

NSG

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NSG Group Update to 6th Annual CdTe PV Workshop

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Outline

- Introduction to NSG
- Supply into the Solar Sector
 - NSG TEC™ by On Line Coatings
- Journey to Carbon Neutrality

NSG Today

- One of the world’s largest manufacturers of glass and glazing
- Principal operations around the world, with sales in over 100 countries 27 float lines worldwide
- Approximately 26,000 employees globally
- Consolidated Revenue JPY600.6bn (2022/3)

Contributing to society with a variety of glass products

Architectural



↑ Optiwhite™ used for Midtown Hibiya in Tokyo



↑ Glass for electrochromic applications
Courtesy of View Inc.



↑ Glass for thin film Solar panels
Courtesy of First Solar Inc.



↑ Antiviral glass

Automotive

- Windshields with head-up display (HUD)



Courtesy of General Motors

- Lightweight laminated glass
- Infrared reflective solar control coating



- Glass compatible with ADAS*



Technical Glass



↑ SELOC™ Lens Array



↑ Metashine™



↑ Antibacterial and antiviral coated glass



↑ Glass cord



↑ Super Glass Paper™

NSG and Solar Activities

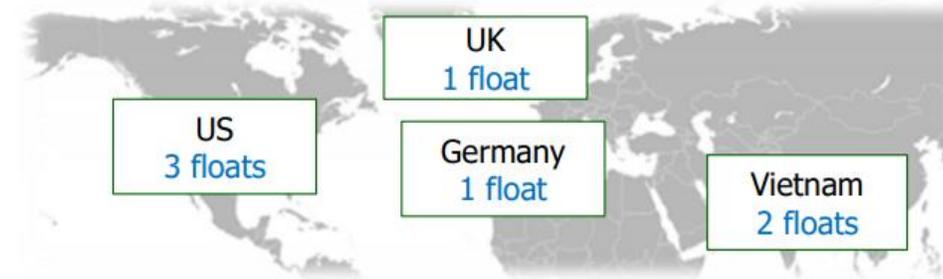
Acceleration of the shift from commodity glass to value-added products

Strengths and Functions of Online Coating

- NSG’s proprietary technology
- Seven float lines with online coaters globally
- Thin, uniform metallic oxide film deposited over glass while being formed inside the float bath
 - Cost competitive, available in large size
 - Durable and versatile, suitable for further processing and various applications

Function	Use
Conductivity	Heating glass
	Transparent conductive film for touch panels
	Transparent conductive film for thin film solar panels
Infrared reflection	Heat insulation glass
	Heat blocking glass
	Low e glass

Float lines with Online Coaters



↑ Glass for thin film Solar panels
Courtesy of First Solar Inc.



