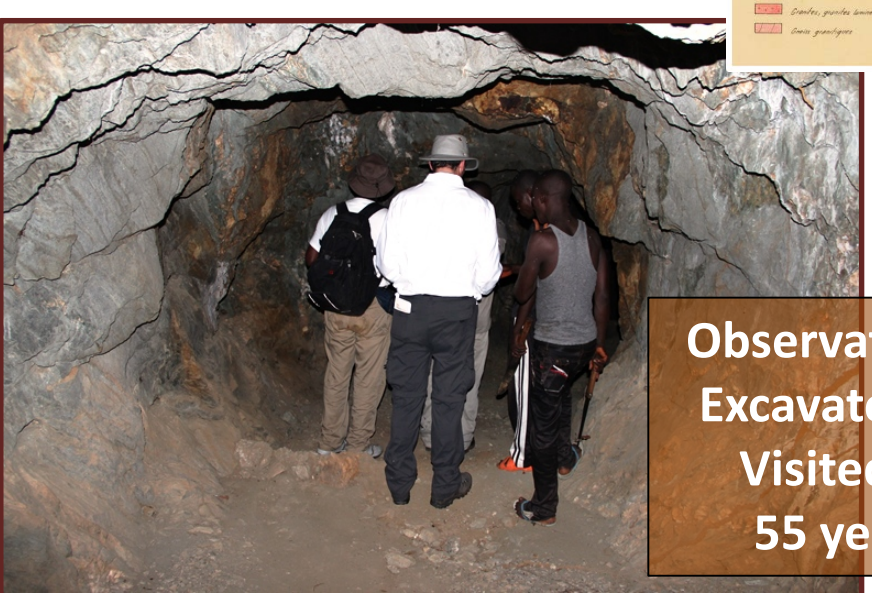


HISTORY OF THE SITE DEVELOPMENT STUDIES

GEOLOGY

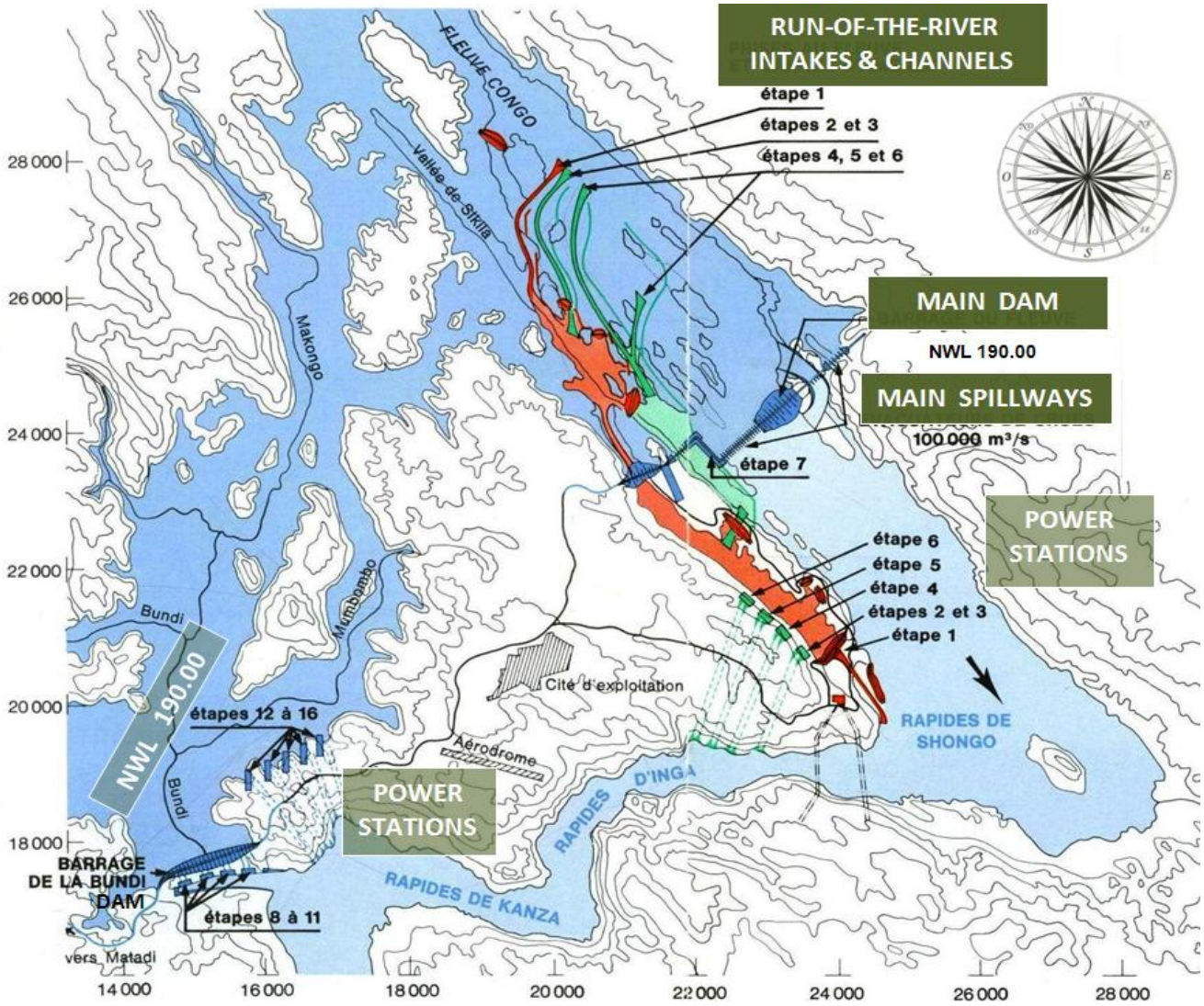
Tunnel in greenstone for geological surveys excavated in 1957





