

Jan Herczyński

SN 119

“Support to Decentralization in Ukraine”

SKL International, Kiev

(+48) 501 048 500, [jan@herczynski.eu](mailto:jan@herczynski.eu)

## Budget Process to Determine Allocation of Education Subvention

### Table of contents:

Introduction.....	2
1. Budget process to determine allocation of education subvention for 2021 .....	4
2. Normative class sizes for large OTG (cities) .....	6
3. Other coefficients based on administrative criteria.....	9
4. Buffer mechanism .....	11
5. Projection of student numbers .....	14
6. Budget process to determine allocation of education subvention for 2022 .....	16

### List of tables:

Table 1. Acronyms used in the SN.....	3
Table 2. Founders of secondary schools 2016-2021 .....	5
Table 3. Normative class sizes for OTG and rayons, 2020.....	7
Table 4. Normative class size for cities of oblast subordination, 2020 .....	7
Table 5. Normative class sizes for large OTG, 2021 .....	8
Table 6. Number of large OTG, 2021.....	8
Table 7. Former COS and large OTG, 2021: units.....	8
Table 8. Former COS and large OTG, 2021: students and class size .....	9
Table 9. Coefficients for non-teaching pedagogical staff, 2020 and 2021.....	9
Table 10. Normative class sizes for evening schools, 2020 and 2021.....	10
Table 11. Coefficients for division of classes into groups, 2020 .....	10
Table 12. Coefficients for division of classes into groups, 2021 .....	11
Table 13. Rayons and OTG with purely rural population and large student density, 2020 and 2021.....	11
Table 14. Examples of the buffers.....	13
Table 15. Number of OTG participating in the buffer mechanism.....	13
Table 16. Funds added or subtracted from education subvention due to buffers (thousand Hr) ....	14
Table 17. Projected and actual student numbers by grade, whole country.....	16

## Introduction

It is the responsibility of the Ukrainian Ministry of Education and Sciences (MES) to propose the allocation formula for education subvention and to apply it in practice on the basis of collected statistical and other data, thus determining the allocation of subvention for all administrative units of Ukraine as founders of secondary schools for any given budget year. As of January 2021, school founders are oblasts, Kyiv, and amalgamated gromadas, or OTG of three different types (urban, settlement type, and rural, Table 2).

In 2020, preparing for the budget year 2021, this responsibility was carried out under very difficult conditions. The main challenges were the completion of the amalgamation process, and therefore appearance of many new OTG (and the corresponding disappearance of rayons as beneficiaries of the education subvention), disappearance of cities of oblast subordination as administrative category, and serious budget constraints due among others to the COVID epidemic.

Year 2020 saw the finalization of the voluntary amalgamation of small territorial gromadas to form larger, amalgamated units, which became autonomous as budget users and entered direct budget relation with the national budget, in particular received education subvention. The process of voluntary amalgamation begun in 2016 and lasted several years (see Table 2), and was completed in 2020 when newly created OTG covered the whole all territory of Ukraine. For each oblast, the Cabinet of Ministers adopted separate decree (Розпорядження ) defining its perspective plan. The decrees were being adopted from April 14 (Zhitomirska, Mikolaivska, Kharkivska) to May 26 (Lvivska, Odeska, Zaporizska). The first list of all OTG with their new budget codes was received by MES on July 20, the updated list on August 13 (budget code is a permanent identification of the budget unit, necessary for all budget transactions).

A Decree on Creation and Liquidation of Rayons was adopted by Ukrainian Parliament on July 17, amalgamating the rayons (their number was decreased from 475 to 136). The amendment to the Budget Code adopted on September 17, 2020, changed the budgetary position of rayons. In particular, they are no longer founders of secondary schools and will not receive education subvention.

That same amendment to the Budget Code removed any reference to the cities of oblast subordination (COS) and their special treatment during the budget process. For this reason, all elements of the allocation formula for education subvention which relied on this legal concept had to be changed. The most important one is the determination of the normative class size (NCS) for all administrative units. Until and including 2020, NCS for OTG and rayons depended on student density and on percentage of rural population and was determined according to Table 3, while for cities of oblast significance it depended on their administrative role (on whether a given city of oblast subordination is an oblast center) and on percentage of rural population, and was defined according to Table 4. This distinction reflected the natural difference between large classes present in large cities, and smaller classes in small cities and in rural areas. This distinction, however, no longer applies in 2021, so a new way of identifying large cities and setting NCS for them is necessary.

All these significant changes meant that MES had to prepare and implement necessary adjustments to the allocation formula (these adjustments are described in further sections). To make situation

more difficult, they came rather late in the budget process. The work of the Ministry on the formula adjustment extended to November 2020.

Since there was little time for the Ministry to publicly discuss and explain new elements of the allocation formula for education subvention for 2021, they came as a surprise to all interested stakeholders. Inevitably, there was public confusion and lack of understanding of the changes introduced by the MES and of the reasons why they were introduced. Naturally, the reaction of the education community and of local government experts was quite skeptical and at the same time critical of the new elements of the allocation formula.

