

# Renewable energy business models for realizing the competitive advantage of renewable energy

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# The XXI<sup>st</sup> Century Challenge- Sustainable Economic Development

- ▶ *Companies that specialize in high-tech production and implementation of photovoltaic and wind equipment may acquire additional competitive potential and may realize double dividend: pollution free production of electricity and sufficient profitability.*
- ▶ Knowledge gap: Research gap remains in governance of BMs resulting from network participation for sustainability. In particular, resource dependency of energy companies involved in a sustainable development model. Resource dependency of energy companies involved in a sustainable development network affects innovation and management of BMs.
- ▶ The existing literature also argues that firms must redesign their BM based on networks and collaborative practices to attain sustainable development (Bocken et al., 2014; Roome and Louche 2016), there's little research into the role of individual level factors affecting the scaling process for impact (Smith and Kistruck, 2016).



# Renewables: The cornerstone of Europe's decarbonized energy future

- ▶ **Relevance:** In contrast with the traditional fossil energy, Renewable energy (RE) comes from naturally replenished resources such as sunlight, wind, tides, rain, and geothermal heat. Though RE technology is improving fast, the general public has been slow to adopt it ( *Van Der Horst, 2017*).
- ▶ The age of SD recommends a holistic framework, in which society aims for environmentally sustainable and socially inclusive development, underpinned by good governance (Jeffrey Sachs, 2015)
- ▶ In order to reverse the process of global warming and to limit the process of environmental pollution the increasing production of renewable energy is viewed as one of the key instruments. However, the production of renewable energy is much more expensive than the production of energy based on non-renewables. Nevertheless, as stated by Lytinen (2017), the establishment of favorable business model for sustainable development, supported by fiscal incentives, may overcome the problems with the cost increase.



# The XXI<sup>st</sup> Century Challenge- Sustainable Economic Development

## ▶ Research objective:

- ▶ To understand which are the key success factors for effective use of the policy instruments that contribute to more efficient and sustainable production of renewable energy equipment, respectively renewable energy electricity.

## ▶ Contribution statement:

- ▶ On the verge of positive and negative arguments, there is an argument known for pushing forward economic development, namely that competition is the main advantage of the market economy. The contribution statement of this presentation is to offer an understanding on how the underlying mechanisms of achieving environmentally friendly production of RE equipment affect the positive externalities on nature and socio-economic effects.



# RENEWABLE ENERGY BUSINESS MODELS



- ▶ **Ownership Business Models, which focus on financing and risk mitigation concerns**
  - Public-private partnership
  - Multiparty ownership
  - Lease or hire purchase model
  - Dealer Credit business model
- ▶ **Service Business Models, which focus on providing specified services and highlight different methods of operation and maintenance**
  - User Cooperative
  - Energy performance contracting

In practice, most real-world business models are hybrids, combining elements of various types and approaches. For example, a utility or a private company may develop and own a minigrid system, operated and managed in turn by a community-based organization, while a private maintenance company provides the technical backup and support services (Rolland 2011).



# Market regulation - The role of government

- ▶ Governance can best be described in terms of the elements of a successful common pool resource management model (Nobel prize in economics to Elinor Ostrom)
- ▶ Given the central policy role of the state, the great diversity of capabilities and differences in resource endowment, a flexible, collaborative approach is necessary.
- ▶ The goal is to find polycentric modes of governance that fall between the market and the state where a community self-organizes to build institutions based on trust, legitimacy, and transparency.
- ▶ Governments have enough monetary, fiscal, and commercial means (foreign trade regulations; export incentives; technical, health and environmental standards; and administrative procedures for import and export) through which it can direct the whole investment process in the state's desired direction. Most of these tools are applied even now, but to insufficient extent, diversity, and interrelation.
- ▶ Some governments have introduced pricing programs to allow customers who wish to buy green power the opportunity to do so for a marginal fee. Various governments have also introduced regulatory programs - usually known as Renewable Portfolio Standard (RPS) - to force electricity supply companies to increase their production of electricity from RE sources.





