

# **Renewable Energy Market, Project Feasibility, Deal Structure, Financing and Disputes**

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January 2024

# Renewable Energy Presentation AGENDA

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Renewable Energy Market Drivers

Project Feasibility, Regulatory Challenges and Cash Flows

Deal Structure and Financing

Potential Disputes

Question and Answer Session

# Market Drivers

# Technology Transitions Disrupt the Status Quo



Final horse drawn tram in New York City, 1917. Image: Brown Brothers.

**Source:** <https://thetyee.ca/News/2013/03/06/Horse-Dung-Big-Shift/>

What happened to horse farms, horses, liveries, blacksmiths, leatherworks, buggy builders, dung sweepers, saddle makers?

## Computers Appear in Offices

During the 1980s things changed very quickly.

Since the early 20th century, all businesses and organisations employed secretaries who were skilled typists. They used typewriters to produce professional looking letters, memos and documents for the senior staff who either hand wrote them or dictated directly and the secretary would write it down, often using shorthand for speed. The document would then be typed up. Often, they would use several sheets of paper with carbon paper between them. This would make several “carbon copies” of the document in one typing - and is the origin of the optional “cc” (for carbon copy) in the “To” line of emails..

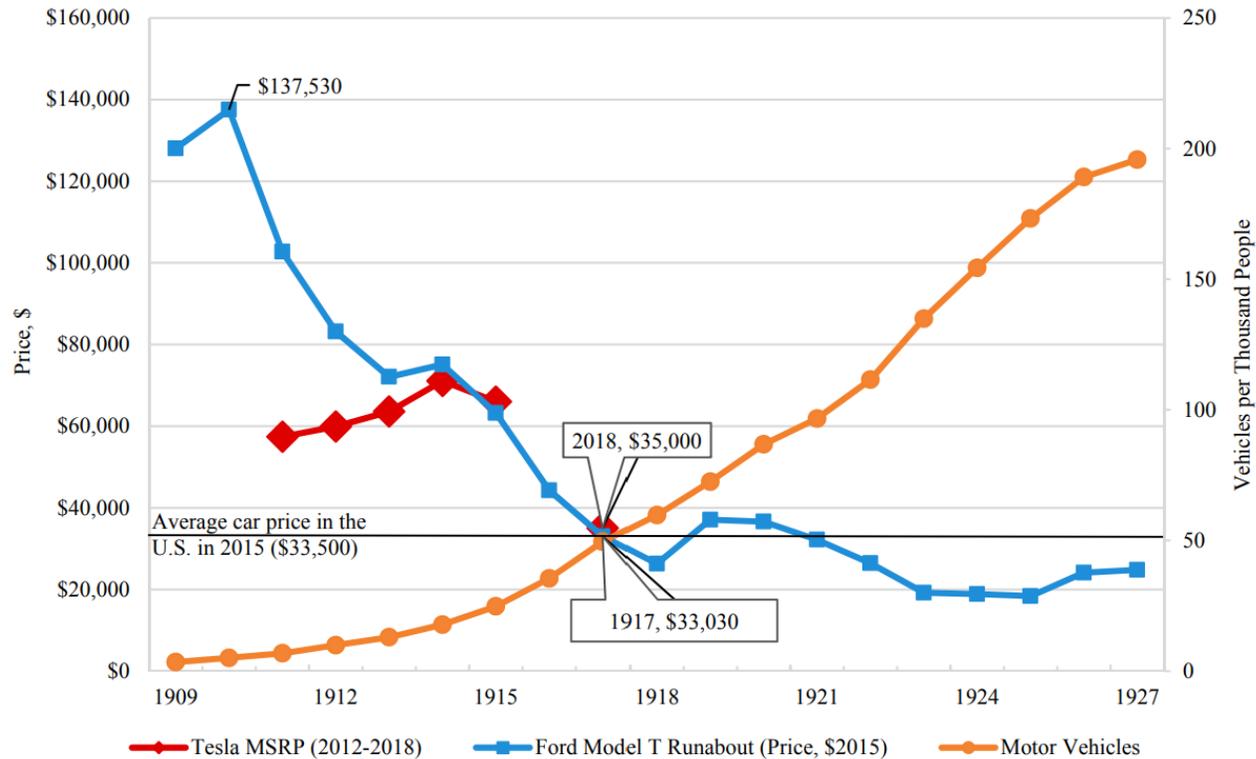


*Large organisations would have a Typing Pool of skilled typists*

**Source:** <https://www.briansmithonline.com/computing/computers/computers-in-offices.html>

# Obstacles and Resistance to Transitions Erode Over Time

Figure 8: Electric and Motor Vehicles Adoption and Prices

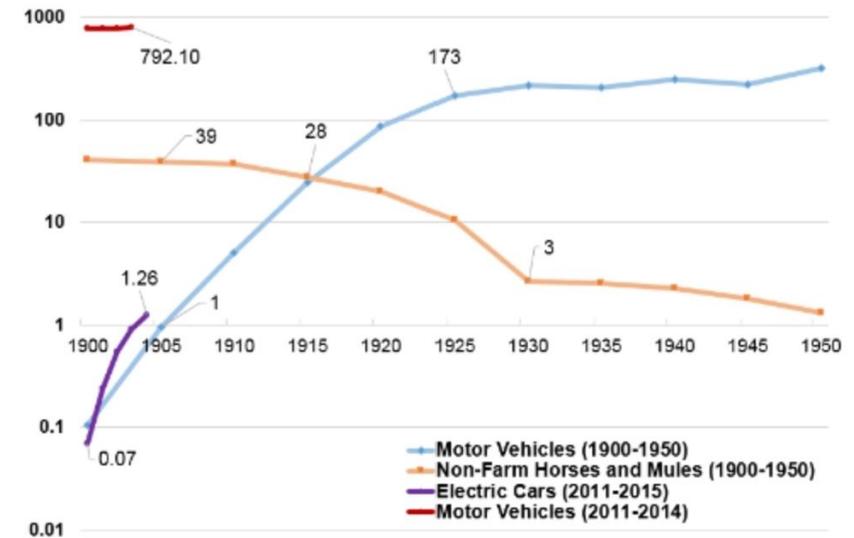


Note: See footnote 22 for the price indexation methodology of Ford Model T.  
 Sources: Collins (2007), FHWA, various years, OECD/IEA (2016), NADA (2015), and Tesla prices: Tesla (2012), Davies (2014), Quiroga (2015), Fleming and Peltz (2016), Randall (2016).

## Beyond horsepower

Just as motor vehicles displaced horses a century ago, electric cars could replace motor vehicles in the next 10 to 25 years.

