

## **Annex to the Internet Survey 2 report**

COST Strategic Workshop series

”Foresight on Future Demand for Forest-based Products and Services”

This is a summary from the survey responses highlighting a number of key observations (for individual responses, see the separate eDelphi report).

Following the practice of the first internet survey (December 2010 – January 2011), the survey was published at eDelphi tool collecting expert perceptions in an anonymous way, but allowing the participants to acquaint with other respondents’ contributions. The survey was open March 31 – April 18 at [www.edelphi.fi/en/groups/costforesight](http://www.edelphi.fi/en/groups/costforesight) and invitations for contributions were targeted to the participants in the two workshops as well as the respondents of the previous internet survey rounds. The distribution list includes app. 200 e-mail addresses, representatives of academia, business, governmental and other administration bodies, as well as NGOs and stakeholders of various interests both in and outside Europe. By April 18 there were a total of 55 responses in the survey.

The Internet Survey 2 opened three images of a future 2025 for assessment. The three snapshots of possible futures were described based on input from the participants of the COST Strategic workshops and the respondents of the previous internet survey. Instead of presenting full scenario storylines for assessment, the survey concentrated on possible developments in three factors as separate illustrations of a future: global energy crises, economy shift from West to East, and accelerating climate change. The time horizon was set for the next 10-20 years in order to connect the futures with trends and developments already perceivable today. The three images of a future are not full scenario storylines, but rather, snapshots of possible developments in one key factor (among many interlinked factors) providing examples how to assess the effect of these developments on forests and the forest-based sector in Europe.

The respondents were guided to read the three images of a future as separate descriptions – thus each query illustrating one dimension of possible developments. The queries asked the respondents’ assessment on probability of each “future”, as well as questions on the preconditions that the future state of affairs could happen, and if this is to happen, what should we do in order to reduce the problems and/or harness the possibilities for forests and the forest-based sector in Europe.

The survey results will contribute to discussions at the COST workshop series Steering Committee (May 11, 2011) as a preparation for the final conference in Poland and an information event in Brussels in the autumn 2011. Aim of the exercise is to define research needs and priorities for the forest-based sector and related sectors, as well as possible needs for more detailed foresight investigations. The data collected throughout the process is available for further analysis (for further information contact [paivi.pelli \(at\) efi.int](mailto:paivi.pelli@efi.int))

This survey is about investigating alternative development paths: the below description opens up a snapshot of a future where one key factor – the energy sector developments – has taken an important turn. Read through the description, the statements about forests and the forest-based sector in Europe in 2025 and respond the questions in the end of the page.

## Query 1: Energy crisis

It's 2025. The energy crisis has changed the world. Instability in the Middle East in the 2010's affected the development of oil markets, but few foresaw the more radical changes that were coming: peak oil was reached already in 2018. Old technology such as energy generated from coal gave some relief in the short term. However, nuclear power is no more a major source of energy, since after a severe nuclear accident in 2011 at the Fukushima nuclear power plant in Japan, several countries started to phase out nuclear energy. The unexpected shortage of oil brought the world into a global energy crisis. The prices of food and consumables have risen to new records. And although local solutions have been found for supplying energy for food and other production, there are food crises in several parts of the globe. Europe is managing the crises relatively well, due to investments and political support on bio-economy development.

In 2025 the forests and forest-based sector in Europe can be described by following statements:

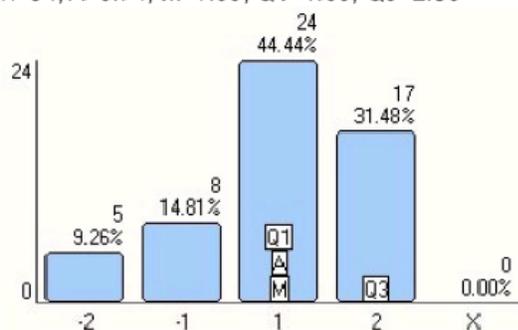
- Due to high demand for energy, forest biomass is harvested on a large scale and has become a major energy source in Europe. Energy and oil companies are now major players in the forest-based sector focusing on intensively managed plantations with fast growing species, and on more intensive recycling to meet the demand for energy.
- The loss of biodiversity is accelerating. Societal demands are becoming louder for nature conservation and preserving larger areas of forest for biodiversity. Also ecosystem services other than energy extraction (recreation, public health, fresh water) are in high demand.
- Competition for natural resources leads to increased land use conflicts, more intensive land use management and zoning of specific functions. Land use for food production and energy is prioritized over forestry.
- Forest ownership is centralised mainly to large owners. Forest owners benefit of the high demand for raw material. Large forest companies have merged with energy companies and are investing in developing new fuels and energy solutions.

All in all, the image of a future with energy crises and the described developments in the forest-based sector are perceived probable (76%).

**Question 1.1: Think of the above description and the statements about forests and the forest-based sector as a whole: how probable do you see the developments?**

- -2 = very improbable
- -1 = somewhat improbable
- 1 = somewhat probable
- 2 = very probable
- X = don't know

n=54, A=0.74, M=1.00, Q1=1.00, Q3=2.00



The respondents agree to a large extent with the developments and the preconditions as described above, but the following points are perceived critically in several (+5) written comments/answers:

- Development of forest ownership towards more centralized ownership in Europe;
- Role of forest biomass as an energy solution i.e. the description lacking perspective of developments in alternative energy sources and other renewable sources than forest-based biomass, and technology development in existing energy solutions, as well as in producing, distributing and saving energy.
- Development of nature conservation and biodiversity issues as well as the land use change i.e. the description lacking perspective of regulations and societal pressure solving the trade-offs between energy production and biodiversity in a way or another.

For the question about **what should we do to reduce the problems and/or harness the possibilities of developments for the forest-based sector in Europe** in the described “energy crises” future image, there are several viewpoints raised – some of them opposing each other. Here below examples of points made in several responses:

- In the energy questions, the importance of **energy saving solutions** (e.g. new technologies improving efficiency but also **promotion of biomass-based materials** – both traditional forest industry products and new products – for replacing plastic and other oil-based materials), development of **several energy sources**, and efficiency of using the forest-based biomasses throughout the whole wood chain, i.e. wood for **several end uses**, including preference for high value added uses first.
- **European level more coordinated approach** to forest policy, to land use planning and incentives for directing the developments (incl. strong central government, pan-European regulations, subsidies, taxes...).
- Improved forest planning and management, such as efficiency by **zoning and intensive forest management approaches** including a wide spectrum of biotechnology solutions for genetics, tree breeding, plantation and land use planning, and/or “intensive conservation” solutions and means for ensuring **multiple forest use**. Responses also call for **impact assessment** of consequences of alternative solutions as well as better **risk preparedness** and remedies for possible problems e.g. from the new technologies.
- **Good governance**, appropriate policies and legislation, as well as more **community approach**, e.g. public involvement in decision making and holistic approach to whole wood-sector development, including local sustainability solutions for rural livelihood and for urban areas.
- **Science, innovation and research** (technologies, efficiency, biotechnology) as well as improved knowledge and awareness, e.g. through **education** and awareness raising for decision makers
- To look the questions from **a wider perspective than “Europe only”** – thus, e.g. striving for global agreements, solutions to global challenges, incl. land use pressure.

This survey is about investigating alternative development paths: the below description opens up a snapshot of a future where one key factor – the global economy developments – has taken an important turn. Read through the description, the statements about forests and the forest-based sector in Europe in 2025 and respond the questions in the end of the page.

## Query 2: Economy shift from West to East

It's 2025. China is already for more than 10 years the world's leading economy. Europe is lagging behind China and other Asian countries and is suffering from high unemployment rates as large multinationals have moved their development and production facilities closer to large markets. Asian investments in Latin America and Africa are blooming, and a large share of the mass production takes now place in these countries. The European population is rapidly ageing. Service sector is increasing and processing industries are concentrating mainly on the domestic European markets – many technological innovations come here a year or two after the leading Asian markets.

In 2025 the forests and forest-based sector in Europe can be described by following statements:

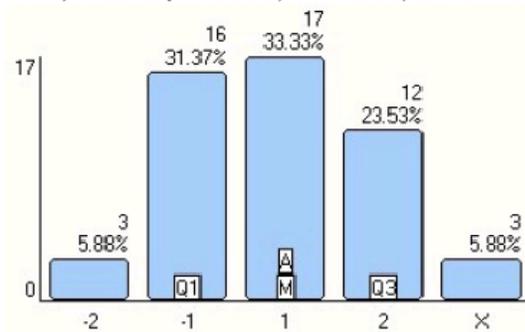
- Global demand for wood, pulp and paper is still increasing but the forest industry in Europe is struggling to find solutions to regain its competitiveness against the Asian and other competitors. The forest industries in Europe have started to focus on high quality products and services with a high-end value.
- Service companies related to public health and well-being such as medical companies, tourism and recreation businesses have grown in importance. Cooperation with ICT firms as well as agri-business and other natural resource sectors produce new innovations, although this often requires foreign investments outside Europe.
- As forestry is now focusing less on intensive wood production there is more space for recreation, conservation and production of non-wood goods. Biodiversity of European forests starts to improve slowly. There is less competition for land use resources and in Europe the conflicts over natural resources are manageable.
- Increasing share of income for forest owners comes from e.g. nature tourism, recreation, public health services, and non-wood forest products and fresh water.

