

Euler Hermes Rating GmbH

## Project Rating Methodology (Renewable Energy)

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# Introduction

## ***Transparent presentation of rating methodology***

This project rating methodology for rating renewable energy projects replaces the project rating methodology (renewable energy) from September 2014. Its main purpose is to more transparently describe how Euler Hermes Rating GmbH (EHR) arrives at its renewable energy project ratings so that clients, investors and interested third parties can better understand which rating criteria are relevant and how they are combined into a final rating notation. The revised methodology does not change any rating criteria, weightings or assessment standards. Applying this methodology will not change rating notations based on the project rating methodology from September 2014.

## ***No impact on existing rating notations***

## ***Typical projects include wind energy, solar energy, bioenergy and hydroelectric power***

The renewable energy project rating methodology supplements the basic principles for assigning ratings and providing other services and further specifies the general project rating methodology that is available on our website. The renewable energy project rating methodology generally addresses all special purpose vehicles that use (debt) financed renewable energy assets for a specific purpose and, in many cases, for a limited period of time. Typical projects tend to include wind energy, solar energy, bioenergy and hydroelectric power. Issue ratings of financial instruments are also covered by the issue rating methodology, which is available on our website as well. The renewable energy rating methodology does not apply to the rating process for structured finance where the issue is backed by an asset pool.

## ***Case-by-case evaluations are an integral part of the methodology***

As with all its rating methodologies, Euler Hermes Rating GmbH uses the methodological principles set out below as guidelines for the rating process. However, each rating decision is ultimately made at the Rating Committee's discretion. A rating expresses the opinion of analysts and the rating agency, and so the rating methodology must include case-by-case evaluations and assessments. It must also accommodate different project and transaction structures in these case-by-case assessments. The methodology thus provides a framework for the analysis and is constantly being refined.

## ***Weighting of project risks and financial risks***

The rating methodology for renewable energy projects is organised into two major risk categories: project risk and financial risk. The following sections break down these categories as objects of analysis and explain the individual rating drivers. They also describe how the drivers are weighted and combined into a final rating notation after factoring in operational risks and external influences. Appendix 1 lists all the rating drivers and shows how renewable energy project ratings are derived.

# Project risk

## *Analysis starts with internal and external analyses*

The analysis of renewable energy project risk with respect to forecast reliability starts with information provided by the various project participants as well as internal and external market analyses. External information primarily consists of market analyses, supplementary information or expert reports and information material supplied by research institutes and trade associations. Analysts gather additional information from contracts, project finance documentation and discussions with management.

## Forecast reliability

### Cash flow stability and quality

EHR's evaluation of cash flows from renewable energy projects focuses on the predictability of the underlying revenues. Revenue stability depends heavily on resource and counterparty risk, diversification effects, off-take agreement duration and length of time between price reviews. Planned project expenses are significantly affected by contractual inflation indexing and the extent to which prices are contractually fixed.

## *Analysis of resource risks and diversification*

Resource risk describes the risk that the actual quality and quantity of required project resources (wind, sun, etc.) will fall short of the planned quality and quantity. Resource shortfalls will result in lower-than-expected revenue and cash flow and can thus jeopardise debt service for project debt instruments. To evaluate resource risk, EHR generally conducts plausibility checks of at least two external yield reports for the renewable energy project in order to properly assess cash flow predictability. EHR's plausibility checks include the use of statistical tools to simulate probability distributions of resource availability (wind turbine site suitability, etc.). As a rule, EHR bases its rating in this category on conservative scenarios with correspondingly high exceedance probabilities (e.g. P75 or P90). Minimum exceedance probability requirements may vary depending on the resource type and the degree of project diversification.

## *Analysis of off-take agreements and length of time between price reviews*

Generally, off-take agreements and price controls should have the same durations as the project finance in order to achieve at least a moderate risk score in the "Cash flow predictability" rating category. If the off-take agreement or price control expires before the project finance is repaid, this will generally increase the merchant risks (e.g. energy price risks) and thus the uncertainty of the revenue and cash flow assumptions. In these cases, EHR assesses the merchant risk relative to the project's remaining debt and useful economic life. Government-guaranteed feed-in tariffs are generally a rating strength with respect to counterparty risk. However, the credit ratings of governmental guarantors or non-governmental counterparties may also serve as a ceiling that caps the scores assigned in this category. Contract terms that index significant project expenses to inflation are generally viewed favourably for rating purposes.

