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## **FINANCING ENERGY EFFICIENCY PROJECTS FOR RETAIL SECTOR**

### **FINANCIRANJE PROJEKATA ENERGETSKE UČINKOVITOSTI ZA SEKTOR GRAĐANSTVA**

#### ***ABSTRACT***

*Energy poverty is defined as a situation in which the household is unable to pay the costs of heating and electricity, or the amount needed for those costs exceeds a tenth of household income. This problem is one of the biggest problems in the European Union. Sources for financing energy efficiency projects could be represented as a part of the solution to this problem. Furthermore, solution key could be knowledge of housing sector structure and "energy products" that could be appropriate for households at risk of poverty. Countries in the region that are longer faced with this problem have developed a series of products, through which they encourage new investments, but also substantially reduce its impact.*

*Croatia, as a new member of the European Union adopted "The energy renovation of residential buildings in the area for the period from 2013th by 2020." Program is aimed at improving the energy performance of existing buildings in Croatia. Measures described in the Program are encouraging renewal of the outer shell (increase thermal protection of the outer shell and windows replacement) encouraging the replacement of the heating system (replacement of existing heating systems that use electricity or fossil fuels new systems with condensing gas boilers), and encouraging the use of renewable energy (installation of solar thermal collectors, heat pump installation and installation of small biomass stoves). The Program defines forms of financing these measures from the national level, but also the role of other stakeholders in their implementation. The question is if measures listed in the Program are for themselves sufficient to address the issue of energy poverty? Second question is if some other measures used in neighboring countries could be used in Croatia.*

*This paper will analyze the measures implemented/ or measures that are planned to be implemented in Croatia. Further analysis will show measures implemented by countries in the region. After that further conclusion will be made about the possibility of extending the measures, or "product" that could be of interest to the target group.*

*The purpose of this research is to explore the possibilities of application of the new measures, or "products" of energy efficiency, which could have impact on reducing energy poverty.*

**Key words:** energy poverty, energy efficiency projects

## SAŽETAK

*Energetsko siromaštvo se definira kao situacija u kojoj kućanstvo nije u mogućnosti plaćati troškove grijanja i električne energije ili iznos tih troškova premašuje desetinu primanja kućanstva. Ovaj problem predstavlja jedan od najvećih problema Europske unije. Izvori financiranja projekata energetske učinkovitosti predstavljaju dio rješenja ovog problema. Poznavanje strukture stambenog sektora, ali i „energetskih proizvoda“ koji će kućanstvima kojima prijeti siromaštvo biti prihvatljiva, ključ su rješenja. Zemlje u okruženju koje se duže suočavaju s ovim problemom razvile su čitav niz proizvoda, kroz koje su potaknule nove investicije, ali i u bitnoj mjeri smanjile njegovu naglašenost.*

*Republika Hrvatska kao nova članica Europske unije je tijekom 2013. godine usvojila „Program energetske obnove stambenih zgrada na prostoru RH za razdoblje od 2013. do 2020. godine“. Program je usmjeren na unaprjeđenje energetskih svojstava postojećih zgrada Republike Hrvatske, a mjere se odnose na poticanje obnove vanjske ovojnice (povećanje toplinske zaštite vanjske ovojnice, zamjena prozora), poticanje zamjene sustava grijanja (zamjena postojećih sustava grijanja koji koriste električnu energiju ili fosilna goriva novim sustavima s kondenzacijskim plinskim bojlerima) te poticanje korištenja OIE (ugradnja sunčanih toplinskih kolektora, ugradnja dizalica topline te ugradnja malih peći na biomasu). Program je definirao i oblike financiranja ovih mjera s nacionalne razine, ali i ulogu ostalih dionika u njihovoj provedbi. Postavlja se pitanje u kojoj su mjeri mjere koje su navedene u Programu same za sebe dostatne za rješavanje pitanja energetskog siromaštva, te koji su još oblici financiranja prisutni u zemljama okruženja, odnosno u kojoj mjeri se ti oblici financiranja mogu primijeniti i na Hrvatsku. U ovom radu biti će analizirane mjere koje se provode ili je njihovo provođenje u planu u Republici Hrvatskoj. Nadalje provest će se analiza mjera koje provode zemlje u okruženju, a odnose se na sektor građanstva. Analizirati će se mjere koje bi se mogle provoditi, te iz svega ranije navedenog izvesti zaključci, o mogućnostima proširenja mjera, odnosno „proizvoda“ koji bi mogli biti zanimljivi ciljnoj skupini. Cilj rada je istražiti mogućnosti primjene novih mjera, odnosno „proizvoda“ energetske učinkovitosti, koje mogu utjecati na smanjenje energetskog siromaštva u Republici Hrvatskoj.*