All in all, the image of a future with economy shift from West to East and the described developments in the forest-based sector are perceived probable (57%) – although not as likely as the developments described in the futures images of an energy crisis or accelerating climate change.

**Question 2.1: Think of the above description and the statements about forests and the forest-based sector as a whole: how probable do you see the developments?**

- -2 = very improbable
- -1 = somewhat improbable
- 1 = somewhat probable
- 2 = very probable
- X = don't know

n=51, A=25.00, M=25.00, Q1=12.00, Q3=37.00



The respondents agree partly with the developments and the preconditions as described above, but the following points are perceived critically in several (+5) written comments/answers:

- Development of China (or other “emerging” markets): also these economies will become mature with same challenges as the West, also societal changes are likely to change the growth pace.
- Recreation and other uses replacing biomass production as main income from forest: Europe supplies wood biomass to global needs i.e. forest-based products are sold in global markets and the need for biomass (roundwood and energy) is not decreasing
- Globally unsustainable development will affect also Europe; what is the engine of economy in Europe, how can Europe sustain its welfare and pay for the social and other services; who are the paying customers for forest products and services.

Furthermore question is raised about missing description of developments in US and Russia and about the energy solution available in this futures image.

For the question about **what should we do to reduce the problems and/or harness the possibilities of developments for the forest-based sector in Europe** in the described “economy shift” future image, there are several viewpoints raised. Here below examples of points made in several responses:

- **Investments in forest industries, support for business start-ups, market creation and financing/remuneration** e.g. solutions for ecosystem services, recreation, non-wood products (incl. fresh water, clean air...)
- **Innovation** and investment in development of **new products**, concentration in high-quality, high-end products and services; new business and entrepreneurship with regard to products and services designed for increasing ageing population; orientation to fields where Europe can compete with Asia and where Europe is less dependent in US; joint ventures between sectors (e.g. medical companies, tourism, recreation, ICT, agri-business and other natural resources sectors).
- **Global trade agreements** and rules striving for global sustainable development
- Economic policy and investment in **labor markets** (e.g. work force, immigration policies, salaries, social costs) and overall competitiveness in Europe.
- Investment in RTD, technological leadership in Europe and **collaboration with Asia and Latin America**; education and awareness / conscious raising

This survey is about investigating alternative development paths: the below description opens up a snapshot of a future where one key factor – the climate change developments – has taken an important turn. Read through the description, the statements about forests and the forest-based sector in Europe in 2025 and respond the questions in the end of the page.

## Query 3: Accelerating climate change

It's 2025. Unmanageable climate change has become reality: natural disasters have become much more frequent and people are trying to cope with the changing conditions where severe floods, droughts and forests fires are yearly returning phenomena. Governments at all levels (local, national, global) are aiming at integrating environmental, energy, agriculture, forest, land use and climate policies with a stronger environmental emphasis. Climate change adaptation and mitigation strategies are developed in most countries around the globe. At least in a short term, the effects of the new measures are modest. Environmental awareness of the people is increasing and there is a great willingness to take action. Investments in new technology development are increasing and new solutions are sought by scientists and practitioners.

In 2025 the forests and forest-based sector in Europe can be described by following statements:

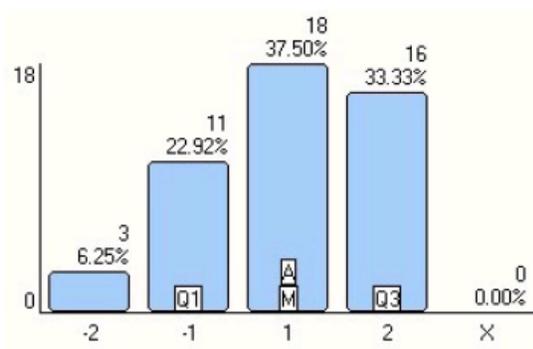
- Despite diminishing forest area for intensive wood production due to forest damages, the wood and wood-based products industries are thriving. This is partly due to the policies which support the use of renewable and re-usable materials, and partly due to the innovations in new materials and smart solutions combining energy efficiency, reusable materials and services for lengthening the product life-time. Wood working industries, including companies designing spatial and construction solutions for population to manage the extreme natural events, are becoming an important provider of jobs and income in Europe.
- Less-carbon and less-energy intensive solutions are forced through industries and the approach affects also European life-styles: sustainability and security is sought from local solutions, and for example, forest management is involving citizens and local communities at a new scale.
- Public and political interest on forests is high. With the aim of capturing more carbon, European governments support reforestation of large areas. However, with forests now occupying a much larger share of the land area, conflicts with food production are looming.
- European forest know-how, including forest planning and management practices, climate change mitigation and adaptation measures and e.g. monitoring systems and techniques are on high demand, and several companies target for a global business in this field.

All in all, the image of a future with accelerating climate change and the described developments in the forest-based sector are perceived probable (71%).

**Question 3.1: Think of the above description and the statements about forests and the forest-based sector as a whole: how probable do you see the developments?**

- -2 = very improbable
- -1 = somewhat improbable
- 1 = somewhat probable
- 2 = very probable
- X = don't know

n=48, A=0.69, M=1.00, Q1=-1.00, Q3=2.00



The respondents agree to an extent with the developments and the preconditions as described above, but the following points are perceived critically in several (+5) written comments/answers:

- Climate change development during next 15 years (too radical compared with projections made so far). Furthermore, the impact of forest damage and differences in Europe (e.g. extensive droughts, desertification in the Mediterranean area..) for development of the forest based sector are lacking from the description.
- Impact on the forest sector in Europe is too positive – like a “dream come true” – are the forest-based sector actors (research, decision makers and industry players) advanced enough to achieve this? What will raise the environmental awareness and involvement of the public?
- Land use changes: land use conflicts between food production and forests are underestimated, furthermore impact of urbanization is not included in the description.

Furthermore it is pointed out, that there are also other solutions to climate change mitigation than forests: nature’s resilience and impact of e.g. oceans is not known.

For the question about **what should we do to reduce the problems and/or harness the possibilities of developments for the forest-based sector in Europe** in the described “climate change” future image, there are several viewpoints raised. Here below examples of points made in several responses:

- Diversification of forest management, **forest adaptation** and solutions increasing forest resilience – incl. all means available (biotechnology, existing and new technologies..)
- **Improved information, evidence** on the changes underway as well as on the alternative solutions and their impacts; education and increased awareness of policy / decision makers as well as the general public.
- **Improved knowledge basis**, including multi-disciplinary research and development projects, citizen participation, **sharing of know-how and new technologies** with the emerging and developing countries.
- **Land use policies** and improving **productivity** of land supplying both food and other biomass, more local solutions; improving disaster **preparedness**.
- Policy and technology innovation; more **clean and energy-efficient production and consumption**; life style changes, reduced living standard – increased quality of life.
- Finding **solutions for the global challenges** of population change, demographics, poverty reduction.

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## Query 1: Energy crisis

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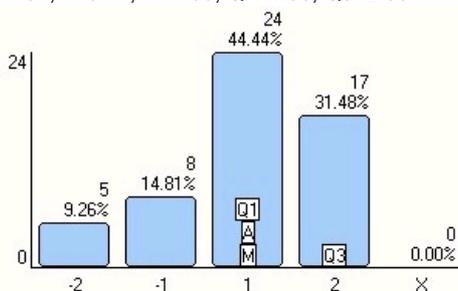
In 2025 the forests and forest-based sector in Europe can be described by following statements:

- Due to high demand for energy, forest biomass is harvested on a large scale and has become a major energy source in Europe. Energy and oil companies are now major players in the forest-based sector focusing on intensively managed plantations with fast growing species, and on more intensive recycling to meet the demand for energy.
- The loss of biodiversity is accelerating. Societal demands are becoming louder for nature conservation and preserving larger areas of forest for biodiversity. Also ecosystem services other than energy extraction (recreation, public health, fresh water) are in high demand.
- Competition for natural resources leads to increased land use conflicts, more intensive land use management and zoning of specific functions. Land use for food production and energy is prioritized over forestry.
- Forest ownership is centralised mainly to large owners. Forest owners benefit of the high demand for raw material. Large forest companies have merged with energy companies and are investing in developing new fuels and energy solutions.