(per thousand people, log scale)

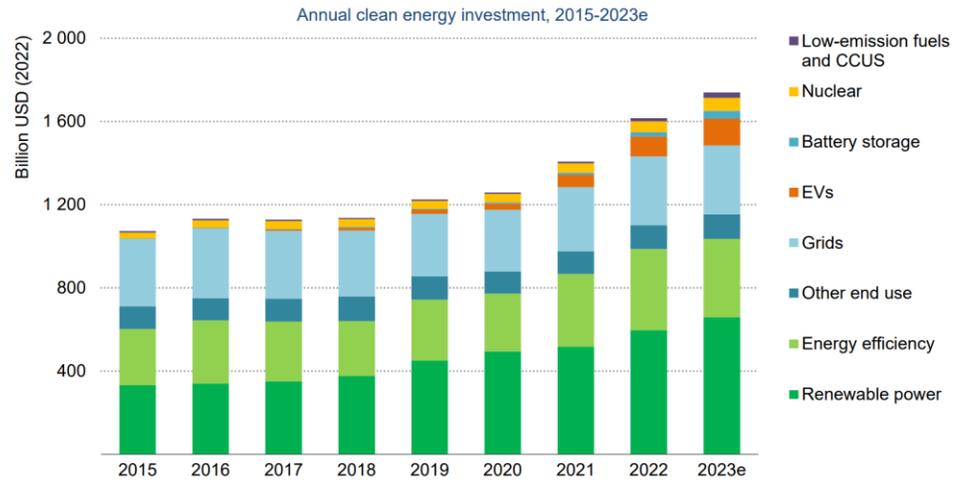


Note: Electric car graph line starts in 2011.  
 Source: Cherif, Reda, Fuad Hasanov, and Aditya Pande, 2017, "Riding the Energy Transition: Oil Beyond 2040," IMF Working Paper 17/120.

Source: *Riding the Energy Transition: Oil Beyond 2040*, Reda Cherif, Fuad Hasanov, and Aditya Pande, IMF Working Paper 17/120 (2017)

# Renewable Energy Growth Coexists with Fossil Fuel Demand

Renewables, led by solar, and EVs are leading the expected increase in clean energy investment in 2023

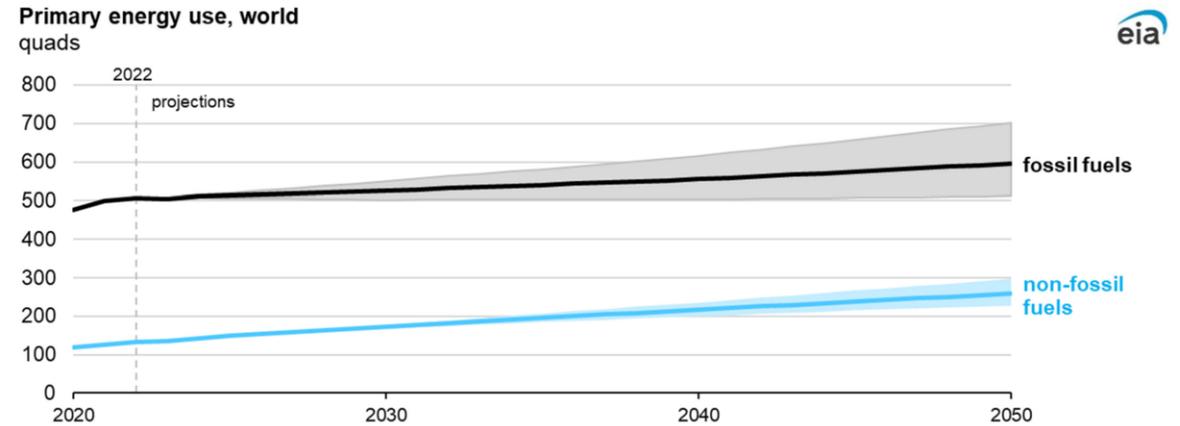


IEA, CC BY 4.0.

Notes: "Low-emission fuels" include modern liquid and gaseous bioenergy, low-emission hydrogen and hydrogen-based fuels that do not emit any CO<sub>2</sub> from fossil fuels directly when used and emit very little when being produced; "Other end use" refers to renewables for end use and electrification in the buildings, transport and industrial sectors. 2023e = estimated values for 2023; CCUS = carbon capture, utilisation and storage; EV = electric vehicle.

“Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed.” (United Nations)

Increasing demand and current policies drive steady growth in fossil fuel energy—and faster growth in non-fossil fuel sources



Data source: U.S. Energy Information Administration, *International Energy Outlook 2023* (IEO2023)  
Note: Each line represents IEO2023 Reference case projections. Shaded regions represent maximum and minimum values for each projection year across the IEO2023 Reference case and side cases. Quads=quadrillion British thermal units.

- COP28 Called for Tripling of Renewable Capacity by 2030
- Incentives in U.S. include:
  - Transmission Access
  - Investment & Production Tax Credits
  - Portfolio Standards
  - Carbon Offsets; Cap & Trade
  - Time of Use Tariffs
  - IRA Buy America Provisions; Labor Rules

