



Ariel Green

# *The Technology Performance Insurer*

Overview

November 2023



LLOYD'S

Underwriters



# The Technology Performance Insurer

## Ariel Green is a Division of Ariel Re, Lloyd's of London Syndicate 1910

- Leads Lloyd's consortium to insure technologies powering the transition to Net Zero
- Not a broker or MGA; issues policies directly

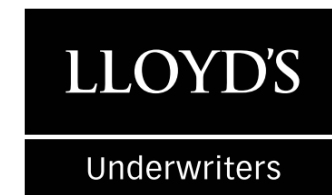
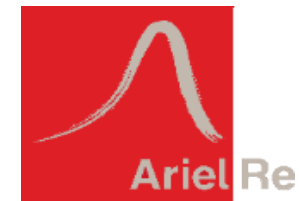
## Offering Capacity up to \$150 million Per Risk

- Focused exclusively on clean energy Technology Performance Insurance (TPI)
- Issuing long-term, non-cancellable output and performance guarantee backstops policies
- In-house expertise to evaluate existing and emerging technologies and underwrite complex projects

## Investment Grade Policies

- Financially strong and stable, written by Lloyd's of London
- For commercial clients with a minimum total sum insured of \$20 million
- Written 160+ policies for 30+ technologies across 5 continents

<b>A</b> Excellent A.M. Best	<b>AA-</b> Very Strong Fitch Ratings	<b>AA-</b> Very Strong Kroll Bond Rating Agency	<b>A+</b> Strong Standard & Poor's
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# The Ariel Green Way



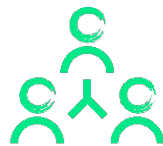
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## Expertise

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We bring **Deep Expertise** from energy industry, insurance and project finance needed to effectively underwrite clean energy projects.

- Senior leadership pioneered TPI category
- Team members have collectively 150+ years of industry experience



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## Collaboration

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Our experts work **Collaboratively** with project teams to understand and evaluate the unique technical and financial challenges of individual projects.



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## Custom Solutions

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The result is **Customized** risk management solutions that best situate projects to secure financing, get built, and achieve long-term operational success.



# Ariel Green Team



## **Jan Napiorkowski – *Managing Director***

Pioneered TPI category  
MSc Physics, MBA



## **Fraser Blunt – *Leader Europe***

Senior Energy Executive  
BEng CEng Electrical Eng., Adv. Mgmt. Program



## **Christine Sun – *Leader Greater China***

Underwrote 130 GW of PV Panels  
BEng Electrical Eng., Adv. Mgmt. Program



## **Frank Petrocelli – *Sr. Risk Advisor***

30+ Years Process Development Experience  
PhD in Chemical Engineering



## **Kit Chu – *Solar PV Lead***

Lead PV Underwriter  
MSc Environmental Eng., MBA



## **Tad Dritz – *Bioconversion & Hydrogen Advisor***

20+ Years Cleantech R&D and Deployments  
MBA/MS Enviro. Studies, BS Chemical Eng.



## **Moche Ning – *Underwriting Assistant***



## **Jamie Daggett – *Energy Storage & Fuel Cells Advisor***

Involved with 10+ GWh Energy Storage  
MS System Eng., BS Mechanical Eng.



# Unmatched Experience



130+  
GWp

## Solar PV Modules

Backstop manufacturer's warranties

Applicable to both brownfield and greenfield projects

For ground-mounted, rooftop and floating solar



200+  
MW

## Fuel Cell & Electrolyzers

Backstop electrical and thermal performance warranties

Support for long-term service agreements (LTSA)

Project specific or full production (balance sheet protection)



1.1+  
GW

## Bioconversion

Biofuels, bioplastics, waste-to-energy

Startup repair – commissioning risk cover in form of repair cost

Long-term performance – guarantees project output and quality of products over term of debt



5+  
GW

## Solar Projects & Systems

Performance ratio or MWh guarantee (includes irradiance risk)

For large utility installs, or C&I and residential portfolios

Applicable to: EPC, O&M, utility partners, and asset managers



5+  
GWh

## Energy Storage

BESS (Li-ion, others), pumped hydro, CAES, innovative concepts

Backstop for defects, energy capacity, RTE and availability

Coverage from onsite commissioning and up to 15 years



300+  
MW

## Other Technologies

Carbon capture utilization and storage (CCUS)

