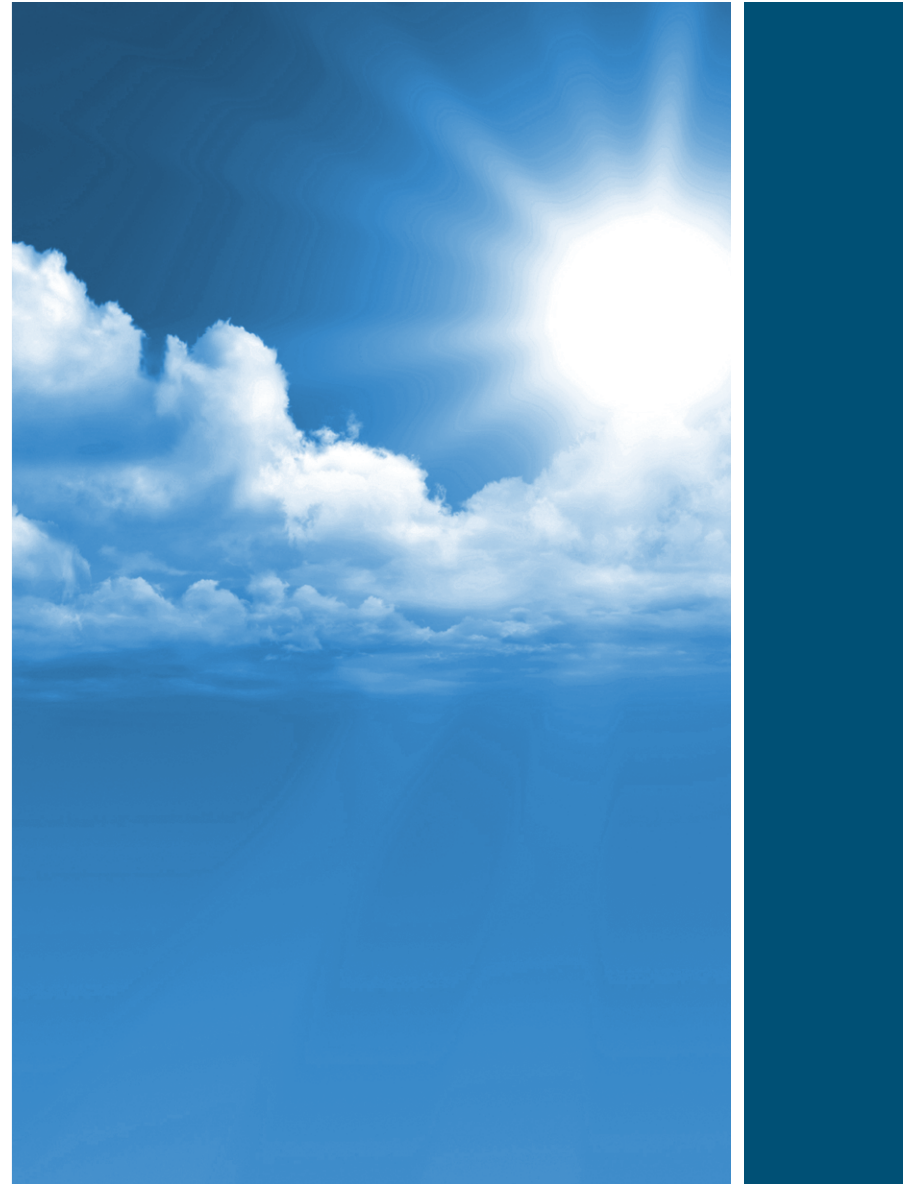


# Building an Innovation and Entrepreneurship Driven Economy: How Policies Can Foster Risk Capital Investment in Renewable Energy

Webinar

May 4, 2011



**CLEAN ENERGY**  
**SOLUTIONS CENTER**  
AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

# Solutions Center & Webinars

The Solutions Center is designed to assist Clean Energy Ministerial countries and partners with the design and adoption of clean energy policies and deployment programs. It serves as a virtual clearinghouse of clean energy policy information and tools and leverages assistance available through other Clean Energy Ministerial initiatives. It also offers peer-to-peer learning, remote expert assistance, and online training.

Webinars are facilitated learning sessions to discuss and learn about experiences and best practices in priority areas from our global colleagues.

# Panelists



[Dean Cooper](#)  
Head of Finance Unit  
United Nations Environment Programme (UNEP)



[Marty Murphy](#)  
Enterprise Development Program Manager  
National Renewable Energy Laboratory



[Charlie Dou](#)  
CEO  
Beijing Bergey Windpower



[Andres Pesce](#)  
VP of Business Development & Investment  
Fundación Chile



[Jim Matheson](#)  
General Partner  
Flagship Ventures

# Jim Matheson Flagship Ventures



- General Partner
- Flagship Ventures is an entrepreneurship and venture capital firm focused on creating, financing and building breakthrough companies in the sustainability and healthcare arenas. Flagship manages \$900M from its offices in Cambridge, MA but searches for world-class innovations wherever they are occurring.





# The Government: Friend or Foe to Financiers?

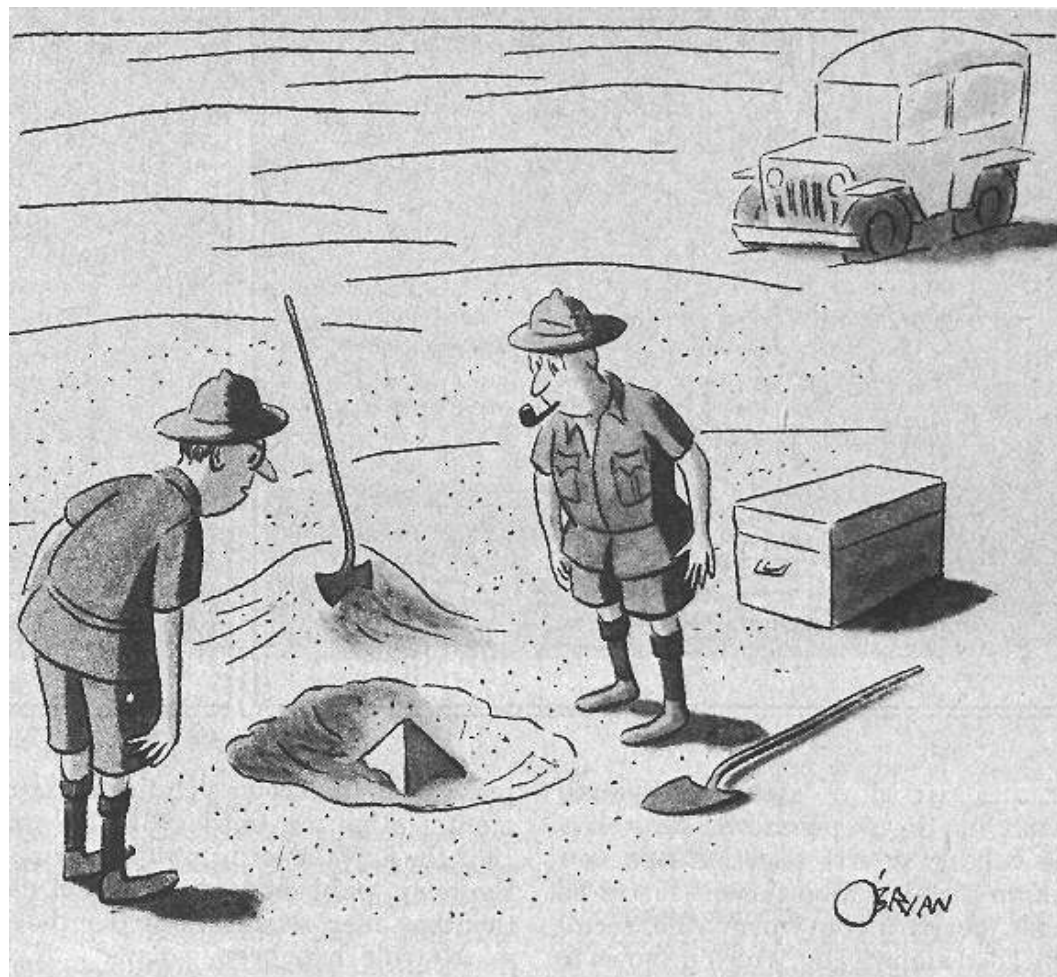
**Jim Matheson**  
General Partner

**One Memorial Drive**  
**Cambridge, MA USA**



FLAGSHIP VENTURES

# FSV's Mission: Uncovering Big Ideas

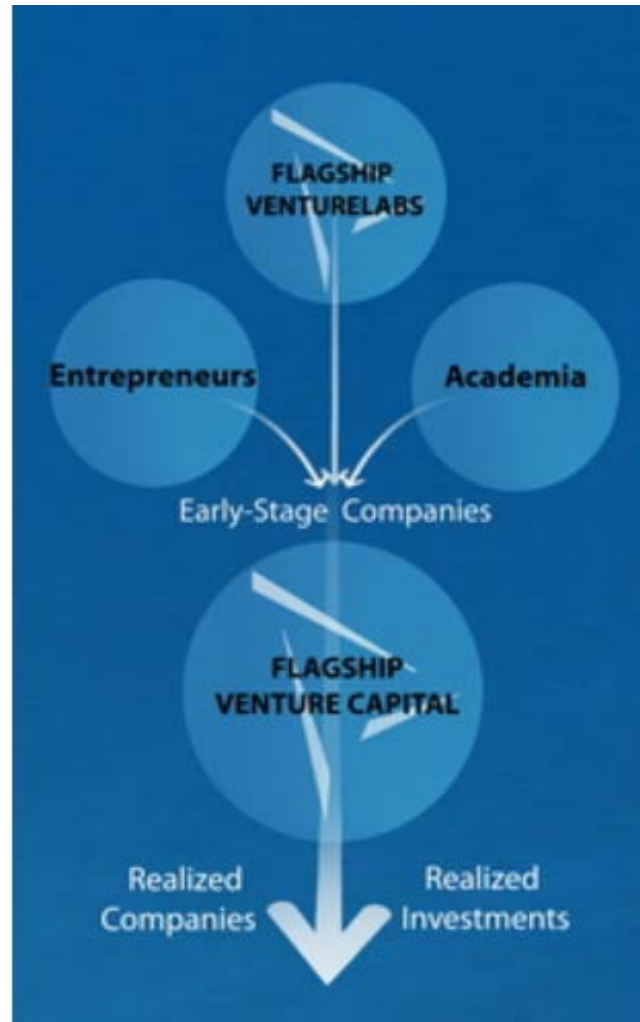
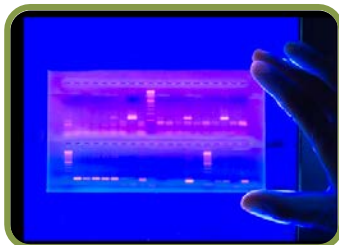


