

# BIODIVERSITY ROADMAP

## for the Energy Sector



**Finnish Energy**

# Vision

The energy sector is committed to promoting biodiversity so that the total impact of the sector on biodiversity will be net positive by 2035.

2022


2035

# 1

## The energy sector solves the climate challenge by promoting biodiversity

Energy companies want to solve the climate challenge hand in hand with the biodiversity issues. The green transition and the ecological transition support each other. Companies in the sector want to take action to stop the decline in biodiversity in a way that is equally responsible and solution-focused as with the climate measures.

The low-carbon roadmap of the energy sector provides the direction and targets for climate action in the sector. The biodiversity roadmap on the other hand presents the targets and concrete measures to improve biodiversity in the sector. Together, the roadmaps provide a basis for the effectiveness and sustainability work of the energy sector.

An illustration of a woman wearing a yellow hat, a green shirt, and blue pants, holding a pink watering can and watering two sunflowers. The sunflowers have solar panels for heads. In the background, there are wind turbines, a green hill, and a blue sky with birds.

# The energy sector is a strong player

Operators in the energy sector want to promote biodiversity recovery because

- the sector plays a key role in turning society more sustainable
- expertise gained in climate work can be utilised in the restoration of biodiversity
- the sector makes substantial investments, through which it is possible to have an impact on biodiversity
- by being a forefront, the sector will benefit from the opening of new business opportunities
- the sector is capable of efficient cooperation in order to reach the targets
- energy companies want to meet the expectations of customers and society
- the sector supports political targets at the national and international level.

# Drivers of a company's biodiversity work

## Society's expectations

Actors are expected to take environmental responsibility. Biodiversity is one of the most significant global environmental threats in addition to climate change.

## Value of nature

Biodiversity is the lifeblood of humankind, and the energy sector has the opportunity to safeguard it.

## Risk management

Biodiversity loss is reflected in growing business risks. Many energy production forms are directly dependent on nature. Indirectly, biodiversity loss has an impact on the operations of enterprises in many ways.

## Customers' requirements

Customers expect companies to commit to increasingly better production practices and responsibility. Consumers want information about the production chain and environmental footprint of products.

## Development of regulation

Finland is bound by several international agreements. Targets and legislation at the EU and national levels guide operations to an increasing extent.

## Brand and product image

A company can have an impact on the brand and product image by setting ambitious targets for the protection of biodiversity, by carrying out concrete measures and by telling about them to its stakeholders.

## Capacity for innovation

Biodiversity work challenges a company's competence and capacity for innovation. Solutions related to supporting biodiversity are found through ecological planning, by combining competence in business operations and environmental issues and by utilising innovative methods.

## Financing

The financial sector develops ways of taking biodiversity issues into account in investment decisions.

## Employees

Employees want to be proud of their employer and hope that it plays its part in solving major global challenges.



# Climate action supports biodiversity

The energy sector wants to achieve climate targets while safeguarding natural values at the same time. The increase in biodiversity helps in adapting to climate change.

- The greatest impacts of climate change on the environment are occurring in the Northern habitats. The Finnish energy sector plays a key role in reducing greenhouse gas emissions in the entire society.
- Climate change accelerates the pace of biodiversity loss. In addition to climate change, the main factors behind biodiversity loss are
  - changes in land use
  - pollution
  - overexploitation of natural resources
  - increase in alien species.

The energy sector can have an impact on all of these.

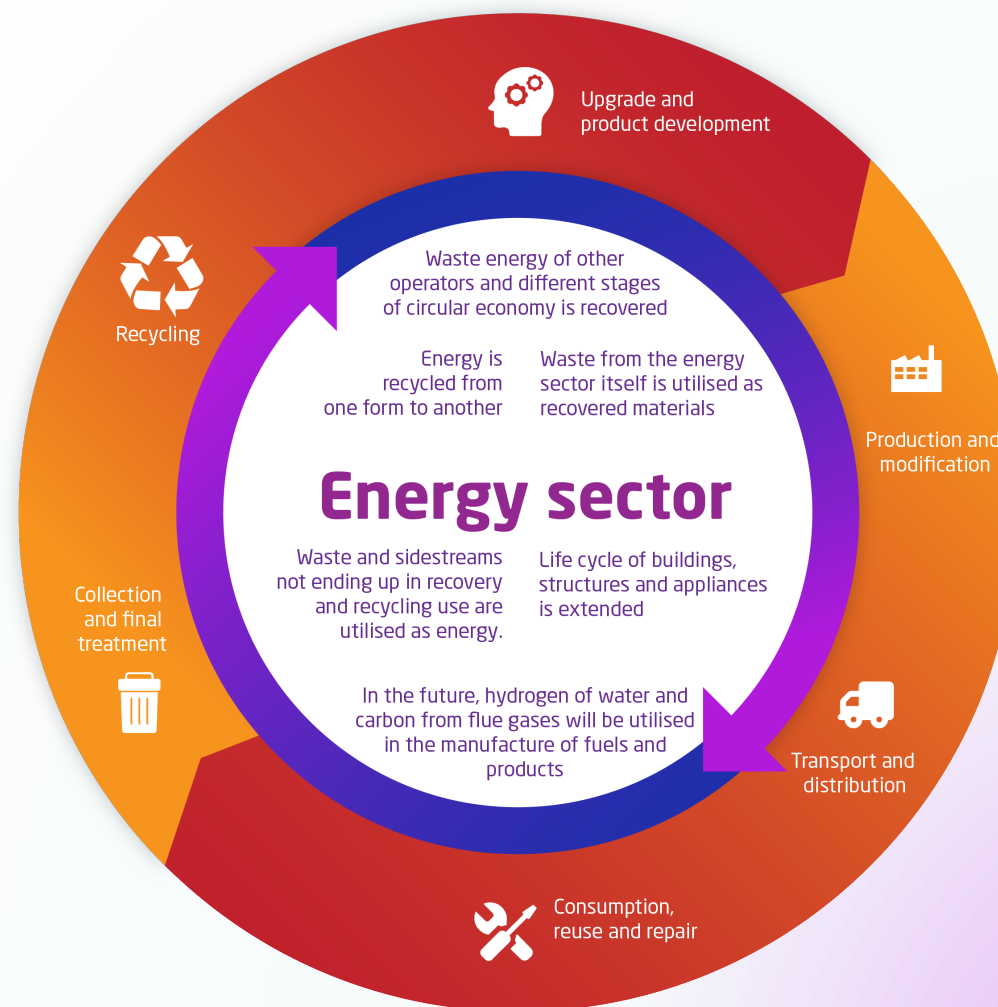


# The energy sector drives the circular economy

The energy sector enables an efficient circular economy with clean production, smart solutions and new technologies. The energy sector keeps the substances, materials and products of the economy in efficient use. When the need for new natural resources is reduced, it safeguards the regenerative capacity of nature and reduces the environmental load.

- Circular economy is a key solution in the mitigation of biodiversity loss. Energy is needed in all stages of circular economy.
- Energy circulates between producers and consumers as electricity, heat and chemical energy.
- Energy is produced from waste materials and waste energy is utilised.
- Waste from the energy sector itself is utilised and the energy infrastructure is maintained and looked after

## The energy sector produces low-carbon energy for all phases of the circular economy



# 2

## Visions and targets guide the biodiversity work

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The energy sector is committed to promote biodiversity in Finland so that the total impact of the sector on the environment will be net positive by 2035. The reference year of this goal is 2022.

This vision directs the energy companies' work, which is divided into five main goals with an equal weight. Each main goal includes sub-goals. In addition, the third section presents function-specific practical measures. Environmental work is long-standing and continuous action. Efforts will be made to increase the effectiveness of the work over time.





**The energy sector is committed to promoting biodiversity so that the total impact of the sector on biodiversity will be net positive by 2035.**

1. The biodiversity targets are part of the management of energy companies
2. Biodiversity work is carried out systematically and transparently in compliance with the principle of continuous improvement
3. Biodiversity thinking has been mainstreamed, i.e. it is taken into account in all activities as part of green transition
4. The energy sector contributes to stopping the trend of species and habitat types becoming endangered and improving the quality of habitats
5. The energy sector is involved in building a socially and economically fair ecological transition that permeates the entire society

# 1

## Biodiversity targets are part of the management of energy companies

- The management of Finnish Energy's member companies proves their commitment to biodiversity work.
- Nature values have been included in companies' sustainability principles.
- Nature values are part of companies' strategy and policy and their management, quality and environmental systems or action plans.



# 2

## Biodiversity work is carried out systematically and transparently in compliance with the principle of continuous improvement

- The energy sector's level of knowledge about biodiversity and its management has grown in active interaction with the scientific community and stakeholders and through the education of parties operating in the sector.
- Companies are using a method of managing biodiversity impacts, which covers the identification, measurement and monitoring of impacts, risks and opportunities.
- Energy companies have set their own targets to support the general target of the sector.
- Companies report publicly and regularly on their biodiversity activities.



