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## **REAL OPTIONS AS AN INSTRUMENT FOR ELECTRICITY SMART TECHNOLOGIES EVALUATION**

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### **OVERVIEW**

Nowadays we are about to transform the whole sector of power industry very massively. The transformation is caused by lots of factors, mostly by efforts of energy import minimization, sustainable energy development facilitation and future predicted lack of fossil fuels. The mentioned problems are also connected with environmental problems, especially with CO<sub>2</sub> emissions.

On the other hand represents this transformation costs and risk for every market participant. The transformation needs implementation of lots of new and modern smart technologies that are mostly very expensive. Very little experience with these technologies represents risk, because after massive investment the results (economic benefits) follow with delay of many years.

Evaluation of any new technology implementation is mostly done by classic methods of NPV or IRR. In our paper we present approach based use of real options, These methods allow us to work with projects with higher flexibility and creativity of modelling.

### **METHODS**

Real options are used mostly for evaluation of some decision process. It is based on analogy between some decision processes and financial derivatives (options). Option is non linear derivative that represent possibility for buy or sell of some asset on some concrete price. It is obvious that decision depends on situation on the market.

The option represents chance for some market participant to behave in profitable way under market conditions. Possibility of come decision have only market participants that have long position. They have possibility (not obligation). On the other hand short position bring obligation and our decisions do not depend only on our will.

In financial and economics theory, real options applies call and put option valuation techniques to investment decisions. A real option is a right to undertake business decision, as a make or expand project. Real option are based on mathematical techniques developed for financial options. Real option techniques are in contrast with standard techniques as a net present value(NPV) for example. Nevertheless standard project valuation technique NPV ignore the flexibility of a project and NPV therefore assume that there is no chance to change the project during its life. Real options methods are working in opposite way, implicitly assuming the possibilities of modifying the project as necessary. Valuation methods are adapted from techniques of valuing financial options. The most commonly as Black Scholes formula, binomial lattices and Monte Carlo methods

### **RESULTS**

It is obvious, that real option represents possibility. The only way how to make decision (according to our interests) is to be in long position, not in short one. Implementation of smart technologies represent implementation of lots of brand new devices and technologies [1] The first step would be therefore division of these technologies into two groups. The first are

technologies that bring us possibilities of real options (long position) and the second one bring us obligations (short positions). In the table 1 is some example of ST from customer's point of view. According to legislation the situation is different for each market participant.

Table 1. Division of some smart technologies into groups long/short position [1]

Type of Smart Technology	Long Position	Short Position	Notice
Smart Grids	0	X	Connected together
Advanced Metering	0	X	
Smart Appliances	X	0	
Accumulation	X	0	
RES-E	X	0	
PHEV	X	0	

Interesting for us are mostly technologies that bring long position – the first group. An example is possibility of accumulation. This accumulation could serve as an instrument for electricity production stabilization. It would be often used e.g. by households in combination with installation of decentralized local RES-E. If this stabilization brings some economic benefit for this customer, he will evaluate if this benefit will balance possible investment cost.

## CONCLUSIONS

Method based on real option principles showed us the possibility of application this techniques in the problematic of new technologies and smart solutions in energy sector. The only limitation is visible due to the contrast between real options and financial options, which is caused by non tradable feature of real options and this difficulties as estimating spot value and volatility of underlying asset are key to fair price valuation.

## REFERENCES

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