The New York State Post-Production Industry
New York State has a thriving post-production ecosystem.

From the launch of Kaufman Astoria and Edison Studios in the early twentieth century, post-production has been a critical component of the New York economy. Unfortunately, as the production and post-production industries shifted to California starting in the early 1930s, only a thin pipeline of projects remained, making it challenging for post-production firms and talent to do business in New York.

With the introduction of NYS’s Film Tax Program in 2004, as well as the Post-Production Film Tax Credit in 2010, westward movement started to subside. New York’s post-production ecosystem is now a national leader, with 20% of all U.S. post-production firms residing in New York. Today, post-production supports a large quantity and diversity of firms and offers economic opportunities to a broad range of workers. However, incentives provided by other jurisdictions continue to challenge New York’s competitive position and the post-production ecosystem’s ability to continue to thrive in New York.

The post-production, production, sound and independent artist industries have a mutually beneficial relationship, acting to strengthen and grow each other. As a result, post-production activity does not occur solely at post-production firms. A comprehensive assessment of the post-production ecosystem must deploy a definition that includes all jobs at post-production firms, plus select post-production occupations traditionally classified as production, sound, or independent artists. Using this definition, it is clear that the post-production ecosystem significantly benefits the broader New York economy.

- The post-production ecosystem employed 11,260 people in New York State in 2015.
- From 2004 to 2015, employment in the post-production ecosystem grew by 35%, a rate faster than both total New York State and total United States employment.
- Approximately 40% of the ecosystem’s members are classified as freelancers.
- Including economic multiplier effects, the New York State post-production ecosystem supported 23,310 jobs and generated $1.87 billion in income and $7.06 billion in economic output.
- Approximately 23% of the jobs and economic impacts would not have occurred but for the two tax credit programs.
- In 2015, the post-production ecosystem generated $128 million in state tax revenues, including individual income, corporate income, sales, selective sales, and other taxes.
- On average, core post-production workers have earnings of $95,800, ~21% more than average New York State earnings and 5% higher than average New York City earnings.
- Over 40% of jobs in the New York State traditionally defined post-production industry do not require a bachelor’s degree, and over 90% of those offer on the job training.
With technological advancements, the four core post-production service categories are continuously evolving.

**Picture**
Processing images, including editing and color correction.

**Sound**
Recording and integrating sound elements in order to create a soundtrack that matches a production’s audio and images.

**Visual Effects**
Creating computer-generated imagery (CGI) and animation and adding captioning and titling.

**Music**
Arranging, recording, licensing, editing, and integrating music into a soundtrack.
A comprehensive assessment of the size and economic and fiscal impacts of the post-production ecosystem requires an industry-occupation approach.

Production and post-production activities have always been related, with post-production focused on organizing, refining, and adding to content captured during production. In recent years, the interconnections between the production and post-production industries have only intensified, due to both technological advancements and the desire for the convenience, cost savings, and enhanced creative control associated with doing production and post-production in close proximity:

- Technological improvements have caused previously production-oriented activities (e.g., the creation of visual effects) to become part of the post-production process.
- Since visual effects have become cheaper and easier to create, they now are included in a broader range of productions.
- For shorter production timelines and enhanced creative control, post-production activities that used to occur after principal photography have moved up to during production. In many cases, post-production is completed on content before final imagery has been selected, and post-production professionals are consulted before and during production to shape story development.

The growing interconnections between production and post-production, as well as their links to the related industries of sound recording and independent artists, have allowed for common functional roles, such as film and sound editors, to occur across industries. In order to evaluate the complete economic value of common functional roles across industries, policymakers have developed a new term, an “ecosystem,” a network of organizations that enable the provision of goods or services. The diversity of post-production activities and its close links to production, sound recording, and independent artists call for post-production to be evaluated as an ecosystem that considers both industry and occupations.

An analysis of only the post-production industry would fail to capture the cross-cutting economic contributions of Film & Video Editors, Multimedia Artists & Animators, Music Directors & Composers, Photographic Process Workers, and Software Developers who support the success and growth of the multiple industries that contribute to the post-production ecosystem. Likewise, an analysis of only post-production activities would exclude the many people working as project managers, administrative staff, and business development professionals in the ecosystem, so only a combined industry-occupation based approach can assess the complete post-production ecosystem.
The post-production ecosystem includes all jobs in the traditionally defined post-production industry and all post-production occupations in other industries.

The combined industry-occupation based approach enables consideration of all people, regardless of occupation, working in the traditionally defined post-production industry and people conducting core and secondary post-production occupations at firms classified as production, sound, and independent artists industries. The core post-production occupations include Film & Video Editors and Multimedia Artists & Animators. The secondary occupations include Music Directors & Composers, Photographic Process Workers, and Software Developers. The post-production ecosystem includes four categories of employment that all directly enable or support post-production activity:

1. All post-production occupations at post-production firms;
2. Non-post-production occupations at post-production firms;
3. All post-production occupations at firms classified as Motion Picture & Video Production, Motion Picture & Video Distribution, and Other Motion Picture & Video Industries;
4. Core post-production occupations at firms classified as Sound Recording Studios, Other Sound Recording Industries, and Independent Artists, Writers, & Performers.

Images not to scale.
Only one-third of all people working in the post-production ecosystem are employed at firms traditionally defined as post-production industry.

In 2015, there were 11,260 total jobs in the post-production ecosystem in New York State. Approximately 35%, or 3,830 jobs, were classified under the traditionally defined post-production industry; 60%, or 6,640 jobs, were post-production occupations classified under the traditionally defined production industry; and 10%, or 990 jobs, were core post-production occupations at firms classified under other relevant industries.

Of the 3,830 people working in the traditionally defined post-production industry, approximately 12% perform core and secondary post-production occupations. One-third, or 1,260, are freelancers. Film & Video Editors, with 380 jobs, represent the largest concentration of post-production occupations, while the 800 non-music Producers & Directors constitute the greatest share of people performing non-post-production occupations.

In the traditionally defined production industry, 6,640 people perform core and secondary post-production occupations, with over 90% being either Film & Video Editors or Multimedia Artists & Animators and 35%, or 2,320, freelancers.

In the other relevant industries, 990 people perform core post-production occupations, with over 90% working as freelancers and 920 as Multimedia Artists & Animators.

Across the ecosystem, 4,470 people, or 40% of the post-production ecosystem, are classified as freelancers, with one-third classified in the traditionally defined post-production industry, close to half in the production industry, and close to 20% in other relevant industries.

