Economic & Financial Risks and Challenges

Transforming the energy system to achieve the 2°C target: investment risks and policy challenges

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Scaling up Renewable Energy

1. Our Starting Point – Global Context

Economic Downturn

Where are we today?

Opportunity

Political

- COP15, selective national interest
- Lack of legislative / FIT arrangements
- FF lobbying

Social

- Geopolitical concerns
- Development opportunity
- Increasing international engagement

Mitigation **Adaptation**

Economic

- Investment costs
- Certainty / incentives for investors
- Lack of a developed market structure
- Timescales

Technology

- Which technology?
- Can it be scaled up to commercial levels?
- Maintenance and operating requirements

Risk

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1. Our Starting Point - Economic

		Costs		
Technology	**Investment (€/kW)**	**O&M (€/kW/a)**	**Fuel (€/MWh$_{el}$)**	**LCOE (€c/kWh)**
Coal	1200	40	22	6.0
Gas	550	27	45	6.6
Nuclear	3000	55	4	5.9
			Full load hours (hrs)	
CSP (trough, Spain)	3300	70	2500	17.3
CSP (trough, Sahara)	2500	70	2500	13.7
PV	3700	22	1500	28.4
Wind (onshore)	1200	23	2300	7.1
Wind (offshore)	2200	50	2800	11.0

Source: PwC Report: 100% renewable electricity, A roadmap to 2050 for Europe and North Africa

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1. Our Starting Point - Financials

