Housing and School Enrollment in New Hampshire: An Expanded View

May 2005

Prepared For: New Hampshire Housing Finance Authority

Prepared By: Applied Economic Research Laconia New Hampshire

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This report expands on an analysis prepared by Applied Economic Research (AER) entitled *New Residential Development and School Enrollment: Just the Facts*, which appeared in the spring 2004 issue of the New Hampshire Housing Finance Authority's Housing Headlines newsletter.

Subsequent to that publication, New Hampshire Housing asked AER to expand on the analysis by focusing on school generation from *new* housing units in New Hampshire by:

1. Examining in more detail actual school enrollment generated by new development in a sample of New Hampshire communities.
2. Refining and expanding the analysis of unpublished year 2000 Census data contained in the Public Use Microdata Sample data by focusing on school generation of new housing units.

Summary of Findings

The major findings of this analysis are:

- ***Demographic forces have a more powerful impact than growth on school enrollment.*** School enrollment has been expanding in New Hampshire because of growth and development, but also because of powerful demographic forces. The Baby Boom generation is the largest age group in the State. During the 1990s and early in this decade, New Hampshire enrollment mushroomed primarily because the children of Baby Boomers fell in the school age category.

- ***New Hampshire's period of rapid enrollment growth is all but over.*** The New Hampshire Office of Energy and Planning projects that New Hampshire's total population will increase by 157,100 during the current (2000-2010) decade. School age population, in contrast, will increase by only 5,500. This is in contrast to a school age population growth of 39,700 in the 1990s. Baby Boomer children are graduating from local public schools. The coming generation of new parents is much smaller than the Baby Boomers. As such, there are fewer children are entering public schools.

- ***Total public school enrollment is now declining modestly in NH.*** First grade enrollment is now dramatically lower. As these smaller classes progress through the grades, the pressure on growth in total enrollment will subside.

- ***Communities that are not adding many new housing units will likely see declining enrollment in the coming years, because of these demographic forces.***

- ***New Hampshire's occupied housing units generated an average of only 0.45 students in the year 2000.*** Census data, based on a sample of New Hampshire households in 2000, indicates New Hampshire enrollment by type of housing unit (including new and existing units) is well below the two children per housing unit assumed by the "conventional wisdom":

NH School Public Generation By Unit Type, Grades K-12
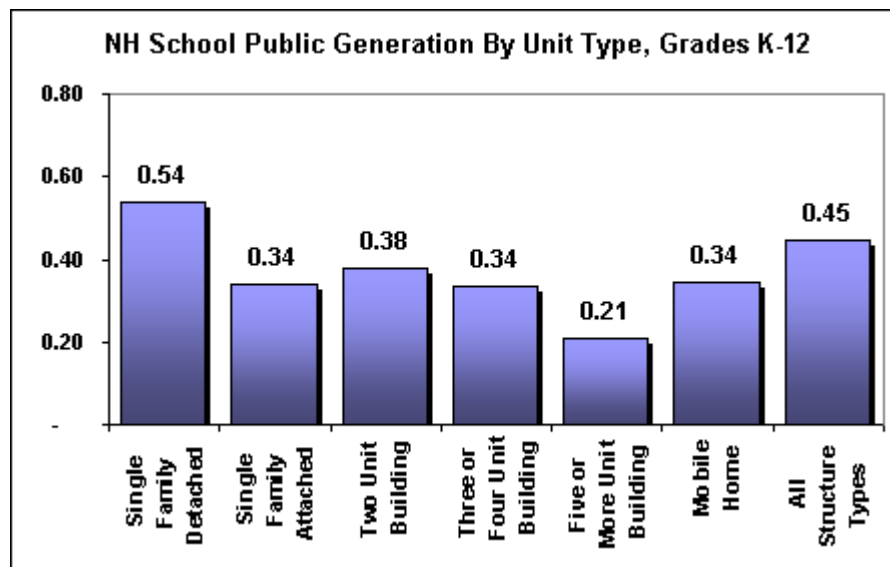
- *Most new housing unit types generate students at about the same rate as existing units.* AER supplemented Census data by conducting a unit-by-unit tally of school enrollment in 3,400 housing units built between 1998 and 2004 in Bedford, Hudson, Lebanon and Rochester, with the following results:
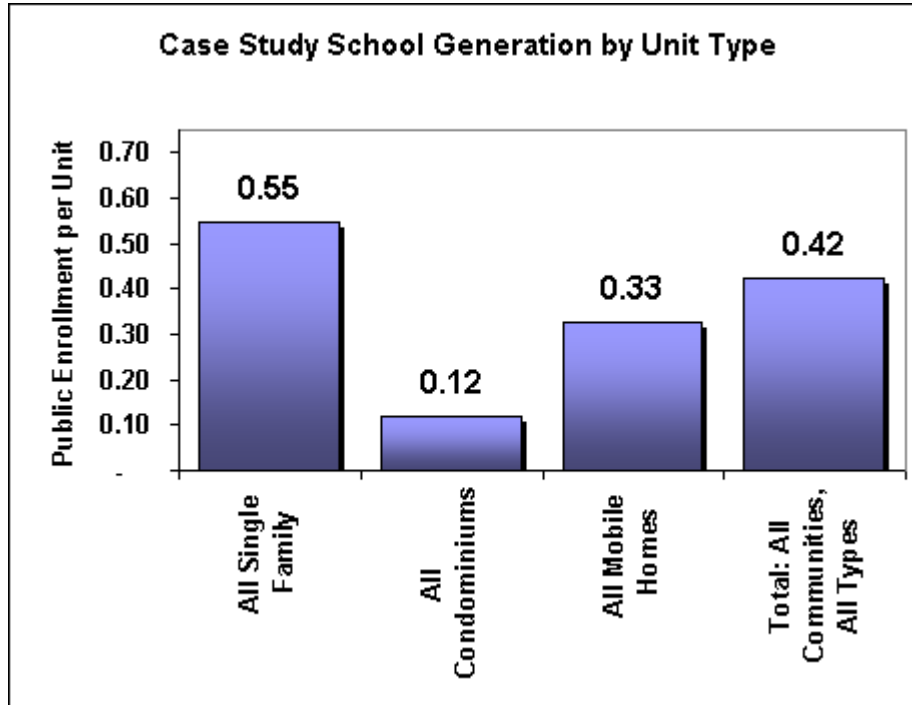
The two exceptions are (1) new condominiums, which generated fewer enrollees in our survey than the Census indicated for existing condos, and (2) new four-bedroom single-family homes, which generated more enrollees in our survey than the Census indicated for existing four-bedroom single-family homes.

Synopsis of First Study's Findings

New Hampshire planning boards are very concerned about the impact of new residential development on school enrollment in New Hampshire because:

- Schools typically represent two-thirds of local spending.
- During the 1990s school enrollment in New Hampshire expanded rapidly, adding 39,000 new students, a 24% growth rate—more than twice as fast as the 11% overall population growth.
- Increasing enrollment forced many communities to expand school capacity at a considerable initial construction cost and subsequent ongoing operating cost.