**NYS Post-Production Ecosystem, 2015**

<table>
<thead>
<tr>
<th>Post-Production</th>
<th>Production</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,830 jobs</td>
<td>6,440 jobs</td>
<td>990 jobs</td>
</tr>
</tbody>
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EMSI data; HR&A analysis.
Core and secondary post-production occupations are growing rapidly at traditionally defined production industry firms.

While the entire post-production ecosystem in New York State has experienced significant growth of 35% since 2004, post-production occupations in the traditionally defined production industry have experienced exceptionally high growth, illustrating the increasing interconnectedness between the production and post-production industries. From 2004 to 2015, people performing post-production occupations at traditionally defined production firms grew by 51%, representing an increase of 2,180 jobs. This growth was primarily driven by an increase in Film & Video Editors, which grew by 1,840 jobs during this period.

During the same period, the traditionally defined post-production industries grew by almost 27%, or 820 jobs. This growth was primarily driven by an increase of 730 jobs in non-post-production occupations, illustrating that the stability of a growing post-production ecosystem has allowed for industry investment in support employment, multiplying the ecosystem’s impact.

Conversely during the same period, post-production jobs in other relevant industries declined by 8%, reflecting compression of the sound recording industry and the movement of freelancers to post-production and production firms.

EMSI data; HR&A analysis. Interviews with industry representatives regarding sound recording.
Since 2004, the post-production ecosystem in New York State has grown by 35%, adding more than 2,900 jobs.

During the early 2000s, post-production in New York State was in decline, likely reflecting lingering effects of the 2001 recession and the expansion of reality television, which requires less post-production-related activity. Beginning in 2003, there was an uptick in ecosystem employment, potentially reflecting discussion of the forthcoming Film Production Credit (FPC). From 2004 to 2008, the post-production ecosystem grew steadily. While employment declined in 2008, reflecting national economic woes and uncertainty about the FPC’s renewal, the post-production ecosystem began to see recovery in 2009. Since 2010, when the Post-Production Credit (PPC) was established and the FPC was renewed, employment has shown a consistent upward trajectory of 3% annualized growth, higher than the national rate of 2% during the same period.

Post-Production Employment, 2001-2015

EMSI data; HR&A analysis.
The number of New York State post-production firms has also grown, and today they comprise 20% of post-production firms nationally.

Prior to the establishment of the Film Production Credit (FPC), NYS had a modest cluster of post-production firms. Since 2004, as evidenced by the rise in the number of firms, not only have existing post-production firms expanded, but new firms have launched or entered the state from other markets. Demonstrating this growth, the Post New York Alliance, which represents a subset of the post-production ecosystem, has expanded from 14 companies in 2009 to 50 companies in 2015.

In 2015, 20% of all post-production firms in the United States were located in NYS, representing a 3% increase in the state’s share since 2001. Further demonstrating growth, the average firm size in NYS in 2015 was 26 people, suggesting that firms have been able to grow beyond small shops due to the post-production ecosystem’s strength and stability. While firms have expanded across all post-production services (picture, visual effects, music, and sound), they remain concentrated in NYC, with 74% calling the five boroughs home.

Post-Production Firms, 2004-2015

250 firms

FPC established


325 firms

FPC raised to 30%

Great Recession

370 firms

FPC renewed & PPC established

PPC raised to 30-35%

430 firms

5% labor credit added & PPC share of funding increased

The two credits contributed to an increase in New York State’s share of the national post-production ecosystem and a significant increase in jobs.

**Film Production Credit (FPC)**
- **Credit:** Refundable tax credit for 30% of qualified spending, with 10% bonus for qualified labor costs in specific upstate counties.
- **Annual Allocations:** $420M, guaranteed through 2019.
- **Target:** Productions primarily shot in-state, which receive credits for both their production and post-production spending under the FPC.
- **To qualify for the credit, productions must meet all of the following:**
  - Productions must spend at least 75% of total production costs (excluding post-production) at any facility at a Qualified Production Facility (QPF) in NYS.
  - Level 2 productions (budgets over $15M or produced by a publicly traded company) must shoot at least 10% of total principal photography days at a QPF. Pilots must shoot at least one day of principal photography at a QPF.
  - Level 1 productions (maximum budgets of $15M or produced by an independently-owned company) must shoot at least one day of principal photography at a QPF.
  - To get credit for qualified spending outside the QPF, productions must spend either at least $3M at the QPF or do at least 75% of total principal photography days on location in NYS.

**Post-Production Credit (PPC)**
- **Credit:** Refundable tax credit for 30% of qualified spending inside the Metropolitan Commuter Transportation District (essentially, New York City and its metro area) and 35% outside, with 10% bonus for qualified labor costs in specific upstate counties.
- **Annual Allocations:** $25M set-aside within FPC, guaranteed through 2019.
- **Target:** Productions that are primarily shot out-of-state, but bring some or all of their post-production spending in-state.
- **To qualify for the credit, must meet one of the following:**
  - For VFX/animation projects: Productions must spend at least 20% of total VFX/animation costs incurred anywhere within NYS OR spend $3M on VFX/animation costs in NYS, whichever is less.
  - For post-production: Productions must spend at least 75% of total post-production costs (excluding VFX/animation) incurred anywhere in NYS.
The credits’ requirements and multi-year funding have fueled the growth in post-production ecosystem employment and infrastructure investment.

The 2010 establishment of the stand-alone Post-Production Credit supported New York State’s post-production ecosystem by enabling out-of-state projects to bring their post-production work to the state. In addition, the 2012 establishment of the 20% or $3M qualifying threshold for visual effects spending has enabled large projects to bring part of their visual effects work to the state, even if the remainder of production and post-production occurred outside New York State.

- **2004**
  - Film Production Credit (FPC) established, offering a 10% credit on qualified in-state production and post-production spending

- **2008**
  - FPC increased from 10% to 30%

- **2010**
  - FPC renewed and funded to 2014.
  - Post-Production Credit (PPC) established at 10%.

- **2012**
  - PPC increased from 10% to 30% credit, with a 5% additional credit for qualified spending outside the Metropolitan Commuter Transportation District.

- **2015**
  - For both FPC and PPC, additional 10% credit for qualified labor expenses in specific upstate counties ($5M annual cap). Credit program extended to 2019. PPC funding increased from $7M to $25M.
Since 2010, post-production spending tied to both the Film Production and Post-Production Credits has increased over 300%.

From 2010 to 2015, total in-state post-production spending (qualified and non-qualified) tied to the Film Production Credit (FPC) and the Post-Production Credit (PPC) has grown from $64.7 million to $259.8 million, a fourfold increase. The post-production spending tied to the FPC increased from $56.6 million to $122.9 million. Using spending data from 556 projects that received both initial and final certification between 2010 and 2016, Empire State Development estimates that on average post-production spending represents approximately 4% of total spending associated with the FPC. Post-production spending tied to the PPC rose from $8.1 million to $136.9 million, a roughly 17-fold increase. This exceptional increase indicates that a growing number of out-of-state productions are coming to New York State to do part or all of their post-production work.