Attracting investors is difficult…

- Many **investors are keen to become / remain involved**, but getting them to invest at the moment is difficult.
- There are **different financing interests**
- There are also **different time frames** for investment
- Market structure and **costs of production** play a large part in investor interest

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1. Our Starting Point - Financials

What are some of the challenges?

- Short term behaviours and trust
- Longer term certainty
- Big funds and small funds, different tastes
- Limited money, much of it now flowing to the US
- Are we creating another “bubble”?
- Other factors weakening the REN investment decision – is a project bankable?

“CSP is still not seen as a low risk investment”

Renewables Investor

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2. Possible Responses - Summary

Economic

- LCOE / project costs
- Market structure and incentives (REN & FF)
- NA development opportunities
- Risk profile – previously outlined

Financial

- Standardisation of tools, templates: e.g. business case, financial models
- Financial: risk mitigation mechanisms, coordination of investors
- Awareness: better information, involvement in project development

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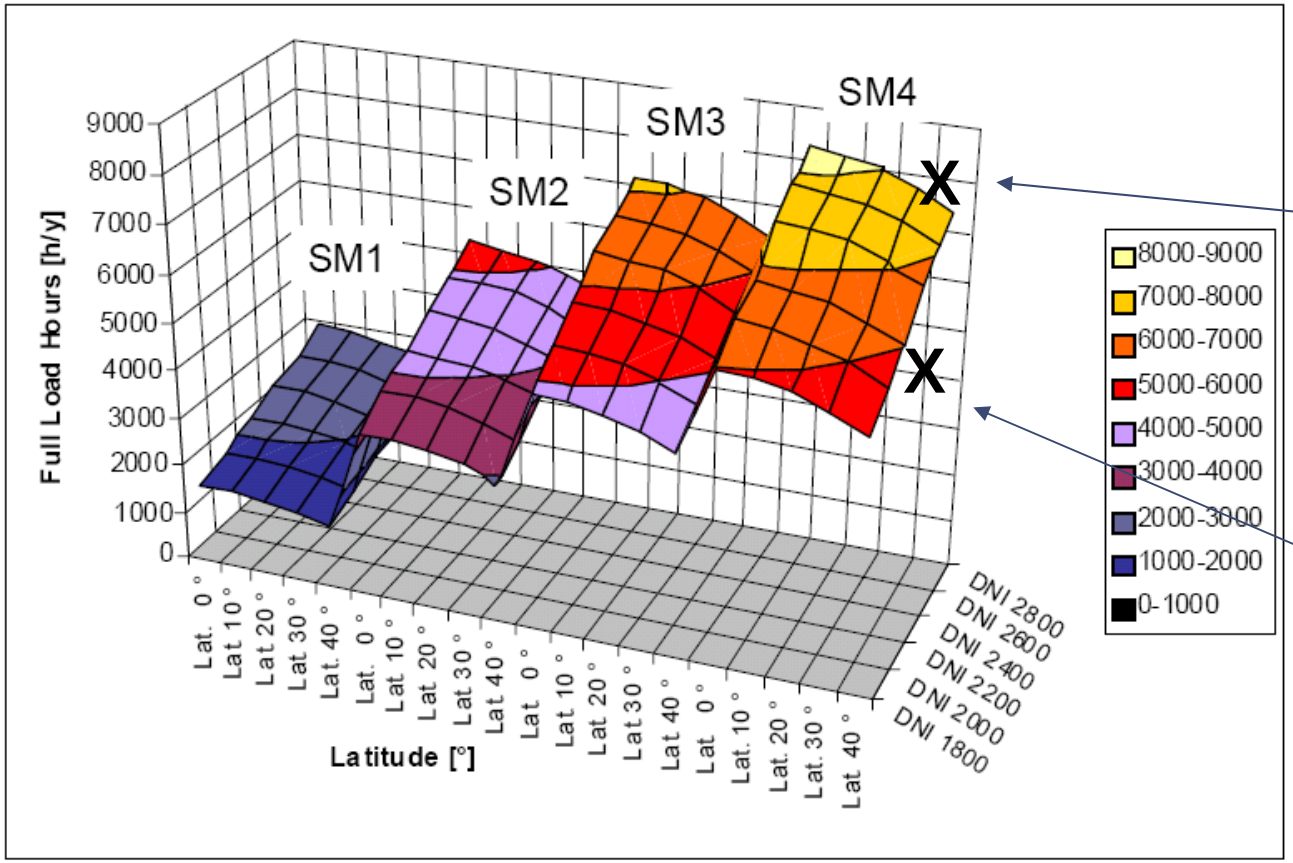
2. Possible Responses – Economic (LCOE)