Hydrogen production and applications

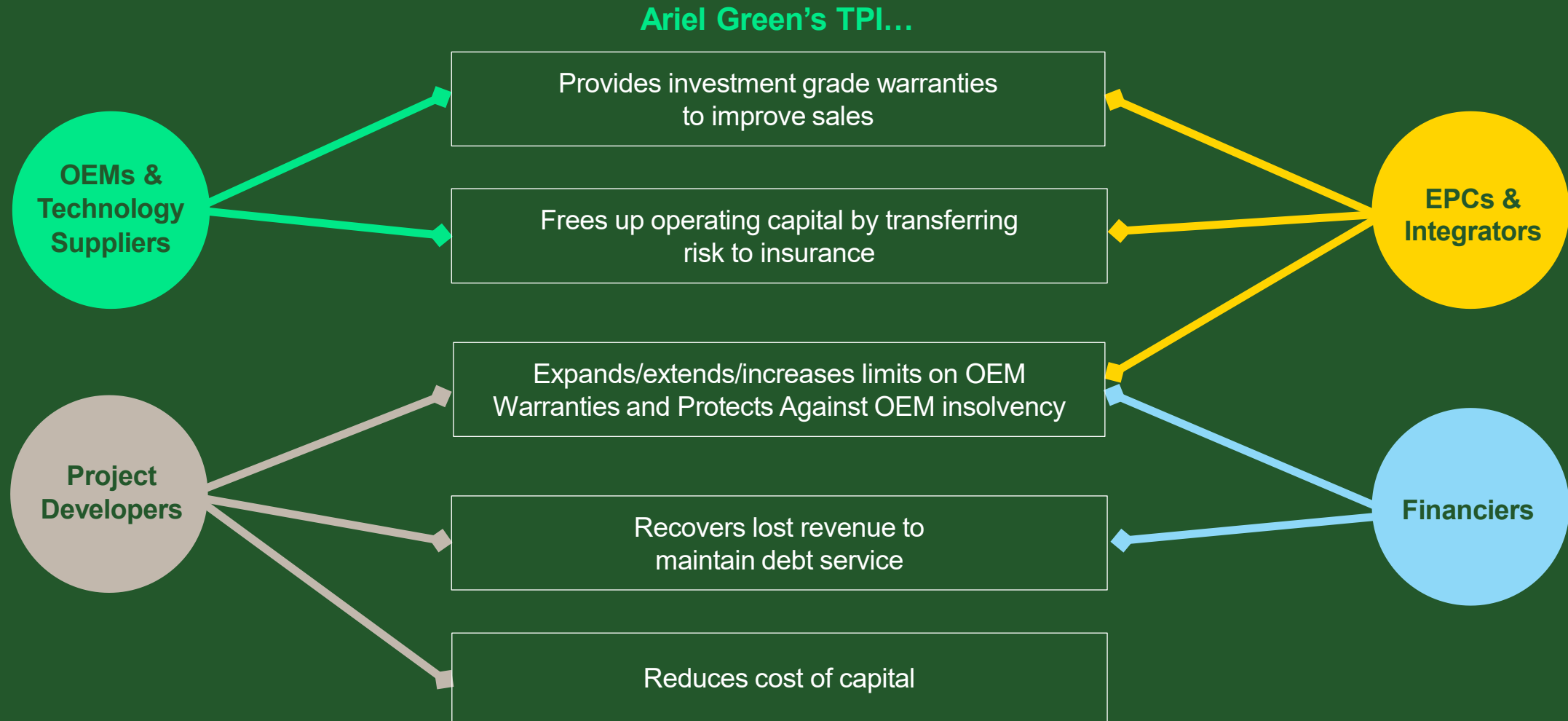
Energy efficiency

Desalination & water treatment

Electric vehicles



# Benefits to Clean Energy *Stakeholders*





# Technology Performance Insurance

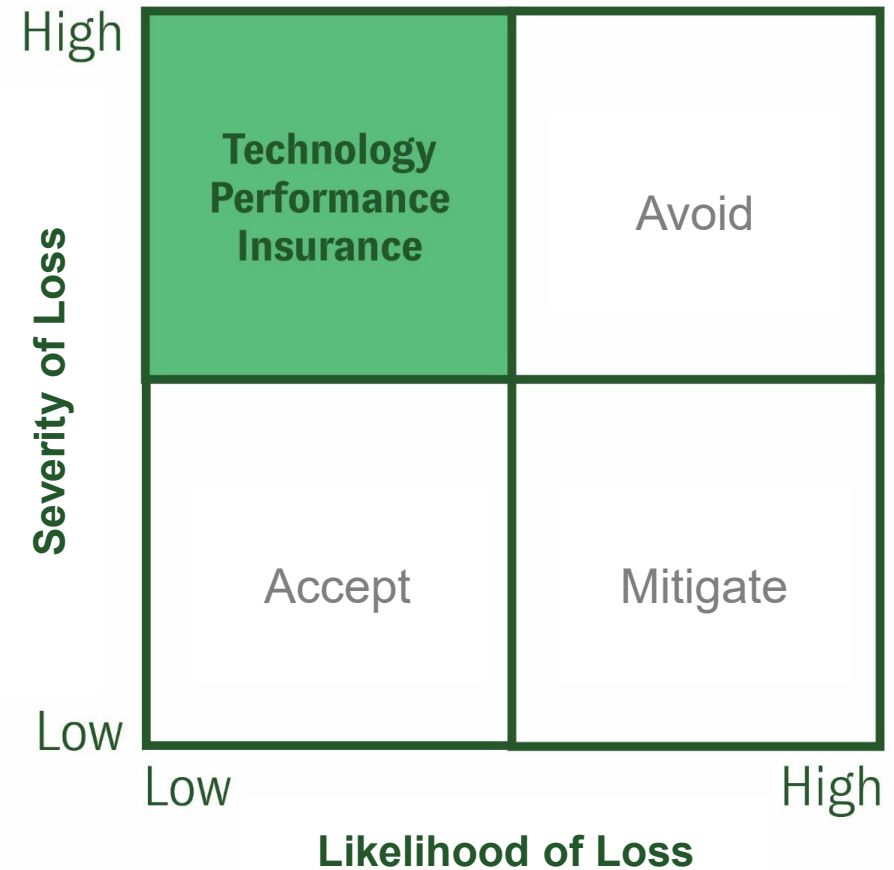
## Mitigates 'Technology Risk'

- Named peril policies
- Generally, for protection against low likelihood, high impact events
