

THE BROOKINGS INSTITUTION

How Pittsburgh went from steel town to innovation city

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(MUSIC)

DEWS: Welcome to the Brookings Cafeteria, a podcast about ideas and the experts who have them. I'm Fred Dews.

Pittsburgh Pennsylvania is America's sixth the third largest city by population and the 26 largest metro area in the U.S. Famously situated at the conclusions of three rivers, it is known as the City of Bridges, and was one of the leading centers of U.S. manufacturing in the 20th century.

Today it is home to world class museums, schools, medical centers, sports teams, research centers, libraries, and according to the Pittsburgh Post-Gazette the most bars per person in America. And today, Pittsburgh is poised to be a leading global city in innovation and technology.

Joining me by phone today to talk about the city's strengths and opportunities is Scott Andes, a fellow with the Centennial Scholar Initiative here at Brookings. He is a co-author along with Mitch Horowitz, Ryan Helwig, and Bruce Katz of the new report titled "Capturing the next economy: Pittsburgh's rise as a global innovation city." The research comes out of the Anne T. and Robert M. Bass Initiative on Innovation and Placemaking, which is part of the Centennial Scholar Initiative here at Brookings.

Stay tuned in this episode for a new "ask an expert" segment, and after the interview, I have for you another "Metro Lens" segment featuring a discussion of broadband subscription rates in America's metro areas. Alright, on with the show. Scott thanks for calling in.

ANDES: Happy to join you.

DEWS: So we're going to talk about Pittsburgh. What is your personal connection to Pittsburgh?

ANDES: Well I went to graduate school in Carnegie Mellon University here in Pittsburgh and I just fell in love with the city. I have just a personal interest in manufacturing towns, I think there's just something a little different about places that have some sort of blue collar blood in their system, but this place really is special. The

interplay between a school like Carnegie-Mellon that's totally focused on the frontiers of science and technology and then a city like Pittsburgh that, while I was here, was sort of rebuilding itself in real time from its industrial heyday and subsequent demise to a world class eds-and-meds center. And I got to kind of watch that happen while I was here.

It may sound a little cheesy, but it's a city that you can kind of feel the optimism because so many people lived through the hard times, and they weren't that long ago in the 80s, and they were bad. And now to see sort of a city rebuild itself you kind of get a sense that people are excited and optimistic which is not the case amongst many rust belt cities.

DEWS: Yeah I want to follow up just for a moment on that boom and bust cycle on the bad times. I mean I think when a lot of us think about Pittsburgh especially in the post-World War II era, it was a manufacturing city, it was a steel city, it was steel town, it was booming, and then something happened. The economy for steel got hollowed out maybe in the 70s and 80s, and it seemed like for a long time Pittsburgh was on the ropes. But it sounds like from what you just said and also from this report that you all put together that it's really a much different place now.

ANDES: We talk a lot about the decline in manufacturing here in the United States, but it's hard to overplay just how much a dramatic economic impact the decline in U.S. manufacturing has had for the Rust Belt and industrial Midwest particularly in the late 70s through early 90s. And you're talking about places, and Pittsburgh was at the heart of this, that suffered a multi-decade great depression essentially.

In 1980 Pittsburgh had over 18 percent unemployment rate. 75 percent of the steel in this city just simply vanished overnight, 130,000 jobs were completely lost. Just an economic impact that I think it's hard for many of us to even imagine. And this is what the city looked like for the better part of a decade. But through good planning, through a little luck, through a philanthropic community that's second to none, the city has in fact remade much of itself very much in the last 10 years. And a thesis of this report, I think the data backs this up, is much of that is tied to the strengths of the universities here in Pittsburgh, the medical centers and the hospital systems, and

actually advanced manufacturing, so very high end manufacturing, that weathered the storm and we can talk about why that happened. But it's a very, very different place.

DEWS: Those assets the universities, the medical centers, and advanced manufacturing and others, I think are examples of when you write today "Pittsburgh is once again at the precipice of a new competitive reality," and obviously those assets feed into that. When you think about the competitiveness for a city what exactly are you talking about?

ANDES: Right, and so taking a step back, the reason why Pittsburgh became a city to begin with is because the rivers allowed good access to major markets both domestically and globally for steel. So that was its competitive advantage. We're all very familiar with sort of traditional ways of thinking about competitive advantage, the number of workers you have, transportation infrastructure. But for Pittsburgh as with many, many cities in the developed world, the new competitive advantage is the ability to translate technology and innovation and often scientific discovery into commercial products and services and export them globally. This is in fact the only way that a relatively high wage city and a high wage economy can thrive globally which is to innovate. So how is that happening? What are the specific assets in Pittsburgh that have allowed it to do that?