**Ključne riječi:** *energetsko siromaštvo, projekti energetske efikasnosti*

### 1. The concept of energy poverty

Although there is no single universally accepted, unique definition of energy poverty, the term itself implies the inability (or difficulty) for the households in gaining access to energy needs that ensure dignified living conditions at an affordable price in terms of total revenue generated in the household. In these restrictive terms of heating, it means the inability of household heating at an acceptable level at an affordable cost. (Brynart, Grevisse, 2011, 538)<sup>144</sup> The basic objections to such definition of the concept of energy poverty relate to the incompleteness or the lack of uniform criteria which determine the meaning of the term dignified living conditions, the criteria used in determining the energy needed for living conditions that characterize a dignified standard of living and the criteria of "acceptable" costs.<sup>145</sup>

<sup>144</sup>Brynart, Marie, Grevisse Francois: "Energy poverty in Europe: Towards a more global understanding", ECEE 2011. Summer study- Energy efficiency first: The foundation of low carbon society, pp. 538.

<sup>145</sup> Ibid., pp 538

Consequently, although still subject for further discussions, the most concrete and the general application of the definition of energy poverty, is defined by the UK<sup>146</sup> government and by that definition the household is considered fuel poverty if:

they have required fuel costs that are above average (the national median level)  
were they to spend that amount they would be left with a residual income below the official poverty line

In accordance with the statistical indicators household is considered poor if energy to maintain an acceptable level of indoor temperature in the heating regime (when the usual temperature for the main living area is 21 degrees, and 18 degrees for other occupied rooms) requires cost of energy accounts that exceed more than 10 % of total revenues.<sup>147</sup> Energy poverty is a growing problem in the European Union and the member states. All countries affected and still facing this problem are required, with the aim of reducing the number of affected people, to develop a national action plan, or other appropriate framework to solve it. (Boromisa, Bukarica, Kaselj-Pavičić, LandekaiRobić, 2011.,1)<sup>148</sup> Member States should provide the necessary energy for the most vulnerable consumers, where it would be desirable to use an integrated approach and measures such as social policy and improve energy efficiency in homes.<sup>149</sup> System of protection for the vulnerable consumers has been regulated by Directive on common rules for the internal market in natural gas.<sup>150</sup>

Based on research conducted by GFKin collaboration with the United Nations Development Program (UNDP) in Croatia two-thirds of households spend about 12.2% of total revenues on energy costs. In other words if you take the terminology common in the UK, then the two-thirds of households in Croatia are considered energy poor<sup>151</sup>. Furthermore, the results showed that:

10% of households can not adequately warm their homes in the coldest months

26% of households are delaying with payment of monthly energy bills

63% of households are spending too much money for the energy costs in accordance to the total income per household<sup>152</sup>

Based on European Directive 2006/32/EC on energy efficiency and energy services (ESD)<sup>153</sup> the National Energy Efficiency Program for the period from 2008th to 2016th<sup>154</sup> was developed and adopted. Its stipulated targets for energy savings and set the basis for making three-year national energy efficiency plans for three-year period by the year 2016. Based on the template of the European Commission<sup>155</sup>, this document includes a report on the states assessments in

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<sup>146</sup> <https://www.gov.uk/government/collections/fuel-poverty-statistics>, (accessed 25. February 2014.)

<sup>147</sup> Ibid.

<sup>148</sup> Boromisa A, Bukarica V, Kaselj-Pavičić A, Landeka J iRobić S:

"Financiranje provedbenih mjera energetske učinkovitosti", CENEP, Zagreb, september 2011. pp.. 1.

<sup>149</sup> Ibid pp.. 2.

