SOLAR PV IN SUB SAHARAN AFRICA

Case for a development of an ambitious industrial program in Sub Saharan Africa

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I. HELIOS ENERGIE

II. PV electricity price – calculation methodology

III. Legislative framework - Proposals

IV. DFIs support mechanisms - Proposals

V. Conclusions

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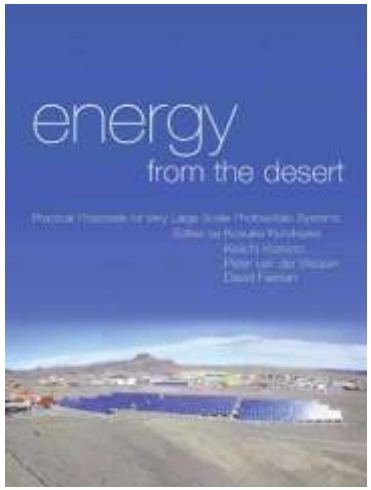
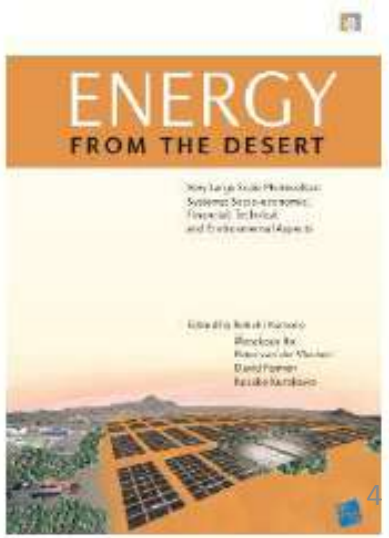
1. HELIOS ENERGIE