# “UNITED” STATES NOT A UNIFORM RENEWABLE LANDSCAPE

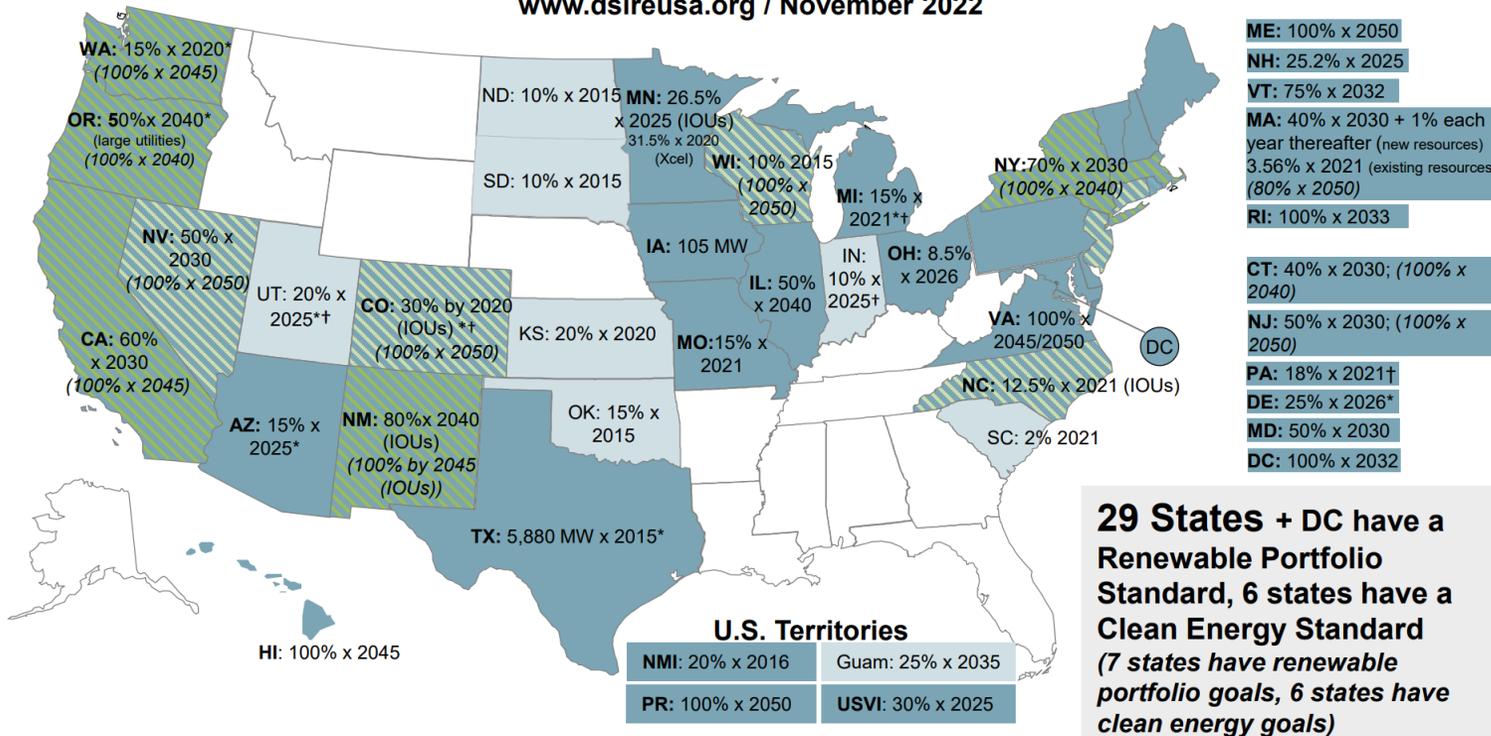
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## Renewable & Clean Energy Standards

www.dsireusa.org / November 2022



■ Renewable portfolio standard   
 ■ Clean energy standard   
 \* Extra credit for solar or customer-sited renewables  
■ Renewable portfolio goal   
 ■ Clean energy goal   
 † Includes non-renewable alternative resources

### Federal Government

- Legislation and Regulations
- Clean Air and Water Acts
- Inflation Reduction Act
  - Tax Credits
  - Other Support
  - Buy American or FTA Partner
- FERC & NERC Jurisdiction

### ISOs, RTOs & ERCOT

- Auctions: 3-year projected demand
- Interconnection Agreements

### State Jurisdiction

- RPS and Other Targets
- Clean Air and Water Acts
- Energy Policies and Commissions
- Public Utility Commissions
- Grid Interconnection Agreements
- Permitting

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# ***Inflation Reduction Act (2022) Incentives***

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- Buy America Provisions Driving Manufacturing Growth
- Community Benefits for Environmental Justice (\$3Bn), Clean Ports (\$3Bn), Pollution Reduction per State (\$5Bn), Greenhouse Gas Reduction (\$27Bn), Transportation to Reconnect Communities (\$3Bn), Climate Smart Agriculture (\$20Bn), Rural Electric Coop Clean Energy Grants (\$9.7Bn), Healthy and Fire-Resistant Forests (\$5Bn), Coastal Habitats (\$2.6Bn), and Philanthropic Support
- Tax Credits now transferrable
  - Makes them Available to Non Profit and New Companies
- Davis-Bacon Act Compliance to Optimize Tax Credits
  - Apprenticeship Ratio Requirements and Penalties
  - Prevailing Wage Requirements, Regulations, and Penalties

# Project Feasibility, Regulatory Challenges & Cash Flows

# Renewable Energy Project Feasibility Highlights

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## Technical

- Technologies evolve and improve through trial and error; risk rises with novelty
- Match technology to site and develop energy production throughout day, month, year

## Economic

- Determine Development Time, Capital Costs, Operation & Maintenance Costs, Risks
- Incorporate Incentives, Determine Revenues from Energy Sold or Saved, Ancillary Services

## Regulatory

- Identify all federal, state, local incentives, regulations, rules, deadlines affecting project
- Develop permitting and compliance roadmap and plans; stabilization clauses

## Legal

- Identify all agreements, parties, deal points, and risk sharing arrangements pertinent
- Negotiate all relevant agreements and terms

## Financial

- Convert all revenues, incentives, capital and ongoing costs into cash flows
- Prepare model; Calculate returns and perform sensitivity around risks; obtain financing

# Wind Energy Production: Statistical Variation of Wind Speed

LCOE\*

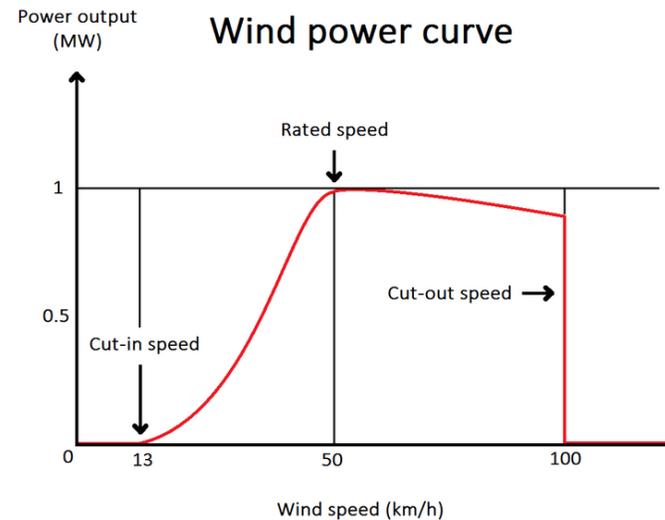
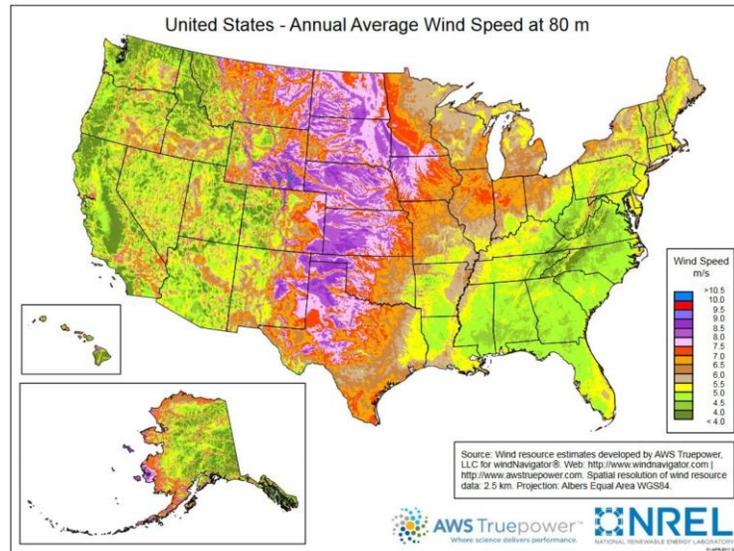
Onshore: \$37.80 per Megawatt Hour, Non-Dispatchable (By comparison, Combined Cycle Dispatchable (fossil fuel) is \$37.05 per MWh)