<sup>150</sup> Directive 2009/73/EC of the European Parliament and of the council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC, October 2009, pp.. 94-135, [www.seebiz.eu/](http://www.seebiz.eu/) (accessed 25 February 2014)

<sup>151</sup> <http://mreza.tv/pristupacnost-energije-izazov-za-mnoga-kucanstva/> (accessed 26 February 2014)

<sup>152</sup> <http://www.hep.hr/hep/propisi/Direktiva200632Energetskaucinkovitostiusluge.pdf> (accessed 28 February 2014)

<sup>153</sup> <http://www.mingo.hr/userdocs/images/energetika/Nacionalni%20program%20energetske%20u%C4%8Dinkovitosti%202008.%20-%202010..pdf> / (accessed 28 February 2014)

<sup>154</sup> "Vodič predložak za izradu drugog nacionalnog akcijskog plana energetske učinkovitosti"

<sup>155</sup> Europska komisija i Zajednički istraživački centar (Joint Research Centre), prosinac 2010., Ispra, Italija

implementation of energy efficiency policy and establishes energy savings in the preceding three-year period also providing guidelines for the following period. In accordance with the second National Action Plan for Energy Efficiency for the period up to the 2013th The Ministry of construction and physical planning adopted the "Program of Energy renovation of residential buildings in the territory of the Republic of Croatia for a period of 2013th-2020th."

## **2. Energy reconstruction program for residential building in the period from 2013 up to 2020 with detailed plan for the period from 2014 by 2016.**

The Program<sup>156</sup> defines the action lines of the energy efficiency policy in new buildings (where the greatest impact will be further development of regulations and the provision of financial assistance) and the existing building. However, the measures set out in the Program are relating to existing buildings. Because of their technical characteristics, but also the possible savings, priority buildings are those built between the 1945th and in 1980. The program separates measures for multistage buildings and measures for the houses. Measures relating to the family home (houses), predict that their owners can apply to tenders by local and regional governments in cooperation with the Fund. In other words, Environmental protection and energy efficiency Fund announces contest on which local and regional governments could apply. If they manage to fulfill contests requirements and if there project is approved, they can announce contest in their area. There is the possibility of association units (regional) self-government and local government, and this association increases the share of funding for the citizens. According to the Program, Environmental protection and energy efficiency Fund is in charge of implementing measures divided in three separate groups:

- encouraging the renewal of the outer shell (increase thermal protection of the outer shell, window replacement)
- encouraging the replacement of the heating system (replacement of existing heating systems that use electricity or fossil fuels to new systems with condensing gas boilers) and
- encouraging the use of renewable energy (installation of solar thermal collectors, heat pump installation and installation of small biomass stoves).<sup>157</sup>

For multistage building measures are co-financing for energy audits and energy certification of buildings; support for the preparation of project documentation for building reconstruction; encouraging integral renovation of apartment buildings: increasing the thermal protection of the outer shell; windows replacement; upgrading or replacement of heating systems. In those measures building managers should apply on Fund competition. Though local and regional governments could help building managers in their paper submission to the contest, their role is not defined as an intermediaries as it is for the private houses.

## **3. Energy efficiency programs in neighboring countries**

Group of authors (Boromisa, Bukarica, Kaselj-Pavičić, Landeka and Robić, 2011., 10.)<sup>158</sup> Have made scientific research and founded that the most common form of financing energy efficiency projects/ programs aimed for individuals (citizens) measures are financed through loans. It is stated that with classic loans, using models in which the risks are divided among the participants in the project (except for the end user, can include contractors, equipment suppliers, energy suppliers, and sometimes a third party that provides funding). Still, there

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<sup>156</sup> Program energetske obnove stambenih zgrada na prostoru Republike Hrvatske za razdoblje od 2013 do 2020 godine s detaljnim planom za razdoblje od 2014 do 2016. godine, studeni 2013., pp. 32.