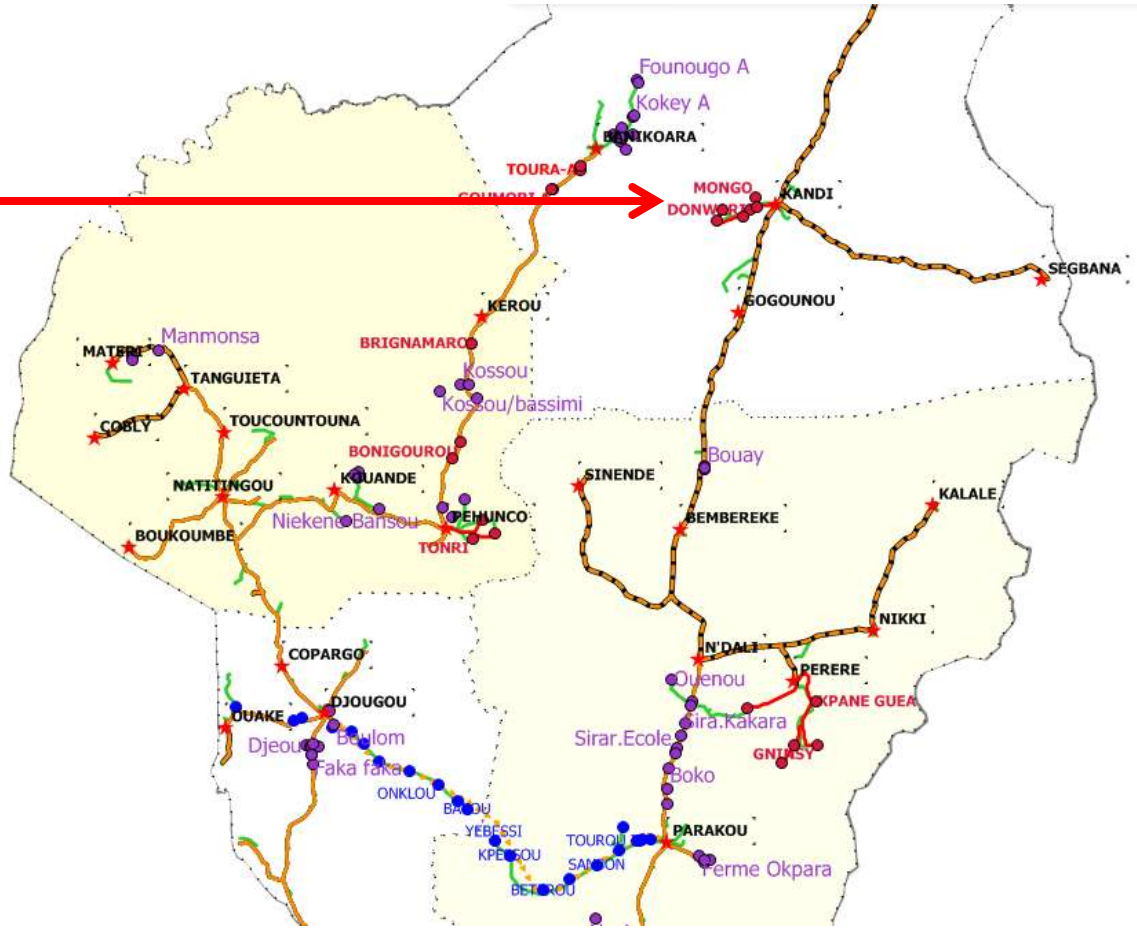
A unique Business Model in the industry

- **Three core activities** :
  - ✓ **Project development in Sub Saharan Africa and the Caribbean**
    - ✓ **400 MWp pipeline** in Benin, Burkina Faso, Mali, Mauritania, Chad, Senegal, Haïti…
  - ✓ **Technology development**
    - ✓ **Compressed air energy storage**
  - ✓ **Thought leadership**
    - ✓ **Analysis and opinion**