Annual full load hours under varying solar irradiance at different latitudes



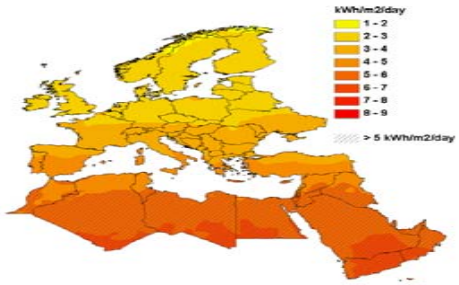
For a plant with a solar multiple of 4,

Southern Egypt:

25º latitude
2800 kWh/m²/y (DNI)
8000 full load hrs / y

Southern Spain:

35º latitude
2000 kWh/m²/y (DNI)
5900 full load hrs / y



Source: DLR (German Aerospace Research Centre), 2009

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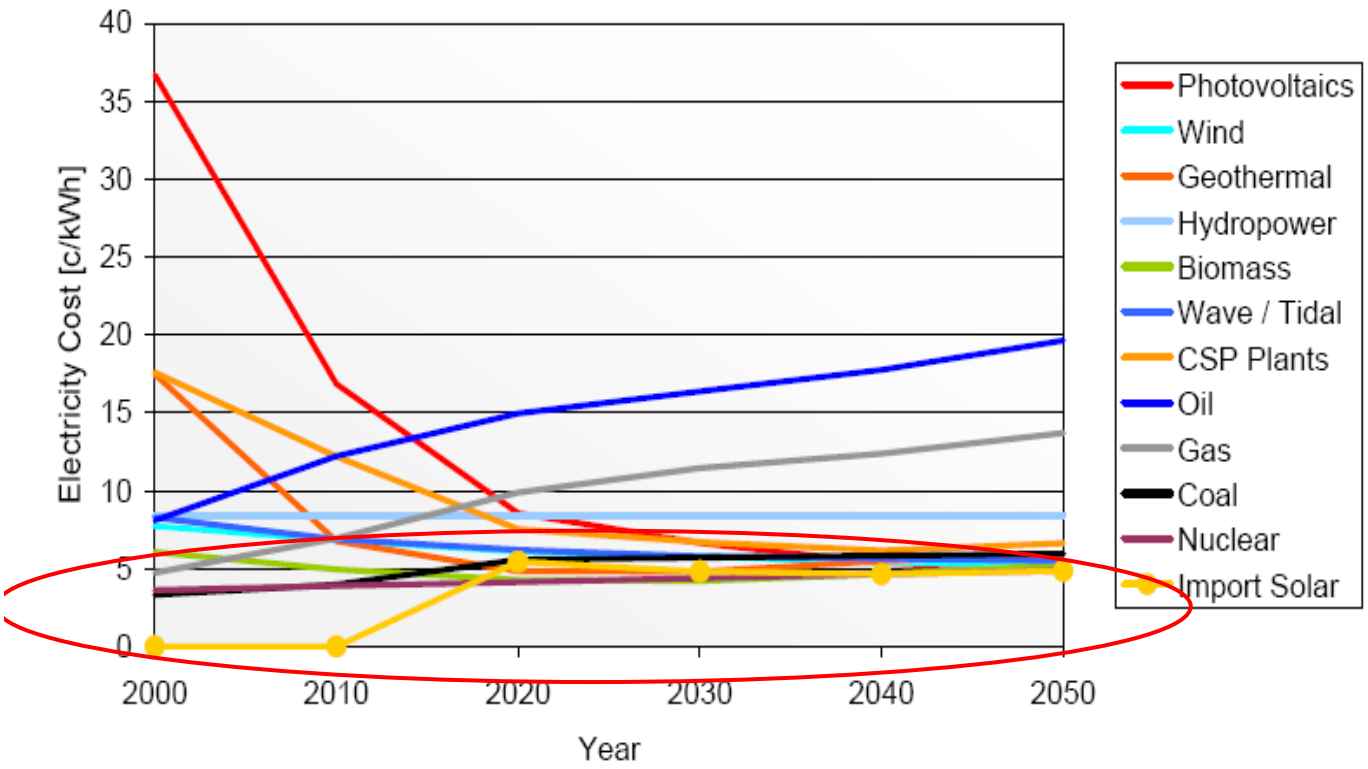
2. Possible Responses – Economic (LCOE)



