

Module: Introduction

Page: Introduction

0.1

Introduction

Please give a general description and introduction to your organization

REC was established in Norway on December 3, 1996, and has grown to become a leading supplier of solar electricity solutions offering sustainable, high-performing products, services and investment opportunities for the solar and electronics industries. We create value by providing solutions that better meet the world's growing electricity needs. The Group headquarters are located in Sandvika, outside Oslo, Norway.

REC's business structure comprises the two business segments Silicon and Solar. Production was in 2012 carried out in the following subsidiaries; REC Solar Grade Silicon LLC and REC Advanced Silicon Materials LLC in the US, and REC Wafer Pte Ltd, REC Cells Pte Ltd, and REC Modules Pte Ltd in Singapore. REC's sales and marketing activities in solar panels, systems integration and project development are handled by local subsidiaries in Germany, Italy, Japan, India, Thailand, Malaysia, Argentina, Australia, the US and Singapore.

0.2

Reporting Year

Please state the start and end date of the year for which you are reporting data.

The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.

We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year.

Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed

Sun 01 Jan 2012 - Mon 31 Dec 2012

0.3

Country list configuration

Please select the countries for which you will be supplying data. This selection will be carried forward to assist you in completing your response

Select country
Norway
Singapore
United States of America
Spain
Italy
Germany

0.4

Currency selection

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

NOK

0.6

Modules

As part of the request for information on behalf of investors, electric utilities, companies with electric utility activities or assets, companies in the automobile or auto component manufacture sectors, companies in the oil and gas industry and companies in the information technology and telecommunications sectors should complete supplementary questions in addition to the main questionnaire.

If you are in these sectors (according to the Global Industry Classification Standard (GICS)), the corresponding sector modules will not appear below but will automatically appear in the navigation bar when you save this page. If you want to query your classification, please email respond@cdproject.net. If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below. If you wish to view the questions first, please see <https://www.cdproject.net/en-US/Programmes/Pages/More-questionnaires.aspx>.

Module: Management [Investor]

Page: 1. Governance

1.1

Where is the highest level of direct responsibility for climate change within your company?

Individual/Sub-set of the Board or other committee appointed by the Board

1.1a

Please identify the position of the individual or name of the committee with this responsibility

Chairman of the Board of Directors and the Board of Directors

1.2

Do you provide incentives for the management of climate change issues, including the attainment of targets?

Yes

1.2a

Please complete the table

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator
All employees	Monetary reward	Reductions in manufacturing costs (which reduces the costs of the solar panels to make them more competitive with other technologies)
Management group	Monetary reward	Reductions in manufacturing costs (which reduces the costs of the solar panels to make them more competitive with other technologies)
Management group	Monetary reward	Optimization of production to achieve improved production stability
Management group	Monetary reward	Improvements in production efficiency (which contributes to reduce the energy payback time and the carbon footprint)

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator
Management group	Monetary reward	Expansion of FBR polysilicon capacity (Production of FBR polysilicon is 75% more energy efficient than conventional production technology and reduces therefore the solar modules' carbon footprint significantly)
Management group	Monetary reward	Expanded PV markets (which contributes to increase the displacement of electricity generation by fossil fuels with PV)
Corporate executive team	Monetary reward	Reductions in manufacturing costs of silicon, wafers, cells and panels(which reduces the total costs of the solar panels to make them more competitive with other technologies)
Corporate executive team	Monetary reward	Improvements in cell efficiency (which contributes to reduce the energy payback time and the carbon footprint)
Corporate executive team	Monetary reward	Increase solar efficiency of cells and panels (which contributes to reduce the energy payback time and the carbon footprint)

Page: 2. Strategy

2.1

Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities

Integrated into multi-disciplinary company wide risk management processes

2.1a

Please provide further details

Global energy demand is expected to continue to increase over the coming years, and the climate change problems are still escalating. The world needs to promote sustainable alternatives to traditional energy sources, as the UN expects a quadrupling of annual carbon emissions in the 21st century unless active climate policies are quickly implemented. REC believes reduced cost, attractive carbon footprint and declining energy pay-back time will make solar energy an essential part of the future global electricity generation mix.

The company's mission statement "We create value through efficient and sustainable solar products, services and investment opportunities together with our partners to better meet the growing electricity needs globally" signals REC's commitment to play a leading role in the development of a sustainable energy market, and REC's vision is that every person should benefit from electricity directly from the sun. To realize this vision, REC will seek to advance the competitiveness of solar energy and create value through innovation, operational excellence, and industry-wide expertise.

REC has over the last few years been through a phase of construction and ramp up of significant new production capacity, mainly in the US and in Singapore. REC continues to focus on cost reductions, further optimization of assets and improved product quality. In 2013 REC will make investments in implementation of technology to improve product performance and reliability, and REC will seek to build brand identity and strengthen the market organization, particularly in emerging growth markets in Asia and the US.

Sustainability is an integral part of the strategy of REC. By making solar panels clean and affordable globally, REC makes an important contribution to mitigate climate change. The strategy also involves maximizing the energy efficiency of its products, minimizing negative environmental impacts, and preventing pollution from all business activities and products. Both REC and the solar industry in general depend on the safety and sustainability of solar products.