**Question 1.1: Think of the above description and the statements about forests and the forest-based sector as a whole: how probable do you see the developments?**

- -2 = very improbable
- -1 = somewhat improbable
- 1 = somewhat probable
- 2 = very probable
- X = don't know

n=54, A=0.74, M=1.00, Q1=1.00, Q3=2.00



If you wish you can explain your answer here:

- I don't foresee the change to small properties to forest ownership centralized mainly to large owners. I think (and hope) that the legislative framework of Europe will protect biodiversity.
- Unless some excellent solutions for better utilization of solar energy are found it is quite probable that we will face energy crisis of some sort in the future
- However I do not think that loss of biodiversity and competition for natural resources will necessarily happen. The conversion to a biofuels and biomaterials future needs to be managed well to ensure we avoid these problems.
- I don't think that this scenario is very probable but only somewhat probable because the best answer to an energy crisis is not the one described here. The consequence of an energy crisis, and still more after Fukushima, is first to save energy consumption. The contribution of forestry to a reduction of energy consumption is through the development of wooden products rather than glass, iron, concrete,... Moreover, wood can be burnt at any stage of its life cycle and it is better at the end. I think that relative prices will convince forest owners to produce logs (and fuelwood as byproduct) rather than only fuelwood. Thus the answer to the energy crisis will not be only oriented towards intensive management. If it is, the evolution will be only gradual (due to the high stock of wood in forests and a conversion will be implemented anyway with a big inertia (problems such as biodiversity losses would happen much later.
- Forced centralizing of ownership implies a policy that will never be accepted in European democracies.
- I think that the issue of forest biomass will indeed become a major driver, but there are a lot of 'counter-drivers' (e.g. multifunctional forest use, ownership issues, public sector securing of e.g. recreational opportunities and nature conservation) that will limit the move towards the sketched situation.
- According to current estimates, it is probable that fossil fuels become scarcer.
- in general I agree but I think some of the combination of events is less likely than some specific points. eg

prioritisation of land use (by 2025)

- I do not believe that forest ownership is centralised to large owners. At least not in countries where there is a large number of small owners now. Reason: Money making from forest is not their main issue. In addition forest-based industry (producing materials - forest products) will suffer
- Changes in forest ownership needs to be argued: what is the driving force?
- There are possibilities to develop renewable sources of raw materials and energy by establishing an equilibrium between plantation and harvesting and by selection of new species and developing new species by genetical modification. At the same time we need to have a new model by combination of silviculture with agriculture by mozaic cultivation. The agriculture could be sustainable if its energy consumption can be assured by proper sources.
- This scenario is very likely, even without the revolutionary developments in the Middle East and without countries phasing out nuclear energy this could happen. The signs were already there before Fukushima and before Kaddafi had to go. Energy is going to be scarce in the future anyway, with or without a major crises.
- I agree with issues in bullets 1-3 but not with the issue in bullet 4
- Energy crisis yes, but forests will only be a minor mostly regional contributor to the solution for energy shortage but I agree that there are indirect effects that will lead to land use conflicts. On the other hand I don't believe that there will be a big outcry for nature conservation as soon as there is an economic crisis.
- In my opinion this scenario looks a little bit to pessimistic, but obviously, it looks realistic. We do not know what will happen in next few years, and especially not in 2025. Cross fingers that my vision is realistic in spite all circumstances.
- some aspects are very likely other are very unlikely
- About 40% of the paper and board production is consumed in packaging. Paper and board packaging has 35-40% of the global packaging market. About the same share has oil based plastics. In a globalised world we need packaging and must get them from some resource. If we withdraw forest and have an oil shortage the described equation doesn't seem logical.
- I believe new energy sources will be developed to replace the dependency from present energy source. They could be due to improved technologies that improve use of wood (e.g. buildings, logs, etc), wood residues, food oil residues, waste, solar power, wind power. Or maybe someone develops a way to develop "oil" from mushrooms? Also, forest companies WILL NOT let the oil companies to step in and steal their share of profit. Forest ownership remains fractured and small-sized but new organisations may be formed to pursue forest owners' interests.
- Forecasting fourteen years forward is frightful given that economics, with financial incentive "to get it right" has still failed to foresee one day ahead. The crash of October 2008 was really the first Fukushima.
- Considering the hypotheses, there wouldn't be many alternatives. I might even happen earlier.
- First we don't really know about the effects on the nuclear energy politics. Second I think that there will be a diversifications on the energy resources (wind, solar and the bio).
- The energy crisis is possible and even evident, but large companies do not necessarily react in the way introduced. Centralized production of biofuels has already met problems, and I think that these problems will become worse before 2025. In developing countries, conflict between local people and large companies make it quite difficult to get societal acceptance for large scale production of raw material of liqued biofuels. Transportation cost might become so high that large scale biorefineries are not economically sustainable. I believe in decentralized systems in bioenergy and the development toward it is not a path of reacting to sudden energy crisis. Instead, this development has already started. I don't believe in the change in forest ownerships, because of democratic system of Europe. People quite soon will become aware of the rising value of forest and that is why they do not want to sell their forest holdings.
- To have four general statements and asks for one answer seems not accurate for me. I think that some developments mentioned above are probable (e.g. Competition for natural resources) and other very improbable (forests biomass as a major source of energy in Europe)
- I perceive some signs of such development.
- Szenario is quite realistic if the conditions described above will happen. But, I still hope they will not happen.
- My answer especially refers to the last to bullet points above.
- Forests have to be applied in other sectors, especially fast growing species as energy source and in the same time to be used as shelterbelts (used to protect agricultural areas, roads and railways against snow, ...) and in similar parallel uses.

### **Question 1.2: What are the preconditions that would lead to these developments?**

- the organization of raw material producers only will happen if the marked prize are high enough.
- Extreme price increase of oil.
- We would fail in the development of new energy sources (especially wind and solar energy but also utilizing waste materials for energy production) as well as fail in the prediction of how long we are able to utilize our oil resources.
- Natural species like other intensively managed plantations and harnessing the renewable energy resources will have profound importance.
- The need to make energy and materials from resources other than petrochemicals. This cannot be food crops, so it has to be other crops for example trees or algae.
- No new energy solution is found (very probable) The arguments above are omitted (somewhat probable)
- mainly the peak oil
- general acceptance/wide scale use of plantations and genetically modified plants ALSO in forestry. Russia and USA not finding/releasing further drillings in the tundra/Siberia/ North pole area and Barrenets sea/Antarctica. I see a problem in over population in Asia and Africa, possibly LatAm, combined with an aged European population. Probably massive migration into Europe. Illegal harvesting threatening the world globally. Including Europe.
- Some kind of revolution when it comes to ownership.
- Dramatic changes in energy supply by 2025 and the lack of alternatives to biomass. A lack of public support for other forest functions (e.g. biodiversity, recreation)
- No additional oil and lng reserves are found.
- While such developments might conceivably occur at a future date, the pace of change will not be so fast - the

fallout from Fukushima will need to be much more severe than presently. Chernobyl was a much more serious event and that did not put a brake on nuclear power.

- Technology to make wood-based bioenergy profitable, and large-scale consolidation of forestland ownership, rather than fragmentation.
- continuing difficulties in oil supply, governmental directives in greater intensification of forestry into plantations (short and longer rotations), commercial power from energy companies high investment capability. biodiversity arguments would be based on a lack of knowledge or evidence for the state of biodiversity and what the impact might be (that cannot be attributed to climate change).
- the big energy hunger of the industrial world
- competition between wood used for material purposes and energy.
- Politicians who do not have courage to defend nuclear power and scientists who do not have capacity to invent new sources of energy.
- The preconditions are determined by the analysis of the opportunities to close the cycle and to develop other renewable sources including the algae, wind and solar energy.
- Scarcity of energy could lead to these developments, but also unsustainable use of natural resources or explosive population growth can lead to similar developments.
- the right technology to convert biomass into usable energy products
- this is BaU scenario
- Fukushima has a major impact. The political crisis in oil rich countries is exasperating and getting out of control. Oil reserve calculations are totally wrong
- continuing energy demand / energy waste
- Fragile political situation in developing countries with high national conflict levels. Increased consumption of commodities and energy from growing economies.
- first and the most important is a lack of the collective (global) awareness; future possible natural disasters (earthquakes, volcanic eruptions, tsunamis, wars,...);
- oil shortage
- Energy crisis, increasing land costs (mostly taxes), movement of people from the rural world to the cities.
- That the developments in e.g. solar energy is believed to have no future and the authorities do not have the power to regulate the situation. Before we are to leave the nuclear power there must be additional accidents with much larger consequences.
- I think the loss of biodiversity will not accelerate in Europe (laws, NGO's...). The last statement is not true for many countries
- that the current policies do not drastically change and - while securing that the forest area in Europe does not decrease much - still degrading (biodiversity, social values) of forests and privatization is going on
- How I see it (that is, my future and not the future given): energy, water and natural resource scarcity lead to that development. Also, the global development (again, the same resources + food) will support the development of Europe to become more self-sufficient.
- That solar, tidal, geothermal and wind energy research failed to provide economic solutions.
- increasing population, increasing demand for food, commodities and energy; stagnation or reduction of nuclear energy generation, increased use of biomass for energy purposes
- emissions of CO2 prices,
- The ones that are described in the narrative: peak oil, nuclear phase out.
- oil prices
- Increasing demand for bioenergy and raw material for products, resistance towards nuclear energy.
- I think that these were already defined in the introduction.
- Again, the same for previous question. One needs to develop each of the topics mentioned above.
- a total shift in expertise from the forest sectors to an industrial and irresponsible strategy of forest mgmt
- Develop a European Union which is really unified. But this could not happen, even one century later.
- Strong policy interventions affecting forest holding market, greater value and structural change of forest owners and citizens than expected, some more eco-catastrophes leading to food and water crisis
- There still are alternative sources of energy. Scenario does not seem very probable at least in Northern latitudes of Europe except bullet two
- Forests are the only natural resource that is only updated
- Dramatic reduction of nuclear power use will increase pressure on wood as renewable energy resource because it can be activated immediately.
- Lack of awareness of environmental and social functions/values of forests let them become low-priority issues. Weak regulations (and/or weak enforcement) on environmental dimensions of forest management allow the development of intensively managed fast-growing plantations
- - Integrated exploitation of biomass resources to reach a balance of demands for the energy, forest based industry and society. - Extension of the services provided by considering the possibilities of alternative growing forest for food.
- Solving land use conflicts for instance between agriculture and forestry (raising awareness of farmers that losing a part of farm land for establishing shelterbelts/windbreaks is focus on global increase of yield conditions on the farm).
- Continued rapid economic growth in China and India, no major progress in energy efficiency