1. HELIOS ENERGIE
Example of Benin



6 MWp plant located north of Benin – AFD as MLA
Distributed values by diesel replacement

1. HELIOS ENERGIE
Example of Burkina Faso

22 MWp plant located West of Burkina Faso – Semafo as Developer and Lead Investor – BAD as MLA

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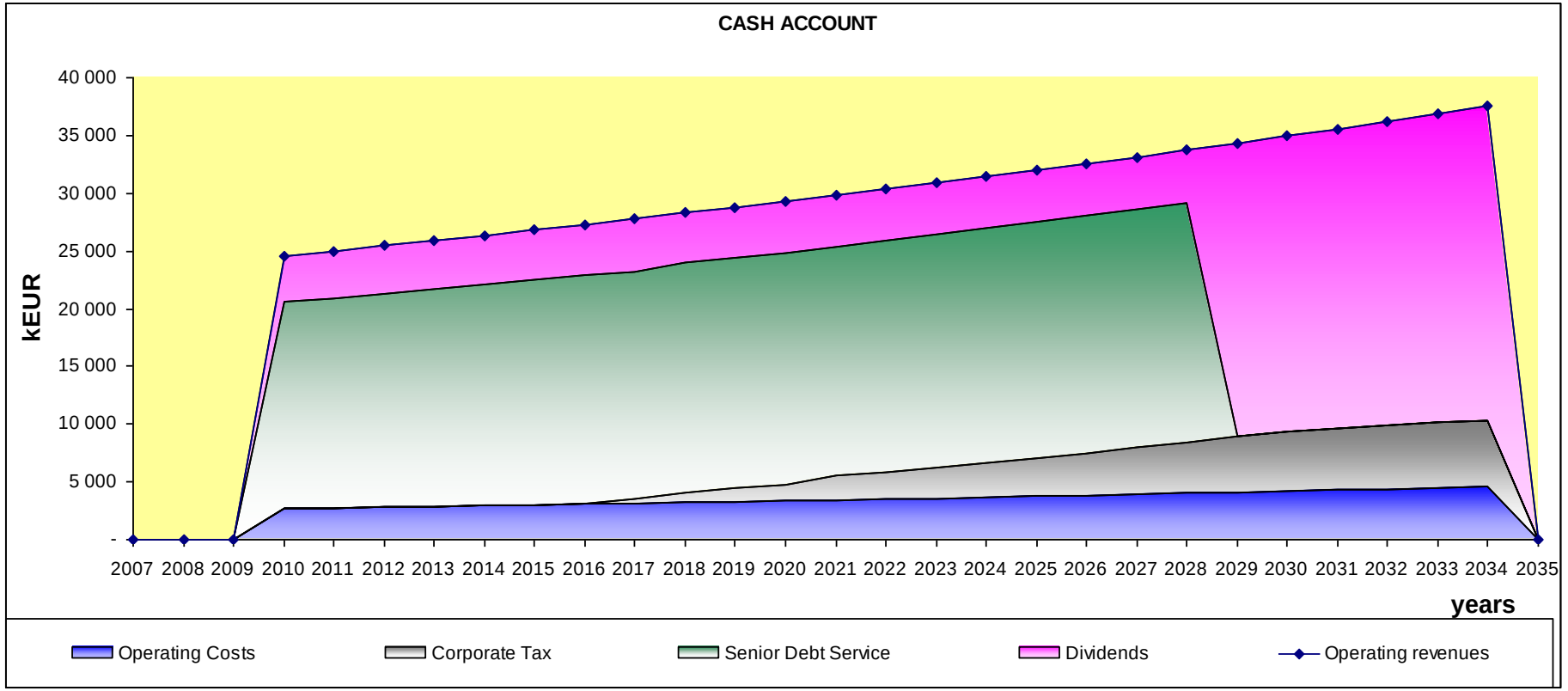
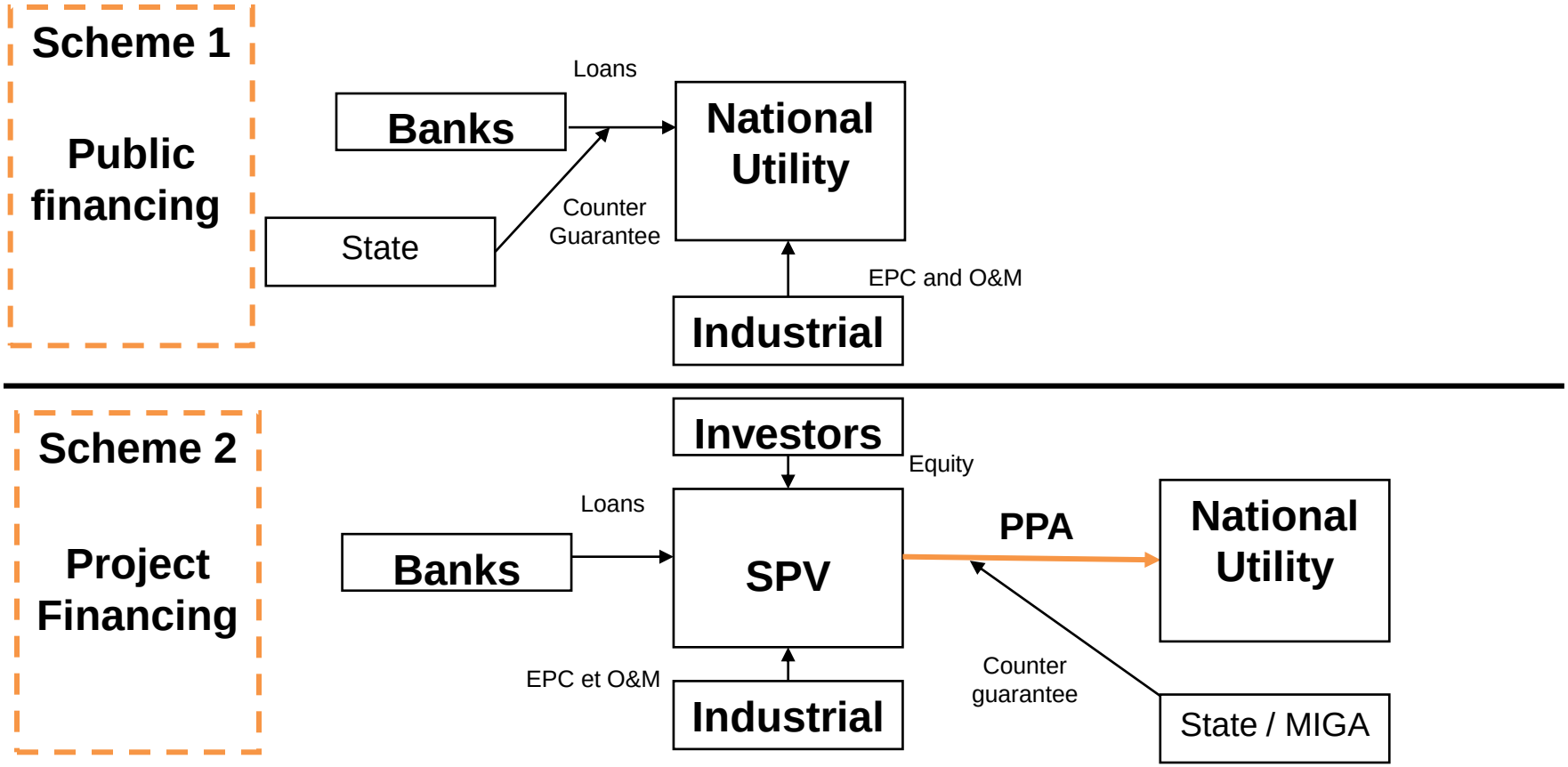
2. PV ELECTRICITY PRICE
Methodology