Power & Energy

**Power Equation:**  $P_{Wind\ Turbine} = C_p P_{Air} = C_p \frac{1}{2} \rho A Velocity^3$

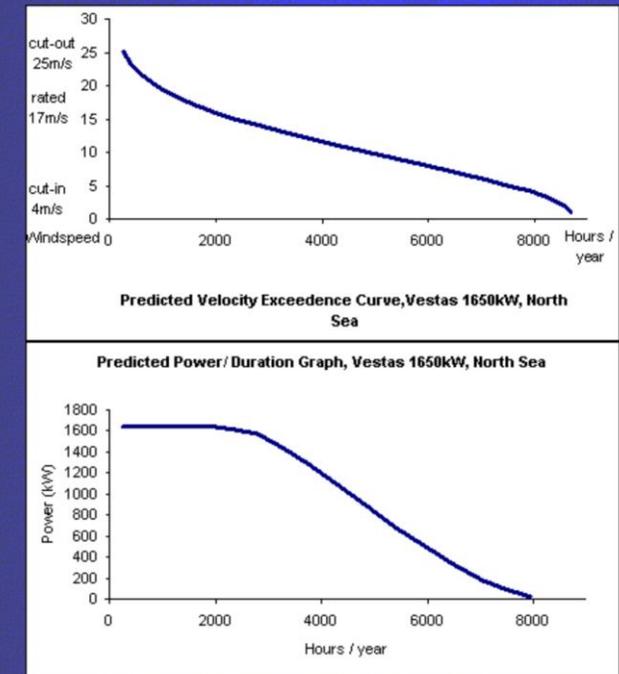
( $C_p$ , Coefficient of Performance, about 0.4;  $\rho$  is air density; A is the Area of capture of the wind blades)

Wind duration curve at site defines resource; energy output based on turbine performance at various wind speeds



Source: [https://energyeducation.ca/encyclopedia/Wind\\_power](https://energyeducation.ca/encyclopedia/Wind_power)

Method of calculation of the wind energy converted



Source: [https://www.esru.strath.ac.uk/EandE/Web\\_sites/98-9/offshore/wind/windmeth.htm](https://www.esru.strath.ac.uk/EandE/Web_sites/98-9/offshore/wind/windmeth.htm)

\* LCOE is the Levelized Cost of Electricity that includes value of tax credits; all figures are from the U.S. Energy Information Agency, 2022 Annual Report

# Solar PV Energy Production: Geographic, Daily, Seasonal Variation

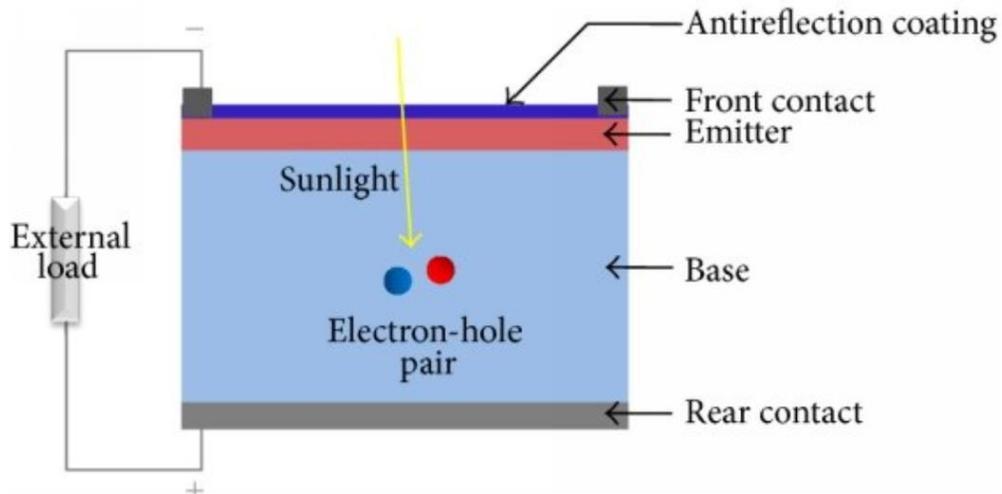
LCOE\*

\$33.46 per Megawatt Hour, Non-Dispatchable  
 (By comparison, Combined Cycle Dispatchable (fossil fuel) is \$37.05 per MWh)