**Question 1.3: Assuming that this "future" is to happen, what should we do to reduce the problems and/or harness the possibilities of these developments for the forest-based sector in Europe?**

- \* Do not reduce the focus in biodiversity issues. \* Try to keep the rural areas alive, with people living in it (the risk of forest owners selling the land to big companies would decrease)
- Energy savings both in industry, transportation and house warming/cooling. Energy production from wind, sun and biomass.
- Plan for the best geographical places for plantations for fast growing species, plan for the best uses of the forest raw materials from the northern, central and southern Europe, plan for the best possible regions to be used for energy wood, wood used for other purposes and food production on European level
- New technologies bring new problems, recently, severe nuclear accident at the Fukushima embodies well this situation. Therefore for future one should be ready for remedies for new technologies as well.
- Start now, plant forests on marginal lands, invest in appropriate research, get rid of unnecessary and stifling regulations such as those related to the use of GMOs. Restructure European forestry, use plantation forestry

models to enhance productivity. Agree with NGOs on which areas are used for highly productive forests and which areas are in turn left alone (natural)

- Convince decision makers that there are several alternatives to reduce the energy crisis from a forest point of view and that all of them have to be evaluated according to multiple criteria.
- focus on reducing energy consumption
- increase machine efficiency in all applications of society and industry. encourage small-scale forest ownership and family forests to educate society of how to live simply and without extensive needs, as well as to pass on knowledge and understanding about nature and forest as first hand experiences. To avoid alienation (and fear from ) forests, as it's already to be observed in larger populated areas, eg in Germany. Increase recycling of polyethylenes (plastic) as far as possible and retain oil for production of these/find new ways. Cutting down on oil for heat/electricity/transport. Find/increase alternative, non-environment-disturbing means of electricity/heat production for everyday use, like photovoltaic panels, zero-energy-buildings, bag covers (for mobile and pc charging on-the-go), etc
- I see no reason to do anything for the forest-based sector. I would not like loss of biodiversity. Neither would I like to freeze. Therefore I guess society will ensure that the trade-off between the two services is close to optimal.
- Keeping focusing on multiple use and try to find ways of producing forest biomass that can go together with other functions. Using agricultural lands and a share of forest lands for high-production tree crops, while other forests have other functions in focus. This will require appropriate policies and legislation, as well as mobilisation of different stakeholders.
- Improve techniques to utilise biomass energy production. Improve energy efficiency in all sectors.
- We should ensure that communities have a much stronger stake in forests - that would be developed for wood production, fuel supply, recreation and education. Communities must become shareholders in locally-developed energy solutions, with the profit from energy retained in communities and used to enhance them with infrastructure improvements that benefit the community.
- Invest in greater efforts to conserve existing natural forests, expand areas of natural forests, invest in research to advance wood-based bioenergy, perhaps.
- better planning, more plantation forests with shorter lifespan trees, pan eu planning for what region is best at what activity, development of urban planning for green technologies and green zones that are interlinking and well planned, advantage in investment in green futures for trees.
- energy quota Higher energy prices and taxes on energy higher taxes on material use encourage recycling and repair
- SAVE energy. Because any reduction of life style will not be possible politically there is not too much which can be done realistically.
- Concentrate on traditional forest industry which is efficient in material use and energy production, and facilitates better forest management for multiple use than energy forests.
- We have to increase the research funds to develop new sources, new technologies and to accelerate the technological transfer. Manipulation of biosynthesis processes and developing new biotechnologies can be solutions to assure food and energy.
- - We would need to study the social, ecological, cultural and economical impact what would happen if nuclear energy and/or fossil fuels are replaced with bioenergy. Is a transition to a new bioeconomy possible in a sustainable way? - We would also need studies aiming at finding a balance between energy production and biodiversity conservation. Is it possible to fulfil our ever rising energy demand with renewable resources and at the same time maintain (or preferably restore) natural biodiversity. - Furthermore we have to work on energy saving solutions e.g. in traffic, electricity and heat consumption. This would need new traffic solutions, sustainable construction, optimized (bio-)energy production chains, and optimized food production (for example in developed countries 1/3 to 1/2 of the food ends up in the rubbish bin unused, most commercials end up in the paper (or rubbish) bin unread). It is possible to save a lot of energy and resources with a bit more careful planning and education.
- Invest in the development of alternative energy production techniques. Meanwhile, invest also in research to make nuclear energy production safe(r).
- reserve the right areas for other applications than biomass production. Also looking at unorthodox areas for biomass production (for example road sides) would help.
- impacts to natural resources should be integrated in all sectoral policies (obligatory measurement of impacts by indicators, quantitative and qualitative targets set) Forest needs better integration with environmental policy and development their multifunctional aspects driving forces should be taken in account at global, european to local level. Technology is important driver.
- Establishing a clear priority list of what we would like to get out of our forest resources. High value products first and promote the cascade idea. Develop new valuable products that replace oil based products (not only energy related). Improve wood based products already on the market by decreasing the raw material input.
- work on the global population growth problem energy saving as one big "source of energy" multifunctionality of forests (rather than segregative zoning)
- Manage forests sustainably, improve resource efficiency in the forest industries.
- to put "all heads together", in spite of all differences, local (global) interests; nature is the only one human kind have and there are no doubts about it; minimum intervention (cutting trees) in the natural forests, maximisation of the food production and in the same time optimise growing of the plantation forests;
- increase energy efficiency
- Maintain the subsidize of wood raw material for energy as low as possible and making it dependent of the size of the property (small land owners will be given the most money).
- An european policy for the whole of forest sector
- do not sell forests from government / public management to private companies
- First and foremost, keep the EU alive! So you have a strong central "government" to outmanoeuvre the big companies. And pursue environmental values.
- Invest in better forest science, forest genetics, breeding, biotechnology and tree transformation for better resistance to biotic and abiotic stresses.
- increase energy efficiency at all levels, increase material efficiency, create more value from biomass utilisation; cascading use of bio-based material and bio-based products; recycling; energy generation from bio-based material at and of life
- promote and demand of education about nuclear power technologies (short terms), develop solar, wind and any other technologies of energy production which not need large area exclude from food and wood production. If not we will can observe growing food prices (not will), lack of wood for wooden products. We can also exclude

- wood from the forest from energy production (e.g. only wood from plantation can be used to CO2 balance)
- Focus on RTD and innovation to increase the efficiency of conversion from biomass into energy, but also in finding new source of energy (hydrogen batteries, etc.)
- We have to include this scenario on the forest planning policies, especially on those areas where at this moment there is no such demand of forest products and the forests are mainly unmanaged, for example south of Europe. Another goal is to prevent against the overexploitation and their consequences, loss of biodiversity, soil, production.
- Discuss and produce knowledge for strategies for trade-offs between different forest ecosystem services.
- We must develop decentralized local level bioenergy solutions. Realistically, nuclear power is still needed for a while, but we should shut down the nuclear power stations as soon as possible. We should not build more nuclear power stations.
- I personally do not believe that combustion of forest based fuels can be considered sustainable energy. Alternative sources of energy such as wind and solar have to be exploited. Devices with lower energy consumption have to be developed. Cellulose, the major component of forest based materials has a poor combustion value due to the high oxygen to carbon ratio (0.83). Selective fractionation and gasification of carbon rich fractions needs to be considered.
- in a knowledge based bioeconomy an educational programme with different scenarios would help
- We should not think only "Europe". Europe, alone will lead only to a deadlock. We should think "World", World forests, as ONE unity, to sustainably manage, etc.
- Designing European energy taxation and subsidy system to keep the demand of forest land stable and not susceptible to severe market cycles or speculations.
- Better zoning in forests, public involvement in decision making, promotion of wood as material (for construction etc.)
- Invest in intensive forest protection and their adaptation to altered conditions
- Start at once with developing alternative renewable energy resources, most probably off shore wind will be a good solution. Decentralise energy production in any case will need a good grid. We should start at once with modernizing the energy grid. We will need it anyway.
- For European forests in general, and Mediterranean ones in particular: Ensure wooded ecosystems and their biodiversity are better protected/restored, and adopt and implement policies to optimize their adaptation to global changes (especially to climate change impacts) in order to enhance the provision of environmental & social services and meet society (including local population) demands. Develop adequate financing mechanisms. Promote cross-sectoral, participatory and long-term approaches and the integration of forest management in land management policies and territorial development projects, to ensure a "good governance" of forests and avoid that some stakeholders (e.g. big energy companies) illegitimately take over the resources use/property. Where productive functions are central, establish and enforce regulations to ensure that forested areas are sustainably managed and to minimize the environmental impacts of intensively managed fast-growing plantations.
- - Investments in research - Public awareness and education, especially in developing countries
- More control on private forests, especially in the countries in transition.
- The "traditional" forest-products industry should try to take a leading position in developing renewable energy, speeding up the development of bio-refineries, built around sawmills (central, both for supplying by-products for bio-energy, panels and pulp as well as for mobilising wood) and (former) pulp and paper mills, producing renewable, energy efficient construction elements as well as bio-plastics, bio-diesel, etc.

