

## Lesson Four: Fire Protection - A Public Good Problem?

Overview: In this lesson, we will use the topic of fire protection to explore the ideas of public goods, free riding, and externalities. Fire protection is often provided by local governments and funded through county property taxes and other surcharges and fees. In rural areas, fire protection is sometimes funded through special fire protection district taxes or offered on an optional basis to residents of unprotected counties by nearby counties with organized fire protection programs.

In the past few years there have been several news stories about people either forgetting or refusing to pay fire taxes (usually around \$75), then watching their houses burn down because the fire department would not assist them when their homes caught fire. This lesson uses those scenarios to explore the ideas of public goods (like security services), free-riding (how do those services get funded if people don't pay for them?), and externalities (how does your consumption of fire protection affect your neighbors?).

### Activities:

- Introduction and discussion question.
- Review of key terms pertaining to this lesson.
- Group brainstorm about infrastructure of fire protection.
- Class discussion of fire protection scenario.
- Small group discussion of possible solutions.

### Key Terms:

- Infrastructure
- Public Goods
- Free-Riding
- Externalities (Positive and Negative)
- Hard Infrastructure
- Soft Infrastructure

### Teacher Instructions:

- This lesson plan is guided closely by a pair of teacher and student handouts.
- Each student needs a copy of the student handout, and it may be useful for the teacher to have a copy as well (although the teacher handout follows the same outline).
- No PowerPoint slides or additional handouts accompany this lesson.

## Lesson Four: Fire Protection - A Public Good Problem?

This lesson is designed to explore the concepts of externalities, public goods, and free-riding once those topics have been introduced to students in a basic way. The lesson contains a built-in section for reviewing the definitions of those terms, but assumes that this will not be the first time students are become acquainted with them (definitions, examples, and explanations of each term are included in the teacher's copy of the handout). Fire protection taxes are the lens through which a deeper exploration of these concepts will be pursued, using stories about people who elected not to pay for fire protection and discussion of the possible solutions.

**Definition of Infrastructure:** the organized network needed to provide particular goods and/or services to a large group of people.

We continue to use the following definition of infrastructure:

If you would prefer to use a real story, instead of the fictional scenario provided in this lesson, here are some options:

- NY Times 2010: <http://thelede.blogs.nytimes.com/2010/10/06/tennessee-firefighters-watch-home-burn/>
- ABC News 2010: <http://abcnews.go.com/US/tennessee-familys-home-burns-ground-firefighters-stand-watch/story?id=11806407>
- Yahoo News 2011: <http://news.yahoo.com/blogs/sideshow/tennessee-family-home-burns-while-firefighters-watch-191241763.html>
- NBC News 2011: [http://usnews.nbcnews.com/\\_news/2011/12/07/9272989-firefighters-let-home-burn-over-75-fee-again](http://usnews.nbcnews.com/_news/2011/12/07/9272989-firefighters-let-home-burn-over-75-fee-again)
- Video: <https://www.youtube.com/watch?v=PwJrPa8Ps7A>

In general, fire protection is usually provided by local governments and funded through county property taxes and other surcharges (especially in urban and suburban areas). Those funds also help pay for schools, streets and roads, police, and other services.

In more rural areas, fire protection is sometimes funded through special fire protection district taxes, which may encompass a number of counties and which may be optional or mandatory, depending on the location. In some rural areas, residents' only option is to buy private fire protection insurance.

*The following includes directions to read, progresses with student handout, and answers. Answers that are not provided to students are printed here in italics.*

**Preparation:**

- Make copies of the student handout
- Write the definition of infrastructure on the board

**Introduction and Discussion Questions**

**Read Introduction:** Today we will use the topic of fire protection and fire fighting services to explore the ideas of security infrastructure, public goods, free riding, and externalities. In the past few years there have been several news stories about people either forgetting or refusing to pay fire-protection taxes (usually around \$75 per year), then having their homes burn down because local fire departments would not assist them when their homes caught fire.

**Definition of Infrastructure:** the organized network needed to provide particular goods and/or services to a large group of people.

**Guide Students in Brief Review of Terms and Ideas:**

1. Read or have a student read the definition of infrastructure from the board or from their handout.
2. Direct students to discuss the following questions in pairs: fire protection is a form of security infrastructure; in what ways is security infrastructure different from physical infrastructure?

*Security infrastructure includes forms of physical infrastructure (like buildings and physical assets), but it may also include institutions, organizations, plans and procedures, etc. These latter components are sometimes referred to as “soft infrastructure,” while the physical components are referred to as “hard infrastructure.”*

3. Are there other types of infrastructure that provide protection and safety or otherwise help to preserve other forms of infrastructure?