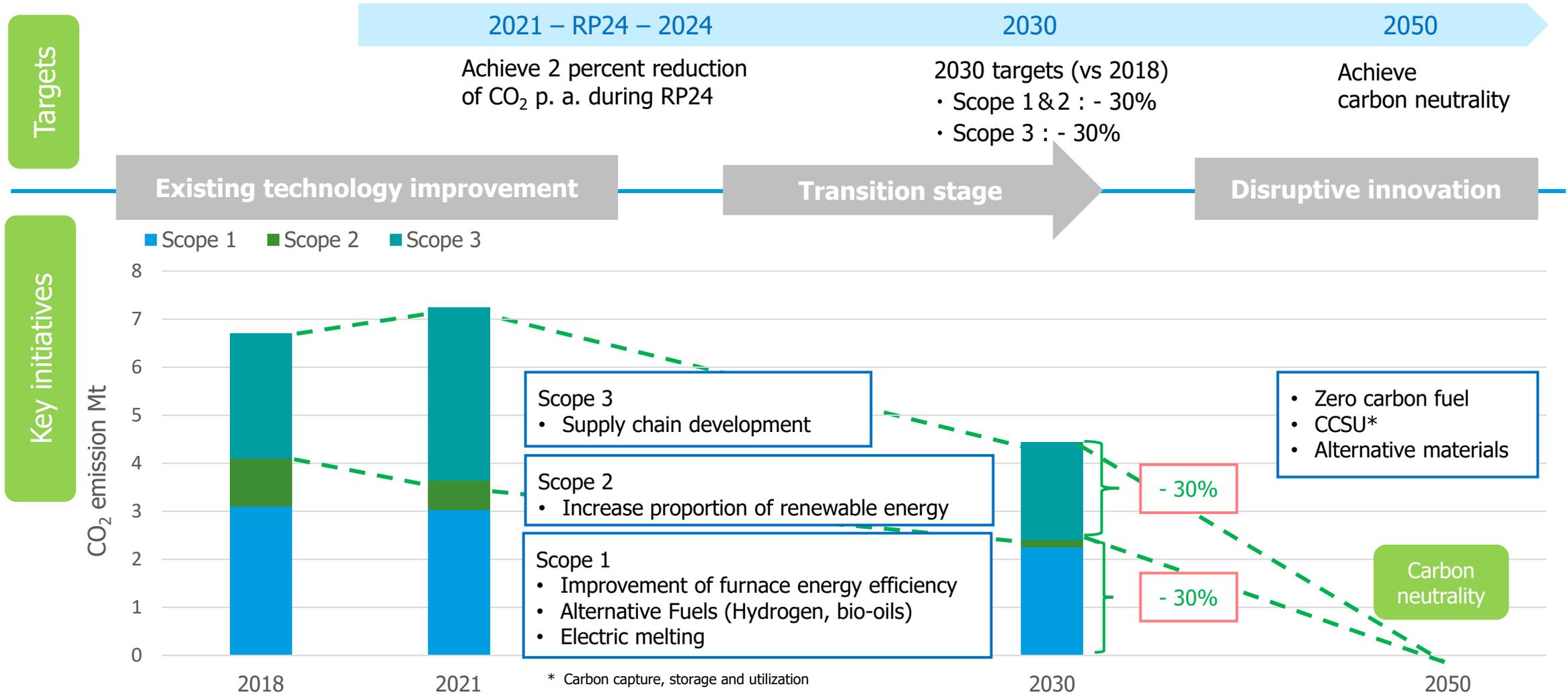
↑ Glass for electrochromic applications
Courtesy of View Inc.

Recently Announced - Installation of online coating capacity to existing float furnace in Malaysia to produce Solar Energy Glass – Operational 2024

Roadmap to Carbon Neutrality for 2050

Committing to achieve carbon neutrality by 2050.

Raising carbon reduction target by 2030 from 21% to 30% compared to 2018



Decarbonisation Roadmap



Step 4: Value Chain Engagement

- Understand & reduce scope 3 emissions
- Activities include; data collection, workshops, etc.
- Benefit vs Baseline @ 15 – 50 % (scope 3)

Step 3: Technology Change

- Development & implementation of new technologies
- Benefit vs Baseline @ 20 – 70 %
- Activities include; Carbon capture, Low carbon fuels, electrification, alternative materials, etc.