Source: Initially certified spending data from Empire State Development.
The Post-Production Credit has seen a sizeable spike in applications, as firms have brought out-of-state projects for in-state post-production work.

New York State received its 300th application for the Post-Production Credit in 2016. There were 91 applications initially certified (granted conditional approval) in 2015. Today, there are a number of large production firms performing post-production work in New York State, including Netflix, Home Box Office (HBO), Fox, and Showtime.

The growth in applications is likely the result of:

• Enhanced local capacity to undertake large projects, due to expansion in talent, firms offering post-production services, and post-production facilities.
• 2012 credit increase from 10% to 30-35% of qualified spending.
• Positive word of mouth, as firms have successfully completed post-production projects in New York State.

18.2x
increase in Post-Production Credit initially certified applications, 2010-2015

31%
PPC component of total initially certified projects, 2015

2.3x
increase in Film Production Credit initially certified applications, 2010-2015

69%
FPC component of total initially certified projects, 2015

Source: Initial certification data from Empire State Development.
In recent years, the rise of scripted television has bolstered the expansion of the post-production ecosystem in New York State.

While New York State has a long history of television production, including iconic late-night shows with studio audiences, in recent years, the state has benefitted from a national increase in scripted television programming. This expansion has been fostered by the rise of new content providers, such as Netflix and Amazon. Compared to reality television programming, scripted television projects tend to require more post-production services, supporting higher employment and the build-out of post-production infrastructure. In particular, television induces infrastructure development because it tends to be a good source of reliable ongoing work. For example, in 2014, New York City launched its largest-ever television production, a $200 million, 60-episode TV series for Netflix based on Marvel Defender characters for which visual effects are being done in New York. In addition, HBO both films and completes all post-production for a significant number of their series and films in NYS, including Divorce, Boardwalk Empire, Sex and the City, and The Night Of.

**3.75x**

more pilot and series television projects submitting initial applications for the FPC, 2015 vs. 2010

**60**

pilot and series television projects submitting initial applications for the FPC, 2015

Source: Empire State Development Quarterly Report data.

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Projects filmed and posted in New York
NYS’s credits have facilitated the expansion of Phosphene, a niche visual effects firm in New York City.

**Overview**

Phosphene is an independent design and visual effects firm founded by Vivian Connolly and John Bair in 2010. Ms. Connolly and Mr. Bair, both long-time New York City residents who met working in the local post-production ecosystem, opened their firm to continue working on quality productions with quality directors in their hometown.

With the Post Production Credit’s expansion in 2012, Phosphene experienced a surge in business. Today, the firm has a robust project pipeline, with significant repeat business. The firm’s management believe that credit-eligible productions are all or the majority of the firm’s business.

**Staff and Workforce Development**

The volume and predictability of post-production projects supported by both tax credits has allowed Phosphene to grow and invest in its team. Since the PPC’s expansion, Phosphene has been able to move towards more consistent, full-time staffing and offer health, retirement, and profit-sharing benefits. The firm places a strong emphasis on training talent and promoting from within. Phosphene participated in the 2016 Empire State Development Post Production Fellowship Program, hired one of its fellows full-time, and is planning to continue its participating in the program. Ms. Connolly and Mr. Bair frequently speak to students about required industry skills and offer a one-day visual effects class for Columbia graduate students.

**Infrastructure**

In response to the growth generated by the FPC and PPC, Phosphene has made significant investments in specialized infrastructure. The firm rented its first independent space, a SoHo studio, in 2011. Five years later, they expanded their footprint three-fold in Manhattan’s Financial District, attracted by lower rents and the opportunity to be part of the neighborhood’s diverse cluster of technology and finance tenants. At its new headquarters, Phosphene was able to increase its infrastructure including computer hardware and software, and will continue to make upgrades as industry technology evolves.

**Founded:** 2010  
**Current Pipeline:** 13 projects in 2015, with 3-7 active at any given time  
**Credit-Eligible Share:** All or the majority of their work  
**2015 Staff:** 21 full-time and 30 freelance employees  
**Infrastructure:** New headquarters (3x larger), plus hardware and software
Case Study: Sixteen19

NYS’s credits have facilitated the statewide expansion of homegrown firms such as Sixteen19.

Overview
Sixteen19 is a full service post production facility founded by Jonathan Hoffman and Pete Conlin in 2009, providing picture finishing, visual effects, and editorial services for feature film, episodic, and commercial clients. Today, Sixteen19 has offices in New York, London, and Los Angeles, but cites New York as its fastest-growing and highest revenue-generating location.

The firm’s management identified the increase in demand for picture finishing services and visual effects supported by the Film Production and Post Production Credits as a critical driver of its growth, enabling the firm to expand in NYC and Buffalo. In addition, the stability created by enhanced demand from feature films and new demand from episodic television for post-production work has allowed for staff and infrastructure investments that also support its healthy commercial campaign practice.

Staff and Workforce Development
The enhanced demand and volume for work supported by both credits has enabled Sixteen 19 to invest in a larger stable of full-time staff. The firm’s management has seen the number of trained professionals, especially for visual effects, grow markedly since the credits were established. Today, Sixteen19 sources most of its staff from the NYC talent pool, primarily through its internship and fellowship programs with local schools, including the School of Visual Arts, New York University, and Columbia. The firm also operates the Empire Visual Effects facility in Buffalo in conjunction with Daemon College.

Infrastructure
In 2015, Sixteen19 expanded its Chelsea facility, investing $1.5 million in equipment and build-out.

In 2013, the firm also invested $1 million in building the 5,000 square foot Empire Visual Effects facility in Buffalo, in conjunction with a grant from the Empire State Development fund. Sixteen19 cites the additional credit for upstate post-production work as the determining factor for this investment.

Programs

**Founded:** 2009

**Current Pipeline:** 20 feature films, 6 episodic shows, and 8 recently completed commercial campaigns

**Credit-Eligible Share:** Over 80% of all projects

**2015 Staff:** 25 full-time, and 15 – 25 freelance at any given time

**Infrastructure:** 20,000 SF NYC facility, 5,000SF visual effects facility in Buffalo
Phosphene and Sixteen19’s growth can be directly tied to the credits.