The REC group has an overall risk management process to identify a broad range of risks and also those related to climate change and environmental issues. REC has a risk management system to ensure that all business segments within the REC Group have a systematic and uniform approach to risk management. The system defines the roles, responsibilities, processes and procedures, standards, tools and documentation. Group Management sets the context in which risks are managed, i.e. how risks are to be identified, analyzed, controlled, monitored and reviewed. It also supervises the risk management process, however the business segments are the "risk owners" and responsible for ensuring that risk management is a systematic, integrated part of their day-

to-day operations. Each business segment defines and analyzes risks in order to establish or update its risks picture through a bottom-up process. In addition, each segment must carry out a top-down analysis.

Each segment reports a risk picture every year as an integrated part of the planning process. REC Group Management performs a separate and additional risk evaluation based on a top-down approach. In addition, REC Group Management generates monthly reports that are sent to the Board of Directors including operational and financial reviews and key performance indicators, including financial, operational and health, safety and environmental statistics. REC Group Management also submits quarterly sustainability reports to the Board of Directors.

In order to minimize sustainability risks, REC has developed and implemented an HSE management system consisting of 14 HSE principles, including e.g. environmental management, risk management and product stewardship. Within each principle it is described how to achieve world class standards that will contribute to minimizing environmental and social risks throughout the lifecycle of our products. Each unit is assessed annually according to these standards and results are reported to the Group management and the Board of Directors, in addition to statistics on safety and environmental parameters. In this way, REC can identify and detect risks in a precautionary manner and act accordingly.

2.2

Is climate change integrated into your business strategy?

Yes

2.2a

Please describe the process and outcomes

The link between climate change and business strategy is stronger with REC and solar industry than with other industries. By making solar panels clean and affordable globally, REC makes an important contribution to mitigate climate change. The strategy involves maximizing the energy efficiency of its products, minimizing negative environmental impacts, and preventing pollution from all business activities and products. Both REC and the solar industry in general depend on the safety and sustainability of solar products.

Cost reductions

Back in 2005 REC defined a cost roadmap to halve the production costs of solar panels by 2010, and this was achieved. Increased competitive pressure and reduced support from policy makers (in particular in Europe), made it necessary for REC to accelerate cost reductions over the last couple of years. Therefore, production cost was reduced by approximately 30 percent year on year in 2011 and 2012. The cost is expected to be reduced further in 2013, targeting a cost reduction of 13 percent per unit for FBR polysilicon and 20 percent per unit for solar panel production. The cost reductions include improved solar output and efficiency from the end products, establishing new and improved production methods, improved sourcing and reduced use of polysilicon, glass, aluminum and other materials in the end products. REC is continuously working on improving design to use less material, to improve output and to reduce cost per unit. The result of the significant cost reduction is that solar now is competitive with other conventional sources of electricity in the residential and commercial segments in the sun rich regions of the world.

EPBT, LCA & emissions

In addition to the cost reduction program, REC aims to achieve an energy payback time (EPBT) of one year for the REC solar panels. The EPBT is defined as the time required for the solar panel to generate as much energy as cumulated energy demand in the entire solar panel production. REC has carried out LCA (Life Cycle Analysis) for the products in order to map average carbon footprint in the lifecycle of the products. The LCA-results have subsequently been compared with the carbon intensity in the grid.

A Life Cycle Assessment (LCA) study was undertaken in 2011 based on production data from the first quarter of the year. The LCA, conducted independently by the Energy Research Centre of the Netherlands (ECN), calculated the carbon footprint and the energy payback time. For polysilicon produced in the US, and for wafers, cells and modules produced in Singapore, a carbon footprint of 21 g CO₂-eq/kWh with a corresponding energy payback time of 1.2 years was achieved. Solar panels containing 100 percent silicon produced using the proprietary Fluidized Bed Reactor technology, have an energy payback time of 1.0 years.

To ensure REC has a minimal impact on the environment, efforts are continually made to reduce energy use and carbon emissions. Wherever possible, REC uses low-carbon energy sources such as natural gas power in Singapore and natural gas and hydroelectricity in the United States. In REC's Solar production facility in Singapore, there has been a strong commitment to save energy with a site goal to reduce consumption by 7 percent from 2010 to 2012. More than 20 initiatives were identified to achieve this goal, including minor

adjustments and larger operational changes, and a 4 GWh reduction was achieved in 2012 due to these activities. In total, which includes the energy reduction due to the dedicated efforts mentioned above and a REC's focus on lean production and cost reduction in general, REC Solar reduced its relative energy consumption per MW produced by 15 percent and the total energy usage by 11 GWh in 2012.

R&D

REC has focused on research and development and this has been very important for the development of the next generation products. One of the important outcomes from the R&D efforts has been the development of the FBR (Fluidized Bed Reactor) technology where REC has obtained several patents. This technology has 75 percent lower energy use for the production process of polysilicon compared to the conventional Siemens process. Today, 70 percent of REC polysilicon production is based on the FBR technology and all business expansion and unit upgrading will adopt the FBR technology, thus rendering an ever increasing share of REC's total silicon production. REC is working on a second generation of FBR technology to improve product performance and reduce cost further.

Material and waste management

An important aspect of REC's environment & climate policy is material and waste management. To minimize resource consumption contributes significantly to reducing the carbon footprint of solar panels. REC continually investigates opportunities to enhance level of material reuse and recycling with its design and production processes. Throughout the product design process, REC works to reduce material and packaging, without compromising on quality. Another aspect is the waste handling process, where REC continually works to reduce the amount of waste as well as enhancing the portion that goes to recycling.

In general waste from the manufacturing processes is sorted and recycled to a high degree with third party waste management facilities. In 2012, REC sent over 2,172 tonnes of material for recycling, which represents a 69 percent increase from the previous year.