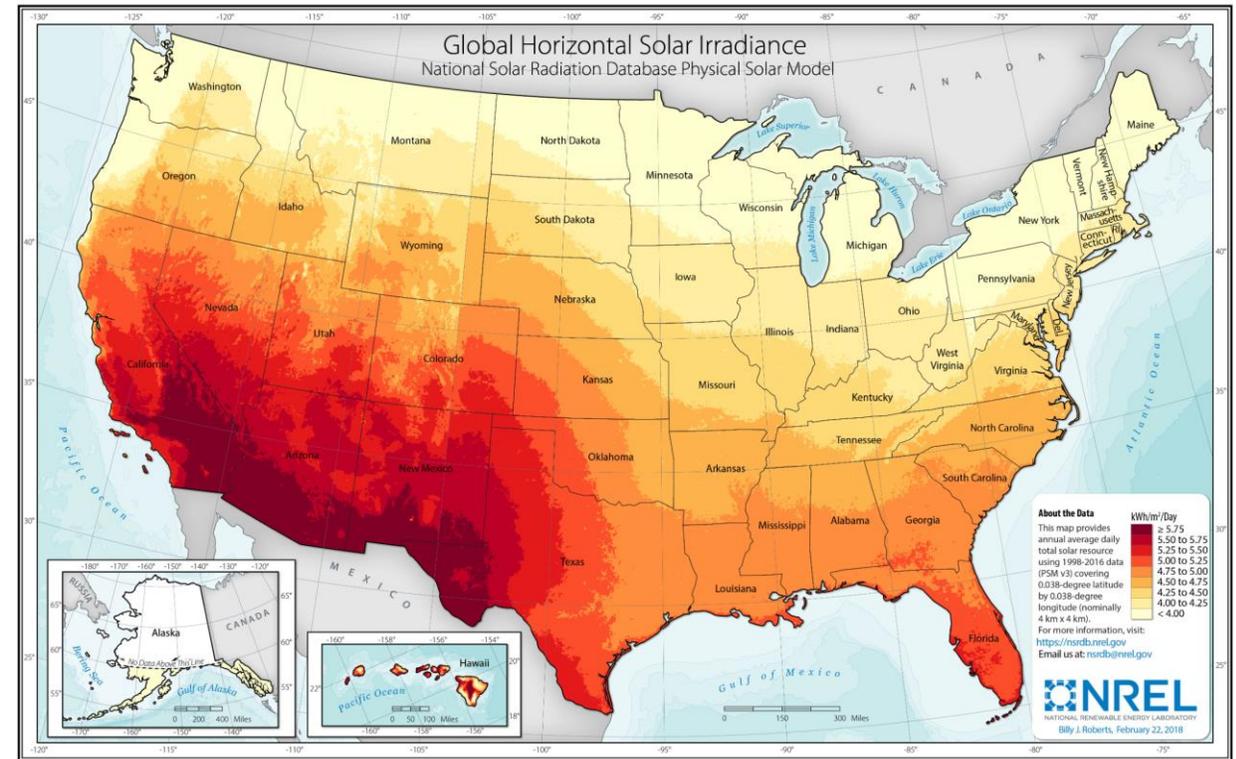
Power & Energy

Resource based on solar irradiance at surface based on latitude, time of day, season.

- PV cell conversion efficiency for crystalline silicon just below 20%
- Newer technologies above 40%



Source:  
[https://www.researchgate.net/publication/307893635\\_Emerging\\_Photovoltaics\\_Organic\\_Copper\\_Zinc\\_Tin\\_Sulphide\\_and\\_Perovskite-Based\\_Solar\\_Cells/figures?lo=1](https://www.researchgate.net/publication/307893635_Emerging_Photovoltaics_Organic_Copper_Zinc_Tin_Sulphide_and_Perovskite-Based_Solar_Cells/figures?lo=1)



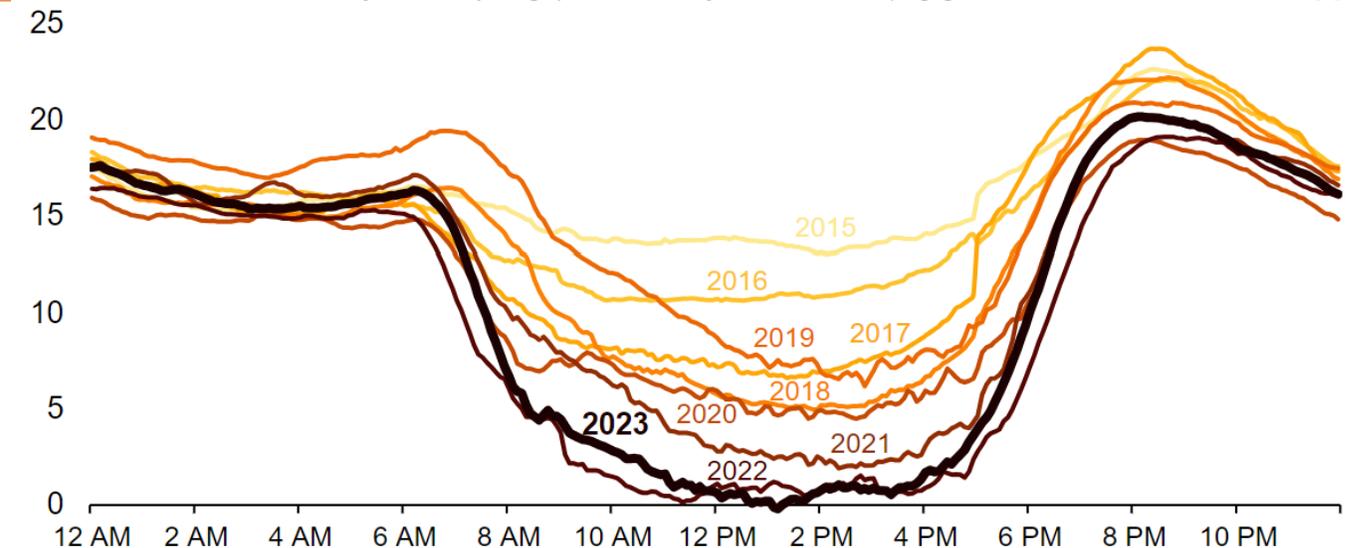
\* LCOE is the Levelized Cost of Electricity that includes value of tax credits; all figures are from the U.S. Energy Information Agency, 2022 Annual Report

# The Regulator's Dilemma and the Value of Energy

- Regulators seek the least cost solution to the provision of electricity on demand with minimal social cost:
  - Manage climate change: Incentivize the growth of renewables; Phase out fossil fuel burning
  - Expand grid capacity to replace fuel in transportation and to manage distributed generation
  - Provide power on demand to energize economic growth and meet consumer expectations for quality
  - Keep the price of electricity as low as possible—utility scale auctions, net metering for residential
- Without storage, renewable forms of energy alone cannot meet system performance objectives:
  - Voltage Regulation and Load Flow
  - Capacity on Demand, Reliability, Reserves