Observation Tunnel
Excavated in 1957
Visited in 2012
55 years later

HISTORY OF THE SITE DEVELOPMENT STUDIES



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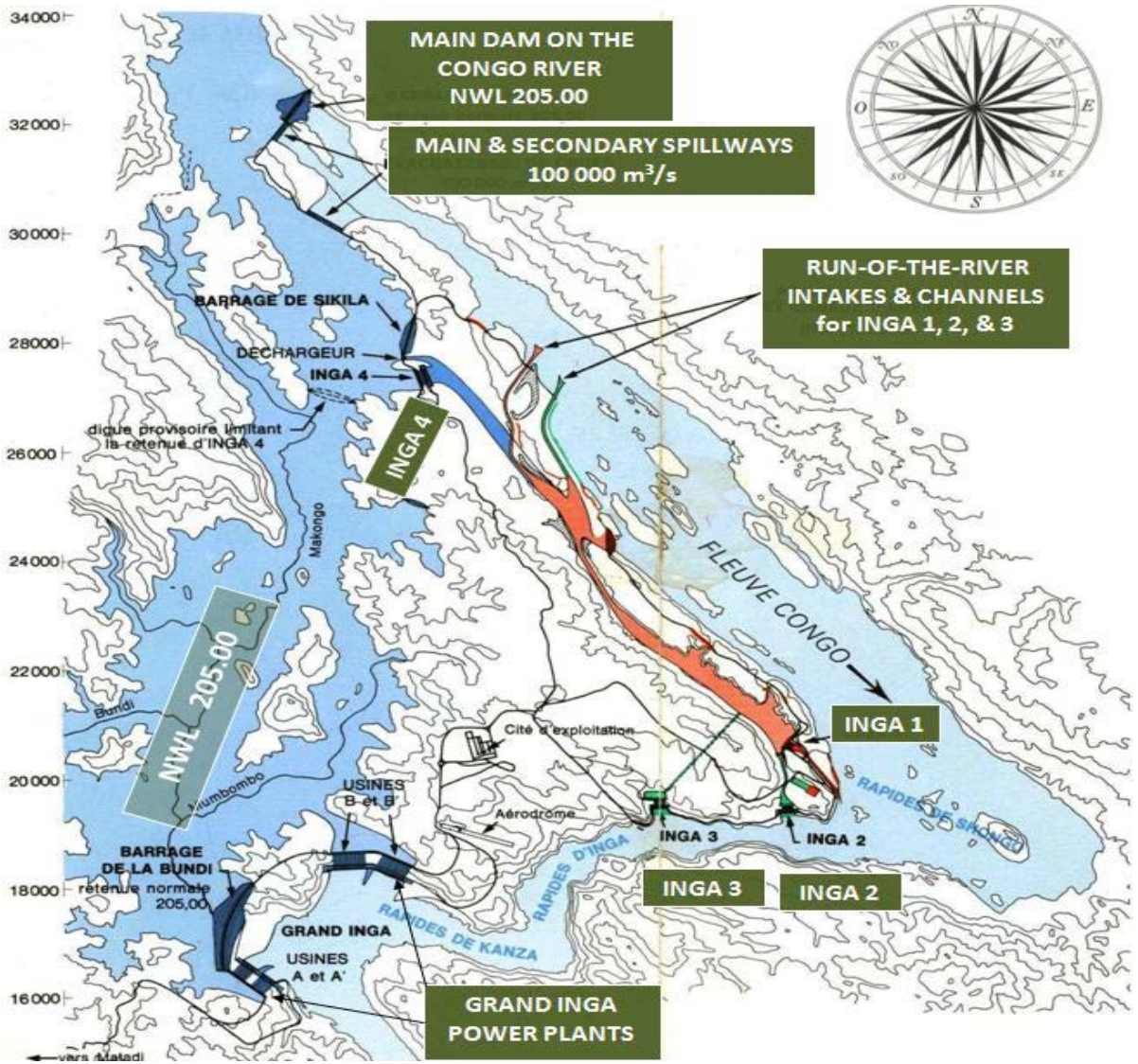
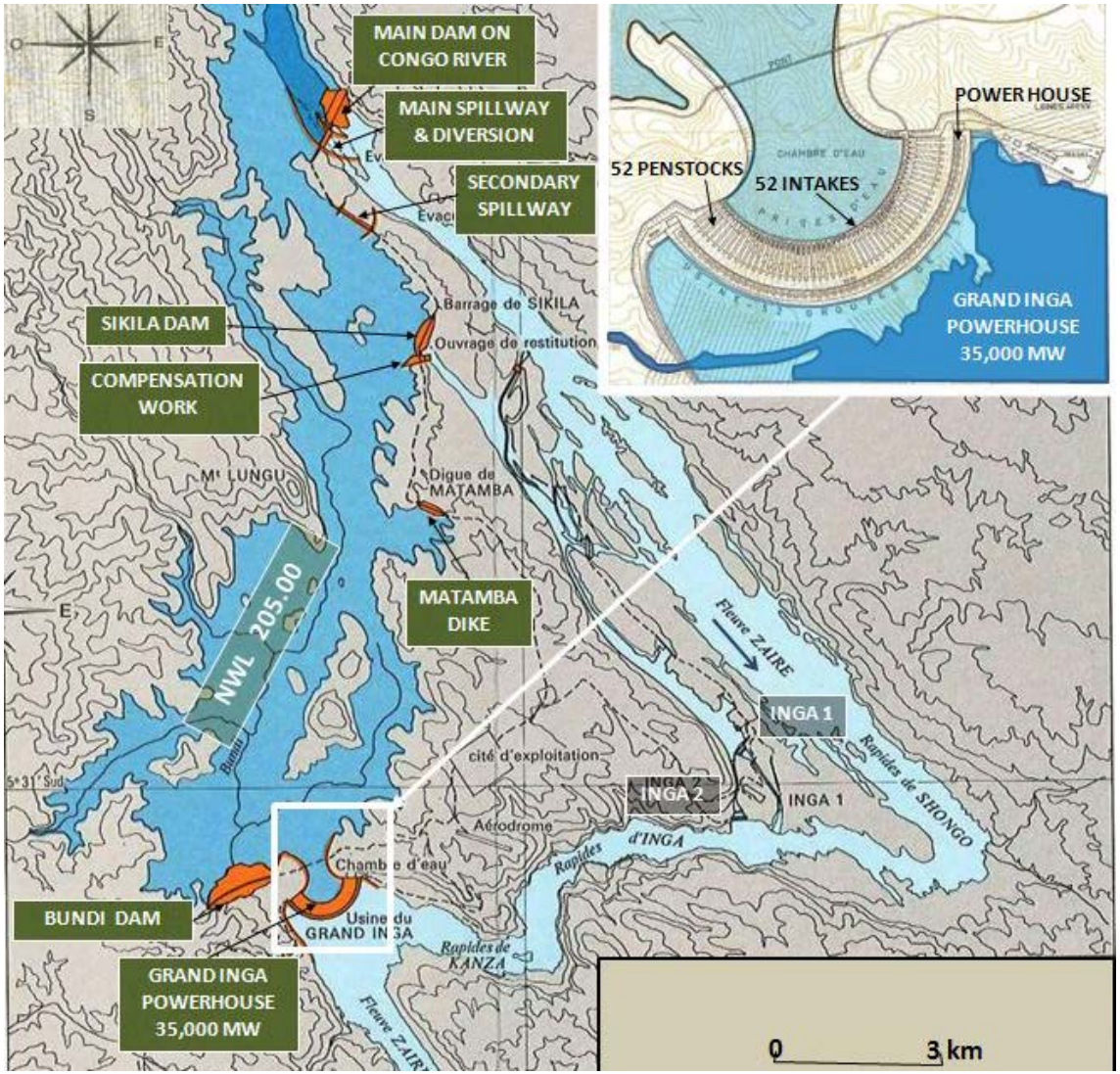


1971

HISTORY OF THE SITE DEVELOPMENT STUDIES

1974

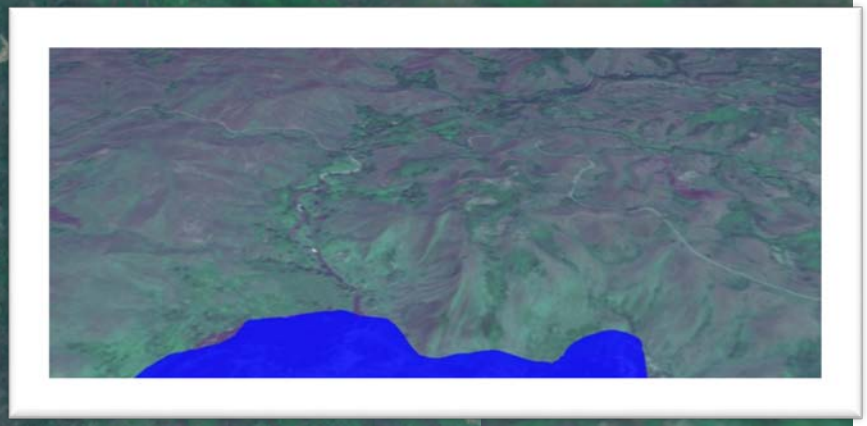


2013 FEASIBILITY STUDY : MAIN RESULTS

A new approach is proposed, making the development of the Grand Inga possible in the very short term:

- Innovative, flexible and economical staging identified
- Each phase as small as 7,000 MW at competitive costs
- Phase size can be adjusted to adapt to planned demand and export opportunities
- Inga 3 becomes a simpler first phase, with no closure of the Congo River and no tunnels, using an open channel

DEVELOPMENT SCHEME

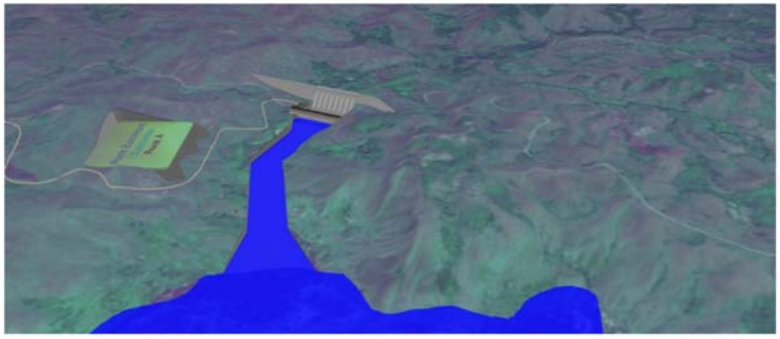


Inga Site

Average flow: 41,000 m^3/s
100 m head

Inga 1 (351 MW)
Inga 2 (1 424 MW)

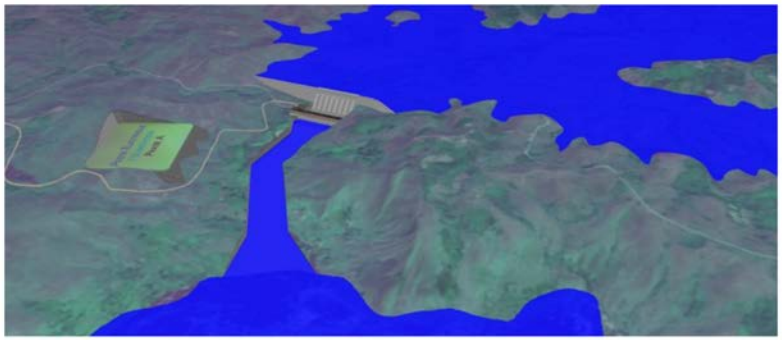
DEVELOPMENT SCHEME



Inga 3 Low Head

Transfer Channel
Bundi Valley Dam
Inga 3 Power house
P max : 2,500 – 5,000 MW
Q max : 3,500 – 7,000 m^3/s

DEVELOPMENT SCHEME

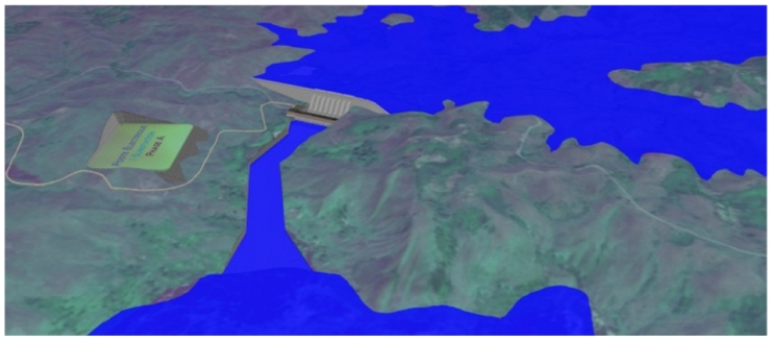


Inga 3 Low Head

Reservoir Filling

Upstream Water Level: 145 - 170m

DEVELOPMENT SCHEME

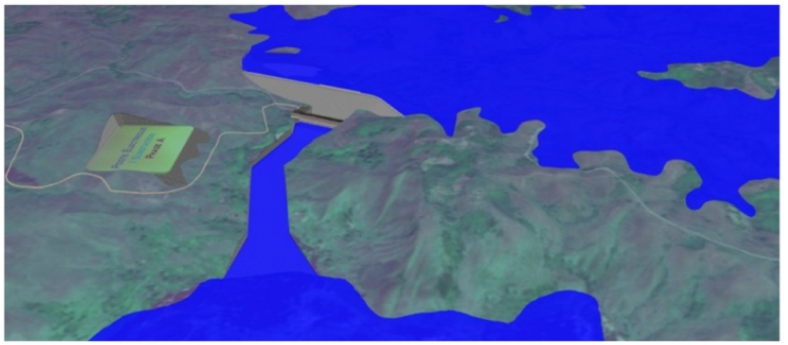


Inga 3 High Head

River Closure Dam
Spillways and Dikes
Raising Bundi Dam
Head +50%
No New Power house

P Inga 3 HH : up to 8,000 MW

DEVELOPMENT SCHEME



Inga 3 High Head

Reservoir Filling

Upstream Water Level: 202 – 205 m

INGA 3 TUNNELS VS OPEN CHANNEL – MAIN FINDINGS OF THE COMPARISON :

Major risks associated with underground works

- More than 60 km of very large tunnels
- Construction delays and costs overrun to be anticipated

All INGA 3 alternatives located downstream from the future Grand Inga do not allow the optimal development of the site

- Uses large flows that will not make use of the full head once the Grand Inga dam is built
- Put constraints on the future development of Grand Inga, in terms of water usage, land use, etc.

MAIN ASPECTS OF THE NEW PHASED DEVELOPMENT

- New Inga 3 LH with open channel is the first phase of the integrated phased approach of Grand Inga
- Size of Inga 3 LH adaptable to confirmed offtakes, and could start as a national project, and later upgrade to a regional project scope
- ➔ Preliminary analysis proposed Inga 3-LH to be 4,800 MW *(to be confirmed based on maximum capacity of river intake)*

DEMAND COMPONENTS

1ST DEMAND COMPONENT OF A PHASED DEVELOPMENT OF INGA 3 LH : INTERNAL (DRC) DEMAND ONLY

- 2,000 to 2,300 MW for DRC including mining industry needs in 2020
  - Internal increase in demand or limited exports
  - Line losses below 5%
- Opportunity for electro-intensive industries in a Special Economic Zone (SEZ) to benefit from Inga competitive energy .