- Complements traditional insurance coverage

## Enables Financing

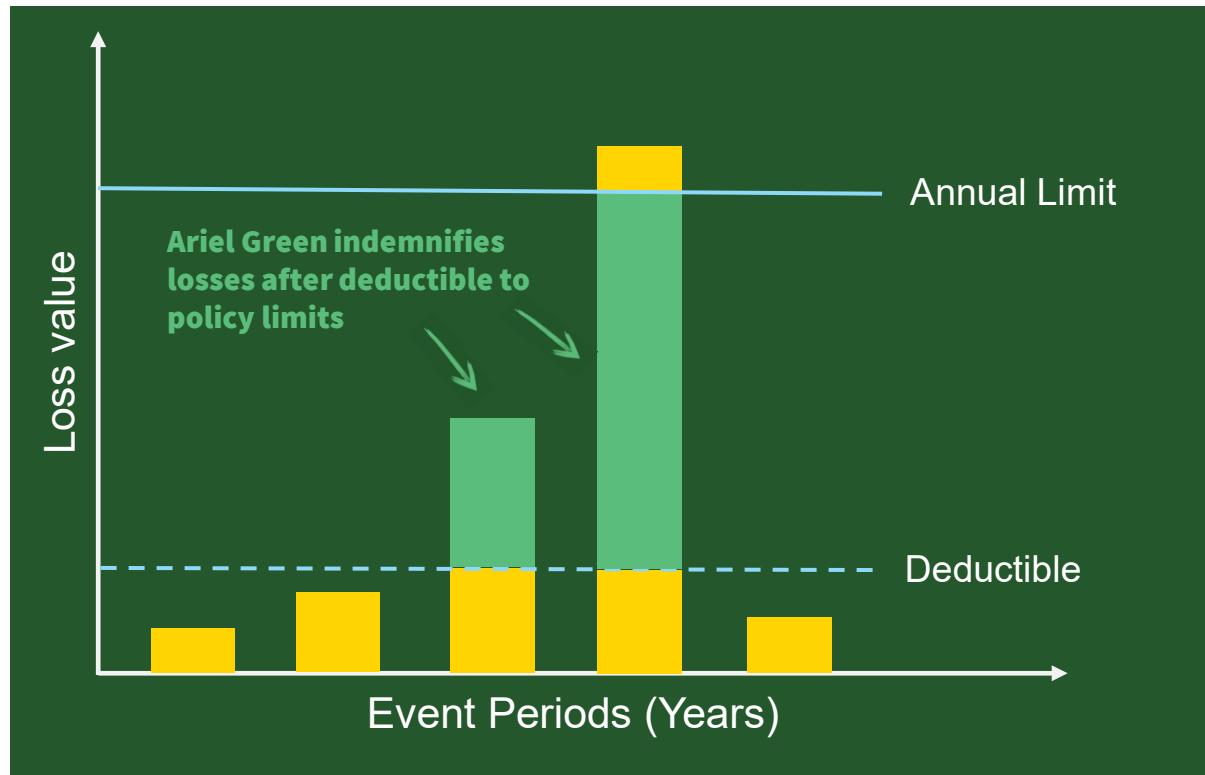
- Bankability & Insurability – Allows projects to secure financing from low-cost sources
- Avoids additional cost associated with funding early deployments
- Attracts Equity Investors – increased leverage improves equity return