It really comes down to four key players and they're interlinked; universities, academic medical centers, the foundation community, and then advanced manufacturing. And so quickly marching through those. Universities you've got the University of Pittsburgh, which is a life science powerhouse. You've got Carnegie Mellon University and number one computer science program in the country. Together they have well over a billion dollars of federally funded research occurring here adjacent to the universities, which are you know I'm actually currently doing this interview at the University of Pittsburgh, and I can look out my window and see Carnegie Mellon there right next to each other. And then you also have UPMC here which is the hospital system the health system in Pittsburgh. It's the largest employer in the state of Pennsylvania, and it is a major driver of innovation.

On top of that you've got several major foundations that, unlike many foundations that invest you know in the arts, and culture, and amenities, these foundations have invested in translating academic and scientific work from the universities into young startups, into existing companies, into commercial products and services in a number of different ways. And over the last 30 plus years the city has developed a series of competitive competencies in these technology areas that put the city on the map globally.

DEWS: You talk about in the report the need for an innovation city, and you just mentioned a few minutes ago, to translate all of those technology advantages into new products into broad base economic opportunity and growth. But it seems to me that you suggest in the report that those outputs are a little bit lacking in Pittsburgh's case, is that the right reading?

ANDES: That's exactly right. The way I think about Pittsburgh from this innovation city perspective and global player is almost dramatically "glass is half full glass half empty." The glass half full part is that this city has the feedstock to become a global player, and to drive a broad based economic activity because of its research assets. That you can't make up, you can't fake it, you can't import it, you either have it or you don't. The city has it. It produces over 230 percent the university research and publications as the national average—and you've got some areas like robotics that are like four or five hundred times the national average—so the glass is half full is it has the inputs to drive the economy based on these features.

The glass is half empty side of this is what you just said. We aren't yet seen broad based economic growth or opportunity coming from those. A number of factors. One factor, I think, is while these have been in the making for you know more than a couple of decades, in relative terms Pittsburgh still somewhat new to the game. So if you look at for example federal funding of health care universities, universities are focus on health care, the University of Pittsburgh ranked number five. The other universities like Harvard, and MIT, and others, these have been institutions that have been in the top 10 for 200 years. UPENN has been on this list for less than a decade. So it's a process there and it doesn't happen overnight.

So another area is in advanced robotics. Pittsburgh is, as I'm sure you know and your listeners know, the sort-of playground for autonomous cars, autonomous vehicles. But that's just the early stages. So the short answer is that technology areas that Pittsburgh's are good at are just now coming online—so that's part one.

Part two is the other things that need to happen. Developing the workforce, making sure young companies are growing, a number of those things just aren't happening fast enough rate to take advantage of the technical capacity. So we have a number of recommendations to help force multiply that activity.

DEWS: Well I want to go into those recommendations here in a moment. Before that, I'll note a data point that caught my eye. You note that the city has 7 percent fewer jobs in high wage, high tech advanced industries now than it did in 2000—17 years ago. Why is that, and maybe use that as a launching pad into some of your recommendations for how to correct that issue.

ANDES: Absolutely. So this is going back to our opening conversation about the decline in manufacturing, in the Rust Belt, and just what this region has experienced in the last 30 years. You're seeing some of that in that statistic. So that statistic, the advanced industries, is something that I've worked on with a number of colleagues like Mark Murro at Brookings. And what that piece of that number is, is manufacturing. Despite the fact that you've got global robotics technology being developed, you have seen an exodus of major manufacturing companies throughout the Pittsburgher region as you have seen throughout the entire Rust Belt region.

To give you another example of this coming out of the recession, Pittsburgh the metropolitan area ranked Ninety fifth out of the top hundred for population growth. It's been losing population. But there are big macro forces that are under play in this entire region, and Pittsburgh hasn't been immune to that. So, the goal is –and we can get into the recommendations—the goal is to use the strengths of the universities and other innovations anchors to overcome what is really pulled down frankly a lot of the Rust Belt region.