- ➔ *Total requirements for first development step approximately @ 2,300 MW*

DEMAND COMPONENTS

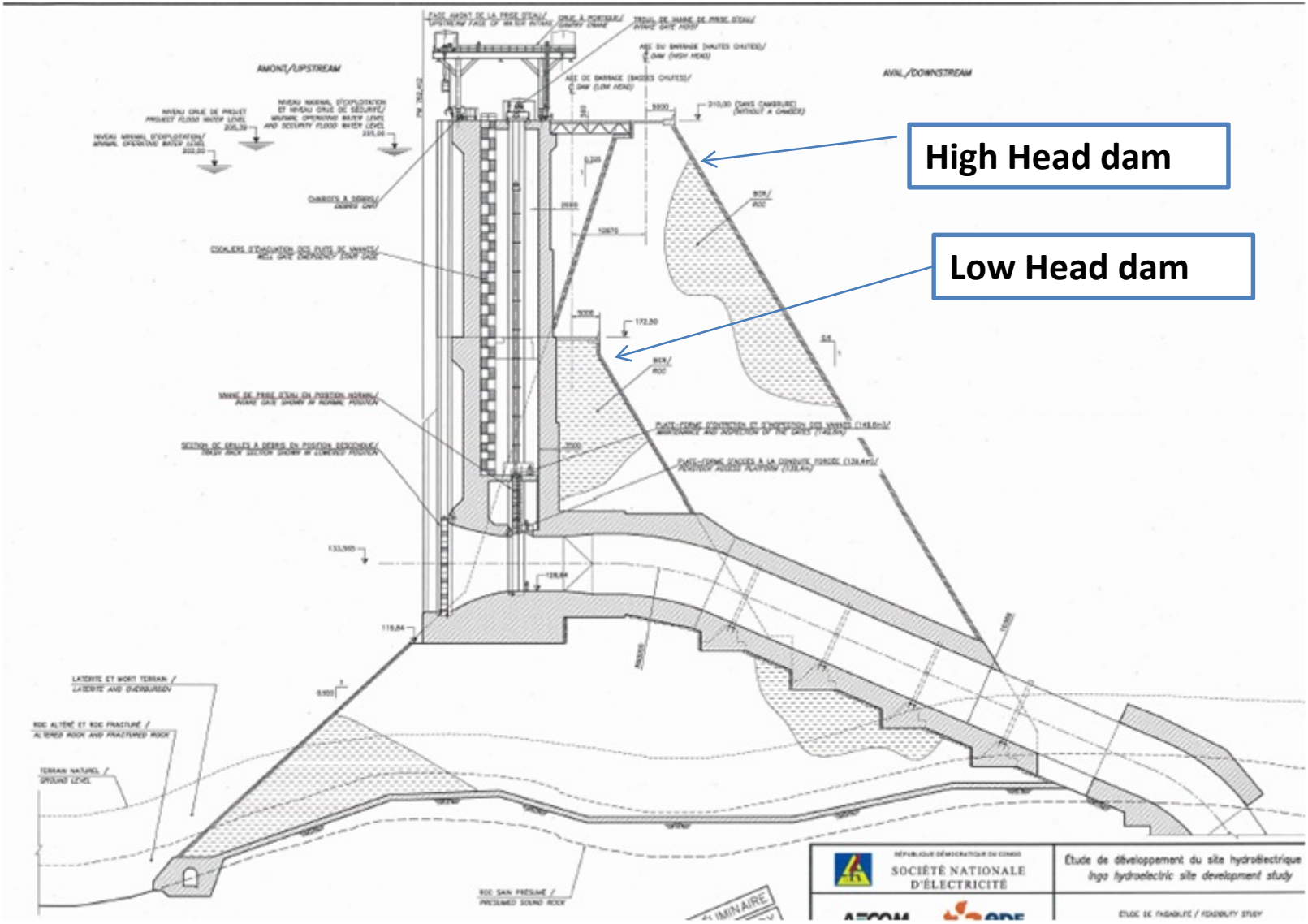
2ND DEMAND COMPONENT IN PHASED DEVELOPMENT OF INGA 3 LH : INTERNATIONAL EXPORTS

- RSA (size of exports 2500 MW)
- Line losses to be included (~below 5%)

➔ *Total international requirements 2500 MW...*

INGA 3 POWER PLANT

INGA 3 POWER PLANT



INGA 3 POWER PLANT

INGA 3 – LOW HEAD

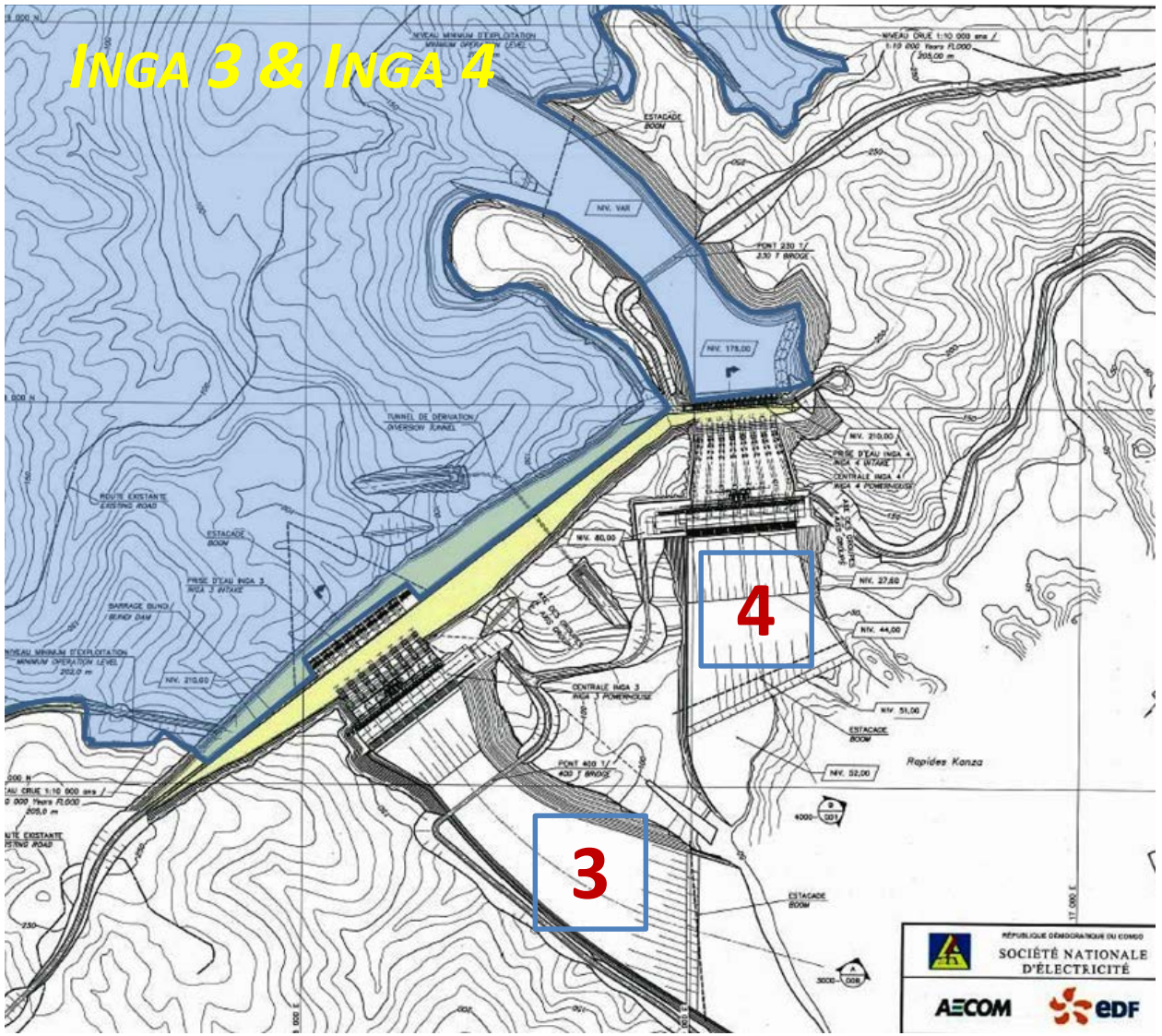
- From 4 to 12 units, 2,500 to 5,000 MW
  (maximum confirmed : 11)
- Integrating final development of Grand Inga when river dam is built in the future
  - ✓ Turbine-generators designed to operate at low and high head
  - ✓ Bundi Dam and intake structures designed to be raised in the future
- Construction costs (excluding Financing, inflation & IDC)
  - ✓ 2,600 MW, 4.1 billion $
  - ✓ 3,500 MW, 5.0 billion $
  - ✓ 4,800 MW, 6.2 billion $ (2,6 billion $ Channel/Dam/spillway + 3,6 billion $ Power plant + 2,6 billion $ DC line Inga - Kolwezi)
- Construction schedule : 6 years for full commercial operation