The purpose of the present Short Note 119 is to review the budget process as it was conducted in 2020, including a description of the new technical elements, and to propose a more systematic approach for the future. In section 1 we discuss the budget process in 2020 and the reasons why the use of new technical elements was necessary. Section 2 discusses the new concept of “small OTG” and “large OTG” and how it is used to redefine NCS for large cities (these groups of OTG are called type I and type II in the Decree of Cabinet of Ministers on the allocation formula for education subvention for 2021). Other coefficients formerly based on administrative criteria are reviewed in section 3. In section 4, new mechanism introduced by MES for the first time, namely buffers (in the Decree of the Cabinet of Ministers on the formula, this mechanism is called "NCS adjustment"), is explained and reviewed. Section 5 describes the projection of student numbers, also conducted for the first time by MES in 2020. A possible calmer approach for preparation of the budget for the budget year 2022 is proposed in section 6.

The present SN is a continuation of technical cooperation of MES and the Swedish-Ukrainian project “Support to Decentralization in Ukraine” (SDU). Education subvention was the topic of SN 102 (August 2018), SN 104 (September 2018), SN 112 (August 2019), SN 117 (April 2020) and SN 118 (May 2020).

Table 1 provides acronym used in the present Short Note.

Table 1. Acronyms used in the SN

<b>Acronym</b>	<b>English</b>	<b>Ukrainian</b>
SN	Short Note	Аналітична записка
MES	Ministry of Education and Sciences	Міністерство освіти і науки
COS	City of oblast subordination	Місто обласного підпорядкування
OTG	Amalgamated territorial gromada	Об'єднана територіальна громада
NCS	Normative class size	Розрахункова наповнюваність класів
ACS	Actual class size	Фактична наповнюваність класів
SDU	Support to Decentralization in Ukraine	Підтримка децентралізації в Україні

After the completion of the amalgamation process, the term OTG, amalgamated gromada, is no longer used and is replaced with just territorial gromada (територіальна громада). We retain the former term because we describe the last phase of this process.

## 1. Budget process to determine allocation of education subvention for 2021

According to the Budget Code, the allocation formula for education subvention is prepared and proposed by the Ministry of Education and sciences and approved by the cabinet of Ministers. It is of course clear that the main partner for discussion of possible variants of the allocation formula is the Ministry of Finance, given that education subvention is one of the largest items in the state budget of Ukraine. Moreover, the law says that every three year the formula should be subject of a thorough review. This specific requirement has been present in Ukrainian legislation for many years, even when the responsibility for the formula rested with the Ministry of Finance, and it represents reasonable thinking that together with the evolving condition and state of the education system and the networks of schools, the formula needs to be analyzed to see whether it is still well adapted to the needs of the education sector. The current formula was introduced on December 27, 2017, so the obligatory review should have been done in 2020.

The allocation formula uses normative class sizes as its main parameters, and therefore the review of the formula should have covered NCS for different groups of schools. For OTG and rayons, NCS was based on student density and share of rural population (Table 3). For cities NCS was based on whether the city is an oblast center and on the share of rural population (Table 4).

In accordance with the legislation, it was planned to conduct a review of the formula, including a review of Table 3 and Table 4, in 2020, in preparation for budget year 2021. However, the budget process in 2020 was conducted under very difficult conditions.

1. The gromadas amalgamation process was completed, creating a completely new territorial division of the country. However, the network of new OTG was determined very late, until late May (see introduction for the dates of this process). Only in July the Ministry of Education received from the Ministry of Finance the list of all OTG for the next budget year, with budget codes allocated.
2. In some cases, two OTG merged. In other cases, the territory of the city expanded. So the network of administrative units was quite unstable.
3. Rayons as administrative units responsible for managing and financing of secondary schools in the territories not covered by OTG have disappeared.
4. The disappearance of cities of oblast significance as an administrative category meant that NCS for large cities had to be defined in a new way. Moreover the decision to abandon the category of these cities was also taken quite late (see the introduction).
5. Due to difficult condition of the national budget, the Ministry of Finance imposed strict budget ceiling on the overall volume of education subvention.

The primary challenge to preparing the budget allocation was the completion of the amalgamation of gromadas through formation of a system of amalgamated gromadas encompassing all territory of Ukraine. This change is reflected in the following Table 2 presenting the evolving numbers of founders of secondary schools throughout the amalgamation process, from 2016 to 2021.

Table 2. Founders of secondary schools 2016-2021

<b>School founder</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Oblast	24	24	24	24	24	24
Kyiv	1	1	1	1	1	1
City of oblast subordination	148	148	148	148	107	0
Rayon	460	459	449	447	443	0
OTG	155	363	662	782	873	1 438
Total	788	995	1 284	1 402	1 448	1 463

The number of rayons was decreased whenever all the territory of the rayon was covered by OTG and the rayon administration was no longer responsible for secondary schools and did not receive education subvention. This was however a very slow process. Two cities of oblast subordination were OTG from the beginning of the process (Balta, Bilyaivka) and are listed as such. The number of cities of oblast subordination declined in 2020, because some of them formally became OTG. The smaller than expected increase of the number of OTG in 2021 is partly due to the consolidation of OTG (merger of two previously existing OTG).

