

POWERFUL: ENERGY FOR EVERYONE

95 Minutes

00:00

**[Opening Credits]**

00:02

*Quiet Revolution Pictures presents*

00:08

*A Living Lightly Production*

00:35

*A film by David Chernushenko*

00:44

*Produced by Michael A. Dobbin & David Chernushenko*

00:52

*Music by David Burns*

00:56

*Edited by Lisa Virtue*

00:58

*Directed by David Chernushenko*

01:04 **[Title]**

*POWERFUL*

*ENERGY FOR EVERYONE*

0:01:12

**[David Chernushenko - live speech]**

"We know about climate change ... We know that fuel prices, even if they are in a brief dip right now, they're not going to stay down. They're going to keep going up. We know that electricity prices are going to go up and it's going to get harder and harder to have reliable electricity supply and acquired in a way that's not polluting our air our water our soil. So we have big challenges. Why don't we start by acknowledging they are there and choosing a different way forward."

0:01:40

**[David Chernushenko voice-over]**

My name is David Chernushenko. I'm an entrepreneur and green economy educator. I think the way we get our energy and use it falls far short of our potential.

01:51

**[David Chernushenko live speech]**

I don't think there's anyone in the room... who says I'd rather have more polluted air, I'm a big fan of coal and I'd like to see more nuclear reactors built.

0:02:03

**[David Chernushenko voice-over]**

In my effort to live more lightly, I've been trying to make smarter choices about food, water, waste, and, especially, energy.

Energy has always intrigued me.

It's right there in the words: energy and power.

0:02:19

**[David Chernushenko voice-over]**

In 1999 my wife and I decided to start generating power on the roof of our downtown Ottawa home. We wanted to do something about where we sourced our energy; To make a statement, even if just a small one. And even if some found it a bit eccentric.

02:33

**[David Chernushenko voice-over]**

We didn't NEED solar panels after all.

We were on the grid and had all the energy we could ask for, reliable, on demand, and so cheap it could be wasted -- and sometimes was.

I wanted our panels to feed electricity into the power system -- to be "grid intertied" -- but it wasn't possible or legal in the province of Ontario, unlike in some other states and provinces. Our only choice was to store it in batteries.

0:03:01

**[David Chernushenko voice-over]**

In August 2003, Eastern North America suffered a major blackout. 50 million people were cut off: no bank machines, no gas, no internet. We, however, were the house with the lights on.

Still, the blackout revealed the limits of an "off grid" system. Our batteries would have lasted only two days, just giving us light and keeping the fridge running.

0:03:26

**[David Chernushenko voice-over]**

The failure of the grid was a wakeup call, or it should have been. A reminder that our lives and lifestyles depend on a steady supply of cheap energy from just a few big sources; a system that can be less reliable than we want to believe.

0:03:42

**[David Chernushenko voice-over]**

In 1999, there had been talk of grid intertie coming soon in Ontario. I could actually have earned money from the electricity my panels generated! Yet here I was in 2008, still not connected and still obliged to pay for Ontario's nuclear energy debt on every electricity bill!

0:04:01

**[Text]**

*Debt retirement charge*

**[David Chernushenko voice-over]**

Was I the only one thinking we should be exploring other options. It seems not.

0:04:08

**[Title] Brad Leonard, Renewable Energy of Plum Hollow, Kingston, Canada**

We saw a real change happening a couple years ago: we saw a lot of boomers coming in with a lot of disposable income and rather than spending that income maybe buying an SUV, they would buy a smaller car and take that extra money they would spend and put it into an alternative energy system.

0:04:27

**[Text:]**

*ALTERNATIVE ENERGY*

*Solar, wind, hydro-electric, geothermal, biomass, biogas*

**[David Chernushenko voice-over]**

Looking around the world, we can see that renewable energy systems work. Conservation and efficiency work. What then, is blocking the kind of global energy revolution that some people believe is essential, even inevitable?

0:04:40

**[Title] Sergio Oceransky Losana, World Wind Energy Institute, Denmark**

The way in which energy politics works determines a lot of the way in which the rest of society works. Energy is the most important commodity. It's the most important market, energy corporations are the most powerful corporations in the world. ... they have a lot of influence.

0:05:03

**[Title] Louis Helbig, Aerial photographer, Ottawa, Canada**

The tar sands are the world's largest capital project...where the people with the money, if you will, or the power make decisions that might not be in our best interest.

It is happening in our own backyard. ... I think what's missing in Canada is a substantive debate about it ... I think it's less an environmental issue as in fact an issue of democracy, of accountability, of public discourse, of civil engagement.

0:05:35

**[David Chernushenko voice-over]**

We seem stuck in old ways of sourcing our energy, and consuming it. Why are our elected officials still encouraging approaches that have proven so costly -- socially, ecologically and financially -- while discouraging people like me from investing in a brighter future?

0:05:53

**[Title] Paul Gipe, Consultant, Wind-works.org, California, USA**

We have always had the ability to develop renewable energy on a scale that we need. It's always been a question of do we have the will to do it.

0:06:03

**[Title] Paul MacKay, Investigative reporter and author, Ontario, Canada**

We waste so much energy that we have a lot to gain by focusing on efficiency. We are blessed in Ontario actually with enormous renewables.

0:06:13

**[Title] Johan Hultqvist, Lead singer, Mr. Something Something**

In the past couple of years it seems there has just been this explosion of brilliant ideas and new devices

and new ways of creating sustainable energy.

0:06:26

[TEXT]

*\$40 Billion for nuclear. The Ontario government has announced it will invest \$40 billion to upgrade and expand nuclear power generation in the province."*

[TEXT]

*Nuclear*

0:06:45

**[Title] Marion Fraser, Energy policy consultant, Toronto, Canada**

It's up to us as consumers and generators right across the province to demonstrate that we don't need another nuclear plant.

0:06:54

**[David Chernushenko voice-over]**

Then I heard about Germany's successful minimum price law, also known as the Feed In Tariff.

[Text]

*Feed in Tariff*

0:07:00

Brad Leonard

Every little town you went through you saw solar panels on many many roof tops. ... as you drove through the country-side it would be nothing to see four or five windmills. So here's a country with less sunshine than Canada ... and they're producing a lot of their energy from solar power.

0:07:17

Paul Gipe

Talk to farmers in Denmark and Germany and see why are they installing wind turbines in their backyard. What is it that they hope to accomplish?

Do they hope to make money so that they can stay on the farm, and they can pass that farm on to their children? Is it because they want to save the world? ... and what is it about Germany and Denmark that a farmer can do this, as well as a corporation?

0:07:41

**[David Chernushenko voice-over]**

Industrialized countries today are the wealthiest in human history and yet our thirst for cheap energy is driving us to make short-sighted choices, with hidden costs. We remain shackled to the status quo.

I believe we can do better.