The PPA price is the minimum price that allows the operator to cover all his expenses over the life time of the project. It depends strongly on the index.

2. PV ELECTRICITY PRICE
Different Business Models



Operating expenses should not be drastically different but the financial expenses will change from one structure to another.

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3. LEGAL FRAMEWORK
What is a FIT?

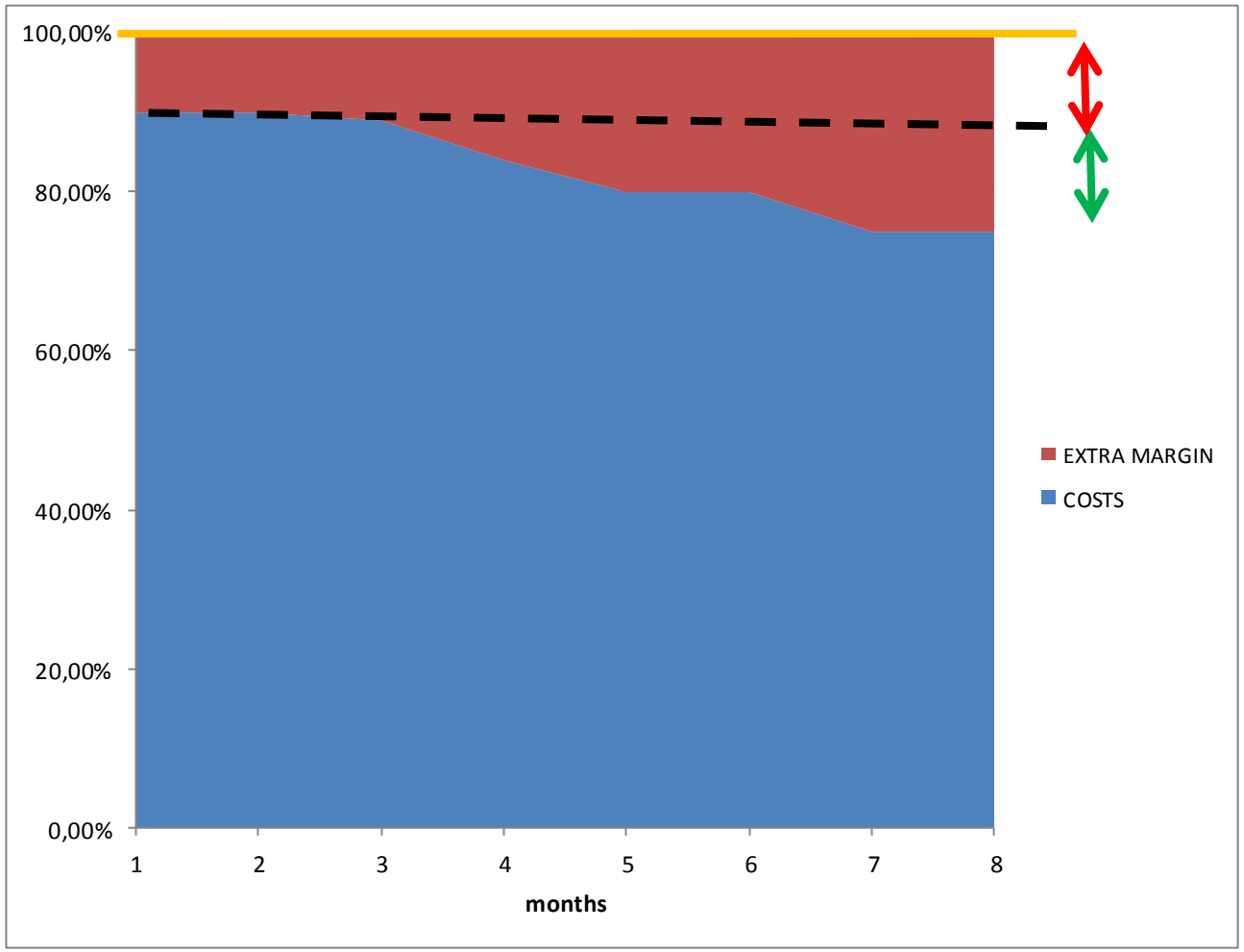
- **FIT fundamentals**:
  - ✓ Fixed price allocated to a **project** over its lifetime
  - ✓ Priority access to the grid : cap on the disconnection
  - ✓ Transparent rules to get access to the tariff
- The FIT was based on costs and implemented to provide a "jump start" to the renewable industries by wealthy countries
- It can be adapted successfully for Africa if based on value

A FIT tariff mechanism is a simple, crude concept based on few key principles.
What is really key is its implementation procedures which are almost infinite!