## Ariel Green Works Collaboratively with Clients to Strategically Apply TPI





# Performance Guarantee Backstop



## Covers Performance Shortfalls and Equipment Repair/Replacement in Event of Underperformance

- Loss above deductible is covered

## Named Perils Policy Directly Address 'Technology Risk'

- Defective or faulty manufacturing process
- Defective or faulty materials

## Available to Technology Providers, Component Suppliers, Project Developers and Asset Owners

## Project/Portfolio Level or Corporate Liability Backstop

### Typically Applies To:



Solar PV



Energy Storage  
(BESS)



Fuel Cells &  
Electrolyzers





# Long-term Output Cover

## Guarantees Output at Attachment Level (Required Output)

- Typically covers debt service
- Can include operating cost

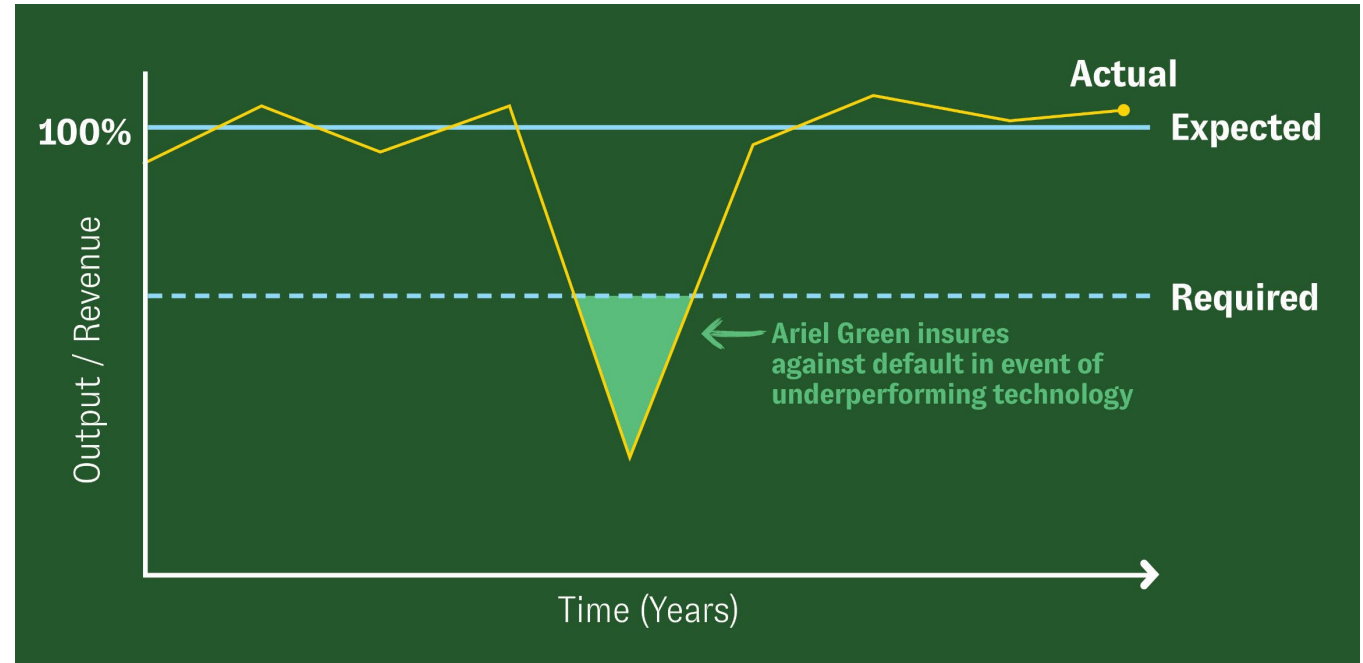
## Named Perils Policies Directly Address 'Technology Risk'

1. Defective, faulty, or insufficient process
2. Defective or faulty material
3. Defective, faulty, or incomplete engineering
4. Insufficient operating and maintenance procedures

