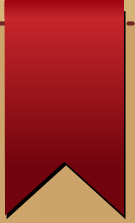


# **Solar Parks**

## **Concept, implementation and lessons learned**

**A Presentation  
by  
Agostinho Miguel Garcia  
SunBD – Sun Business Development**

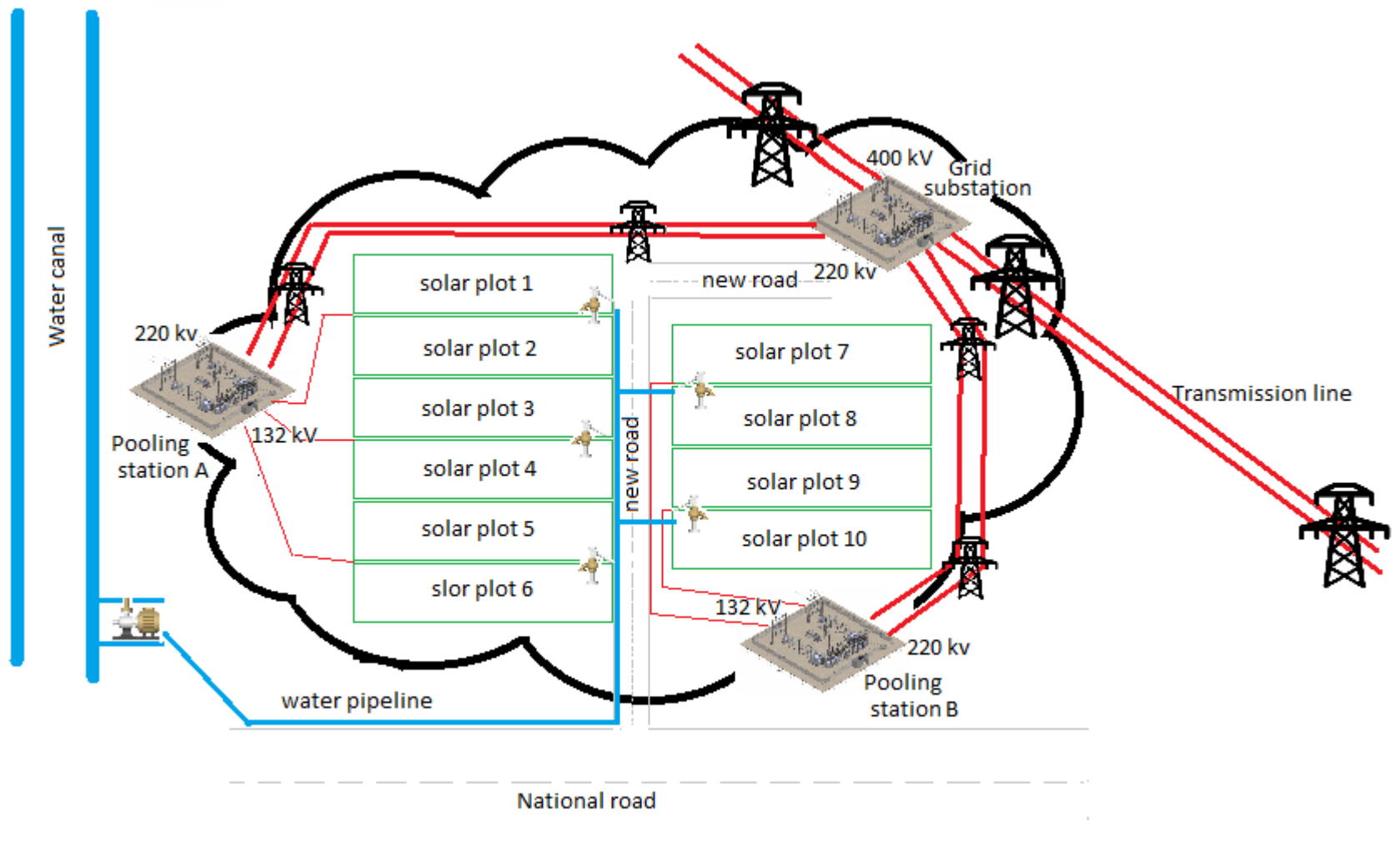
# Solar park concept



- Solar park is not a fancy name for a solar plant.
- Solar park is not another designation for a solar farm
- Solar parks do not generate power, the solar plants that reside in them do the generation
- **A solar park aims to accelerate the development of solar power generation projects in a certain location, by providing an infra-structured ready area that is well characterized, with dedicated infrastructure to reduce the expenses of development and achieve lower tariffs.**



# Solar park concept



# Solar park implementation

- Land identification: orientation and area
- Power evacuation: voltage, capacity in MVA, distance to the site
- Land characterization: topographic (identify the slope) and geotechnical (identify the soil type for foundations) surveys
- Access: distance to main roads, ports, railway stations, airports
- Hydrological study: water availability: location, quantities, local impact
- Environmental and social impact assessment
- Statutory and legal framework: permits, authorizations, etc
- Off-taker: who will sign the PPA and buy power