*"This could be the discovery of the century. Depending, of course, on how far down it goes."*

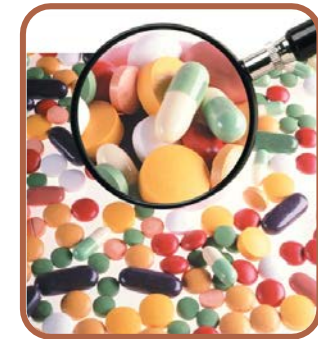


# FSV's Strategy

Breakthrough technologies



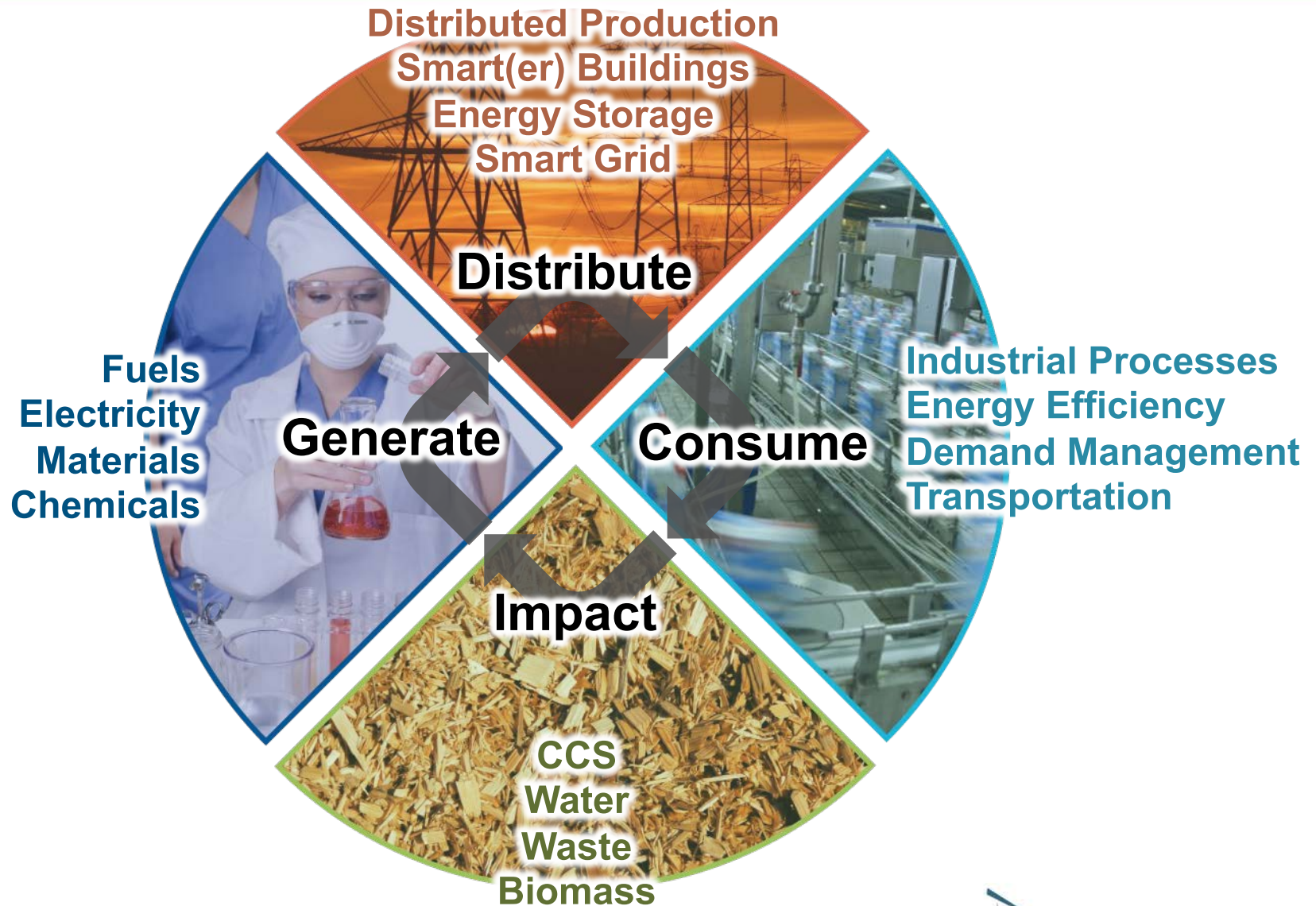
Healthcare



Sustainability

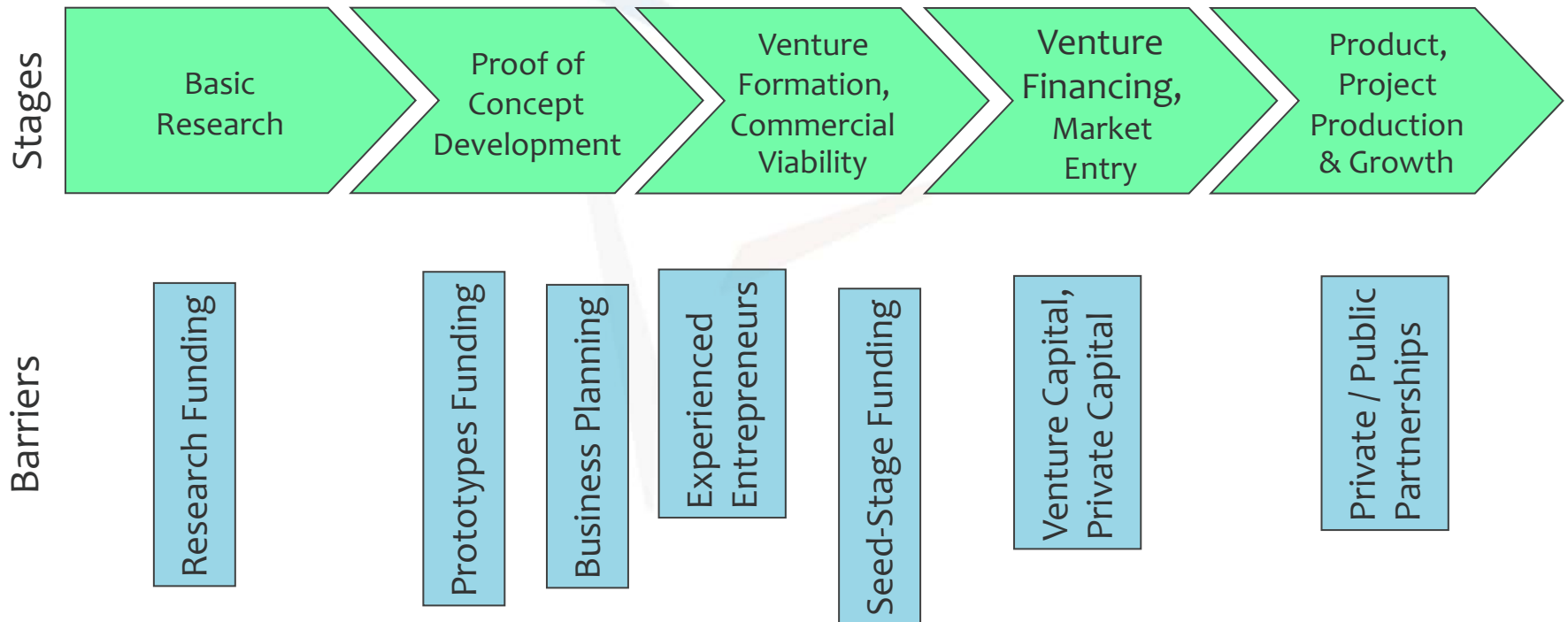


# Clean Tech Investment Framework





# Clean Tech Startup Lifecycle



# The Role of Government

## *“I’m From the Government and I’m Here to Help”*

- To set broad energy & resource POLICY
- To provide FUNDING for public good
- To design and implement INCENTIVES
- To facilitate PERMITTING processes