3. LEGAL FRAMEWORK

The failure of the cost approach

FIT



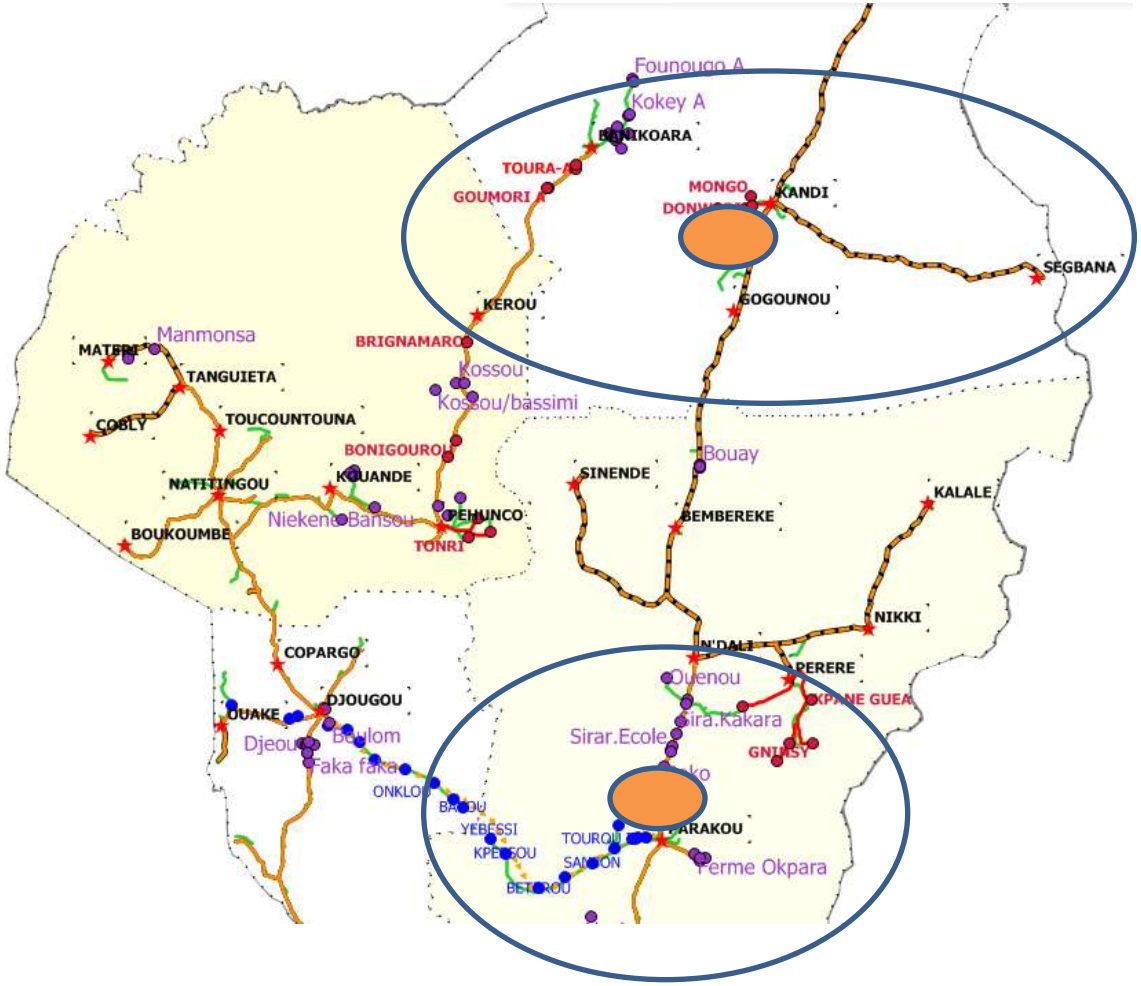
Initial extra margin: wrong FIT set up

Increasing extra profits over time: technology improvement

Asymmetry of information leads necessarily to a wrong design of the FIT if based on cost assumptions

3. LEGAL FRAMEWORK

Fixed national FIT: losing all the value of PV



Different locations, different grid impacts for the utility.

If the FIT is the same, developers will seek the lowest project cost which could be counterproductive to the value of the project for the Utility.

3. LEGAL FRAMEWORK
Summary of the cost approach

- **It is i) not logical to give the same price to all projects and ii) <u>not possible for the State or a Consultant to accurately assess the cost of production</u>**:
  - the projects do not have the same value depending on their characteristics (location, grid losses, local demands, etc…)
  - none of the private companies will display their real costs
  - the price changes of some technologies (like PV) is so fast that this price will be incorrect in few months
- **This approach leads always to great mistakes and losses for the countries, as shown in all countries in Europe**.

The most dangerous FIT system is one based on a single price calculated in relation with the cost of production of a technology.

3. LEGAL FRAMEWORK
The Value of PV

- **Energy & Capacity** – based on avoided costs.
- **Avoided Transmission Line Losses** –consumed close to where it is generated PV incurs fewer line losses.
- **Transmission Upgrade Costs** – defer or eliminate the need for transmission or distribution upgrades.
- **Reactive Power Control & Voltage Support** –to isolated or over-extended feeder lines.
- **Emissions Reductions** –depending upon the type of generation that is avoided.
- **Energy Price Volatility Hedge** –against volatility in the future of fossil fuels.
- **Economic Development** – local jobs, net gain compared to imported fuel oil or electricity.