In the minds of many residents and planning board members, new residential construction is the culprit underlying enrollment growth and escalating local education costs. The conventional wisdom holds that each new dwelling unit generates two or more students, at an annual local education cost of $10,000 per student. As a result, the conventional wisdom holds that new development "doesn't pay its way". This mindset is a major factor underlying the use of growth control measures in New Hampshire, including annual restrictions on the number of building permits issued and outright moratoriums on new residential development. These restrictions are being imposed at a time when housing costs are escalating faster than resident incomes. These efforts to restrict supply are contributing to a housing affordability crunch in most of the state's market areas.

Our first analysis found that this conventional wisdom is flawed:

- The typical housing unit in New Hampshire generates significantly fewer school children than assumed by the conventional wisdom. According to US Census figures the typical New Hampshire occupied housing unit generated only 0.45 public school students in the year 2000, rather than the two or more students assumed to be the case.
- New housing construction did contribute to higher school enrollment in the 1990s, but the age structure of the population was probably more significant. That is, during the 1990s the Baby Boomer children were enrolling at record numbers, creating an enrollment bulge that was unique in the state's history.
- The cost per student figures relied on in the conventional wisdom do not take into account non-local revenues that school districts rely on. The *total* cost per student may well be $10,000 or more in many school districts, but state and federal funds offset a significant portion of that cost in many districts.
- Education costs are rising not only because more students entered the system, but also because of rising standards, including, for example, the introduction of kindergarten in many districts.

The fundamental misconception in the conventional wisdom is that it attributes too much of the responsibility for recent enrollment increases to new construction, and not enough to the changing demographics of New Hampshire, especially the impact of Baby Boomer

children entering the school age population in the 1990s. Additionally, the conventional wisdom does not square with the occupancy characteristics of New Hampshire housing.

Whereas the concept is that each housing unit is occupied by two parents with two children enrolled in school, the reality is starkly different[1]:

- Only 26% of the state's occupied housing units are occupied by a married couple with children under age 18 (including children not yet enrolled in school).
- 33% of the state's occupied units consist of a household head aged 55 or over—unlikely to have school age children.
- 24% of the state's occupied units have only one person living in them.
- 31% of the state's occupied units are occupied by non-family households, meaning no relatives, children or otherwise, occupy the unit.

This report expands on the observations in our first report by:

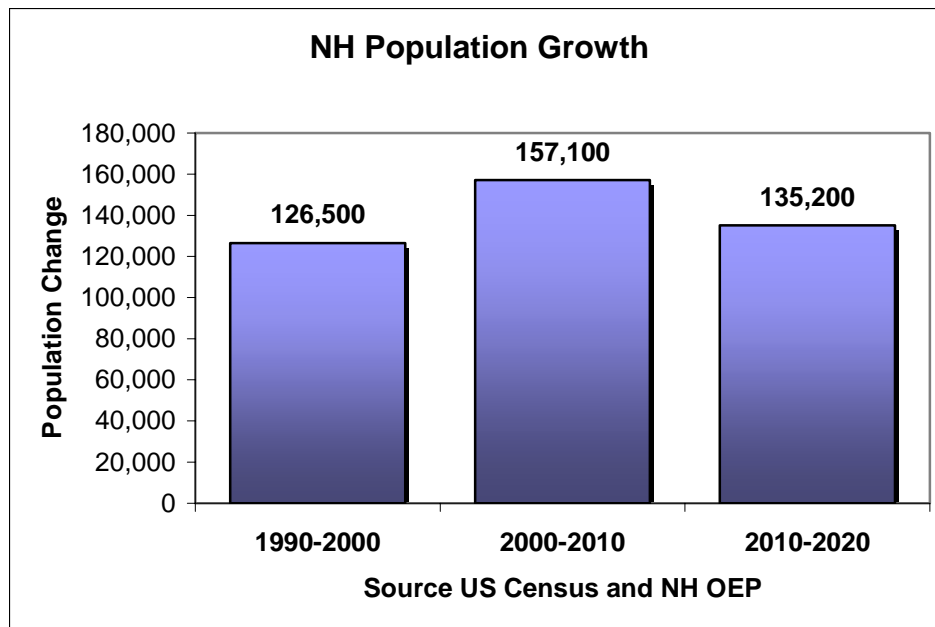- Analyzing demographic trends in more detail.
- Incorporating the state's most recent population forecasts prepared subsequent to our initial report.
- Analyzing unpublished Census data focused on school generation by unit type in New Hampshire.
- Conducting a New Hampshire case study analysis of school generation in new housing units.

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[1] These categories overlap and should not be added together.

Demographic Trends and School Enrollment Revisited

Demographic trends and projections (the trends and outlook for population by age group) are critically important to any analysis of school enrollment. Subsequent to our initial report, the NH Office of Energy and Planning (NHOEP) prepared a new set of population projections for the state. These revised projections incorporate data from the year 2000 US Census of Population and also reflect population trends that surfaced between the 2000 Census and 2003.
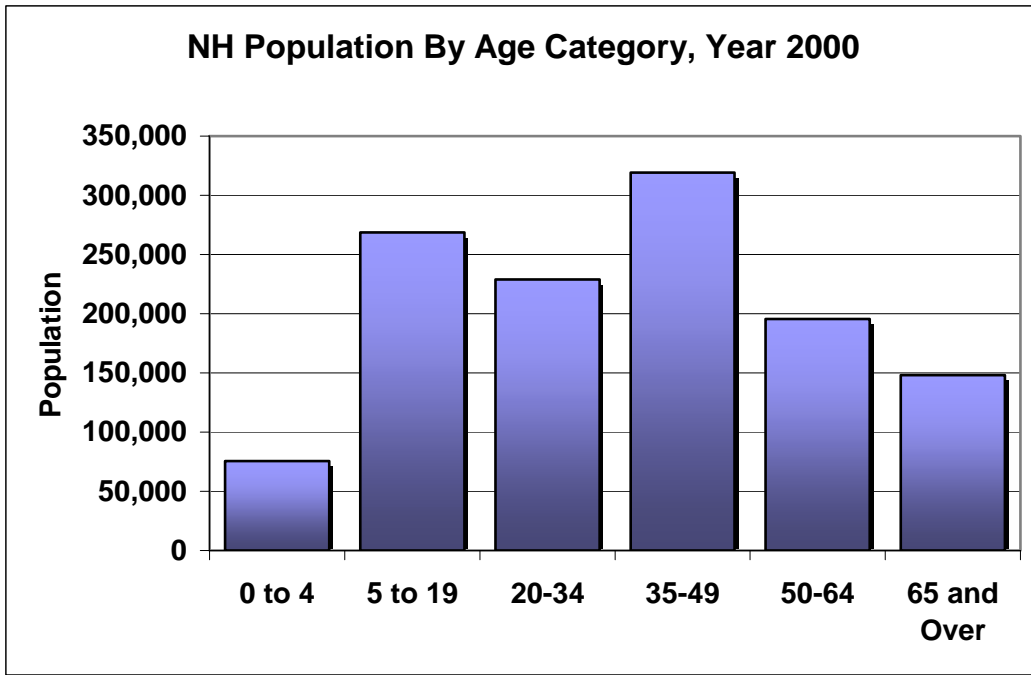
The "big picture" is that New Hampshire's population has been expanding. Between 1990 and 2000 the state's total population grew by just over 125,000 residents, an 11 percent increase. The most recent projections anticipate that the state's population will continue to increase during the next two decades:

NH Population Growth

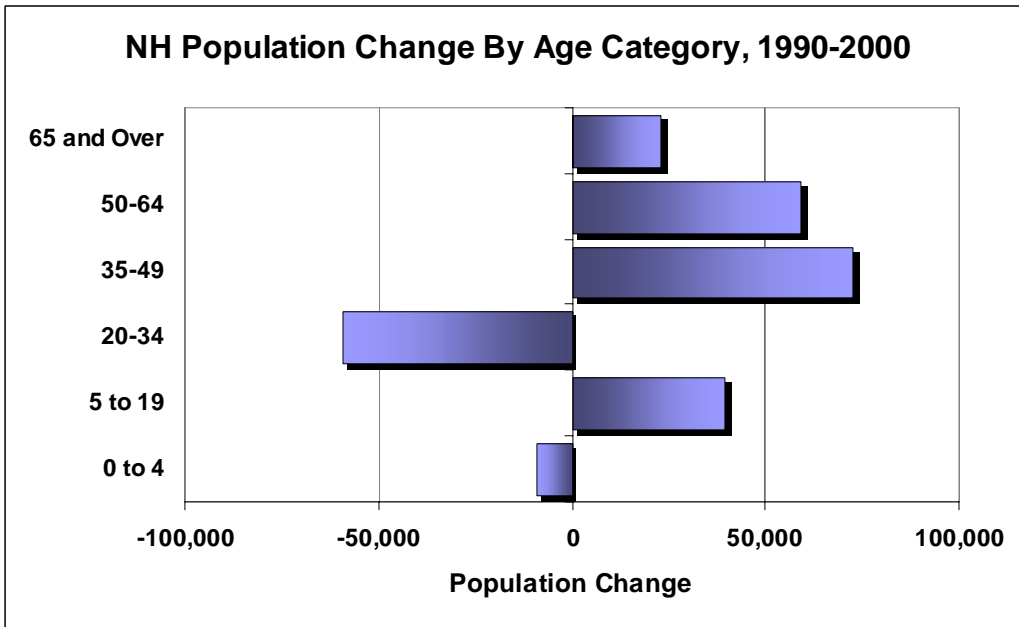| Period	Population Change
1990-2000	126,500
2000-2010	157,100
2010-2020	135,200

Source US Census and NH OEP

If school age population had expanded proportionate to total population in the 1990s, there would have been an 11 percent increase in school age population. In fact, school age population in the 1990s increased significantly faster—by 17 percent. Public school enrollment increased faster yet, (by 24 percent) because many districts added kindergarten and there was a shift from private schools to public schools.

Clearly, there is something other than growth contributing to rising enrollment.

That "something" is primarily the influence of the Baby Boomer generation. By the end of the decade (year 2000), the Baby Boomer generation (ages 35-49) and their children (ages 5-19) were the two largest age categories in the State:

NH Population By Age Category, Year 2000

Population

(bar chart: 0 to 4 ≈ 75,000; 5 to 19 ≈ 268,000; 20-34 ≈ 228,000; 35-49 ≈ 320,000; 50-64 ≈ 195,000; 65 and Over ≈ 148,000)

Furthermore, during the 1990s the Baby Boomer age category (ages 35-49) grew by 72,800, adding more people than any other age category in the state.

NH Population Change By Age Category, 1990-2000

(horizontal bar chart: 65 and Over ≈ +22,000; 50-64 ≈ +58,000; 35-49 ≈ +73,000; 20-34 ≈ -58,000; 5 to 19 ≈ +40,000; 0 to 4 ≈ -7,000)

Population Change

The Baby Boomers entered the 35-49 year old age category in force during the 1990s. This is also the age category that is most likely to have school age children. Hence, school age population expanded faster than total population during the 1990s partly because the state was growing, but also because the Baby Boomer generation entered the 35-44 year old age category, which has a lot of school age children. Note also that between 1990 and 2000 the population in the 20-34 age group declined by nearly 60,000—there will be fewer parents with school age children in the coming decades.

What happens to the 35-49 year old age category going forward in time? NHOEP projections show a much different picture emerging than what happened in the 1990s. In contrast to the experience in the 1990s, this "school-age parent" age group is expected to decline, despite the strong overall population growth outlined above:

NH Population Change Among 35-49 Year Olds

Source: US Census and NH OEP
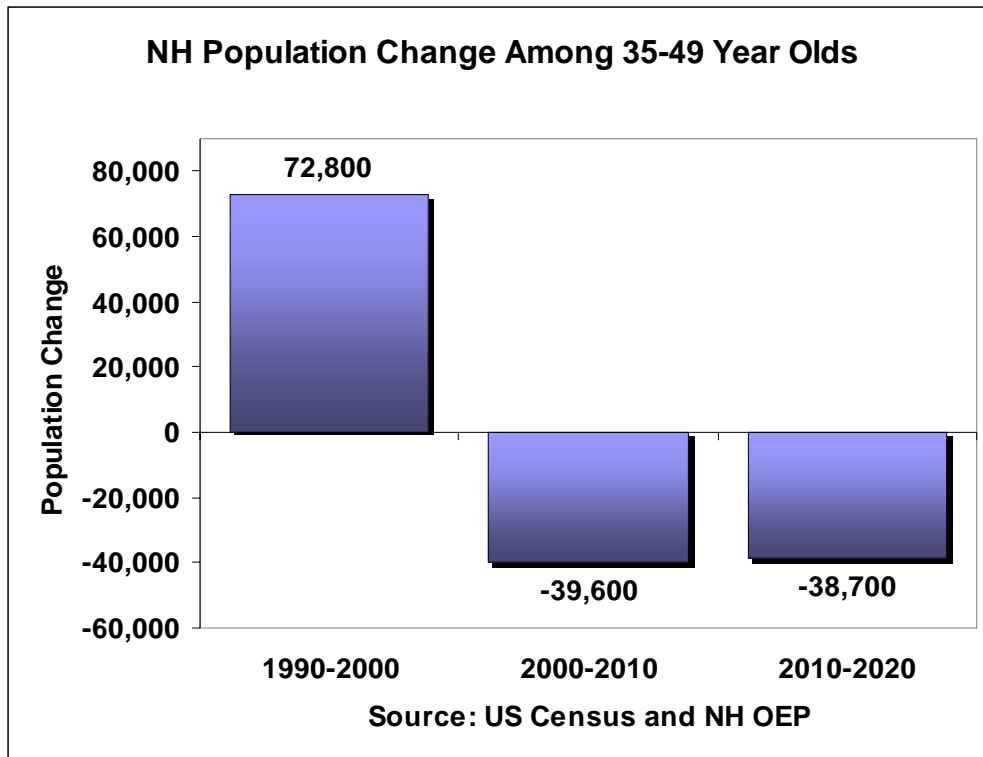
This decline happens because the age group immediately behind (younger than) the Baby Boomers is significantly smaller than the Baby Boomer generation.