**What about the solar irradiation???**

# Solar park implementation

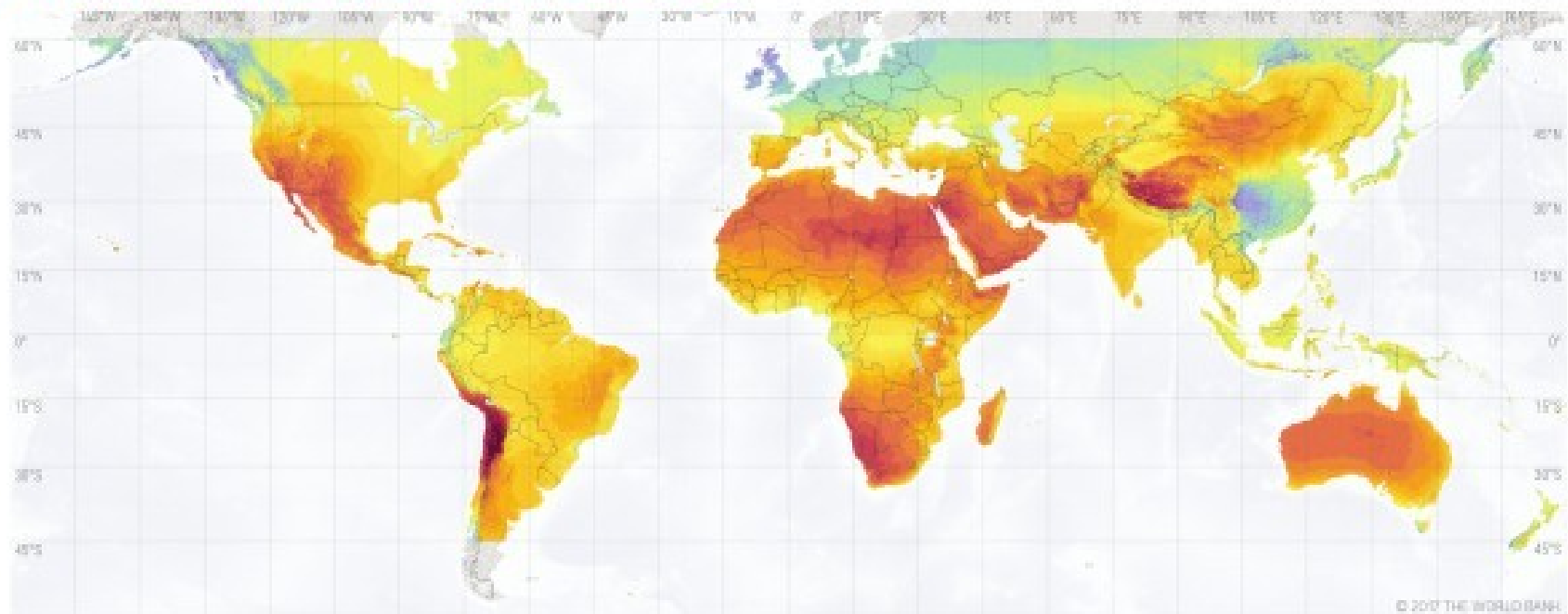
## SOLAR RESOURCE MAP PHOTOVOLTAIC POWER POTENTIAL



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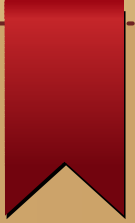
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# Solar park implementation