0:07:58

[David - speech]

Charles Darwin, what did he say? "survival of the..."

Wrong. What he actually said is "it's not the strongest species that survive, nor the most intelligent, but the ones who are most responsive to change."

Changes happen. Big changes happen. The survivors are the ones who are able to adapt. The survivors are the ones who anticipated and started taking steps. But I'd like to talk about more than survival. How about the people who thrive. We thrive when we anticipate. We thrive when we have, and I'll use this word, acquired resilience.

0:08:42

[Johan Hultqvist]

Our drummer Larry said “Man what if we could do a bicycle powered show, wouldn't that be awesome!” We put together this system of 10 stations where people can hook up their bicycles and then pedal away to power a fair-sized PA system.

You could say that it is a gimmick but at the same time it makes me think if we could do this, if we can have fun and be creative and get people dancing and involved without contributing to more climate change, well then I ask myself what is not possible?

It's excitement around human ingenuity right. Our greatest untapped resource is this human urge to create beauty.

0:9:36

**[David Chernushenko voice-over]**

My family had been planning a trip to Europe in the spring of 2008. This was my chance to see Germany and learn more about the Feed in Tariff first hand. And I could check out a few other energy leaders while I was at it. I would document my journey, and seek out answers to some burning questions.

Is it really possible to meet our energy needs with less reliance on fossil fuels and nuclear?

Who is already taking that path?

| And how have they made it work?

0:10:07

**[David Chernushenko voice-over]**

Once we'd set up our home base in Alsace, France, I made my first foray to Germany. To Berlin, for a conference on solar energy and architecture. The fall of the Berlin Wall changed the lives of millions. Now, other barriers were being knocked down all across Europe, with the potential to change the lives of everyone.

0:10:33

**[Prof. Sue Roaf]**

There are thousands of solar cities around the world, or renewable energy cities, and they have got the power to make huge changes.

0:10:41

**[Title] Josep Puig**

**former municipal councillor, Barcelona, Spain**

Fifty percent of all the population lives now in cities, in urban areas. The problem of energy sustainability will be solved in cities.

0:10:51

**[Title] Prof. Sue Roaf**

**Heriot-Watt University, Edinburgh, UK**

**Author, *Adapting Cities and Buildings for Climate Change***

Barcelona passed it that every new building has to have a solar hot water system, then 10 Catalanian cities passed it, then the whole of Catalonia put in a law; in 2005 the whole of Spain put in a law.

0:11:06

**[Title] Prof. Steffen Lehmann,**

**University of Newcastle, Australia**

The major challenge lies in increasing the densities in the suburban areas and not to sprawl any further and to increase the footprint of the city.

Urban design is great because it provides you and me the highest ability to influence sustainable outcomes.

0:11:22

**[Prof. Sue Roaf]**

Buildings are incredibly important in the climate change equation, because buildings use over 50% of the energy in developed countries and emit over 50% of the emissions. What we need is a paradigm shift to really appropriate 21st century buildings.

0:11:41

**[Prof. Steffen Lehmann]**

Making the cities future proof is obviously a huge task because most of the building stock is already existing, and how to transform our existing cities, into cities based on renewable energy. To make great

buildings is fine on the building level but we have to move into the city level if you want to have an impact and change.

0:12:01

**[Josep Puig]**

It's possible to do everything with renewable energy, but it's a question of the political will. Perhaps the barriers, sometimes are in the head of people, not in the reality.

0:12:19

**[David Chernushenko voice-over]**

Berlin offered plenty of revelations, but the biggest was the idea of the 100% renewable energy region. A number of places in Europe are already powered completely by renewable energy. I made plans to include some on my energy discovery tour.

0:12:37

**[David Chernushenko voice-over]**

When we planned our trip to Europe, we asked our children to pick one place they most wanted to go. Eric picked Rome for its history.

Dwindling access to energy played a big role in the collapse of the Roman empire. Energy in Roman times meant wood, and food -- food not just for citizens, but as fuel for beasts of burden, slaves and soldiers. Eventually Rome was getting its supplies from so far away that it had become unsustainable to keep its supply lines and trade routes open. Have we, today, made ourselves just as vulnerable?

0:13:16

**[David Chernushenko voice-over]**

My daughter Gaia chose to visit Venice, for its canals and art, or so I thought.

**[David – off screen]**

What do you like most about Venice?

**[Gaia Chernushenko]**

There are no cars.

0:13:37

**[David Chernushenko voice-over]**

Few cities are entirely car-free, but plenty are working to reduce the volume of cars and raise the quality of life for people. Some of Europe's big cities charge a "congestion" fee for entering the city centre, investing that money in public transit. Others are looking at new ways to help more people move around by bicycle.

Public bicycles have been available in a few European cities for years. But they are popping up all over now.

In Lyon, you will find VeloV -- love your bike.

It's designed to complement public transit, where you need a bike at the start or finish of a trip.

0:14:30

**[David Chernushenko voice-over]**

Eighty percent of France's electricity comes from nuclear stations. But not everyone embraces nuclear in France, or neighbouring Germany. In the Seventies, protesters in both countries teamed up to block construction of a nuclear station in Germany, near the town of Freiburg.

One protester was Jacques Muller, now mayor of his town, and also a Green senator.

0:14:53

**[Title] Jacques Muller**

**Mayor of Wattwiller, Member of French Senate**

*[sub-titled in English, original sound is in French]*

I said to myself, to be heard you need to get involved in politics, not just stay an activist, you have to be in places where the power is in order to make changes happen.

When we built the building for this daycare, it was a big deal, and we decided to aim for quality, high environmental quality.

We decided to go with solar energy, all our hot water is heated by solar, we decided to create the first energy-generating building in the region, where we can sell our excess energy to the grid. Because we produce far more than we need for the building.

0:15:39

Our big effort now will be to keep working on increasing the use of renewable energy and improving energy efficiency in our buildings, especially as we have a lot of old buildings that need work.

Sustainable development is not just greenhouse gases, we still don't know what to do with our nuclear waste, we really shouldn't be promoting nuclear energy as something that's sustainable.

0:16:17

**[Dr Josef Pesch]**

The first nuclear power station was not built here. This was the beginning of the end of nuclear power in Germany in the late 70's. The prediction then as now was that if we don't build this nuclear power station the lights will go out. We are now 30 years on from this; the lights are still on.

0:16:38

**[David Chernushenko voice-over]**

Like Jacques Muller, Josef Pesch once worked to block nuclear expansion. Then he set his mind to building renewable alternatives. He now runs FESA, an association that helps communities to develop their own solar, small hydro and wind projects.

He enticed me to visit the Freiburg region by listing the achievements of Freiamt – a community nestled in the Black Forest. Freiamt would be my first glimpse of a 100% renewable energy region. 130% in this case!

