Decarbonizing the Steel Industry: A Global Multi-Energy Company Perspective

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TotalEnergies in brief

TotalEnergies is a global multi-energy company that produces and markets energies: oil and LNG, new low-carbon energies, electricity and renewables.

- $20.5bn in net income* in 2022
- World no.3 in liquefied natural gas
- 2.8 mboe/day produced in 2022, of which 53% is natural gas
- 17 GW of gross installed renewable power generation capacity in 2022
- 100 GW in production capacity by 2030
- A goal of 150,000 charge points for electric vehicles
- 8.8 million gas and power customers in Europe
- > $4 billion invested in low-carbon energies in 2022
- More than 3,500 researchers in our 18 R&D centers
TotalEnergies energy mix* is dramatically evolving

TotalEnergies’ ambition is to be a major player in the energy transition, to get to net-zero by 2050, together with society.
OneB2B Solutions
A team dedicated to your energy transition journey
How do we see Steel decarbonization?
Decarbonizing the Steel Industry

Blast Furnace

- Raw Materials & Preparation
  - Iron Ore
  - Limestone

- Sinter Plant

- Ironmaking
  - Direct Reduced Iron (DRI)

- Steelmaking
  - Electric Arc Furnace (EAF)
  - Ladle (Refining)

- Continuous Casting

- Rolling

- Semi-finished Products
  - Blooms
  - Billets
  - Slabs

- Welded Tube
  - Plate
  - Flat Products

- Light Gauge/Decking

- Hot Rolled

1 B$ for 2 Mta
8 TWha from 2 to 1 tCO2e
120 kta from 1 to 0 tCO2e
-30% by 2030

Source: Vepica website
Our solutions: Renewable Electricity

Becoming a major global player in Renewables by 2030 (top 5)

- Solar: 80% (10 GW 2021)
- Wind: 25% (35 GW 2025)
- Energy Storage: 20% (100 GW 2030)

Gross capacity

Renewable electricity available through Power Purchase Agreements (PPAs)
- Provides long term viability on volume and price
- Combines wind & solar in various geographies with energy storage targeting baseload supply
- Complemented with on-site PV installations for self-consumption
Our solutions: Biogas

Develop a worldwide presence in Biogas

- Seamless transition from Natural Gas
- TotalEnergies EU ambition supported by REPowerEU (325 TWha by 2030)
- Reporting status in GHG Protocol yet to be clarified
Our solutions: Low Carbon Hydrogen

- **Masshylia project**: biggest low carbon hydrogen production site in France in our La Mede biorefinery (120 MW) supplied by renewables assets and French electricity mix.

Decarbonizing our refining operations and third party off-takers

- **Natural Gas substitution as reducing agent and where electrification is not possible**
- **First target is to decarbonize H₂ consumed in our refining operations (>300 kta)**
- **Third party off-takers to be supplied from domestic operations and imports (India, US, Australia, South America, Africa)**
- **Point of attention remains the stringent RFNBO criteria**
Our solutions: Carbon Capture & Storage (CCS)

**TotalEnergies is building a world-class carbon storage portfolio across the North Sea**

- Targeting ~10 MtCO₂/y storage capacity by 2030 (50 to 100 MtCO₂/y in 2050) globally

- **Northern Endurance Partnership** (TotalEnergies: 10%)
  - 4 MtCO₂/y by 2025

- **Aramis** (TotalEnergies: 25%)
  - CO₂ storage (TotalEnergies: 65%, operator)
  - Phase 1, up to 5 MtCO₂/y by 2025
  - Phase 2, up to 8 MtCO₂/y by 2030

- **Bifrost** (TotalEnergies: 85%)
  - Phase 1, up to 5 MtCO₂/y by 2030
  - Phase 2, up to 9 MtCO₂/y by 2031

**Off-setting solution for hard-to-abate process/scope 1 emissions**

- **Mid-stream infrastructure to co-develop**

- **First industrial projects with near commercial operations dates**

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**Aug 22 2023**

Luna – New acquisition of exploration licence adjacent to Northern Lights
Decarbonizing is a global challenge for all value chains

<table>
<thead>
<tr>
<th></th>
<th>% of global emissions</th>
<th>Green electricity(^1)</th>
<th>Low carbon H(_2)</th>
<th>Carbon Capture &amp; Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>9%</td>
<td>&gt;100 TWha</td>
<td>&gt;3 Mta(^2)</td>
<td>&gt;45 Mta</td>
</tr>
<tr>
<td>Aluminium</td>
<td>4%</td>
<td>&gt;40 TWha</td>
<td>tbd(^3)</td>
<td>&gt;4 Mta</td>
</tr>
<tr>
<td>Cement</td>
<td>8%</td>
<td>&gt;30 TWha</td>
<td>tbd(^3)</td>
<td>&gt;80 Mta</td>
</tr>
<tr>
<td>Chemicals</td>
<td>6%</td>
<td>&gt;165 TWha</td>
<td>&gt;10 Mta(^2)</td>
<td>&gt;50 Mta</td>
</tr>
</tbody>
</table>

\(^1\) excluding electricity needs for H\(_2\)  
\(^2\) 160TWha (steel) and 860TWha (chemicals) additional green electricity required to produce low carbon H\(_2\)  
\(^3\) no structural requirement in decarbonization roadmap

Early movers will be favored as demand may outpace capacity build-up
Thank you for your attention!
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