*Medical services, security services like police and emergency response systems, national security systems, prisons and justice systems, etc.*

## Review of Key Terms

**Guide Students in Review of Definitions:** have students go back to their notes or textbooks to review definitions of the following terms.

**Define Public Goods:** *public goods are products or services that people can use without reducing the availability or usefulness of that good for other people. Importantly, it is also impossible to exclude people from using public goods (if the goods are provided at all). Public goods are both non-rival (see definition below) and non-excludable (see definition below). To be a public good, a good must have these two qualities:*

- Define **non-rival**: *one person's use of the good does not diminish another's person's use of the good. One person's use cannot "fully consume" the good, causing it to be diminished, depleted, or gone.*
- Define **non-excludable**: *people cannot be stopped from using or consuming the good or service if the good or service is provided.*

Give an example or two of a public good:

- **Light Houses** – *a ship cannot be prevented from using the light from a lighthouse (non-excludable) and one ship's use of the light does not inhibit another ship's ability to use that light (non-rival)*
- **Fireworks** – *a person cannot be prevented from seeing fireworks in the sky (non-excludable) and one person's viewing of the fireworks does not inhibit another person's viewing (non-rival)*
- **National Security** – *typically, a person can be deprived of the protection of national security (non-excludable) and one person's enjoyment of that security does not diminish another person's security (non-rival)*
- **Street Lights** - *a person cannot be prevented from using the light from street lights (non-excludable) and one person's use of the light does not inhibit another person's use of that light (non-rival)*
- *If students come up with other examples, determine whether the examples exhibit BOTH non-exclusion and non-rivalry.*

**Define Free-Riding:** *When someone consumes a good without paying for it or pays less than their fair share for their use of the good. Public goods are vulnerable to the free-rider problem because people cannot be excluded from consuming the good if it is being provided. To solve this, governments often provide public goods and tax their citizens so as to fund them. If everybody free-rode and nobody paid, what would happen to production of that good? The good would not be provided by the market because it would not be profitable for a business to produce this product or service.*

**Define Externalities:** *Externalities are third-party side effects, where people or parties who were not involved in economic decisions or transaction are affected by those decisions or transactions. What's the difference between a positive externality and a negative externality? A positive externality causes a third party benefit; in other words, someone outside of the original economic transaction experiences a benefit they do not pay for. A negative externality causes third party cost or harm; in other words, someone outside of the original economic transaction experiences a cost they did not sign up for. Give an example of each kind (below are some examples):*

**Positive Externality:**

- *Vaccines – People who get vaccinated make it less likely that other, non-vaccinated people will get diseases since the vaccinated people won't transmit them.*
- *Gardens – If your neighbor plants a beautiful front yard, you can enjoy the benefits of the beautiful view without having contributed anything to the garden's construction/cost.*
- *Education – (although not exclusively) Educated people contribute to economic growth, inventions and innovations, and new discoveries, which often benefit everyone in society.*
- *Bee Keeping – If someone decides to start keeping bees, those bees may pollinate the flowers and trees in nearby areas, which could help farmers and gardeners.*

**Negative Externality:**

- *Second-Hand Smoke – If you are around someone who is smoking cigarettes your health can be negatively affected by a decision you had nothing to do with.*
- *Air Pollution – If you live or work around a source of air pollution your health can be negatively affected by a decision you had nothing to do with.*
- *Barking Dogs – If your neighbor buys a dog that barks all the time, you may lose sleep or enjoy your house less, even though you had no say in the neighbor getting a dog.*

**Read the Following Comments:**

The public (i.e. government) provision of a good or service is often a clue that the good might qualify as a public good. Fire protection is often provided by local governments and funded through county property taxes and other surcharges. Those funds also help pay for schools, streets and roads, police, and other services. In rural areas, fire protection is sometimes funded through special fire protection district taxes.

**Group Brainstorm**

Instruct Students to Think About Fire Protection Infrastructure with a Brainstorm.

What components of infrastructure (equipment, materials, etc.) are associated with the delivery of fire protection? See how many you can come up with.

At the end, consider which components are hard infrastructure and which are soft infrastructure.

- *Hoses + Tools (hard)*
- *Trucks + Ladders (hard)*
- *Stations + Training Grounds (hard)*
- *Hydrants, Pipes, Waterways (hard)*
- *Fire Fighters + Training (soft)*
- *Protective Equipment + Uniforms (hard)*
- *911 Services (hard + soft)*
- *Office Supplies + Communication (hard + soft)*
- *Road Network (hard)*

**Main Activity**

Read the Main Story (students have this in the handout): there have been several stories in the last few years of people either forgetting or refusing to pay fire taxes (usually around \$75), then watching their houses burn down because the fire department would not assist them when their homes caught fire.