*This survey is about investigating alternative development paths: the below description opens up a snapshot of a future where one key factor – the global economy developments – has taken an important turn. Read through the description, the statements about forests and the forest-based sector in Europe in 2025 and respond to the questions at the end of the page.*

## Query 2: Economy shift from West to East

It's 2025. China is already for more than 10 years the world's leading economy. Europe is lagging behind China and other Asian countries and is suffering from high unemployment rates as large multinationals have moved their development and production facilities closer to large markets. Asian investments in Latin America and Africa are blooming, and a large share of the mass production takes now place in these countries. The European population is rapidly ageing. Service sector is increasing and processing industries are concentrating mainly on the domestic European markets – many technological innovations come here a year or two after the leading Asian markets.

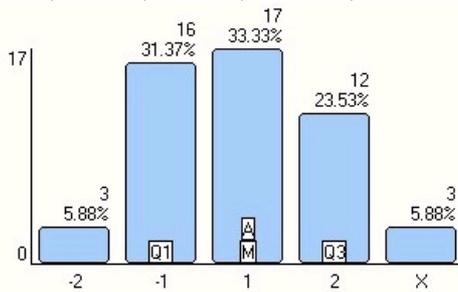
In 2025 the forests and forest-based sector in Europe can be described by following statements:

- Global demand for wood, pulp and paper is still increasing but the forest industry in Europe is struggling to find solutions to regain its competitiveness against the Asian and other competitors. The forest industries in Europe have started to focus on high quality products and services with a high-end value.
- Service companies related to public health and well-being such as medical companies, tourism and recreation businesses have grown in importance. Cooperation with ICT firms as well as agri-business and other natural resource sectors produce new innovations, although this often requires foreign investments outside Europe.
- As forestry is now focusing less on intensive wood production there is more space for recreation, conservation and production of non-wood goods. Biodiversity of European forests starts to improve slowly. There is less competition for land use resources and in Europe the conflicts over natural resources are manageable.
- Increasing share of income for forest owners comes from e.g. nature tourism, recreation, public health services, and non-wood forest products and fresh water.

**Question 2.1: Think of the above description and the statements about forests and the forest-based sector as a whole: how probable do you see the developments?**

- -2 = very improbable
- -1 = somewhat improbable
- 1 = somewhat probable
- 2 = very probable
- X = don't know

n=51, A=25.00, M=25.00, Q1=12.00, Q3=37.00



If you wish you can explain your answer here:

- Global wood demand will increase and Europe needs to adjust to this trend. This cannot be done in the current European regulatory and political environment, so radical change is needed to allow for highly productive forest plantations (including GMO), while at the same time substantial areas of forests are left alone to ensure other ecosystem services are met, for example biodiversity, tourism, water retention etc.
- This scenario could be much closer in time!
- The economic development is very probably, the eco-tourism for bio-diversity is less probable. Compared to the global scale, European biodiversity is less "striking". Who's interested in a dung beetle variation, if there are paradise birds, tigers and geckos in other parts of the world? By nature, European biodiversity is less diverse and colourful than in other areas in the world. But the infrastructure to getting there is easier. However, the bit "non-wood" sales item of European forests/landscape will be water! Good-quality drinking water. And good air. These I guess are the non-timber products. I foresee an increase in Kneipp-applications and health resorts.
- The marginal growth rate is always diminishing in any country. Therefore, China will develop just like any other country. The economy will become big, but also mature, like what we have seen in Japan, US and Europe. As people get richer they want more spare-time, earlier retirement, more environmental services etc. This also applies to Chinese people. And Africans. Besides, the African cultures are not well suited for production economics. African workers will not behave like Asians.
- This is partly linking up to developments we already are seeing in parts of Europe.
- Forest owners get major income only by selling wood or other biomass it is also possible that China's economical development start to catch
- It is unlikely that Asia's technology will lead Europe's in the way described.
- I think it unlikely that there will be less intensive need for forests, or that the EU will be so 'bucolic': however some of the statements are more likely - eg external investment for technological innovation, and development of higher value alternatives for commodity products such as wood, pulp and paper.
- Who pays for the services and where does the money come from, especially to pay for imported products - or are we fully closed market? What happens to immigration to Europe?
- I agree with bullets 1-2 but don't agree with bullets 3-4. The implication of an economy on its bottom is that European purchasing power for mineral oil sources will decrease and pressure on forests will increase to provide wood for energy production even more.
- This is very likely and in fact already going on a long time. Many companies have moved already to Asia: Nokia, Perlos, Volvo, etc. There is a workforce of many billions working for the lowest salary. How can Europe compete with that? The financial reserves of those countries are increasing and eventually they just buy those companies.
- This scenario is problematic in plausibility as global situation doesn't correspond somehow with European response. Doesn't seem to be compatible. Also health and wellbeing development on the European level is not clear regarding the investment outside Europe.
- Yes I can see the scenario but I can't see why this should lead to less intensive wood productions and more space for recreation...
- Something is missing in your scenario. If ageing, less productivity/competitiveness etc. will be future problems, then overall welfare will probably be diminished, and resources be more limited than today. Assuming that biodiversity protection is some sort of a luxury good, I suggest that the interest in conservation will be just far lower than today.
- Not very likely to happen because wood and forest products is traded on a global market.
- The tradition of European forest and wood processing management is inappreciable (including all European countries). Due to the very known European knowledge and experience, Europe has to be the global leader in this sector. It is a fact in spite of very fast development of Asian countries (particularly China and India) and its market.
- If Europe is suffering so much, I wonder who will buy the products. I think global economy would go down. I do not see the impact on the forest based sector in this scenario - forest based industries are too much dependent on the resources.
- It all depends if the social and economic health-fare of European countries will be sustainable in the future.
- China is still an agrarian society, it will not grow as outlined in this above scenario.
- China's growth is not expected to continue. It is artificially sustained. Forest resources would in any case still be needed, even if exported from Europe to other continents. Protectionism might be very active at the time.
- I don't think really probable the fact that the income from tourism, recreation, etc will arrive to the forest owners. There will be other companies that will do the business
- In general, this sounds quite good from a European citizen's point of view. However, I think that economy in East cannot continuously grow because of many uncertainties related to trade between East and West, financial sector, world political issues and more expensive oil in the future.

- I don't see a growing global demand for pulp and paper, but I do see a continuing shift of focus from Europe to Asia and the developing countries. Although the focus of economy moves outside Europe, the more diverse land use in Europe still does not necessarily reduce land use conflicts.
- I do strongly believe that we will continue to use our renewable resources at least as much as we do now
- Comments: This scenario does not mention North America: what would be its position in such a world? Similar as the European one? What about Russia, which has huge forest resources? It seems it is not included in this Europe which produces less wood, but in the rest of the world which contributes to meet the global demand for wood products (?)

### **Question 2.2: What are the preconditions that would lead to these developments?**

- The world market for forest products. No economical crisis that lead the wellbase society to a dramatic change
- I think you descibed i well above
- The domination of Asia, especially China will continue. US economy will not recover well enough from the crisis we see now and this has a large effect also on European economy
- The following businesses medical companies, tourism , recreation businesses have grown in importance. Cooperation with ICT firms as well as agri-business and other natural resource sectors produce new innovations
- Significant population growth, higher demands for energy, food, materials
- No energy crisis
- "Enough" stability in China. China might otherwise fall apart from old internal differencies. Strict energy savings in Europe or the forest would not be untouched.
- European development/stagnation going on as it does. It will be very soon overtaken, adn braindrain is an issue, as the education is good but not the career and family options.
- Political regimes that do not allow the people to enjoy wealth.
- The mentioned economic shift, less focus than expected on forest biomass, as well as a continued interest in e.g. recreational and touristic uses of European forests.
- Forest sector can not renew itself in Europe
- Extensive market development for ecosystem services.
- Asias continued growth and development, legislation that monetarises non wood forest products such as tourism, recereation etc. proof of loss of biodiversity will e required for biodiversity benefit to be defined, new company JVs between 'sectors'
- Neglecdtion of human dignity, human rights and environmental concern.
- Europe has something on which to earn money. From above it is not clear what that is.
- - underinvestment in European scientific and technological research- European failure to balance salaries, social costs, within the highly competitive global workforce market- Lack of stimulus to innovation, business startups, lacking investment climate
- don't know
- First companies move their production to the East, then whole companies shift east and after that also the financial balance shifts east.
- Global drivers need to be addressed and under control . If there is no global development in sustainability directions it will fail on Europena level as well. On European level it requires high expenses but not clear where do they come from. See other comments below.
- Europe is further lacking behind in putting research results to ground (bad conditions for innovation)China is overcoming its intern social problems.
- Continous economic recession in Europe.
- If the avidity for profit and serching for cheper labour force continoue, the probability of these developments will be higher, but the complete uotcome would be lower at the end. Consequently we have to find a balance between "outcome" and "income".
- exploitation of the current trend
- The strict European legislation and rulesthe enormous power of NGO's in EuropeExtreme democracy in Europe
- That the growing economies are able to handle the unevenly spread wealth in their countries. Without that we can easily have riots etc. There are futurist who expects taht will happen in China because of the difference between east and west China.
- a development of the society to reduced consumption
- Production focus continues focusing on outside of Europe, as well as production. Environmental-friendly values gain more importance. Sustainable use of natural resources, such as water, mushrooms, etc, gain more importance. As people get older, the more they appreciate things they can enjoy: nature, health, etc...
- Communist China will fall and a more democratic political system will learn to run China's society and industries.
- globalization, labour price, not fair competition from china
- China's growth would be sustained. Needs for wood resources globally would decrease.
- That demand for bioenergy and raw material for products can be fulfilled by plantation forests in developing countries. And that climate change allows for high biomass production in these regions.
- high consumption of wood products at a global scale
- a purely economic growth in the East; no sociological change in the East
- It could be very probable, from the Religious point of view. But, regarding forests, nether the East alone, nor the West alone, would bring the optimal solution for forests. Only thinkig "WORLD" for our forests could lead to SUSTABILITY of the world forests.
- Europe fails to recover its financial and monetary system. Flight travelling must survive to bring Asian money to Europe so that traditional rural livelihoods based on wood production could be replaced by tourism and other service-based livelihoods.
- There is not flow of imigrants from outside Europe, European countries are able to provided wellbeing for aging population (people have money enough to buy recreation services).
- I dont no.
- Environmental and social values of forests are recognized. Societal demand + political will + adequate resources devoted to enhance environmental and social functions. Other continents are able to cover the global demand for wood products (pulp, paper, raw materials), as the European production is low.
- rapid growth in emerging areas of the globe; development of middle classes in emerging areas and increase in consumption; shift in consumer behaviour in particular concerning information and communication