# 3

## Biodiversity thinking has been mainstreamed and it is taken into account in all activities as part of green transition

- The energy sector has identified the multi-dimensional significance of biodiversity loss, which is communicated in all discussions and actions.
- Climate and biodiversity targets are promoted hand in hand by taking the significance of both of them into account.
- In addition to direct impacts, indirect impacts such as biodiversity impacts of procurement are also taken into account.
- Biodiversity work is carried out in close co-operation with the stakeholders.
- Customers are encouraged to take measures for the benefit of biodiversity in the same way as saving energy.



# 4

## The energy sector contributes to stopping the trend of species and habitat types becoming endangered and improving the quality of habitats

- Biodiversity aspects are taken into account already in the planning phase of projects.
- Mitigation hierarchy is complied with in investments and measures in the sector.
- The sector supports the development of ecological compensation so that the compensation can be taken widely into use in the compensation of nature values.
- In addition to nature values that are endangered and under strict protection, non-protected habitats are also taken into account.
- The sector utilises areas that have already been taken into use, where possible, and takes into account the maintaining of ecological connectivity.



# 5

## The energy sector is involved in building a socially and economically fair ecological transition that permeates the entire society

- The energy sector is committed to the target of achieving a good status for wellbeing and economy so that the use of natural resources is sustainable.
- The sector supports the target of a market-based economic model that takes nature into account.
- Biodiversity impacts are introduced as part of financial accounting.
- The sector has taken the nature aspect into account in its range of products and services.



# 3

## Measures to promote biodiversity

Energy production and measures have different kinds of impacts on nature. The impacts can be divided into direct, consequential and indirect impacts and into impacts outside the plant and project area. The most significant biodiversity impacts of the key production forms and operations in the energy sector and the concrete measures that promote biodiversity are presented in this section. The environmental work of companies is based on identifying biodiversity impacts in the entire value chain.

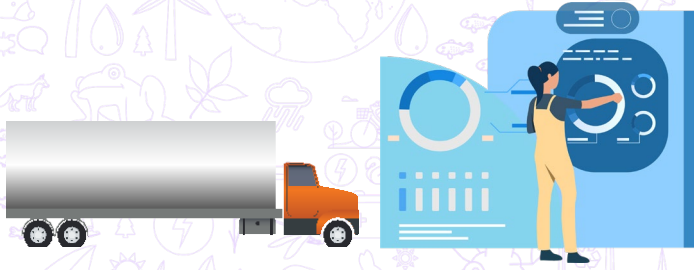
# Energy transition is in full swing

- The energy transition is in full swing, and investments in the field focus on clean production.
  - While the measures by energy companies help to reduce society's emissions, the sector takes action to restore biodiversity.
  - The development of the energy sector is directed by major trends, such as electrification, hydrogen economy, digitalisation and the development of new technology. Energy companies make strenuous efforts, and the change is rapid.
- Green transition, phasing out fossils
    - Electrification of society
      - Increasing non-combustion production
        - Development of security of supply and self-sufficiency
        - Increasing the use of domestic biofuels
        - Significant further construction of wind power
      - Energy storage
      - Utilisation of hydrogen economy
    - Strengthening and further construction of transmission networks
    - Carbon-neutral energy production
    - Strengthening of biodiversity





# Value chains of the energy sector



## Procurement

- Fuels
- Materials
- Chemicals
- Appliances
- Water

## Construction and demolition

## Transport

## Core operations

- Energy production
- Energy transmission and distribution
- Energy storage
- Sales and marketing
- Services

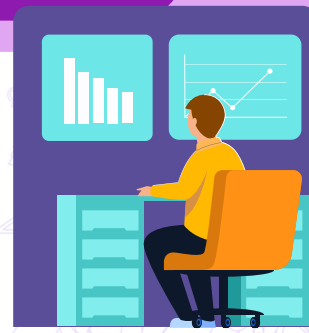
## Support measures

- Maintenance and servicing
- Transportation
- Office facilities
- Personnel

## Customers

## Biodiversity impacts

## Partners



# Foot- and handprints of business operations in terms of nature

## Direct impacts

- Direct impacts in the company's own plant or project area are related to land use and waterways.
- Changes resulting from construction have a direct impact on biodiversity in the area.

## Consequential impacts

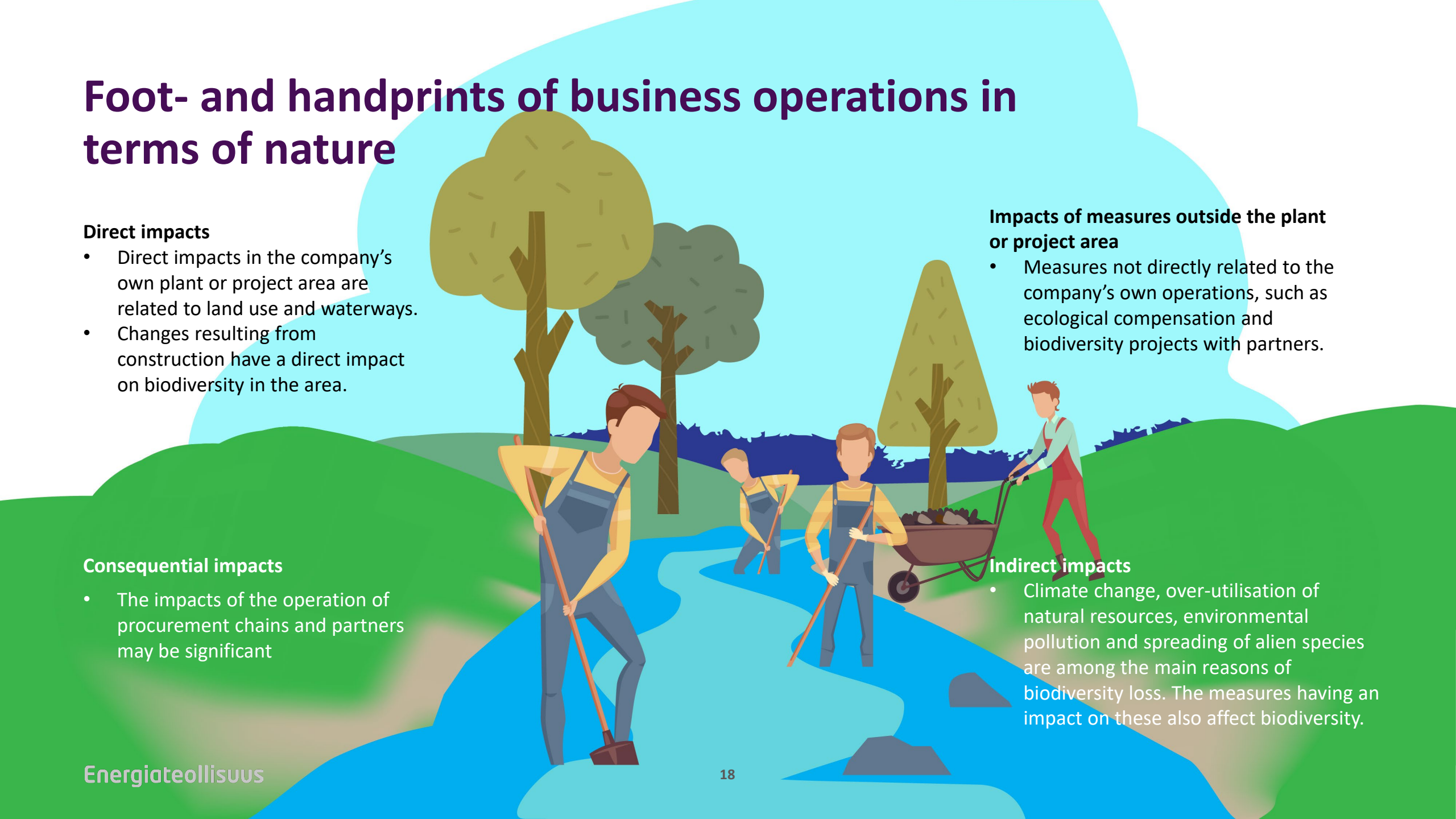
- The impacts of the operation of procurement chains and partners may be significant

## Impacts of measures outside the plant or project area

- Measures not directly related to the company's own operations, such as ecological compensation and biodiversity projects with partners.

## Indirect impacts

- Climate change, over-utilisation of natural resources, environmental pollution and spreading of alien species are among the main reasons of biodiversity loss. The measures having an impact on these also affect biodiversity.

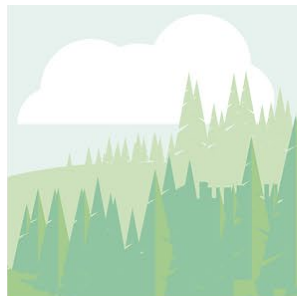


# Measures to promote biodiversity

The role of the energy sector's key production forms, the energy networks and operations in terms of Finland's energy system, the key biodiversity impacts and measures to reduce them and to promote biodiversity are presented in the following.