INGA 3 POWER PLANT

INGA 3 – HIGH HEAD

- Main dam on the Congo River built at maximum elevation (205 m)
- Spillways, dikes and secondary dams built
- Bundi Dam raised to maximum elevation
- No new powerhouse, no equipment modification
- Generation raised by 50% approx using the same power plant

PROGRESSIVE DEVELOPMENT OF GRAND INGA



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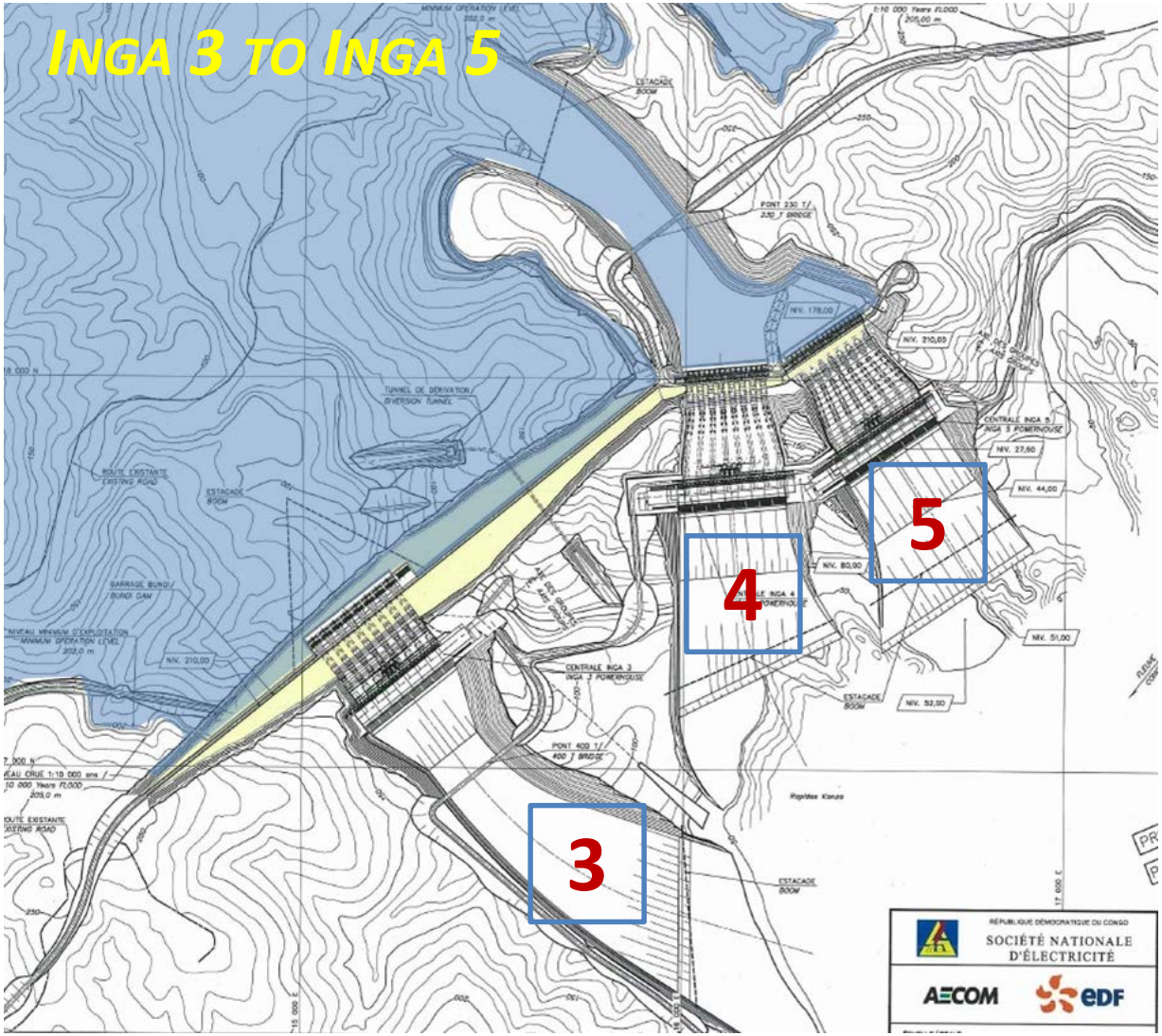

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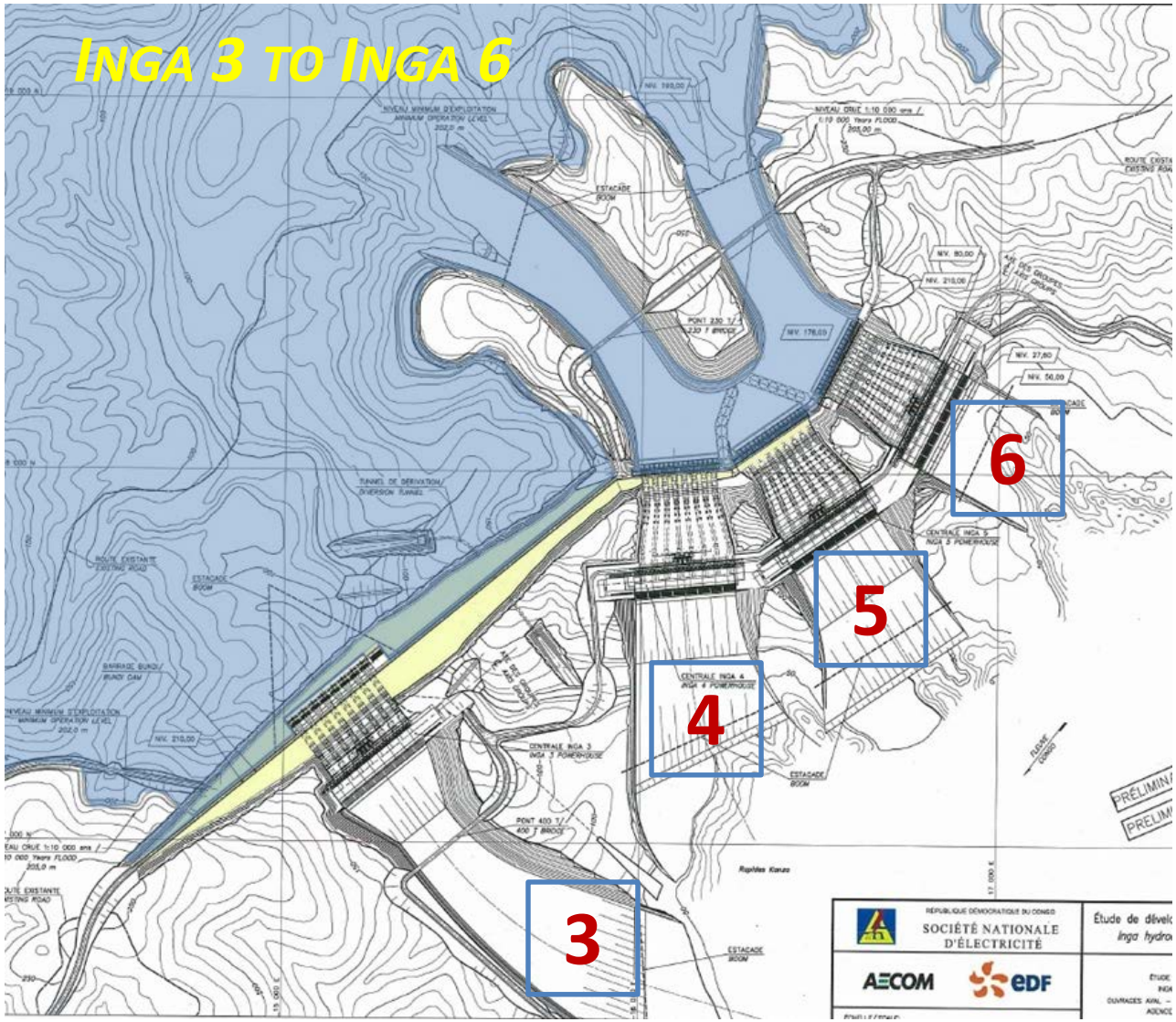