### Contract terms

## *Analysis of key contract terms*

EHR evaluates project cash flow streams against the backdrop of possible ancillary contract terms that may disrupt revenue generation and result in pass-throughs of cost increases. These ancillary clauses are particularly pertinent in power purchase agreements (PPAs). A PPA is a contract between a power producer and a power offtaker for a definite term. It may require the power producer to meet a minimum performance level (minimum availability, etc.) in order to receive revenue.

# Market viability and competitiveness

**Analysis of competitive intensity and competitive position**

The renewable energy project's competitiveness and profitability provide important indications of its long-term ability to service its debt (interest and principal payments for project financing). EHR's analysis focuses on general market and competitive conditions that could affect the future course of the project.

## Competitiveness

The competitiveness analysis first determines the current and future intensity of competition faced by products generated by the project. Intensity of competition is largely a function of a market's structure, particularly in terms of the fundamental legal and economic conditions that govern it. The analysis also evaluates the project's current and future competitive position, particularly with regard to cost structure, geographical location and technical innovativeness.

**Analysis of governmental regulatory regimes**

Some renewable energy projects do not merely compete in the open market but receive government subsidies as well. Government incentives for renewable energy take two basic forms: price instruments such as rate floors or bonuses, and quantitative instruments such as auctions or quotas for renewable energy certificates. Countries operate their own versions of these models; many have introduced price-based incentives. It is against this backdrop that EHR evaluates the scope and quality of government subsidies. It also assesses the likely continuation of these frameworks, which tend to be favourable for renewable energy projects.

The analysis of the competitive position of renewable energy projects focuses on the levelised cost of energy (LCOE) by itself and in relation to other energy projects. To receive a moderate risk assessment, a renewable energy project must have an LCOE comparable to other energy projects. The project's competitiveness is determined by the results of the analysis of competitive intensity and competitive position.

Competitiveness	Assessment parameters
<ul style="list-style-type: none"> <li>▪ Competitive intensity</li> <li>▪ Competitive position</li> </ul>	<ul style="list-style-type: none"> <li>▪ Scope and quality of government regulation</li> <li>▪ Levelised cost of electricity relative to other renewable energy projects</li> </ul>

## Profitability

The profitability analysis assesses the structural demand drivers for the products and services generated by the project or the final products that can be derived from it. It also looks at contract structures and especially evaluates whether they fairly balance the economic interests of all the key contracting parties.

Profitability	Assessment parameters
<ul style="list-style-type: none"> <li>▪ Structural demand</li> <li>▪ Contract structures</li> </ul>	<ul style="list-style-type: none"> <li>▪ Is there structural demand for the products generated by the project or the final products derived from them?</li> <li>▪ Are the contracts and / or regulatory regimes structured in a reasonable manner, particularly with regard to balancing the economic interests (prices, rights, obligations) of all the key contracting parties? Stability and track record of government regulation?</li> </ul>

**Analysis of existing off-take agreements and regulatory regimes**

These rating drivers play a particularly important role in projects with high price and demand risks. This does not mean, however, that analysts can ignore these aspects for a project that has fixed off-take agreements for its products. They should validate this kind of project's long-term competitiveness and profitability as well. It is EHR's opinion that the reliability of off-take agreements and regulatory regimes is primarily a function of profitability. The less profitable the project, the greater the likelihood that off-take agreements will be terminated or regulatory regimes will be modified.

Important factors in the profitability analysis include the current off-take agreements and regulatory regimes. Here, the focus lies on the levelised cost of energy relative to current market rates and regulatory conditions. A stable regulatory regime is necessary to achieve a moderate risk rating.

Contracts regarding the purchase of materials and supplies, operations and maintenance, hedging and other services should also be examined for their long-term competitiveness and profitability.

## Technical risks

Technical risks can cause downtime or business interruptions at the cash generating unit (CGU) and thereby significantly weaken the individual project. This can lead to lost revenue, higher expenses, higher investment costs and/or contract penalties under off-take agreements, particularly if the project is not very diversified.

**Analysis of technical risks**

EHR generally evaluates technical configurations, components and processes as well as product manufacturer quality (e.g. experience and financial stability of wind turbine manufacturers). It generally consults external information such as technical opinions or collaborates with external service providers in the course of its evaluation. These outside sources enable EHR to identify projects that use sufficiently proven technologies (based on track records, failure statistics, etc.) and experienced operators. Assessments in this category benefit from product and performance guarantees, such as those extended by wind turbine manufacturers. When assessing photovoltaic projects, EHR focuses on factors such as photovoltaic modules and inverters since they can account for a large share of the project's costs and have a significant impact on energy yields.