## California's duck curve is getting deeper

CAISO lowest net load day each spring (March–May, 2015–2023), gigawatts



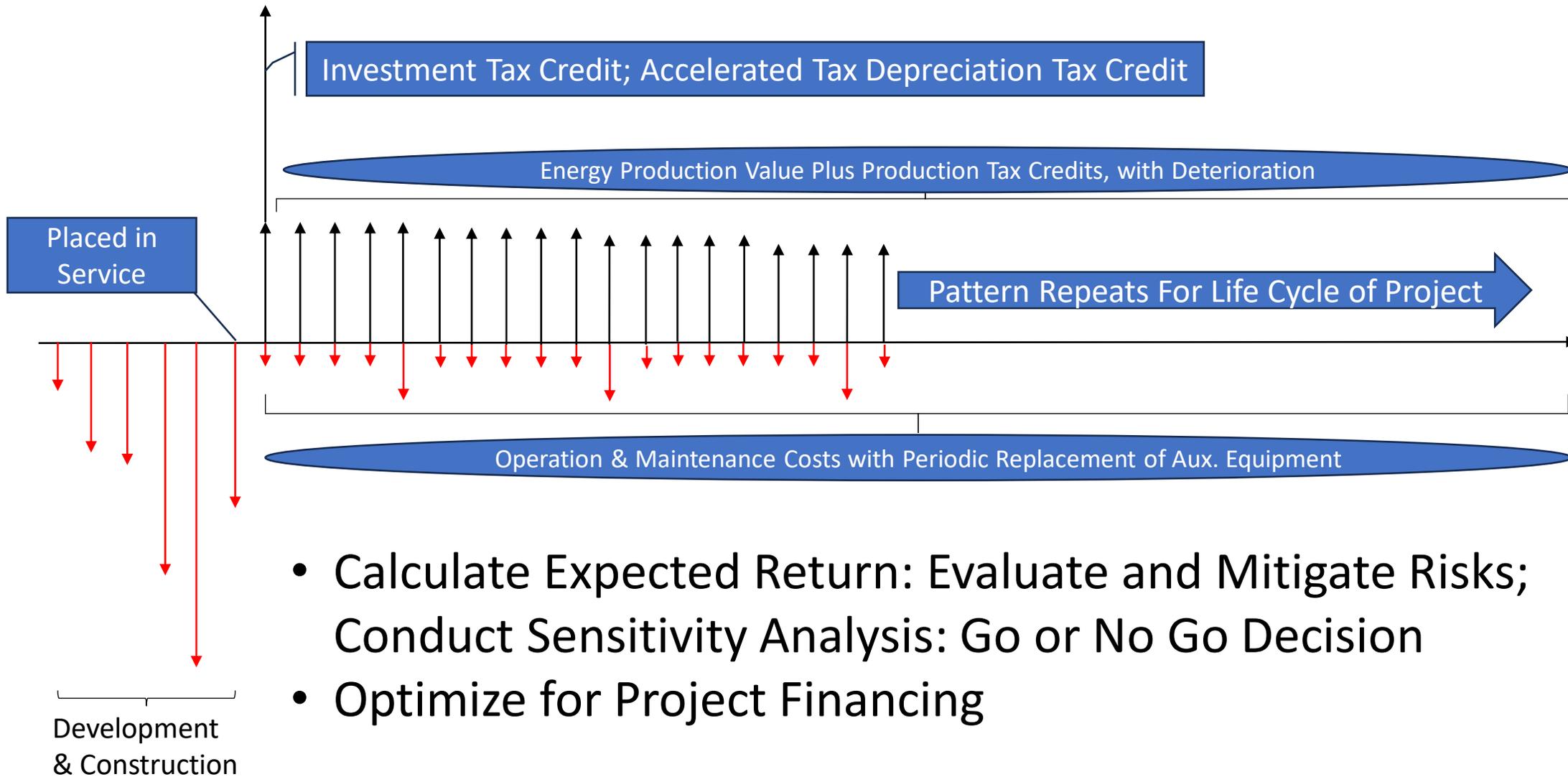
Data source: California Independent System Operator (CAISO)

## Average Retail Price of Electricity (\$/kWh)

	<u>2012</u>	<u>2022</u>
California	\$.1350	\$.2233
U.S. Average	\$.0984	\$.1236

Source: U.S. Energy Information Agency (EIA)

# Renewable Energy Projects Illustrative Cash Flow Diagram



# Deal Structure and Financing

# GREEN FOR GREEN: FINANCEABILITY IS ABOUT CASH FLOW FOR ENERGY

## High ESG and Strategic Fit

- Hold Competitive Advantage
- Shareholder ESG Goals
- Carbon Footprint Lowered
- Energy Security

## Technology Fit

- Capacity and Energy
- Offsets Peak Demand
- Operations Proven
- Longevity and Degradation Known



## UPDATE RATIONALE & ADD FINANCING

## High Market Need & Returns

- Robust growth next 30 years
- Fulfills Renewable Portfolio Standards
- Economics show mid teens ROI or better

## Risk Assessment

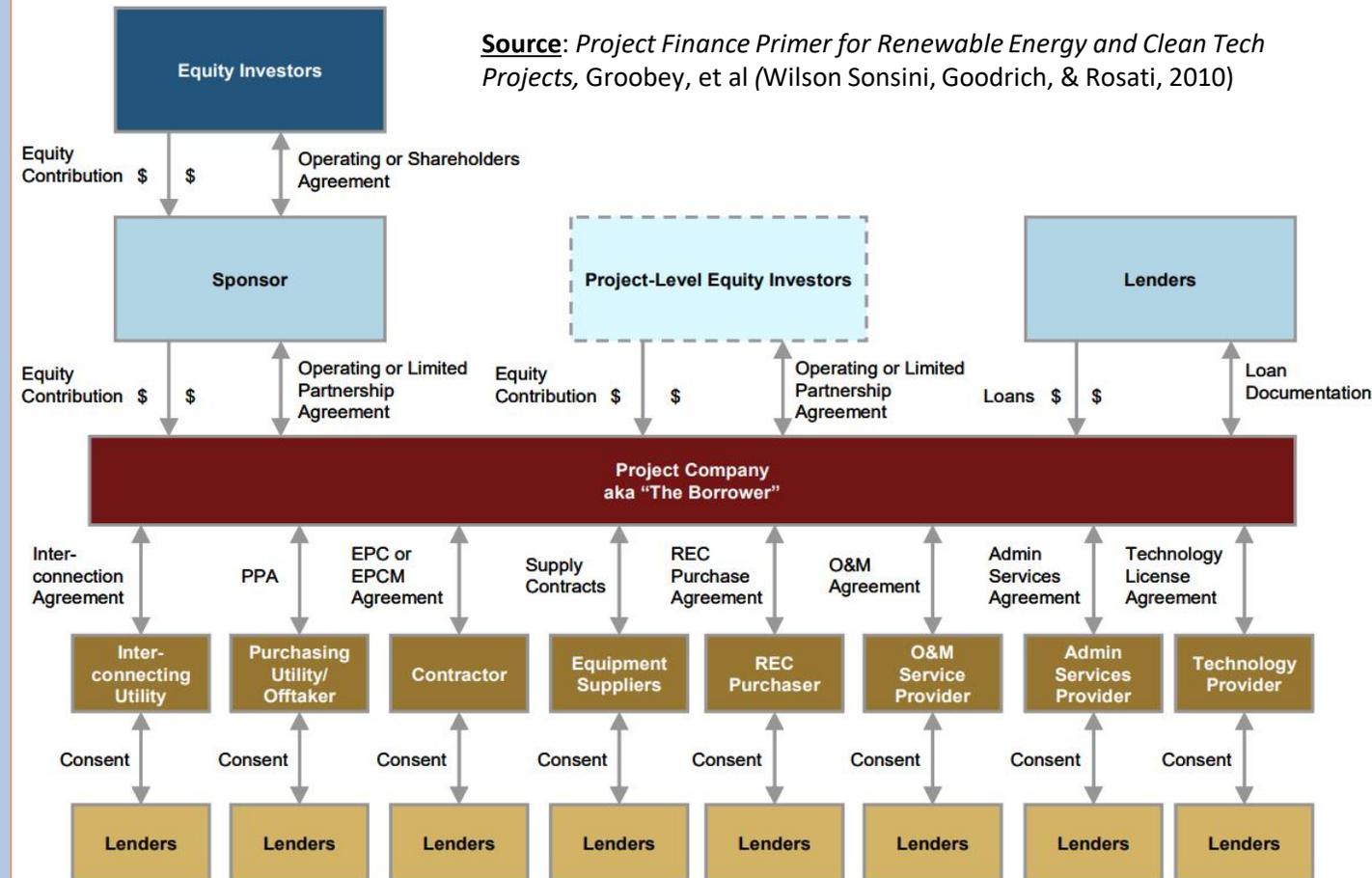
- Institutional Arrangements
- Production Uncertainty
- Partners' Due Diligence
- Construction Risk Mitigation
- O&M Phase
- Pre Flip and Flip Stage