2.3

Do you engage in activities that could either directly or indirectly influence policy on climate change through any of the following? (tick all that apply)

Direct engagement
Trade associations

2.3a

On what issues have you been engaging directly?

Focus of legislation	Corporate Position	Details of engagement	Proposed solution
Clean energy generation	Support	REC engages policymakers mainly through solar industry trade associations. REC is an active member of SEIA (Solar Energy Industry Association) in the US and EPIA (European Photovoltaic Industry Association) in Europe, where we participate in the Policy/Communications working group. Through these memberships, we contribute to the development of predictable, sustainable and just frame conditions for solar energy and monitor legislation that affects the solar industry. REC is also involved in the work to create a standard for transportation, collection and recycling of PV products under the WEEE Directive as part of the CENELEC working group. CENELEC is the standardization body mandated by the European Commission, and REC is involved as a representative of EPIA. REC engages policymakers through participating at events such as the Zero conference and presentations for politicians and bureaucrats. REC also keeps a direct dialogue with policymakers to improve framework	Governments across the world must fast-track implementation of renewable energies by providing good framework conditions and allowing for smooth grid integration for solar energy. Authorities in the EU, China and the US must cooperate to avoid the introduction of trade barriers and trade restrictions in form of import duties on solar products in order to create a level playing field for the solar industry and thereby increased deployment of solar electricity.

Focus of legislation	Corporate Position	Details of engagement	Proposed solution
		conditions for the deployment of solar energy, and to prevent the introduction of tariffs on solar energy products which is currently being considered by China and the EU. Such tariffs will only increase the price of solar energy for the end user and slow down the deployment of solar energy.	

2.3b Are you on the Board of any trade associations or provide funding beyond membership?

No

2.3h

What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

REC is mainly involved to further the development of predictable, sustainable and just frameworks for the deployment of solar energy which is in line with the overall strategy of the company and the company's vision - we want every person to benefit from electricity directly from the sun.

Our contribution towards influencing policy is mainly organized through memberships and active involvement in industry associations and bodies like EPIA (European Photovoltaic Industry Association) in Europe and SEIA (Solar Energy Industry Association) in the US. In EPIA, REC is actively involved with participation in the Policy/Communications working group, and have also accepted to participate in a CENELEC working group tasked by the European Commission to create a sub-standard for treatment of end-of-life solar panels behalf of EPIA.

REC covers the policy affair area in Europe with one dedicated resource, the Manager Public Affairs, REC Solar Sales & Marketing GmbH, working out of Munich, Germany.

In the US, REC works to further the advancement of solar energy products by engaging in dialogue with policymakers to promote a level playing field in the global solar industry, arguing that trade barriers, import duties and unfair trade practices may slow down the deployment of solar energy. In REC's silicon business in the US, it is the Legal Counsel, REC Silicon, who is involved in dialogue with policymakers at federal level both direct and through SEIA (Solar Energy Industry Association).

Page: 3. Targets and Initiatives

3.1

Did you have an emissions reduction target that was active (ongoing or reached completion) in the reporting year?

No

3.1e

Please explain (i) why not; and (ii) forecast how your emissions will change over the next five years

To ensure that REC's operation has minimal negative impact on the environment, efforts are continually made to reduce energy use and carbon emissions. The commitment to reduce energy consumption is closely linked to REC's aggressive cost road map, where production volumes continue to increase year on year, while cost has come down dramatically. REC's ambitious cost road map is in line with the solar industry learning curve. Over the past 30 years, the price of solar panels has decreased by over 20 percent every time the cumulative sold volume of solar panels has doubled. In 2008, the average price per kilowatt hour of electricity based on solar for the end-user was about 35 eurocents. In 2010, it was down to 20 eurocents per kilowatt hour. At the beginning of 2013 one could obtain a solar electricity price down to about 7 eurocents per hour in a sun-rich location. The race to cut costs puts a lot of pressure on solar producers, which is one of the reasons for the lack of systematic

emission reduction programs which can easily be monitored, measured and reported. Also, it is worth noting that the solar industry is in its infant stages, and a greater focus on monitoring emissions and setting clear reduction targets is one of the great opportunities in the industry.

Although REC did not have a company-wide qualitative emission reduction target in the reporting year, the company still saw a 4.3% reduction of CO₂ emissions per produced unit in 2012, with total emissions of CO₂-equivalents of 156 metric tons/MW, compared to 163 metric tons/MW in 2011. The emissions reduction is a result of considerably reduced energy consumption in 2012 compared to 2011, with a consumption of 658 MWh/MW in 2012 and a consumption of 720 MWh/MW in 2011. This equals a reduction of nine percent in the reporting period.

To calculate an emissions forecast for REC, one must consider the expected overall solar industry development and prognosis for growth. According to a solar market evolution analysis by EPIA (European Photovoltaic Industry Association) the global solar market growth between now and 2017 is expected to continue year on year, adding between 50 GW and 80 GW in 2017 compared to about 30 GW in 2012. Price decrease is still the key to unlock emerging markets, thus the learning curve for the industry continues. In this scenario, REC will have to continue its cost cutting strategy, and as energy is one of the main inputs in the production of solar products, energy consumption will have to continue to come down. Thus, the reduction of CO₂ emissions from REC's operation (emissions per output) is expected to continue at a similar rate as in the reporting year (minus 4.3%). However, the absolute emissions increased by 7.5% in 2012. Due to the large production increase that is expected (+ 12% yearly), the emissions would increase from 668 516 to 959 741 tonnes of CO₂ in 2017.