# Energy & Resource Policy

- Examples:
  - Renewable portfolio standards (RPS)
  - Carbon trading schemes (CDM)
  - Energy efficiency targets
  - Nuclear energy strategy
- Impact:
  - Helps drive long term capital allocations
  - Helps cross industry / technology coordination
  - Lack of policy hinders long term project(s)
  - Dynamic policy worse than a steady / bad policy

# Funding

- Examples:
  - Nat'l labs (basic research, early applied)
  - SBIR, NIST, etc. (more applied)
  - ARPA-E (targeted to specific technology areas)
  - Loan Guarantee program (help scale first of a kind projects)
- Impact:
  - Create breakthrough capabilities without commercial pressure
  - Prepare technologies for next stage of funding
  - Provide incentives for capital deployment
  - Enable next-gen technologies to reach commercial scale

# Incentives

- Examples:
  - Investment & production tax credits
  - Feed in tariffs
  - LEED standards
- Impact:
  - Increase IRR on capital projects
  - Help drive down cost curve for early technologies
  - Drive buyer behaviour(s) to incent “good” behaviour via economic rewards
  - Can create perverse behaviour and can have unintended economic value transfer



# Permitting

- Examples:
  - Construction permits
  - Off-shore wind project(s)
  - Grid interconnect for renewables
  - Automobile certification
- Impact:
  - Protect stakeholders and enable an open dialogue
  - Uncertainty impacts capital deployment
  - Stakeholders often get more power than appropriate
  - Permitting risk late in process stunts project launch
  - Often neighboring “permitting agencies” have different views

# Summary

- Governmental action GREATLY impacts capital deployment
  - LONG TERM & STABLE policies are key to innovation and capital deployment
  - Government should COOPERATE with private capital to ensure capital continuity, not replace / bolster
  - Incentives need to drive DESIRED behaviour
  - Permitting processes should be PREDICTABLE & TRANSPARENT

**Jim Matheson**  
**General Partner**  
**[jim@flagshipventures.com](mailto:jim@flagshipventures.com)**  
**617.218.1508**



FLAGSHIP VENTURES

# Charlie Dou, Bergey Wind Power



- Vice President for Asia of Bergey Windpower Co. USA; CEO of Beijing Bergey Windpower Co.; Adjunct Professor and Research fellow, West Texas AM& University, USA
- Bergey Windpower has been building high-reliability, extremely low maintenance small wind turbines up to 10 kW for over 30 years, with over 7,000 units installed covering all 50 U.S. States and over 100 countries.





## Webinar: How Policies Can Foster Risk Capital Investment in Renewable Energy

What types of renewable energy policy  
mechanisms can best help an entrepreneur and  
small to mid size clean energy companies  
expanding into new markets

Adjunct professor, West Texas A&M University, Texas, USA  
Vice-president for Asia, Bergey Windpower Co., OK, USA

Charlie Dou

May 4, 2011

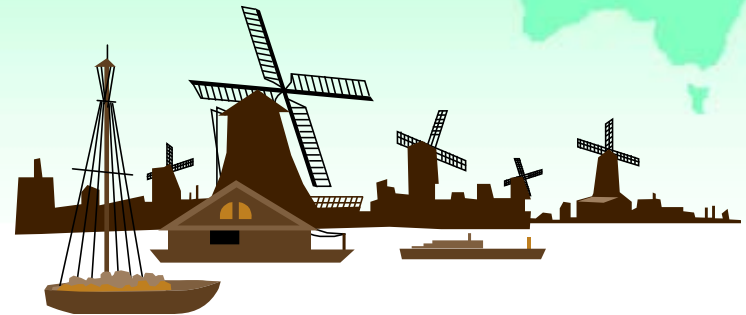


# Overview of Government RE policy

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The mixture of relevant policies and regulations can be considered in two main categories:

- Fiscal, Incentives
- Law, regulations, and guidance



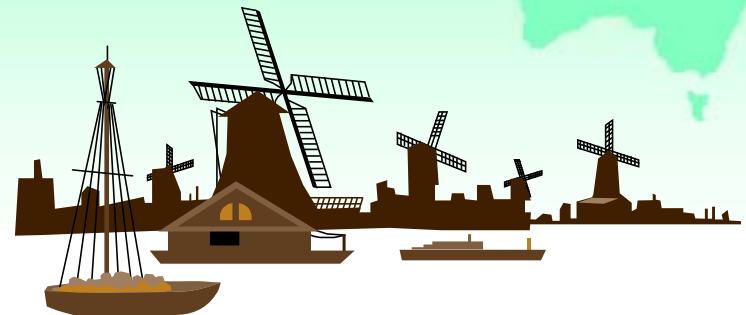
# Overview of Government RE policy

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## Incentives

Methods: Financing, tax credits, subsidies, rebates, net metering, FIT

Targets: Project developers, business (Utility, power producers), manufacturers, customers, organizations (government buildings, schools) , etc.

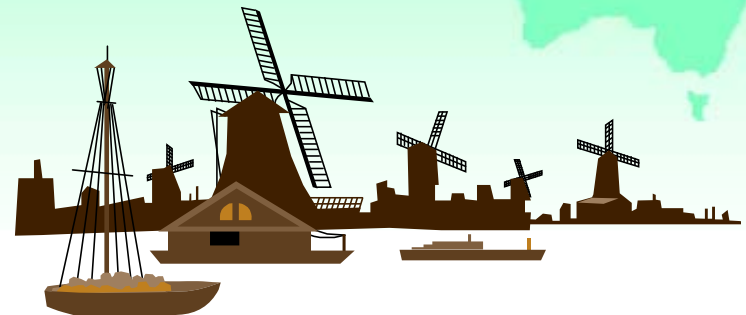


# Overview of Government RE policy

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## Institutional

- Law, regulations, roadmap, Renewable Obligation, etc.
- Standards, certification, etc.



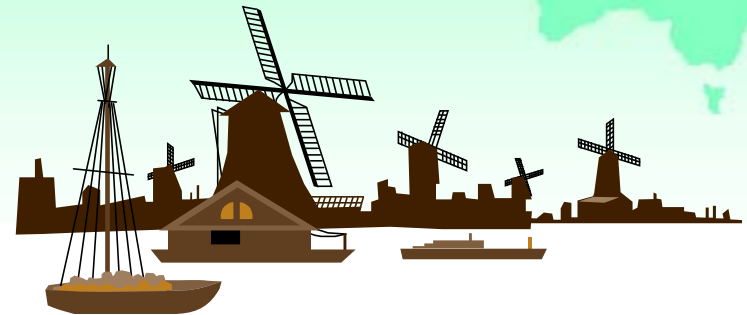
# Gov't policy effectiveness

---

**LONG-TERM SUPPORTIVE POLICY  
IS THE BEST EFFECTIVE ONE.**

## Long-term mechanism vs short-term program

- Lots of government prefer “*Programs*”.  
Rush in & Rush out (Not willing to long-term investment, Less R&D)
- RE industry is quite different than most traditional industries.
- Needs high initial investment, slow payback, looking for long-term operation
- Highly relying on government long-term policy.



# Gov't policy effectiveness

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## Long-term mechanism vs short-term program

- A policy or policy mechanism which can provide the investors a clear, sustainable, long-term picture will be the most important ones.
- Business and investors are mostly afraid of the unclear, fluctuated and short-vision policy.





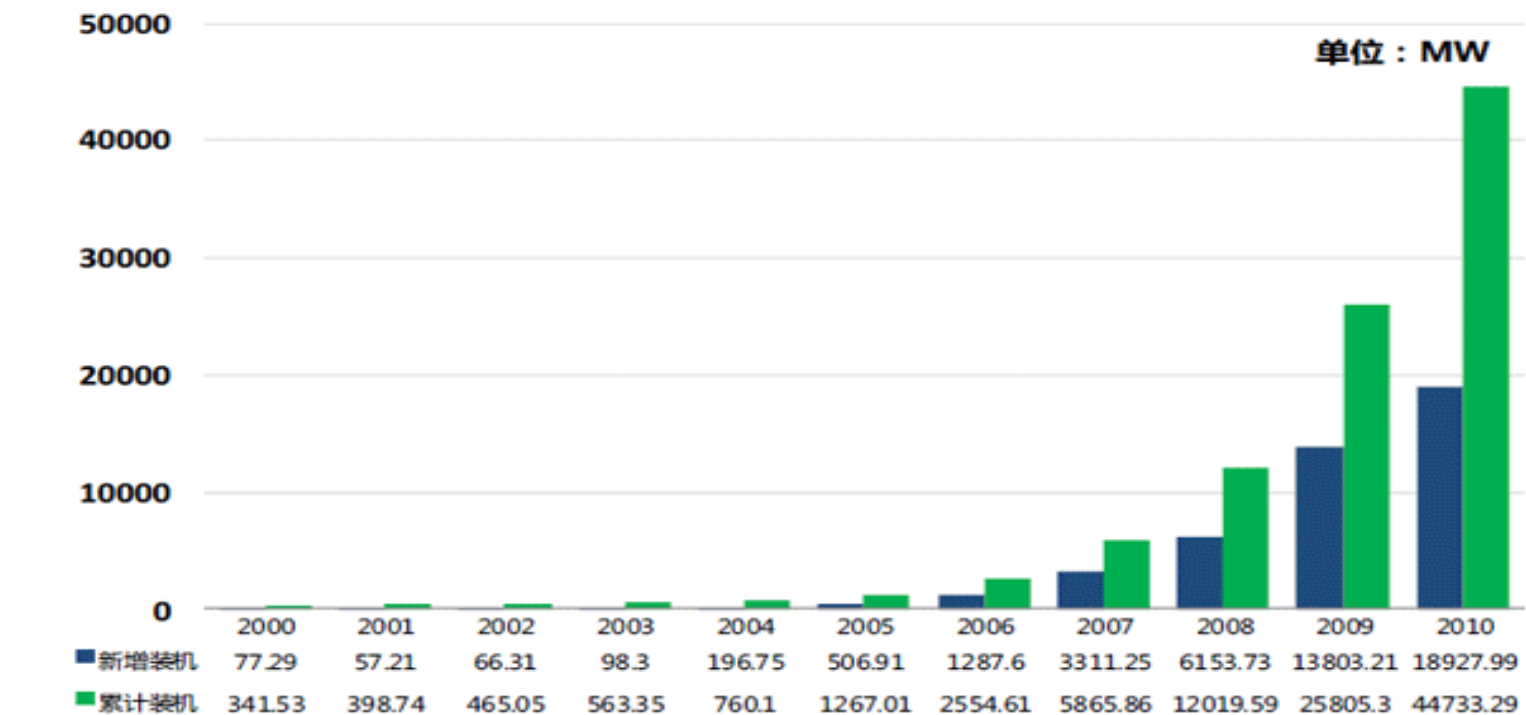
# Gov't policy effectiveness

## Example 1: China wind power industry development

### Overview:

New installation (2010) : 12,904; capacity: 19GW, growth rate to 2009: 37.1%.