With fewer parents in the 35-49 prime school-age parent category, it is logical to expect that enrollment growth will subside. In fact, NHOEP's projections anticipate much less growth in school age population during the next several decades. Even though the state is projected to add more total population in the current decade than in the 1990s, growth in the school age population will be much lower than in the 1990s and will actually decline in the decade following 2010:

**Trend and Projected NH School Age Population
(Ages 5-19)**

Source: US Census and NH Office of Energy and Planning
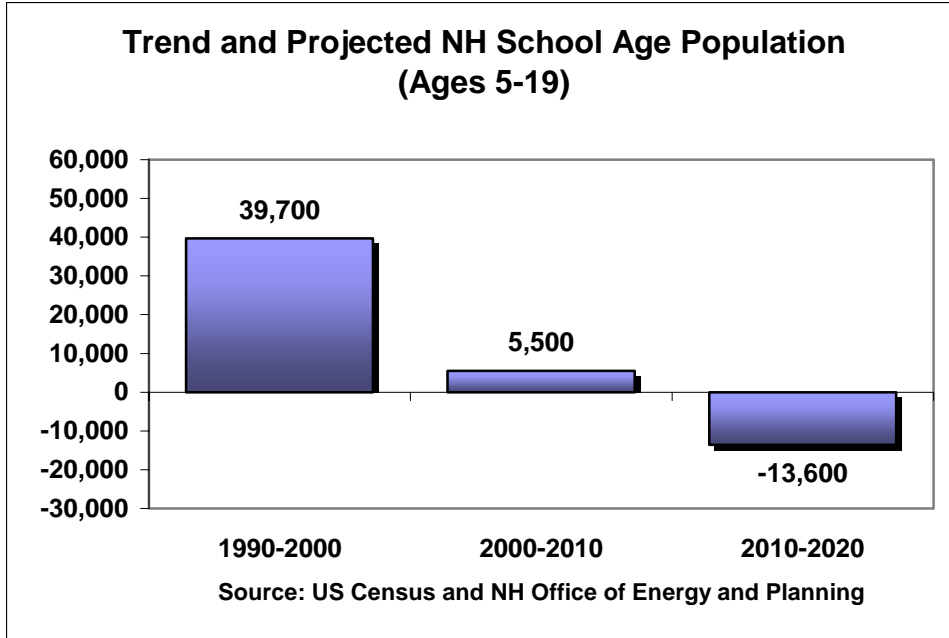
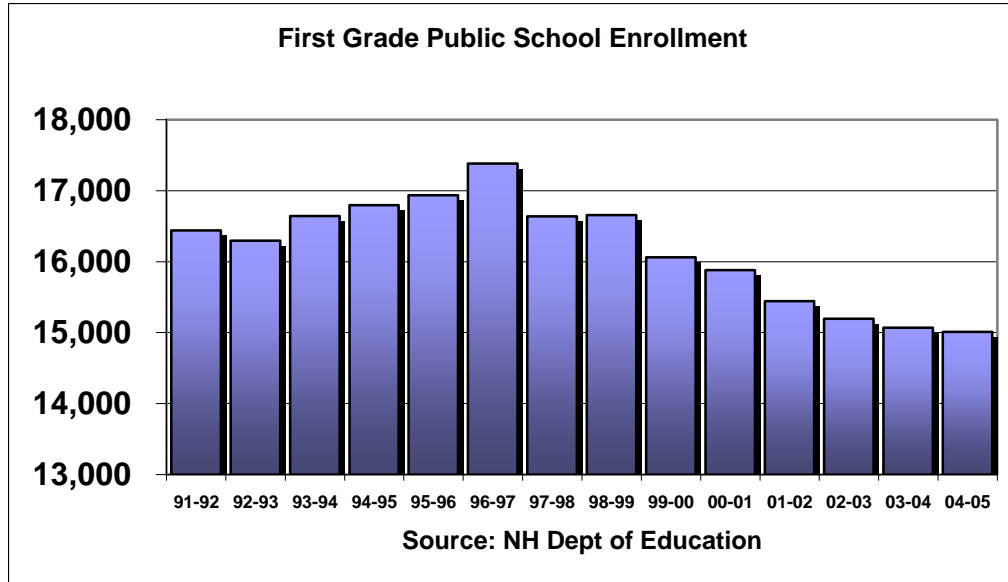The relationship between growth and school enrollment is not as simple as it may seem on the surface. Yes, new housing units typically add students to the local system. However, demographic forces are a more powerful determinant of enrollment than housing growth. During the 1990s (a time when the state added relatively few new housing units in comparison to past decades) enrollment mushroomed because the Baby Boomer generation entered the prime school-age parent age category (35-49). Between 2005 and 2020, the state's total population is projected to grow by just over 200,000 new residents, but school enrollment is projected to be lower in 2020 than it is today.

An analysis of enrollment trends compiled by the NH Department of Education shows that the ebbing of enrollment growth has begun. In contrast to the steep enrollment growth in the 1990s, total public school enrollment in New Hampshire has shown a modest decline in recent years, despite higher levels of new residential construction.

**NH Public School Enrollment Trends (Grades
Preschool-12)**

Source: NH Dept of Education
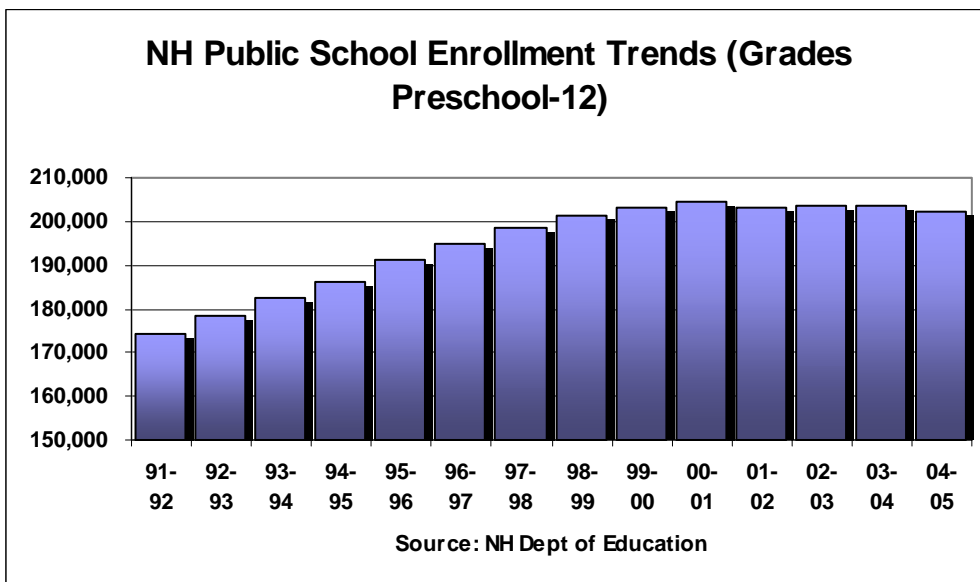
The principal reason for this decline is that there are smaller numbers of students entering first grade classes:

First Grade Public School Enrollment

Year	Enrollment
91-92	~16,400
92-93	~16,300
93-94	~16,600
94-95	~16,700
95-96	~16,900
96-97	~17,400
97-98	~16,600
98-99	~16,650
99-00	~16,050
00-01	~15,850
01-02	~15,450
02-03	~15,200
03-04	~15,100
04-05	~15,000

Source: NH Dept of Education

The number of first graders entering public schools is declining, because there are fewer parents in the prime school-age-parent category. These smaller first grade class sizes have a cumulative effect on total enrollment, as these students progress through the grade levels.