0:17:11



**[Title] Dr Josef Pesch**  
**General Manager, FESA GmbH, Freiburg, Germany**

They live off farming and tourism and so there was a debate. After the first two windmills were in place and the whole “hoo ha” that you have about windmills – that it will scare off the tourists, that it will have noise impact and so on and so on – turned out to be totally and utterly false. So this community then looked at this and decided we want two more. So we built two more. This community on its own made a very clear decision. It is not some investor from Frankfurt saying, hey, we are going to build 10 windmills.

0:17:49

[Text]

*Minimum price law –also known as Feed in Tariff*

**[Title] Dr Josef Pesch**

The minimum price law is very simple: if you produce renewable energy, the grid operators have to buy it, all of it, have to give priority to it, and they have to pay you a fixed price.

If he has to shut down dirty generation, that is okay, that is wanted, that bias towards renewables is in the law.

0:18:14

This is the building of the local fire brigade that they added solar to. They put solar on the changing rooms of the local soccer stadium.

This farm over there, he is now biogas farming. He got together with three other farmers who are bringing raw materials to him and are taking out the sludge that comes out of the biogas plant that is then brought back to the fields as fertilizer. After we started the windmill project, there was this raised awareness about the importance of bio-energies about renewable energies.

0:18:54

Many of the people whom we contacted about using their roof said hey, yes this is a great idea, we really like this but we’re doing it ourselves. We’re not giving you the roofs.

If you have a wind site that you can use, that generates any thing between €5-€10,000 of annual income without any extra effort.

When the wind is really blowing what we have here is that the noise from the trees almost blocks out the noise from the turbines. This is what the farmer says who is closest.

0:19:38

If you’re very quiet you can just hear the wind, the blades.

Traffic is much much louder!

Can the landscape take it? I believe it can.

I like to hear them turn, and you know with every revolution the blades make it produces kilowatt-hours. That's the beauty of it. You can stand here and just watch kilowatt-hours being produced.

0:20:38

**[David – off screen]**

I got it!

**[Joseph Pesch]**

This is Freiamt for you. Now this wasn't ordered!

When you remove the windmill in 20 years, the landscape will be as it was before. The next generation can take a completely fresh and uninhibited decision. Of course, that is definitely not true for nuclear power, and it's not true for coal as well.

Some people are making a lot of money now out of renewables, and that's alright.

0:21:12

**[David Chernushenko voice-over]**

Just south of Freiamt, the city of Freiburg is a hotbed for sustainable development -- chiefly solar energy research and good community design, a key to energy wise living.

0:21:25

**[Title] Craig Morris**

**Author, Energy Switch, Freiburg, Germany**

Freiburg is one the few places that is still growing.

They said we have these two areas we can develop.

Let's develop these two and quite literally create green zones out of them. They said we're going to make what we have very compact. So the planners went in and said that we have to do everything at once to make this work; we have to get the buildings up, you have to get the homes up, but you also have to have a street car connection to the city, the inner city. It's a real community because the people had real input into how the community would be designed.

0:22:02

They put their cars up in garages that are out of the way and they don't encourage everyone to be driving past all the houses all the time.

"We're going to make the world the way we want it." It's a childish way of viewing the world, but they did it.

0:22:20

In the afternoon you'll have this place...it'll be teeming with kids and you have a giant playground over here on the other side so the kids can cross the street here freely. Here comes a street car. Look out.

I've got a house in Baltimore, street car rolling by my door. There was a time in America when having a streetcar rolling by your door was just about the best thing you could have. And we have it again here.

0:22:46

There is a theatre here in walking distance, any dozen restaurants ... by the time I've got in the car and gone and found a parking space I could have walked, and I do.

When I go back to North America the first thing I have to do is rent a car. Doing without a car here is no problem. Doing without a car in Dallas, Texas is a real problem. You might as well not go.

0:23:32

**[David Chernushenko voice-over]**

From a distance, Sweden is a beacon of sensible sustainable living. But how about up close?

Living well on less energy globally, will require an overhaul of our cities, and Sweden has made an impressive start. National and local governments promote sustainable urban living in an integrated way, through better public transport, more efficient building design and turning degraded land into compact communities. Such as Hammarby Sjostad, in the heart of Stockholm. This former industrial area integrates residential neighbourhoods with commercial activity, allowing some people to live and work in the same area. For commuting, there are a range of options other than the car: train, bus, ferry and bicycle. For running errands and weekend use, there is even a car sharing club.

0:24:24

**[Erik Freudenthal]**

Seventy nine percent are either walking, taking a bicycle or using the local transportation system. This is due to integrated planning, we call it. Sit down beforehand and make all these decisions, how we should solve all these environmental matters, how the infrastructure is going to work and so on, before you do the master plan.

**[Title] Erik Freudenthal**

**Information Office, Glashus Ett, Hammarby Sjostad, Sweden**

You have this main road going through the area but all the side streets are dead-end streets. You have cycle ways along the canals and also one area of the main street is designated for cyclists.

0:25:03

**[David Chernushenko voice-over]**

There are many intelligent ideas on display at Hammarby Sjostad, but the most surprising one is almost invisible. Waste collection for the entire community is actually underground. It is user-friendly systems like this that have made it possible for Sweden to divert 92% of its waste from landfills.

0:25:23

**[Title] Joakim Karlsson**

### **Envac automated waste collection, Sweden**

You have portals or inlets in all the houses or outside in the courtyard: One inlet for normal waste that is going to become energy; one inlet for organic food waste and one inlet for recyclables, for newspapers. There is a pipe system underground connected to these collection stations. For the newspaper you are making new paper; for the food waste you generate biogas and compost, and for the mixed waste you are making district heating and electricity.

0:26:06

Three or four times per day we start up the fans and empty all the discharge valves in the area.

You have a solution that can reduce traffic, make it clean and easy to use for the users, and also in the long term an economic rational decision because you collect all of the waste from one point instead of going with a waste truck to hundreds of different bins.

This is a very typical inlet point or a portal.

0:26:43

Here in Sweden we are not handling this by a landfill. We are trying to take the energy from the mixed waste: incinerate it, but recover the energy so it will become district heating and electricity.

0:27:01

#### **[David Chernushenko voice-over]**

While most Swedes believe in handling waste by burning it, I travelled to Linköping with a suitcase full of biases against waste incinerators. They pollute the air. They create greenhouse gases. They generate toxic waste. They discourage recycling. But maybe the time had come to test those biases against the Swedish approach.

Linköping's city-owned "waste to energy" incinerator handles burnable waste from 25 municipalities. And makes a profit.

0:27:31

#### **[Title] Samar Nath**

#### **Usitall, Swedish waste-to-energy solutions**

There is not a question of either recycling waste or incinerating waste; this is a question of synergies.

You see countries that incinerate large amounts of waste, they also recycle large amounts. We build a system around waste incineration. When you incinerate waste you don't have to burn as much fossil fuels to create energy, so the waste itself is a replacement of fossil fuels.