Technical risks	Assessment parameters
<ul style="list-style-type: none"> <li>▪ Standard technology</li> <li>▪ Product and performance guarantees</li> <li>▪ Product manufacturer quality</li> </ul>	<ul style="list-style-type: none"> <li>▪ How good is the track record of the technology or installed components?</li> <li>▪ What guarantees do manufacturers give, and how extensive and reliable are they?</li> <li>▪ Experience and financial stability of the product manufacturers involved in the project</li> </ul>

## Operating and management risks

### *Analysis of operating and management risks*

Operating and management risk refers to risks inherent in the generation process that could interrupt operations and result in lost output. Operating and management risks are often the result of design errors, incorrect operation, improper maintenance and servicing or the performance and supervision of operating processes. Operating and management risks can be reduced by employing a professional operation and maintenance contractor who can keep the project systems functioning and keep the project running continuously. EHR accounts for this fact by evaluating the quality of existing maintenance contracts and operator / operation and maintenance agreements. Full maintenance contracts, for example, may be viewed as a strength in this rating category, depending on the contract term.

EHR also generally assesses the project operators' experience and quality in order to identify possible risks to cash flow. In addition, EHR evaluates the financial stability of the project sponsors.

Operating and management risks	Assessment parameters
<ul style="list-style-type: none"> <li>▪ Quality of project operators</li> <li>▪ Quality of maintenance contracts</li> <li>▪ Quality of project sponsors</li> </ul>	<ul style="list-style-type: none"> <li>▪ How good is the project operators' experience and historical performance?</li> <li>▪ How long do maintenance contracts run and what components and services do they cover?</li> <li>▪ How good is the project sponsor, particularly in terms of its track record and financial stability?</li> </ul>

## Weighting

### *Analyst-based weighting of the sub-factors*

To assess project risk, an EHR analyst assigns weights to four sub-factors: technical risks, cash flow predictability, operating and management risks, and market viability and competitiveness. The weighting reflects the analyst's assessment of which factors will have the biggest impact on the project's planned performance. Once these sub-factors have been weighted, project risk is assigned to one of five rating categories:



## Financial risk

### *Analysis of the financial model and historical data*

The financial analysis evaluates the financial model developed by the project sponsor for the entire project lifecycle (including construction period, operating period and removal period, if applicable). If a project history is available, it will be assessed largely on the basis of annual, quarterly or monthly reports. Financial flexibility is usually estimated by analysing future free cash flow and available liquidity (including reserve accounts for debt service and major maintenance).

### *Critical assessment of model parameters and stress scenario analysis of the financial model*

Analysts check the financial model provided by the project sponsors for plausibility and analyse it with regard to debt service coverage and financing structure. Financial ratios are calculated based on this information and assessed using EHR's internal ratio system. In addition, the project sponsors provide detailed information on the financial model and underlying assumptions. All significant model parameters are closely scrutinised; the impact of various stress scenarios or simulations on debt service coverage is examined closely. During this process, analysts verify that the stress scenarios and probability distribution of simulated parameters meet EHR's minimum requirements for relevant financial ratios (P90 exceedance probabilities<sup>1</sup> for earnings forecasts, degradation assumptions for photovoltaic projects, assumed wind shadow effects in wind farms, market price forecasts, etc.).

## Debt coverage

### *DSCR requirements depend on project risk and cash reserves*

When assessing project cash flow, analysts consider its ability to cover debt service for all interest and principal payments. One key metric is the debt service coverage ratio (DSCR). The stability of this ratio and its minimum and average requirements can go up or down depending on project risk (cf. "Project risk"). Debt service coverage calculations do not consider cash from the debt service or major maintenance reserve accounts. These accounts must meet minimum requirements that are specific to each project (e.g. six months of debt service or six months of the maintenance budget). Arrangements that exceed or fall short of this standard may decrease or increase DSCR requirements.

Another key aspect of the financial analysis is an assessment of the financing structure. This assessment focuses on the ratio between debt and project sponsors' equity as well as planned amortisation structures. Project finance often relies on the cash flows generated by

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<sup>1</sup> P90 means that the probability of meeting or exceeding the long-run forecast for average annual energy production is 90%.