In short, the period of New Hampshire's mushrooming school enrollment is ending, because the Baby Boomer generation is aging and there are fewer parents in subsequent generations.

Census School Generation: Examining the Details

Every ten years the US Census Bureau conducts its Decennial Census of Population and Housing. The data collection includes an actual count of population and housing via mailed forms and face-to-face interviews. In addition to this basic data from the 100% count, the Census gathers detailed socio-economic data from a sample of households. This data includes variables such as income, employment, education levels, etc. The Census publishes this data in hard copy and makes it available on the Internet for New Hampshire, its counties, communities and census tracts.

Yet more data is available from the Census in unpublished form via the Census's Public Use Microdata Sample (PUMS) files. The data in these files are derived from a sample of 5 percent of occupied housing units. The data is unpublished and accessed via data queries. Data queries enable the researcher to specify unique data requests. In the case of the current study the PUMS data allows the correlation of school enrollment by dwelling unit type, age of housing unit and number of bedrooms. Due to issues of confidentiality and data reliability, the PUMS data is not available at the town or county level, but rather the PUMS files contain geographic units known as super-Public Use Microdata Areas (super-PUMAs)—there are two in New Hampshire and Public Use Microdata Areas (PUMAs)—there are 11 in New Hampshire. Each super-PUMA contains a minimum population of 400,000 and each PUMA contains a minimum population threshold of 100,000.

Working with the New Hampshire Housing staff[2] a series of PUMS data has been analyzed for the state and its sub areas. These detailed tabulations of the PUMS data are available on the [New Hampshire Housing web site](#)[3] and may be of interest to those seeking a fine-grained examination of school generation by dwelling unit type and bedroom count at the sub-state level in New Hampshire. For purposes of this analysis we limit the discussion to statewide data and the major observations important to the consideration of the relationship between residential development and school enrollment.

The PUMS data allows a more detailed examination of school generation. This more detailed examination allows the isolation of those factors that have a structuring influence over school enrollment and provides insight into questions such as:

- How does enrollment per unit vary by type of housing unit (single family, condo, mobile home, etc)?
- How important is the number of bedrooms to school generation per unit?
- Do newer units generate more school children than existing units?
- Do ownership units generate more school age children than rental units?
- Does school generation per unit vary between urban and rural settings?
- Does school generation differ among the regions of the state?

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[2]The considerable assistance of New Hampshire Housing, Office of Policy and Planning staff is acknowledged.
[3] see http://www.nhhfa.org

The following paragraphs discus these questions within the context of the Census Bureau's PUMS data for New Hampshire.

School Generation By Type of Housing Unit

The PUMS data reveals the following public school generation figures for New Hampshire housing units:
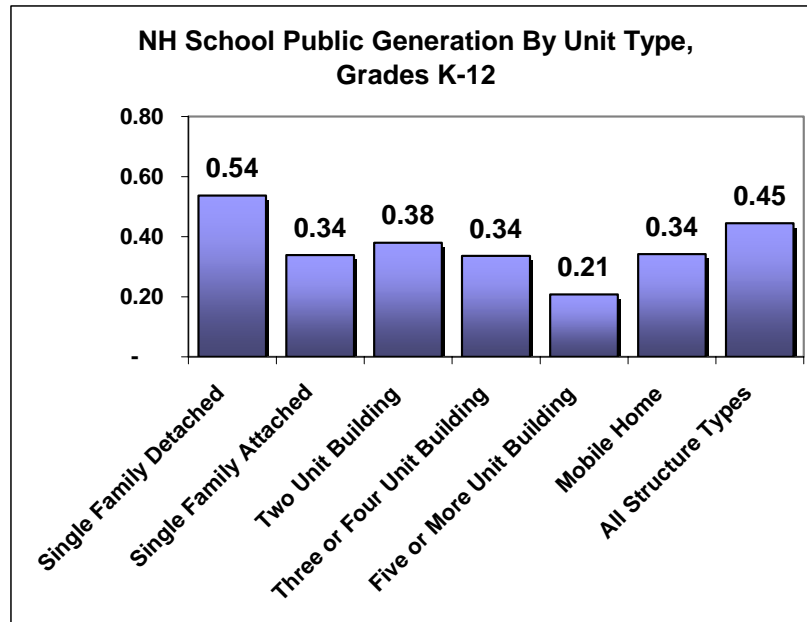
Other things being equal, single-family homes generate more school children than other housing unit types. The typical single family home generates 0.54 students per housing unit, while the typical attached single family home (the Census Bureau's label for condominiums) generates 0.34 students. Garden apartments typically fall in the "Five or More Unit Building" category, which generates an average of 0.21 students per unit.

School Generation By Unit Size

There is a strong relationship between the number of bedrooms in a housing unit and the average number of school children from the unit. Four bedroom units generate nearly four times the number of school children per unit as compared to two bedroom units (0.81 versus 0.22 students).