0:27:54

It's not economical to incinerate waste that you can make more money out of by recycling. We have 49% recycling in Sweden.

0:28:05

Over 70 studies have been examined; all favour waste-to-energy. With waste-to-energy you take the energy you need from non-recyclable waste material.

We have minimal greenhouse gas emissions and no methane.

0:29:18

In this particular incinerator our fuel is waste. We reach temperatures of 1100 degrees centigrade, and the walls of this boiler are filled with water, which obviously gets super heated into steam. And the steam is sent through the system into the turbine over here and the turbine drives the generator, which produces electricity.

0:29:45

We absolutely have to take out the remaining heat from the steam in the form of district heating. From the total content of energy in the waste, we can take out about 25 to 30% in the form of electricity. The rest of it has to come out of it in the form of heat. If you don't have a district heating grid you're only using 25% of the fuel.

0:29:11

So we send this heat through insulated hot water pipes in the city. The advantage of distributing the energy in the form of heat is you can also use it to produce cooling. So instead of having electricity-fueled air conditioning units we have heat-fueled air conditioning units which makes this system valuable also for hot countries.

0:29:38

In waste management it's really important to maintain a holistic perspective. You can't just take one plant out of context and say this is economically feasible or this is not. This is not a competitor to the waste incineration plant. It's a compliment: we treat organic or biological waste here.

0:30:01

Out the top comes methane gas and carbon dioxide. This gas is then purified to 98% methane so we can fuel buses and cars.

0:30:10

**[Title] Muharrem Demirok,**

**Chairman, Community Planning Committee, Linköping, Sweden**

We are one of the first cities to work with biogas... all the buses run on biogas.

Linköping is a centre for companies that work with sustainable development and work with renewable fuels; so we've reached a point now where this effort is starting to give us jobs.

0:30:33

We are one of the world's best cities when it comes to the possibility of riding a bike. Bicycle routes were an accepted part of the city planning. We have over 400 kilometers of bicycle roads in Linköping.

0:30:50

**[Title] Hans Lindberg,  
Cycling coordinator, City of Linköping, Sweden**

If you like people to use bicycles, you must have the infrastructure, that's a start; then you can try to change behaviours. Bicycle lanes, bicycle lanes, bicycle lanes and tunnels.

Over 30% of the traffic is bicycle traffic, but there is still potential to change people's behavior.

0:31:12

**[Demirok]**

We're not going to save the world, but the people that live in Linköping support this effort. And they want us to do this, and as a politician it's my job to follow my voters.

0:31:50

**[David Chernushenko voice-over]**

Urban sustainability can take many forms, as the port city of Malmö illustrates.

Where the new Western Harbour redevelopment has the luxury of starting from scratch on a former industrial site, using cutting edge design and technology, to produce 100% of its energy needs locally, the older worker's district of Augustenborg must make the most of aging buildings and infrastructure.

0:32:12

**[Title] Louise Lundberg  
Superintendent, Scandinavian Green Roof, Malmö, Sweden**

If you compare it to the Western Harbour, here you already had old run down buildings, you had a sewage system which wasn't working optimally any more, and you had a bunch of people. You can't get to the same technological heights, but on the other hand, there are so many more of these types of areas.

0:32:40

**[David Chernushenko voice-over]**

A distinctive feature of Augustenborg is its green roofs, part of a holistic approach to managing energy, water and other resources. By capturing rainwater, green roofs reduce pressure on the aging water management system. At the same time they improve building insulation and provide more biodiversity and space for gardening.

0:33:01

**[Louise Lundberg]**

Green roofs take about 50% of the rainwater that falls on them annually. All rainwater that you can keep locally, and evaporate or infiltrate is going to help our ocean stay cleaner.

0:33:17

I think one big feature here also is how we've been working with people.

Before this project started this area had a voting rate of 54%. At the peak of this project when it was very active with listening to people, communicating, taking everybody's

views into account, the voting rate four years later had gone up to 80%. People had noticed that they counted.

0:33:55

**[David Chernushenko voice-over]**

Denmark's traditional icon is the Little Mermaid, but it's modern icon is the wind turbine -- a symbol of its drive to innovate by linking economic and environmental progress.

0:34:08

**[Title] Peter Bach  
Danish Energy Authority**

We have been quite successful over the last 25 years.

In 1973 when we had the first oil crisis we were 95% dependent on imported oil. We have managed to double our economy, and keep the primary energy consumption stable.

0:34:17

**[TABLE]**

*Danish Energy Consumption and Economic Growth (1980-2005)*

*GDP*

*Gross Energy Consumption*

0:34:27

We have to go further on in the future.

Coal will be for sometimes still an important part of the Danish system.

The cleanest fuel is the fuel not used.

0:34:35

Wind turbines are today producing more than 20% of the total electricity consumed in Denmark.

0:34:40

**[Title] Jens Larsen  
Copenhagen energy and environment office, Denmark**

Eighty percent of all turbines in Denmark are locally owned or initiated. People understand why they have 2 or 3 turbines in the neighbourhood. Unfortunately we have the same problem now as in other countries: the turbines are getting bigger and people are saying more why should we have turbines here? It's mainly the big companies establishing wind turbines and this is a problem.

0:35:19

**[Bach]**

If you are a shareholder yourself you think it's beautiful... if the big company owns it,

you think it's ugly.

0:35:27

**[David Chernushenko voice-over]**

Where the turbine is the country's ambassador for technological innovation; the bicycle is the capital's symbol of social innovation.

0:35:40

**[TEXT]**

Copenhagen Population: 1.15 million

Bicycles: 2.5 million

0:35:53

Bicycle lanes: 360 kilometres

Year-round bicycle commuters: 40 percent of residents

0:36:12

**[Title] Johan Hultqvist  
Lead singer, Mr Something Something**

The bicycle is really a symbol for a quiet revolution that's going on right now.

I have some of my happiest moments riding my bike down the street through the city because I feel free. I am truly free and I am propelling myself forward.

0:36:47

**[David Chernushenko voice-over]**

Many Danes are seeing the bigger picture when it comes to energy. Propelling themselves forward with wind and wheels... and food. Food is the most basic form of energy. What we eat and where we get it has implications for energy demand and greenhouse gas emissions. The modern food system relies on long distance shipping, but just north of Copenhagen, I found some pioneers who grow or source organic produce, as locally as possible, requiring less energy for transport.

0:37:19

**[Title] Annette Hartvig Larsen  
Managing Director & CEO, Aarstiderne, Denmark**

We pack boxes of vegetables and fruits and we deliver them directly to the doorsteps of people's houses.

We have been registering everything, so we know exactly how much carbon dioxide we throw out in the air. The first step is to know what you are doing and then we can start finding out where we can have an impact.