# Multiple Criteria Analysis pour “L’énergie du jour”

## - An attempt for systematic approach

Presented at the World Renewable Energy Congress - Sweden, 8-13 May, 2011, Linköping, Sweden

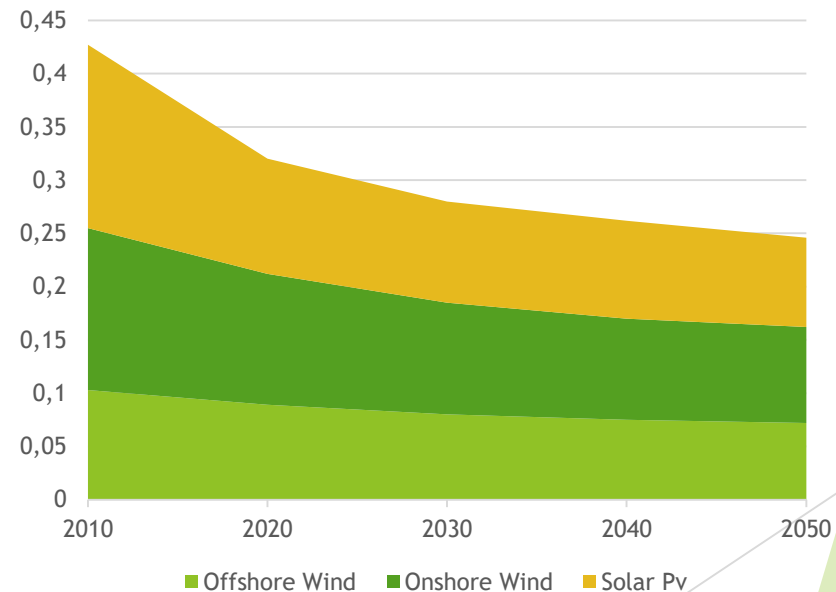
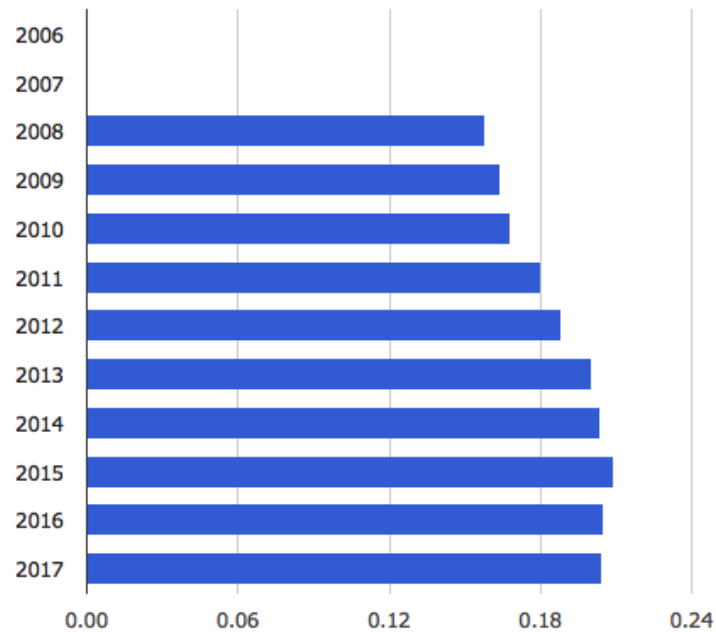
Multiple Criteria Decision Making\_Renewable energy models parameters

Type of REM	Technology improvement	Maturity/reliability	Installation consistence and maintainance requirements	Climatic conditions	Continiuity and predictability of perfomance	Value of energy output	Value of environmetal benefit	Land requirement	Labor impact	Distribution cost	Compitability with legal, administrative & political framework	Cost/Kwh As per 2017 Source: IRENA	Emissions /GWh
Solar Energy	1) Market availability of the technology for more than 10 years.	Mature technologies, close to reaching the theoretical limits of efficiency	1) great technical background for installation/maintenance	1) Depending on site specifics.	1) Predictable and continuous operation.	$VEO = E[XsmPsm + XcmPcm]$	The VEB can be calculated using two scenarios, the renewable energy certificates and the certified emission reductions scenario.	1) High land requirements and significant landscape alternation that has no affect on future growth of the area;	1) High employment during installation however low during the maintenance	1) High cost for connection to the grid lowering significantly the NPV	Renewables can be seen as a way to reduce carbon emissions, to promote industrial development, to decrease fossil fuel imports, and meet other policy goals.	1) 0.10 USD / Kwh	1) low emissions / 85 T CO2_GWH
Wind Power	1) Market availability of the technology for more than 10 years.	Mature technologies, close to reaching the theoretical limits of efficiency	1) great technical background for installation/maintenance	1) Depending on site specifics.	1) Predictable but not continuous operation	$VEO = E[XsmPsm + XcmPcm]$	The registered CDM project obtains one CER for each 1 ton of CO2	1) High land requirements and significant landscape alternation that has no affect on future growth of the area;	1) High employment during installation however low during the maintenance	1) High cost for connection to the grid lowering significantly the NPV		1) Offshore wind energy 0.14 USD/ kWh & Onshore wind energy 0.06 USD/ kWh	1) low emissions / 26 T CO2_GWH