Total units: 34,485; Total capacity: 44.7GW



数据来源：CWEA

# Gov't policy effectiveness

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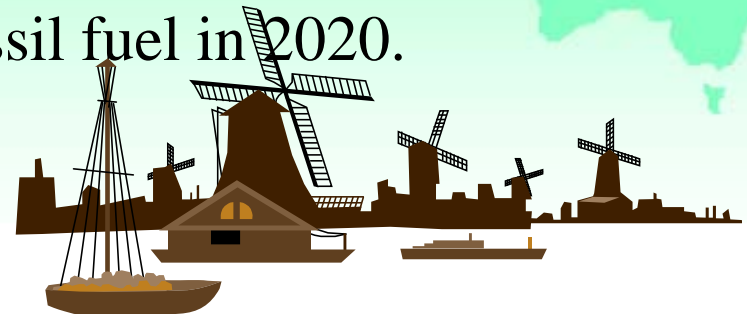
## Example 1: China wind power industry development

### **Policies create the market demand**

China wind power installed capacity exponential growth since 2004.  
Major contributor: Renewable energy law”.

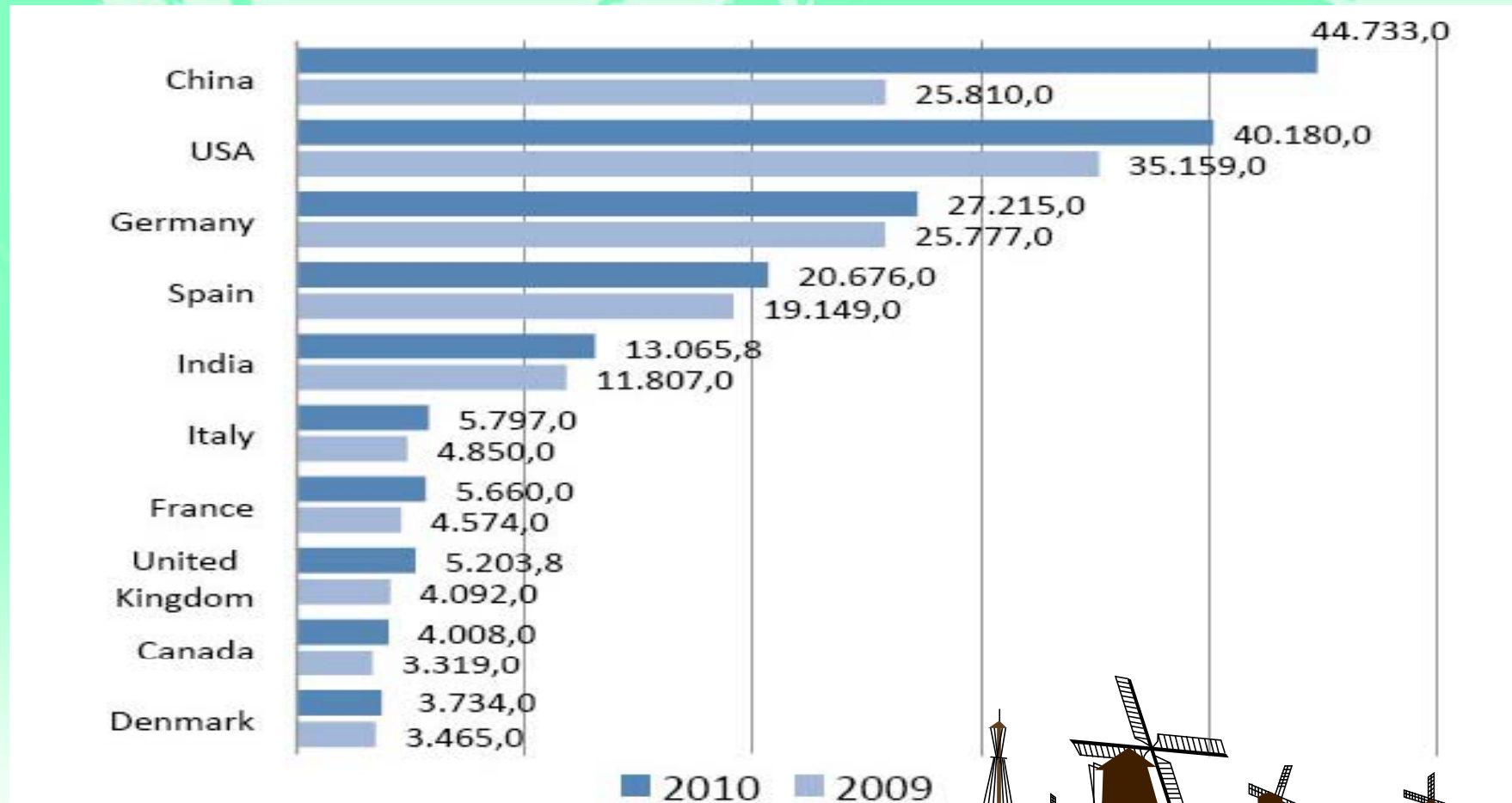
Milestones:

- “Renewable energy law”,
- Regulation of Renewable Energy Power Price and Expense Sharing Management (shortened to “Method”) was published by China NDRC
- Fixed FIT: 0.51, 0.54, 0.58, 0.61
- Government promises on G20 meeting that China shall achieve 15% of energy consumption from non-fossil fuel in 2020.



# Gov't policy effectiveness

## Example 1: China wind power industry development



Source: GWEA



# Gov't policy effectiveness

---

## Example 2: China Goldwind S&T Corporation

HONG KONG, Sept 25, 2010 (Reuters) - China's second-largest wind turbine maker Xinjiang Goldwind S&T (002202.SZ) revived its initial public offering plan in Hong Kong and has set its initial public offering price on Saturday to raise up to \$917 million, a term sheet showed.

- 2010: No. 5 global WT manufacturer. Revenue US\$2.7 billion, net profits US\$333 million. Accumulated installation: 9 GW (by end of 2010). 2500 global employees.
- Found 1998 based on Xinjiang Dabancheng No. 2 wind farm, under ministration of Department of Water conservation. 20-30 employees. Introduced German 500KW, developing it as 600KW. Difficult for surviving until 2005.



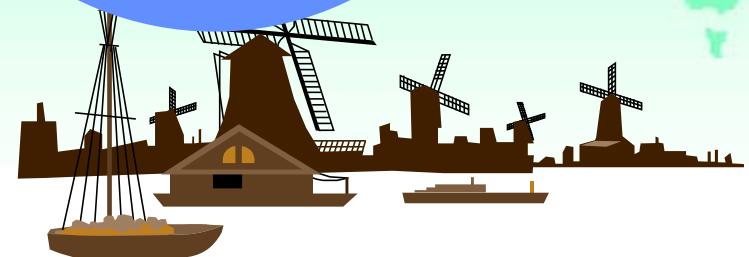
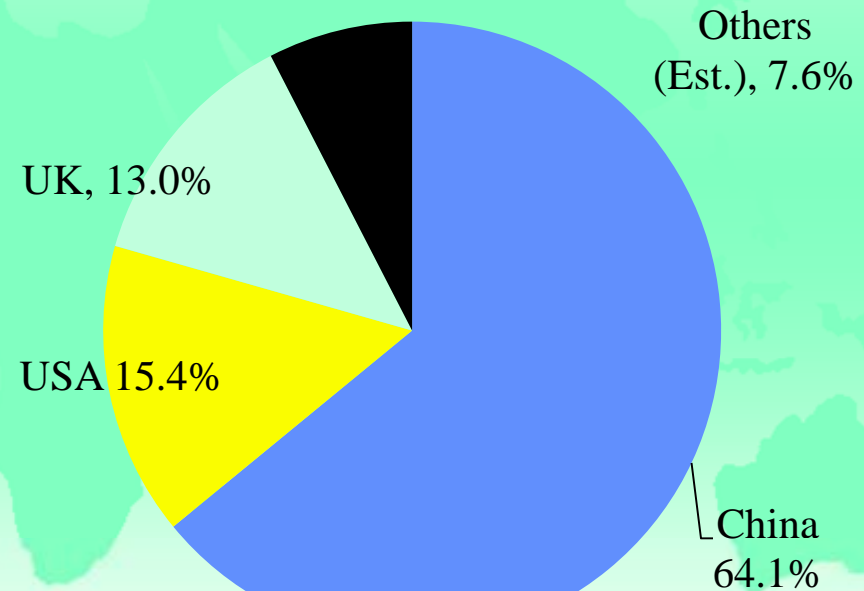
# Gov't policy effectiveness