In order to assess education subvention for a given administrative unit, it is necessary to obtain statistical data (numbers of students in different groups), as well as some non-student data. Both proved difficult.

For the statistical data, it was necessary to determine which secondary school was located on the territory of a given OTG. This required correspondence with oblast administrations and multiple verification.

Non-student data include surface area, total population and rural population of all OTG. MES obtained this information only in June 2020. This was already late into the budget process, with repeated requests from the Ministry of Finance to submit proposed allocation for the review.

For those reasons, there was no time to systematically review Table 3 of NCS based on student density and share of rural population. This table was retained unchanged for 2021. However, it was clear that in some respects this table does not correspond well to the current, new network of administrative units, meaning that it now grouped OTG with quite different average class sizes (see Table 13). To address this problem, it was decided to use a buffer mechanism, which ensured that the difference between actual and normative class size is not too large. The buffer mechanism selected for use for NCS is described and discussed in section 4.

Another important reason to adopt the buffer mechanism was the difficult budget situation of the country and the reduced budget ceiling, imposed on the total volume of the education subvention by the Ministry of Finance. Indeed, as evident from Table 16, the buffer mechanism was used to eliminate allocation inefficiency and to reduce overall cost of the subvention to the national budget.

Moreover, as the legal concept of city of oblast significance disappeared, it was necessary to adjust NCS for large cities. The population of the OTG was selected as the key criterion for "large OTG", alongside population density (see section 2). Note that the terminology of "small OTG" and "large OTG" is used here for clarity, in draft Decree of Cabinet of Ministers defining the allocation formula for 2021, these types of OTG are called type I and type II respectively. For large OTG, new definition

of NCS was based on population size and on share of rural population, see Table 5 (effectively, this table replaced Table 4). Several other coefficients in the formula, formerly depending on the category of COS, had also to be adjusted (they are discussed in section 3). Again, due to insufficient time, no in-depth analysis of the value of the coefficients was possible.

A separate important challenge to the Ministry of Education and Sciences arose in July regarding the use of student numbers. Until 2018, all preparations of the allocation of education subvention were conducted on the basis of statistical data on student numbers collected in statistical forms ZNZ-1 more than a year earlier. Thus, the allocation for the budget year 2019, which was approved together with the Law on State Budget for 2019 in December 2018, used the statistical data collected in September 2017.

In 2019, during the preparation of state budget for 2020, when the Law on State Budget for 2020 was submitted to the Ukrainian Parliament for the first reading on September 15, 2019, the allocation was based on statistical data collected in September 2018, thus again one year old data. The same was true for the second reading in November 2019. However, the Decree of Cabinet of Ministers of February 12, 2020, for the first time based the final corrected allocation of education subvention on the most recent statistical data, namely collected from schools in September of the previous year (this means, in particular, that data collected in September 2018 were never used in actual allocation of education subvention). This was a major step forward, and was made possible due to the DISO database operated by MES.

In July 2020, during the preparation of state budget for 2021, the Ministry of Finance requested that MES provides even preliminary data valid for September, so that there will be no major change of student numbers and therefore of allocation of education subvention between the first and second reading of the budget law in the Parliament. MES collected these data (so called “operational”, not fully verified data), but various data problems and discrepancies made these data unusable. For this reason, the Ministry decided to use projection of new student numbers based on statistical data from September 2019. This required adoption of a methodology and then conduction of systematic estimates. This technical issue is discussed in section 5.

To summarize, under rather stressful conditions of the budget process in 2020, the Ministry of Education and Sciences had conducted a review of the allocation formula, in line with the requirements of the Budget Code. On this basis MES has adjusted Table 4, Table 11, NCS for evening schools, the coefficient for non-teaching pedagogical staff, and the coefficients for division of classes into groups (see sections 2 and 3). In addition, the Ministry developed methodology to project the student numbers. However, the main Table 3 of normative class sizes for most OTG was not adjusted. A complete review should be planned for the year 2021.

## **2. Normative class sizes for large OTG (cities)**

Starting in January 2021, the historical administrative categorization of cities, namely cities of oblast subordination and cities of rayon subordination, is disappearing. Historically, there were 150 cities of oblast significance and one city with special status, namely Kyiv, outside of Crimea and territories not under control of Ukrainian Government. As of 2021, all these administrative units except Kyiv become urban amalgamated gromadas (OTG).

This has an immediate consequence for the allocation of education subvention, because up to and including budget year 2020, cities of oblast subordination had been assigned normative class sizes in different way than other OTG and rayons. For OTG and rayons, NCS was assigned according to their student density and percentage of rural population, as the following Table 3 indicates.

