

## 5:30 A.M.



It's still dark outside, but the green-glow numerals on Jason's alarm clock say rise and shine. The shine will have to wait. The ceiling fan hums overhead and a tiny, blinking light on his fully charged cellphone signals there's a new email or post or tweet to look at. Thanks to reliable electricity, the clock, the fan, the phone, the lights, the appliances and things in every room of Jason's house all work. Energy is launching his day.



**ENERGY FYI:** Electricity must be generated, fueled by a primary energy source – natural gas, coal, nuclear, solar, wind, biomass, geothermal. In early 2016, natural gas, for the first time ever, became the leading fuel for U.S. electricity generation.<sup>1</sup>

## 7:35 A.M.



Susan's morning commute is an energy event – as is almost everyone else's. She climbs into her car, checks the fuel gauge and smiles. Gasoline prices are lower, and with some of the hundreds of dollars she's saving on gasoline, she can afford new winter coats for the kids.<sup>2</sup> She remembers hearing something on the news about the United States leading the rest of the world in oil and natural gas production<sup>3</sup> – which surprises her – and figures it has something to do with lower prices at the pump. Susan backs out of her driveway and heads to work. The broad, positive impact of more affordable fuels here at home is clear in highway lanes filled with cars, pickups, semis and other vehicles – moving people and commerce where they need to go.



**ENERGY FYI:** More than 90 percent of U.S. transportation energy comes from petroleum – gasoline, diesel, jet fuel and natural gas.<sup>4</sup> U.S. oil production was 9.4 million barrels per day in 2015, the highest output since 1972.<sup>5</sup> Average annual gasoline prices are at their lowest point in seven years.<sup>6</sup>

## 9:45 A.M.



Rasheed checks in for a doctor's appointment. A stethoscope dangles from a hook on the door of the examination room, and a fire engine-red box with a slotted lid for discarded sharp objects is on the counter. There's also a little stack of pointy black caps for the scope used to check ears. All come from petroleum. There's ethylene in the stethoscope's polyvinyl chloride tubing. The sharps box is plastic, made from ethylene and propylene. Petroleum also is in antiseptics, aspirin and antibiotics – here and in millions of Americans' medicine cabinets. Chemicals from petroleum are used to make the coating for time-release pills and others that won't irritate the stomach.<sup>7</sup> Without medical equipment and supplies made from oil and natural gas, our health care would look and feel very different.



**ENERGY FYI:** The nation's largest 3,040 hospitals use more than 5 percent of the energy consumed by the entire U.S. commercial sector.<sup>8</sup> Each year there are about 37 million calls for emergency medical help, most involving one of the country's 81,000 emergency vehicles.<sup>9</sup> Betadine, the brownish antiseptic that's common in emergency rooms, includes a synthetic polymer made of chemicals derived from petroleum.<sup>10</sup>

## 11:10 A.M.



The plant where Garrett works is in the business of fabricating steel pipe of all different diameters and lengths. The factory floor is a cacophony of clanks, thumps, whirs and hisses as steel is heated, rolled, pressed, stretched and welded into tubes of different diameters and lengths. All of that machinery needs energy to operate, including the lubricants that keep everything well oiled. Business is good, in part, because of America's energy renaissance. The need for manufactured supplies, including steel pipe and much more, is growing again. The oil and natural gas industry's long supply chain provides the materials, vehicles, equipment and more that support energy development. And jobs, like Garrett's.



**ENERGY FYI:** In steel-making, 20 to 40 percent of the cost is related to energy.<sup>11</sup> Energy-intensive industries – steel, paper, petrochemicals and others – benefit from power costs that are 30 to 50 percent lower than those of foreign competitors, thanks to abundant and affordable domestic energy production.<sup>12</sup> According to one study, the cost to manufacture goods in the U.S. was 10 to 20 percent cheaper than in Europe and nearly on par with costs in China.<sup>13</sup>

## 1:25 P.M.



Lunch is history and Allison turns her attention to the evening meal. Generally, she buys the food and Ben prepares it for them and their son Michael. They've got vegetables they bought at the farmer's market – squash, spinach, green beans – all planted, raised and harvested with equipment fueled by petroleum. They'll go well with a hamburger casserole. She'll brown the meat then turn things over to Ben. He enjoys cooking on their natural gas stove. It's efficient and temperatures are easy to control. They'll have leftovers. Families all across the country know the value of stretching a meal. It can't be done without plastic storage containers or plastic wrap to cover bowls, both made from petroleum.