Step 5: Carbon Offsets

- Final step to achieve carbon neutrality

Step 1: Operational Efficiency

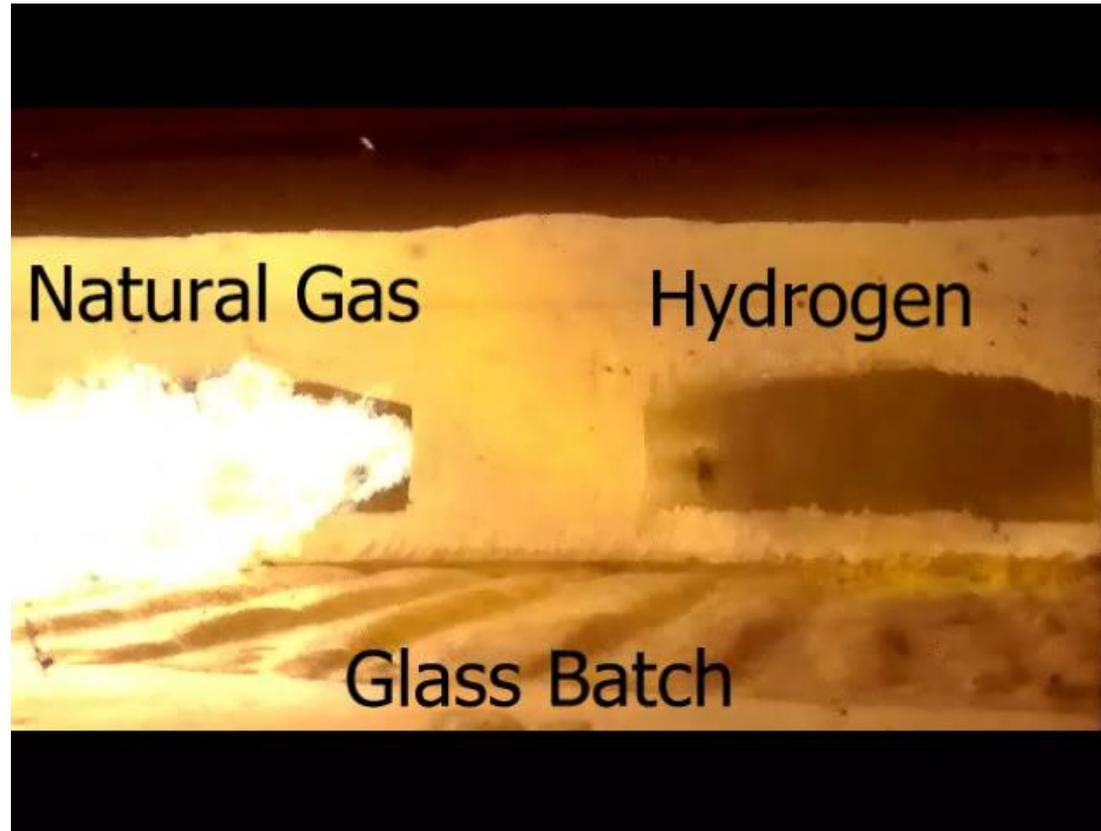
- Effective dissemination of energy/CO₂ efficiency measures across all Group operations
- Activities include; infrastructure upgrades, waste glass (cullet) management, etc.
- Benefit vs Baseline @ 5 – 15 %

Step 2: Renewable Energy

- Procurement/generation of renewable energy
- Activities include; PPA, on site generation, heat recovery
- Benefit vs Baseline @ 5 – 15 %

NSG Group achieves World First Float Glass production with Hydrogen Fuel

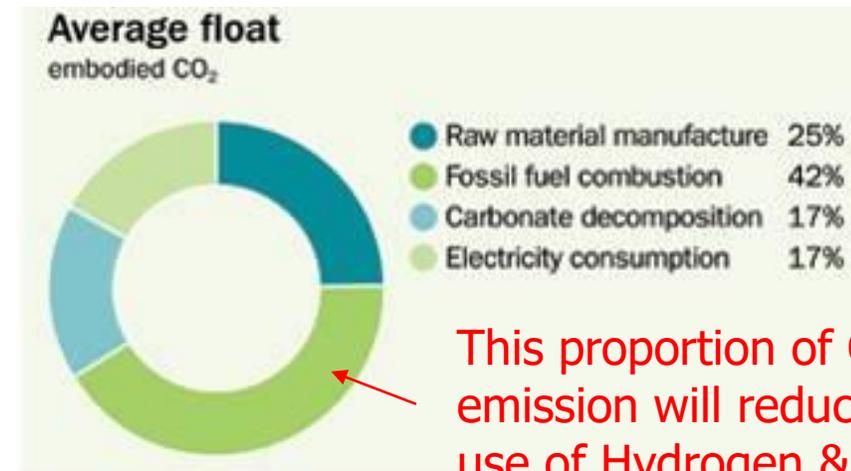
- Aug-2021 – Flame appearance with increasing hydrogen
- @7% reduction in overall CO₂ footprint of glass produced during the trial



World's first float line to use Hydrogen as a fuel

NSG Group achieves another world first – Float Glass production with 100% biofuel

- 14th – 17th February 2022
- Excellent fuel for glassmaking – technical properties very similar to traditional fuel oil
- High level of confidence that liquid biofuel is a viable alternative to fossil fuel
- @40% reduction in overall CO₂ footprint of the glass produced
- Technical challenge overcome – Commercial & Logistics challenges remain



Lowest carbon float glass ever produced in the world

Summary

- NSG continuing it's shift from commodity to value added glass
 - Solar sector is a key part of this strategy
 - Further expansion of our use of On Line Coatings to supply sector announced
- NSG working in parallel on key carbon reduction activities
 - Proof of concepts successfully conducted for H₂ and Biofuels
 - Significant work now on evaluating commercial viability of these routes

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