**Assessment of equity ratio, debt and amortisation structure**

temporary concessions, rights or licenses (e.g. project rights or regulated prices). Once these temporary rights expire (e.g. at the end of the price cap period), the assumptions underlying the model (e.g. maintenance services or market rates for energy) may no longer apply. Full amortisation of project finance between price reviews will result in lower DSCR requirements than partial repayment.

**Assessment of refinancing risk**

With partially amortising projects, EHR also assesses the probability of successful refinancing. In this assessment, assumptions must be made about the project's net present value at the time of refinancing. Successful refinancing depends on factors such as market trends, technical innovativeness, hidden reserves, the amount of outstanding debt and the continued availability of project rights, concessions and licenses. EHR assesses the probability of successful refinancing using tools such as simulated cash flow models (Monte Carlo simulation) or investment multiples (e.g. EBITDA multiples).

Key financial ratios for assessing debt service coverage are:

Ratio	Parameter
<ul style="list-style-type: none"> <li>▪ Debt service coverage ratio (DSCR)</li> <li>▪ Cash flow coverage</li> <li>▪ Loan life coverage ratio (LLCR)</li> </ul>	<ul style="list-style-type: none"> <li>▪ CFADS / (interest + principal)</li> <li>▪ FFO / total debt</li> <li>▪ NPV of future cash flows / outstanding debt</li> </ul>

## Stress scenario analysis

**Critical examination of key model parameters and derivation of stress scenarios**

An extensive analysis of the base scenario closely scrutinises all the main model parameters and examines the stress scenarios derived from these parameters to determine their impact on debt service coverage. These scenarios simulate variances in key income and expense categories. The variance analysis may simulate scenarios such as diverging price and quantity trends. In the renewable energy market, the analysis may involve Monte Carlo simulations of maintenance costs or energy production output.

The overall purpose of EHR's analysis is to measure and assess the sensitivity of project cash flows to various factors, particularly event risks, technical risks and operational risks (cf. "Project risk").

**Insights into the stability and sustainability of debt service coverage**

EHR's assessment is generally based on conservative scenarios with correspondingly high exceedance probabilities (P75 or P90). The minimum required exceedance probability may vary depending on the calculated project risk, simulation parameters and project diversification. In extreme scenarios, debt service coverage is also calculated using P95 to P99 probabilities. Goal Seek analysis (e.g. DSCR=1.0) may be performed for selected variables as well. Scenario analysis findings provide valuable insights into the stability and sustainability of debt service coverage during the project period.

Possible stress scenario analysis tools are:

## Tools

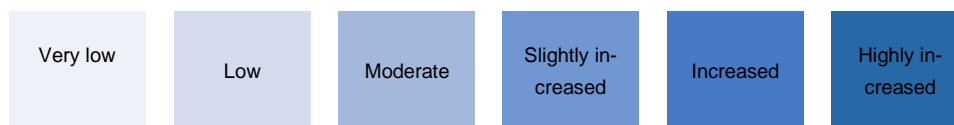
- Market price scenarios, inflation, interest rates (e.g. Pöyry/ISH/CERA scenarios)
- Demand scenarios
- Probability distributions/Monte Carlo simulation
- Goal Seek analysis (e.g. DSCR=1.0)
- Event risks and likelihoods of occurrence (force majeure, etc.)
- Combination of various stress scenarios

The analysis of the future debt burden is based on the financial plan. It considers the impacts of implementing corporate actions and capital expenditures and changing financial ratios. These developments must be consistent with the strategic goals and conditions for execution.

## Weighting

### *Coverage ratios given the highest weighting*

Financial risk is assessed based largely on the findings from the scenario analysis. The impacts on coverage ratios are given the highest weighting. Financial risk is classified into one of six rating categories:



## Anchor rating

### Weighting the risk profiles

The estimated project and financial risk is used to calculate the project's anchor rating. The anchor rating combines the project and financial risk to form a (sub-)rating. It does not consider possible operational risks or external factors associated with public sector involvement or membership in a corporate group.