Table 3. Normative class sizes for OTG and rayons, 2020

Student density	Percent of rural population								
	100	89-100	57-89	67-75	64-67	57-64	46-57	25-46	0-25
0-1,3	10,0	10,0	10,0	10,5	11,0	11,5	11,5	11,5	13,5
1,3-1,5	11,0	11,0	11,5	11,5	12,0	13,0	13,5	13,5	13,5
1,5-2,2	11,0	11,5	12,0	12,5	13,0	13,0	14,0	15,0	15,0
2,2-2,6	11,5	11,5	12,0	12,5	13,5	14,0	14,0	15,0	15,0
2,6-3,6	12,0	12,5	12,5	13,0	13,5	14,0	15,0	16,0	17,0
3,6-3,7	12,0	12,5	12,5	13,0	13,5	14,0	15,5	16,0	19,0
3,7-9,4	13,0	14,0	14,0	14,0	14,0	15,0	16,5	17,0	19,0
9,4-	14,5	15,0	15,0	15,0	15,0	17,5	18,0	18,0	20,5

As Table 3 shows, NCS for rayons and OTG ranged from 10 to 20,5. In contrast, normative class sizes in the cities was much larger, to reflect actual network of classes there. For COS the following simple Table 4 determined their normative class size (we also provide number of cities in each category).

Table 4. Normative class size for cities of oblast subordination, 2020

Type of city of oblast subordination	NCS	Units
Oblast center, Kyiv	27	22
COS with rural population less than 10%	25	110
COS with rural population between 10% and 25%	22,5	13
COS with rural population over 25%	21	6

The reason for this treatment of large cities is that student density (or population density) is not very relevant for class sizes: large cities have high population density, but different levels of this density are not correlated with their class size. Under the new administrative division of Ukraine, a thorough analysis of class sizes is necessary, but there was not enough time for that. A simpler approach was needed to replace Table 4 with a similar instrument to determine normative class size, but without using the administrative category of cities of oblast subordination.

After preliminary analysis (conducted with the technical support of SDU project staff) the Ministry adopted the criterion of population size (number of inhabitants), to distinguish large cities from remaining, more rural OTG. The term “large OTG” is now applied to the OTG meeting the following two conditions:

1. Population at least 40 thousand,
2. Population density at least 50 persons per square km.

The criterion of population density is used to distinguish large, metropolitan OTG from those large OTG which have rural character but simply cover a large territory (for example, for OTG based on the whole rayon). Altogether, there are 122 large OTG in Ukraine, according to this definition. All large

OTG are urban OTG, that is their center is a city. Further, all oblast centers are large OTG. OTG which are not large are classified as small OTG.

For the large OTG, the following Table 5 with normative class sizes replaces the use of Table 4.

Table 5. Normative class sizes for large OTG, 2021

Population of OTG (thousand)	Percent of rural population		
	Less than 10%	Between 10% and 25%	More than 25%
More than 150	27,5	27	25
Between 70 and 150	26	24,5	22
Between 50 and 70	25	24	21

The largest normative class size was increased to 27,5, because average class sizes in most of those large OTG with little rural population is over 27,5.

The number of administrative units meeting these conditions is listed in the following Table 6.

Table 6. Number of large OTG, 2021

Population of OTG (thousand)	Percent of rural population		
	Less than 10%	Between 10% and 25%	More than 25%
More than 150	26	1	
Between 70 and 150	19	10	3
Between 40 and 70	23	12	28

It is of course not surprising that there are few very large cities with high proportion of rural population. It is also clear that as there are far fewer large OTG than former cities of oblast subordination, some of these cities are not considered large OTG and will be assigned lower normative class size. On the other hand, some OTG, which are not former COS, fall into the category of large OTG. The following Table 7 shows the volume of these changes.

Table 7. Former COS and large OTG, 2021: units

	Large OTG	Small OTG	Total
Former COS, Kyiv	101	50	151
Other OTG	21	1 266	1 287
Total	122	1 316	1 438

We note that 50 former cities of oblast subordination are no longer considered large. On the other hand, 21 OTG which are not former COS are classified as large OTG and therefore their normative class size will be increased (and their allocation decreased). However, with one exception their new NCS is equal to 21 (prior to buffers, and in the majority of cases their actual class size is close to 20).

To review how these shifts of administrative units between categories of OTG work in practice, in the following Table 8 we provide average number of students and average class size for groups of OTG identified in Table 7



Table 8. Former COS and large OTG, 2021: students and class size

		<b>Large OTG</b>	<b>Small OTG</b>
Former COS, Kyiv	Average number of students	17 399	3 092
	Average class size	26,6	21,4
Other OTG	Average number of students	6 071	1 353
	Average class size	18,8	15,3
Total	Average number of students	15 449	1 419
	Average class size	25,9	15,7

We observe in Table 8 that the adopted definition of large OTG has correctly selected large OTG from all former cities of oblast significance. Those former cities which are large OTG are far larger and have much larger class sizes than those which are now considered small OTG. Similarly, this definition correctly classified large OTG from other, non-former COS administrative units, which are indeed twice as large (on average) as former COS categorized as small OTG. However, the reverse is true for average class sizes. This indicates that the approach adopted has some open issues, which will need to be addressed in the future (see section 6).

### 3. Other coefficients based on administrative criteria

Other than normative class sizes (discussed in section 2), the following coefficients of the allocation formula for education subvention in the budget year 2020 depended on the legal concept of city of oblast subordination and have to be defined in a new way for the budget year 2021:

1. Coefficient for non-teaching pedagogical staff,
2. Normative class size for evening schools,
3. Coefficients for division of classes into groups.

These three coefficients are discussed separately below.