3.2

Does the use of your goods and/or services directly enable GHG emissions to be avoided by a third party?

Yes

3.2a

Please provide details (see guidance)

The REC group produces solar technology products with significantly lower CO₂ emissions compared to all fossil based energy types. REC products are positioned at the lower end also of renewable energy systems in terms of carbon intensity (about 20 g/kWh). Hence, REC products have substantially lower carbon intensity than any grid average in any region of the world and thus the introduction of REC products directly imply a reduction in average CO₂ emissions from the grid.

CO₂ emissions are avoided by the products being installed and used for energy generation. The more solar power that is installed (replacing fossil sources) for energy generation, the more CO₂ emissions are avoided.

Solar technology can be used by private consumers, businesses, local governments and energy providers. In the future solar technology will be one of the sources that enable anyone to produce environmentally friendly power, for covering their own needs or for generation to the grid.

In 2012, REC produced polysilicon, wafers and solar panels representing an installed total PV capacity of 3,151 MW. Assuming world-wide irradiance and grid electricity emissions as well as an annual linear degradation of the solar panels power output, we conservatively estimate that our 2012 products are being used to displace more than 1,800,000 MTCO₂e per year for the 25+ year product life.

Since REC began commercial operation in 2006 and through 2012, REC has produced PV modules, wafers and polysilicon representing a total installed PV capacity of approximately 10,300 MW, which is estimated to displace around 6,170,000 MT CO₂e in average per year for their 25+ year product life.

The installed capacity in MW is calculated on the basis of polysilicon production in MT where an estimate of the electronic grade production has been subtracted from the total production. A conversion factor of 6 gram/W is adopted for converting from MT to MW. The production in Singapore is not included since this activity is part of the total supply chain for module production from polysilicon. Part of the polysilicon will be further processed by external stakeholders.

The estimated carbon displacement is based on average annual electricity output over 25 year project lifetime with 0,7% linear annual degradation, performance factor of 80%, and the following global average assumptions: 1) Irradiance – world average value of 1617 kWh/m²-yr over 1983-2005; excluding latitudes within the Arctic and Antarctic circles; NASA Surface Meteorology and Solar Energy (SSE) Release 6.0 Data Set (Jan 2008); <http://eosweb.larc.nasa.gov/sse/>

2) Electricity generation CO2 emissions intensity – world average value of 502 g CO2/kWh in 2008 for all generation sources from IEA (<http://www.iea.org/co2highlights/>)

REC group has not yet considered originating credits according to CDM or JI. REC produces solar technology products for sale and installation by their clients. REC is not an energy provider. The installation of REC products can however enable REC clients to originate CDM or JI carbon credits.

3.3

Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and implementation phases)

No

3.3d

If you do not have any emissions reduction initiatives, please explain why not

To ensure that REC's operation has minimal negative impact on the environment, efforts are continually made to reduce energy use and carbon emissions. The commitment to reduce energy consumption is closely linked to REC's aggressive cost road map, where production volumes have continued to increase year on year, while cost has come down dramatically. REC's ambitious cost road map is in line with the solar industry learning curve. The race to cut costs puts a lot of pressure on solar producers, which is one of the reasons for the lack of systematic emission reduction programs which can easily be monitored, measured and reported. However, REC still saw a 4.3% reduction of CO2 emissions per produced unit in 2012 with total emissions of CO2-equivalents of 156 metric tons/MW, compared to 163 metric tons/MW in 2011. The emissions reduction is a result of significantly reduced energy consumption in 2012 of 658 MWh/MW compared to 720 MWh/MW in 2011, equaling a reduction of nine percent from 2011.

Price decrease continues to be the key to solar market growth, thus the learning curve for the industry is expected to carry on and REC will maintain its cost cutting strategy. Energy is one of the main inputs in the production of solar panels, therefore the focus on reducing energy consumption continues to be of vital importance. The solar industry is still in its infant stage, and therefore REC welcomes increased focus on sustainability in the solar value chain in the coming years. There lies great opportunities to set ambitious emission reduction targets, initiating systematic work and activities to achieve these targets and establishing company-wide reporting routines to measure results year-on-year.

Page: 4. Communication

4.1 Have you published information about your company's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s)

Publication	Page/Section reference	Attach the document
In mainstream financial reports (complete)	Page 8, pages 22-23, pages 36-49	https://www.cdproject.net/sites/2013/35/23135/Investor CDP 2013/Shared Documents/Attachments/Investor-4.1-C3-IdentifyAttachment/REC annual report 2012 FINAL web.pdf
In voluntary communications (complete)	Pages 1-21	https://www.cdproject.net/sites/2013/35/23135/Investor CDP 2013/Shared Documents/Attachments/Investor-4.1-C3-IdentifyAttachment/REC Sustainability report 2012 FINAL.pdf

Module: Risks and Opportunities [Investor]

Page: 5. Climate Change Risks

5.1

Have you identified any climate change risks (current or future) that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Risks driven by changes in regulation

Risks driven by changes in physical climate parameters

Risks driven by changes in other climate-related developments

5.1a

Please describe your risks driven by changes in regulation

ID	Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Regul	Lack of regulation	There is a risk of reduced support and lack of policies promoting renewable energy sources (including solar). These policies include carbon taxes, feed-in tariffs for renewables etc. Stricter regulation to mitigate climate change represents an opportunity for REC (see opportunity section).	Reduced demand for goods/services	1-5 years	Direct	More likely than not	High
Regul	Uncertainty surrounding new regulation	Th ongoing trade disputes between the United States, China and the EU may have negative impact on REC. The introduction of trade barriers, trade restrictions and unfair trade practices for solar products would impact REC's ability to sell its products, increase selling prices and cost of operation, and thus have a significant adverse effect on the company's business and financial results.	Reduced demand for goods/services	1-5 years	Direct	About as likely as not	High

5.1b

Please describe (i) the potential financial implications of the risk before taking action; (ii) the methods you are using to manage this risk and (iii) the costs associated with these actions

Adverse development in relation to regulations promoting renewables (including solar) can have severe negative financial impact on REC through reduced demand for our products and lower pricing.