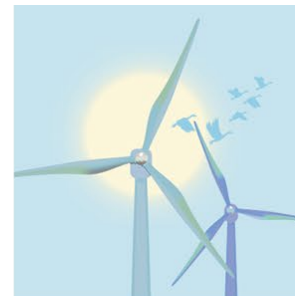
Hydropower



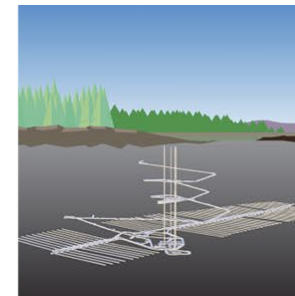
Forest energy



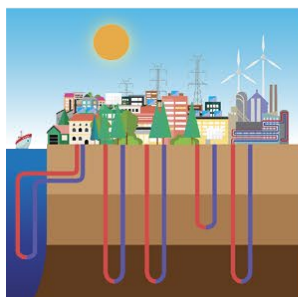
Other combustible production



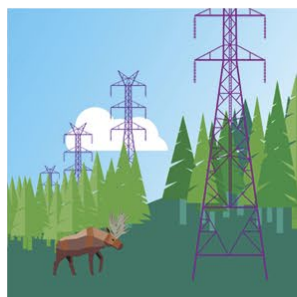
Wind power



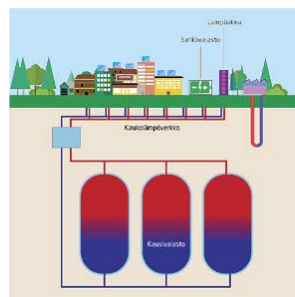
Nuclear power



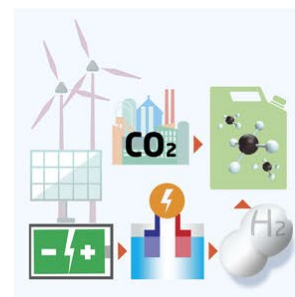
Storage



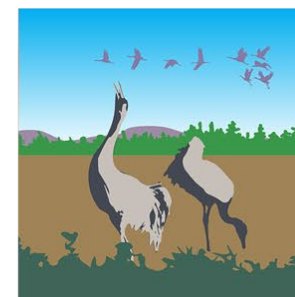
Energy networks



Solar, geothermal and geo energy, and heat pumps



Hydrogen and new fuels



Peat production



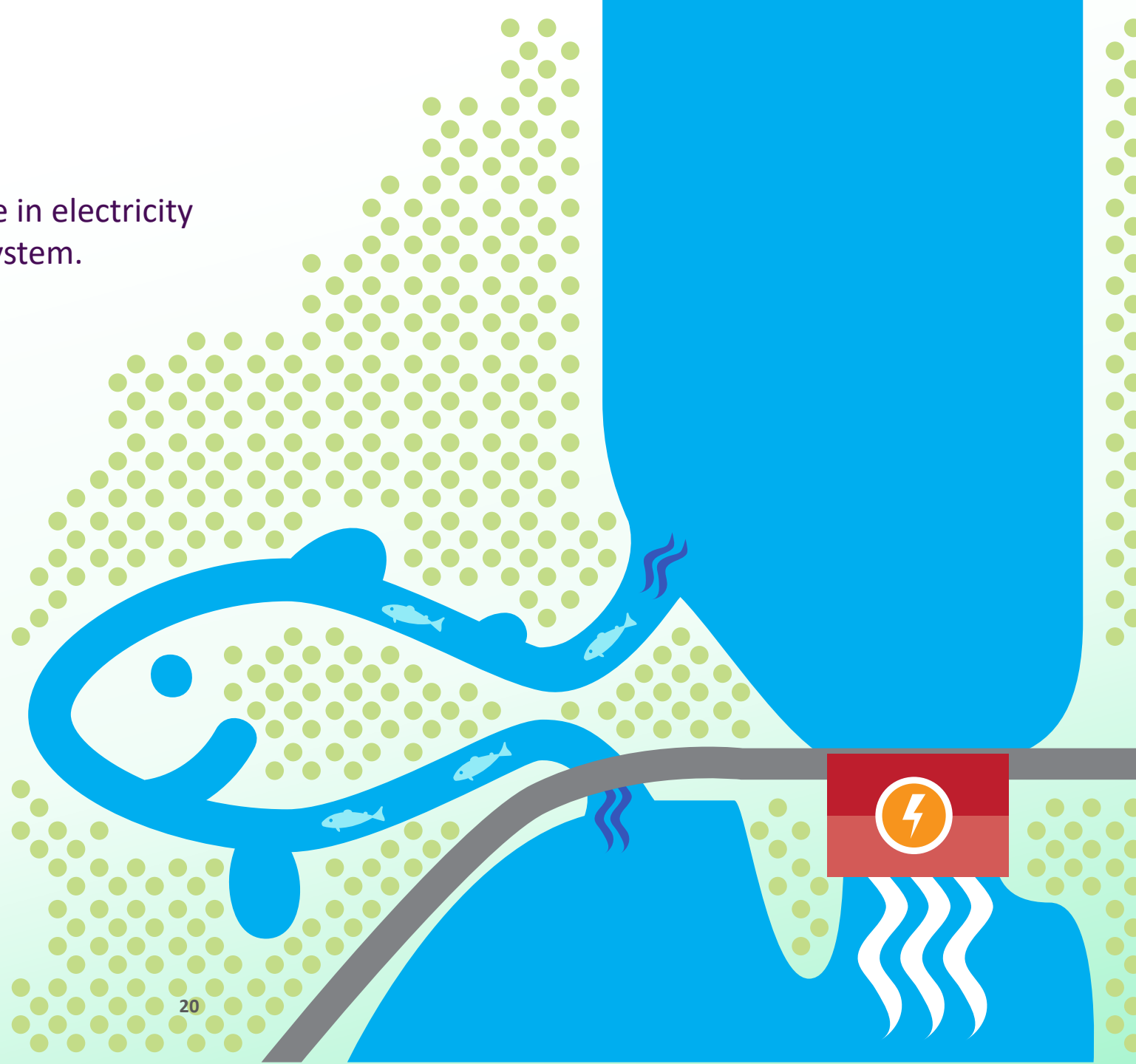
# Hydropower

Renewable hydropower plays a significant role in electricity production and the balancing of the energy system.

Due to its flexibility, hydropower has an important role in balancing electricity production and consumption at the daily and short-term levels. Hydropower enables the increase of variable wind and solar energy production.

## Nature impacts

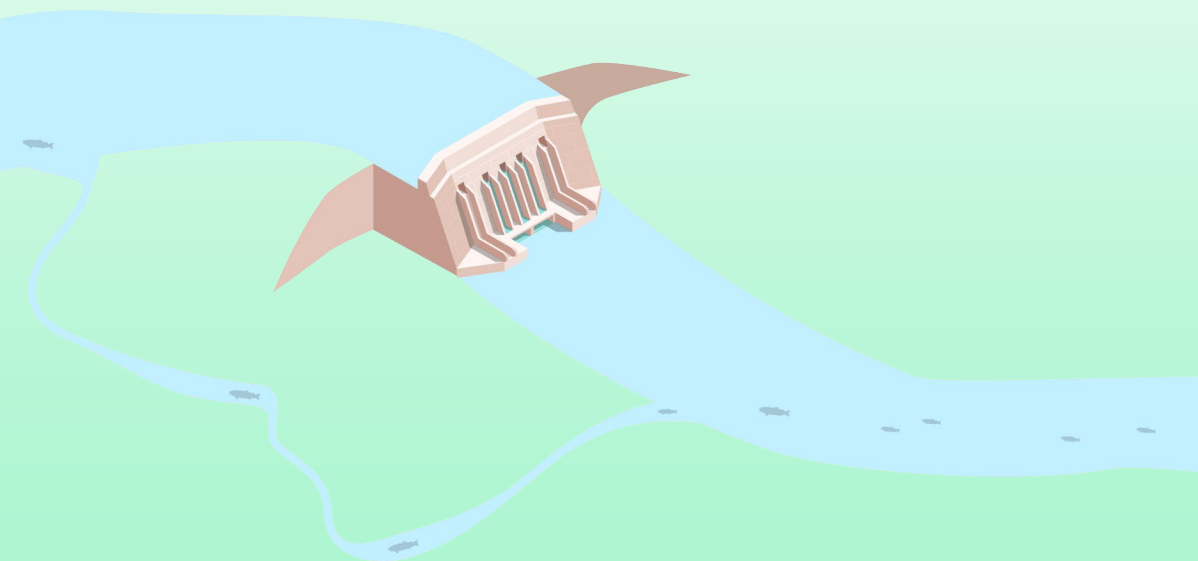
- The building of hydropower dams has significantly altered river habitats. As a result of dams, fish migration has been hindered and the breeding areas have reduced.
- Regulation and changing flows caused by the hydropower operations have not only impacts on fish stocks but also on ecosystems in areas below and above dams.
- Hydropower helps to reduce flood damage. Changes in floods have an impact on the floodplain and riverbank habitats.
- Hydropower is used for water level regulation, which is beneficial for the recreational use of lakes and rivers.