#### Coefficient for non-teaching pedagogical staff

In 2020, coefficients for non-teaching pedagogical staff (school directors, pedagogues, school psychologists and similar) were determined based on administrative type of school founder, as shown in Table 9.

For 2021, this has to be changed. Instead of the administrative type, the division of OTG into large OTG and small OTG (see section 2) is used. The new values of the coefficients depending on type of administrative units are listed in Table 9.

Table 9. Coefficients for non-teaching pedagogical staff, 2020 and 2021

<b>Administrative unit type 2020</b>	<b>Coefficient in 2020</b>	<b>Administrative unit type 2021</b>	<b>Coefficient in 2021</b>
Oblast	0,199	Oblast	0,199
Kyiv	0,199	Kyiv	0,199
Cities of oblast subordination	0,199	Large OTG	0,199
Rayon , OTG	0,484	Small OTG	0,484

Since the majority of former cities of oblast subordination to correspond to what we call large OTG (compare with Table 7), for most administrative units this represents no change at all.

It is important to note that the approach adopted for coefficient for non-teaching staff is limited to changes of groups of school founders, for whom different values of the coefficient are used, and the values of the coefficients were not changed. A full review of the coefficient requires also analysis of its values. This comment also applies to adjusted normative class sizes for evening schools, see below.

### **Normative class size for evening schools**

The approach to the normative class sizes for evening schools is very similar to approach to the coefficient for non-teaching pedagogical staff, discussed above. In 2020, normative class sizes for evening schools were determined according to administrative type of the founder, that is it depended on whether the school founder was Kyiv, city of oblast subordination, rayon or OTG, as shown in Table 10 below (oblasts are not founders of evening schools).

For 2021, instead of the administrative type, the division of OTG into large OTG and small OTG is used (as it is for coefficient for non-teaching pedagogical staff). The values of NCS are given in Table 10.

Table 10. Normative class sizes for evening schools, 2020 and 2021

<b>Administrative type 2020</b>	<b>NCS for evening school 2020</b>	<b>OTG type 2021</b>	<b>NCS for evening schools 2021</b>
Kyiv	19	Kyiv	19
Cities of oblast subordination	19	Large OTG	19
Rayon , OTG	11	Small OTG	11

Similarly to the coefficient for non-teaching pedagogical staff, the change described in Table 10 will not have any effect for most administrative units and for most evening schools.

### **Coefficients for division of classes into groups**

In 2020, coefficients for division of classes into groups for general and special education were defined according to the following Table 11.

Table 11. Coefficients for division of classes into groups, 2020

<b>Legal type of administrative unit</b>	<b>Education</b>	
	<b>General</b>	<b>Special</b>
Oblast	0,070	0,101
City of oblast subordination, Kyiv	0,124	0,047
Rayons, OTG	0,017	0,000

For 2021, the Ministry adopted an alternative approach, namely to link the coefficients for division of classes into groups for general education to the normative class size after correction for the buffers. The following Table 12 presents adopted coefficients.

Table 12. Coefficients for division of classes into groups, 2021

Legal type of administrative unit		Education	
		General	Special
Oblast		0,070	0,101
OTG	NCS after buffers less than 20	0,017	0,047
	NCS after buffers equal or above 20, less than 22	0,075	0,047
	NCS after buffers equal or above 22, less than 25	0,100	0,047
	NCS after buffers equal or above 25, less than 27	0,125	0,047
	NCS after buffers equal or above 27	0,150	0,047

The coefficients for oblasts have not changed. For general education, coefficients for large cities were increased from 0,124 to 0,15. For special education, the value of coefficient does not depend on the type of OTG and is the same for all of them. This change resulted in a small increase of about 1 million Hr of the overall funds for education subvention (previously, the non-zero coefficient was applied only for the cities and Kyiv).

#### 4. Buffer mechanism

The normative class sizes of rayons and OTG until 2020, and of small OTG in 2021, are determined according to Table 3. This table was adopted in 2016 on the basis of actual class networks in secondary schools at the time, when the system of local governments other than COS included 155 OTG and 460 large rayons (see Table 2). Over time, as new OTG were created out of rayon territory, and as rayons were becoming smaller and were gradually losing secondary schools, this empirical basis was becoming less and less relevant. Especially in the last step of the decentralization process in 2020, the validity of normative class sizes set in Table 3 became questionable. To illustrate the scale of the problem, in the following Table 13 we present the characteristics of administrative units (rayons and OTG) which have 100% rural population, and where student density is over 9,4. According to Table 3, these units have normative class size 14,5.

Table 13. Rayons and OTG with purely rural population and large student density, 2020 and 2021

Characteristics	2020	2021
Number of administrative units	37	63
Average class size	18,52	19,83
Minimum average class size in administrative unit	13,98	12,25
Maximum average class size in administrative unit	23,57	30,73
Range of average class sizes (maximum minus minimum)	9,49	18,48

It is clear from Table 13 that the group of OTG with purely rural population and with large student density has become very differentiated and should be divided into some subgroups. Further, the normative class size for this group does not correspond to average class size, and that extreme cases (minimum and maximum) within this group are too far apart from each other. It is clear that many OTG in this group would obtain excess funds, if NCS 14,5 would be used for them. Similar problems appear for other groups of OTG as defined in Table 3.