## Example 3: China Small wind power

2009 Global small wind power new installation

2009 SWT installation by major nations

	2009 (MW)	%
China	84.7	64.1%
USA	20.3	15.4%
UK	17.2	13.0%
Other(Est.)	10	7.6%
Tot (MW)	132.2	100.0%





# Gov't policy effectiveness

## Example 3: China Small wind power

### Position of China SWT in National Power structure

#### Capacity (2010)

Tot Power capacity	960,000MW
Accumulated installed SWT	200MW
% of Tot power capacity	0.02%

LWT 3.3%

\* By end of 2009, tot installed capacity ~150MW, 2010 sales: 130MW, export ~50%, 1/3 to be used for replacement,. Est. new increased capacity 50MW

#### Power generation (2010)

Tot power consumed	$4.2 \times 10^8$ kWh
Est. generated by SWT	$3.65 \times 10^6$ kWh
%	0.0087%

\*Est. working 5 hrs a day

- Developed much earlier than LWT
- Current industry scale is tiny
- No supportive policy



*Thank you for your attention!*

Beijing Bergey Windpower Company, Ltd.

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<http://www.bergey.com> (Bergey Windpower Co. USA)

<http://www.bergey.com.cn> (Beijing Bergey Windpower Co.)



Beijing Bergey Windpower Company

# L. Marty Murphy

## National Renewable Energy Laboratory



- Enterprise Development Program Manager
- NREL is the only federal laboratory dedicated to the research, development, commercialization and deployment of renewable energy and energy efficiency technologies.



# NREL Industry Growth Forum – Building an Innovation and Entrepreneurship Driven Economy



**Denver, Colorado**

**L Marty Murphy, NREL**

**May, 2011**

# NREL Growth Forum.. What is it?

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- A venue providing access to capital
  - Early Venture is the sweet spot
  - Competitive process to present
  - National in scope
- A partnership and relationship building platform fostering networks and collaboration
  - Investors (VC's, Strategic, PjF, other)
  - Entrepreneurs
  - Private and public sector ( e.g. legal)
  - CTO, Incubators etc.
- Ties to Economic (and CE Cluster) Development





# Stages of value for startups

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## Apply

- Value: Hundreds of emerging companies are exposed to hundreds of investors and potential partners
- 2010: **197** applications of which 62 were seed stage, 121 were early stage, and 14 were later stage & expansion capital

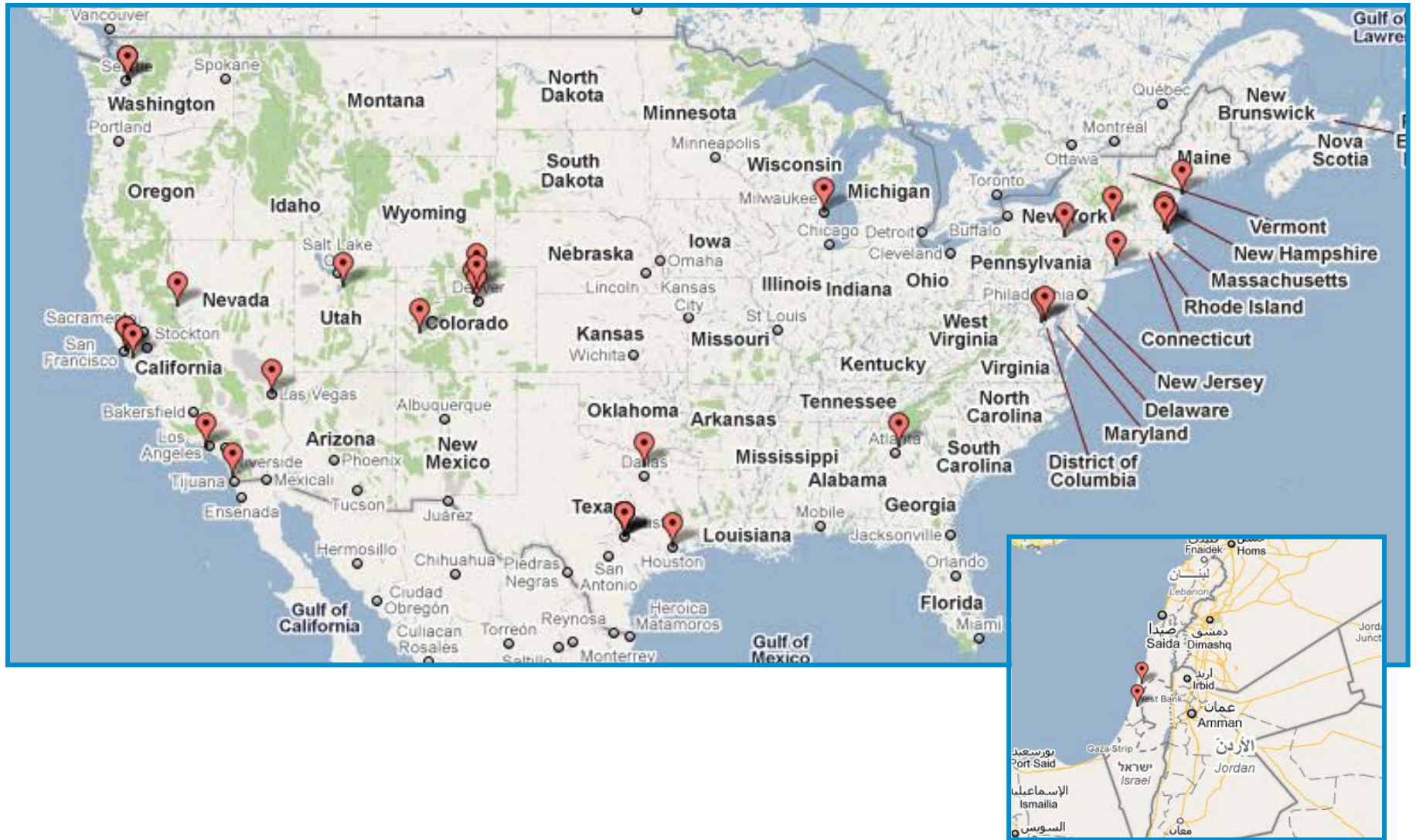
## Select

- Value: All applicants receive critical feedback from investors
- 2010: **130** investors representing sophisticated angels, venture, and strategic investors

## Present

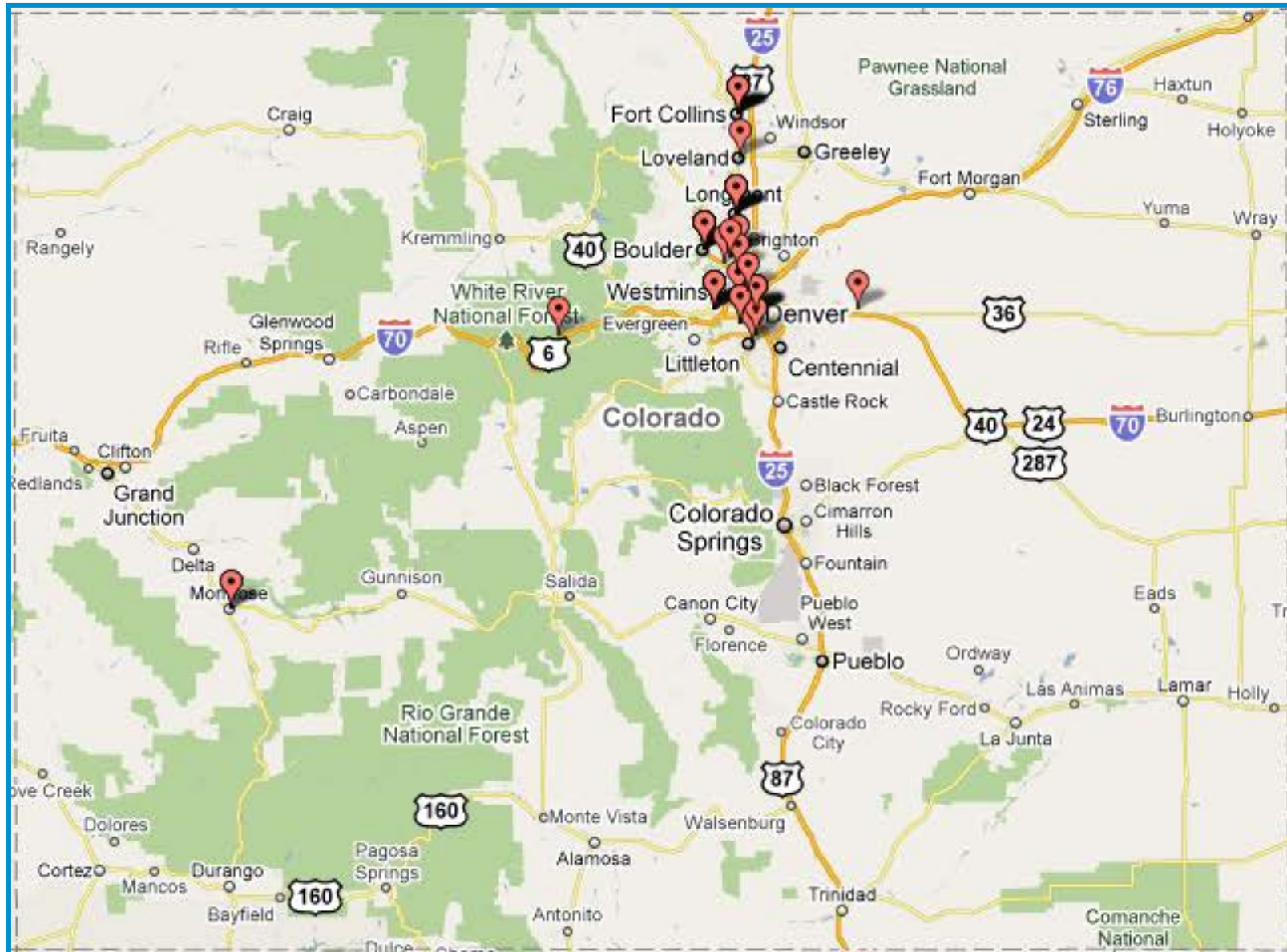
- Value: Presenting companies receive critical feedback from investors
- Value: Presenting companies are aligned with investment mentors
- Value: All applicants can attend the Forum at a significantly reduced rate
- 2010: **34** presenting companies