## EHR rating matrix

### *Asymmetrical weighting of project and financial risk*

The anchor project rating is a function of the categories previously assigned to the two risk profiles. The assigned financial risk category plays an outside role in risk profile weighting. The weighting, in other words, is asymmetrical. If the project has an increased financial risk, the financial risk profile will tend to dominate the anchor project rating. If the financial risk is low, the project risk will gain significance. That means that a project must have a strong financial risk profile in order to obtain an investment grade anchor project rating. An increased financial risk, on the other hand, generally produces an anchor project rating that is below average or even considerably below average.

Project and financial risk profiles are weighted in the EHR rating matrix, which combines the two risk profile categories into a single anchor project rating:

Project risk	Financial risk						
		Very low	Low	Moderate	Slightly increased	Increased	Highly increased
Very low		AAA / AA+	AA	A-	BBB-	BB-	B-
low		AA	A+	BBB+	BB+	B+	CCC
Moderate		AA-	A	BBB	BB	B	CCC-
Slightly in-creased		A	BBB+	BB+	BB-	B-	CC
Highly increased		BBB	BB+	BB-	B	CCC+	C

The matrix provides guidance for analysts. However, analysts may elect to depart from this procedure in specific, justified cases.

# Standalone rating

## Operational risks

Operational risks are identified and assessed separately from project and financial risks. They primarily relate to project planning and construction risks as well as structures and processes that are specific to the project.



### ***Assessment of project planning, construction and marketing risks***

The presence of typical project planning, construction and marketing risks often results in a negative modification of the anchor project rating. However, the modification may be reversed once the project has been completed on schedule and successfully started up. During the assessment, analysts pay close attention to measures taken to limit typical risks posed by construction cost overruns, delays, start-up problems and liquidity shortages during the construction period.

### ***Assessment of management / governance***

The company's management is assessed based on factors such as external stakeholders' qualifications and dependence on specific individuals. If necessary, corporate governance policies are critically assessed as well, concentrating on interest, oversight and incentive structures and the ability of external stakeholders to obtain reliable information about the project's situation and progress. The analysis of the company's organisation focuses on transparency, efficiency, sustainability and manageability. Planning and management tools, for their part, are assessed for their ability – along with the risk management system – to give the project team a sound basis for making project management decisions.

### ***Analysis of the organisation and the planning and management tools***

### ***Analysis of the business processes***

The business process analysis looks at the efficiency and flexibility of the project's value creation processes. Next, counterparty risks for key service providers and other transaction risks are evaluated against the project's specific structure (based on legal and tax opinions, etc.). The assessment of legal risks mainly considers risks from ongoing litigation or legal disputes.

### ***Assessment of the legal risks***

## Modification 1

### *Standalone rating as a modification of the anchor rating*

Regarding the assessment of operational risks and the possible modification of the anchor project rating, EHR initially assumes that the project stakeholders have all their internal structures and processes under control. For that reason, potential modifications generally have a negative effect. The extent of the modification is determined by analysts on a case-by-case basis and can result in a significant (negative) adjustment to the rating. In specific, justified cases, the modification may also result in a slight improvement of the anchor project rating.

The result of Modification 1 is the standalone project rating, which provides an opinion about the project's independent rating.

## Project rating

### Public sector

#### *Public sector involvement*

The creditworthiness of the project being rated may be affected by public sector involvement.

If public sector entities hold qualified voting or control rights or make up the majority of the project's sponsors, analysts will conduct a review to determine whether the facts justify a rating modification. A distinction is made between direct / de jure control and indirect / de facto influence due to the project's significance. If de facto influence is found to exist, various criteria are evaluated to determine the probability and possibility of the public sector intervening temporarily if necessary.