0:37:46

**[David Chernushenko voice-over]**

In the lead up to my trip, everywhere I turned there were reports about Samsø, the renewable energy island, a sort of self-made miracle.

Samsø's plan was to become entirely run on renewable energy within 10 years,



using a combination of conservation, district heating based on biomass and solar thermal sources, and electricity from the wind.

0:38:10

**[Title] Jesper Kjems**  
**Samsø Energy Academy, Denmark**

On the heating side, we had the possibility of making district heating plants which we have a lot of in Denmark, but here we base the district heating on renewable energy sources. We have 3 plants based on straw, and we have one plant based on wood chips and solar panels.

0:38:32

We decided to build 10 offshore wind turbines south of Samsø that produce more energy actually than we use in our transport, including the three ferries and their oil consumption.

Of course, when it's not windy we have to borrow a little from the mainland but then we send more clean energy back when it's windy.

0:38:52

We export more CO2 neutral renewable energy than we import of fossil fuels. We really want to do something more.. We just got electric bikes at the academy so maybe we can exchange car number two with an electric bike.

0:39:11

If the government had said now you have to have wind turbines on Samsø, the Samsø population would go like this. There are different mechanisms you can do to make people take ownership. The majority of the grown up people on Samsø has shares in a turbine, and when you own a wind turbine yourself, it looks differently, it sounds differently.

0:39:36

**[Title] Erik Koch Andersen**  
**Farmer, Samsø, Denmark**

You know the yellow flowers you see in the field now. You put up into this one and press the oil out here.

It's pumped into this tank, it goes through this filter, and then I can pour it in the tractor and into the car.

0:40:03

Solar panels for heating the house and solar cells for making electricity. I send power out to the community. Not at night though, I have to take it back then. I am charged by how much I am using. But it's counting backwards in the daytime.

0:40:23

**[David – off screen]**

The career of a farmer didn't used to include being an energy specialist as well.

**[Andersen]**

I ask these guys before I invest anything. I come to the academy and ask for advice.

**[David off screen]**

And they give you good advice?

**[Andersen]**

Ya ya, every-time.

0:40:44

**[Jesper Kjems]**

We are part of an energy service in Denmark which has 10 offices around Denmark, so all Danish people can call us for free and get advice.

We felt it was time to have a place to show what we have done because so many people were eager to know how we did it.

0:41:08

It's not like everyone on the island are now totally eco-freaks or something like that. People still buy pickup trucks on Samsø, but I think quietly and slowly it will change people's attitudes.

0:41:22

**[David off screen]**

Do you enjoy having all these interested foreigners come and put their cameras in front of you.

**[Andersen]**

I think it's good. We are attracting people from all over with this little experiment. I just hope we'll be a little more ambitious, like having cars running by batteries and -- what do you call it -- hydrogen cars and so on. You can charge the batteries with the windmills, have these cars running without pollution.

I have shares in the wind turbines, in the ones offshore.

0:42:01

**[Marie-Odile Junker off screen]**

Why did you buy shares in the windmills?

**[Andersen]**

Just interested in renewable energies. We have to do it.

0:42:21

**[David Chernushenko voice-over]**

My Europe trip showed me how good city planning and integrated transport systems are vital to using energy efficiently.

I also discovered the role that community ownership can play in our energy choices. While processing all this, my friend Dick Bakker told me about a wind energy conference coming up in Kingston on Lake Ontario. Community power was the theme. I wondered if anything close to what I had seen in Europe exists here in North America.

[TEXT]

*7<sup>th</sup> World Wind Energy Conference, Kingston, Ontario*

0:42:55

**[Title] George Smitherman  
Minister of Energy, Province of Ontario, Canada**

By 2025 we want to double the amount of renewable energy we have on the grid.

**[David Chernushenko voice-over]**

George Smitherman was making grand promises in his first speech as minister responsible for energy policy.

0:43:08

**[George Smitherman]**

Let me make it very clear – this government, this minister, is committed to renewable forms of energy.

Obviously conservation is the cheapest fastest greenest source of electricity around, and I plan to do all I can to buy all of it that I can.

0:43:25

We are, in Ontario, in the midst of a very significant and long overdue overhaul of our energy system. We're getting out of coal-fired generation and replacing it with cleaner, greener sources of energy. And we're maintaining our nuclear capacity at 14,000 megawatts.

0:43:42

There are signed contracts for another 1300 megawatts of wind power projects that are under development, including the exciting Wolfe Island project, a short ferry ride from downtown Kingston. And I know you'll be hearing a lot more about that.

0:43:55

DAVID VO

We would hear a lot about Wolfe Island, but that's a story for later.

The minister's message was confusing. After all, his government had just confirmed its plan to spend heavily on nuclear plant repairs and new construction. And then it froze its only Renewable Energy Program.

**0:44:09**

**[Animation TEXT]**

*Ontario Staying with Nuclear*

**[Poster TEXT]**

*“Minister: Don’t nuke green energy”*

0:44:15

**[Smitherman]**

We are taking a short prudent pause to reflect on the program’s strengths, while addressing a few of its glaring deficiencies.

0:44:23

**[Title] Paul McKay [speech]**

**Investigative reporter and author, Ontario, Canada**

On June 15th the McGuinty government committed to a 40 billion, 40-year plan to build new nuclear plants and a minimum construction cost of 26 billion.

By contrast it has silently sandbagged Ontario’s fledgling green power industry.

0:44:40

**Paul McKay [interview]**

That 26 billion dollars can’t be spent in two places. If you build 3000 megawatts of decentralized green power plants of different geographical area and a diversity of supply, then you build in resilience and flexibility in the system. You have to make a choice between one or the other.

0:45:02

**[Title] José Etcheverry**

**York University, Toronto, Canada**

If we allow the powers that are currently controlling the minds of the decision makers of this province, to lock our province with nuclear power into the 21st century, we will not do what we are supposed to do.

0:45:28

**[Title] Paul Gipe**

**Consultant, Wind-Works.org, California, USA**

If we had as Americans, spent the money we have disastrously invested in Iraq, we would have in the United States today 1/5 of our electricity produced with wind turbines. Imagine that, today, 1/5 of our electricity produced with wind energy.

0:45:50

We can use renewable energy to reindustrialize the North American economy. We can re-employ our people building the things we that need for our future.

0:46:01

**[David Chernushenko voice-over]**

Hermann Scheer was a driving force behind Germany’s renewable energy policies, making him a bit of a “rock star” in some circles.

I had missed interviewing him in Berlin, but here he was on my home turf.

0:46:12

**[Title] Herman Scheer**

## **German member of parliament**

For decades there was ignorance about renewable energies. The potential was denounced.

0:46:23

We should speak about 100% renewable energies. If we have a race against time we have the best opportunity to do it with decentralized renewable energy systems. But why 100%? Because only then the justification is over that we would need new coal power stations or new nuclear power stations.