# Hydropower

## In order to promote biodiversity:

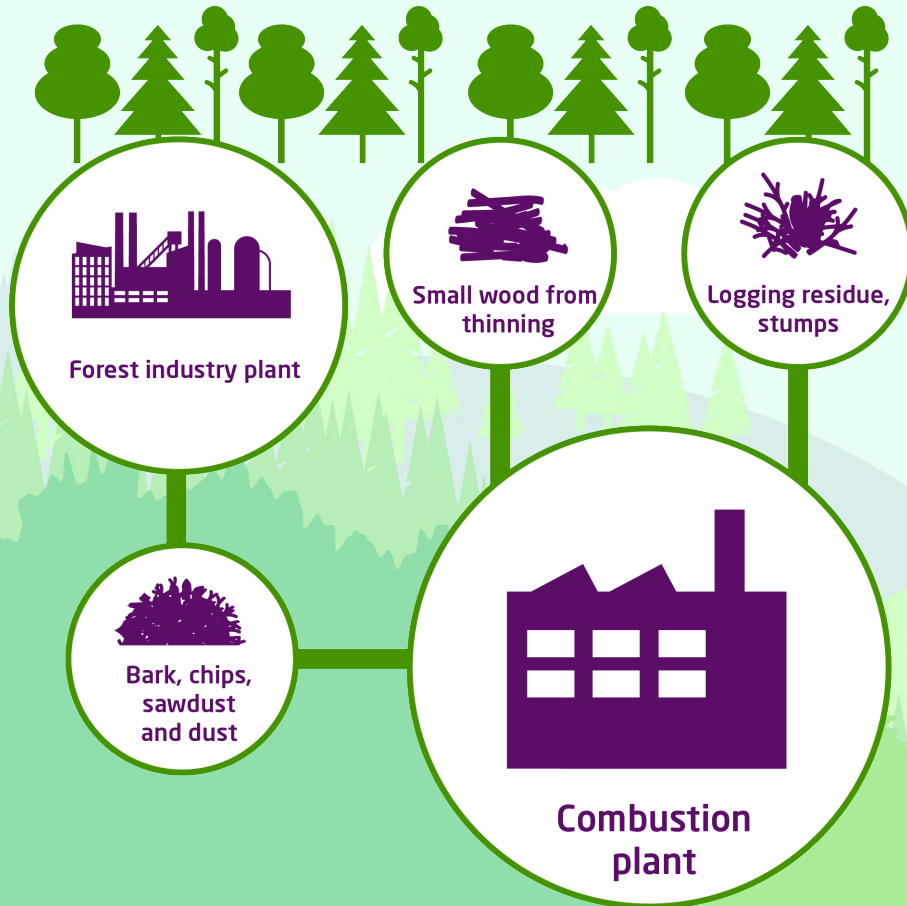
- Finnish Energy together with stakeholders is committed to jointly determined sustainable hydropower production, taking into account the operating requirements of hydropower and the nature values of freshwater habitats as a whole.
- Finnish Energy's migratory fish strategy with an objective of enabling the breeding of migratory fish in the majority of constructed waterways shall be implemented.



Energiateollisuus

- Measures that improve fish migration are planned
  - with respect to each plant and water body in cooperation between various actors with a focus on migration from a sea/lake area towards breeding areas
  - with the technology neutrality principle in order to gain the most cost-effective benefit; in the planning of projects, natural and technical bypass, as well as their combinations and other technical solutions are examined; the solutions are regarded as complementary to each other
- Water level regulation practices are developed in cooperation with various stakeholders in order to reduce the drawbacks of regulation.
- Environmental flows are introduced at sites where significant environmental benefits are achieved without causing significant harm to hydropower production.
- Research and development work related to ecosystems, the movement of living organisms and the vitality of stocked fish are invested in to find the best solutions; information about implemented projects is provided openly
- Determined measures to improve the efficiency of power production in hydropower plants are carried out, and electricity storage solutions are also planned and implemented in connection with the plants, where possible
- The energy sector supports voluntary removal of obsolete barriers and other fish migration preventing obstacles in waterbodies that have preconditions for the re-establishing, recovering or protection of significant migratory fish stocks.

# Forest biomass



**Renewable energy from forest biomass makes it possible especially for district heating to stop using fossil fuels.**

The role of wood-based fuels is significant in district heating, but they also produce electricity in co-generation plants. By-products and residues from the forest industry are used for producing energy for the industry's own needs and often also for communities at the same time. The high significance of forest biomass as a renewable fuel in energy production will remain and even grow in the future although combustion-based production will reduce as a whole.

## Nature impacts

- Woods in the Finnish forest aren't grown for energy use in mind. Bioenergy production is largely integrated into forest sector. Energy producing companies utilise the by-products of forestry and forest industry.
- The impacts of the use of forest biomass are primarily determined by forest management solutions. The energy sector can have an impact on activities taking place in forests through the procurement chains.
- The transport and intermediate storage of fuel also have impacts. Wood is also imported to Finland from elsewhere.

# Forest biomass

## In order to promote biodiversity:

- The procurement procedures and agreements on forest biomass have an impact on the development and strengthening of sustainable forestry. The energy sector's recommendation on the procurement of forest biomass recommends to comply with general forestry methods that take the environment into account. The recommendation is used actively in enterprises, and it is updated when necessary.
- The forest management recommendations and certificates are developed in cooperation with the forest sector to ensure that biodiversity will be taken into account better than at present.
- The recommendations take into account, e.g. the safeguarding of valuable areas, increasing of decayed wood, saving of deciduous trees and favouring multispecies forests, diversification of the age structure of forests, avoiding the use of stumps, leaving part of the felling residues in the woods, reducing the amount of draining on peatlands, and the minimisation of damage on felling's.
- The sufficiency of resources for the management of young woods is supported. With the management, it is possible to increase carbon sequestration of forests while improving the availability of forest biomass.
- Nature impacts are taken into account throughout the delivery chains of forest biomass, including transport, storage and chipping. The development and intensification of delivery chains also safeguards the continuity of the energy use of wood-based fuels and the security of supply and delivery.
- The energy efficiency of heating-and powerplants is constantly improved through process optimisation, by increasing flexibility in production and, for example, with flue gas heat recovery.
- Efforts are made to fully utilise the ashes of power- and heating plants either as fertiliser or in soil construction.
- In plant areas, biodiversity can be increased with minor measures in the area. Instead of paved and managed lawn areas, meadows richer in terms of their biodiversity and small wooded areas and wetlands are promoted. Measures to restrict invasive alien species and their habitats are implemented.
- Increasing pressure with regard to the demand for forest biomass based fuels is reduced by promoting the development and investment opportunities of district heat production methods that act as an alternative to incineration.

# Other combustion-based production

Energy production with fossil fuels is reduced significantly.

- The use of coal will end soon.
- The energy use of peat will also end in the longer term.
- Natural gas and fossil oils are used for longer.
- Biogas and bio-oil can be used to replace fossil fuels.
- Waste incineration has a key role in district heat production.





# Other combustion-based production

## Nature impacts

- Combustion-based energy production has biodiversity impacts related to the land use and construction of plants. All transport and transmission of fuels involve environmental and nature impacts.
- The energy producer usually has no option to have a direct impact on the production of fuels. The production of coal, natural gas and fossil oil has significant impacts in the country of production.
- The most significant impacts of biogas and bio-oil production are related to the raw materials used. The use of residues formed in the biogas process enables efficient recycling of nutrients.
- As part of waste management, the most significant impacts of waste incineration are positive. Through the reduced landfilling of waste, waste incineration reduces environmental emissions and promotes safeguarding of biodiversity.

## In order to promote biodiversity:

- The fuel procurement procedures and agreements and the auditing of fuel suppliers have an impact on the development of sustainable production methods.
- The energy efficiency of incineration plants is constantly improved through process optimisation and by increasing flexibility in production.
- Inputs that are created in addition to other operations and are unsuitable for food production are used as raw materials in biogas and bio-oil production.
- Waste incineration is carried out in cooperation with other waste management operators so that the waste hierarchy is implemented as efficiently as possible. Waste incineration plants process materials that are not recovered or recycled, and harmful substances are removed from the material circulation while utilising the energy released at the same time.
- Metals from the waste fuel are separated efficiently and directed to utilisation. Areas of utilisation are sought for ash and slag through research and development cooperation.
- In plant areas, biodiversity can be increased with minor measures in the area. Instead of paved and managed lawn areas, meadows richer in terms of their biodiversity and small wooded areas and wetlands are promoted. Measures to restrict invasive alien species and their habitats are implemented.
- In addition, for example, solar energy is utilised in industrial plant areas, where possible.

# Wind power

Renewable wind power is the fastest-growing electricity production form in Finland.

The share of wind power in annual production will be even more significant in the future, and increasing of production will help reach the renewable energy targets.

In addition to onshore wind power, there is also offshore wind power under plan, especially in the western sea areas.