DEWS: I think another interesting aspect of your report and Pittsburgh generally, and we should talk about it here, is the Oakland neighborhood. It's what you call an "innovation district" which, you know, is a whole other stream of research that Brookings scholars are doing. So, what you talk about what does an innovation district, and explain the importance to Pittsburgh of the Oakland neighborhood?

ANDES: So innovation districts are a concept my colleagues Bruce Katz and Julie Wagner came up with, identified several years ago, and basically what they are is neighborhoods in very large cities, usually mid-sized cities and large cities, and they're usually anchored by a major research university or academic hospital and they produce economic growth by the interplay between those research institutions and the firms that cluster near nearby. The firms, the entrepreneurs, they are sort of dense innovation playgrounds. They are like Kendall Square in Cambridge and near MIT and Harvard, the midtown Atlanta area near Georgia Tech. So hubs of intense both commercial and innovation activity. So that's kind of what they are.

The Oakland neighborhood, which is the neighborhood where the University of Pittsburgh, UPMC, and Carnegie Mellon are located in, may be one of the most naturally occurring innovation districts in the country if not world. Like I said, I'm sitting in my temporary office in the University of Pittsburgh and I could throw a rock and hit Carnegie Mellon University. It's 1.7 square miles but represents 29 percent of the jobs.

You can take a walk around that 1.7 square miles and cover one third of the entire state of Pennsylvania's research at universities. So it is it is a powerhouse of activity in a highly concentrated area. And I think with the way we look at it is the hub to the spokes of the different sort of employment hubs in the region. So taking some of the strength in the district and applying them to regional actors, be those manufacturers in the suburbs, or energy companies and the experts, or even technology companies across the river, this is how Pittsburgh will experience economic growth.

DEWS: I read in the report that the Oakland district is also surrounded by high poverty, low wage, neighborhoods. So how do city leaders of Pittsburgh take advantage of the powerhouse of the Oakland innovation district, but also try to figure out what to do

to raise living standards, raise wages, improve the job prospects of people who live right there in that same neighborhood?

ANDES: This is an ever-present issue for every innovation district that I've ever worked in because it's an ever present issue in every city. The struggle to address both a high wealth and high value areas that are right next door to some of the poorest citizens, and that's certainly the case here in Pittsburgh.

So one, the opportunities are significant. To give you an example, here in Pittsburgh there's over 100,000 jobs in health care, 55 percent of those don't require a bachelor's degree. You have a number of growing training programs and whatnot to sort of meet a lot of those needs and to address those issues. So there's opportunity there, the question is whether or not the local stakeholders will do what's necessary to capture that opportunity. And obviously here there is a fairly obvious two part process, right.

So one you need policies and programs to address poverty. So you need not only those training programs that can get people in the door, but to be completely frank, a lot of the individuals in these neighborhoods don't have the prerequisites even begin the training programs. So there's long term hard issues.

Sometimes, I think when we try to fix these inclusion issues we do it on the cheap and we say "oh you know build it they will come" type of thinking. These are hard long-term issues. And the second piece of the puzzle obviously is resources, and that's where the district really is going to play the most part. It's not going to be in the University of Pittsburgh creating a training program for poor people in an adjacent neighborhood, it's creating a company that grows and creates a tax base. You have to have that economic growth engine that's sustainable, that's producing tax revenue, in a way that can build these programs.

So, I think those are the two pieces. One, workforce development particularly in health care, and then, you know, it's sounds generic but you need that broad based economic growth to have the tax revenue to do any of these things for these neighborhoods.

DEWS: It's time now for "Ask an Expert" where I invite you, the listener, to send in a question and I find an expert to answer it. Here's my colleague Chris McKenna who will read our listener's question.

McKENNA: Thanks Fred. Just a reminder to listeners that if you record your question as an audio file, we'll play it on the air.

Here's a question sent by e-mail to BCP@ Brookings.edu. My name is Alan Schoen, and I'm a data scientist in the aerospace industry in northern Virginia. I studied computer science and neuroscience in college so I have no real education in the social sciences, but I'm interested in a lot of issues related to economics and social welfare, and I have a question about unemployment.

Over the last decade we have seen very low unemployment rates, yet polls show that most Americans don't believe that unemployment is at historic low. At the same time, the labor force participation rate has decreased. I've heard a range of narratives about this in the media, some suggesting that the American public is acting like a bunch of hypochondriacs "everything's great, so are you mad?" In my career as a data scientist I found that when your metrics show that everything is fine, but your customers are panicking, you should probably listen to the customer because it's probably your metrics that are wrong.