0:46:48

The justification is always that renewable energies are not enough, or would not be enough. But it is enough.

0:46:55

**[David on screen]**

How important do you think it is for citizens to have a say in where their energy comes from?

**[Herman Scheer]**

It is absolutely important!

With renewables we have the potential to source everywhere, everywhere. That means you can relink the places, the spaces of energy harvesting and energy consumption. And this changes the whole economy, this changes the world. This makes the world safe, not only clean, it makes the world safe, and it makes democracy... it gives to democracy a future.

0:47:35

**[Book cover TEXT]**

*Hermann Scheer*

*Energy Autonomy – The economic, social and technological case for renewable energy*

**[David Chernushenko voice-over]**

Herman Scheer believes that for a country or community to achieve “energy autonomy” we must break our dependence on powerful and distant energy suppliers, and shift away from sources that are both finite and unsustainable -- economically, socially or ecologically. Energy autonomy will be achieved by conserving, and by shifting to renewable energy produced closer to home.

Are we in North America moving closer to energy autonomy? Could we be?

0:48:02

**[Title] Paul Gipe**

**Consultant, Wind-Works.org, California, USA**

It's never been a question of the technology. It's always been a question of “do we really want a renewable energy future?”

0:48:10

**[Title] Preben Maegaard  
Nordic Folkecenter for Renewable Energy, Denmark**

I don't see renewable energy as a resource problem. It is human resources that is the main source to be developed.

0:48:20

**[Graph: TEXT]**

*Electricity Consumption (Watts per person per year)*

I don't think you have a much higher standard of living in Canada than we have in Denmark.

But you consume nearly 4 times more electricity per capita. This is not to have development. It's just to be wasteful.

0:48:33

The most efficient and important thing we did in Denmark – you could do it in Canada I am sure as well - was to change our power production to combined heat and power. Sixty percent of all our electricity in Denmark is from combined heat and power.

**[Maps: TEXT]**

*Development of Combined Heat and Power in Denmark  
Centralized production in the mid 80's  
Decentralized production of today*

0:48:49

**[Paul Gipe]**

The people are way ahead of our public servants but I think eventually the public servants will see that the people are demanding it.

Don't tell me this can't be done cause I've been to Germany, I've been to Denmark, I've been to Spain, I've been to France...

0:49:07

**[David Chernushenko voice-over]**

Efforts by grassroots organizations in Ontario to develop renewable energy projects continue to encounter roadblocks. One, is the political influence of the nuclear industry. After decades of being shunned by the public, nuclear is now being aggressively marketed as a response to climate change.

0:49:27

**[Title] Brian Iler  
Ontario Sustainable Energy Association, Canada**

The Ontario Sustainable Energy Association is developing a campaign for a Green Energy Act. A key component of that act is a right of access to the grid.

0:49:40

After we'd spent several hundred thousand dollars developing a community-owned wind project, we were advised by the Ontario government that the entire area around the Bruce nuclear plant was off limits to renewable power. We were being kicked off the wires by nuclear.

[MAP - TEXT]

*Toronto*

*Bruce Nuclear Power Station*

Without that right we go nowhere. With that right, you'd be amazed at what you will see.

0:50:02

**[David Chernushenko voice-over]**

A common criticism of renewable energy is that it won't always be there when you need it; it isn't always sunny or windy, and there isn't always enough water flowing to turn a turbine. Unless you can store enough of it to provide so-called "baseload" energy – or the basic amount required at all times – conventional thinking is that conventional energy sources should take priority.

0:50:24

**[Title] Don MacKinnon**

**President, Power Workers' Union, Ontario, Canada**

To have a reliable system that incorporates renewables, you need a couple of things. You need a transmission and distribution system that will take that generation as it happens. The other component is to have a large block of what we call baseload supply. What we use in Ontario for that is nuclear energy and have for the last 40 years.

0:50:51

**[Preben Maegaard]**

No renewable energy solution can stand alone. But what about when's there's no wind? When there's no sun? Here we see the biomass is the storage. What is biomass? That's photosynthesis from the sun. Just like for our food. Harvest the food in the summer and keep it for the rest of the year so we have food all year round. The same we can do with the energy.

0:51:12

**[Title] Prof. Steve Lapp**

**St. Lawrence College, Kingston, Ontario**

The past understanding of what baseload is about is not necessarily the future of what base load will be about.

0:51:20

**[Animation: TEXT]**

*Baseload Demand*

*Power required to meet minimum demands based on reasonable expectations of customer requirements*

0:51:25

**[Prof. Steve Lapp]**

We can use modern grid technology to manage that baseload in a much more renewable energy friendly way.

0:51:32

**[Paul McKay]**

They really haven't grasped this whole revolutionary concept of building an electric grid on the model of the internet, where instead of having all of the computing sent to one huge or a few huge mainframes and everybody being dependent on that, as was the case 30 years ago, now we have an Internet system where everyone has a laptop in their home.

0:51:54

**[Prof. Steve Lapp]**

Ultimately yes, where are we going to store energy. One of them would be more pumped storage, so anytime we are generating excess power we could pump water up. It could be from Lake Ontario to Lake Erie, it could be from any body of water to a higher elevation, where there is a hydro facility in between.

**[map TEXT]**

*Lake Ontario*

*Lake Erie*

0:52:13

Managing peak and baseload electricity generation doesn't mean we might not use coal or gas for some of those generation periods, but those can be very brief.

0:52:23

**[Title] Eric Martinot**

**Institute for Sustainable Energy Policies, Tokyo, Japan**

There are now battery technologies being advanced. You can combine the battery with the wind turbine and get a constant output that looks just like a nuclear power plant output.

On the solar side it's even more dramatic, because most solar is very small scale: 3 kilowatts, 10 kilowatts on the rooftop and you have power for your home, for your business. If you combine that with energy storage then you really have the potential for smaller community-scale power.

0:52:48

Charge up your car with your own local renewable energy. Use that as you need to, sell that back to the utility during the daytime at peak power rates.

0:52:56



We don't have to worry about using land for it, we can just put it on all the rooftops, parking structures, highways, you name it.

0:53:03

**[David Chernushenko voice-over]**

Renewable energy is now proving so attractive in some places that banks, developers and other power players have sensed the opportunity. That's a good thing right? Not always. There can be downsides to pursuing renewable energy without well thought-out public policy.

0:53:20

**[Title] Sergio Oceransky Losana  
World Wind Energy Institute, Denmark**

For a long time in Denmark there was a regulation that only allowed people from the municipality and neighbouring municipalities to invest in wind energy projects. That's what really built up the wind industry. It was a part of the local economy. It was one more basis on which rural communities could thrive and prosper.