# Wind power



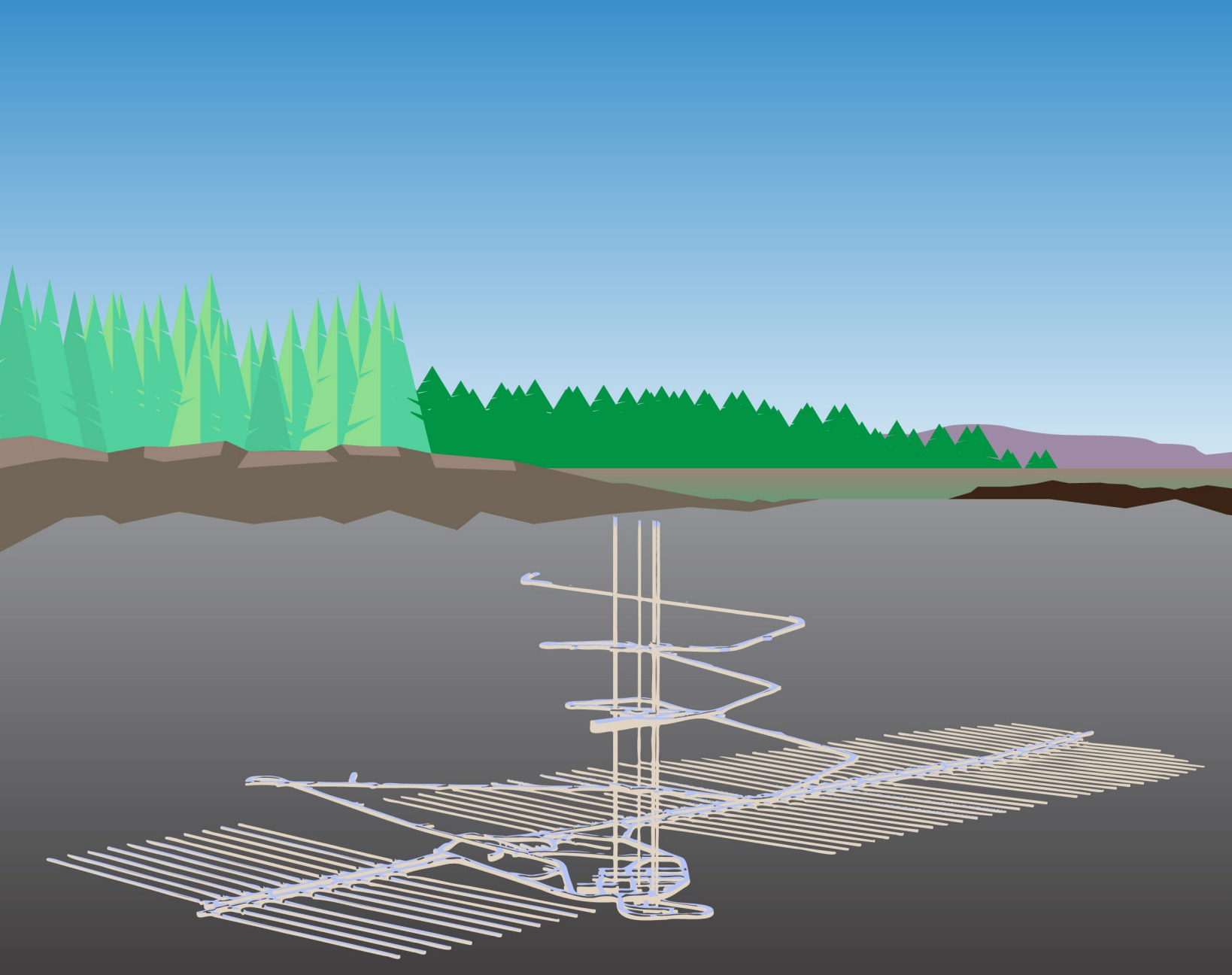
## Nature impacts

- The impacts of wind power construction are related to the manufacture of turbines and the construction of foundations, as well as to the land use of building the wind power area, electricity network connection and maintenance roads. Changes in land use may result in the fragmentation of habitats and cutting of wildlife corridors.
- During operation, wind power may have an impact on the fauna if the area is located along flyways or migration routes or in resting and feeding locations.
- At sea, there are impacts on aquatic organisms, such as fish and phytobenthos, especially during construction. On the other hand, the underwater foundations of wind turbines may act as artificial reefs and that way create new feeding areas for fish and sea birds.
- The increased unit sizes and longer life cycles of wind turbines reduce the impacts of wind power in relation to production.

## In order to promote biodiversity:

- Nature values are established and taken into account as early as possible during the planning stage in terms of the wind power area and the power and road connections.
- The electricity connection lines of the wind power areas are concentrated within the scope of legislation in order to reduce land use.
- The majority of a wind turbine is recycled. The foundations can be dismantled or landscaped, taking the further use of the area into account.
- Utilisation of areas where nature values are already diminished.
- Wind power areas are also utilised for other use, where possible, such as for solar energy production, electricity storage and recreational use, taking safety aspects into account.
- The bird population is monitored with radar in specific bird areas.





# Nuclear power

A significant share of electricity is produced with nuclear power in an emission-free and stable way.

In the future, electric and thermal energy can be produced with small modular reactors. A small modular reactor offers a solution as a basis for heating urban areas.

Finland is starting the final disposal of spent nuclear fuel as the first country in the world.

*Radioactive waste is managed in the country of origin. Nuclear waste is deposited in the Onkalo facility, which is about 430 metres deep.<sup>®</sup>*

# Nuclear power

## Nature impacts

- The impacts of the construction of nuclear power are related to the construction materials and land use. Land use is efficient in relation to production.
- Excavation and production of fuel causes biodiversity impacts in its country of production.
- Power plant's cooling water has an impact on the ecosystems of waterways. Thermal load into the waterways may exacerbate eutrophication and enable the spread of invasive alien species. Some fish species benefit from the increase of water temperature. The thermal load has an impact on the ice cover and the length of the period free of ice. On the other hand, the cooling water discharge areas may offer good resting and nesting places for birds. Small modular reactors do not necessary produce cooling waters.
- The impacts of the caverns built for the final disposal of nuclear fuel are low during operation. In the caverns, nuclear waste is separated from organic nature with multiple safety solutions.

## In order to promote biodiversity:

- In the planning of the nuclear power plant area, the natural environment is reconciled with the infrastructure planned and located for the area.
- Sustainability of production methods is ensured with fuel procurement procedures and agreements and the auditing of fuel suppliers.
- The impacts of cooling waters on the waterways are reduced by planning the location of water intake and discharge structures and by dimensioning the increase in water temperature and flow, taking the impacts on the waterways into account.
- In plant area, biodiversity can be increased with minor measures in the area. Instead of paved and managed lawn areas, meadows richer in terms of their biodiversity and small wooded areas and wetlands are promoted. Measures to restrict invasive alien species and their habitats are implemented.