<sup>157</sup> Ibid pp. 41

<sup>158</sup> Boromisa A, Bukarica V, Kaselj-Pavičić A, Landeka J i Robić S: Financiranje provedbe mjera energetske učinkovitosti, CENEP, Zagreb, rujan 2011. pp 10.



are also some other financing options used for citizens in those countries:

"The financing of equipment suppliers, where leasing is the most common form of financial funding equipment manufacturers

- Energy mortgages (mortgage involves financing the house / apartment, which takes into account the increase in energy efficiency, increases the value of the house / apartment. Has to do with the property, rather than its owner, thereby enabling investments with longer repayment)

- Funding through the electricity bill - integrated loan repayment for improving energy efficiency in the monthly bill

- Funding through special bank credit lines aimed at improving energy efficiency in households (EBRD)

- Joint purchases of equipment to improve the energy efficiency of buildings (Eng. Pooled procurement)

- Green Loans (Eng. Carbon finance - Green investment schemes / domestic carbon offsets) " Boromisa ,Bukarica, Kaselj-Pavičić, LandekaandRobić, 2011. 10.)<sup>159</sup>

EU Member States have developed a variety of different forms of aid (grants, soft loans, tax breaks and exemptions) through which the successful cooperation between national, regional and local authorities is trying to encourage investment <sup>160</sup> in energy efficiency improvements. Those forms are considered as incentives are used as space for new investments. Subsidy programs (co- investments or subsidized interest rates), are very common form of financing that supports the high initial costs of energy efficiency projects. Group authors<sup>161</sup> stated that the initial cost of increasing financial rate of return on investment, and thus increase the demand for such investment. Most are used for the promotion of energy-efficient renovation of existing buildings and the use of renewable energy sources (RES). These measures are aimed at investing in existing, mature technologies (e.g. insulation) and new technologies (e.g. renewable or micro - cogeneration and subsidized : substitute fuels in buildings heated to inadequate/unacceptable manner (e.g., electricity, use of specific technologies (e.g., installation of solar panels, heat pumps), renovation of existing buildings in order to achieve its reduction of energy consumption ( typically 20-30 % ) or meet the requirements of the applicable regulations<sup>162</sup> simultaneously taking into account the specifics of the social status of individual groups, special programs are designed for particular social groups, such as households with elderly, etc.

Preferential loans are generally used for the implementation of energy efficiency measures, and are characterized by: a prolonged period of repayment, zero or low interest rate, and delay the start of the repayment of the loan <sup>163</sup> Furthermore, revolving fund<sup>164</sup> is a financial mechanism to fund specializing clearly defined types of projects. When we talk about energy efficiency projects we assume return on investment through the contrast achieved after the implementation of the project from savings. A revolving fund is usually a multilateral agreement between the national / international institutions and financial institutions. The reason for the establishment of a revolving fund is a discrepancy between market supply and

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<sup>159</sup>Boromisa A, Bukarica V, Kaselj-Pavičić A, Landeka J i Robić S.Financiranje provedbe mjera energetske učinkovitosti, CENEP, Zagreb, rujan 2011. str 10

<sup>160</sup>Bertoldi, Paolo, Rezessy Silvia: Financing energy efficiency: Forging the link between financing and project implementation, Report prepared by the Joint Research Centre of the European Commission, May 2010, pp. 25

<sup>161</sup>Boromisa A, Bukarica V, Kaselj-Pavičić A, Landeka J iRobić S.Financiranjeprovedbemjeraenergetskučinkovitosti, CENEP, Zagreb, rujan 2011. str 18.

<sup>162</sup>ibid pp. 19.

<sup>163</sup> Financing energy efficiency: Forging the link between financing and project implementation, Joint Research Centre of the European Commission, svibanj, 2010.

<sup>164</sup>Bertoldi, Paolo, Rezessy Silvia: Financing energy efficiency: Forging the link between financing and project implementation, Report prepared by the Joint Research Centre of the European Commission, May 2010, pp. 22.

demand for financing energy efficiency projects. Business practices in countries that are longer in energy efficiency projects (Hungary, Slovakia, Czech Republic, Lithuania, Latvia, Estonia, etc.) have defined several models in which revolving funds are used as a form of financing. The main difference between the types of revolving funds is a way of financing the government's role in their financing.