That leaves me with a question for an expert on labor economics. Is the Bureau of Labor Statistic's unemployment rate still a good measure of the health of the labor market? If not, are there any metrics to watch that might show why Americans are so upset about the economy?

NUNN: Thanks for your question, Alan. I'm Ryan Nunn and I'm the policy director for the Hamilton Project at the Brookings Institution. So I think this is a great question because it gets us thinking about the different ways that people interact with the labor market, and what sorts of questions we have to ask to fully understand their experiences.

It's true that relatively few people are out of work and actively searching for employment. That's the official definition of unemployment. The unemployment rate

stands at 4.4 percent in August 2017, which is right around its level in 2006 and 2007 before the Great Recession.

This is a useful question to ask. How many people out of work are actively searching, but it's not the only important question. We could ask a simple question, what percent of the population is employed? For 25 to 54 year olds, the answer to that is 78.4 percent, which is about a point and a half below its pre-recession level.

By that measure the labor market is looking somewhat worse. In fact, that employment rate has actually been falling since about 2000. Another measure that tells a similar story is the share of those who are involuntarily part time—people who are underemployed. There are now about half a percentage point more such workers, amounting to nearly one million people, than there were before the recession.

I think it's also important to emphasize that the strength of the economic recovery has been relatively weak for certain groups. If you're a member of one of these groups, or know people who are, you may not evaluate the labor market in quite the same way. For example, those with less education have fared especially poorly. In some previous work with Diane Schanzenbach, Lauren Bauer, and Audrey Breitwieser, we looked at the recovery in employment rates that occurred after the Great Recession. After we took account of population growth and aging, we saw that those with at least a four year college degree had recovered the pre-recession level, but those with less than a four year degree are still about 2 percentage points below their pre-recession employment rate.

But perhaps the most important factor in explaining widespread dissatisfaction is the long run wage stagnation for low and middle-income workers. Adjusted for inflation, the typical worker earns only slightly more than they did in the early 1970s. When people compare their economic situation with that of their parents at the same age, I suspect that many are not very happy. Even during this long recovery from the Great Recession, wage growth has been relatively low. When you adjust for inflation it actually looks considerably better because inflation has been so low lately, but that may not make workers feel much better. So to sum up, I think that the BLS official unemployment rate is a great statistic for understanding the health of the labor market

but it's certainly not the only one. And as we look at a number of those statistics we get a somewhat more nuanced picture of the labor market and its health right now. So all that said, I think we can hope that unemployment stays low for quite a while yet allowing workers to gain more ground before the next recession strikes.

DEWS: You can learn more about Ryan Nunn and the Hamilton Project at HamiltonProject.org. He and Jay Shambaugh, director of the Hamilton Project, were my guests on a recent episode of The Brookings Cafeteria talking about why more Americans aren't working even 10 years after the Great Recession hit.

Alan thanks for your question, and look for a Brookings coffee mug in the mail as a token of my thanks. And now back to my discussion with Scott Andie's about Pittsburgh. Stick around afterward to learn more about the digital divide in broadband subscription.

Let's continue into recommendations, as listeners to this podcast know I talked to Brookings scholars about their research and its analysis of the problem, but quite often if not most of the time it's also recommendations for what to do about the problem.

So let's move into that part. It's all detailed in this report, but just at a high level, talk about what are some of the key recommendations that you and your co-authors are making about Pittsburgh.

ANDES: We have four buckets of recommendations. The first is what we call innovation clusters. So we look at life sciences, and healthcare, advanced manufacturing, and what we call economist systems. So that's all the stuff that goes into self-driving cars in each one of those.

So one, those are industry clusters, and technology clusters that Pittsburgh's already good at. So start with what you're good at and then we walk through a number of recommendations for each one of those three on how to build those clusters. So essentially, you've got in health care, we need to move more of the technology and research out of the university and into companies. So that's what we consider translational science and there's a number of ways to do that.

In advanced manufacturing, you've got a substantial amount of activity going on at the high end of the advanced manufacturing spectrum. People making advanced robotics and whatnot but connecting those to regional supply chains, often these are small and medium size companies in the suburbs and in the larger metropolitan area, that's been missing. So, we've got to connect the supply chain to the technology to allow them to grow.