We can conclude that, certainly, Table 3 requires now a thorough overview, regarding both the grouping of administrative units and the values of normative class sizes. Such a review should have

been a part of overall analysis of the allocation formula, which according to the Decree of cabinet of Ministers had to be conducted in 2020. In 2020, however, as discussed in section 1, for several reasons it was not possible to conduct a complete review of Table 3. This has now become an urgent task for the next year (see section 6).

Instead of reviewing and appropriately adjusting Table 3, the Ministry decided to apply a new technical instrument of the allocation formula, namely buffers. The aim of the buffers is to ensure that in cases when for a given administrative unit, the NCS as determined by Table 3 or by Table 5 is much higher or much lower than actual average class size (ACS), then NCS is adjusted upwards or downwards to make this difference smaller. By “much higher” or “much lower” it is meant that the difference between ACS and NCS is more than 2. By “adjustment” it is meant that this difference is reduced to 20% of its original value. Adjusted NCS becomes much closer to actual class size.

To clarify the functioning of the buffers, we note that if the differences between NCS and ACS is less than 2, the buffers do not intervene and the NCS is not adjusted. This is the situation where the formula may be considered correct. If however this difference is larger than 2, the buffers do intervene. The normative class size is decreased or increased by 80% of the difference, and then rounded to the nearest half integer. In addition, like the original NCS, the adjusted NCS cannot be smaller than 10 and cannot be larger than 27,5 (compare with Table 3 and Table 5).

We may also present this in the formulaic form. Let  $\Delta$  be the difference between the actual class size and NCS as determined by Table 3 (we assume that  $\Delta$  is non-negative). The buffers mechanism intervenes if this difference is larger than 2 ( $\Delta > 2$ ).

If ACS is smaller than NCS minus 2, then adjusted NCS, denoted  $NCS_{adjusted}$ , is smaller than NCS and becomes  $NCS_{adjusted} = NCS - 0,8 * \Delta$ . This is the same as  $NCS_{adjusted} = ACS + 0,2 * \Delta$ . Further, this number is rounded to the nearest half integer, and cannot be smaller than the minimum class size as determined in Table 3 (that is, cannot be less than 10).

If ACS is larger than NCS plus 2, then adjusted NCS, denoted  $NCS_{adjusted}$ , is larger than NCS and becomes  $NCS_{adjusted} = NCS + 0,8 * \Delta$ . This is the same as  $NCS_{adjusted} = ACS - 0,2 * \Delta$ . Further, this number is rounded to the nearest half integer, and cannot be larger than the maximum class size as determined in Table 5 (that is, cannot be more than 27,5).

Note that if the difference between original NCS and actual class size is greater than 2, then buffer mechanism will change the value of the NCS in all cases except when original NCS is equal to either 10 or 27,5.

The following Table 14 provides several examples of how buffers work in practice for individual administrative units (all examples are taken from actual OTG, but we do not provide the name or the location of the OTG).

Table 14. Examples of the buffers

Actual class size	Normative class size	Action taken	Adjusted NCS
15,57	16,5	The difference between ACS and NCS is less than 2, so buffers do not intervene	16,5
16,75	20,5	The difference between ACS and NCS is 3,75, so NCS should be adjusted downwards. 80% of the difference is equal to 3, so NCS becomes 20,5 minus 3.	17,5
9,91	12	The difference between ACS and NCS is 2,09, so NCS should be adjusted downwards. 80% of the difference is equal to 1,67, so NCS becomes 12 minus 1,67, that is 10,33. This is rounded to the nearest half integer, that is 10,5.	10,5
8,03	11	The difference between ACS and NCS is 2,97, so NCS should be adjusted downwards. 80% of the difference is equal to 2,38, so NCS becomes 11 minus 2,38, that is 8,62. This is rounded to the nearest half integer, that is 9. However, this is less than minimum allowed NCS at 10, so NCS becomes 10.	10
23,58	14,5	The difference between ACS and NCS is 9,08, so NCS should be adjusted upwards. 80% of the difference is equal to 7,27, so NCS becomes 14,5 plus 7,27, that is 21,77. This is rounded to the nearest half integer, that is 22.	22

The buffers apply to all OTG, but not to oblasts.

We see that the buffers to ensure that there cannot be large differences between actual and normative class sizes (after adjustment). If NCS is much above the actual class size, the OTG will receive insufficient funds for its secondary schools and will have to add from own revenues. This may lead to excessive difficulties for the local administration. If NCS is much smaller than the actual class size, then OTG will receive more than it needs. This may lead to inefficient allocation. Reduction of NCS increases the allocation of subvention, increase of NCS makes it lower.

To assess the scale of the buffer mechanism, the following provides the numbers of administrative units for which the buffer mechanism intervenes. By “receiving OTG” we mean those administrative units, for which the buffers reduced NCS and therefore increased allocation. OTG for which buffers increased NCS are called “contributing OTG”. OTG for which the buffer mechanism does not intervene are neither contributing nor receiving OTG.