Germany and Italy represented more than 50 percent of global solar demand in 2012. Further reductions of the subsidy schemes and other adverse changes in regulations, in these and other markets may reduce demand for PV components. Changing regulations, mainly in Europe, led to overcapacity in the solar industry in 2011 & 2012 and caused prices to drop significantly on products produced by REC.

REC is engaged with policy makers in key solar markets directly and through industry associations to influence solar/renewable policies and regulations. Through this dialogue REC is also able to stay informed on potential policy changes that may affect demand for our products. REC mitigates these risks through active development of our market position in emerging markets to broaden the basis for demand for our products.

There are limited costs associated with these activities.

5.1c

Please describe your risks that are driven by change in physical climate parameters

ID	Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Physi	Other physical climate drivers	Risk related to impact of climate change and extreme weather conditions. Risks include changes in precipitation, droughts, rising sea levels and storms/hurricanes	Increased operational cost	1-5 years	Direct	Unknown	Medium-high

5.1d

Please describe (i) the potential financial implications of the risk before taking action; (ii) the methods you are using to manage this risk; and (iii) the costs associated with these actions

Severe weather conditions may cause damage on RECs production facilities, interrupt production, and may thus increase cost of operations. REC has its wafer, cell and solar panel production facility in Singapore located near the sea and these can in the long term be affected by rising sea levels. For RECs customers, increased frequency of storms and extreme weather conditions can lower output from the solar panels and may reduce the value of REC products. Extreme weather may also increase the cost of transportation and logistics.

Please note that severe negative impact of climate change is likely to drive stricter regulation on carbon emissions and further promote the use of renewables. This would rather represent an opportunity for RECs solar products (see opportunity section).

REC partly mitigates these risks through insurance covering the most common extreme weather events and production interruptions. REC pays NOK 8.9 million annually for this coverage, which also includes property damage. However normal insurance coverage would not provide complete financial cover and would typically involve deductibles etc.

5.1e

Please describe your risks that are driven by changes in other climate-related developments

ID	Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Other	Changing consumer behaviour	Reduced consumer concern for climate change impacts may reduce the demand for renewable energy sources in general and solar in particular.	Reduced demand for goods/services	1-5 years	Direct	Unlikely	Medium-high

5.1f

Please describe (i) the potential financial implications of the risk before taking action; (ii) the methods you are using to manage this risk; (iii) the costs associated with these actions

Reduced demand for solar panels may have significant negative financial impact on our business.

We are mitigating the risk through marketing and communication activities and industry associations with the objective to increase awareness about the benefits of solar as a low cost and low carbon source of electricity.

REC also engages in direct dialogue with policymakers in the US, to promote a level playing field in the global solar industry, arguing that the introduction of import duties and tariffs will only serve to increase the cost of solar electricity.

The costs associated with these activities are limited, and REC staff directly involved in managing regulatory risk is limited to two people, one for the Solar business of REC and one for the Silicon business of REC.

Page: 6. Climate Change Opportunities

6.1

Have you identified any climate change opportunities (current or future) that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Opportunities driven by changes in regulation

Opportunities driven by changes in physical climate parameters

Opportunities driven by changes in other climate-related developments

6.1a

Please describe your opportunities that are driven by changes in regulation

ID	Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact
Regu l	Other regulatory drivers	Increased awareness and focus on the issue of climate change and the continued cost reductions for solar, is likely to provide a basis for increased support for the use of solar energy. This represents a significant opportunity for REC and the solar industry.	Increased demand for existing products/services	1-5 years	Direct	More likely than not	Medium-high

6.1b

Please describe (i) the potential financial implications of the opportunity; (ii) the methods you are using to manage this opportunity and (iii) the costs associated with these actions

Strengthening of policy support for solar and renewables globally will increase demand for REC's products and provides opportunities for maintaining a long term sustainable pricing of our products.

Further progress on the international negotiations on commitments to reduce global carbon emissions and introduction a carbon tax would represent a great opportunity for solar and for REC.

In 2012 we see increased support for solar globally but in particular in Japan, China and India.

REC is engaged with policy makers in key solar markets directly and through industry associations to influence solar/renewable policies and regulations. Through this dialogue REC is also able to stay informed on potential policy changes that may affect demand for our products.

REC is continuously assessing which markets to enter with the basis in the forecasted demand potential. REC strives to capture new market opportunities by deploying our resources, insights in the PV market fundamentals and by working together with local and regional partners.

6.1c

Please describe the opportunities that are driven by changes in physical climate parameters

ID	Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Physi	Other physical climate opportunities	Opportunities related to impact of climate change and extreme weather conditions, and the expected increased support for initiatives to reduce carbon emissions through i.e. adaption of solar energy technologies.	Increased demand for existing products/services	1-5 years	Indirect (Client)	Likely	Medium-high

6.1d

Please describe (i) the potential financial implications of the opportunity; (ii) the methods you are using to manage this opportunity and (iii) the costs associated with these actions

Strengthening of policy support for solar and renewables globally will increase demand for REC products and provides opportunities for maintaining a long term sustainable pricing of our products.