**ENERGY FYI:** Plastic wrap has its origin in 1933, discovered accidentally by a Dow lab employee who was working on another project. It was initially a spray designed to protect fighter planes from salty sea spray. In 1949, Dow refined the spray into a plastic wrap made out of PVC (Polyvinylidene Chloride), a petroleum derivative. More recently wraps have been made from low-density polyethylene,<sup>14</sup> also from petroleum.

## 4:30 P.M.



Jacob, his wife Emma and their daughter Olivia leave their downtown apartment, headed for the park. It's just a short hop on the bus. Energy will get them there – some of the city's buses run on diesel, others on compressed natural gas (CNG). It's light jacket weather, and the family's windbreakers keep the breeze at bay thanks to fabrics coated with polyurethane, another petroleum derivative. Olivia wears her bike helmet to rollerblade on the park's sidewalks. There's petroleum in the helmet's plastic shell and foamy inner lining. Parks throughout the U.S. illustrate innovative energy use. Modern playground equipment often is made from recycled plastic and other materials that come from oil. They rest on a layer of sliced-and-diced old car tires – put there for softer landings – also made with the help of petroleum.



**ENERGY FYI:** Vehicle tires are made from natural rubber, but also a number of petroleum derivatives that make the treads and sidewalls stronger. U.S. production of tires for cars and light trucks totaled 167.8 million units in 2015, the highest total since 2011.<sup>15</sup>

## 7:30 P.M.



After dinner, John and Sarah get ready to put their small children to bed. They love their home. The natural gas furnace keeps things cozy on cool nights. The water heater runs on natural gas, too. Natural gas is abundant and affordable, thanks to America's shale energy renaissance. A broad economic study found that natural gas from shale is largely responsible for putting more than \$1,300 per household back in the pockets of Americans in 2015.<sup>16</sup> For John and Sarah, that's a mortgage payment. U.S. homes are constructed with and by energy – from fuels for the production of lumber for framing to the asphalt roofing, PVC pipe network and vinyl siding, all made from petroleum. It's held together by nails, screws and bolts – manufactured with the help of energy.



**ENERGY FYI:** It takes 600 pieces of lumber to build a three-bedroom Habitat for Humanity dwelling – from trees that were planted, grown, harvested and milled by vehicles and machinery powered by energy. The National Association of Home Builders calculates that building the average single-family home supported 2.97 jobs and more than \$110,000 in 2014 taxes.<sup>17</sup>

## 9:00 P.M.



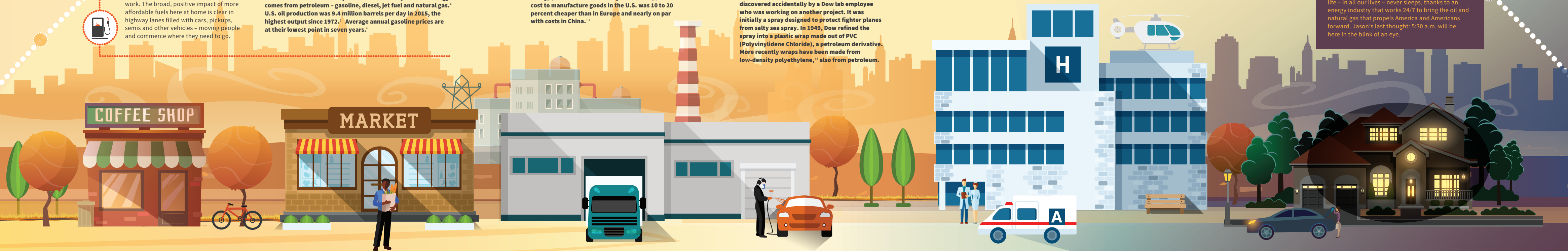
The children are tucked in, and Terry and Sharon settle on the couch for a movie or a new series. They're in a "show hole" after finishing both seasons of a sci-fi series over the weekend. "The Revenant" is on cable, so they watch that. Now, there's a film that took lots of energy to produce. Start with transporting actors, production staff, carpenters, wranglers, gaffers, boom handlers and key grips – and all their gear – thousands of miles to remote portions of the Canadian Rockies and the southern tip of Argentina.<sup>18</sup> And then more energy to keep them warm and dry while they were in the wild – something the film's main character would have appreciated. Without modern energy, we might all still be marveling over vaudeville. Modern motion picture production is energy intensive beyond transportation fuels and power for equipment. Latex, gelatin, silicone and other chemical polymers are derived from or transformed by using energy.