And then the third cluster around these autonomous systems. This is a platform. The technology that goes into what makes Ubers drive themselves, self-driving cars that will be applied in almost every industry we can think about. It'll happen in health care. There'll be autonomous activity in manufacturing in wholesale and retail. Every sector will be touched by autonomy the same way every sector has been touched by digitization and the Internet. And so Pittsburgh needs to think about how it can make those connections into all those different industries. For example, finance is pretty big here. You've got PNC headquartered in Pittsburgh. What's the strategy to connect the financial industry with this Autonomy's system?

So that's bucket one, clusters. Bucket two is building out this Oakland Innovation District, and there are many strategies to do that. One, for example, is to build out a better tech attraction strategy. The city is not very good at figuring out how to attract technology companies that may be interested in any way. So what does that look like? The third bucket is around high growth entrepreneurs. As I said earlier, Pittsburgh's pretty good at starting young companies. They're just, we aren't seeing those young company scale and grow. How do we connect them with mentors, how do we connect them with access to capital, what do we need to do to make sure that companies that are growing both day in Pittsburgh and those young companies are in fact growing as quickly as they can? And then the final bucket is around inclusion and workforce development. And here we really think connecting the large anchors, the universities and the hospitals, to low income individuals through training programs and other opportunities will be key to expanding the economic opportunity to the community.

DEWS: So we have these four very large recommendations. What's the next step? You and your co-authors have written this report, you've done this research to

produce this wonderful report, what kinds of activities do you take next to try to help these policy ideas come into being?

ANDES: That's a great question, and oftentimes frankly what we do is we produce these papers, and we help stakeholders understand them, and then it's their job to really implement them. However, in the Pittsburgh project we're doing something a little different whereas I am actually in Pittsburgh, I'm now currently like I said in the University of Pittsburgh, for three months where I'm helping the team on the ground implement these strategies.

So today I have a series of meetings where we're going to try to figure out how do young companies and companies around the world who are looking at Pittsburgh because of their technologies access Pittsburgh. So did they call an engineer, one of the universities, or do they call the mayor's office? How do we develop a strategy to attract companies? So that's just one example of several. Brookings is very active in actually helping the players on the ground implement these strategies.

A second area that we do, that I think is a little different than traditional work done at Brookings and other think tanks, is we help build the coalition of institutions needed to pursue this work. So here in Pittsburgh, we have spent most of our 18 months advising the leadership at the two major universities, the mayor, the county executive, some of the largest foundations and corporate community, to build a group of stakeholders, they call it BGH, to both fund and direct the some of these recommendations. And somebody has got to pay for it, and somebody's got to do it. And these are the stakeholders who are going to do it, so we've also help them build that leadership group as well.

DEWS: Well maybe I'll also tell them all to listen to this podcast episode and maybe that'll help.

ANDES: Absolutely.

DEWS: You and Bruce Katz have written that Pittsburgh is among the 30 or so global cities that are positioned as leaders in next generation technologies. So, what are those other cities, the U.S. and global cities, that are Pittsburgh's peers?

ANDES: It really needs to come down to what you're talking about. One is you've got places that look similar from a technology industry perspective. So these are places, let's take autonomy system self-driving cars, you've got the obvious examples of like Detroit, Ann Arbor, and Dearborn, we will just group those together because of the massive amounts of R&D the big three are doing in Michigan. So that's a no brainer.

But then you've also got places like Stuttgart, Germany that are headquarters to major automobile companies and that are making some of the largest investments in autonomous systems in the world. So that's sort of it bucket one. You've got your peers based on the intersection between the technology Pittsburgh's good at and the industry those correspond with.

Then you've got another peer cities that look like Pittsburgh in terms of their entrepreneurial ecosystem and these are the cities that I think are kind of here twos. So you've got like Raleigh, Durham type areas. Aspirational cities would be like Austin, maybe Tel-Aviv—though that would be very aspirational. But these are cities that have sort of that entrepreneurial ecosystem but they're not at the San Francisco, Boston level yet.

And then finally you've got what I'm most interested in is cities that are using their academic anchors, be those medical schools and hospitals or universities, to grow their economies. And these are cities like Melbourne, Atlanta, Quebec, I'd even put Seattle in this but they may be a little bit further along. Again, I think there's a grouping of these things depending on where you're looking at, but those would be the ones kind of off the top of my head that I would consider to be "peers."