Further progress on the international negotiations on commitments to reduce global carbon emissions and introduction a carbon tax would represent a great opportunity for solar and for REC.

In 2012 we see increased support for solar globally but in particular in Japan, China and India.

REC is engaged with policy makers in key solar markets directly and through industry associations to influence solar/renewable policies and regulations. Through this dialogue REC is also able to stay informed on potential policy chances that may affect demand for our products.

6.1e

Please describe the opportunities that are driven by changes in other climate-related developments

ID	Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Other	Changing consumer behaviour	Increased awareness of the negative impact of climate change may lead to changing consumer behaviour and increased demand for renewables and solar products.	Increased demand for existing products/services	1-5 years	Direct	More likely than not	Medium-high

6.1f

Please describe (i) the potential financial implications of the opportunity; (ii) the methods you are using to manage this opportunity; (iii) the costs associated with these actions

Increased demand for solar products will have significant positive impact on RECs business.

We are capturing this opportunity through marketing and communication activities and by working with industry associations with the objective to increase awareness about the benefits of solar as a low cost and low carbon source of electricity.

The direct costs associated with these activities are limited, and REC staff directly involved in managing regulatory risk is limited to two people, one for the Solar business of REC and one for the Silicon business of REC.

Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading [Investor]

Page: 7. Emissions Methodology

7.1

Please provide your base year and base year emissions (Scopes 1 and 2)

Base year	Scope 1 Base year emissions (metric tonnes CO2e)	Scope 2 Base year emissions (metric tonnes CO2e)
Fri 01 Jan 2010 - Fri 31 Dec 2010	91456	412679.2

7.2

Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

7.2a

If you have selected "Other", please provide details below

7.3

Please give the source for the global warming potentials you have used

Gas	Reference
CH4	IPCC Second Assessment Report (SAR - 100 year)
N2O	IPCC Second Assessment Report (SAR - 100 year)
CO2	IPCC Second Assessment Report (SAR - 100 year)

7.4

Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data

Fuel/Material/Energy	Emission Factor	Unit	Reference
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Attachments

[https://www.cdproject.net/sites/2013/35/23135/Investor_CDP_2013/Shared Documents/Attachments/InvestorCDP2013/7.EmissionsMethodology/Worksheet-to-input-of-Emission-factors_REC.xlsx](https://www.cdproject.net/sites/2013/35/23135/Investor_CDP_2013/Shared_Documents/Attachments/InvestorCDP2013/7.EmissionsMethodology/Worksheet-to-input-of-Emission-factors_REC.xlsx)

Page: 8. Emissions Data - (1 Jan 2012 - 31 Dec 2012)

8.1

Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Operational control

8.2

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

217598.8

8.3

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

450917.1

8.4

Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions which are not included in your disclosure?

Yes

8.4a

Please complete the table

Source	Scope	Explain why the source is excluded
Car business travel US, Singapore	Scope 1	Difficulty gathering the data. Very low emissions compared with production sites
Some smaller offices	Scope 2	Difficulty gathering the data. Very low emissions compared with production sites

8.5

Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Scope 1 emissions: Uncertainty range	Scope 1 emissions: Main sources of uncertainty	Scope 1 emissions: Please expand on the uncertainty in your data	Scope 2 emissions: Uncertainty range	Scope 2 emissions: Main sources of uncertainty	Scope 2 emissions: Please expand on the uncertainty in your data
More than 2% but less than or equal to 5%	Data Gaps Assumptions Metering/ Measurement Constraints	All production site data has been collected by standard templates used for GRI reporting. The data has been quality assured by DNV and CO2focus. There may still be smaller energy consumption that has been missed out in the QA. The reported data is constrained by the measurement methods used at the sites. Regarding business travel reported in Scope 1, assumptions have in some instances (where actual consumption is missing) been made on emission intensities per travelled km.	More than 2% but less than or equal to 5%	Data Gaps Metering/ Measurement Constraints	All production site data has been collected by standard templates used for GRI reporting. The data has been quality assured by DNV and CO2focus. There may still be smaller energy consumption that has been missed out in the QA. The reported data is constrained by the measurement methods used at the sites. Regarding energy consumption in buildings, assumptions have in some instances been made based on economical figures for estimating the actual consumption.

8.6

Please indicate the verification/assurance status that applies to your Scope 1 emissions

Third party verification or assurance complete

8.6a

Please indicate the proportion of your Scope 1 emissions that are verified/assured

More than 90% but less than or equal to 100%

8.6b

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Type of verification or assurance	Relevant standard	Attach the document
Limited assurance	ISO14064-3	https://www.cdproject.net/sites/2013/35/23135/Investor CDP 2013/Shared Documents/Attachments/Investor-8.6b-C3-RelevantStatement/GHG Verification statement_2013 REC.pdf

8.7

Please indicate the verification/assurance status that applies to your Scope 2 emissions

Third party verification or assurance complete

8.7a

Please indicate the proportion of your Scope 2 emissions that are verified/assured

More than 90% but less than or equal to 100%

8.7b

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Type of verification or assurance	Relevant standard	Attach the document
Limited assurance	ISO14064-3	https://www.cdproject.net/sites/2013/35/23135/Investor CDP 2013/Shared Documents/Attachments/Investor-8.7b-C3-RelevantStatement/GHG Verification statement_2013 REC.pdf

8.8

Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

No

Page: 9. Scope 1 Emissions Breakdown - (1 Jan 2012 - 31 Dec 2012)

9.1

Do you have Scope 1 emissions sources in more than one country?