NH School Public School Generation Grades K-12, By Number of Bedrooms,

Number of Bedrooms	School Generation
1 Bedroom or Less	0.05
2 Bedrooms	0.22
3 Bedrooms	0.57
4 or More Bedrooms	0.81
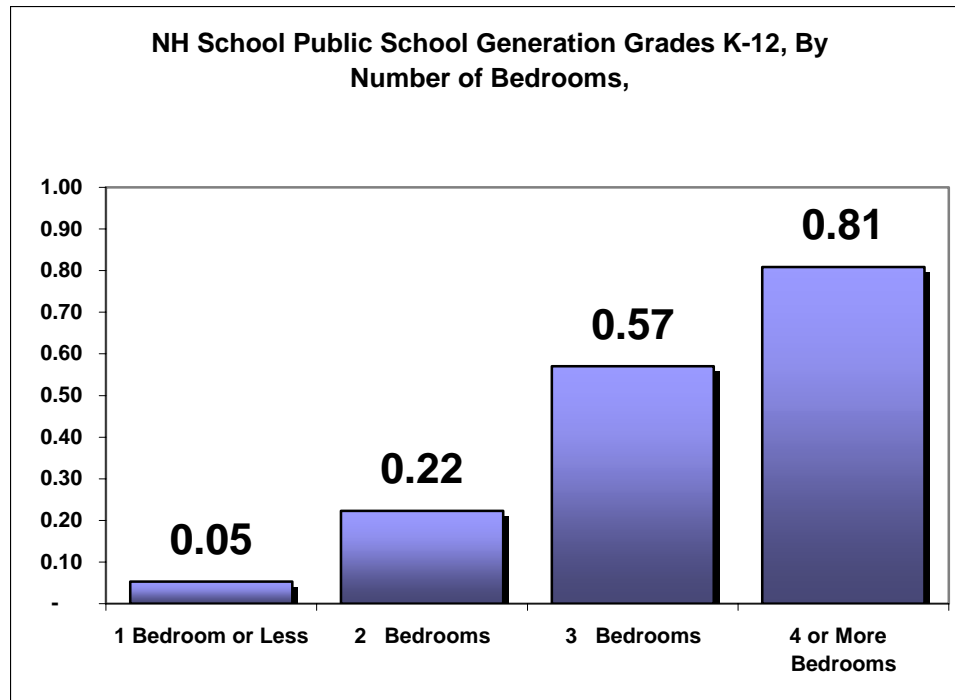
The rationale is one of common sense: larger families are attracted to larger housing units. It is interesting to note, however, that even four bedroom units do not approach the school generation rate of "two or more students per unit" common to the conventional wisdom of school generation and housing.
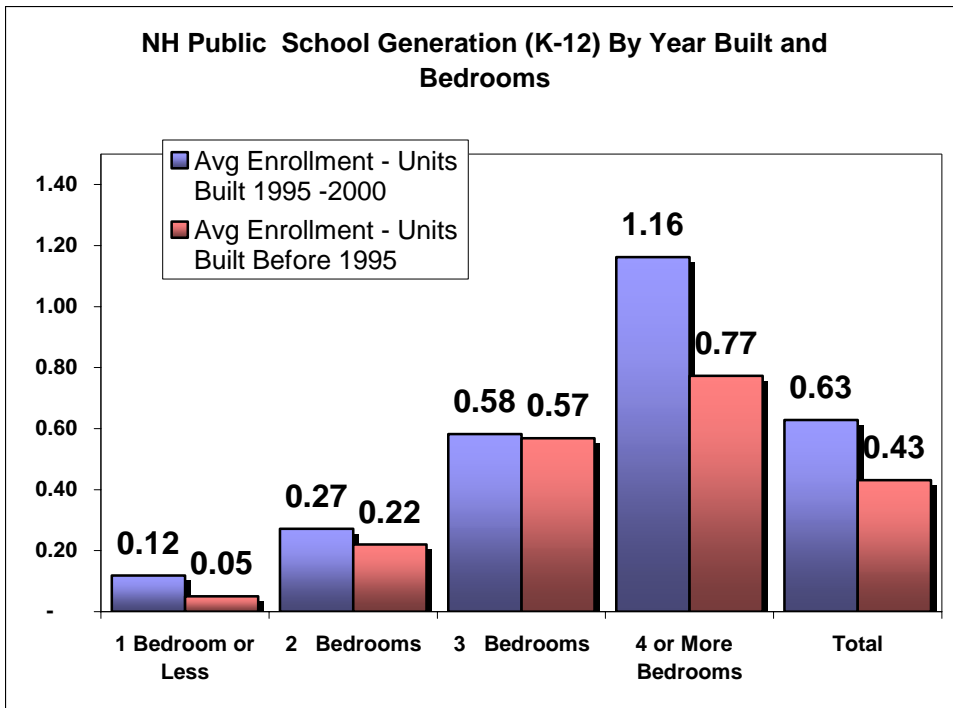
A more detailed look at school generation by unit type and bedroom count shows that bedroom count is a more important factor than unit type.

Average School Enrollment In New Hampshire (Public Enrollment Only)		1 Bedroom or Less	2 Bedrooms	3 Bedrooms	4 or More Bedrooms	Total
Grade K - 12						
Single Family Detached		0.04	0.21	0.54	0.81	0.54
Single Family Attached		0.15	0.22	0.59	0.57	0.34
Two Unit Building		0.09	0.24	0.65	0.67	0.38
Three or Four Unit Building		0.06	0.29	0.72	0.88	0.34
Five or More Unit Building		0.04	0.24	0.98	#N/A	0.21
Mobile Home		0.07	0.17	0.61	#N/A	0.34
All Structure Types		0.05	0.22	0.57	0.81	0.45
#N/A means there were too few units in this category to yield reliable results						

For example, a three bedroom single family home generates 0.54 students per unit, on average and compared to 0.59 students in a three-bedroom condominium (single family attached) and 0.61 students in a three-bedroom mobile home. Most of the school generation variation by housing unit type is driven by bedroom count. Single-family homes generate more school children than apartments….not because they are single-family homes, but rather because single-family homes are likely to have more bedrooms.

School Generation in New Versus Existing Housing

New units generate about the same number of students per unit as existing units. On an overall basis new housing units generate more school children (0.70 students) than existing units (0.48 students), but this is primarily because new units are more likely to be larger, single family units.

NH Public School Generation (K-12) By Year Built and Bedrooms

- Avg Enrollment - Units Built 1995 -2000
- Avg Enrollment - Units Built Before 1995

Bedrooms	Built 1995-2000	Built Before 1995
1 Bedroom or Less	0.12	0.05
2 Bedrooms	0.27	0.22
3 Bedrooms	0.58	0.57
4 or More Bedrooms	1.16	0.77
Total	0.63	0.43

The exception to this observation is for new units with four or more bedrooms, which generate an average of 1.16 students per unit, versus 0.77 students in existing units with four or more bedrooms. Families with school age children are attracted to new four bedroom units. Over time, it is likely that the school generation emanating from these larger single-family units will drop.