I do want to say one thing though. It's a great question to wonder about peers, but the world is changing so quickly particularly in the autonomous space and other technology areas that Pittsburgh is good at, that It really is less about where they are ranked and who has the table stakes currently to launch ahead. So the list I just gave you will look radically different in three years. So really it depends on who decides to make the right investments, and when. That's going to dictate who leads. And is Pittsburgh a top 30 global city as we say, it could be, or are they you know doing pretty good compared to the rust belt? That that is an open question.

DEWS: I think that's a really interesting point, and you've made it throughout this conversation and in your writing, is that it's about good planning, it's about long term planning, and these kinds of things that the regional and the city leaders, other stakeholders like think tanks and universities, are actually planning this out. It just doesn't happen by itself, right?

ANDES: That's right. These are strategic visions. There's a lot that cities and just like businesses can't change about their trajectory. These are the sort of you know like I said you either have it or you don't. In the places like Pittsburgh that have it but aren't there yet, the difference will 100 percent be what they decide to do over the next five to 10 years. To be completely blunt, I'm optimistic on Pittsburgh but this city could go either way.

DEWS: Let me take the focus back from the global and national, back into the local and ask you about a concept called new localism. You and Bruce Katz in a recent piece on citylab.com write that Pittsburgh is an example of new localism. And I know that Bruce along with co-author Jeremy Nowak is going to come out with a book next year through Brookings Press called the new localism. Can you talk about what new localism is and why that concept is particularly relevant today?

ANDES: Yeah, and I should say you should definitely have Bruce and Jeremy on to do a podcast on it when the book comes on it.

DEWS: Absolutely.

ANDES: Your listeners would really enjoy it. But in brief, new localism is essentially the concept that power, and I define that as political and financial and civic, is devolved from the traditional players in the federal government to activity at the local level.

So what does that mean? That means you have a city like Pittsburgh where 20 years ago a vast amount of the resources that came into the city came perhaps through the federal government. We certainly see that with the university funding. But that is changing due to a number of constraints at that the federal level and opportunities at the

local level. The mix of resources and who will dictate how those resources are being used is becoming more locally driven.

In Pittsburgh the foundations here are doing that, the universities are doing that, and the corporate communities, the corporate actors that aren't vested in Pittsburgh are doing that. It's not just driven by what the state is doing or the federal government is doing. Right now in Harrisburg, the state legislature is considering cutting almost all of the university funding to major public universities which would just be detrimental.

This is the world we live in where Pittsburgh's greatest economic strength, its two universities, have to drive to Harrisburg and convince legislators not to get \$150 million dollars out of their budget. It's just, it's insanity. So the question becomes who will step up. And the concept that new localism is that that will necessarily have to be more of a local play.

DEWS: Bruce and Jeremy, if you all are listening to this episode, and I hope you are, you are you are hereby invited to appear on a future episode of the Brookings Cafeteria to talk about your book. Scott let's wrap it up this way, in your report you talk about Pittsburgh 2030, two different visions of Pittsburgh in that time. What are those visions?

ANDES: There are two ways one can envision Pittsburgh's future. So in one scenario the high end elements of Pittsburgh, its universities, its health systems, continue to be global. So 100 of the best computer scientists in the world graduate from Carnegie Mellon every year. There will still be some young companies scattered associated with those, but by and large those companies will go to the coasts when they get big enough that they need venture capital and for the majority of Pittsburgh, the city will look like many of its rustbelt peers. The population will continue to decline, incomes will not rise and may even decline itself, and quality of life will be radically different depending on the neighborhood you're in. It will be a more dramatic version of the present.

That's sort of I think scenario number one scenario number two is that the connective tissue between what the universities and innovation anchors are in the city

and the broader economy is extremely strong. You have workforce training programs so kids in poor neighborhoods are actually becoming med techs in the hospital and earn \$80000 a year. You have young companies that have access to capital so they can grow and stay in Pittsburgh, and employ not dozens of workers but thousands of workers.

You have corporate partners from around the world beginning to flow into Pittsburgh, setting up shop because they understand they can easily work with the university and they have the workforce there. And Pittsburgh is the type of city where their employees want to live—there's fun things to do, it's a vibrant place.

In this scenario, you still can't get a lifelong manufacturing job with a high school education like you could 30 years ago, that still won't be the case, but everybody has opportunities to play a role in the innovation economy. The innovation economy and Pittsburgh's economy are one and the same. But I really do think that, those are sort of somewhat dramatic, but those are the two sort of visions that could play out here.