Yes

9.1a

Please complete the table below

Country/Region	Scope 1 metric tonnes CO2e
Norway	8.9
Germany	101.5
United States of America	217410
Singapore	36.4
Italy	25.6
Spain	16

9.2

Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)

By business division

9.2a

Please break down your total gross global Scope 1 emissions by business division

Business division	Scope 1 emissions (metric tonnes CO2e)
REC Silicon	217386.4
REC Solar	203.5
REC ASA	8.9

Page: 10. Scope 2 Emissions Breakdown - (1 Jan 2012 - 31 Dec 2012)

10.1

Do you have Scope 2 emissions sources in more than one country?

Yes

10.1a

Please complete the table below

Country/Region	Scope 2 metric tonnes CO2e	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low carbon electricity, heat, steam or cooling (MWh)
Norway	38.2	445.5	0
United States of America	339875	1514581.2	656531
Singapore	110995.2	248868.2	0
Spain	3.7	12.7	0
Germany	4.9	11.7	
Italy	0	0	0

10.2

Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

By business division

10.2a

Please break down your total gross global Scope 2 emissions by business division

Business division	Scope 2 emissions (metric tonnes CO2e)
REC Silicon	339869
REC Solar	111010
REC ASA	38

Page: 11. Energy

11.1

What percentage of your total operational spend in the reporting year was on energy?

More than 5% but less than or equal to 10%

11.2

Please state how much fuel, electricity, heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year

Energy type	MWh
Fuel	1058729
Electricity	1763737.4
Heat	98.8
Steam	0
Cooling	83.1

11.3

Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Diesel/Gas oil	573.5
Motor gasoline	114.6
Natural gas	1058041

11.4

Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor

Basis for applying a low carbon emission factor	MWh associated with low carbon electricity, heat, steam or cooling	Comments
Power Purchase Agreements (PPA) not backed by instruments		

Page: 12. Emissions Performance

12.1

How do your absolute emissions (Scope 1 and 2 combined) for the reporting year compare to the previous year?

Increased

12.1a

Please complete the table

Reason	Emissions value (percentage)	Direction of change	Comment
Emissions reduction activities	4.8	Decrease	Both the production in Singapore, Butte and Moses Lake have improved their emission intensities (tCO ₂ e/MW or MT produced). Over all, by converting all production to MW the emissions were reduced by 4,8 % as compared with the what the total emissions would have been applying the intensity from 2011.
Divestment			
Acquisitions			
Mergers			

Reason	Emissions value (percentage)	Direction of change	Comment
Change in output	12.3	Increase	The production (converted to MW) increased by 12.3 %.
Change in methodology			
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other			

12.2

Please describe your gross combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for change
93.6	metric tonnes CO2e	unit total revenue	43	Increase	The revenues decreased by 24.8 % while the emissions increased by 7.5 %. This development is due to a drop in silicon and solar panel prices while the production grew.

12.3

Please describe your gross combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per full time equivalent (FTE) employee

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for change
285	metric tonnes CO2e	FTE employee	64.4	Increase	The number of FTE dropped by 34.6 % while the emissions increased by 7.5 %. The company went through a heavy cost saving program during the year while the production grew.

12.4

Please provide an additional intensity (normalized) metric that is appropriate to your business operations

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for change
156	metric tonnes CO2e	Other: metric tonnes of CO2e per MW modules	4.3	Decrease	Both the production in Singapore, Butte and Moses Lake have improved their emission intensities (tCO2e/MW or MT produced). Over all, by converting all production to

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for change
					MW the emissions were reduced by 4,3 % as compared with the intensity from 2011.

Page: 13. Emissions Trading

13.1

Do you participate in any emissions trading schemes?

No, and we do not currently anticipate doing so in the next 2 years

13.2

Has your company originated any project-based carbon credits or purchased any within the reporting period?

No

Page: 14. Scope 3 Emissions

14.1

Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Methodology	Percentage of emissions calculated using primary data	Explanation
Purchased goods and services	Relevant, calculated	448497	Data has been collected from all production sites for the purpose of the GRI reporting. The data has gone through a QA and is considered to be of good quality. The following materials have been assessed here: Glass, Aluminium, PEG, Polyester, Ethyl vinyl acetate, Silicon carbide and MG-silicon. These raw materials cover 97 % of all materials used. The emission factors are extracted from the Ecoinvent database except for MG-silicon that is taken from an LCA performed by the ECN (Energy Research Centre of the Netherlands) for REC in 2011. These are all found in the list of	100%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Methodology	Percentage of emissions calculated using primary data	Explanation
			emission factors.		
Capital goods	Not relevant, explanation provided				Capital goods are assumed to make up a very small proportion of the total emissions in the value chain. It is optional in the GHG Scope 3 standard to include capital goods parts of other Scope 3 categories.
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	157151	Here all the indirect emissions related to the production of the Scope 1 and Scope 2 energy sources are calculated. The emission factors are the Scope 3 EF from the Defra database including Natural gas, US electricity and Singapore electricity (see attached excel file). No outsourced activities are included here (under development).	100%	
Upstream transportation and distribution	Relevant, not yet calculated				
Waste generated in operations	Relevant, calculated	5341	Data has been collected from all production sites for the purpose of the GRI reporting. The data has gone through a QA and is considered to be of good quality. Some assumptions have been made for which treatment methods that have been undertaken for each waste fraction. There are specifically some uncertainties related to the hazardous waste treatment which has been divided into three types (incineration, landfill of Si-waste and hazardous waste landfill). Further analyses is under development. LCA databases have been used for all emission factors that are listed in excel file section 7.	100%	
Business travel	Relevant, calculated	1464.5			
Employee commuting	Not relevant, explanation provided				The emissions generated from employees commuting is assumed to add minimal effect on