Research by DLR shows imported solar has the opportunity to be cheaper than coal.

This relies on the realisation of the Desertec concept.

What investment would the Desertec concept require?

Source: DLR (German Aerospace Research Centre), 2006

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2. Possible Responses – Project / Technology Costs

CSP Technology

- Alternative heat transfer fluids
- Alternative storage options
- Reduction in water use – dry cooling
- Improvements in reflectivity of solar collector material
- Direct Steam generation
- Use of lower cost materials

Grid Technology

- Use of HVDC technology
- Reducing interconnector and transformer losses
- Avoid network peaks with storage

Finance

- More favourable loan agreements and interest rates due to confidence in the technology and market
- Investment guarantees, credit letters, long term PPA agreements

Supply chain

- Increased supplier base and competition, reduced component cost
- Economies of scale (order sizes, production facilities for components)
- In-country component manufacture, reduced transport costs

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2. Possible Responses – Project Costs

Construction

- Building larger plants, co-location
- Development of skilled local workforce
- Learning through experience, sharing knowledge and best practice

Operation & maintenance

- Learning through experience
- Development of skilled local workforce
- Co-location of plants – shared resources

Project management

- Improvement in time and quality of PM processes
- Tested business case, financial and technical modelling, planning permission, permitting approaches

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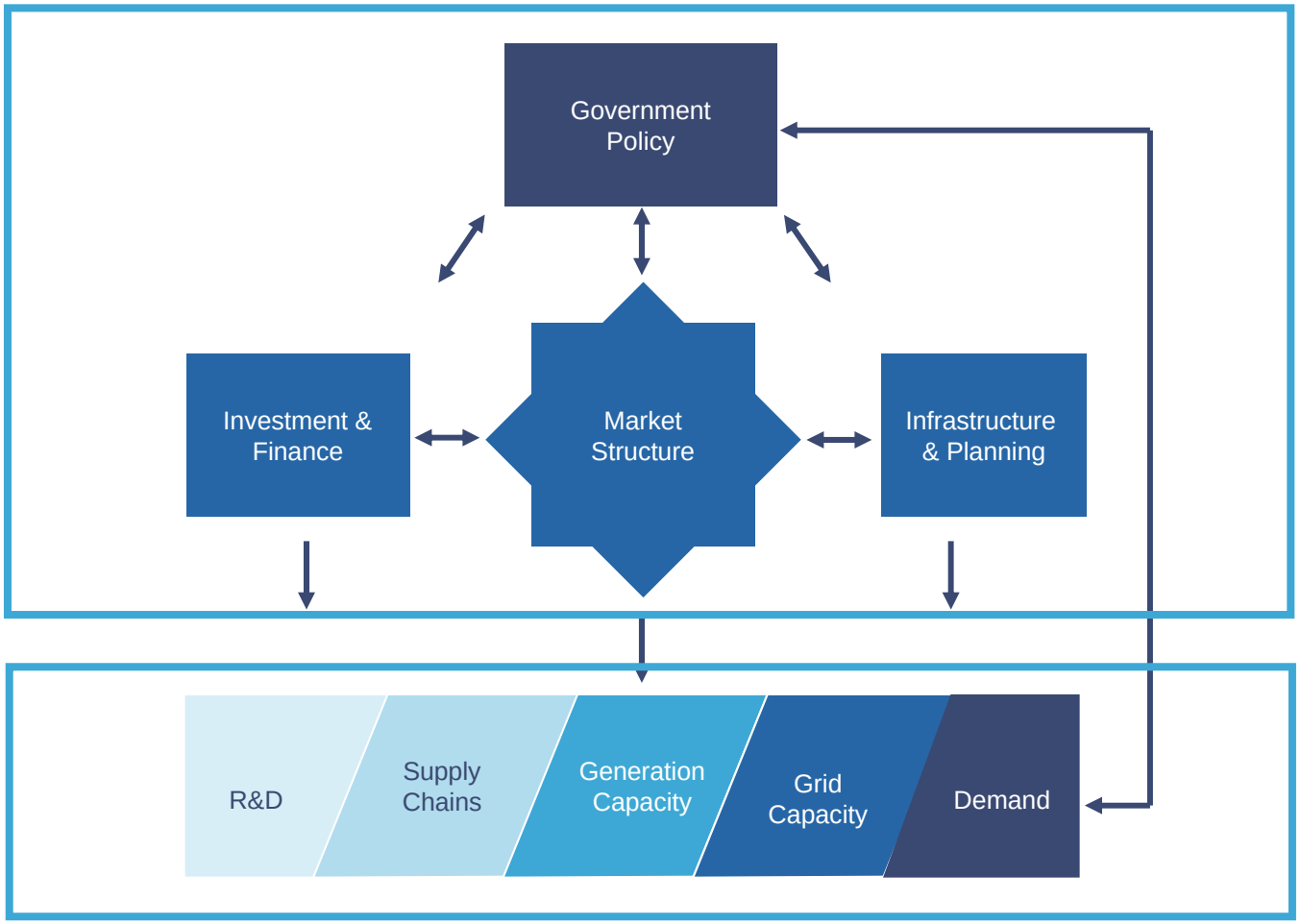
2. Possible Responses – Market Structure / Incentives



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2. Possible Responses – Market Structure / Incentives

Financial Incentive	State of play (2009)
Feed in Tariff	**PV:** 22 EU countries, ~0.25 – 0.45 €/kWh **CSP:** 6 EU countries (+ Algeria and Israel), ~0.16 – 0.28 €/kWh.
Low interest loans	Used in Finland to support renewables
Power Purchase Agreements	Used in Spain to support CSP, aided by the FIT
Tax incentives e.g. **Investment Tax Credit**	Used in USA as an upfront incentive to facilitate large investment
Loan guarantees	Used in USA to help CSP developers access credit