David lives in a rural county that does not have its own fire department. Residents of that county are offered the option of paying a \$75 annual fee to the neighboring county to get fire protection from that county's fire department. Residents who do not pay the fee are not eligible to receive protection, but the opportunity to participate in this option is widely publicized to all residents of David's county. David decides not to pay the fee.

One day, David's house catches fire and he calls the neighboring county's fire department, but they will not respond to the fire. First, he tells them that he will pay the fee on the spot, and when they refuse, he then offers to pay whatever it would cost to put the fire out, but the department still won't go to his house. As the fire gets larger and threatens to spread to the house next door, the fire department comes out to protect that house since David's neighbor paid the annual fee. Nonetheless, they will not put the fire out at David's house, and his home burns to the ground.

**Ask the Class the Following Questions:**

Should people be able to pay for fire departments to put these fires out, if they have not paid the tax?

- How does this relate to whether or not fire protection is a public good?
  - *Fire protection need not be non-excludable, since (as seen in the scenario here) people can be excluded from the service. Fire protection is usually non-rival (in that one person's use of fire protection need not diminish another person's use of fire protection), except in cases of massive disasters, where fire fighters may not be able to respond to every fire at once. Fire protection was provided privately for a long time, and was converted to a public service for mostly political (instead of economic or public good related) reasons.*

- What kind of free-riding might be taking place here?
  - *If it costs money to create and maintain a fire-fighting service, people who don't pay the fee are counting on other people to pay the fee if they want a fire protection system at all.*
- If people were allowed to pay on the spot, what incentives might be set up?
  - *This might create a great incentive against paying the fee. If people knew they could pay the fee on the spot, they might not pay it unless their house caught fire. And if people knew they could pay the full cost of having the fire fighters come out, they still might not pay the fee if they thought their house wouldn't catch fire.*
- Should the fire departments have to put out the fires even if people do not pay?
  - *Students may make moral, economic, and political arguments, and there is not necessarily a right answer to this question.*
- What kinds of externalities come into play here?
  - *The externalities affect David's neighbors and even his broader neighborhood in a big way.*
  - Positive externalities? Negative externalities?
    - *If David pays the fee and gets protection, it makes it less likely that a fire would spread to his neighbors' houses (a positive externality for them) since the fire department would come and put the fire out.*
    - *If David doesn't pay the fee, it makes it more likely that a fire could spread to his neighbors' houses (a negative externality) since the fire department won't come to put the fire out until their house is decidedly in danger.*
    - *If his house burns down it could also negatively affect property values in the community if he doesn't restore it (this would be another negative externality for the community).*

**Additional Questions (not provided to students):**

- Does infrastructure that we don't use every day (or hope never to use) feel less important to fund than things we use every day?
  - *Students may have various responses— no right answer is necessary.*
- How are the *burdens* of funding fire protection distributed amongst society?
  - *People who pay the taxes to fund protection (perhaps especially the people who don't ever need fire fighting services), the fire fighters and their families, people who live near fire stations and hear the sirens, etc.*
- How are the *benefits* of fire protection distributed amongst society?
- Why might someone decide to opt out of fire protection?
  - *Students may have various responses— no right answer is necessary.*



## **Small Group Discussion**

### **Instruct Students to Discuss the Following in Small Groups:**

Which of the following options would you endorse if you were faced with a decision about fire protection for your home and how that protection should be funded?

1. All residents are required to pay an annual \$75 fire-protection fee. It is not optional, and all residents receive fire protection.
  - a. *This eliminates the free-rider problem (since everyone must pay) and the externality problem (since no one will be endangering their neighbors by opting out of the service).*
2. All residents are invited to pay an annual \$75 fire-protection fee. It is optional, but if you do not pay the fee and your house catches fire, the fire department will respond and you will be required to pay the full cost of that service (which may be many thousands of dollars). There is no cap on how much it could cost.
  - a. *This eliminates the externality problem (since all fires are put out by the fire department), but not the free-rider problem (since so many people could opt out of paying the fee that the fire department might not be funded).*
3. All residents are invited to pay an annual \$75 fee to a private fire protection company. It is optional, and if you do not pay the fee but later call the fire protection company for assistance, you are required to pay \$50,000 (no matter what the actual cost of putting out the fire).
  - a. *This could eliminate the externality problem (if all fires are put out by the company), but not the free-rider problem (since so many people could opt out of paying the fee that the fire department might not be funded).*

→ What are the strengths and weakness of each approach to fire protection?