School Generation in Ownership versus Rental Units

Units that are owner occupied have higher average school generation rates than renter units (.50 versus .32 students)
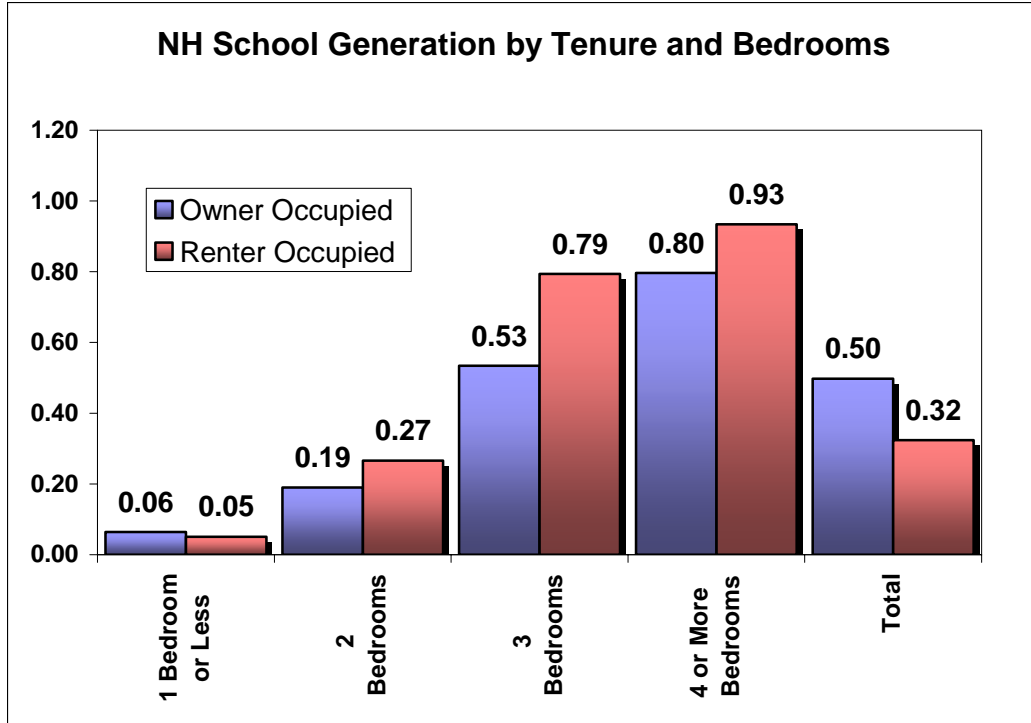
It is interesting to note that for each bedroom count, rental units have higher school generation than ownership units. Yet, ownership units generate more students overall, because they are more likely to be three or four bedroom units which generate more students than the one and two bedroom units that dominate the rental category.

School Generation in Urban Versus Rural New Hampshire

Some believe that there are differences in school generation between the state's southern (predominately urban) and northern (predominantly rural) areas. The sense is that young families with school age children are more likely to be found in southern New Hampshire's dynamic economy than in Northern New Hampshire's more rural and stable economic setting. The PUMS data does not support this view.
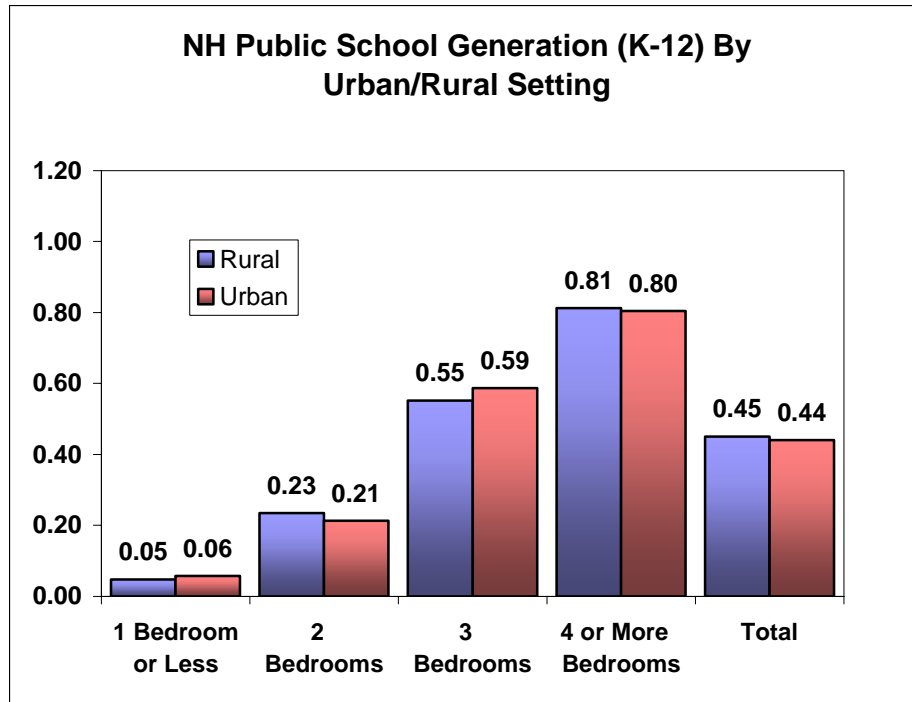
Whether looking at school generation among total units, or by bedroom count, school generation in the state's predominantly rural northern areas, and its more urban southern areas, is essentially the same.

Sub-state Area Variations

School generation does vary somewhat by sub-state area, as depicted in this table:

Average Public School Enrollment In New Hampshire (Grades k-12)					
		1 Bedroom or Less	2 Bedrooms	3 Bedrooms	4 or More Bedrooms	Total
Grade K - 12 (All Unit Types)					
PUMA 1 - Coos & Grafton Co.		0.03	0.21	0.52	0.78	0.40
PUMA 2 - Carroll & Belknap Co.		0.05	0.22	0.48	0.76	0.41
PUMA 3 - Strafford Co.		0.05	0.18	0.61	0.86	0.43
PUMA 4 - Merrimack Co.		0.05	0.19	0.57	0.91	0.45
PUMA 5 - Sullivan & Cheshire Co.		0.04	0.24	0.58	0.72	0.44
PUMA 6 - Hillsborough Co. Non-Metro		0.08	0.33	0.60	0.88	0.57
PUMA 7&8 -Manchester Metro Area		0.06	0.25	0.61	0.77	0.45
PUMA 9 - Nashua Metro Area		0.08	0.21	0.61	0.87	0.46
PUMA 10 - Western Rockingham Co.		0.07	0.21	0.61	0.84	0.52
PUMA 11 - Eastern Rockingham Co.		0.03	0.18	0.48	0.73	0.37

Eastern Rockingham County, which includes Portsmouth, has comparatively low school generation (0.37 students per unit) versus the rural portions of Hillsborough County (0.57 students per unit.   Part of this variation is explained by the mix of housing units—areas with higher average generation are likely to have more four-bedroom units. But, it is also true that even controlling for the number of bedrooms, some areas of the state attract households with more children than other areas.

School Generation in New Hampshire's New Housing Units: Case Studies

Counting students living in new housing units is the most definitive measure of school enrollment in New Hampshire's new housing units. It would be prohibitively expensive to do this in every community in New Hampshire, but it is cost-effective to examine the issue on a case study basis by:

1. Selecting a sample of New Hampshire communities with varying growth characteristics.
2. Identifying the new housing units built in those communities.
3. Identifying the public school enrollees living in those new units.

This is the methodology AER followed in examining actual enrollment data for new housing units in New Hampshire. First, AER chose four New Hampshire communities to for investigation. Four case study communities were selected based on:

1. Experiencing enough new development to allow calculation of reliable school generation per unit figures.
2. Including a diversity of housing types (single family, condo, mobile homes) to provide insight into more than just single-family enrollment generation.
3. Representing a diversity of community types (bedroom, metropolitan, small, large, etc.)

In view of these criteria the following case study communities were selected:

- Bedford, which is a suburban town in a metropolitan setting
- Hudson, which is a southern New Hampshire bedroom community.
- Lebanon, which is a small city not in a metropolitan area.
- Rochester, which is a somewhat larger city with a diversity of new housing types.

The analysis then:

- Identified the address and physical characteristics (unit type, bedrooms) of units built between 1998 and 2004 from town assessment data.
- Secured school enrollment data by address from the local school district.
- Matched the enrollment data with the new construction data by address to identify enrollment in new units.