**ENERGY FYI:** Lots of movie special effects use fuels from oil and natural gas, such as butane, propane and methane, to create pyrotechnics that jump off the screen.<sup>19</sup>

## 11:10 P.M.

Jason heads off to bed. His clock's green-glow numerals gently fade as he falls to sleep. No ceiling fan tonight. His phone is plugged in, juicing up for the next day. The energy in Jason's home and his life – in all our lives – never sleeps, thanks to an energy industry that works 24/7 to bring the oil and natural gas that propels America and Americans forward. Jason's last thought: 5:30 a.m. will be here in the blink of an eye.





Energy is the power to create, shape, transform and animate. It's part of every human endeavor, initiative and invention. Energy helps turn disconnected thoughts into unified concepts, builds them and then puts them in motion.

**Energy is freedom.** It moves us from here to there – across town, across a continent and around the world. It supports the economic rungs forming the ladder for upward mobility.

**Energy is pivotal to improving the lives of millions of the world's most impoverished people.** It brings light to darkness. It helps ensure clean supplies of drinking water, provides safe home cooking fuels that protect health and is the foundation of the chemistry from which modern medicines are built.

WE DEPEND ON ENERGY. EVERY SINGLE ONE OF US. FROM THE MOMENT WE GET UP IN THE MORNING UNTIL WE LIE DOWN AT NIGHT – AND THEN AFTER WE DRIFT OFF TO SLEEP – ENERGY IS ALL AROUND US. ENERGY IS ... EVERYTHING.

**Imagine life without 21<sup>st</sup> century energy.** Our forefathers experienced it. In that world, all of life's daily challenges were more difficult, costlier, more time-consuming and necessarily more restricting. If that were our world, more of our waking hours would be spent focused on core necessities. Food, clothing, shelter – all would be harder to secure for ourselves and our families. We would have to work longer to take care of basic requirements.

**There would be less freedom.** There would be less opportunity for virtually everything people pursue: education, inquiry, exploration, problem-solving, construction, advancement, travel, art, music, science, health, leisure, benevolence. And the list goes on, because we would lack the energy to move, build and communicate in the modern ways we often take for granted.

**Without abundant, affordable and secure energy, lives would be shorter and those years less productive.** Our horizons would be narrower, our possibilities more constrained. The opportunities for each of us to better ourselves would be more elusive – and might not come at all. Many would be locked in place, their futures predetermined.

**Energy is the ability to manage our environment.** It protects us from the planet's potentially harmful aspects, delivering warmth when it's cold and cooling when it's warm. It lets us responsibly adapt to our circumstances while advancing climate objectives.

**Energy is essential for modern life.** It's the power to process, analyze and compute. We use energy to assemble and apply information that educates and empowers. Energy runs modern communications that reach across the globe and beyond, creating connections between people and fostering the exchange of ideas.

**Energy is the key to longer and better lives.** It's in the medical knowledge, diagnostic technologies and treatments that counter disease and heal. It makes advanced health care more available to more people.

**Thus, progress depends on understanding energy and its varied, catalytic roles** – from securing our livelihoods to achieving the sublime. Reckoning energy's broad worth adds urgency to securing it, optimizing its power and being efficient stewards. With this knowledge, we recognize the necessity of looking to the future and the energy it will require – and then planning and working to develop it.

**These considerations must drive the energy choices Americans make today:** What path will our nation take? Do we have the right leadership and the right policies to effectively harness our energy resources? America is energy rich, yet too often we fail to connect this wealth – and the ability to safely and responsibly manage it – with the capacity to spread and deepen our country's prosperity.

**We assume energy.** Flip a switch, and a light comes on. Plug in an appliance, and it works. Turn the key or press an ignition button, and the engine rumbles to life. We live by faith – that the energy we need will always be there. Yet, at some point the thought necessarily occurs:

Energy must come from somewhere.

ENERGY IS ... EVERYTHING.

PROGRESS DEPENDS ON UNDERSTANDING ENERGY AND ITS VARIED, CATALYTIC ROLES – FROM SECURING OUR LIVELIHOODS TO ACHIEVING THE SUBLIME. RECKONING ENERGY'S BROAD WORTH ADDS URGENCY TO SECURING IT, OPTIMIZING ITS POWER AND BEING EFFICIENT STEWARDS.