100 m

200 m

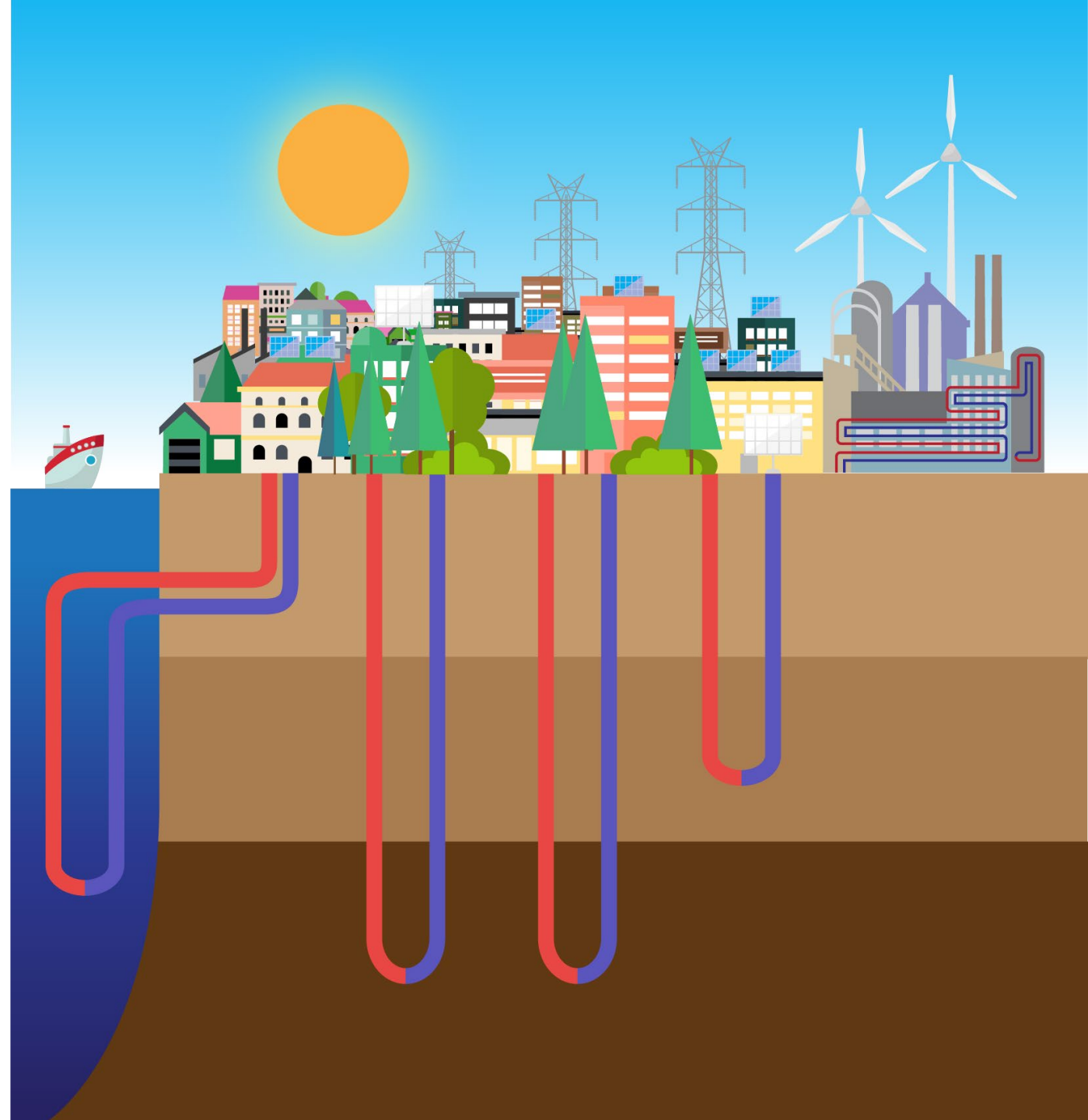
300 m

400 m

# Solar, geothermal and geo energy, and heat pumps

Non-combustion based energy production is developing and increasing.

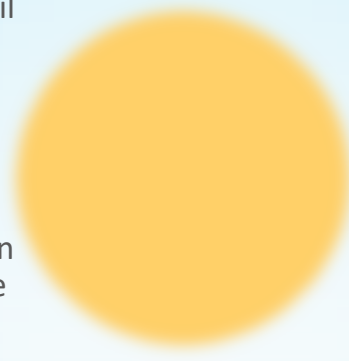
- Electricity and heat can be produced with solar energy. In small-scale generators, panels can be located on buildings and, in a larger scale, in solar panel fields.
- Utilisation of geothermal and geo energy in heat production is increasing, and particular potential is seen with medium-deep boreholes.
- Heat pumps can be used in the production of heat and cooling energy. A large part of the energy need of district heating networks can be produced with heat pumps.



# Solar, geothermal and geo energy, and heat pumps

## Nature impacts

- The high need for land use is a significant direct biodiversity impact of utility-scale solar energy. A solar energy field can be marked off from other use by animals and people. The shading of panels has an impact on soil vegetation.
- The construction of solar panels is related to significant indirect impacts of mineral excavation, especially as a result of mining operations on land use.
- The benefit of geo energy is the low need for land use in relation to energy production. Potential impacts include changes in the water quality and flow in the bedrock.
- The heat source of heat pumps may be waterways or air. In heat pumps utilising the heat of sea, lake or river water, the greatest biodiversity impacts are related to the construction of water intake and discharge structures and to changes in the temperature and flow.
- Various waste heats from industrial processes, cooling systems and waste waters can also be used as a source of heat. The biodiversity impacts of these systems during operation are minor.



## In order to promote biodiversity:

- Existing structures and commissioned or already deteriorated areas are primarily used for the utilisation of solar energy. Panels can be located on the walls and roofs of buildings and in already built areas, or in their vicinity such as, e.g. wind power areas.
- Efforts are made to recycle solar panels.
- In the power plant area, it is possible, e.g. plant vegetation in the surrounding areas outside the solar panels, which may promote the activity of pollinators in the area.
- Geothermal and geo energy wells are located outside groundwater areas.
- Potential earthquakes and the processing of drilling waters are taken into account in the drilling of geo-energy wells.
- The biodiversity impacts of heat pumps based on the heat of waterways are reduced with careful planning. The location of structures and the minimisation of impacts of construction and operation are taken into account in the planning.
- Refrigerants that are as environmentally friendly as possible are introduced for use with heat pumps.
- Efforts are made to utilise waste heat within the limits of cost effectiveness.

# Energy networks

A carbon-neutral energy system is enabled by strong energy networks.

- The role of electricity transmission and distribution networks increase as enablers of renewable production and with the electrification of society. More power lines are built and, on the other hand, the distribution network is turned from overhead lines into underground cables.
- District heating and cooling pipelines located in cities provide an efficient and clean heating system.
- The transmission pipes for natural and bio gas or hydrogen enable efficient transmission of energy.





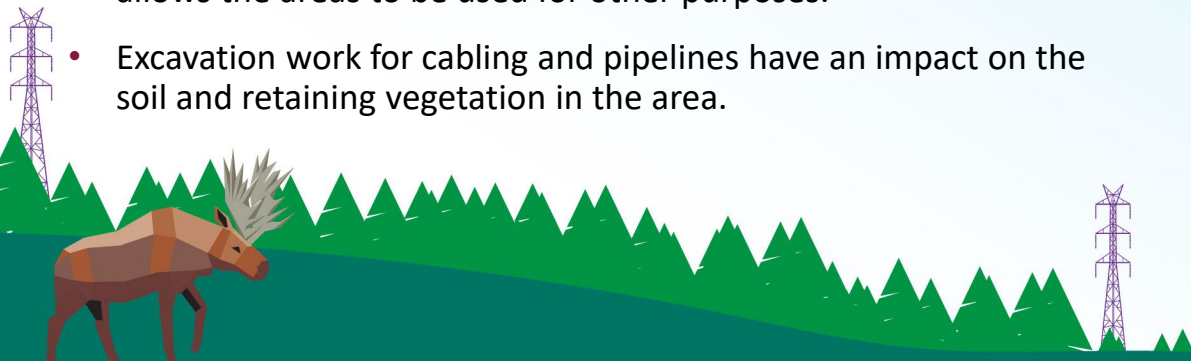
# Energy networks

## Nature impacts

- Major electricity transmission and gas pipelines need a wide, treeless right-of-way or safety area in a wooded terrain. Changes in land use may result in fragmentation of habitats and the cutting off of wildlife corridors. Creating a gap in a continuous wooded area hampers the movement of species utilising trees, such as flying squirrels.
- On the other hand, species that like open habitats can thrive in open line routes. There may also be thickets providing shelter for animals in rights-of-way.
- Open line routes may act as corridors spreading invasive alien species. Birds may collide with overhead lines.
- Cabling and relocation of power lines, for example, along roads, allows the areas to be used for other purposes.
- Excavation work for cabling and pipelines have an impact on the soil and retaining vegetation in the area.