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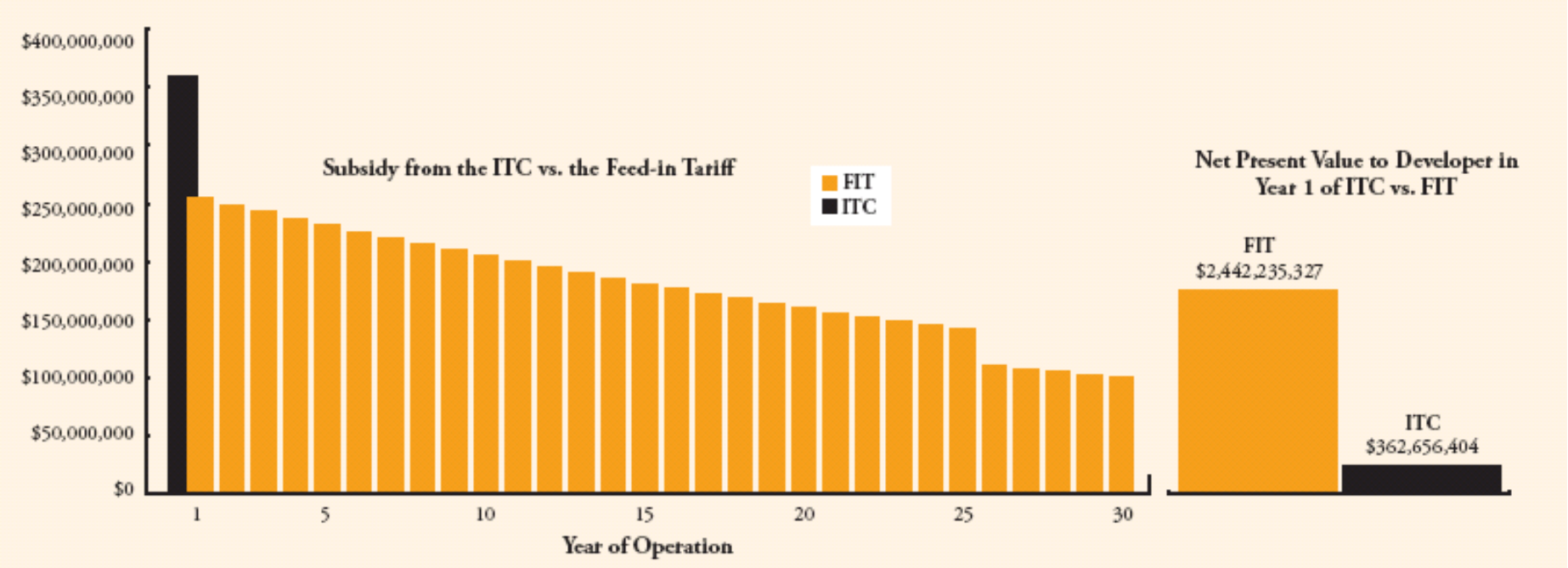
2. Possible Responses – Market Structure / Incentives

Comparing ITC and FITs:

- annual subsidy amount over life of plant
- net present value to the project developer



Source: WRI and Goldman Sachs (2009)

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2. Possible Responses – Market Structure: North African "pull"

Economic / financial benefits:

- Domestic earnings from **sale of electricity** and export earnings from the sale of "clean" electricity to Europe
- New development and **investment opportunities**, e.g. location of supplier manufacturing factories close to the solar fields, attraction of research institutes and expertise to the area
- **Job creation** during the construction / operation of the sites and HVDC cables
- **Land take compensation** for plants and transmission grid
- **Infrastructure improvements** e.g. new roads and improved transport will be required to access the new plants
- **Other income** derived from CSP-related activities, e.g. CSP linked desalination provides water and funds to support horticulture
- Plus other non financial benefits…

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2. Possible Responses – Financial (what makes a project bankable?)

Project will be completed

- EPC contract
- Experienced contractor
- Reasonable budgets
- Permits
- Project programme and critical path
- Site assessment,
- Grid connections
- Equipment suppli

Power plant performance

- Quality components
- Well designed integration
- Suitable design for location
- Maintainability
- Well defined O&M contract

Try to simplify and standardise projects to reduce perceived levels of project risk

Accuracy

- Calculated energy
- Shading analysis
- Resource data source
- Resource losses
- Reasonable risk performance ratio
- Degradation assumptions
- Inter-annual variability

C and O&M

- Warranties and guarantees
- Size of plant
- Security
- Grid connections
- FITs and length of policy
- Off take Agreement

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2. Possible Responses – Financial (Other)

Financial

- Market structure development
  - Infrastructure in place (connections to grid)
  - Long term offtake agreements

- Standardisation of:
  - Internal / external tools and templates
  - Business case requirements and financial models

- Introduction of more financial risk mitigation mechanisms
  - Public sector loan guarantees
  - Credit enhancement
  - Public : private contracting mechanisms
  - Insurance products for components

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2. Possible Responses – Financial (Other)

Financial

- Investors
  - Pooling of investors – regional approach vs project approach
  - Greater role of development banks (project guar. frameworks)
  - Accessing other non-traditional sources of finance
  - 2º deal activity – reflecting lifecycle stage

- Awareness
  - Better information and awareness of REN projects
  - Earlier involvement in project development activities

How else can we reduce the economic and financial challenges?

By creating a strong investment story through active engagement with each of the enabling areas of the REN market model.

Thank you

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