# Renewable Project Deal Structure

## Key Characteristics

- Project Company (NuCo) set up as a Special Purpose Entity (SPE):
  - Holding Co. for sponsor, debt, and other equity contributions
  - Viability depends on project revenues and returns
  - Sponsors do not want to carry debt
- Non-Recourse or Limited Recourse Financing with Repayment from Project Cash Flows
- Lender becomes owner in foreclosure so all agreements must be aligned to allow that transfer of rights (Consent)
- Investment Tax Credits and other tax incentives (accelerated depreciation) which used to require a tax equity partner can now be transferred
- Risk allocation and aligned agreement terms and conditions must address lender terms and due diligence concerns

## Typical Project Finance Structure



# U.S. DOE “FINANCING BASICS FOR RE PROJECTS”

## Key Project Documents:

- Power Purchase Agreement (PPA)
- Energy Performance Contract
- Energy Off-take Agreement
- Construction Contract
- Warranties
- O&M Agreement
- Interconnection Agreement
- Leases and Easements
- Loan Agreements, Guarantees & Financing Docs
- Regulatory and Environmental Docs and Approvals
- Incentive Agreements
- Etc.

### Socio-Economic Benefits and Costs

- Indirect Benefits/Costs of Project
  - Economic Externalities
  - Equity
- Opportunity for Public/Private Partnerships
- Vocational Training
- Construction Jobs
- O&M Jobs
- FLIP SIDE:
  - NIMBY, environmental impacts, supply chain social costs

