

# The 2020 Nobel Prize in Economics and its connection to AURES II





## **The 2020 Nobel Prize in Economics and its connection to AURES II**

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## This year's Nobel Prize in Economics and the connection to AURES II

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2020 (colloquially: the Nobel Prize in Economic Sciences) honours Robert Wilson and Paul Milgrom of Stanford University "for improvements to auction theory and inventions of new auction formats"<sup>1</sup>. They follow William Vickrey and Roger Myerson who received the prize for their contributions to auction theory in 1996 and 2007, respectively. In contrast to former laureates, Wilson and Milgrom develop not only theoretical analyses, but also new auction formats for practical applications.

Auctions have a long tradition and had already been applied in Babylon as early as 500 BC. Today, auctions are used in a wide range of applications, e.g., in the sale of art and antiques, in public and industrial procurement as well as for the allocation of telecommunication licenses or football broadcasting rights. Further, the support for renewable energy sources (RES) is organized via auctions in large parts of the world. While auctions can be divided into sales auctions, in which the auctioneer wants to sell goods to the bidders, and procurement auctions, in which the auctioneer wants to buy goods from the bidders, theoretical results can be transferred between these types of auctions. Most RES auctions are procurement auctions.

The best-known auction formats for selling goods are the English Auction, in which the price rises until only one bidder accepts the price and wins, and the Sealed-Bid First-Price Auction, in which bidders submit sealed bids, the highest bid wins and determines the price. These auction formats were analysed by Vickrey in the 1960s under the assumption of private values: each bidder knows the good's value to him.

Bob Wilson extended this perspective by introducing common values, while Paul Milgrom, Wilson's former PhD student, analysed a more general model that incorporates the two extreme cases of common and private values. In a situation with a common value, the good has the same value for every bidder, but no bidder knows this value exactly. The value may depend on future developments, e.g., market prices, which are the same for all bidders but unknown at the time of the auction. An auction of this good may lead to the so-called "winner's curse:" even if the bidders estimate the common value correctly on average, the bidder who misjudged the value the most will win. This bidder then faces a loss due to his too high bid (in sales auctions) or too low bid (in procurement auctions). In auctions for RES, the winner's curse would likely affect a bidder who overestimates the future electricity price or underestimates the technology costs. His misjudgement will lead to a low bid, with which he may win the auction; however, the support level determined by the bids will be low and may not suffice to cover his costs. According to Bob Wilson, it is important to include not only your estimation of the common value into your bid calculation, but also the fact that if you win the auction, you likely overestimated the value the most. Bidders who consider this, will ex-ante not suffer from the winner's curse.

Paul Milgrom discovered that different auction formats can support the bidders in different ways in avoiding the winner's curse. In an English Auction, in which a bidder can observe the behaviour of competitors, estimations can be adapted more easily than in a Sealed-Bid First-Price Auction, in which the bidder submits only one bid and cannot extract information from observing others' behaviour. Bidders will bid more aggressively if the threat posed by the winner's curse is lower. Since more information is helpful for avoiding the winner's curse, it is in the interest of the auctioneer to provide bidders with information to achieve higher auctioneer's revenues (in a sales auction) while reducing the risk of large losses or bankruptcies for the bidders. In both AURES2 and AURES II3, the consortium further investigated these findings both theoretically and experimentally to help reduce the risk of the winner's curse and to improve the design of auctions for RES.

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<sup>1</sup> <https://www.nobelprize.org/prizes/economic-sciences/2020/press-release/>

<sup>2</sup> Haufe, Kreiss, Ehrhart (2017) „The Winner's Curse in Discriminatory and Uniform Price Auctions under Varying Competition Levels", Report, <https://auresproject.eu/sites/auresproject.eu/files/media/documents/winnerscurse.pdf>

<sup>3</sup> Ehrhart, Kreiss, Ott (2020), „Multi-Unit Common Value Procurement Auctions – Theoretical and Experimental Analysis", Working Paper, if interested contact [ehrhart@takon.de](mailto:ehrhart@takon.de)



Beside these theoretical contributions, the laureates also developed new auction formats for practical applications. They supported the design of the first auction of telecommunication licenses in the USA in 1994. This design incorporates many different elements for increasing effectiveness and efficiency, e.g., activity rules for bidders and rules to hamper manipulative behaviour. These design elements have until now been included in many different auctions from a wide range of applications. Paul Milgrom has since then developed several auction designs to meet increasingly complex market situations, e.g., the frequency auction in 2017 covering the whole of the US.

Both laureates have influenced not only the research of auctions but micro-economic theory as a whole. Next to Milgrom, two other former students of Wilson, Al Roth (2012) and Bengt Holmström (2016), received Nobel prizes for their contributions to market design, i.e., the science of designing markets in a target-oriented way while coping with the challenges of practical implementation. This approach can also be found in the AURES II project, where we analyse different auctions for RES in case studies, dedicated reports, policy briefs<sup>4</sup> as well as theoretical and experimental analysis<sup>5</sup>. We therefore aim to follow the pathway of Robert Wilson and Paul Milgrom in improving auction design to help both project developers as well as policymakers for a successful implementation of auctions for RES.

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<sup>4</sup> All of our reports can be found on <http://aures2project.eu/reports/>

<sup>5</sup> Hanke (2020), „Designing Auctions for Renewable Energy Support - Experimental Analysis of Multi-Technology Auctions“, Working Paper, if interested contact [hanke@takon.de](mailto:hanke@takon.de)



AURES II is a European research project on auction designs for renewable energy support (RES) in the EU Member States.

The general objective of the project is to promote an effective use and efficient implementation of auctions for RES to improve the performance of electricity from renewable energy sources in Europe.

[www.ares2project.eu](http://www.ares2project.eu)