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Methodology	Percentage of emissions calculated using primary data	Explanation
					total carbon accounting due to the location and practical arrangements at the three production units in REC, and has therefore not been calculated. The two US silicon production plants, in Moses Lake, WA and Butte, MA are cornerstone businesses in the local communities, and workers live close to the production plants. In the solar panel production plant in Singapore, a majority of workers travel to work in buses that transport workers in and out of the city centre to the plant at the change of shift. By organizing joint transportation for all its Singapore workers, REC is able to limit emissions generated from employee commuting considerably.
Upstream leased assets	Not relevant, explanation provided				Any leased assets that REC operates would be accounted for in its Scope 1 & 2 emissions due to the operational control approach.
Investments	Not relevant, explanation provided				REC has only very limited investments outside its core, 100% owned operation, and therefore emissions from these investments would not have a measurable effect on emissions calculations.
Downstream transportation and distribution	Relevant, calculated	15009	The logistics to customers from REC Solar has been assessed here while the data from REC Silicon is missing. All the logistics suppliers have been asked to provide detailed data on routes and volumes. Depending on the quality of the reports, specific emission data (calculated by supplier) or generic EF (tCO2e/tkm) have been adopted.	100%	
Processing of sold products	Relevant, calculated	438306	This has been calculated from the difference in production between Silicon and Solar (which	100%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Methodology	Percentage of emissions calculated using primary data	Explanation
			the net amount sold to external stakeholders for further processing). REC Silicon has a production 2846 MW larger than REC Solar. The processing of this silicon is assessed on the basis of the emission intensity in REC Solar (154 tCO2/MW).		
Use of sold products	Not relevant, explanation provided				REC is a leading global provider of solar electricity solutions, delivering 777 MW of solar panels to the market in 2012. The great benefit of using solar panels for electricity generation, is that the installation is completely emissions free and require very little maintenance, therefore no emissions to disclose for sold products in the reporting period.
End of life treatment of sold products	Not relevant, explanation provided				With a minimum lifetime of 25 years on our solar panels, and solar panel deliveries starting less than 10 years ago, end of life treatment has not been relevant in the reporting period. In the longer term, REC supports the inclusion of solar panels in the WEEE (EU Directive), meaning that collection of end-of-life solar panels will become a legal requirement.
Downstream leased assets	Not relevant, explanation provided				REC has not leased any assets to a third party.
Franchises	Not relevant, explanation provided				REC does not have any franchises
Other (upstream)					
Other (downstream)					

14.2

Please indicate the verification/assurance status that applies to your Scope 3 emissions

Third party verification or assurance complete

14.2a

Please indicate the proportion of your Scope 3 emissions that are verified/assured

More than 90% but less than or equal to 100%

14.2b

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Type of verification or assurance	Relevant standard	Attach the document
Limited assurance	ISO14064-3	https://webadmin.cdproject.net/sites/2013/35/23135/Investor CDP 2013/Shared Documents/Attachments/Investor-14.2b-C3-RelevantStatementAttached/GHG Verification statement_2013 REC.pdf

14.3

Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

Yes

14.3a

Please complete the table

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
Purchased goods & services	Change in output	5.05	Increase	The emissions increased due to the production growth of 12.3 %. The resource intensity was at the same time reduced (materials used compared with output).
Waste generated in operations	Emissions reduction activities	25.5	Decrease	The hazardous waste generation has been reduced significantly.

14.4

Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)

No, we do not engage

14.4d

Please explain why not and any plans you have to develop an engagement strategy in the future

REC collaborates closely with our partners at every step of the value chain. For suppliers, the focus for REC has been to implement a standardized sourcing process, and sustainability has formed a key part of supplier pre-qualification reviews and audits. Issues cover human rights, freedom of association, child and forced labor, corruption and occupational health and safety. Supplier audits are still in the process of being implemented , with

88 percent of REC Solar suppliers having undergone audits in 2012, and with audits for REC Silicon suppliers starting in 2012, managing to get 27 percent of suppliers assessed in that first year. To include GHG emissions as part of the pre-qualification reviews and audits represents an opportunity for REC in the near future, and is in line with REC's principle for product stewardship.

REC engages in dialogue with its customers on a continuous basis through the global sales and support force, customer events and through dedicated partner programs. Customers can provide feedback directly online, and through customer surveys at regular intervals. REC works with customer engagement to find optimal solutions for customers, and have invited customers to give feedback on the relevance of doing an updated LCA on our solar panel.

Attachments

[https://webadmin.cdproject.net/sites/2013/35/23135/Investor_CDP_2013/Shared Documents/Attachments/InvestorCDP2013/14.Scope3Emissions/Worksheet-to-input-of-Emission_factors_REC.xlsx](https://webadmin.cdproject.net/sites/2013/35/23135/Investor_CDP_2013/Shared_Documents/Attachments/InvestorCDP2013/14.Scope3Emissions/Worksheet-to-input-of-Emission_factors_REC.xlsx)

Module: Sign Off

Page: Sign Off

Please enter the name of the individual that has signed off (approved) the response and their job title

Mikkel Tørud, SVP Investor Relations & Business Development
CDP