## Long-term, Non-cancelable Policies

- Coincident with debt term (up to 15 years)

## Policy Limit up to \$150 million



## Typically Applies to:



Solar



Bioconversion



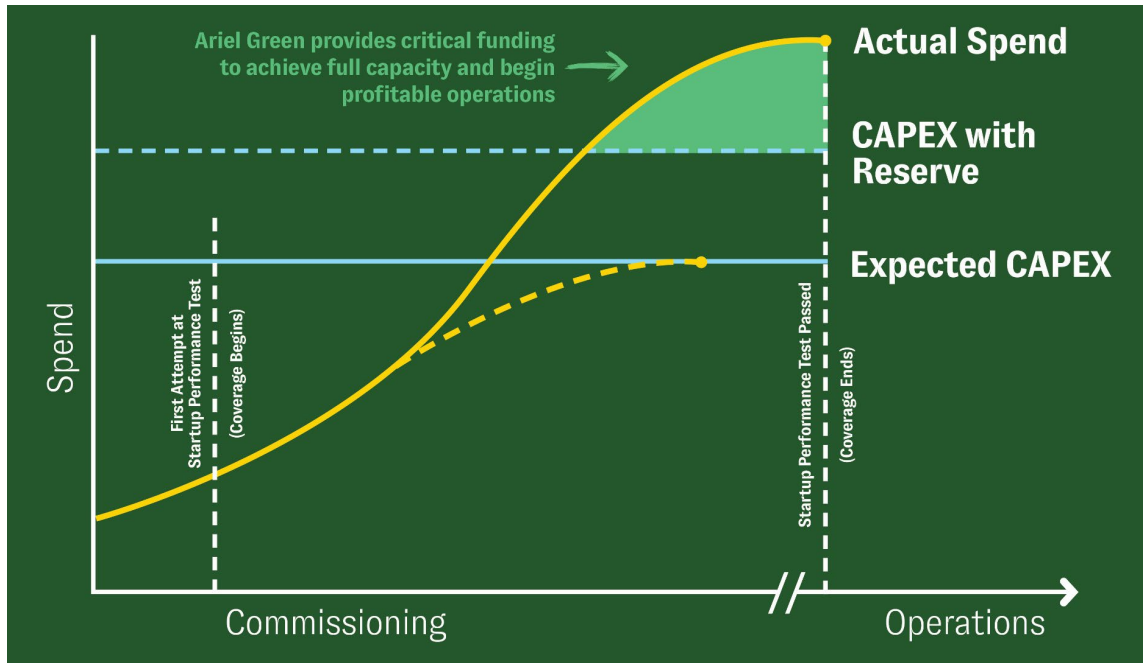
Fuel Cells &  
Electrolyzers



Energy Efficiency



# Startup Repair Cover



**Pays Repair Costs to Pass Startup Performance Test at Expected Output**

**Claims are Paid in Excess of Deductible Expressed as % of Expected CAPEX**

**Provides Critical Funding to Enabling Start of Profitable Operations**

**Named Perils Focused on 'Technology Risk'**

1. Defective, faulty, or insufficient process, materials or engineering
2. Insufficient operating and maintenance procedures

**Only Available with Long-term Output Cover**

**Typically applies to:**



Bioconversion



Desalination



Energy Efficiency



# How We Work

## Initial risk assessment

- 1. NDA**
- 2. Questionnaire**
- 3. Document Request**
  - Technology information
  - Operating history
  - Financial projections
  - Warranty language

## Non-binding Indication (NBI)

- 1. Coverage Options**
  - Deductibles and/or attachment level
  - Policy & annual limits
- 2. High-level Terms**
  - Premium
  - Duration
  - Liability Triggers
- 3. Clarifying Questions**

## Letter of Intent (LOI)

- 1. Formalizes NBI**
  - And relationship with Ariel Green
- 2. More Detailed Terms**
  - Key definitions
  - Policy structure
  - List of exclusions
- 3. Technology Assessment Fee**

## Binding Offer

- 1. Detailed Underwriting**
  - Review project and technology details
  - Pilot plant or factory visit
  - Risk modelling
- 2. Binding Offer of Insurance**
  - Final structure
  - Final terms

## Policy

- 1. Negotiate Language**
- 2. Gather Appendices**
  - Projections
  - Technology/project specific documentation
  - Feedstock, offtake specifications
- 3. Execution**
  - Depending on jurisdiction, may be placed through reinsurance



# *Protecting the Technologies that Protect the *Environment**

Let's talk about your project. Contact us at:

[www.arielgreen.com](http://www.arielgreen.com)