The first model involves an agreement between the state and commercial banks on the establishment of a revolving fund, whereby the funds collected from the state budget or through a dedicated tax. Initial, usually grant funds can provide international institutions such as the Global Environment Facility (GEF) and the World Bank. Commercial banks to finance energy efficiency projects granted interest-free loans from the fund, resulting in interest rates more favorable than the market. End users can be public companies, institutions and local governments, small and medium-sized enterprises and the ESCO. Care billing placements assume that banks are required to return within fund borrowed money or pay penalty interest. In this way the state provides the market risk except opportunity cost of borrowed interest-free funds.

#### **4. Implementation in Croatia**

If Croatia is compared with neighboring countries, we could observe that there are not so many measures that national, regional and local authorities are providing to encourage investment in energy efficiency improvements. Out of 20 counties and the city of Zagreb, only few counties have provided to its citizens proposals for using renewable sources in homes or in multistage housings. Thought there are possibilities for project expansion to other cities and municipalities in the county, or to other businesses registered for the management of buildings, the major problem in expansion is limited fiscal capacity of municipalities / cities, but also limited credit capabilities and low capability of adoption for long term obligations.

Thought there are some credit lines provided by commercial banks for energy efficiency, if compared to European countries, Croatia still has potential in developing forms and projects of financing and coo financing energy efficiency measures.

Under the supervision, and organization of Regional Agency of Northwest Croatian (REGEA)<sup>165</sup> counties in north Croatia have launched projects aimed primarily for households in Zagreb County, Karlovac County, Krapina- Zagorje County and the city of Zagreb, as well as the municipality Jelsa and Konavli. However most of them are related to the previously described financing models that are implemented in collaboration with the Fund for Environmental Protection and Energy Efficiency. The Law on Environmental Protection and Energy Efficiency<sup>166</sup> prescribed the fees and charges paid by taxpayers to pay for environmental protection and energy efficiency, as well as environmental pollution charges, user fees for environment, charges for burdening the environment with waste and special environmental charge for motor vehicles. Although the purpose of Fund establishment is similar to the above described revolving funds, financing is quite different, and because of that comparison is not appropriate.

While fiscal measures could be a very powerful tool for energy efficiency promotion, through tax exemptions and tax relief (relating to income tax, taxes property tax, VAT)<sup>167</sup>, this kind of stimulation of energy efficiency has not yet been introduced in Croatia.

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<sup>165</sup> <http://www.regea.org/> (accessed 23 January 2014)

<sup>166</sup> Zakon o Fondu za zaštitu okoliša i energetske učinkovitost, Narodne Novine (107/03, 144/12) i Statut Fonda za zaštitu okoliša i energetske učinkovitost, Narodne novine :193/03, 73/04, 116/08, 101/09 i 118/11 i 67/13), članak 47.

<sup>167</sup> Bertoldi, Paolo, Rezessy Silvia: Financing energy efficiency: Forging the link between financing and project

Thought at the beginning of describing models of financing energy efficiency projects were considered models that are primarily related to citizenship, however, some of the above models are used to finance public projects<sup>168</sup> and the entrepreneurial sector. Fund for Environmental Protection and Energy Efficiency Fund has so far funded projects in public and entrepreneurial sector.

Croatian Government has adopted Program of energy renovation of buildings of the public sector for the period of 2014. - 2015th. In this Program<sup>169</sup> financing models of energy efficiency related to the building of the public sector are defined.

Models are:

1. Loan Program for energy renovation of public buildings.
2. Issuance of guarantees
3. The financing of the Treaty on the energy performance

Loan program for energy renovation of public buildings imply that the Croatian Bank for Reconstruction and Development ( CBRD ) adapt existing lending program that will allow the implementation of energy renovation of buildings of the public sector with favorable interest rates, according to which the credit app. 50% of investments in the energy reconstruction of public buildings ( depending on the amount of funds eligible costs Fund ), with a grace period of one year and a maximum repayment period of 14 years, including a grace period . The maximum loan amount will be limited, and depends on funding opportunities CBRD specific investment program, the creditworthiness of the borrower and the acceptability of the project on the basis of certificates of technical and financial feasibility of the project (APN issued the prior opinion of the Expert Commission) with a guarantee CASB Invest that guarantees the repayment of loans to the extent of 80 % of the loan and other instruments according to the loan program.<sup>170</sup>