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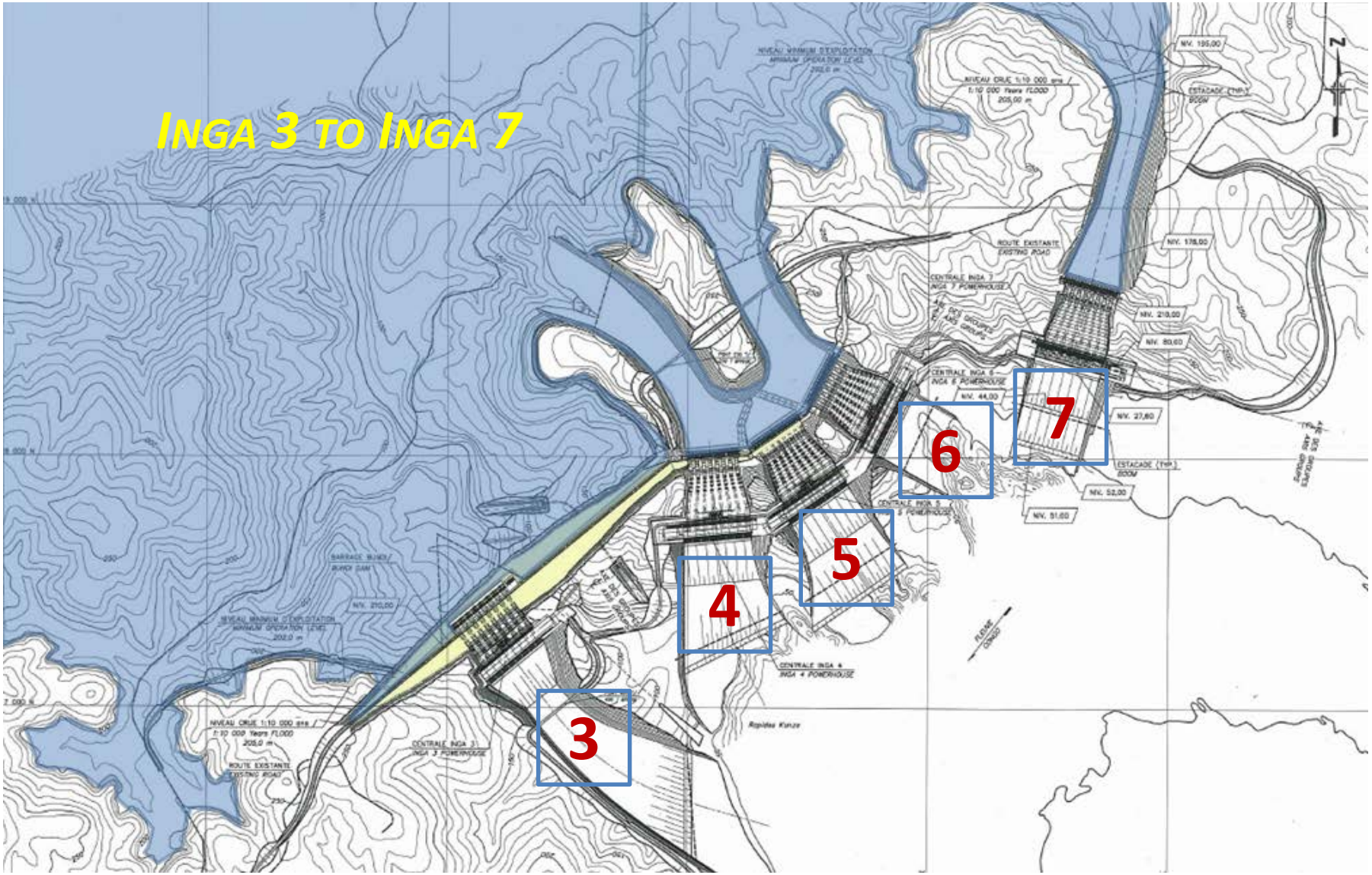
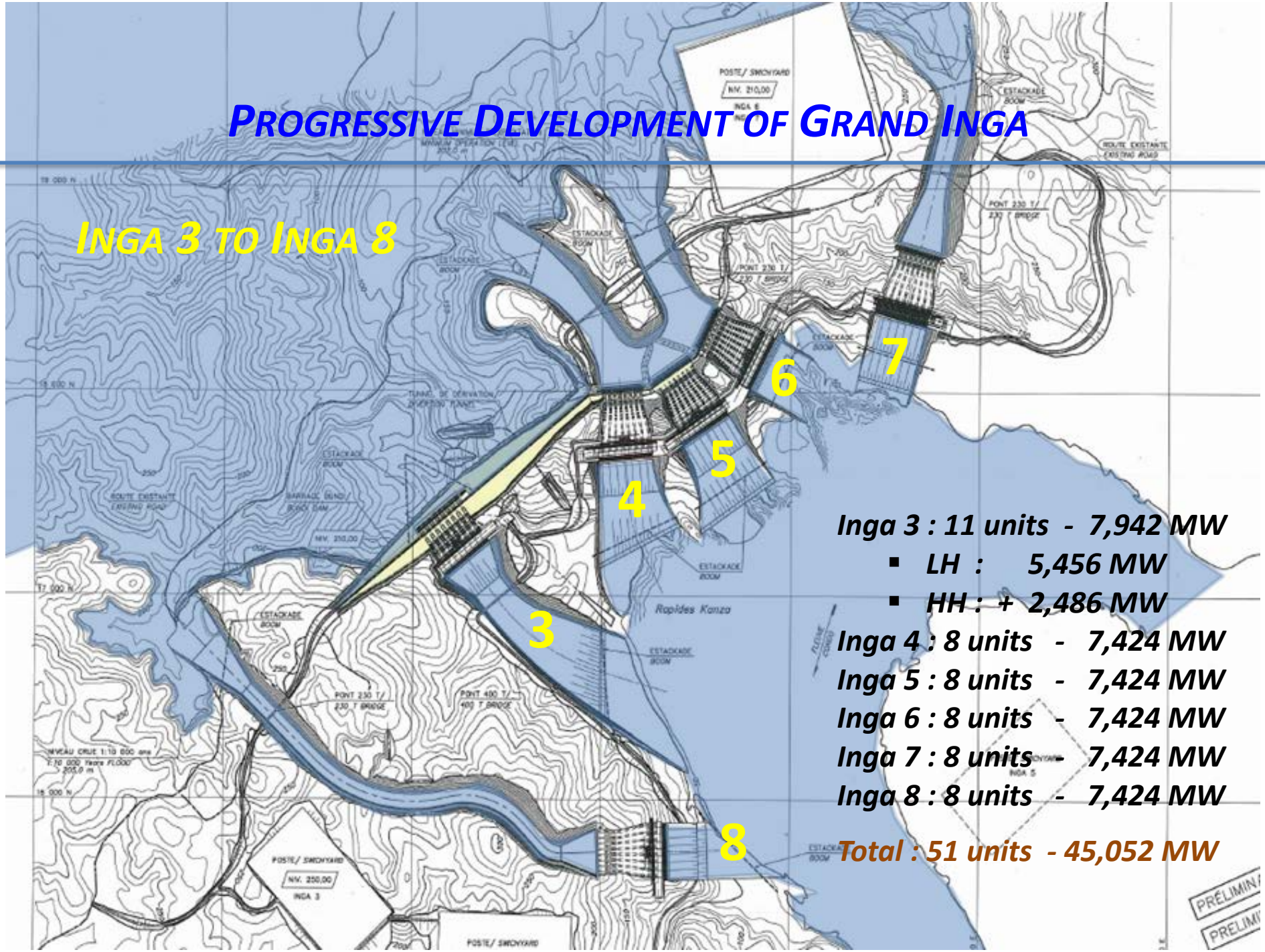