0:53:41

People tend to assume that renewable energies are positive and progressive by nature. But that doesn't mean that the transition to renewable energy is necessarily going to result in more democratic, you know more positive social relations.

0:53:56

Controlling in a centralized way an energy system based on renewable energies has much worse implications in terms of democracy.

And that's because renewable energies are decentralized.

0:54:09

The only way in which you can control a renewable energy system is by controlling the territory. This is already starting to happen in the case of biofuels. There is a huge land grabbing process happening all over the global South. Where large corporations are taking control over millions of hectares.

0:54:27

**[Brian Iler]**

People are happier when they have control of their own lives. I think communities work better if they are relatively self-sufficient.

If you look around, you look at wind energy projects in the province, the ones that are running into trouble are the ones that are seen as outsiders.

0:54:47

**[ANIMATION]**

*Samsø*

*Wolfe Island*

**[David Chernushenko voice-over]**

On Samso, residents seemed to have embraced wind turbines.  
On a similar island in Ontario, support was far from unanimous.  
What was so different here?

0:54:58

**[Title] Dean Wallace**  
**Resident, Wolfe Island, Ontario**

I was at one of the very very first meetings. I went to that, being keen on alternative energies, trying to live a green lifestyle myself. The project basically grew from what appeared to be 12 turbines, it just took incremental growth. Even before the environmental assessment was complete they were crushing gravel in the quarry. It was almost as if everything was a done deal before things started rolling.

0:55:30

It's just too big, the dust just rolls.

This is not the quaint Dutch windmill, these are huge, huge, huge machines.

0:55:43

I see the scale of this project as trying to address an addiction to energy, an overabundance, a wasted use.

Everybody has to be involved because everybody is involved. The turbines are going to be visible, the cables run all around us. If you don't know the truth, then it all falls apart.

0:56:08

**[Title] Greg and Beth Caldwell**  
**Residents, Wolfe Island, Ontario, Canada**

I don't think in any way you could say that this project was foisted upon the island.

Initially I was uncertain because I really didn't know that much about it. I started listening. Gregor and I decided we would go and visit some of these wind turbines. The one thing that struck me was the silence. You could hear more of the swishing of the wind in the trees than anything else. No piles of dead birds or anything. I really and truly would not mind having one in my backyard. I have to be able to say that before I can say I support them.

0:56:40

We went to virtually every meeting and there were hundreds of people there.

I had a number of questions and if they weren't answered at meetings, I would get in touch with the proponents of the wind project and they were always answered fully to my satisfaction.

0:56:56

The meetings have been on going, there were many discussions before this contract was actually put in place.

0:57:05

**[Title] Leann Cunningham**  
**Resident, Wolfe Island, Ontario, Canada**

I don't feel it is Wolfe Island's wind farm.

When I first learned that they were coming to the island I was excited. I think wind turbines are very beautiful and I like the idea that they are a renewable form of energy. I was under the impression at first that there would be, I think, under 40 of them, and then we started getting wind that there would be even more than the 86 that are going up, So I got the sense that this was another big business, that people were jumping on this bandwagon to make money.

0:57:38

I think the amount of money that's going into this project is not addressing the greater issues in the province of Ontario of energy consumption and lack of legislation.

0:57:49

**[Beth Caldwell]**

I feel tremendous pride in this project.

0:57:52

**[Dean Wallace]**

The scale of this thing is just gargantuan.

0:57:56

**[Leann Cunningham]**

I don't feel that there is enough community cohesiveness to call it Wolfe Island's wind farm.

0:58:12

**[David Chernushenko voice-over]**

The clash of viewpoints on Wolfe Island is a reminder that getting support for change of any kind will always be less about technology than about people, and earning their trust.

When it comes to energy and the politics that surrounds it, building public trust and defending the public interest seems to get brushed aside in favour of narrower, more short-term interests. Whether it's U.S. intervention in the Middle East, the violent petro-politics of Nigeria, the nuclear power lobby in France or Germany... or energy development in Alberta's tar sands.

0:58:49

**[Title] Louis Helbig**  
**Aerial photographer, Ottawa, Canada**

What is going on up there is the biggest of everything. The world's biggest bulldozers at work. The world's biggest truck at work. The world's biggest conveyor belt. There's massive dams that hold back the tar ponds, which are the thing that gives the biggest visual impact on the landscape when you're in the area.

0:59:12

It's good for the economy, people have jobs, that's one argument. We can also argue about the naphthalic acids and god knows what else is going on up there. We can argue about the impact on the

river, the environment. We can talk about what is happening to people when they show up out there. The impact on people's health. We could talk about the communities that are downstream of this whole thing.

0:59:40

They are stripping off what is called 'over-burden'; this earth up to about 100 meters that is dug away with massive earth movers like backhoes, electrically-powered backhoes with the world's largest dump trucks.

0:59:55

You have these lakes, man-made lakes full of brown water with tar on the outside and fantastic patterns on them, and that stuff is deadly toxic.

And that stuff is open to nature. The birds land in it. You see 45-gallon barrels floating in the tar lakes, with stickmen on them with a poncho and a hard hat on top. Those are scarecrows. They call those "Bitu-men".

1:00:22

**[David Chernushenko voice-over]**

It's hard not to conclude that the energy economy is about power and profit. Big profits for a few big players, while the small players pay the cost – in all kinds of ways. Could renewable energy be heading down the same road?

1:00:37

**[Title] Don MacKinnon**

**President, Power Workers' Union, Ontario, Canada**

Simply running around indiscriminately putting up large wind systems and large solar panels I don't believe gets us where we need to be. They have their own series of issues that come along with them.

1:00:54

**[Title] Sergio Oceransky Losana**

**World Wind Energy Institute, Denmark**

I just came back from Mexico. There on the Pacific coast is one of the best wind resources in the world.

**[MAP]**

*Mexico*

Out of twelve projects that have been approved ten of them involve Spanish corporations, with some Mexican corporations always as partners in the consortium. They agreed on a price that they were going to give to local people, a remuneration for using their land, for using their wind resource – which is 1.5%. The local communities and the local farmers have no other choice you know other than signing what they offer them.

In an area with such good wind resources you could easily, easily expect that to be like 10% instead. So it really is a very exploitative kind of contract.

1:01:40

**[Poster - Text]**

*Wind conflicts in the Isthmus of Tehuantepec, Mexico*

The same conflict is going to happen in increasing areas of the world. Apparently there are similar conflicts going on in India and in Columbia.

1:01:50

There seems to be an attitude of saying, OK, you know these poor indigenous people should be more than happy with 1.5%. But that's because the local people haven't even considered the possibility that they themselves could be developing it, their wind resources.

1:02:10

**[David Chernushenko voice-over]**

Until we shift away from concentrated political and economic power, we are unlikely to improve public engagement and trust, or to make a transition to cleaner energy, and smarter consumption. I'm having a hard time finding signs that a real power shift is under way.