## **Lesson Four: Fire Protection - A Public Good Problem?**

### **Introduction and Discussion Questions**

**Read Introduction** (read along as your teacher reads this aloud):

Today we will use the topic of fire protection and fire fighting services to explore the ideas of security infrastructure, public goods, free riding, and externalities. In the past few years there have been several news stories about people either forgetting or refusing to pay fire-protection taxes (usually around \$75 per year), then having their homes burn down because local fire departments would not assist them when their homes caught fire.

### **Definition of Infrastructure:**

The organized network needed to provide particular goods and/or services to a large group of people.

Please review the following:

### **Discussion Question:**

With the person next to you, discuss the following question: fire protection is a form of security infrastructure; in what ways is security infrastructure different from physical infrastructure?

- Are there other types of infrastructure that provide protection and safety or otherwise help to preserve other forms of infrastructure?

**Review of Key Terms**

**Review the Definitions of Public Goods, Free Riding, and Externalities:** Go back to your notes or your textbook to review the definitions of the following terms.

**Define Public Goods:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**To be a public good, a good must have these two qualities:**

**Define non-rival:**  
\_\_\_\_\_  
\_\_\_\_\_

**Define non-excludable:**  
\_\_\_\_\_  
\_\_\_\_\_

**Give an example or two of a public good:**

\_\_\_\_\_

**Define Free-Riding:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**If everybody free-rode and nobody paid, what would happen to production of that good?**

\_\_\_\_\_  
\_\_\_\_\_

**Define Externalities:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**What's the difference between a positive externality and a negative externality?**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Give an example of each kind:**

Positive Externality: \_\_\_\_\_

Negative Externality: \_\_\_\_\_

CHECK YOUR DEFINITIONS WITH THE PERSON NEXT TO YOU

**Read the following** (read along as your teacher reads this aloud):

The public (i.e., government) provision of a good or service is often a clue that the good might qualify as a public good. Fire protection is often provided by local governments and funded through county property taxes and other surcharges. Those funds also help pay for schools, streets and roads, police, and other services. In rural areas, fire protection is sometimes funded through special fire protection district taxes.

**Group Brainstorm**

**Begin Thinking About Fire Protection Infrastructure with a Small Group Brainstorm:**

What components of infrastructure (equipment, materials, etc.) are associated with the delivery of fire protection? See how many you can come up with. At the end, consider which components are hard infrastructure and which are soft infrastructure.

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**Main Activity**

**Read the Main Story:**

There have been several stories in the last few years of people either forgetting or refusing to pay fire taxes (usually around \$75), then watching their houses burn down because the fire department would not assist them when their homes caught fire.

David lives in a rural county that does not have its own fire department. Residents of that county are offered the option of paying a \$75 annual fee to the neighboring county to get fire protection from that county's fire department. Residents who do not pay the fee are not eligible to receive protection, but the opportunity to participate in this option is widely publicized to all residents of David's county. David decides not to pay the fee.

One day, David's house catches fire and he calls the neighboring county's fire department, but they will not respond to the fire. First, he tells them that he will pay the fee on the spot, and when they refuse, he then offers to pay whatever it would cost to put the fire out, but the department still won't go to his house. As the fire gets larger and threatens to spread to the house next door, the fire department comes out to protect that house since David's neighbor paid the annual fee. Nonetheless, they will not put the fire out at David's house, and his home burns to the ground.

**Whole Class Discussion Questions:**

Should people be able to pay for fire departments to put these fires out, if they have not paid the tax?

- How does this relate to whether or not fire protection is a public good?
- What kind of free-riding might be taking place here?
- If people were allowed to pay on the spot, what incentives might be set up?
- Should the fire departments have to put out the fires even if people do not pay?
- What kinds of externalities come into play here?
  - Positive externalities? Negative externalities?

**Small Group Discussion**

**Discuss the Following in Small Groups:**

Which of the following options would you endorse if you were faced with a decision about fire protection for your home and how that protection should be funded?

1. All residents are required to pay an annual \$75 fire-protection fee. It is not optional, and all residents receive fire protection.
2. All residents are invited to pay an annual \$75 fire-protection fee. It is optional, but if you do not pay the fee and your house catches fire, the fire department will respond and you will be required to pay the full cost of that service (which may be many thousands of dollars). There is no cap on how much it could cost.
3. All residents are invited to pay an annual \$75 fee to a private fire protection company. It is optional, and if you do not pay the fee but later call the fire protection company for assistance, you are required to pay \$50,000 (no matter what the actual cost of putting out the fire).

What are the strengths and weakness of each approach to fire protection?