PROGRESSIVE DEVELOPMENT OF GRAND INGA



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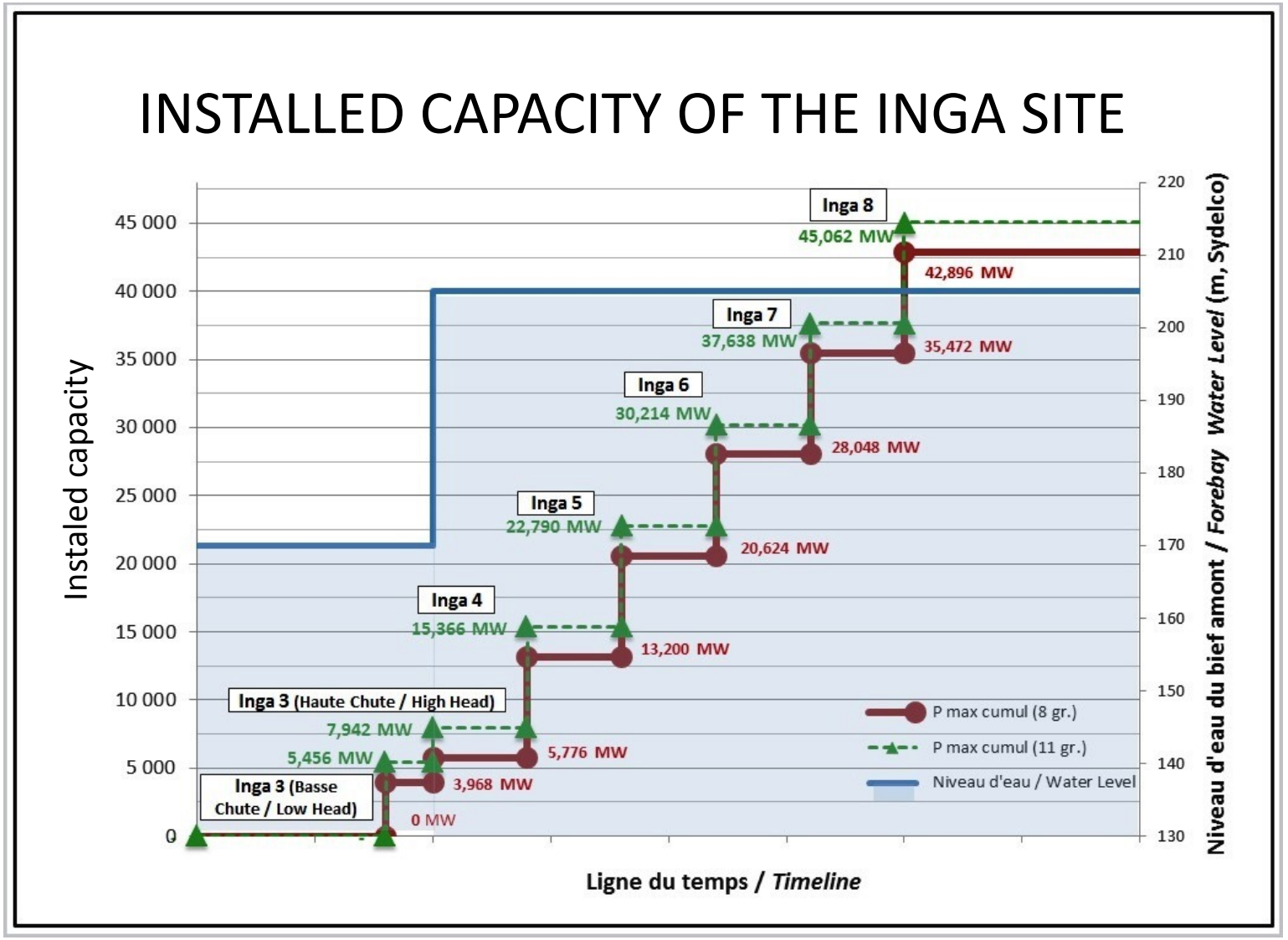


PROGRESSIVE DEVELOPMENT OF GRAND INGA

Main benefits :

- To finally and rapidly start Grand Inga development
- Flexibility to adapt to DRC and export demand patterns
- Provide optimized generation costs at each stage by levelling investments over time
- Allow multiple public / private operators to share the site