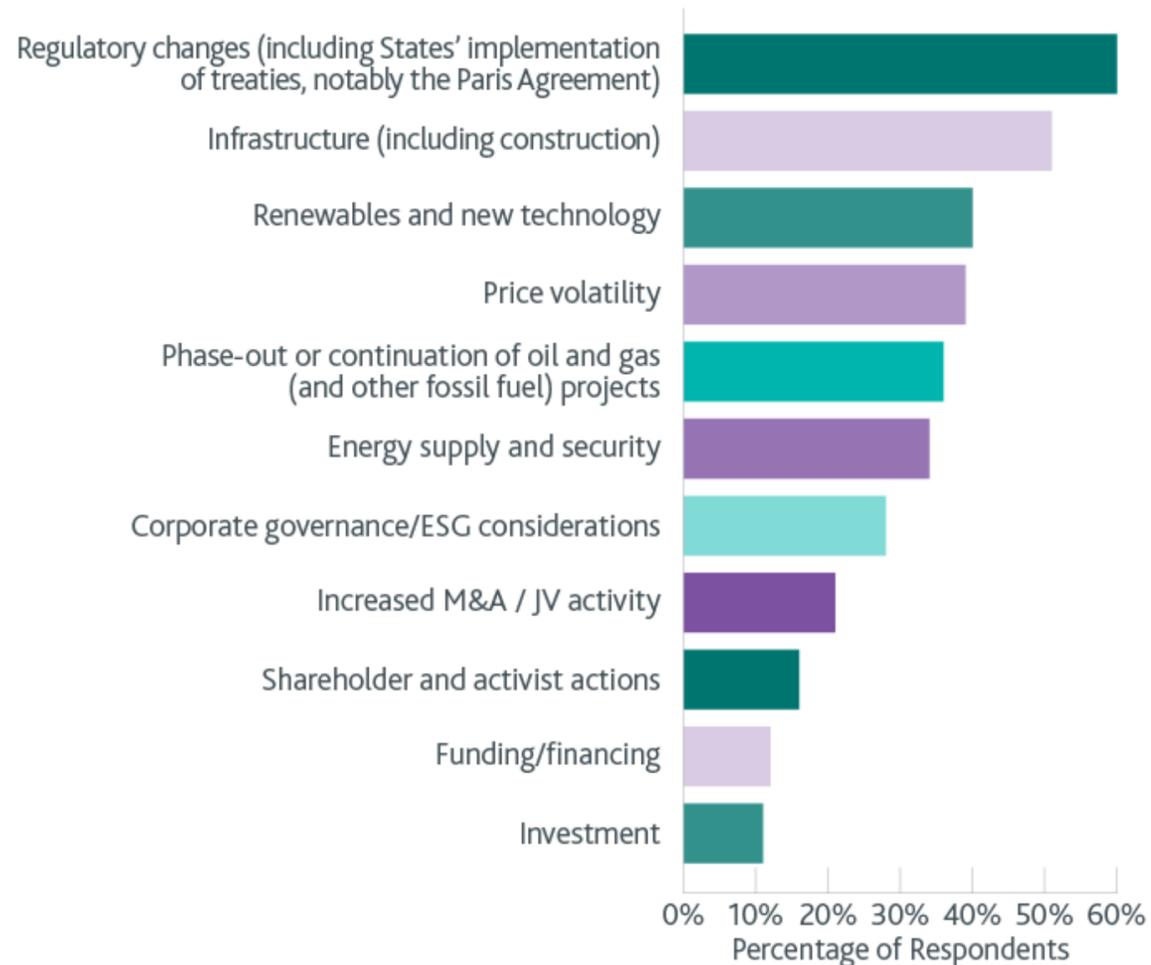
# Potential Disputes

# WHAT COULD GO WRONG? FOLLOW THE MONEY

<u>Example of Agreement</u>	<u>Parties</u>	<u>Consideration</u>	<u>Dispute Risks</u>
Power Purchase Agreement (PPA)	Special Purpose Entity (SPE) for Project and Companies taking the power (Grid/Host)	\$\$ for energy, maybe for capacity, and for lower carbon footprint	<ul style="list-style-type: none"> <li>• Lack of financing</li> <li>• Price/Value shifts</li> <li>• Breach or Default</li> </ul>
Host Agreement	The SPE and the entity leasing the land, perhaps using some of the power	\$\$ for energy, maybe for capacity, and for lower carbon footprint	<ul style="list-style-type: none"> <li>• Price/Value shifts</li> <li>• Change of ownership</li> <li>• Breach or Default</li> </ul>
Interconnection Agreement	The SPE and the interconnected utility or grid operator	Approval to interconnect for provision of energy, power, ancillary services	<ul style="list-style-type: none"> <li>• Project default</li> <li>• Permitting Delays</li> <li>• Ancillary Services</li> </ul>
Engineering, Procurement, and Construction (EPC)	The SPE and the company that does the design and build of the project	\$\$ for a completed project per the terms of the EPC contract	<ul style="list-style-type: none"> <li>• Design or build problems</li> <li>• Performance Delays</li> <li>• Breach or Default</li> </ul>
Operation & Maintenance	The SPE, the EPC, or another entity	\$\$ for operating, managing and maintaining the site	<ul style="list-style-type: none"> <li>• Production Problems</li> <li>• Production Deterioration</li> <li>• Breach or Default</li> </ul>

# TRANSITION TO RENEWABLES: DISPUTE LANDSCAPE

Question 17: What changes arising from the energy transition are likely to give rise to disputes?



## Possible Mitigation

- Regulatory and price stabilization clauses
- Qualified EPC; Permitting; Supply Chain
- Proven technology
- Revenue security in PPA
- Stranded costs and transition resistance
- Capacity Dispatch; Resource Access
- Values match
- Partner due diligence, commitment, quals
- Genuine Green Performance KPIs
- Project cash flows and gurantees
- Returns and patience

# ***Sample IRS Rules Under the IRA:***

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- IRS Regulations on Transferring Tax Credits:
  - <https://www.irs.gov/newsroom/irs-opens-free-ira-and-chips-pre-filing-registration-tool-for-organizations-to-register-to-monetize-clean-energy-credits>

“Taxpayers who intend to make an elective payment or credit transfer election must earn the credit, which means they must make a tax credit investment or undertake tax credit production activities to earn a credit that qualifies for the elective payment election or can be transferred.  
The taxpayer must complete the pre-file registration process to receive a registration number. The registration number must be included on the taxpayer's annual return as part of making a valid election. To facilitate this, the IRS has created the [IRA/CHIPS Pre-filing Registration Tool](#).”
- IRS Credits and deductions under the Inflation Reduction Act of 2022
  - <https://www.irs.gov/credits-and-deductions-under-the-inflation-reduction-act-of-2022>
- Domestic Content Bonus Credit Guidance under Sections 45, 45Y, 48, and 48E: <https://www.irs.gov/pub/irs-drop/n-23-38.pdf>

# SPAIN'S CASE OF INCENTIVES & HIGH ELECTRICITY PRICES

## Spain sued over green incentives

International investors have sued Spain more than 50 times since the country renege on renewable energy incentives meant to boost construction of solar and wind power projects.

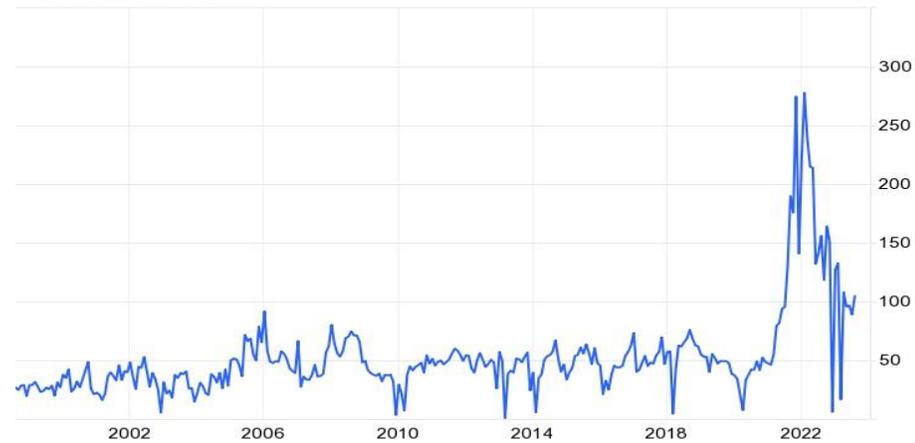
### Investor disputes against Spain since 2011

● Renewable energy ● Other investments



Source: UNCTAD

Spain Electricity Spot Prices



source: tradingeconomics.com



## Regulatory Timeline

- 1997: Special Regime Electricity Sector Law (Law 54/1997)
- 2004/2007: Generous Feed-In Tariff with 25-year duration contracts
- 2010: Reforms to terminate FiT after 30 years, limit operating hours, charge to access grid, and tax on energy
- 2012: Moratorium on Solar PV

Source: Kristensen, et al., *Economic and Financial Issues in Renewable Energy Arbitration*, Lexology citing 2023 European Arbitration Review.

**Claims:** Under Energy Charter Treaty for immutable economic rights based on claimants reasonable reliance on inducements and promises of government.

**Cases:** *Eiser Infrastructure Ltd et al v. Kingdom of Spain (Eiser)*; *Charanne BV and Construction Investments SARL v. Kingdom of Spain (Charanne)*.

**Issues & Holdings:** Expectation of stable regulatory regime versus reasonable return to investors with the cost of capital as the benchmark. *Eiser* did not expect risk of drastic changes to regulatory regime; whereas limitations faced by *Charanne* were “not irrational, arbitrary, or contrary to the public interest.” IRR compared to WACC.

**Damages:** Discounted Cash Flows; compare IRR to promised return, or to WACC.

Source: Kristensen, et al., *Economic and Financial Issues in Renewable Energy Arbitration*, Lexology citing 2023 European Arbitration Review.

# CONCLUSIONS: KEEPING IT ALL TOGETHER

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- Incentives usually make or break project economics
  - Stabilization clauses in event of material changes in regulations
- Equity risk high up front; newer technologies add to risk
- Bankers backing the project financing will want security guarantees
- Underwriters expect all contracts in final form, air tight & consistent
- Bankers demand “Consent Clauses” for assignment in each Agreement
- Interconnection Agreement and permits not a given—expect delays
- Grid operators expect steady progress or project will lose its place in line
- Separate contracts need mutually reinforcing provisions
- Arbitration as preferred dispute resolution mechanism due to complexity
- Multiple areas where audits could be required