- - Investment in the research - Development of the eco-agriculture based on small farms, including "alternative forest for food"
- Continued rapid growth in China and other Asian countries, a lack of political power to strengthen integration in the EU, continued negative demographic development in Europe.

**Question 2.3: Assuming that this "future" is to happen, what should we do to reduce the problems and/or harness the possibilities of these developments for the forest-based sector in Europe?**

- Find solutions for increasing the competitiveness of European forest based companies. New products.
- Education of people combined with longer working days.
- Put more effort on areas that we see already now as potential future areas where we are able to compete with China, put more effort on areas that do not depend on the US economical situation
- we should increase all sectors related to forest developments
- As said before, introduce radical change to European forestry. Reconsider the regulatory environment, make it reflect current scientific knowledge rather than emotional considerations and scare mongering. Europe has for much too long been following the nay-sayers rather than the facts
- To implement a financing of all forest functions (at least social functions in order to insure the well-being of the society) and thus to accept in compensation a decrease in the roundwood prices, stimulating the competitiveness of the forest-based sector.
- I don't really see this as a problem. Focus shift from forest industry to service sector and experience industry seems logical.
- Is it all that bad? Ok, re-consider the immigration policies (loose them), tighten the development aid in monetary terms (does EU REALLY need to pay to China and India?)
- There is nothing that could be done to save the traditional forest industries. I am not so sure about the demand for more recreation etc as long as the wealth is likely to decrease. therefore, a strategy could be to export roundwood. With almost no alternative value (low user cost/reservation price) roundwood may be slaughtered at very low prices.
- Multiple use should remain in focus. It will be crucial that income can be generated from a wide range of forest goods and especially services. This will require mechanisms and markets, as well as of course demand.
- Invest in new products and services
- Expand areas of protected natural forests.
- gather evidence to support the drivers,
- Research of completely other uses of forest biomass with a high value, in particular biorefinery. In turn, this would enable the forest industry to become more competitive, even concerning the procurement of raw materials (e.g. compared to the use of wood for energy)
- To find paying customers.
- - Invest in European scientific and technological research- balance salaries, social costs, within the highly competitive global workforce market - while trying to keep purchasing power in balance- Stimulate innovation, stimulate business startups (society should take part of the burden in certain areas of business investment), create a stimulating investment climate
- don't know
- - New innovations in the forest sector focusing on the highest added value. Energy in this scenario is probably a minor problem since most heavy industry using cheap raw materials is disappearing from Europe. However, we would still need some energy. Thus, it would be good focusing on strategies aiming for high quality products and services and also increased use of renewable energy.- We could use some impact assessments on economical, environmental and social effects of non-wood forest products and services (recreation, tourism, well-being, nature conservation). What are the benefits compared to traditional wood products (pulp, paper).- The increasing elderly population in Europe is an interesting group. Soon also the Asian population might start aging rapidly. They are financially relatively well-off and would appreciate services related to well-being. More services for this group could be developed.
- it is quite favorable scenarios for Europe. Needs high technology investment and business support. Scenarios needs good deal of business stakeholder involvement from the beginning. But it is uncertain as involves many drivers and especially social drivers are uncertain. On global level it is also uncertain as the global competition can be increasing also in the area of highly specialised products Europe will be developing. This would mean that Europe would not gain enough profit on them and would not be able to manage its own development towards more well being quality development and biodiversity. It is costly but not clear how it is financed. Does it mean decline in economic growth? It seems not very plausible scenario.
- provide better framework conditions for innovation. put more effort into education and research. open up the society.
- You haven't described any problems of the forest sector here, only problems of the ageing society (and faintly a problem of the wood manufacturing industries).
- Manage forests sustainably, invest in forest infrastructure, invest in forest industry
- Not to be so averse, means we have to be spry (more pragmatic than emotive). Europe has to RETAIN ecologically acceptable and high-end value industry in own yard.
- no idea
- more risk funding stimulation of implementation of innovation relaxation of legislation and rules consciousness
- If the development would be like this we can expect rising costs (e.g. salaries) also in these countries and a better possibility for the European industry to compete.
- Inculcate our children with an even stronger respect for wilderness, wildlife and Nature.
- Gatt, fair trade
- Fair rules for global trade.
- Focus on high quality products and develop forest tourism.
- We have to ensure that the forest owners will be part of the business on these new forest demand (tourism, recreation, etc)
- an economic policy, less brain drain from the West
- Relocalization might change the economical system in Europe and also in East but later than in Europe anyway. This is good development, and it might make European regions more resilient in economical and political issues and also in forest-based sector.
- It could NOT happen. 100% sure.
- Pay special attention to the survival of rural countryside in remote areas. Create successful market for non-wood

forest products and services. Maintain good infrastructure to enable people moving to buy such products and services.

- To start focus on high quality products now rather start by year 2025
- forest protection
- For European forests in general, and Mediterranean ones in particular: Ensure forests and their biodiversity are better protected/restored and not threatened by increased recreational uses, tourism, and non-wood (medical) forest products exploitation (adequate regulation and enforcement). Adopt and implement policies and concrete actions to optimize forest adaptation to global changes (especially to climate change impacts) in order to enhance the provision of environmental & social services. Develop fair mechanisms (i) for forest management financing and (ii) for benefits sharing, especially those linked to the use of genetic resources in pharmaceutical industry. Promote cross-sectoral, participatory and long-term approaches for forest management, and its integration in land management policies and territorial development projects, to ensure a "good governance" of forests and avoid that some stakeholders (e.g. pharmaceutical companies) illegitimately take over the resources use/property.
- maintaining technology leadership in Europe in particular in environmental and energy and material efficiency technologies and services
- - Centralized forest policy at EU level and good collaboration with non-EU countries, especially Russia- - Intesification of the technical and scientific cooperation with Asia and Latin America (Europe must become an attractive center for training and training for young people from Asia and Latin America)
- To survive, the European forest-products industry needs to locate production close to the growing markets, and speed up technological development

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## Query 3: Accelerating climate change

It's 2025. Unmanageable climate change has become reality: natural disasters have become much more frequent and people are trying to cope with the changing conditions where severe floods, droughts and forests fires are yearly returning phenomena. Governments at all levels (local, national, global) are aiming at integrating environmental, energy, agriculture, forest, land use and climate policies with a stronger environmental emphasis. Climate change adaptation and mitigation strategies are developed in most countries around the globe. At least in a short term, the effects of the new measures are modest. Environmental awareness of the people is increasing and there is a great willingness to take action. Investments in new technology development are increasing and new solutions are sought by scientists and practitioners.

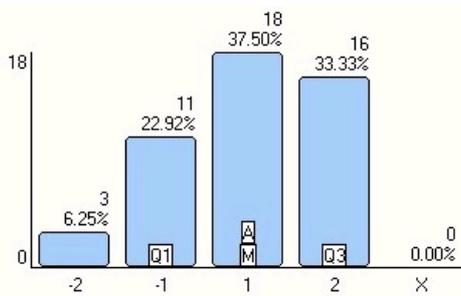
In 2025 the forests and forest-based sector in Europe can be described by following statements:

- Despite diminishing forest area for intensive wood production due to forest damages, the wood and wood-based products industries are thriving. This is partly due to the policies which support the use of renewable and re-usable materials, and partly due to the innovations in new materials and smart solutions combining energy efficiency, reusable materials and services for lengthening the product life-time. Wood working industries, including companies designing spatial and construction solutions for population to manage the extreme natural events, are becoming an important provider of jobs and income in Europe.
- Less-carbon and less-energy intensive solutions are forced through industries and the approach affects also European life-styles: sustainability and security is sought from local solutions, and for example, forest management is involving citizens and local communities at a new scale.
- Public and political interest on forests is high. With the aim of capturing more carbon, European governments support reforestation of large areas. However, with forests now occupying a much larger share of the land area, conflicts with food production are looming.
- European forest know-how, including forest planning and management practices, climate change mitigation and adaptation measures and e.g. monitoring systems and techniques are on high demand, and several companies target for a global business in this field.