Table 15. Number of OTG participating in the buffer mechanism

Type of OTG	Receiving OTG	Contributing OTG	All OTG
Former cities of oblast subordination	20	36	56
Urban OTG	21	43	64
Settlement-type OTG	24	107	131
Rural OTG	27	283	310
Total	92	469	561

Altogether, out of 1438 OTG receiving education subvention, 561 or one third participates in the buffer mechanism, majority of them are those OTG for which the buffers increased their NCS (contributing OTG). In the following we show the additional allocation to receiving OTG due to

buffers (cost to the national budget), and the reduction of allocation to contributing OTG (savings to the national budget).

Table 16. Funds added or subtracted from education subvention due to buffers (thousand Hr)

Type of OTG	Receiving OTG	Contributing OTG	Balance
Former cities of oblast subordination	235 364	-341 029	-105 666
Urban OTG	271 066	-500 105	-229 039
Settlement-type OTG	86 201	-785 244	-699 043
Rural OTG	60 304	-1 892 675	-1 832 371
Total	652 935	-3 519 054	-2 866 118

Altogether, receiving OTG obtained additional 652 million Hr, while contributing OTG had their subvention reduced by 3 519 million Hr. Overall, the buffer mechanism represents savings of about 2,87 billion Hr to the national budget. This illustrates one of the goals of the buffer mechanism as used in 2021, namely to significantly limit the inefficient (excessive) allocation and in this way to keep the overall sum of funds for education subvention within the budget envelope imposed by the Ministry of Finance, in constrained budget conditions of 2021.

## 5. Projection of student numbers

As discussed in section 1, MES had to design a methodology for projection of student numbers in September 2020 for each administrative unit on the basis of actual student numbers collected from schools in September 2019. After preliminary analysis (conducted with the technical support of SDU project staff) it was decided to use a simple methodology, in which students simply progress from one grade to the next one (and students of grade 12 graduate from the secondary school and leave the system).

This simple “shift” of students from one grade to another (point 1 above) does not apply to grade 1, in which new students are enrolled in the school, and to grade 10, because after grade 9 every student has an option to either continue general secondary education, or to leave secondary school and enroll in vocational education. In these two case there is no natural ‘shift’ of students, therefore an alternative approach must be used. For both grade 1 and grade 10, fixed ratio approach was applied, using first grade student numbers from two previous years. This assumes that the ratio of the number of first grade students in September 2020 to the number of first grade students in September 2019 is equal to the ratio of the number of first grade students in September 2019 to the number of first grade students in September 2018, with similar assumption for grades 9 and 10 in two consecutive years. For grade 1 this means, in particular, that ratio of enrollment of first grade students in two consecutive years remains constant. For grade 10 this means that the ratio of students leaving secondary school to continue in vocational schools in two consecutive years is the same.

To be more specific, the following methodology for projection was adopted:

1. For the first class conducted in a preschool, projection is equal to the same data in the previous year (there are very few of these classes and students).

2. For grade 1 in secondary school, that is new students enrolling in the school, projection is made on the basis of two previous years, from September 2018 and September 2019, using fixed ratio approach (discussed above). This assumption allows to estimate future enrollment of first grade students.
3. For grade 2, the number of students in September 2020 was assumed to be exactly the sum of all students the first class in preschool and in the secondary school a year earlier, that is in September 2019 (“shift” of students). This was based on the assumption that all students continue their study from one grade to another, albeit sometimes in a different school. However, it is assumed that migration of students between administrative units, while obviously always happening, will be very small.
4. For all grades from 3 till 9, and for grade 11, the same “shift” was used, that is the student numbers in September 2020 were assumed to be exactly the same as student numbers in one grade lower a year earlier (that is, in grades 2 to 8), in September 2019.
5. For grade 10, in the same manner as for grade 1, projection is made using fixed ratio approach on the basis of numbers of students in grade 9 in September 2018 and 2019. In the case when data for 2018 were not available, value from September 2019 was repeated.
6. For grade 12, the number of students in grade 12 in September 2019 was repeated (this refers to very small number of students).

For grades 1 and 10, the estimate obtained after the calculation was rounded to an integer, as the number of students is always an integer. For policy reasons, the rounding was upwards, to reduce the probability that actual student numbers will be higher than projection, and would require more funds for the education subvention.

Alongside the projection of student numbers, it is necessary to project also the number of classes (for the buffer mechanism which uses average actual class size, (see section 4), as well as the number of inclusion classes in general education. The same methodology is used as for student numbers.

The following Table 17 provides the comparison of the numbers of projected and actual students in September 2020, for the whole country, by grade (projections based on preliminary student data, before final cleaning for the second reading of the budget law).