DEWS: Well Scott, I want to thank you for sharing your time and expertise today.

ANDES: Happy to be here.

DEWS: You can find the report "Capturing the next economy: Pittsburgh's rise as a global innovation city," on our website Brookings.edu.

In a new report from the Metropolitan Policy Program at Brookings, Adie Tomer, Elizabeth Kneebone, and Ranjitha Shivaram find that although 93 percent of Americans live in neighborhoods where high speed broadband wireline service is available, a large number of Americans, including millions of children, live in neighborhoods where in-home broadband subscription rates fall below 40 percent. Here are two of the researchers tell you more about the issue.

TOMER: Just over two decades into the digital revolution, and the Internet is an unquestioned foundation of the modern American economy. Similar to the introduction of electricity in 20th century, an innovation that changed how people live their rooms,

cooked their food, and entertain themselves, the internet is redefining how a 21st century household operates.

Hi I'm Adie Tomer.

Shivaram: And I'm Ranjitha Shivaram.

Tomer: And we work at the Brookings Institution's Metropolitan Policy Program, and focus on infrastructure.

A high speed internet connection known as broadband is the newest essential infrastructure. Wireline broadband, where services delivered through a physical cable connected to every home and business, is the productivity workhorse of our broadband network. It provides the high speed bandwidth and redundancy to unlock the Internet's economic benefits. Including new ways to educate, employ, bring services to, and even entertain every person. Yet in order to maximize its economic potential, broadband must be both available and adopted.

In the first case, that means a physical connection to every home, but that also means every household must subscribe to broadband service much like we expect from an electric or water utility. Unfortunately, America's digital divide is extensive. Over 22 million Americans live in neighborhoods where high speed Internet service is simply not available—including an outsized share of rural residents. Yet for neighborhoods where broadband is available, over 73 million people live in areas of low adoption. And many economically at risk groups, such as the school age population, low income households, and less educated residents are the most impacted. There is not one metropolitan area spared from some form of broadband constraint whether via lack of available service or pockets of low subscribership.

Shivaram: Let's now travel to Louisville, Kentucky for a microcosm of the country's broadband challenges in metropolitan America. The home of the derby and baseball bats does it did a good job getting broadband service to its neighborhoods leaving just under 4 percent of people without service—all of which is in the outer excerpts. But the bigger challenge is broadband adoption. Over two hundred and thirty

thousand people live in neighborhoods of low subscription while only 102 thousand live and high subscription neighborhoods.

Especially troubling the city's high poverty neighborhoods of which the majority show low subscription rates. These subscription gaps drag Louisville down to sixty fifth out of 100 metro areas in our combined ranking system. It joins many Southern peers like Memphis and Charleston and the lower third of the country. These gaps are one key reason why Louisville continues to pursue improvements to its broadband infrastructure and services provided along those cables.

In fact, Louisville was just home to a major national case on broadband deployment. Originally slated to be one of the first cities in the United States to receive Google Fiber broadband Internet, the city of Louisville was embroiled in a legal battle with AT&T over the use and regulation of utility poles. While the Federal Court recently upheld Louisville's law to allow providers to rearrange other provider's cable attachments, the case could still be appealed. Yet as it stands, the decision should improve local broadband service and ideally boost subscribership through a mix of pricing and competition.

The Louisville example illustrates the need to address broadband availability and subscription gaps through a balanced policy framework and true collaboration between the private, public, and civic sectors. The federal government, for the aim of balancing availability and adoption goals, should enact policy should reduce deployment costs, leverage public data more effectively, and sustain adoption focus programming. Local stakeholders meanwhile should seek to align data and programs to reflect local needs.

Two plus decades into the digital revolution, the country's digital divide is both persistent and pervasive. Market demand for broadband connectivity will only continue to grow as more and more economic, social, and government activity moves to the digital connected world. As that growth occurs, it is that paramount that policy makers work to ensure that no one gets left behind by the deployment of this generation's essential infrastructure.

DEWS: Their report and a neighborhood-level interactive map to track broadband subscription rates in your neighborhood is on our website. Also check out the interview that my colleague Adriana Pita did with Adie and Elizabeth on a recent episode of the Intersections podcast.

And that does it for this edition of The Brookings Cafeteria brought to you by The Brookings Podcast Network. Follow us on Twitter @policypodcasts. My thanks to audio engineer and producer Gaston Reboredo with assistance from Mark Hoelscher.

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