- **2004**: FPC established
- **2008**: FPC raised to 30%
- **2010**: FPC renewed & PPC established
- **2012**: PPC raised to 30-35%
- **2015**: 5% labor credit added & PPC share of funding increased

**Sixteen19**
- Founded with 8 employees
- Invests $1.5 million in equipment and buildouts for its NYC facility; 80% project work is credit-eligible; 25 full-time employees

**Phosphene**
- Founded with 4 employees
- Rents independent space; hires additional staff
- Expands to new, larger space 3x the size; reaches 21 full-time staff; 30 freelance employees
Case Study: Technicolor-PostWorks

NYS’s credits have also facilitated the growth of other homegrown firms, such as Technicolor/PostWorks.

Overview
When PostWorks was founded in New York in 1995, it focused on editing room and system rental. Since then, the firm has expanded its offerings to include picture editorial, color correction, and sound, partially through purchasing other firms. In 2011, PostWorks merged with Technicolor New York. Today, the combined firm is the largest post-production company in New York State, offering a broad range of editorial support and finishing services.

Today, the firm’s management estimates that credit-eligible productions account for approximately one-third of their projects, but constitute about half of their revenue. While PostWorks served a large number of reality television productions during the early to mid-2000s, in recent years, as this component of the post-production ecosystem has declined, the firm has replaced them with other types of productions attracted to NYS by its credit program.

Staff and Workforce Development
The volume and predictability of post-production work supported by the credits has enabled Technicolor-PostWorks to invest in full-time, in-house staff to support its creative staff, including picture editors, colorists, and sound mixers. Today, the firm sources its employees primarily from New York City’s local talent pool. Technicolor has a policy of hiring and internally developing young talent, attracted by the chance to work at the confluence of entertainment and technology.

Infrastructure
The firm’s management identified the high cost of New York City real estate as a major ongoing challenge for their business. Due to price pressures, the firm elected to rent additional space in Midtown, which is more affordable than preferred locations in SoHo and the West Village. The firm also faces tightening margins due to the combination of downward rate pressure from intensified local competition and increasing payroll costs.

Founded: 1995, with Technicolor merger in 2011
Current Pipeline: 117 projects, with scripted TV representing for 45% of projects since 2013
Credit-Eligible Share: 36% of projects and 50% of spending
2015 Staff: 146 full-time and 40+ freelance employees
Infrastructure: 4 digital intermediate theatres, 21 edit suites, 181 edit rooms, and 10 digital mix stages
Today, the post-production ecosystem is a source of good-paying jobs for all New Yorkers.

In 2016, average annual post-production earnings in New York State were $83,400, 19% higher than the statewide average annual earnings of $79,400 across all industries. Average earnings in production, in which the largest share of post-production occupations are found, are $111,800, while average earnings in other relevant industries—including a large share of freelancers, are lower, at $50,100.

The most common post-production occupation is Film & Video Editors who, in 2016, earned a median hourly wage of $30.69, 26% higher than the statewide median hourly wage of $24.34 across all other occupations. In New York City, Film & Video Editors earned a median hourly wage of $32.10, 19% higher than the citywide median hourly wage of $26.95 across all occupations.

The Motion Picture Editors Guild Local 700 is the New York State branch of the national union that represents staff in key post-production roles, including picture editors, music and sound editors, assistant editors, and entry-level editing room assistants. Since 2002, union members have recorded steady growth in total post-production hours worked, with members reporting 2,010 more hours worked in 2015 compared to 2004. This suggests that in addition to higher wages overall, the post-production industry in New York also continues to offer a greater volume of work.

Source: EMSI data; HR&A analysis. Average earnings include wages, salaries, supplements (additional employee benefits), and proprietor income.
Post-production jobs are also accessible to New Yorkers with varying levels of educational attainment.

Based on analysis of educational requirements for jobs in the traditionally defined post-production industry, 2 out of every 5 post-production jobs do not require a bachelor’s degree. Of the post-production jobs that do not require a bachelor’s degree, 91% provide on-the-job training, supporting economic mobility for workers with and without college degrees.

Many post-production jobs require specialized skills tied to the use of industry-specific software and hardware. To ensure a steady pipeline of trained workers, the post-production ecosystem has generally followed an apprenticeship model. In a survey of NYC post-production workers conducted by the Post New York Alliance, over 65% of respondents indicated that they learned the skills they use in their work from on-the-job training.

40% jobs in the NYS post-production ecosystem that do not require a bachelor’s degree

91% jobs that do not require a bachelor’s degree and offer on-the-job training

Source: EMSI data; HR&A analysis. Educational requirements considered for all post-production employment. NYS average annual earnings are $67,521.
Since 2004, a post-production workforce development pipeline has emerged in New York State, generating a strong local talent pool.

With the expansion of the post-production ecosystem, a robust workforce development pipeline has emerged to train workers at various educational attainment and skill levels and provide entry to ecosystem employment at varying positions. With its traditional status as a television and film center, New York State has always had 2- and 4-year programs focused on production and post-production, but post-production offerings have expanded and new certification programs have developed in recent years. With the growth of post-production firms, more informal training opportunities have emerged. In addition, New York State, New York City, and other local jurisdictions have collaborated with post-production ecosystem to offer more formalized training opportunities.

Case Study: Post-Production Workforce Development

There are more than 10 programs providing post-production education in New York State.

### 2-YEAR PROGRAMS

NYS’s technical colleges enable students to enter the post-production ecosystem in 9 to 24 months.

**New York Institute of Technology:** NYIT has two 2-year programs in Fine Arts & Technology and Animation.

**Fashion Institute of Technology:** FIT has two 2-year programs in Computer Animation & Interactive Media and Photography.

### 4-YEAR PROGRAMS

NYS has a number of outstanding 4-year film and television programs that offer robust post-production training.

#### UPSTATE

- **Syracuse University:** Syracuse’s four Transmedia Department programs have at least one post-production course, and its facilities include post-production studios and an animation lab.

- **Ithaca College:** Four of out 10 undergraduate programs involve post-production skills training, including video editing and sound mixing. Ithaca also has a newly refurbished sound studio.

- **Rochester Institute of Technology:** RIT has a College of Imaging Arts and Sciences.

#### DOWNSTATE

- **New York University Tisch School:** Tisch offers post-production as a specific concentration. It also has eight full-time and adjunct faculty focused on editing and post-production instruction.

- **Pratt Institute:** The Film and Video Department relocated in 2014 to a new $4.5M facility, including two post-production suites. In Fall 2017, film editing and color grading courses will transition from elective to core requirements.

Sources: Institutional publications; HR&A interviews with institutions.
A broad range of certification programs and on-the-job training apprenticeships and fellowships supplement the 2- and 4-year programs.