# “L'énergie du jour”- LCOE - Wind and Solar RE

- ▶ Levelized cost of electricity (LCOE), also known as Levelized Energy Cost (LEC), is the net present value of the unit-cost of electricity over the lifetime of a generating asset.
- ▶ Current energy prices EU-28/Eur-Kwh - LCOE Projections prices EU-28/Eur-Kwh





# Case study approach \_ The Cooperatives

## “Overcoming the RE barriers”

- ▶ The research design used is adopted in order to discover how RE cooperatives are escaping the barriers to the uptake of RE.
- ▶ Originated from the Theory of Reasoned Action (Fishbein and Azjen, 1975), the Technology Acceptance Model (TAM) is used to identify the constructs of the barriers to RE adoption that the cooperatives are facing that.
- ▶ Our exploratory research will contribute on the fact that cooperatives effectively contribute to the uptake of RE with community-based social marketing initiatives that are creating the promotional factors required for a resilient energy sector.
- ▶ The findings would contribute to the literature about the governance for environmental sustainability.



# Renewable energy business models

- Qualitative research using semi-structured, in-depth interviews.
- data richness, depth and quality
  - Sufficient to create a theory on dealing with these confrontations (Eisenhardt, 1989).
  - compensate for the associated shortcomings of limited representativeness and generalization (Eisenhardt, 1989; Strauss and Corbin, 1994; Yin, 2003)
  - Using these case studies will unveil their basic logics and underlying dynamics (Eisenhardt, 1989; Yin, 2009).
- ▶ 15 Belgian PV & Wind producers and 15 Bulgarian firms
- ▶ 30 interviews /45min. average
- ▶ Founders, board members, management, key partners
- ▶ March until October 2019
- ▶ 10 open questions regarding Business Model, policy instruments, key success factors for increasing the competitiveness, technological innovation, subsidies and cooperation between public institutions
- ▶ Secondary data : articles, news reports, websites and internal reports



# Renewable energy business models

## ► Case selection criteria

- Renewable energy (coming from Wind and Sun)
- PV Firms and Wind producers located in Belgium & Bulgaria
- Recognized as successful BMs by third parties (community, banks, municipalities...)
- Cooperatives case studies vs traditional model
- National or international active



# Findings

- ▶ Renewable energy building blocks: developers, financial parameters (equity provider and the loan provider), operation and maintenance of the installation and at last but not least, competitors in the energy market
- ▶ Important patterns: geographical location of the installations, access to resources, regulatory framework, grid access and mentality
- ▶ It is very important to consider as public policy instruments for technological innovation, as the key enabler is to accept the creation of “sandbox” (fintech innovations) on both regulatory and technical side
- ▶ Important policy instrument provided by the government which are used to enhance the competitiveness of renewable energy business models, is the secured and straightforward permitting system
- ▶ Building-up the “muscles” needed to pave the way towards sustainability and reshape the oligopolistic electrical market could be done through bold and stable subsidy framework, if any with market enabling possibilities (excluding the feed-in-tariff system due to regulatory and political risk)



# Sustainable Energy Models: Connecting the dots

- ▶ The rationalist models of the early 1970s assumed that educating people about environmental issues would automatically result in more pro-environmental behavior (Burgess et al., 1998).
- ▶ Successful RE projects are typically managed by cooperative ventures rather than money making corporations (Subbarao and Lloyd, 2011).
- ▶ We live in a time of transitions, in which we are searching together for new earning or transition models. But because everything we do and don't do is based on a financially-driven transaction model, it is hard or sometimes even impossible to escape reality in such a way that brings other transaction models to the surface and - by using them - show their feasibility and value (Jan Jonker, 2012)
- ▶ Another way to think about RE is to conceptualize it as an innovation.