## In order to promote biodiversity:

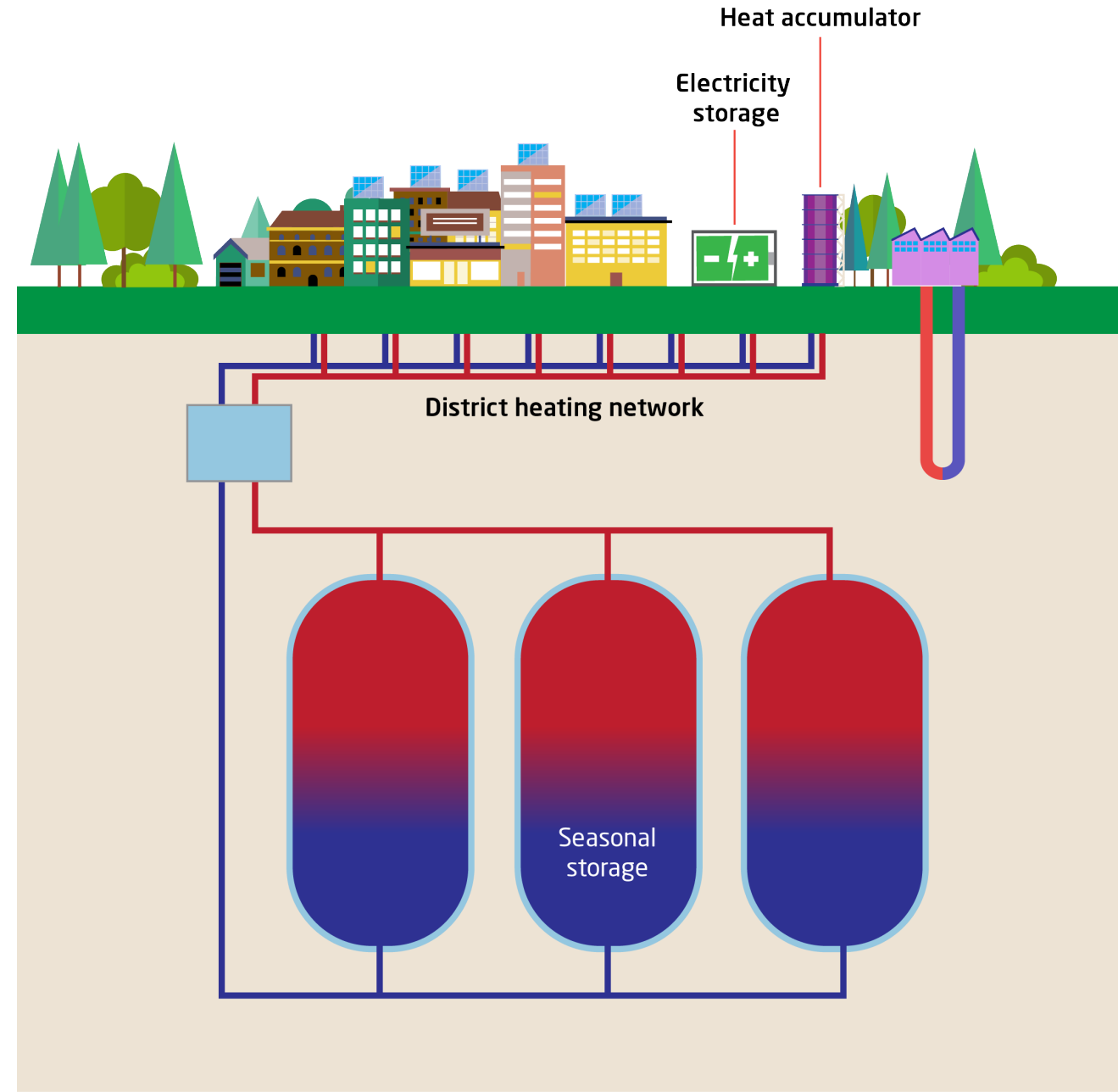
- Nature values are established and taken into account as early as possible during the planning stage.
- In order to reduce fragmentation of habitats caused by the power lines, the lines are located or moved primarily to existing rights-of-way and safety areas or to other areas that are deteriorated or already taken into use, such as along roads and other longitudinal infrastructure.
- Measures in rights-of-way and safety areas:
  - Carrying out measures that increase biodiversity in the area in cooperation with the land owners. Valuable habitats suitable for open areas are meadows, sunny and dry habitats, traditional habitats and wetlands.
  - Minimisation of harm and upkeep of biodiversity are taken into account in maintenance. For example, the amount of decayed wood can be increased in forest management in border zones. Those implementing maintenance measures are instructed in correct conduct.
  - Jumping trees enabling the movement of flying squirrels can be implemented.
  - Overhead lines are equipped with attention signs to prevent birds making contact with power lines.
  - Prevention of the spreading of invasive alien species is taken into account.
  - The areas are also utilised for hiking, cycling and skiing routes, taking safety aspects into account.



# Storage

Energy storage facilities play a key role in the flexibility and balancing of the energy system. Storage improves efficiency in the system.

- Various battery solutions can be used for electricity storage. Lithium batteries are currently the most common large-scale electricity storage facility in Finland. They are best suited for shorter-term storage and rapid balancing of the electricity system. Electricity can also be stored as thermal energy.
- District heat can be stored in storage facilities of different scales. The facility may be used as a daily, weekly or seasonal storage. Heat storage facilities are significant in the flexibility of the district heating system. They enable storage of variable energy sources and electricity as thermal energy. Smaller heat storage facilities are often different kinds of storage tanks. Larger-scale heat storage can be implemented in large underground cave facilities. In these, the above-ground structures are usually small.



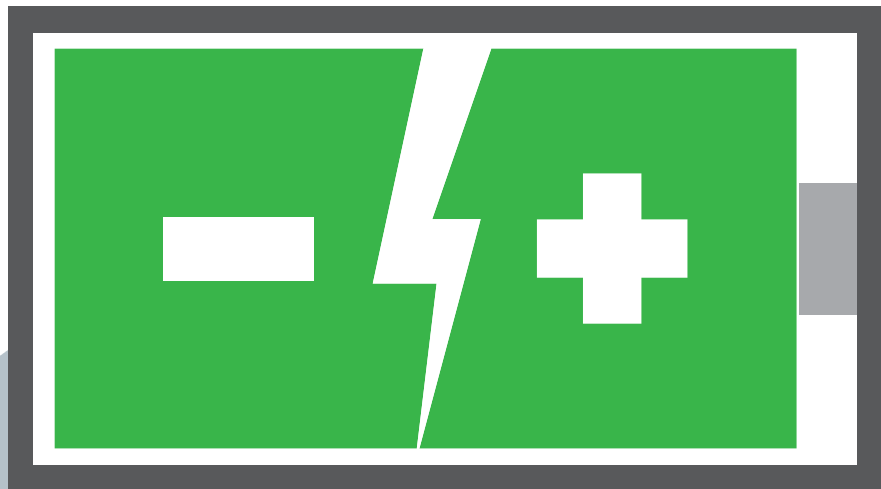
# Storage

## Nature impacts

- The most significant biodiversity impact of electric battery systems is related to the indirect impacts of the excavation of minerals needed in them, especially as a result of mining operations on land use.
- The biggest impact of the construction of larger-scale heat storage cave facilities is the excavation of the soil and bedrock and the resulting changes in the soil and possibly in the quality and flow of groundwater.

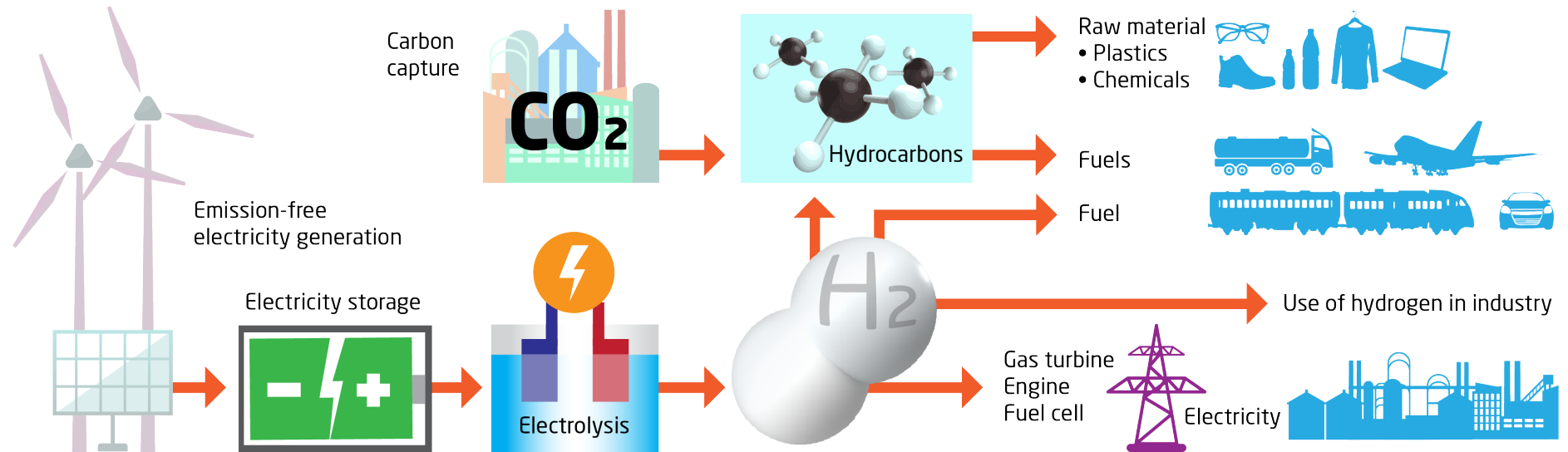
## In order to promote biodiversity:

- Electricity batteries and smaller-scale heat storage facilities are mainly located in existing industrial and plant areas. Electricity batteries can also be located in connection with electricity networks.
- Electricity batteries are recycled at the end of their life cycle.
- It is possible to utilise existing facilities for heat storage, e.g. those previously used for oil storage, in which case the biodiversity impacts remain small.
- New underground cave networks are not located in a groundwater area.
- Intermediate storage of soil and rock aggregates produced in the construction of the cave network is planned so that nature values and minimisation of transport are taken into account in the location of the storage site. Soil and rock aggregates are utilised efficiently.



# Hydrogen and new fuels

The hydrogen economy of the future plays a key role in terms of the climate targets and the development of the efficiency of the energy system.



- Energy production forms and the consumption sector are connected with each other in many ways through various energy carriers, such as electricity and heat, and hydrogen. Hydrogen and synthetic fuels therefore act as both energy sources and stores.

- In the future, carbon capture from combustion processes, such as the incineration of waste or combustion of biofuels, will promote the reduction of emissions and produce starting materials for the manufacture of fuels or products.

# Hydrogen and new fuels

## Nature impacts

- The biodiversity impacts of the manufacture and use of hydrogen and synthetic fuels are related to high electricity demand, and the origin of the electricity used is essential. A considerable amount of energy is also needed for carbon capture.
- Permanent storage of captured carbon also involves biodiversity issues.