**CERTIFICATION PROGRAMS**

Certification programs offer students a convenient way to learn a new skill or enter the workforce in under 12 months:

**NY Film Academy:** In addition to two- and four-year programs, the Academy offers one-year programs in a range of relevant post-production subjects, including 3D animation, graphic design, and illustration.

**Institute of Audio Research:** The Institute offers an Audio Recording certification covering the production, engineering, and editing of music, as well as career placement services.

**ON-THE-JOB TRAINING APPRENTICESHIPS AND FELLOWSHIPS**

Many firms within the post-production ecosystem traditionally have provided significant on-the-job training, developing skilled talent in-house. New York State and New York City have built on this momentum to further support workforce development:

**Empire State Development Post-Production Fellowship Program:** In 2016, ESD launched the NYS Post-Production Fellowship Program. ESD provided the Post New York Alliance (PNYA) with a $50,000 grant to serve as matching funds for a minimum of 20 apprenticeships at 10 or more in-state post-production or visual effects firms.

**New York City Media Employee Trainee Program:** The program offers media employers funding to cover 70% of costs to train staff in cutting-edge technologies and software.

Sources: Institutional publications; HR&A interviews with institutions; New York Post Alliance Survey
The robust growth of the post-production ecosystem has induced facility expansions and infrastructure investments.

New and expanding post-production firms have made substantial investments in post-production facilities and infrastructure. With constantly evolving technology, post-production firms must regularly upgrade their computer hardware and software. For example, in recent years, a visual effects firm in New York City has generally been spending $240,000-$380,000 per year on infrastructure maintenance and upgrades.

Many facilities have also expanded their footprint as a result of the credits, providing a consistent pipeline of work. Several of these expansions include:

• **DiMenna Center**: The Orchestra of St. Luke’s opened the 20,000-square-foot DiMenna Center in September 2015 as a premiere music rehearsal and recording space. From September 2015 to October 2016, the Center has been the site of scoring, recording, and mixing by six studio films, six independent films, and three TV series.

• **NYC’s “Made in NY” Media Center**: The City of New York opened a 18,000-square-foot media facility in the Brooklyn Navy Yard in 2013. Operated by the Independent Filmmakers Project, the center is a collaborative workspace, incubator, educational center and exhibition space that supports new and emerging talent.

• **The Post Factory**: Expanding from a one-person operation to a multi-national company, the Post Factory recently has made multi-million-dollar investments in the expansion of its facilities. Today, the Post Factory’s facilities occupy 40,000 square feet of editing and finishing rooms that serve 200 clients per day. The firm also owns the 12,000 square foot Bling facility in Brooklyn, soon to undergo additional investment and expansion to better serve its clients with onset and near-set daily and finishing services.
NYS’s post-production ecosystem has grown because of the tax credits, local talent, increased infrastructure, and synergies with other industries.

New York’s status as one of the few states with a specific credit for post-production has created stability for the post-production ecosystem and induced infrastructure investment. NYS’s two tax credits, the Film Production Credit and the Post-Production Credit, have fueled the post-production ecosystem by both supporting locally-filmed productions and attracting projects shot out-of-state to do their post-production work in-state.

In response to greater volume and predictability of post-production work, the quantity and diversity of firms providing post-production services in NYS has expanded. Since 2004, the number of firms has increased by over 70%, and firms have made major investments. For example, firms such as Sixteen19 have opened new facilities in upstate New York, outside of the traditional center of post-production activity in New York City, while firms including Phosphene have expanded to larger spaces.

The post-production ecosystem’s stability has attracted workers to an already strong existing talent pool. As a national and international center for media production, NYS had a skilled post-production workforce even before the Film Tax Credit Program’s establishment in 2004, and the workforce has only expanded. Permanent above-the-line talent who live in NYS are now able to do post-production work locally, instead of traveling to Los Angeles or other locations for assignments. Furthermore, the emergence of a local workforce development programs to train people in post-production occupations has contributed to the growth of the local talent pool.

Positive adjacencies created by New York City’s strong technology and digital media ecosystem also has supported post-productions’ growth. Like the technology and digital media ecosystem, the post-production ecosystem is focused on content creation. New York City has become a center of “hyphen tech” firms (e.g., fin-tech) disrupting the City’s traditional industries of advertising, media, retail, and finance. This growth has enabled post-production firms to attract software engineers and other technology talent to manage extensive amounts of data and create applications and systems supporting image processing, visual effects, and sound and music editorial. This symbiotic co-location enables skilled workers to move between both ecosystems, strengthening their infrastructure.

New York’s high quality of life and desirable amenities support the attraction and retention of post-production workers. With the City and State’s many amenities, more and more talent are choosing to move and remain in New York, bringing critical and in demand skills to the post-production ecosystem.
Economic Benefits, Fiscal Impacts and Future Growth
Two components drive post-production’s economic and fiscal impacts.

The post-production ecosystem provides significant economic activity and fiscal revenue to New York State. Total ecosystem activity is that associated with the full post-production ecosystem and is composed of both baseline activity and ecosystem-induced activity. Baseline activity represents the jobs and economic activity that likely would have occurred without the stimulus created by the credit programs.

Ecosystem-induced activity represents the jobs and economic activity generated above the baseline as a result of a post-production ecosystem that would not exist but for the credits. This ecosystem, which consists of post-production workers, firms, and facilities enabled by the volume and predictability of credit-induced work, created an additional 2,630 jobs over and above the baseline post-production jobs that might be expected without the credits.

NYS Post-Production Ecosystem, 2015

Baseline Post-Production Activity
Baseline ecosystem growth that might have been expected in the credits’ absence.

Ecosystem-Induced Activity
Activity that occurred over and above the baseline activity that might have been expected. Includes activity tied to the FPC and PPC.

Total Direct Jobs: 11,260

8,630 jobs

2,630 jobs
The post-production ecosystem generated 23,310 jobs, $1.87 billion in income, and $7.06 billion in output.

Economic impact analysis measures the impact of existing post-production employment in New York State in terms of employment, employment income, and economic output (spending) generated. The direct impact is the employment, employment income, and output in the post-production industries and occupations that make up the ecosystem. The indirect impact is the employment, employment income, and output associated with businesses that supply the industries comprising the post-production ecosystem. The induced impact represents the employment, employment income, and output associated with household spending of employees who work in industries directly and indirectly affected by the post-production ecosystem.

Based on the 11,260 people working in the post-production ecosystem in 2015, the entire ecosystem generated 23,310 jobs, $1.87 billion in income, and $7.06 billion in output through direct and economic multipliers.

