### Key findings

- **Financing**
  - This roadmap targets installed nuclear capacity reaching 1,200 GW in 2050, with annual electricity production of nearly 10,000 TWh. This would represent around 24% of electricity generated worldwide, making nuclear the single largest source of electricity.
  - The 2030 target for nuclear energy deployment does not require major technological breakthroughs, although further development will help maintain nuclear’s competitiveness.
  - Political support and public acceptance are key requirements for the implementation of nuclear energy programmes, with a clear and stable commitment to nuclear energy in national energy policy.
  - Financing the very large investments needed to build nuclear power plants will be a major challenge in many countries, and in some cases governments will need to take a role in addressing this.

- **Policy support**
  - There is an urgent need to strengthen the nuclear workforce to meet future demands, by investing in education and training.
  - Industrial capacities for constructing nuclear power plants will need to increase substantially. Uranium production and fuel cycle capacities will also need to grow.
  - The management and disposal of radioactive wastes is an essential component of all nuclear programmes. Progress needs to be made in building and operating facilities for the disposal of high-level wastes.
  - The international system of safeguards on sensitive nuclear materials and technologies must be maintained and strengthened where necessary.
  - Advanced nuclear technologies, now under development, potentially offer advantages over current technologies. The first of these could be ready for commercial deployment after 2030, although they are not expected to form a large part of nuclear capacity by 2050.

- **Technology development and deployment**
  - The first of these could be ready for commercial deployment after 2030, although they are not expected to form a large part of nuclear capacity by 2050.

- **Capacity building and industry**
  - The timescales shown are approximate and will vary from country to country. In particular, countries without an existing nuclear programme will need to take additional capacity and institution building steps that may require more time.

- **Financing**
  - The 2050 target for nuclear energy deployment does not require major technological breakthroughs, although further development will help maintain nuclear’s competitiveness.

### Growth in nuclear power capacity and its share of global electricity production

<table>
<thead>
<tr>
<th>Year</th>
<th>Installed capacity (GW)</th>
<th>OECD Asia</th>
<th>OECD Europe</th>
<th>Other developing Asia</th>
<th>OECD Latin America</th>
<th>Non-OECD</th>
<th>Non-OECD Asia</th>
<th>OECD Pacific</th>
<th>OECD Europe</th>
<th>OECD Latin America</th>
<th>Other developing Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>100</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>2020</td>
<td>200</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>2030</td>
<td>300</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>2040</td>
<td>400</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>2050</td>
<td>500</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>
Key actions in the next ten years

During the next 10 years, key nuclear power development milestones include:

- Demonstrate the ability to build the latest nuclear plant designs on time and within budget.
- Develop the industrial capacities and skilled human resources to support sustained growth in nuclear capacity.
- Establish the required legal frameworks and institutions in countries where these do not yet exist.
- Encourage the participation of private sector investors in nuclear power projects.
- Make progress in implementing plans for permanent disposal of high-level radioactive wastes.
- Enhance public dialogue to inform stakeholders about the role of nuclear in energy strategy.
- Expand the supply of nuclear fuel in line with increased nuclear generating capacity.

Analysis for this roadmap is consistent with the IEA Energy Technology Perspectives 2010 BLUE Map scenario, which describes how annual CO₂ emissions can be reduced by 50% from 2005 levels, with nuclear power providing 24% of global electricity production.
Regional production of nuclear electricity by 2050

Key actions in the next ten years

During the next 10 years, key nuclear power development milestones include:

- Demonstrate the ability to build the latest nuclear plant designs on time and within budget.
- Develop the industrial capacities and skilled human resources to support sustained growth in nuclear capacity.
- Establish the required legal frameworks and institutions in countries where these do not yet exist.
- Encourage the participation of private sector investors in nuclear power projects.
- Make progress in implementing plans for permanent disposal of high-level radioactive wastes.
- Enhance public dialogue to inform stakeholders about the role of nuclear in energy strategy.
- Expand the supply of nuclear fuel in line with increased nuclear generating capacity.

Analysis for this roadmap is consistent with the IEA Energy Technology Perspectives 2010 BLUE Map scenario, which describes how annual CO₂ emissions can be reduced by 50% from 2005 levels, with nuclear power providing 24% of global electricity production.
Nuclear energy roadmap milestones

Policy support
- Provide a clear and stable commitment to nuclear power in energy and environmental policy
- Ensure that the relevant legal and regulatory systems work effectively
- Strengthen international non-proliferation regimes, while providing security of fuel supply
- Ensure that institutions and funding are in place for waste disposal and decommissioning

Technology development and deployment
- Implement plans to build and operate geological repositories for waste disposal
- Complete demonstration projects for the most promising Generation IV nuclear plants
- Build and operate commercial-scale Generation IV nuclear plants
- Demonstrate on-time and on-budget completion of further Generation III+ plants
- Achieve nuclear construction rates from 2020 around double present levels
- Continue to increase nuclear construction rates
- Develop industrial capacities to support advanced fuel cycles

Capacity building and industry
- Increase industrial capacities to supply nuclear plant components and systems
- Develop the qualified and skilled human resources needed
- Strengthen and broaden global supply chains as more countries launch nuclear programmes
- Increase uranium production and nuclear fuel cycle capacities to meet rapid demand growth

Financing
- Establish electricity and carbon markets that support large, long-term investments
- Consider direct government support or guarantees for nuclear investments
- Increase the availability of private sector finance for nuclear plants
- Establish routine private sector investment in proven nuclear plant designs

OECD Nuclear Energy Agency

NUCLEAR ENERGY ROADMAP

Growth in nuclear power capacity and its share of global electricity production

Key findings
- This roadmap targets installed nuclear capacity reaching 1 200 GW in 2050, with annual electricity production of nearly 10 000 TWh. This would represent around 24% of electricity generated worldwide, making nuclear the single largest source of electricity.
- The 2050 target for nuclear energy deployment does not require major technological breakthroughs, although further development will help maintain nuclear’s competitiveness.
- Political support and public acceptance are key requirements for the implementation of nuclear energy programmes, with a clear and stable commitment to nuclear energy in national energy policy.
- Financing the very large investments needed to build nuclear power plants will be a major challenge in many countries, and in some cases governments will need to take a role in addressing this.
- There is an urgent need to strengthen the nuclear workforce to meet future demands, by investing in education and training.
- Industrial capacities for constructing nuclear power plants will need to increase substantially. Uranium production and fuel cycle capacities will also need to grow.
- The management and disposal of radioactive wastes is an essential component of all nuclear programmes. Progress needs to be made in building and operating facilities for the disposal of high-level wastes.
- The international system of safeguards on sensitive nuclear materials and technologies must be maintained and strengthened where necessary.
- Advanced nuclear technologies, now under development, potentially offer advantages over current technologies. The first of these could be ready for commercial deployment after 2030, although they are not expected to form a large part of nuclear capacity by 2050.