# Presenting Companies





# Colorado Applicants – 46 in 2010



# NREL Growth Forum Results

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- Added 3000 + US jobs
- Realized \$1 billion + in sales
- Raised more than \$3.4 billion (as of August 2010) since giving their presentations
- Raised \$726.9M in cumulative financing within one year; \$1.36B within two years of participating in the forum
- ~59% of the companies that participate in the Forum have received funding
- Fosters engagement with regional economic development



# Preliminary Conclusions from Recent Study\*

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- IGF helps companies raise money—on average presenters raise \$4.4M more than non-presenters
- No evidence of regional effects
- Groups of experienced investors collectively are good predictors of company success
- CTO is a good preparatory activity to increase chance of getting into the IGF
- IGF presenting companies are more highly networked with VCs
- First evidence that properly executed business plan competitions can help stimulate technology transfer

\* To appear shortly, based on 5 years of data

# Dean Cooper

## United Nations Environment Programme



- Head of the Energy Finance Unit
- UNEP's mission is: "To provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations"

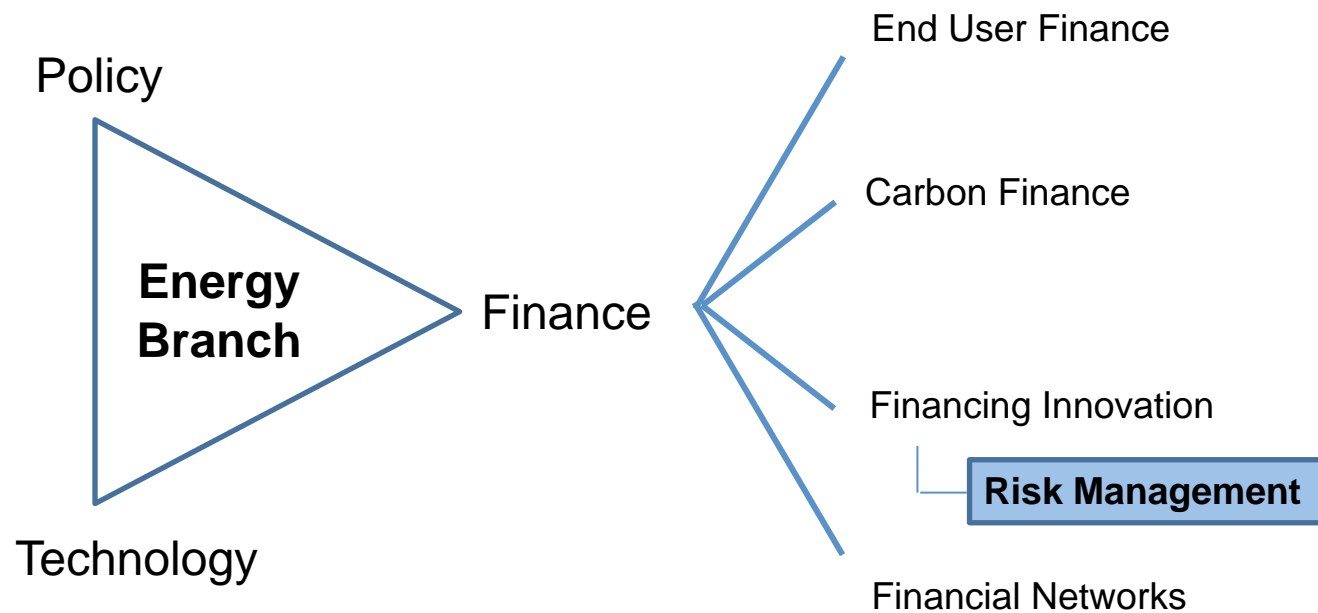


United Nations Environment Programme  
environment for development



## DIVISION OF TECHNOLOGY, INDUSTRY & ECONOMICS (DTIE) (UNEP Lead for Climate Change)

**DTIE Branches:** Energy, Sustainable Consumption & Production, OzonAction, Economy & Trade, Chemicals



*Focus: Renewable Energy & Energy Efficiency*



## CRITICAL FACTORS FOR RISK MANAGEMENT

- Public finance to leverage private investment
- Perceived & actual risk
- **Policy, regulation, legislation**
- Country-dependent
- Appropriate technology
- Practical demonstration & local partnership





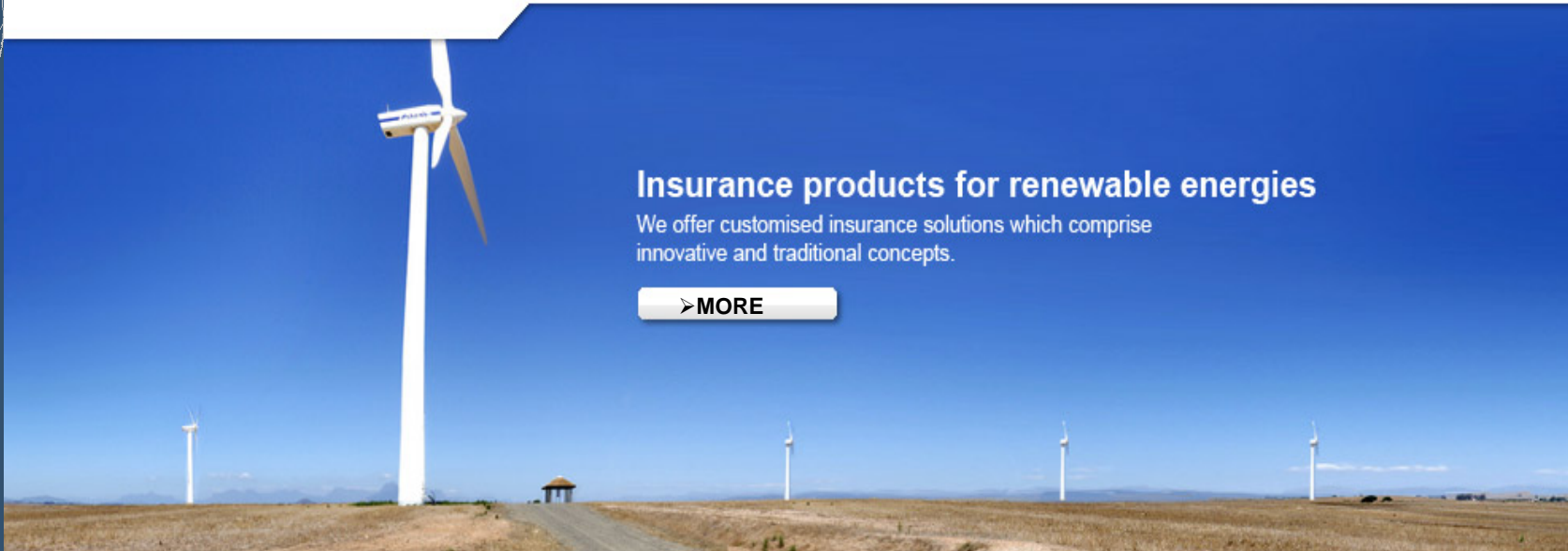
## Standard Due-Diligence Steps for Renewable Energy Projects

- Business plan (financial models, sales projections, market, competitors, fuel source and security)
- **Permits and environmental approval**
- Technology involved - reliability and operating history
- Power Purchase Agreements, Green Certificates, Carbon Credits
- Price per kilowatt hour of electricity/tenor or agreement
- Experience and reliability / creditworthiness of all parties involved
- Schedule of project milestones for completion of various tasks
- Security payments that the contract requires
- Insurance provisions for any losses that impact revenue generation
- **Regulatory environment - possibility of charges to policy environment which can affect the economics of the project**
- Financial interest in project
- Other risk elements that impact the project's ability to service its debt

***=> policies required but not sufficient for investment***







## Insurance products for renewable energies

We offer customised insurance solutions which comprise innovative and traditional concepts.

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CarbonRe, the RSA Group and Munich Re have joined forces to provide through insurance4renewables tailored financial risk management instruments for renewable energy projects and support the development of solutions that meet the needs of renewable energy markets worldwide, namely in developing countries.



**Risk management** Our experts offer risk solutions and support for all project phases.

insurance4renewables covers a wide range of renewable energy technologies including wind power, solar photovoltaic, solar thermal, biomass and biogas systems.