Table 17. Projected and actual student numbers by grade, whole country

Grade	Projection	Fact	Difference	Percent difference
1 preschool	1 572	2 979	1 407	89,50%
1 school	432 294	410 053	-22 241	-5,14%
2	428 563	426 332	-2 231	-0,52%
3	446 384	444 261	-2 123	-0,48%
4	416 165	414 628	-1 537	-0,37%
5	413 808	412 641	-1 167	-0,28%
6	422 144	419 774	-2 370	-0,56%
7	394 279	392 439	-1 840	-0,47%
8	378 252	376 616	-1 636	-0,43%
9	362 377	360 532	-1 845	-0,51%
10	220 910	221 076	166	0,08%
11	222 543	217 970	-4 573	-2,05%
12	116	147	31	26,72%
Total	4 137 636	4 099 448	-39 959	-0,97%

The errors of projection for grades 1 in preschool and for grade 12 are a consequence of the simple approach adopted, but they do not matter at all because the relevant student numbers are very small. The projections for all remaining grades other than grade 1 are very close to the fact, including the exceptional grade 10. The “shift” methodology, described above, leads to minor overestimate of student numbers, due most likely to students leaving the education system (for example, through emigration). This overestimate is most significant for grade 11, which may require some additional research (probably drop-out rate after grade 10 is the largest). The important case is grade 1, for which the projection overshoots the fact by 22 thousand students, or 5,1%, the largest of observed discrepancies between the projection and the fact. For strategic discussions with the Ministry of Finance this was not serious, because this reduced the need for funds for education subvention and thus gave MES more room for adjusting the allocation for the second reading. There are probably good reasons for this discrepancy, which may be due to actual demographic shift and not to the weakness of the adopted methodology. Indeed, first graders in 2020 are exactly children born in 2014 and 2015, after the “revolution of dignity”, occupation of Crimea, and the war in the East of Ukraine, which caused massive internal displacement and a sudden decrease of births.

The projection could have been performed for all administrative units as school founders (about 1500 units). However, when the work was initiated, full information regarding which newly planned OTG was the founder of which school was still not available, therefore the projection was performed for each individual school (nearly 20 thousand institutions). This introduces some errors, especially due to the rounding. Now of course this information is available. Therefore, in the future years, when the list of OTG will be stable, it will be simpler and more reliable to perform the projection on the basis of administrative units, not schools.

## 6. Budget process to determine allocation of education subvention for 2022

In 2021, the Ministry of Education and Sciences will have to conduct the budget process to determine the allocation of education subvention to all administrative units for the budget year 2022. For a number of reasons, this will be easier than the current process, as described above in section 1:



- The network of administrative units is now established and permanent. Of course, there will be some minor changes, with some large cities increasing their territory and absorbing some secondary schools, and with OTG either merging or dividing into two independent local governments. These will be however localized individual changes, unlike the massive process of amalgamation occurring in 2020, depicted in Table 2.
- The methodology for conducting projection of student numbers has been tested and seems sufficient for the needs of the Ministry (with some methodological adjustments). Moreover, the data required for projection are already collected. This means that MES can start conducting analysis using projection numbers in the beginning of the next year.
- Further, MES has all the required non-student data about administrative units (surface area and population data), so can also begin analysis and simulation in the beginning of the next year.

These reasons give hope that the preparation for budget of 2022 can be conducted in a more calm and planned manner. The preparatory work of the Ministry of Education and Sciences should start early next year and be concluded before the budget process begins in earnest in July 2021. Of course, there will always be adjustments and changes introduced to address different policy challenges, but the Ministry may enter these discussions with a complete and coherent proposal.

The obligatory review of the allocation formula in 2020 was conducted, but was somewhat limited and in many areas did not address real evolution of the Ukrainian education system in the last three years. For example adjustments discussed in section 3 were not based on empirical analysis, but were simply steps to adapt different parts of the allocation formula to new legal framework. The reasons for this limited review of the formula are discussed in section 1 above, while the need to use buffers is discussed in section 4. Clearly, using the advantages listed above, a complete review of the formula in 2021 is urgently needed and will be possible. To achieve this, the following steps will need to be taken by the Ministry:

1. Review the definition of large OTG (see section 2). To ensure efficient allocation of education subvention, it is necessary to properly identify large cities with large schools and with large classes.
2. Review normative class sizes for small OTG (Table 3) and large OTG (Table 5). It is already clear that the main table of NCS is no longer applicable without buffers.
3. Review the coefficient for non-teaching staff. This coefficient was assessed 3 years ago using an empirical database which is no longer relevant.
4. Review normative class sizes for evening schools, for vocational schools, and for colleges.
5. Conduct a thorough analysis of teaching programs in different grades, in both general and special education, to ensure that the values used in the allocation formula are correct.
6. Review the division of classes into groups and adjust the relevant coefficients.
7. Adjust the projection methodology based on experience gained in 2020.
8. Analyze whether there is a continuing need to use buffers, and if yes, in what form.
9. Review group sizes for general and special dormitories.
10. Analyze policy consequences for private schools and determine the coefficient for private schools.

This is a serious program of empirical analysis, of review of the findings of that analysis, of policy discussions in light of policy priorities of the Ministry. Cooperation with key education stakeholders and with other Ukrainian ministries, most notably the Ministry of Finance and the Ministry of regional Development, will be necessary. Experts of the Ukrainian-Swedish project SDU are ready to support this analytical work of the Ministry.

It is important to note that next year, the Ministry may be proactive and may submit to the Ministry of Finance proposals and estimates of the overall costs of education subvention in 2022 quite early, well ahead of start of the budget process, before main budget indicators are established by the Ministry of Finance.

Warsaw, November 06, 2020