<table>
<thead>
<tr>
<th></th>
<th>Jobs</th>
<th>Income</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>11,260</td>
<td>$1,060 M</td>
<td>$4,780 M</td>
</tr>
<tr>
<td>Indirect/ Induced</td>
<td>12,050</td>
<td>$810 M</td>
<td>$2,280 M</td>
</tr>
<tr>
<td>Total</td>
<td>23,310</td>
<td>$1,870 M</td>
<td>$7,060 M</td>
</tr>
</tbody>
</table>

Sources: IMPLAN; HR&A Analysis. 2015 Dollars.
Total post-production activity generated $128 million in tax revenues for New York State.

The direct, indirect, and induced economic impacts generated by the post-production ecosystem produce tax revenue for New York State and local governments, such as New York City. This fiscal impact analysis considers only state tax revenues, including individual income tax, corporate tax, sales tax, selective sales tax and other taxes.

In 2015, the full post-production ecosystem generated a total of $128 million in tax revenue for New York State. Of the $128 million in tax revenues, individual income tax represents 55%, corporate income tax represents 7%, selective sales tax and sales tax represent 31%, and other taxes represent 7%.
The two credits contributed to an increase in New York State’s share of the national post-production ecosystem and a significant increase in jobs.

In addition to directly supporting spending by credit-eligible productions, the Film Production Credit and the Post Production Credit also have fostered a post-production ecosystem that has facilitated additional non-credit-eligible post-production activity above what might have occurred without the credits. The post-production ecosystem consists of post-production workers, firms, and facilities enabled by the volume and predictability of credit-induced work.

From 2001 to 2008, the year that the Film Production Credit was raised to 30% and before the Post-Production Credit bill was introduced, NYS post-production employment experienced a steady annualized decline of negative 2% in its share of total national post-production employment. In 2001, NYS comprised 19.6% of total post-production employment in the US; in 2008, NYS employment comprised 17.0% of total US post-production employment.

Using the assumption that if the FPC (and subsequently, the PPC) had not been implemented, NYS’s share of national employment would have continued to decline at the same rate of negative 2%, there would have been only 8,630 direct jobs in 2015. The incremental 2,630 jobs that make up the difference from the baseline to today’s actual of 11,260 direct jobs represent jobs that would likely not have occurred but for the two credits.

EMS data; HR&A analysis.
Activity directly and indirectly tied to the credits generated 5,440 jobs, $435 million in income, $1.647 billion in output, and $30 million in NYS tax revenues

Based on the 2,630 additional jobs induced by the strengthened post-production ecosystem, activity directly and indirectly tied to the credits generated 5,440 total jobs, $435 million in total employment income, and $1.647 billion in total output through direct and economic multipliers. This economic activity represents 23% of all impacts for the full post-production ecosystem.

The incremental 2,630 jobs would not have occurred but for the two credits. For every job generated by this activity, an additional $302,800 in spending was generated throughout the New York State economy.

The direct, indirect, and induced economic impacts generated by post-production ecosystem-induced activity directly and indirectly linked to the credits produce tax revenue for New York State and local governments, such as New York City. This fiscal impact analysis considers only state tax revenues, including individual income tax, corporate tax, sales tax, selective sales tax and other taxes.

In 2015, post-production ecosystem-induced activity directly and indirectly linked to the credits generated a total of $30 million in tax revenue for New York State, or approximately 23% of all fiscal impacts generated by the entire ecosystem. Of the $30 million in tax revenues, individual income tax represents 55%, corporate income tax represents 7%, selective sales tax and sales tax represent 31%, and other taxes represent 7%.

| Direct | Jobs | 2,630 | Income | $247 M | Output | $1,115 M |
| Indirect/ Induced | | 2,810 | $188 M | | $532 M |
| Total | 5,440 | $435 M | | $1,647 M |

Sources: IMPLAN; HR&A Analysis. 2015 Dollars.
Post-production faces challenges in New York State, especially related to high costs.

Post-production firms face high costs in New York due to the combination of high real estate and workforce costs. Specific spatial requirements typically limit the range of suitable real estate for post-production firms: firms require high bandwidth broadband connectivity to accommodate digital workloads and central locations with good transit accessibility to enable employees and clients to reach them. Locations with these characteristics tend to be situated in higher-cost areas. Depending on the services that they offer, firms also may need large-footprint spaces with high ceilings. These needs may cause firms to compete for space with other high-value technology and knowledge economy tenants who are able to pay a premium for space.

Furthermore, general support staff and post-production talent require higher wages to afford NYC housing and living costs. To attract skilled workers from other markets, NYC-based firms may have to pay them higher wages.

The post-production ecosystem also faces capacity limitations, reflecting “growing pains.” While the post-production ecosystem in NYS has expanded substantially, it remains smaller than in California. Major post-production projects occurring simultaneously in NYS can place a strain on the post-production workforce and infrastructure. There remains a shortage of long-established talent at the very highest skill levels. For example, local post-production firms have cited a shortage of high-end colorists. However, the ecosystem has achieved significant recent momentum in talent development.

In addition, post-production and closely-linked production are increasingly global industries. While New York and Los Angeles are the largest centers of post-production activity, incentives offered by other jurisdictions present additional sources of competitive pressure to the drivers of the post-production ecosystem in New York.
Post-production in New York State will continue to thrive.

New York State’s post-production ecosystem is positioned for ongoing expansion. Intensifying connections between the production and post-production processes, continued technological advancements, and the rise of scripted television will all continue to cause growth opportunities.

Post-production and production are becoming increasingly intertwined. With technological advancements, compressed production timeframes, and the desire for greater creative control, the line between production and post-production is becoming increasingly blurred. Post-production is moving further up in the production timeline, and previously production-oriented activities (i.e., visual effects) are shifting to post-production. New York State is poised to benefit from its dual status as a center of both the production and post-production industries.

In recent years, the post-production ecosystem has been transformed by three major technological changes - the shift from film to digital; the movement to higher resolution formats (from SD to 2k to 4k); and the emergence of streaming as a viable viewing medium. These shifts are requiring firms to update their infrastructure and operating modes. With the continued growth of tech ecosystem in New York the close proximity between post-production and tech will foster additional technological advancements benefiting the post-production ecosystem.

Complementing New York State’s historic strength in television, growth in the production of scripted television has increased demand for post-production services. The rise of Netflix, Amazon, and other content providers has significantly fostered demand for high-quality scripted television. Relative to one-time film productions, which do not provide an ongoing stream of work, and reality television productions, which require less post-production work, scripted television programming provides stable, long-term post-production work. The post-production ecosystem will continue to thrive as with the continued expansion of scripted content development for TV and other mediums.