**Question 3.1: Think of the above description and the statements about forests and the forest-based sector as a whole: how probable do you see the developments?**

- -2 = very improbable
- -1 = somewhat improbable
- 1 = somewhat probable
- 2 = very probable
- X = don't know

n=48, A=0.69, M=1.00, Q1=-1.00, Q3=2.00



If you wish you can explain your answer here:

- It all depends on what Europe does now. With foresight and strong political leadership, many of the above issues can be mitigated or their impact lessened
- The time horizon for the situation described is not really consistent. This could happen better after 2050.
- Euro forests for Euro fuels seems quite plausible.
- These conditions would most clearly eradicate large parts of the world population, while the surviving parts will wage wars for better land and access to raw materials (fertile land, water, wood). With this come high fatalities and global involvement, see Afganisatan, Libya, Pakistna, soon Ivory Coast, etc leads to even more de-population and people on the run. So at some point, when the world population is significantly reduced and the standard of living has declined, but the knowledgege has been retained - then the above scenario can build up - ho: the region is not necessarily restricted to EU. It could be anywhere.
- There are some signs that we are developing in this direction. Perhaps this is a case of wishful thinking, though, as I really hope that the sector will develop in this direction
- Climate is changing all the time. Climate change policy is having more impact than climate change itself.
- not sure that teh last point is a given for teh scenario but would be a nice to have, alos the involvement of citizens in decisions about forests (only if owned pubcly)
- The strength of forest sector is captured well but the potential of European forest know-how is over-estimated.
- I could envisage what is described in bullets 1, 2, 4 but not that under bullet 3. Though I could believe the climate change scenario, I am wondering what impact a desertifying Mediterranean region will have on the larger European economy. I don't think that 'additional forests' will be the main driver for carbon capture. There will be a need in geologically-based carbon capture techniques and other technological innovations. Though the forest sector will have definitely an important role and I would expect a large shift to GMOs in forestry.
- I think this scenario is very likely but it will take a lot of time to take actions since the effects of climate change go so slowly that it's hard to notice for human beings that something is really changing. Also environmental awareness goes up and down all the time, depending on other political or economical developments. When there is a crisis people usually pay less attention to the environment.
- 2025 is so far as it is so close! It is really hard to predict what can happen than. I hope that we can survive all consequences and to continue our life but in absolute harmony with the nature.
- I don't believe climate change will accumulate that bad. And China outmanoeuvres Europe in forest-knowledge already in 5 years. Also, European governments are not supporting plantation elsewhere but only in developing countries. As well as traditional forest industries won't be existing anymore.
- Mother Nature is unpredictable, and the oceans' capacity to compensate is still untested.
- Too much contradictions between reduced forest area because of damages and too large forest area competing with food needs.
- Climate change models are not foreseeing large perturbations of the climate system in such a short time period.
- I assume that Europe is affected by CC to a smaller extent.
- Depends on the success of international climate policy negotiations.
- I see this as an idealistic but a bit unrealistic portrait of future conditions. My pessimism comes from the fact that this discourse is nowadays present in most strategies of forest sector. I simply don't believe that the future comes as it is hoped.
- Climate change take place in accerating rate and trees can not cope with these changes - catastrophic damages increase in numbers and areas affected
- I dont no
- Comment: in our opinion, this scenario (where forest areas significantly increase) underestimates land use conflicts with food production (just "looming" in 2025) and with urbanization (not mentioned)
- 15 years period seems to be short for this scenario

### **Question 3.2: What are the preconditions that would lead to these developments?**

- Increasing awarness about climate change.
- Also here well described above.
- Not sure, this scenario presents mainly an idea of us not being able to cope with the nature which as such does not sound like a very wrong assumption, but it also sounds like the people making big decisions would be a bit stupid and unable to react on important issues when they should react and I would not like to believe that
- Inability of European leaders to take action now
- Energy crisis with an increased use of coal could accelerate climate change and cause serious trouble before 2050.
- Switch (smooth changeover) to energy production from forests.
- See above. And the year is maybe not 2025 but rather 2060.
- Actual climate change, of course, realised by people and politicians. Willingness to reduce welfare in order to fight the climatic problems. international cooperation.
- Climate change's effects at outlined in the scenario, as well as the mentioned policies that would assist the sector.
- National economies possibility to invest in climate change policy.
- The wood-based bioenergy sector's technology must advance rapidly. People would need to think that forests

can play a larger role than they actually can.

- broader realisation on the effects of climate change and better data linking current happenings to a long term anomaly rather than "it's happened before" government legislation to encourage the shift as the cost of dealing with disasters becomes too great and affects the GDP. greater use and development of early stage benefits from technological innovations (eg recyclability etc) can be [proven with sound, comparable and to global standards (not just EU) evidence that these measures has a positive impact on climate change
- Mankind will not change behavior and politicians also will not, because they want to become re-elected
- Strong politics and image campaigns based on objective research on environmental performance of wood-based products.
- A failure to significantly reduce the level of atmospheric carbon dioxide.
- Climate change having unknown positive feedbacks, and forests not being managed in a way to be adapted to the changes
- Partially implemented current climate change policies. weak local planning. weak concerted global actions
- This scenario requires climate change (which is quite sure) but also a willingness to take action against it, both from individual citizen as from international governments. It will take a lot of time to increase awareness and to develop international strategies to reduce the impacts of climate change because of different climatic impacts and different interests.
- go on like we do now.
- you mentioned it already in the introduction: A climate change as described
- Political willingness to take action and implement stronger environmental policies.
- In one word... conscience.
- More frequent and more severe natural disasters: should lead to more consciousness of the world population as well as governments that severe measures are needed for a more efficient use of our global resources.
- Public interest in forest as a way to improve their quality of life. Making sure that a profitable market exists for companies to invest.
- That we overall do not succeed with the climate change society and also that the links with lifestyle and climate are the correct ones.
- I am agree with all statements, except the first
- Ocean reservoir is lifeless.
- The forest sector can demonstrate that it plays a dominant (and not a gradual) role in these developments.
- European economy gets stable and growing fast, enabling investments on new services and climate-friendly energy. Less wars and eco-catastrophes globally: more political resources to constructive international agreements. Generational change in people in forest sector.
- To lead the earth to the chaos, it looks very probable, when one sees how some so-called "super-powers" are acting, and are causing climate change and forest destruction in developing world. But to say that Europeans are mitigating climate change and the state of the world, this is only a dream? not a reality. All earth citizens of all countries should EQUAL, without domination or occupation or country invasion and people and human resources killing and destruction, and without "veto" right for any country or group of countries. All countries should have the same right, etc. This is the right and key condition to save forests and people on the world, from all catastrophes.
- Climate change is less than predicted
- I don't know
- Only when politics in really many countries take action, this somewhat positive future will happen. But, I personally, am not so optimistic.
- High climate change impacts and recognition of the importance of forest services to face these impacts.
- Climate change

**Question 3.3: Assuming that this "future" is to happen, what should we do to reduce the problems and/or harness the possibilities of these developments for the forest-based sector in Europe?**

- More focus on sustainable forest and land management. Decrease the dependence on transportation in the society, more local solutions.
- We should make sure that the decision makers that we elect to make the biggest decisions are bold and smart enough to make important decisions in time. Of course it is not enough that we are smart in Europe but we should also support or insist others to be that also
- See my comments earlier. Rapid and significant change is needed
- To implement infrastructures and organisations in order to cope with wood damaged by extreme events. Increase the forest resilience and, in parallel, give some space to plantations of drought resistant species. Maintain at least a forest cover, if not the forest productivity, in order to keep ecological and social functions
- shifting to energy from forests and materials from oil
- lower the expectations of "necessary" living standard. Re-educate on waste of materials, and especially food and energy. Simplify and decentralise to lessen the shock effect of these extreme events (a flooded capital means more damage than several flooded towns/villages. Especially if they are not necessarily at the coast with a seaview)
- Although not wanted, this could imply a revival of the forest sector. We would need to increase forest education, especially within environmental issues and management of land use conflicts. More of the roundwood would be for the wood-working industry, thus research into this would be necessary. Paper industry would probably struggle, and only the most energy-efficient and environmentally sound productions and products would survive. Also this would require more research.
- Policy and technological innovation
- To go more to low-carbon bio-economy
- Educate the public that forests can have a big role in mitigating climate change.
- much more gathering of evidence and presentation of it for the general public and policy makers/politicians now and with a planned implementation over the next 10 years. Well documented proof of the changes happening, and proof of the value of suggested scenarios being valid
- Simpler life with less resource use (but politically impossible)
- Learning to make business on know-how, not just giving it away as "development aid".
- - Invest in geo-capture techniques for carbon 'sequestration' and other related technological innovations. Though the forest sector will definitely have an important role and I would expect a large shift to GMOs in forestry under this scenario. - Invest in cleaner, more energy-efficient production techniques. Invest in cleaner,

more energy-efficient consumer products. Enable sharing of technology with emerging economies.- Increase investment in forest-stand arboreta to test influence of changing environment on tree species and varieties. Invest in modelling the changing ranges of "potential natural vegetation zones".