AER tried to analyze case study school enrollment data for each of the major types of housing: single family, condominium, mobile homes and multi-family rental. The case study communities, however, did not have enough new multi-family rental units to provide reliable results. This lack of new multi-family rental construction is true statewide. Very few new multi-family rental units were built in New Hampshire during

the past 15 years. AER views this lack of new rental units as a reflection of both development economics (it has been more profitable to build condos than rental units) and community resistance to new rental construction, particularly outside of the state's larger communities.
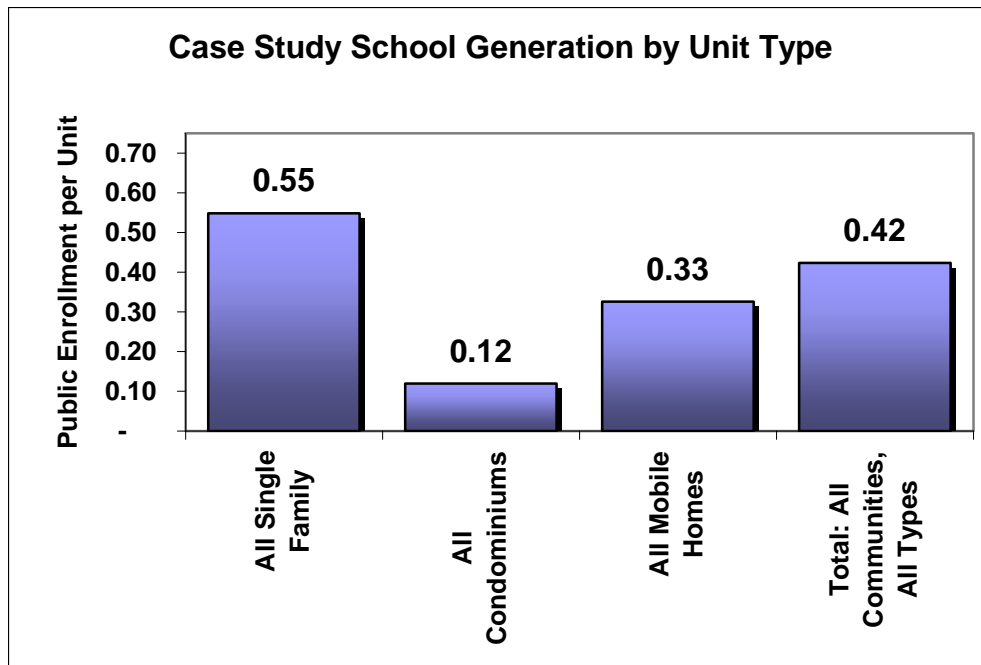
 In total, AER address-matched enrollment in just over 3,400 new units within these four communities.

Overall Enrollment

The 3,432 new units in the four case study communities generated 1,453 students or an average of 0.42 students per housing unit. This is essentially identical to the 0.45 students per unit for all New Hampshire housing units derived from the year 2000 US Census.

Enrollment By Unit Type

As expected, single-family units generate more students than other unit types[4]:

Case Study School Generation by Unit Type

Unit Type	Public Enrollment per Unit
All Single Family	0.55
All Condominiums	0.12
All Mobile Homes	0.33
Total: All Communities, All Types	0.42

Interestingly, the case study data does not support the notion that new units generate more students per unit than existing units. The only major discrepancy between the case study community data on new units and overall Census data is that new condominiums

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[4] There were too few multifamily apartments built in the case study communities to derive reliable multipliers. This is also true statewide—there have been very few new rental units built in New Hampshire during the past five years.

generate significantly fewer students per unit than the Census indicates for all New Hampshire condominium units:

Comparison of Statewide (All Units) and Case Study (New Units)				
	Students per Unit			
	Case Study: New Units	Census: PUMS All NH Units		
Single Family	0.55	0.54		
Condominium	0.12	0.34		
Mobile Home	0.33	0.34		

New condominium units generate fewer students per unit than the Census tally of all condominium units, because new condominium units are more attractive to empty nester households with few public school enrollees. The data in the case studies excluded units in age-restricted developments. Nonetheless, new condominium units are more expensive than existing units and incorporate features that are designed with stronger appeal to empty nester households and young households without school age children. Most families with school age children will prefer single-family housing units and be attracted to condominiums only if those condominiums are more affordable than single family units. Recent new condominium construction has focused on building higher cost units that have less appeal to families with school age children.

Generation by Bedroom Count

The number of bedrooms in a housing unit is a major determinant of the number of school children generated. The data from the case study communities is supportive of this observation. Units with more bedrooms generate more students per unit, as seen in the following table. The lower generation among condominium units discussed in the preceding paragraph extends to the data by bedroom count. That is, new condominium units in the case study communities generated fewer students than single-family units on a per-bedroom basis.

Care should be taken in applying these ratios to new development. The single family data by bedroom count had a sufficient number of units to permit its application in other settings. The data for condominiums (other than 2 bedroom units) and mobile homes by bedroom count is, however, probably too thin to be reliable.

School Generation in Case Study Units Built 1998-2004			
Excluding Age-Restricted Units			
	Students	**Units**	**Students per Unit**
Single Family			
2 Bedroom or less			
Bedford	8	84	0.10
Hudson	9	37	0.24
Lebanon	4	57	0.07
Rochester	23	91	0.25
All Communities	**44**	**269**	**0.16**
3 Bedroom			
Bedford	154	273	0.56
Hudson	219	437	0.50
Lebanon	33	69	0.48
Rochester	171	353	0.48
All Communities	**577**	**1132**	**0.51**
4 or More Bedrooms			
Bedford	414	530	0.78
Hudson	90	127	0.71
Lebanon	9	13	0.69
Rochester	39	68	0.57
All Communities	**552**	**738**	**0.75**
All Single Family	**1173**	**2139**	**0.55**
Condominiums			
2 Bedroom or less			
Bedford	16	239	0.07
Hudson*	22	235	0.09
Lebanon total Condos	0	1	-
Rochester	1	18	0.06
All Communities	**39**	**493**	**0.08**
3 Bedroom			
Bedford	2	6	0.33
Hudson*	41	163	0.25
Lebanon	0	23	-
Rochester	0	0	-
All Communities	**43**	**192**	**0.22**
All Communities	**0**	**1**	**-**
All Condominiums	**82**	**686**	**0.12**
Mobile Homes			
2 Bedroom or less			
Bedford	0	0	**-**
Hudson	0	10	**-**
Lebanon	1	13	0.08
Rochester	64	211	0.30
All Communities	**65**	**234**	**0.28**
3 Bedroom			
Bedford	0	0	
Hudson	2	3	0.67
Lebanon	0	2	**-**
Rochester	131	368	0.36
All Communities	**133**	**373**	**0.36**
All Mobile Homes	**198**	**607**	**0.33**
Total: All Communities, All Types	**1453**	**3432**	**0.42**
* A significant portion of the Hudson condominiums are single family structures			