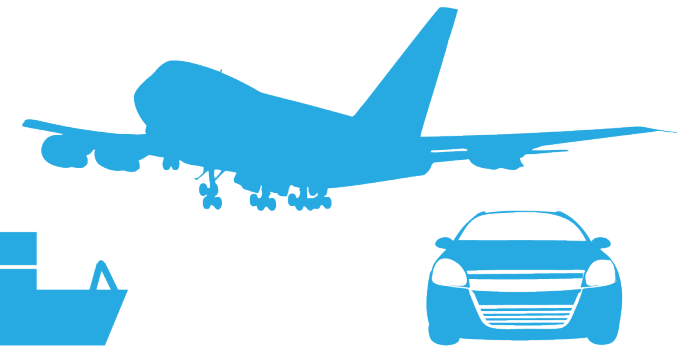
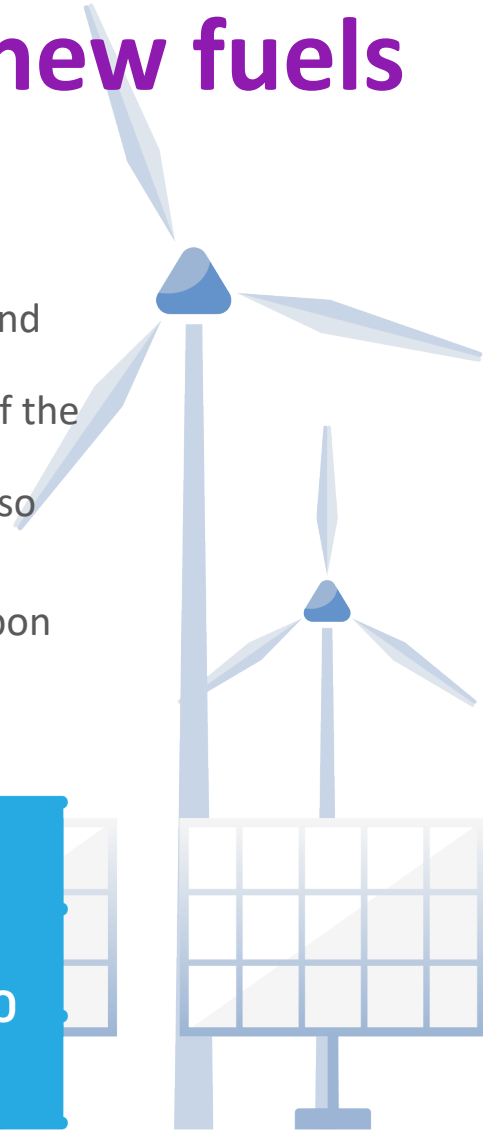
Methane



Methanol



Dimethyl ether



## In order to promote biodiversity:

- The energy sector is involved in developing the hydrogen economy in various roles. Plants producing hydrogen and new fuels can be located in connection with existing plants in order to improve the efficiency of integration of processes and land use.
- In the production of hydrogen and new fuels and in carbon capture, attention is paid to the origin and efficient use of energy.

# Peat production

Peat production is diminishing further, along with the reduction of energy utilisation of peat.

Several peat areas are being closed down and moved to after-use. Peat production can be continued in some areas to safeguard the availability of fuels in order to maintain the security of energy supply and delivery.



# Peat production



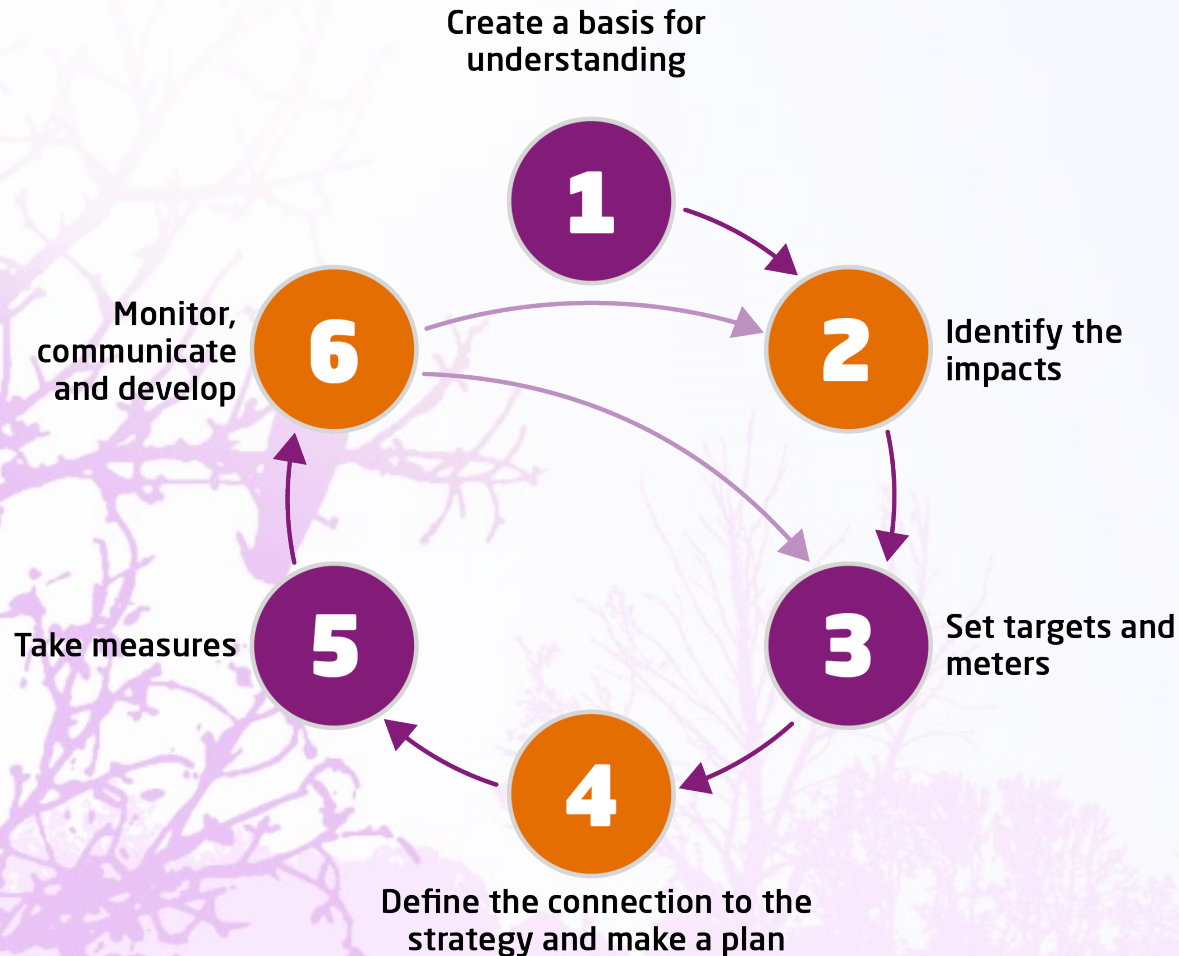
## Nature impacts

- Peat production has significant impacts on mire habitats as a whole. The impacts affect the organisms, vegetation and biological water balance in the area. In peat production areas, all vegetation is destroyed. The production sector also alters the movement connections of organisms. An altered biological water balance may result in changes in the production area and in the surrounding mire and catchment areas, having impacts on the waterways.
- Peat production may, to some extent, be beneficial to insects and amphibians through the ditch network and pools. Birds can also use open fields as a feeding and resting area.

## In order to promote biodiversity:

- The potential for after-use of an area where production is being phased out is investigated in each area.
- The nature of an extraction area can be restored, for example, by paludification, creating wetland areas or changing the area into a bird lake.
- Extraction areas can also be taken into forestry or agricultural use or used for other activities, such as wind power.

# Boosting nature work in enterprises



1. Develop expertise in biodiversity, attend training, utilise networks and the help of experts. Think about the suitability of various methods, alternative development paths, and collect information.
2. All companies have impacts on biodiversity. Find out where the greatest impacts and dependences lie. Take account of value chains, delivery chains, customers, products, etc. Also identify the risks of operations.
3. Define clear, measurable, time-based and significant targets. Specify meters that can be used for assessing the progress of the work. First, attend to the minimisation of the most significant negative impacts and the maximisation of positive impacts. Expand the activities when you gain more experience and the measurement methods are developed.
4. Make biodiversity work part of value creation by integrating it in the business strategy and management systems. Make sure that the biodiversity measures are included in practical operations and that the resources and responsibilities are in order. Consider what the value pledge of biodiversity management is to customers and stakeholders and how you stand out from the competitors.
5. Turn plans into reality. Develop working models, solutions, services and the operating culture. Make use of the restoration and compensation possibilities.
6. Monitor the implementation and results of the measures. Make the work visible! Talk about the measures and their results to stakeholders and remember that biodiversity work also has a marketable value!