Issuing guarantees CASB Invest implemented by creditors of undertakings aimed at the realization of previously contracted energy renovation project, which fulfilled the conditions of competition for the implementation of projects under the Program in accordance with the guarantee schemes HAMAG Invest. Warranties can use companies that are contracted to perform energy renovation of buildings according to the Program. Warranties can be achieved and a newly formed company (SPV) which is formed with the purpose of implementation of energy renovation of buildings , along with a statement that the founders of this company will not perform other tasks<sup>171</sup>. In accordance with Article 4 § 34 Act on efficient use of energy in final consumption of energy performance contract is a contractual agreement between users and providers of energy services ( regularly ESCO ) on measures to improve energy efficiency, where investments in these measures paid according to the agreed level of energy efficiency improvements.<sup>172</sup>

Until now described forms of financing are mainly related to national forms of financing, with the opportunities for participation of local and regional municipalities. Projects financing and energy efficiency programs at the Croatian so far are usually conducted in the form of grants, aid or grants legal and / or physical persons to carry out projects or programs, but also through the ESCO and financing options for loans. ESCO financing model involves the provision of services which includes development, implementation and financing of projects in a way that

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implementation, Report prepared by the Joint Research Centre of the European Commission, May 2010, pp. 25.

<sup>168</sup>Pod pojmom javnog sektora podrazumijeva se opća država središnja vlast, regionalna i lokalna samouprava i javna društva ( dakle sva ona društva koja opća država posjeduje ili kontrolira)

<sup>169</sup>Program energetske obnove zgrada javnog sektora za razdoblje 2014. – 2015. godine, listopad 2013., pp. 23.

<sup>170</sup>ibid pp. 24

<sup>171</sup>ibid pp. 25.

<sup>172</sup>Act of energy efficiency in the final energy consumption, NN 152/08, 55/12, 101/13, 153/13

savings in energy costs and maintenance to achieve investment return. The most significant provider of these services in Croatia is HEP.<sup>173</sup>

Some banks in Croatia have developed models and loan programs, environmental protection, energy efficiency and renewable energy. These are also the most important projects aimed at financing energy efficiency projects for medium and small businesses. Bank managed the implementation of these projects started 2010th<sup>174</sup> The projects are primarily related to the implementation of investment projects whose purpose : remediation of landfills , avoiding and reducing waste generation, waste management, treatment and exploitation of valuable waste, encouraging cleaner production, preventing and reducing waste and emissions in the production process, the protection and conservation of biological and landscape diversity, the implementation of national energy programs, encouraging the use of renewable energy, encouraging sustainable development, cleaner transport, as well as all other projects which are environmental protection, energy efficiency and renewable energy choices. Until now described forms of financing mainly relied on domestic sources, so as such, could be classified as predominantly national forms of financing. Significant forms of financing energy efficiency projects represent EU programs and funds which are described below.

## 5. Conclusion

Earlier studies have demonstrated that the number and types of energy efficiency projects that could have a direct impact on the reduction of energy for the poor population is in its scope somewhat narrower in Croatia than it is in the EU countries.

Croatian accession to the European Union created the preconditions for the implementation of new projects, created a market for new projects, and initiated new investments. Part of new products for the retail sector could easily retrieve the dimensions and form of financing provided for the public sector buildings. At the same time, limited financial resources, and rational usage of financial resources in the retail sector, as well as a high level of awareness that all the savings can reallocate the quality- level of living, make this sector more prepared and motivated for their own initiatives, but also the adoption of new programs. Increasing awareness of the potential savings through energy efficiency measures, increased, and in the future will be increasing measures performance that have been through the program of energy renovation of residential buildings for the period 2013-2020 with a detailed plan for the period of 2014. by 2016. However it is expected that over time, the implementation of those measures, will be increased by some more products and measures already in use in EU countries.

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<sup>173</sup> <http://www.hep.hr/esco/onama/> (accessed 2 February 2014).

<sup>174</sup> <https://www.zaba.hr/home/wps/wcm/connect/36490100495bdaf4a63abefdba424cab/Program+kreditiranja+projekata+zastite+okolisa.pdf?MOD=AJPERES>, (accessed 2 February 2014).

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