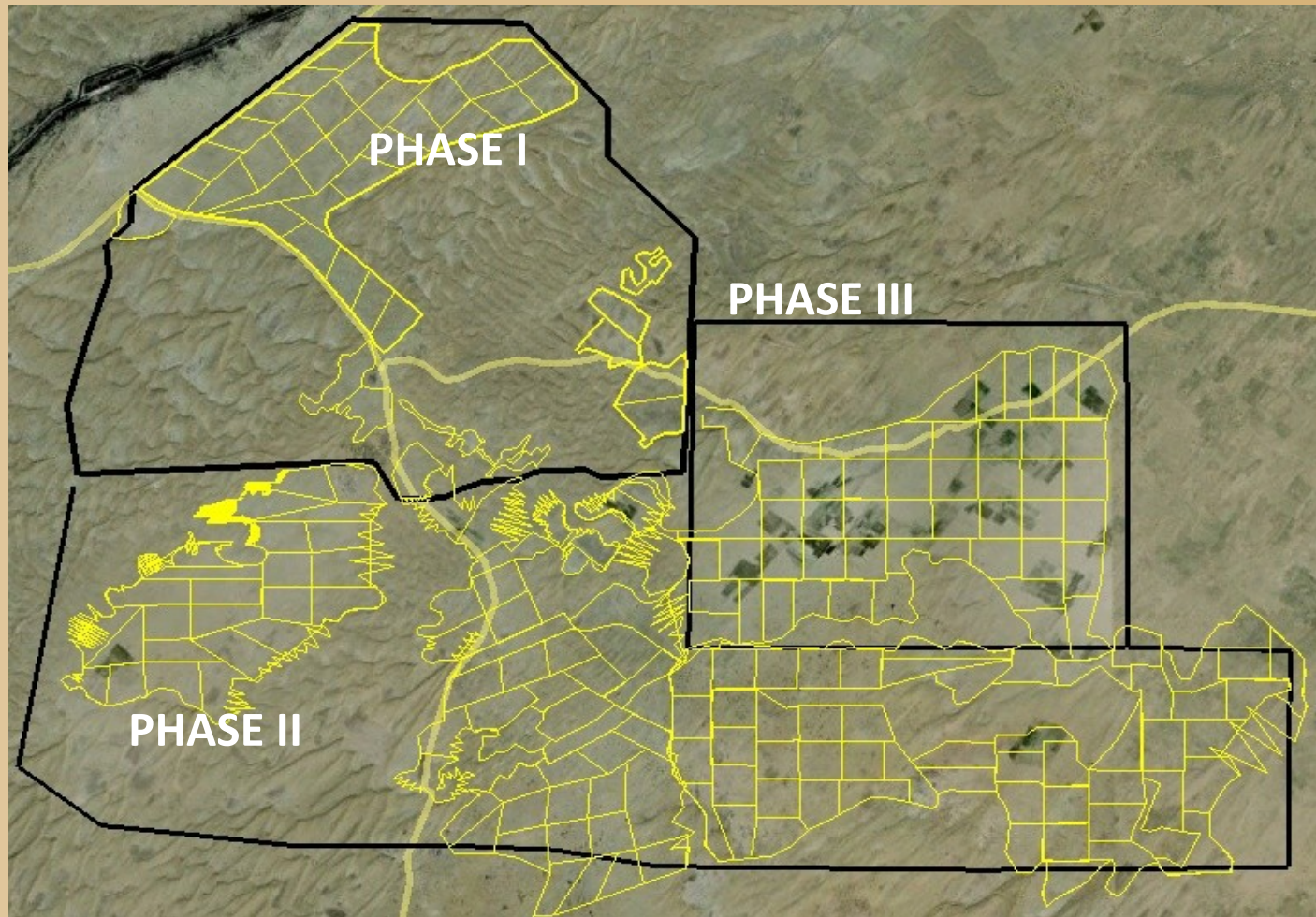


- **Infrastructure development:**
  - **Electrical:** transmission lines, pooling substations, grid substations
  - **Control:** SCADA systems, solar ground measurement stations
  - **Road:** main roads, local roads, access roads, road lighting
  - **Water:** pipelines, water reservoirs, pumps, meters
- **Green belt:** decrease soiling, increase aesthetics
- **Common facilities:** solar park office, warehouse, clinic, O&M services, manufacturing, training facilities, R&D, etc
- **Social responsibility:** health, accesses, education, livelihoods, gender, etc





# Solar park implementation



25 hectare gridding on total 10000 hect land in Bhadla, Rajasthan based on topographic survey and google earth.

# Solar park implementation

- Solar park development
  - Solar park development company: single entity public or private, joint venture, public private partnership (PPP), etc (it may have legal limitations)
  - Schedule of implementation: development of the park, engineering of the park, tender of the infrastructures of the park, tender of the solar plots, supervision of the construction of the park, provision of infrastructures to the winning bidders (tariffs)
  - Solar park development framework: limited returns/profits, equity financing, bridge loan, long term loan, etc
- Project financials
  - Solar park cost estimates and solar park fees (initial and/or annual)
  - Projection of the cost of solar power in the solar park: LCOE estimates
  - Sensitivity analysis: CAPEX, OPEX, gearing ratios, WACC, debt interest rate, energy yield
- Socio-economic impact: foreign direct investment, job creation (local and regional), GDP impact, leakages



# Lessons learned

- No east-west roads: that affects the capacity to join plots
- Single north south roads next to large plots of land versus several north-south roads
- Larger plots. Less than 50 MW is not worth to plan as a solar plot. The optimum quantum on the transmission lines will dictate the right solar plot size
- Each latitude has a necessary pitch between rows and thus a land footprint. Do not use general thumb rules.
- Plan well ahead any grid strengthening (lines and substations) required to be able to evacuate the power from the solar park
- Avoid free services as land, water, tax incentives. Avoid creating bad practices.

# Lessons learned

- Solar parks compete with social livelihoods: flat lands are usually coveted areas being in deserts or elsewhere for several reasons (agriculture, husbandry, housing, etc)
- Solar plants impact the available water for local people: be strict on the amount of water to be supplied and incentivise water harvesting and recycling
- Environmental impacts are usually low and never permanent.
- Power generation can be tuned: solar parks can have a mix of PV, CSP and/or storage to be able to cater to the demand and grid integration (balancing). Recent ideas of having solar and wind hybrid parks are also good examples.
- Carry out grid studies to determine the impact of the solar park in the grid and what is required to accommodate it. Curtailment should be the last option.
- Any additional services beyond the basics should be offer on demand. Avoid loading the solar park fees with services that solar developers may not want.

# **Solar Parks**

**Thank you!**

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