- don't know
- This is more or less existing policy orientation in climate change mitigation and adaptation but implemented when it comes to urgency. No preventive policy actions. Costly. For forestry (and others) it needs high level and long term integrated land use planning. Not clearly described trade-offs with food production and demands on global and European level. Scenario needs further elaborations. Technology is important driver.
- - Improve the general education level and environmental education to increase awareness- Improve forest education- Limit population growth, and with this I mean studies identifying factors which are responsible for fast population growth and what can we do to stop this trend, for example by improving education/reducing poverty.- Research and development of new energy saving solutions and renewable energy (about the same as question 1)- Research on the most effective methods of carbon storage: Carbon storage in old growth vs managed forests, carbon balance of different management methods (intensive management, management for bioenergy, timber production)
- increase awareness, adapt forest management to new climate conditions (breeding, management, harvesting, etc.).
- increase efficiency in the bioenergy sector (in order to reduce land use conflicts) - including a reduction of subsidies for bioenergy production adapting existing forests to changing climate conditions: by shorter rotation periods (in order to reduce risks, and to produce more forest biomass) rather than by focusing only at an increase of the stability of forest stands (which often means longer rotation periods and the usage of less productive forest species, at least in Central Europe)
- Focus on increasing yield when managing forest. Improve forest infrastructure. Invest in increased capacity in the forest industries. Enhance innovation and green product development.
- Again ... conscience (what ever you think about it!)
- adaptation - silviculture, supply chain management, etc.
- These developments will only strengthen the forest-based sector in Europe. But hopefully it won't have to come that far that the real disasters are needed to get to the important consciousness. Hopefully policy will turn the future before it goes wrong.
- The technological level of the forest based sector should increase. The image of the sector in the public opinion should shift from a low-level to a medium or high-level technological sector. The optimization of raw material use should increase.
- This would probably have a positive effect on European forest sector.
- Forest carbon must be included in EU ETS
- Invest more abroad. Not be so narrowly Europe-focused.
- Speed up growth of trees by engineering them with C4 Photosynthesis capacity. Rice is already being genetically engineered for C4 metabolism, poplar should be next.
- Countries land use policies must be strictly balancing the different needs. Further efficiency and productivity per hectare will be needed, including options like growing agricultural crops under a forest cover.
- The forest sector would be very important in many aspects; other sectors may suffer because forest mgmt is more expensive.
- Brave resource allocation to environmental education, multi-disciplinary forest research and developmental projects, establishment and support for distinguished European forest-knowledge policy.
- It will never happen! One can only imagine it, as a dream.
- To diversify forest management,
- Intensify investment in the forestry sector and its adjustment to changed conditions
- Start informing politicians about the consequences of acting in various directions based on scenario.
- For European forests in general, and Mediterranean ones in particular: Adopt and implement policies and concrete actions to optimize forests adaptation to climate change impacts (including by reducing its vulnerability to extreme events such as fires), in order to enhance their resilience and the provision of environmental & social services. Enhance climate change mitigation by forests. Mobilize adequate resources and develop fair financing mechanisms. Promote cross-sectoral, participatory and long-term approaches for forest management, and its integration in land management policies and territorial development projects.
- development of forest-based industries towards carbon-neutral and fully bio-based industries for a new generation of products and services - total greening of forest-based industries
- Harness flexibility in policy, silviculture, and forest management, e.g., allow and stimulate assisted migration of tree species better suited for a changed climate.

## Additional remarks

**Are there any other viewpoints you would like to express with regard to the future demand for forest-based products and services?**

- As Russia has such large share of the wood land. I think that they should have been mentioned in the scenarios.
- There could have been one scenario that was a bit over optimistic in the view, not because that would be the future but to balance these views
- I have no doubt that forests will play a major role in satisfying our future energy and materials demands. Petrochemicals will run out or become less acceptable due to increasing cost or the environmental damage their use does. There are many alternatives and they all need consideration. No technology or strategy should be dismissed at this point in time, we simply cannot afford doing this. The current discussion in Europe around the "risks" of GMOs is an example. While no harm can be substantiated scientifically, politicians and societies keep discussing the "risks". At the same time the potential and very significant benefits that can be had in relation to our climate and future, evaporate. Strong political leadership is needed to turn this around, and the earlier Europe can enter into the process, the more benefit we will see in 2025.
- A major problem with well differentiated scenarios is that they are focused on one part of the challenges for the future. They don't take into account more balanced scenarios (for example with some energy crisis, some climate change and some reduction in European economic performances). And these balanced scenarios are not only a combination of individual scenarios because of interactions between options for each individual scenario. They are a new scenario as such with its own specific solution.

- Forest raw materials for energy and packaging. Oil for materials. Printing paper purely a luxury product - digital media has taken over all graphic communication.
- Forest-based products and services and their productions are not static. When thinking 15-20 years into the future it is hard to imagine what this entity/concept is. As an economist I find it hard to put the forest sector in the centre, I rather prefer to put mankind (welfare) in centre and regard the forest sector as any other sector of the economy.
- -
- No
- In general few more points:-scenarios lack of description of all drivers and trade-offs. -2 of them have low level of plausibility or partial implausibility which is not good for scenarios-consistency checking is needed
- Population growth is actually a very important factor which can be the main driver behind other factors such as energy demand and climate change. Without explosive population growth there wouldn't be much of these problems and somehow most problems can be related to massive population growth. All these scenarios sounded very bad but the impacts for the forest-sector were actually not so bad at all. More scenarios are still possible where the outcome wouldn't be so positive. For example: In many European countries we see a rise of extreme right parties (e.g. Denmark, Austria, Belgium, the Netherlands, Finland). In a relatively short period these parties became very popular and this is hopefully only some temporary phenomenon. However, if it continues, the effects could be quite dramatic. These parties are generally characterized by short-mindedness, negative attitude towards foreigners, focusing on the national economy, negative attitude towards the EU and other international cooperation. These kind of parties also stress the availability of cheap energy (so mainly nuclear) and they have very little interest in environmental issues. It is not clear to me what this would mean for the use of domestic bioenergy. However, a development towards extreme right could mean a disaster for the progress made with renewable energy, taking care for the environment and international cooperation.
- Forest products are traded on a global market.
- From my point of view, Croatia has a great tradition and opportunity in forestry and wood technology. Because of that I am sure that Croatia will follow the main European directions.
- The forest owners will have the power in the future. After the oil, wood will be the new gold.
- The future can also be something completely different. The storylines were telling the same kind of story - yes, one possibility.
- Not really. I already provided some of my humble opinions.
- More stress should be given to include wild forest species in Kew Gardens' Millennium Seed Bank initiative.
- Where do demographics come in the various scenarios. Would any of them lead to a decreasing population, or more epidemics ???
- .
- Freedom, Equity, Equality are needed. Domination, Occupation, Killing of occupied countries' citizens are to be banned. Under these conditions, everything on earth will be optimal.
- Asia was pondered a lot, but the role of Africa was less thought of. However, there are potentially important developments related to economy, politics, and religion of several African countries that could have an impact on European forest sector within the next 15-20 years.
- No
- The 3 scenarios presented here are not exclusive and could happen simultaneously.
- Personally I would advocate zoning, i.e., the separation of ecosystem services over the forest area.

#### Here you can give feedback to this survey and the organisers of this Internet Survey:

- I have enjoyed very much creating the future worlds in my mind. It has been an interesting exercise.
- I appreciate the an interesting exercise.
- Thanks, it's been very interesting =)
- curious on how many respondents you get. results from earlier round gave me the impression that only a handful of persons actually cared to answer.
- This was a truly stimulating exercise. Thanks. Good structure and clear relevance. (and p.s.: longer than 15 min)
- The foresight is not about predicting the future. Why are we then asked how likely the different scenarios are?
- -
- No
- The survey is well done. We need more of this type of activities. Perhaps invest in cross-sectoral foresight dialogue: have you been looking into what foresight is being done in other sectors? Maybe a joint cross-sectoral publication could be targeted?
- Thank you for organising this survey.
- (Please take my compliments for your survey - I have seen other future scenarios for the forest sector which have been less sensibly described than yours!) Good luck, P.
- It is really fruitful and useful to exchange meanings and opinions about present and future situation. Each strategy needs detailed (public) discussion and mutual agreement as well.
- Nice viewpoints! I enjoyed reading it...
- I would like to see some variety and other possibilities - these future lines we have already seen and I can agree. More imagination and more "wild cards" or whatever "new".
- The structuring of the questions was slightly confusing. When I didn't agree with the presupposition and answered to question x.1 "totally disagree", I was uncertain if I should have provided my answers to questions x.2. and x.3 keeping in mind my own opinion, or to answer to the general hypothesis.
- long-winded scenarios, please try to be more brief. This is already my 3rd web questionnaire today, I am not paid to fill out surveys all day!! must get back to conducting my experiments, thank you just the same for the great work at COST.
- This survey requires a refining. There is too much information on each question and there is a need to discuss each of the statements separately in an extensive way. Very time consuming if one wants to do it in a proper way
- The survey was intellectually a great challenge thus apparently well-prepared. I really like Delphi surveys as you can see what others' opinions are - but I felt that there was too much introductory text to be able to concentrate and find the time for responding. I tried my best though. Good luck with the data and remaining workshops!
- Everything is OK
- Excellent survey, very interesting scenarios