Our network offers worldwide support for your innovative projects.

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OFFICIAL PARTNERS:



# Andrés Pesce

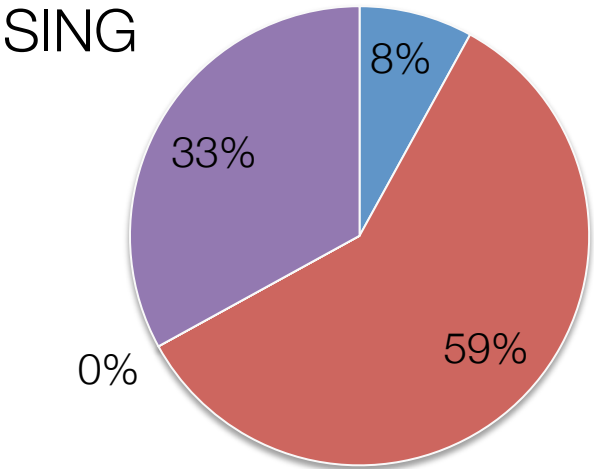
## Fundación Chile



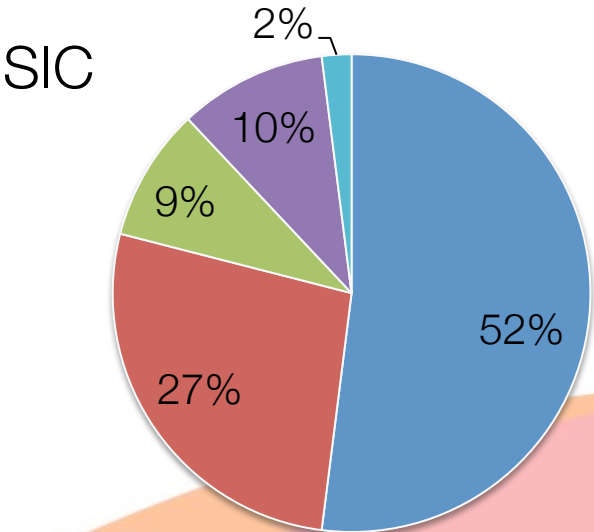
- Vice President of Business and Investments
- Fundación Chile, a non-profit privately owned corporation who's partners are the Chilean Government and BHP Billiton-Escondida Mining, works to foster technology transfer and innovation for Chile. We partner globally to provide a high impact response to better address our country's challenges—ultimately today's global challenges: sustainability, human capital development, healthier and more functional food, and the incorporation into the digital economy.



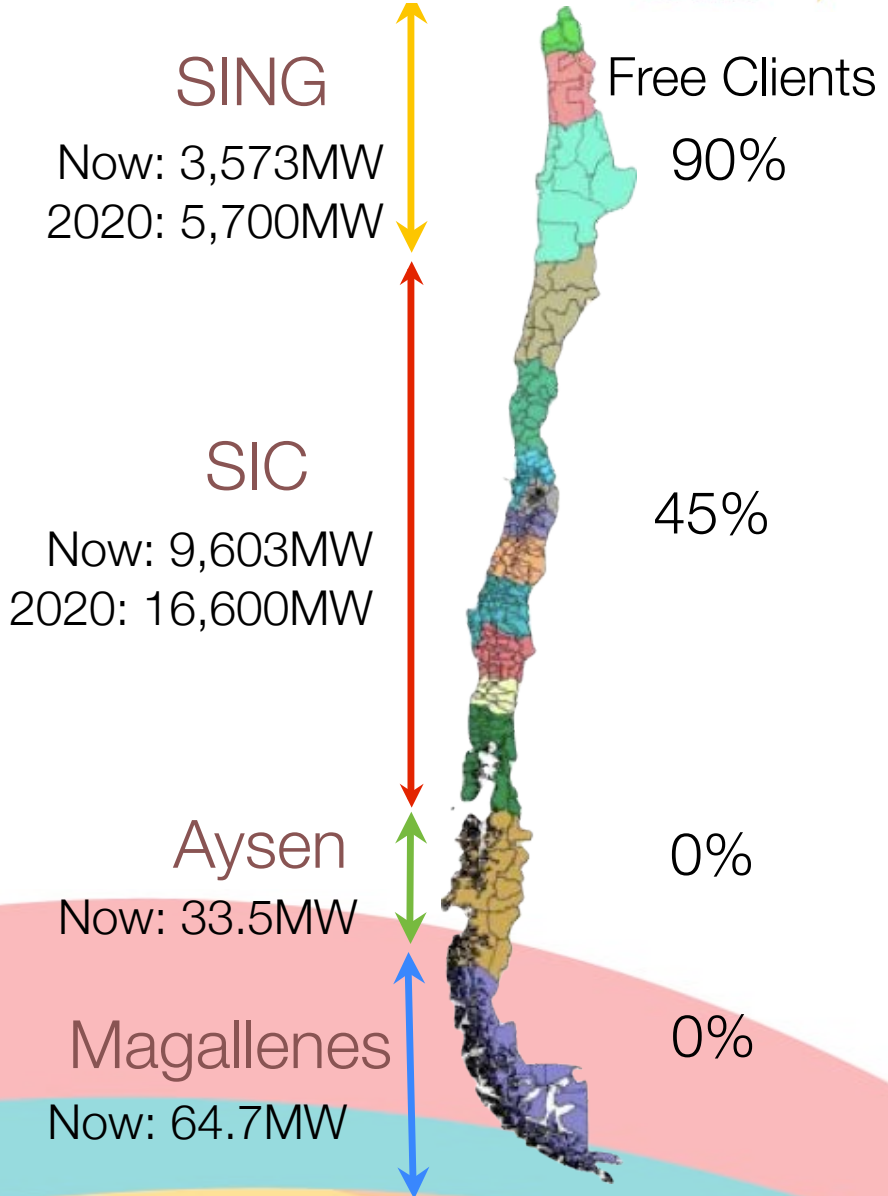
# Chilean Grid



- Diesel
- NG
- Hydro
- Coal



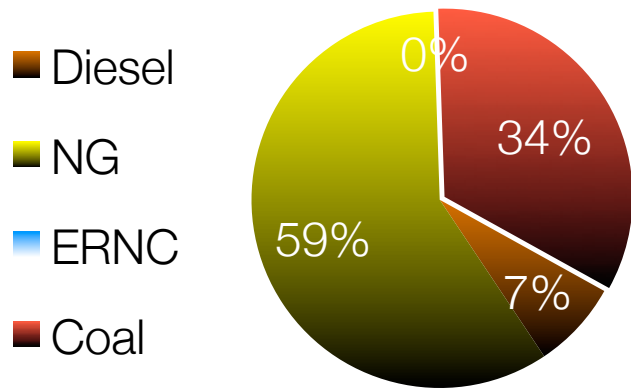
- Hydro
- NG
- Coal
- Diesel
- Biomass



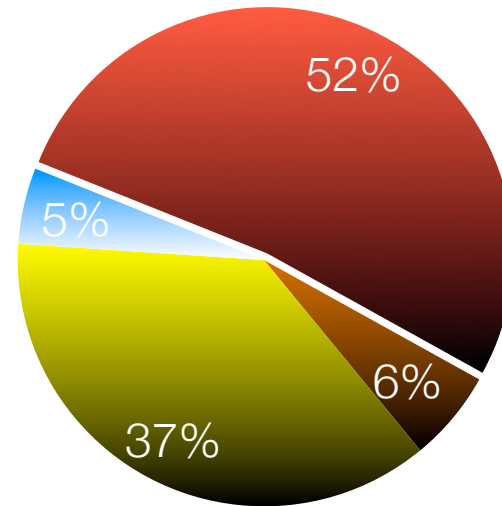
Source: CNE 2010

# SING: Mix and Emission Factor

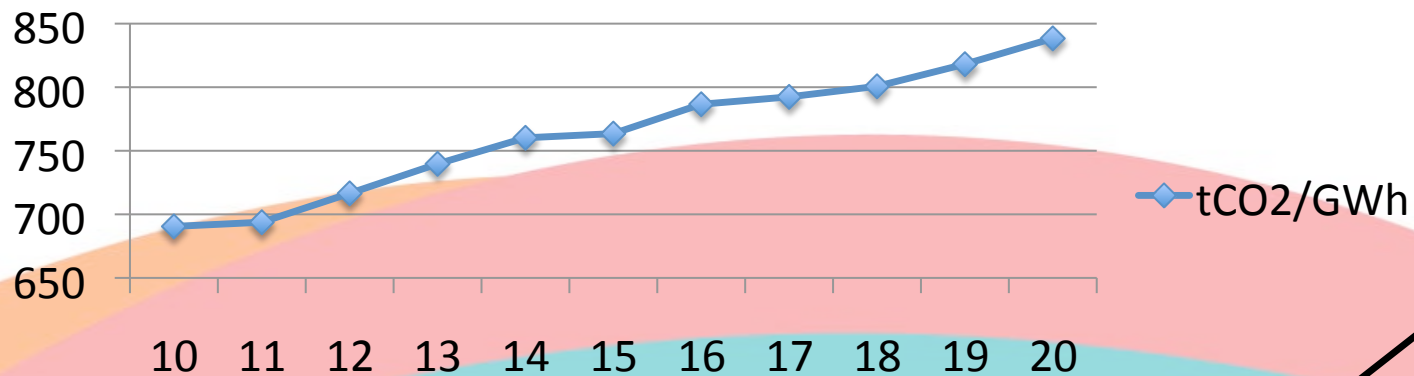
SING 2010



SING 2020 BAU



SING CO2 Emission Factor (tCO2/GWh)