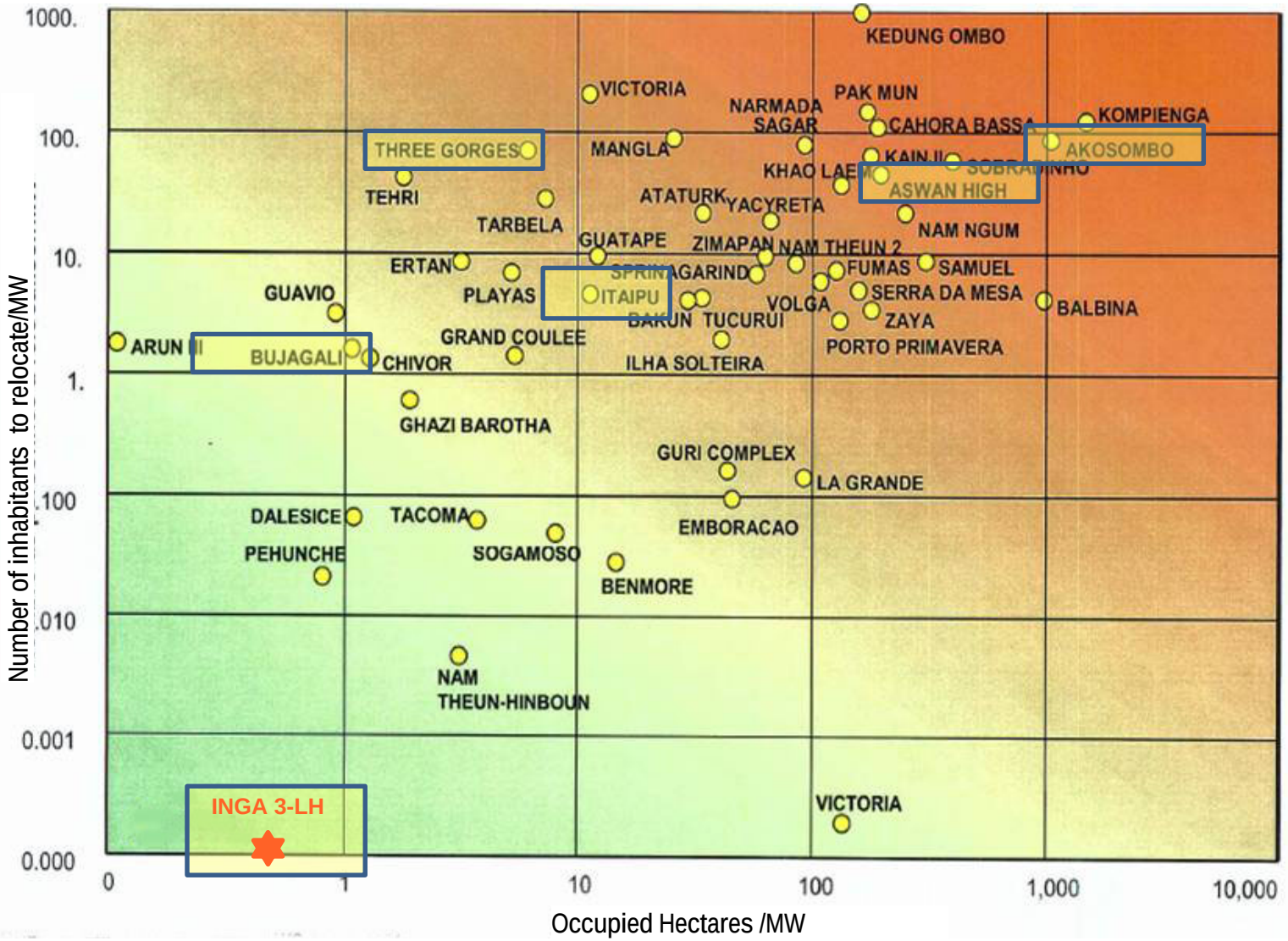
IMPACTS OF INGA 3-LH

IMPACTS ON LAND USE

- Very low footprint on land: <19 km²; <0.5 ha/MW
- Favourable Land Use:
  - 100% of the installations within SNEL concession
  - Few forest (2.6 km²) and cultivated zone (1.8 km²)
  - Biodiversity with no particular or exceptional character
  - No habitation affected
  - No involuntary population displacement
  - No infrastructure destruction

IMPACTS ON LAND USE VERY LIMITED

IMPACTS OF INGA 3-LH

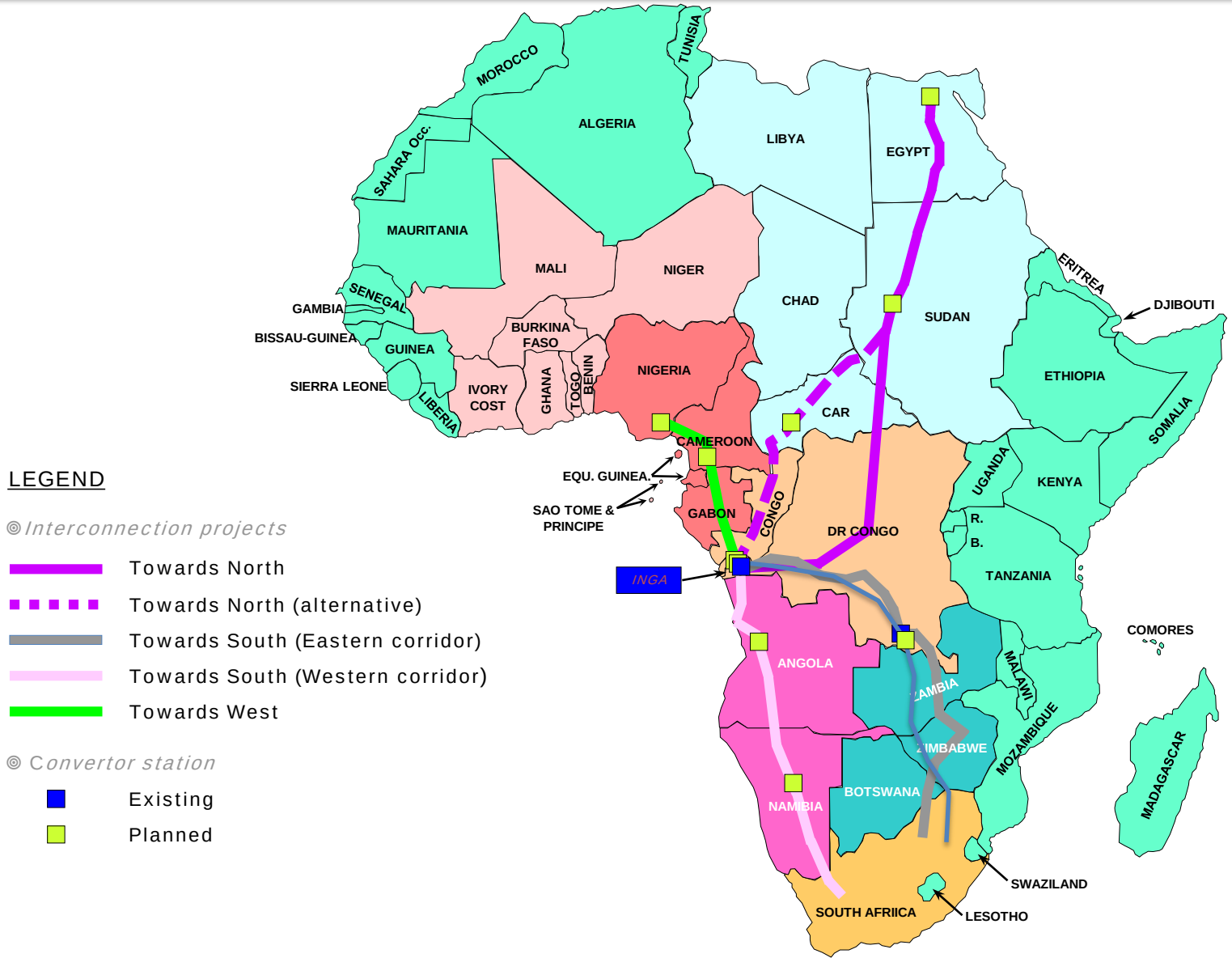


IMPACTS OF INGA 3-LH

IMPACTS RELATED TO CONSTRUCTION

- Spontaneous population: manageable risk
- Employment: Very positive, 6-7 years, estimated 3,000 direct jobs in average and 7,000 at peak
- Regional Economy: Positive impacts regarding the growth of purchase power and derived jobs
- Water and Air Pollution: Manageable risk with good management
- Public Safety: Low risk on roads and site, except for urban zones (5.7 km)
- Camp Kinshasa: opportunity to solve the conflict related to promiscuity: 7,500 hab. en 2010, or 40,000 hab./km²
- Recommendation to resettle the camp

POWER HIGHWAYS FROM INGA SITE



CONCLUSION

- Site specific initial conditions very favourable
- Hydrology greater than the needs
- Negative Impacts identified are of low intensity and manageable
- Potential Social and Economic Positive Impacts