The New York State tax credits are instrumental to the ecosystem’s continued growth. In an increasingly global industry, the credits have established New York in a competitive market against other jurisdictions offering similar incentives. The depth and predictability of these credits has created a robust, stable volume of work that has fostered the post-production ecosystem.
HR&A Advisors specializes in analyzing the economic and fiscal impacts of industries, policy interventions, and development projects.

About HR&A Advisors, Inc.

HR&A Advisors, Inc. is an industry-leading real estate, economic development, and public policy consulting firm based in New York City, with offices in Washington, D.C., Dallas, and Los Angeles. The firm has studied the economic impacts of the New York City technology ecosystem, Times Square, the High Line, the New York State Film Production Credit, and the New York State affordable housing industry.

The following technical appendix details:

• HR&A’s process for defining the post-production ecosystem in New York State;

• HR&A’s process for measuring the economic and fiscal impacts of the post-production ecosystem;

• The economic data packages (EMSI and IMPLAN) that HR&A employed in the course of this analysis;

• Definitions for key industry terms used throughout this study.
In analyzing the post-production ecosystem, HR&A relied on employment data provided by Economic Modeling Specialists International (EMSI).

A CareerBuilder company, EMSI is a leading national provider of employment data and economic impact analysis. EMSI clients include the New York State Department of Labor, North Carolina Department of Commerce, and Oklahoma Department of Commerce. HR&A utilized EMSI’s Analyst tool in estimating the size of the New York State post-production ecosystem and its associated wages, educational requirements, and demographics.

EMSI gathers and integrates labor market data from a wide array of sources, including the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) and Occupational Employment Statistics (OES), U.S. Bureau of Economic Analysis, O*NET, U.S. Census Bureau American Community Survey (ACS) and County Business Patterns (CBP), and state departments of labor.

Integrating data from multiple sources allows EMSI to provide a broad accounting of employment that is unavailable from any one traditional source. To fully account for the New York State post-production industry, HR&A relied on EMSI data pertaining to three classes of workers:

1. QCEW employees: All jobs covered by federal and state unemployment insurance.
2. Non-QCEW employees: Jobs exempt from unemployment insurance coverage, including military, railroad, and small non-profit jobs.
3. Self-employed: Jobs held by people who consider self-employment a significant part of their income.

EMSI’s proprietary estimation process enables it to accurately report detailed data for every county in the United States, including even employment data which is not disclosed by government sources due to confidentiality issues. EMSI reports industry-level data to the six-digit NAICS code and occupational data to the five-digit SOC code. Moreover, EMSI provides a cross-walk between industry and employment data (staffing patterns and reverse staffing patterns) that enabled HR&A to account for both jobs in the traditionally defined post-production industry and jobs in post-production occupations in the broader production industry and other relevant industries.

EMSI also reports the most common educational or training requirements for each of the 800+ SOC codes based upon data from the U.S. Bureau of Labor Statistics.

Sources: EMSI; HR&A Advisors, Inc. Analysis
Post-production related industries and core and secondary post-production occupations were identified based on two evaluation questions.

Working with industry experts, HR&A identified a list of relevant post-production industries and occupations and used the following two questions to determine the appropriate share of jobs to include in post-production occupations falling under the production industry and other relevant industries:

1. Does the industry center on the creation of audiovisual content or does it involve the creation of content in other media (e.g., live theater, music recording)?

2. If an occupation centers on the creation of audiovisual content, do its primary activities fall within the post-production or production process?

Using these questions, 100% of Film & Video Editors and Multimedia Artists & Animators were included across the three industry categories because these occupations center on the creation of audiovisual content (Yes to Q1) and their primary activities fall within the post-production process (Yes to Q2). However, 0% of Producers & Directors and Actors outside the post-production industry were included because these occupations involve other media, such as live theater (No to Q1) and the audiovisual component of their work is concentrated within production (No to Q2).

Industries are based on the 2012 NAICS codes as defined by the U.S. Census Bureau. Occupations are based on the Standard Occupational Classification (SOC) codes as defined by the Bureau of Labor Statistics.
## Technical Appendix

### Post-production ecosystem industries and occupations

#### NAICS Codes & Classification

<table>
<thead>
<tr>
<th>NAICS Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>512191</td>
<td>Teleproduction and Post-Production</td>
</tr>
<tr>
<td>512199</td>
<td>Other Motion Picture and Video Industries</td>
</tr>
<tr>
<td>51211</td>
<td>Motion Picture and Video Production</td>
</tr>
<tr>
<td>51212</td>
<td>Motion Picture and Video Distribution</td>
</tr>
<tr>
<td>512240</td>
<td>Sound Recording Studios</td>
</tr>
<tr>
<td>512290</td>
<td>Other Sound Recording Industries</td>
</tr>
<tr>
<td>711510</td>
<td>Independent Artists, Writers, and Performers</td>
</tr>
</tbody>
</table>

#### SOC Codes & Classifications

<table>
<thead>
<tr>
<th>SOC Code</th>
<th>Occupation</th>
<th>Post-Production</th>
<th>Production</th>
<th>Other Relevant Industries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>27-4032</td>
<td>Film &amp; Video Editors</td>
<td>375</td>
<td>4,687</td>
<td>68</td>
<td>5,130</td>
</tr>
<tr>
<td>27-1014</td>
<td>Multimedia Artists &amp; Animators</td>
<td>84</td>
<td>1,319</td>
<td>918</td>
<td>2,322</td>
</tr>
<tr>
<td>27-2041</td>
<td>Music Directors &amp; Composers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-1132</td>
<td>Software Developers, Applications</td>
<td>15</td>
<td>259</td>
<td>0</td>
<td>274</td>
</tr>
<tr>
<td>15-1133</td>
<td>Software Developers, Systems Software</td>
<td>0</td>
<td>35</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>51-9151</td>
<td>Photographic Process Workers</td>
<td>0</td>
<td>144</td>
<td>0</td>
<td>144</td>
</tr>
</tbody>
</table>

#### All Occupations in Teleproduction and Post-Production

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Post-Production</th>
<th>Production</th>
<th>Other Relevant Industries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Engineering Technicians</td>
<td>57</td>
<td>0</td>
<td>0</td>
<td>57</td>
</tr>
<tr>
<td>Audio &amp; Video Equipment Technicians</td>
<td>136</td>
<td>0</td>
<td>0</td>
<td>136</td>
</tr>
<tr>
<td>Producers &amp; Directors</td>
<td>801</td>
<td>0</td>
<td>0</td>
<td>801</td>
</tr>
<tr>
<td>Actors</td>
<td>342</td>
<td>0</td>
<td>0</td>
<td>342</td>
</tr>
<tr>
<td>Camera Operators</td>
<td>136</td>
<td>0</td>
<td>0</td>
<td>136</td>
</tr>
<tr>
<td>Musicians and Singers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All Other Occupations Falling In Post-Production Industry</td>
<td>1,882</td>
<td>0</td>
<td>0</td>
<td>1,882</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,828</strong></td>
<td><strong>6,444</strong></td>
<td><strong>986</strong></td>
<td><strong>11,258</strong></td>
</tr>
</tbody>
</table>

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HR&A Advisors, Inc.
Relevant Industries and Occupations (NAICS Codes), Not Counted

Using the same questions that determined the appropriate share of post-production occupations in other industries to include in the post-production ecosystem, a number of occupations were deemed not appropriate to include due to the risk of counting jobs that would be more appropriately allocated to other industries. This includes occupations within Production and Other Relevant Industries.