Source: CNE, IPCC, EIA, PUC

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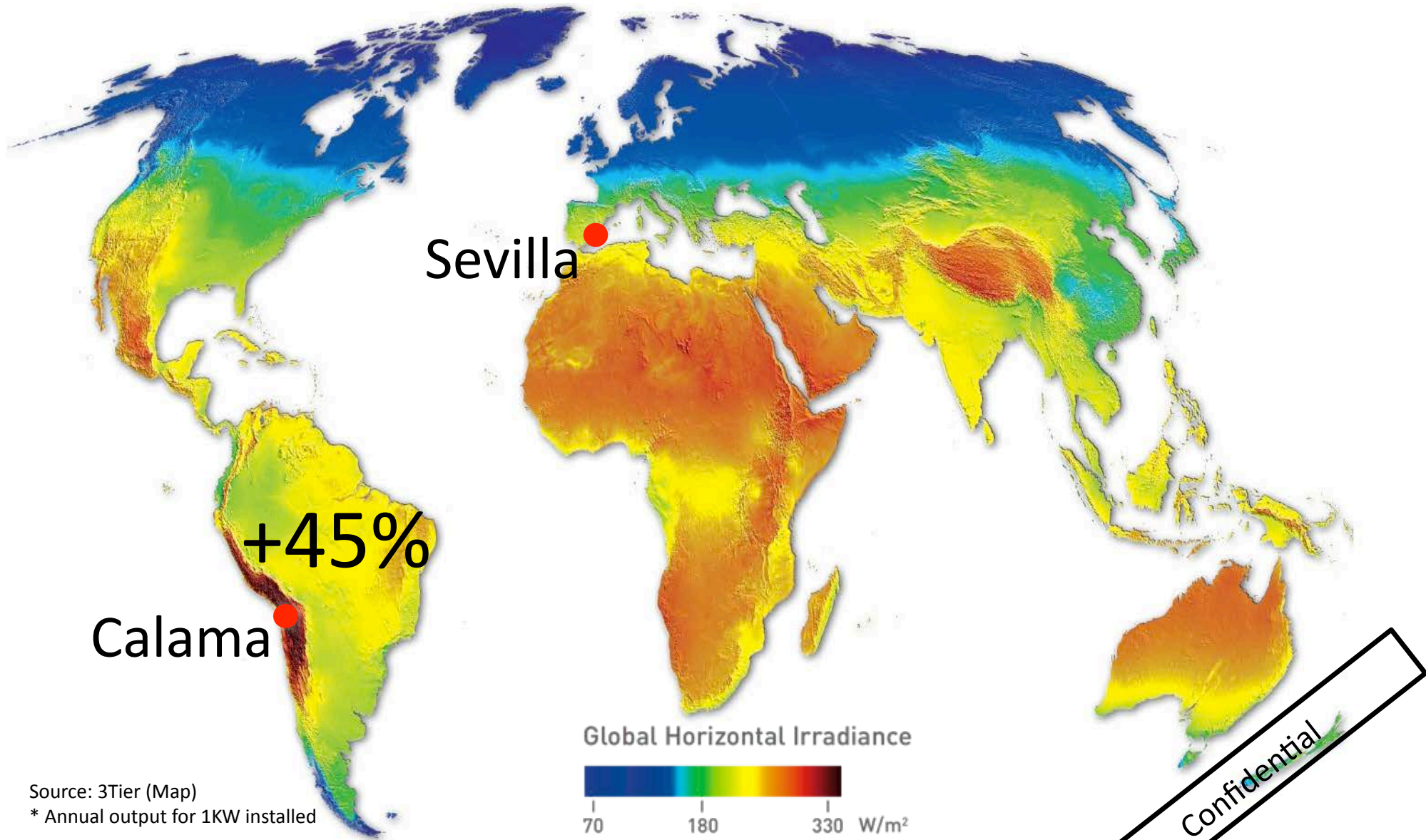


# Chile's Solar Advantage



UNA EMPRESA  
FUNDACION CHILE

SOLAR  
Chile



Source: 3Tier (Map)

\* Annual output for 1KW installed

# Atacama Desert

- 40,600 square miles
- World's largest Copper & Lithium Reserves
- Driest place on the planet (rain 1mm/yr)
- Atacama Large Millimeter Array (ALMA)
- Highest electricity prices in LATAM



Geysers del Tatio

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# Mining Industry Expansion



US\$50B Expansion plan by 2015

+50% (2GW) increase of generating cap.

Mine's supply decision will define SINGs future generating source mix

Increased valuation of renewable and carbon footprint reduction

20.257 Law: ERNC 5-10%

Increased interest to have direct supply or NCRE in SING (geotérmica, eólica y solar)



SING's mix will be defined in 2010-2015

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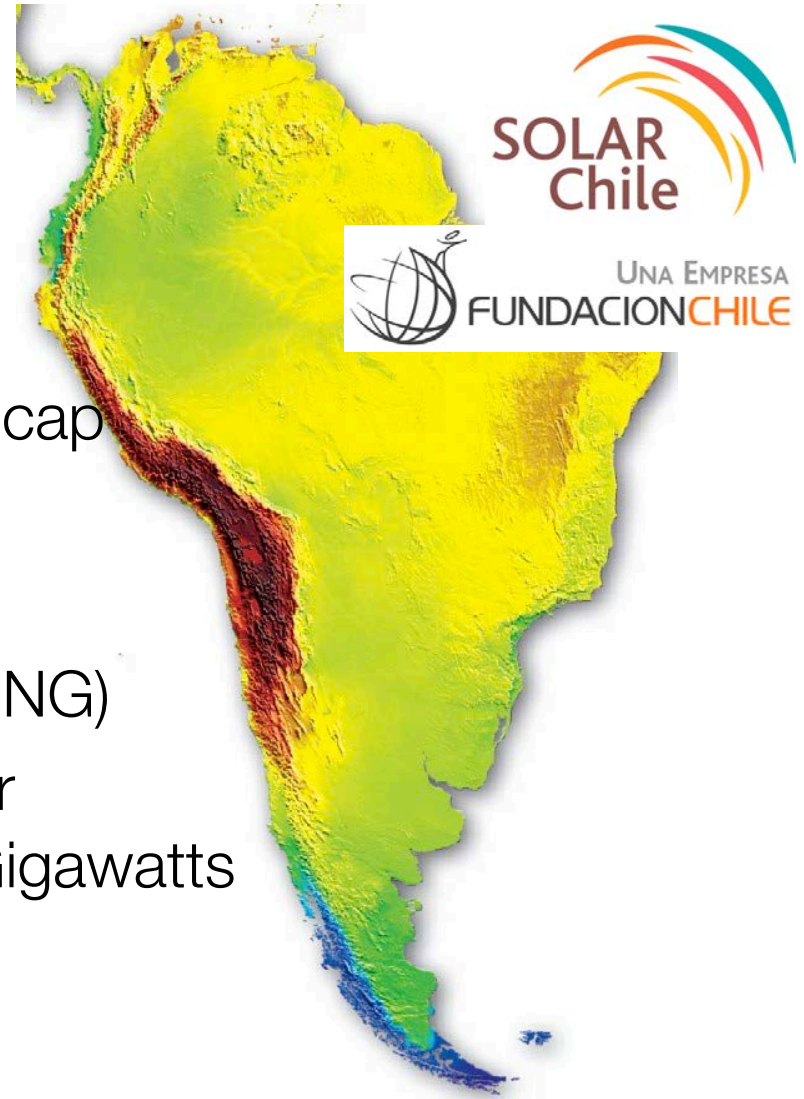


# The opportunity

- New Copper investment (\$50B)
- +50% (2GW) increase of generating cap
- Highest Electricity prices in LATAM
- RPS standard - 5% → 10% (2024)
- 98% dependent on fossil imports (SING)
- 4000km<sup>2</sup> of available desert for solar production equating to nearly 200 Gigawatts potential (CNE)



Highest Solar Irradiation  
in the World



# Solar Chile

- Solar Chile develops & operates utility scale solar plants
- Target clients are large mining and industrial companies in Chile
- Solar Chile is technology neutral
- Promote development of solar cluster

Development + Operation

- Land  
- Contracts  
- Technology  
- Finance

- Operation  
- Maintenance  
- R&D Interface



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# Discussion

Feel free to pose your questions to the panel or individual panel members via the web-conference messaging feature.

# Other Resources

  
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- Ask an Expert
- Training
- Contact Us

## Building an Innovation and Entrepreneurship Driven Economy: How Policies Can Foster Risk Capital Investment in Renewable Energy

Expert panels—including government, industry, and financial experts from countries across several continents—will explore how countries have used policies to build a clean energy economy by stimulating venture capital investments in new renewable energy companies. Panelists will briefly discuss policy experiences and approaches from their own countries, including business competitions and coaching, state-owned venture funds, tax incentives, and loan guarantees, as well as perspectives on best practices across the globe. The webinars will conclude with ample time for the panel to respond to audience questions. The webinar will be on May 4th at two times to accommodate panelists and audiences from different time zones.

- [www.cleanenergysolutions.org](http://www.cleanenergysolutions.org)
- Available resources:
- Recorded version of this webinar including slides
- Frequent webinars
- Ask an Expert & Peer Forum
- Other feedback/suggestions: [webinars@cleanenergysolutions.org](mailto:webinars@cleanenergysolutions.org)