A FIT should take into account the value of a technology. Only the value of a project matters to a Utility/State

3. LEGAL FRAMEWORK
Assessing the value of a project

- The **value assessment methodology** should take into account, over the life of the project :
  - Benefits to the local grid (de-congestion, harmonics, etc.)
  - Local energy mix
  - Localization of the project
  - Production profile depending on technologies (PV: intermittency, low volatility of the solar radiation, follows the course of the sun…)
  - Social benefits (jobs, …)
  - National economic benefits (fuel price hedge, …)

A transparent, complex assessment model is to be built. Some are already available but need to be improved. It will be the same for all technologies and projects, just the assumptions will change.

3. LEGAL FRAMEWORK

How to implement the value approach (1/2)

- A group of people should be **responsible for running the model** (for ex. a department in the National Regulation Authorities).
- The model should be **audited regularly by a national committee** and also a regional institution, like ECREEE, which will continue to **improve the model through studies.**
- **Cap**: The maximum acceptable capacity should be based on an analysis of the national grid, present and future. You could then process with waves of tenders, each one will be a % of this maximum cap. The frequency depends on the process time.

Key first steps: creation of the evaluation model and definition of the global national caps

3. LEGAL FRAMEWORK

How to implement the value approach (2/2)

- **Eligibility**: large and transparent criteria. Candidates will have to prove their capacity to close their deals. Pre feasibility is required, but not a feasibility study.
- **Offers**: Candidates will propose their own price.
- **Winners**: the projects that bear the greatest value for the country and whose costs are the closest to the value. Prices may differ from one project to another.

A simplified bid mechanism based on the value of the projects.

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4. DFIs support mechanisms
Development costs

- **Helping the project to become bankable:**

  ✓ Financing the feasibility study
  ✓ Financing the development costs

- **Key barriers to overcome:**

✓ Availability and high cost of capital
✓ Size of the project
✓ Country risk

Projects should be "ready to go" to have access to affordable Equity

4. DFIs support mechanisms
Legal process

- **Depending on the financial scheme, the tender process is a major constraint:**
  - ✓ **Public scheme**: OK for a "EPC and O&M" tender (PPP)
  - ✓ **Project financing**: the EPC tender process is not adapted since it prevents the developer to work with EPC contractors from the beginning.

- In PV, **the EPC contractors could make a tender for up to 85% of the total investment costs** and **can pre finance several studies and development costs.**

The DFIs procedures should be more oriented toward the success of the projects

4. DFIs support mechanisms
Financial products

- **The financial ratios should be adapted to the specific nature of PV**
  - ✓ Gearing
  - ✓ DSCR
  - ✓ Maturity
  - ✓ Interest rates
- **Broad guidelines in term of revenues of developers**
  - ✓ Could either be a development contract, an AMO contract, shares, or a mix of all of them
  - ✓ They are expressed as a % of the total investment cost
  - ✓ They depend on the complexity of the project

As market is growing banks should have specific guidelines for PV

4. DFIs support mechanisms
Key supports along the value chain

- **DFIs should have a more active role where the private sector is absent**
  - ✓ **Financing the work of a Task Force responsible to build the Value Assessment Model** + improvement studies
  - ✓ Financing the establishment of **a reliable, detailed information system in all utilities**
  - ✓ Helping the utilities to improve their management of their growing numbers of clients
  - ✓ Improving the distribution systems
  - ✓ Developing the interconnexion systems
  - ✓ Helping the utility to manage a BOOT scheme

DFIs should act as partners with the private sector and coordinate their strategies.

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5. Conclusions

Making projects happen

- Feed in Tariff based on cost production are not appropriate. Feed in Tariff should be based on a value approach.

- It may be relevant that countries and regional institutions define their own strategies for the next 10/20 years before launching their legal framework

- DFIs will play a key role in helping the development of the sector. Their strategy should consider all the segments of the electricity sector: helping the private sector to close BOOT deals and helping the Utility to increase their financial strength through management and information systems.

HELIOS ENERGIE is willing to play an active role in the PV market in Sub Saharan Africa

HELIOS ENERGIE

THANK YOU

FOR YOUR ATTENTION!

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