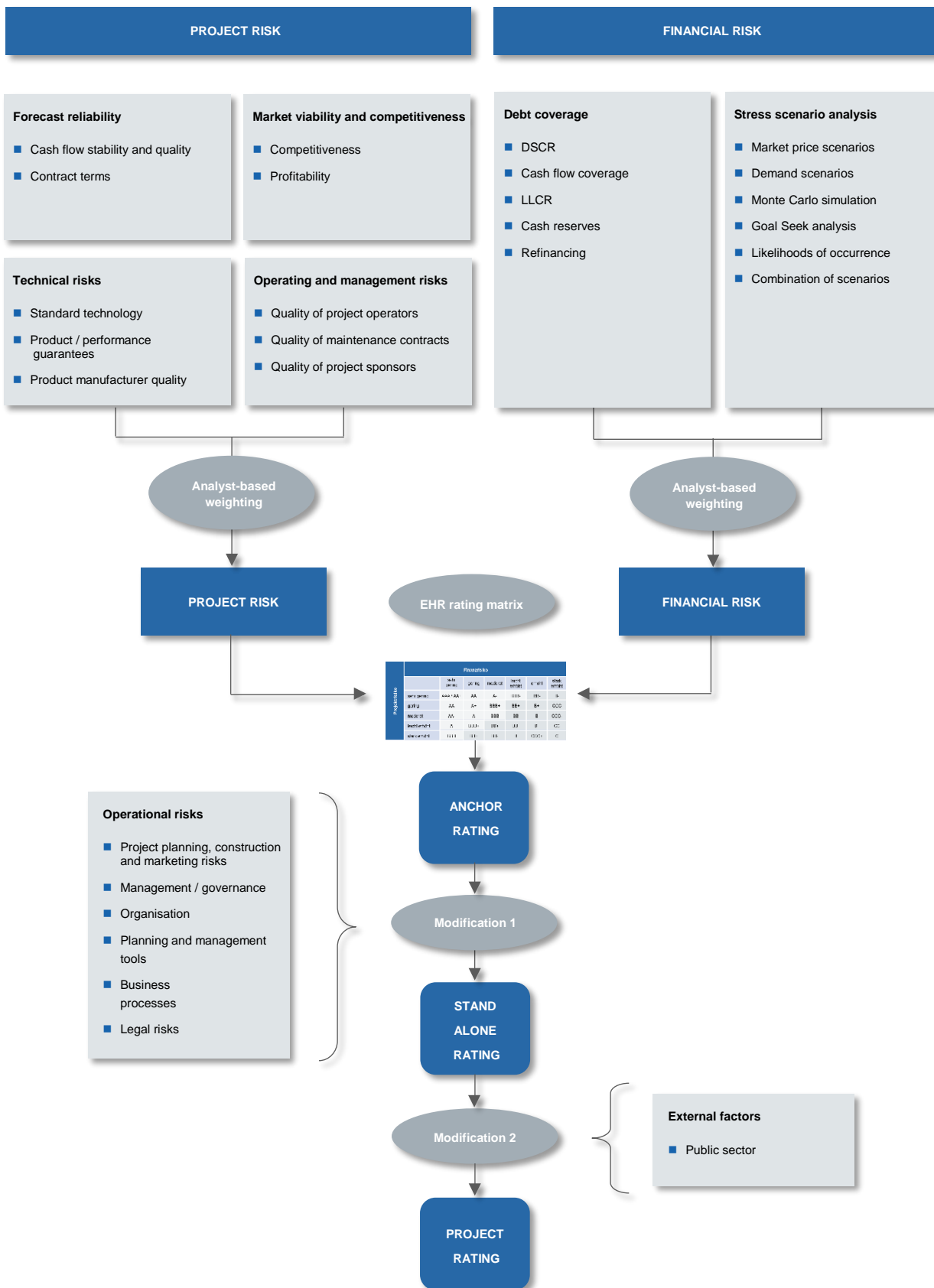
## Modification 2

### *Project rating as the result of modifying the standalone rating*

The standalone project rating is modified after possible external factors associated with public sector involvement have been evaluated. The modification can be positive or negative depending on the specific facts of the situation, including the public sector rating. The extent of Modification 2 is generally determined by analysts on a case-by-case basis.

The result of Modification 2 is the project rating, which provides an opinion about the creditworthiness of the project and/or the special purpose vehicle for the project.

## Appendix 1: Derivation of project rating (renewable energy)



## Appendix 2: Definition of financial ratios

### Debt service coverage ratio (DSCR)

DSCR
<b>Numerator</b>
Cash flow available for debt service (CFADS): cash flow from current project activities - significant maintenance expenses
<b>Denominator</b>
Debt service: interest and principal payments

### Annual debt service coverage ratio (ADSCR)

ADSCR
<b>Numerator</b>
Annual cash flow available for debt service (ADSCR): cash flow from current project activities (p. a.) - significant maintenance expenses (p. a.)
<b>Denominator</b>
Debt service (p. a.)

### Loan life coverage ratio (LLCR)

LLCR
<b>Numerator</b>
Net present value of future cash flow available for debt service
<b>Denominator</b>
Outstanding debt

FFO / total debt
<b>Numerator</b>
Funds from operations (FFO): CFADS - interest expenses
<b>Denominator</b>
Outstanding debt + leasing liabilities

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