<table>
<thead>
<tr>
<th>SOC Codes &amp; Classifications – NOT COUNTED</th>
<th>Post-Production</th>
<th>Production</th>
<th>Other Relevant Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OTHER POST-PRODUCTION OCCUPATIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27-2041 Music Directors &amp; Composers</td>
<td></td>
<td></td>
<td>1,240</td>
</tr>
<tr>
<td>15-1132 Software Developers, Applications</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>15-1133 Software Developers, Systems Software</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>51-9151 Photographic Process Workers</td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td><strong>OCCUPATIONS TESTED BUT NOT INCLUDED</strong></td>
<td>797</td>
<td>386</td>
<td></td>
</tr>
<tr>
<td>27-4014 Sound Engineering Technicians</td>
<td>1,925</td>
<td>473</td>
<td></td>
</tr>
<tr>
<td>27-4011 Audio &amp; Video Equipment Technicians</td>
<td>10,693</td>
<td>810</td>
<td></td>
</tr>
<tr>
<td>27-2012 Producers &amp; Directors</td>
<td>5,443</td>
<td>1,549</td>
<td></td>
</tr>
<tr>
<td>27-2011 Actors</td>
<td>1,498</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>27-4031 Camera Operators</td>
<td>36</td>
<td>6,662</td>
<td></td>
</tr>
<tr>
<td>27-2042 Musicians and Singers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,392</strong></td>
<td><strong>11,169</strong></td>
<td></td>
</tr>
</tbody>
</table>
HR&A utilized analysis to define the direct and indirect impacts of credit-eligible spending.

The Film Production Credit and the Post Production Credit support spending by credit-eligible productions, but also foster a post-production ecosystem that would not exist but for the credits. This ecosystem consists of post-production workers, firms, and facilities enabled by the volume and predictability of credit-induced work that is over and above the baseline post-production ecosystem activity that might be expected without the credits.

The following methodology was employed to estimate the 2015 non-credit-eligible activity that might not have occurred without the credits:

1. Using the combined industry-occupation definition of the post-production industry, determine total post-production jobs in the U.S. and NYS for 2001 and 2008, the year that the FPC was renewed and increased from 10% to 30%.

2. Determine the baseline average annual growth rate in NYS's share of national post-production employment for the period from 2001 to 2008.

3. Apply the -1.97% growth rate to NYS's 2008 share of national post-production employment to calculate its 2015 share of national employment if the credit program had not been renewed and expanded.

4. Calculate the residual between actual 2015 jobs and projected 2015 jobs if the credit program had not been renewed and expanded. The residual includes jobs generated both by credit-induced activity and by non-credit-eligible activity enabled by the post-production ecosystem. Direct credit-induced jobs were subtracted from the residual to determine direct post-production ecosystem-induced jobs.

<table>
<thead>
<tr>
<th>Post-Production Ecosystem, 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual direct post-production jobs in NYS</td>
</tr>
<tr>
<td>Projected direct post-production jobs in NYS</td>
</tr>
<tr>
<td>Residual jobs in NYS</td>
</tr>
</tbody>
</table>

Sources: EMSI data; HR&A analysis.
HR&A utilized the IMPLAN input-output model to estimate the economic impacts of the post-production ecosystem.

Created by MIG, Inc. (formerly the Minnesota IMPLAN Group, Inc.), IMPLAN is a leading national input-output model. IMPLAN’s clients include many public and private sector organizations, such as the federal government, New York State Department of Labor, New York Office of the State Comptroller, and Cornell University. IMPLAN traces the pattern of commodity purchases and sales between industries that are associated with each dollar’s worth of a product or service sold to a customer, analyzing interactions among 440 industrial sectors for New York State. IMPLAN reports direct impacts and multiplier (indirect and induced impacts) for sectors across the economy.

HR&A utilized the 2013 IMPLAN model to estimate the economic impacts of the post-production ecosystem. HR&A designated New York State as the study area. The economic impact study is designed to measure the impact of the post-production ecosystem in terms of employment, employee compensation, and economic output (spending) generated:

- **Employment** includes full-time and part-time jobs.
- **Income** includes all forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income.
- **Economic output** is the total value of production across all industries in the economy. It is equivalent to total spending in the economy.

Direct employment in the post-production ecosystem constituted 11,260 jobs in 2015. HR&A used IMPLAN to project the multiplier impacts of this direct employment.

Sources: IMPLAN; HR&A Advisors, Inc. Analysis
HR&A’s methodology for projecting fiscal impacts is based on economic impacts generated and existing ratios between personal income and tax revenue.

HR&A calculated fiscal impacts to New York State by estimating effective State tax rates for five categories of taxes and applying these rates to the level of personal income generated by post-production spending as estimated by IMPLAN.

Effective State tax rates are calculated based upon the relationship between New York State personal income in 2013, reported by the Bureau of Economic Analysis, and New York State tax collections in 2013, as reported by the U.S. Census Bureau’s State and Local Government Finance Bureau. 2013 was used as the year for analysis, as it was the last year for which data was available. Ratios of tax collections to personal income were calculated for the following major tax revenue streams reported by the Census: individual income tax, corporate income tax, general sales tax, selective sales tax, and other taxes.

<table>
<thead>
<tr>
<th>Ratio of New York State Tax Revenue to Total Personal Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Income Tax</td>
</tr>
<tr>
<td>Corporate Income Tax</td>
</tr>
<tr>
<td>Sales Tax</td>
</tr>
<tr>
<td>Selective Sales Tax</td>
</tr>
<tr>
<td>Other Taxes</td>
</tr>
</tbody>
</table>

Sources: U.S. Census Bureau’s State and Local Government Finance Bureau
The New York State Post-Production Ecosystem
December 2016