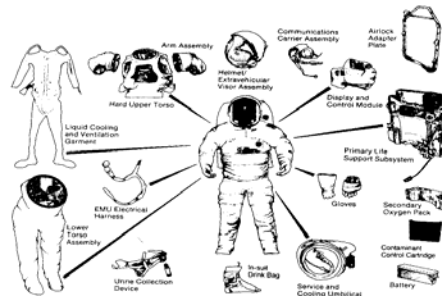


Survival in Space requires technologies that protect astronauts from the extreme thermal energy from the Sun. Their EMU (Extravehicular Mobility Unit) or space suit is such a technology.



Heat energy that we use to supply our basic needs is essential for our survival. An understanding of heat and the technologies that use heat will help us make sure that the energy available to us will sustain our planet now and in the future.

## 1.0 Human needs have led to technologies for obtaining and controlling heat.

### 1.1 History of Heat Technologies

#### *Early Theories of Heat*

Prior to 1600 - people thought that heat was a combination of fire and air.

1600 – Scientists decided that heat was an invisible fluid called *caloric*, because it seemed to flow from a hot object to a cold one. This was called the Caloric Theory.

#### *Heat Is Energy*

After further investigations and observations – Scientists decided that heat was not a substance, but a form of energy, that comes from the movement of tiny particles.

#### *Humans Using Heat*

As technology advances, so does our culture. New technologies create more demands for even better technology. The cold climate in Canada creates pressures on science and technology to meet the heating needs of Canadians. By understanding the concept of heat, we will better satisfy our needs to improve our cultural activities by adapting better to the climate.

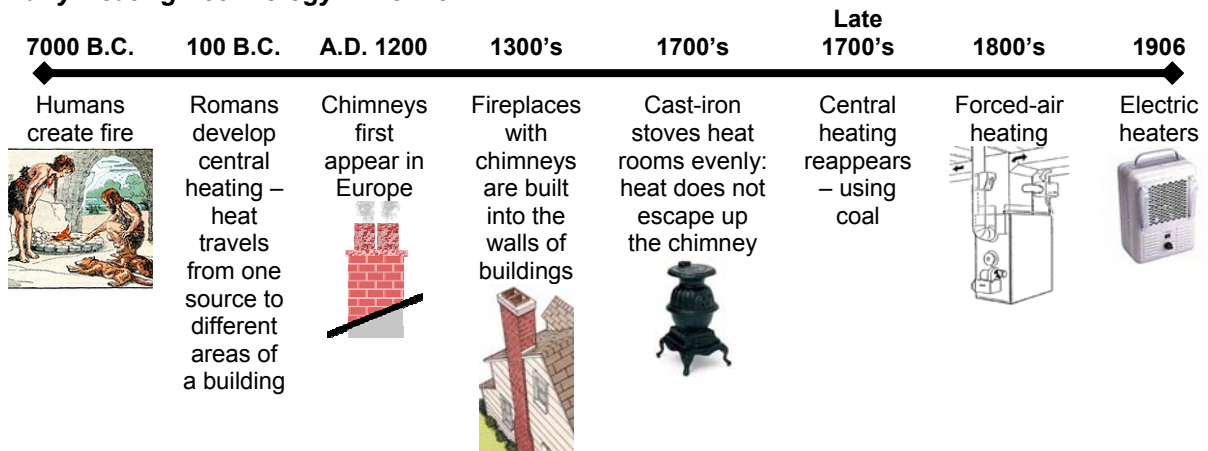
#### *Heat and Human Needs*

The importance of heat in Canada is linked to our basic **needs** of shelter, clothing, food, water, and physical activity. The human range of tolerance for temperature is between 0°C and 45°C. By improving our shelters, clothing and other basic needs, by making advancements in heat technologies, we can increase that range of tolerance to meet our **wants** as well.

#### *Heat-Related Materials and Technologies*



## Early Heating Technology Timeline



## 1.2. Heat Technologies in Everyday Life

In addition to being able to produce heat to meet human **needs** and **wants**. It is also important to be able to control that heat. As technologies develop to generate heat, ways to direct and manage that heat have also been created.

### **Personal and Societal Choices**

North Americans have a high standard of living, and as a result, *take for granted* the many tools and technologies that make their living easier, like the microwave oven.



This is an example of a **want** that many people in North America consider to be a **need**.

### **Making Sustainable Choices**

Both the personal and societal choices we make in using heat energy are important, because they affect our sustainability. We must use our heat energy resources wisely and be careful of the consequences to the environment when we use them. By looking for, and using, a wide variety of heat energy sources and developing technologies that will sustain this energy, we will be making ourselves a better future.