A changing energy landscape towards 2050

(1) Changing demand

(2) Changing energy carriers

(3) Massive increase RES-E

(4) Renewable and low-carbon gases
Energy System Integration in a nutshell: why and what

ESI presents significant investment opportunities in post-Covid recovery context.

ESI is necessary to deliver on climate neutrality at the least cost, in line with Green Deal ambitions.

ESI helps deliver on other objectives: security of supply, jobs, industrial leadership.

Energy System Integration (ESI) is the integrated planning and operation of the energy system ‘as a whole’, across multiple carriers, infrastructures and consumption sectors.
Laying the foundation for a climate-neutral energy system

**Energy System Integration Strategy**

1. A more **circular and energy efficient** energy system
2. A **deep electrification** of consumption, based on **renewable electricity**
3. The use of **renewable and low carbon fuels** (incl. hydrogen) in hard-to-abate sectors

**Hydrogen Strategy**

A full value chain approach to upscale hydrogen

**Clean Hydrogen Alliance**
## Making it happen – an action plan for Energy System Integration

<table>
<thead>
<tr>
<th>Pillar</th>
<th>Actions oriented towards</th>
<th>Main tools involved (*)</th>
</tr>
</thead>
</table>
| A more circular and energy efficient energy system                     | • Better apply EEF principle & PEF  
• Build a more circular system                                             | RED, EED, TEN-E                                                                          |
| A deep electrification of consumption, based on renewable electricity  | • Increased supply RES-E  
• Faster electrification end-use sectors  
• Roll out EV infrastructure & new loads integration                       | RED, IED, AFID, TEN-E, TEN-T, CO2 emissions for cars, EU funding, offshore RES, Renovation wave, NC Flexibility |
| RES & low carbon fuels for hard-to-abate sectors (incl. hydrogen)      | • Promoting RES fuels from biomass  
• Promoting RES hydrogen  
• Enabling CCUS incl. for synthetic fuels                                     | RED, Aviation/Maritime initiatives, EU funding + Hydrogen Strategy Follow-up             |
| Energy markets fit for decarbonisation & distributed resources         | • Creating a level playing field across carriers  
• Review gas regulatory framework  
• Improve customer information                                                | ETD, ETS, State Aid, gas legislation, guidance on non price components                  |
| A more integrated energy infrastructure                                | • More integrated planning at gas, electricity, heat and hydrogen  
• Better governance                                                         | TEN-E, TEN-T, RED, EED, TYNDP                                                          |
| A digitalised energy system & supportive innovation framework          | • Ensure digitalisation support energy system integration  
• Research and innovation as a key enabler                                   | Energy Digitalisation Action Plan, NC cybersecurity, impact oriented research outlook |
Hydrogen – key issues

Hydrogen:
• Feedstock, fuel, energy carrier / storage, many applications
• Does not emit CO2, no air pollution
• Essential to reach our climate ambition (hard-to-abate sectors)
• Europe is highly competitive in clean hydrogen technologies manufacturing

Which hydrogen:
Currently: fossil-based hydrogen
Our vision: Renewable (clean), and in a transitional period low-carbon hydrogen (fossil-based hydrogen with carbon capture and electricity based) for:
  • Replacing existing hydrogen production
  • Industry (fertilisers and green steel) and transport
    (Local buses, parts of rail, heavy duty road vehicles; in the longer term: maritime and aviation)

Issues:
• Cost-competitiveness
• Technological maturity (cost-effective electrolyzers)
• Renewable energy & scale
## Making it happen – an action plan for the Hydrogen Strategy

<table>
<thead>
<tr>
<th>Full value chain approach,</th>
<th>Actions oriented towards</th>
<th>Main tools involved (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>An investment agenda</strong></td>
<td>• Create project pipeline</td>
<td>Clean Hydrogen Alliance, InvestEU, IPCEI, State aid, Cohesion policy</td>
</tr>
<tr>
<td></td>
<td>• €220-340 bln renewable power, €24-42 bln electrolysers, €65 bln infrastructure</td>
<td></td>
</tr>
<tr>
<td><strong>Boosting demand and scale up production</strong></td>
<td>• Comprehensive terminology and EU-wide certification of hydrogen</td>
<td>RED, EU ETS, Transport policy, Industrial strategies</td>
</tr>
<tr>
<td></td>
<td>• Support schemes and CCfD for renewable and low-carbon hydrogen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Demand-side policies in end-use sectors</td>
<td></td>
</tr>
<tr>
<td><strong>Develop hydrogen infrastructure and markets</strong></td>
<td>• Planning of hydrogen transport, storage and dispatch infrastructure</td>
<td>TYNDPs, TEN-E, TEN-T, AFID, CEF, decarbonisation of gas package</td>
</tr>
<tr>
<td></td>
<td>• Ensure access, develop liquid hydrogen markets and integrity of internal gas market</td>
<td></td>
</tr>
<tr>
<td><strong>Research and Innovation</strong></td>
<td>• Scale up electrolysers</td>
<td>Clean Hydrogen Partnership, ETS Innovation Fund, Horizon Europe,</td>
</tr>
<tr>
<td></td>
<td>• Develop hydrogen value chain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Innovative hydrogen technologies</td>
<td></td>
</tr>
<tr>
<td><strong>The international dimension</strong></td>
<td>• International standards, regulation and definitions for hydrogen</td>
<td>IEA, IRENA, CEM, G20, Neighbourhood policy, EU-Africa Green Energy Initiative, bilateral energy dialogues, € benchmark</td>
</tr>
<tr>
<td></td>
<td>• Promote cooperation</td>
<td></td>
</tr>
</tbody>
</table>

(*) Non-exhaustive list
The policy context for the REDII review

- Climate Target Plan
- 38-40% overall RES share by 2030 and increased sectoral shares
- 3 core pillars: EE/Circularity + RES - E/Electrification + Fuels/H2
- European Green Deal
- Biodiversity Strategy
- Energy System Integration and Hydrogen Strategies
- Offshore RES Strategy
- Renovation Wave
REDII review main interactions with other key legislative reviews

EED  EPBD  Decarbonized Gas Markets
ETS  Effort Sharing  LULUCF
CO2 and Cars  Energy Taxation  AFID
Maritime and Aviation  State Aid
The policy areas being looked at

- Overall RES Targets
- Energy system integration (incl RES and low-carbon fuels)
  - Transversal measures
- Sector specific measures
  - H&C / DHC
  - Buildings
  - Industry
  - Transport
  - Electricity
- Bioenergy sustainability
Next steps

Open Public Consultation
• Published 17 November 2020 until 9 February 2021

Stakeholder virtual event
• Taking place on 11 December (full day)

Legislative proposal
• Planned in Q2 2021
Q1 – Which are key elements for the implementation of the Energy System Integration and Hydrogen Strategies?

Q2 - which are key issues for the review of REDII to contribute to the increased climate ambition and the energy system integration vision?
Thank you for your attention!

antonio.lopez-nicolas@ec.europa.eu