RESOURCES

1. EIA, Electricity Data Browser, "Net Generation for Electric Power," <a href="http://www.eia.gov/electricity/data/browser/">http://www.eia.gov/electricity/data/browser/</a>	12. Fortune, "U.s. Manufacturing Costs are Almost as Low as China's, and That's a Very Big Deal," June 2015, <a href="http://fortune.com/2015/06/26/fracking-manufacturing-costs/">http://fortune.com/2015/06/26/fracking-manufacturing-costs/</a>
2. AAA, "2015 Gas Prices Second-Cheapest in a Decade," <a href="http://newsroom.aaa.com/2015/12/2015-gas-prices-second-cheapest-in-a-decade-aaa-year-end-gas-price-report/">http://newsroom.aaa.com/2015/12/2015-gas-prices-second-cheapest-in-a-decade-aaa-year-end-gas-price-report/</a>	13. Harvard Business School/Boston Consulting Group, "America's Unconventional Energy Opportunity," June 2015, <a href="http://www.hbs.edu/competitiveness/Documents/america-unconventional-energy-opportunity.pdf">http://www.hbs.edu/competitiveness/Documents/america-unconventional-energy-opportunity.pdf</a>
3. EIA, Today in Energy, "United States Remains Largest Producer of Petroleum and Natural Gas Hydrocarbons," May 2016, <a href="http://www.eia.gov/todayinenergy/detail.php?id=26352">http://www.eia.gov/todayinenergy/detail.php?id=26352</a>	14. USPackagingandWrapping.com, "Plastic Wrap 101," <a href="http://www.uspackagingandwrapping.com/Plastic-Wrap-101-19.html">http://www.uspackagingandwrapping.com/Plastic-Wrap-101-19.html</a>
4. EIA, "Use of Energy in the United States Explained," <a href="http://www.eia.gov/energyexplained/?page=us_energy_transportation">http://www.eia.gov/energyexplained/?page=us_energy_transportation</a>	15. TireBusiness.com, "2015 Was Strong Year for U.S. Tire Industry," February 2016, <a href="http://www.tirebusiness.com/article/20160217/NEWS/160219928">http://www.tirebusiness.com/article/20160217/NEWS/160219928</a>
5. EIA, "U.S. Field Production of Crude Oil," <a href="https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&amp;s=MCRFPUS2&amp;f=A">https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&amp;s=MCRFPUS2&amp;f=A</a>	16. National Association of Manufacturers, "Energizing Manufacturing," May 2016, <a href="http://www.nam.org/Data-and-Reports/Reports/Natural-Gas-Study/Energizing-Manufacturing/">http://www.nam.org/Data-and-Reports/Reports/Natural-Gas-Study/Energizing-Manufacturing/</a>
6. EIA, Petroleum & Other Liquids, "U.S. All Grades All Formulations Retail Gasoline Prices," <a href="http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&amp;s=emm_epm0_pte_nus_dpg&amp;f=a">http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&amp;s=emm_epm0_pte_nus_dpg&amp;f=a</a>	17. National Association of Home Builders, "Impact of Home Building and Remodeling on the U.S. Economy," May 2014, <a href="https://www.nahb.org/en/research/housing-economics/housings-economic-impact/impact-of-home-building-and-remodeling-on-the-u-s-economy.aspx">https://www.nahb.org/en/research/housing-economics/housings-economic-impact/impact-of-home-building-and-remodeling-on-the-u-s-economy.aspx</a>
8. EIA, Today in Energy, "Large Hospitals Tend to be Energy-Intensive," August 2012, <a href="https://www.eia.gov/todayinenergy/detail.cfm?id=7670">https://www.eia.gov/todayinenergy/detail.cfm?id=7670</a>	18. AtlasofWonders.com "Where Was the Revenant Filmed?" <a href="http://www.atlasofwonders.com/2016/01/the-revenant-filming-locations.html">http://www.atlasofwonders.com/2016/01/the-revenant-filming-locations.html</a>
9. Federal Interagency Committee on Emergency Medical Services, U.S. Department of Transportation, National Highway Traffic Safety Administration, "National EMS Assessment," DOT HS 811 723, 2012, <a href="https://www.ems.gov/pdf/811723-National-EMS-Assessment-2011.pdf">https://www.ems.gov/pdf/811723-National-EMS-Assessment-2011.pdf</a>	19. High-Tech Special Effects.com, <a href="http://www.hightechspecialeffects.com/effects/special-fx">http://www.hightechspecialeffects.com/effects/special-fx</a>
10. Drugs.com <a href="https://www.drugs.com/inactive/povidone-169.html">https://www.drugs.com/inactive/povidone-169.html</a>	
11. World Steel Association, "Energy use in the steel industry" <a href="https://www.worldsteel.org/publications/fact-sheets">https://www.worldsteel.org/publications/fact-sheets</a>	