1:02:34

On a sunny March day, my panels are generating more electricity than I'm using. But the batteries are full - so it's being rejected. I'd rather be feeding into the grid and watching my meter spin backward.

Why is it so hard here, yet so simple in other places? Like California and British Columbia.

1:02:55

After a long winter comes an invitation to screen my first film at the Green Lifestyle Film Festival in Los Angeles. Hmm, I could watch snow melt or take a West Coast road trip?

This time with someone who knows a bit about California, and a lot about power.

1:03:12

Adam Kreek is a fellow member of Clean Air Champions. We partner with Canadian athletes to promote action that improves air quality while encouraging an active lifestyle. Adam caught my attention during the Beijing Olympics: with his gold medal performance, and his energy. With an engineering degree from Stanford and a passion for biofuels, Adam could make an interesting traveling companion.

And he has wheels - bio-diesel wheels.

1:02:40

**[David off camera]**

Sweet sound of biodiesel.

**[Adam]**

Yep, thirsty little critter. His name's Helmut. He loves the taste of biodiesel but he'll settle for petroleum diesel in a pinch.

1:03:56

**[David off camera]**

Goes both ways, eh?

**[Adam]**  
Yeah, goes both ways.

1:04:00

**[Adam]**  
I worked on an oil rig, straight out of high school, and realized just how much work it took to produce this energy that you don't really think about when you pull up to the gas pump.

I love driving my little Helmut around. He's a great little tool. But when you have more tools in your toolbox you have this sense of power.

1:04:27

MAP

**[David Chernushenko voice-over]**  
California has been a leader in renewable energy for decades. Adam and I mapped out a trip to visit some energy pioneers and landmarks. The wind site at Altamont Pass was the world's biggest in the 1990s with over 4 thousand turbines. Though most are no longer operating, the site provided some important lessons about turbine design and ways to minimize bird collisions.

1:04:56

**[David]**  
You've got longer legs! No fair! I'm older than you!

That is a lot of wind turbines.

1:05:18

**[Adam]**  
What kind of energy do you use?

**[Text]**  
*Gopher hole*

**[Adam]**  
Geothermal. Ground source.  
You've got a stable temperature year round. Smart little critter. Gotta think more like him.

1:05:32

**[David off screen]**  
What have we got here Adam?

**[Adam]**  
Energy, unrealized potential.

1:05:38

[MAP]

1:05:44

**[David Chernushenko voice-over]**

Another signpost on the road to a better energy future is Rancho Seco. A nuclear generating station closed by referendum in 1989. Plagued by technical problems and cost overruns, taxpayers voted to shut it down despite an intense pro-nuclear lobby. On this same site, you can now find a natural gas plant and a massive field of solar panels, that produces over 3 MegaWatts of electricity. Past, present and future, perhaps? Sunrise or sunset technologies; the choice is ours.

1:06:21

**[Adam Kreek]**

Unfortunately they don't have biodiesel at every gas station when you need it. Just enough to get to the Biofuel Oasis.

**[David off screen]**

The delights await us at the Oasis?

MAP

**[Adam Kreek]**

1:06:40

You gotta queue, because they only have one pump and there's such high demand. You have to take one of these numbers.

**[Melissa Hardy]**

You came at a busy time.

1:06:52

**[Adam Kreek]**

I was a typical starving student and starving amateur athlete in Canada so I was looking for the most economical way of getting around. I got to know the technologies required and eventually built a biodiesel reactor of my own.

1:07:10

Biodiesel can sometimes be few and far between.

There is definitely a lower carbon profile associated with biodiesel, especially when you take waste vegetable oil which the biodiesel cooperative here does exclusively.

1:07:26

**[Title] Melissa Hardy**

**Partner, Biofuel Oasis, Berkeley, California**

The Biofuel Oasis was founded out of a community group, the Berkeley Biodiesel Collective, and two women who were a part of that said, "Hey we're brewing our own fuel we're using it in our cars, we could sell this stuff in Berkeley and offset how much petroleum diesel is used."

We are about to move cause we've out grown this warehouse.

1:07:52

We're very strict on the criteria, for the type of fuel that we buy.

I think of us as sort of a wine bar and we have all of our California wine producers.

1:08:02

I think that being a woman-owned cooperative and being women in the automotive industry -- which is non-traditional -- we help, especially women, feel comfortable just understanding how their car works.

When someone finishes changing their fuel filter here, the amount of excitement that they feel is unbelievable.

1:08:24

We're very removed from really having control over all the necessary things in our life: food and fuel and fibre.

1:08:37

When oil companies were making huge profits...I think that was something that made our customers feel like they wanted to put their dollars in the local economy.

Our biodiesel comes from a hundred-mile radius.

1:08:49

**[Adam Kreek]**

It's like the 100-mile diet for your car.

Now it's time to vote with our wallets. Energy democracy. Ooh! I need to keep those windows dirtier!

1:09:01

**[Sign TEXT]**

*It takes seventeen muscles to smile and forty-seven muscles to frown. Conserve energy.*

1:09:14

**[David Chernushenko voice-over]**

Whenever human societies have undergone structural shifts, people have been thrown out of work, sometimes in large number. In the end new jobs get created; though not always in the same place or for the same people. What might a clean energy shift do for employment?

**[SIGN TEXT]**

*Green for All*

1:09:33

**[Title] Pauli Ojea**

**Policy Advisor, Green for All, Oakland, USA**

What we've seen in a lot of different industries over the years in a new technology or a new type of economy is that there isn't always the same amount of opportunity for all people. What happened with the computer industry for example here in Silicon Valley is a great example of this.

We want to make sure that the green economy provides opportunity for everybody.



1:10:04

One of the first places where we can inject a lot of jobs into the economy and make a huge dent in our greenhouse gas emissions is by helping to retrofit the nations building stock.

[SIGN TEXT]

*Richmond Build*

*Green Job Training Academy*

1:10:22

**[Title] Angela Greene**  
**Training and Project Manager, Solar Richmond, Richmond, USA**

I was in the third class to graduate from the Richmond Build program and I got involved because I lost a job after almost 20 years in the printing industry ... And that's when I was introduced to solar and the whole green collar industry.

1:10:38

**[Title] Samuel Charles**  
**Lead Instructor, Richmond Build**

We have another group in here called our helping hands group, a group of teenagers who are learning a trade while working and performing maintenance on senior citizens homes in the neighbourhood.

1:10:55

**[Greene]**

They talk about saving the polar bears, but for us here in this community it's about saving us. Once we can take care of ourselves and save ourselves then we're more apt to worry about saving everything else.

1:11:08

When I did my first install I was holding a solar panel and I was on the roof and I was telling myself that if I could just take the positive end of this panel and put it to the sun, and take the negative end and put it to me, I can renew my energy, my power could be renewed. I could be repowered.

1:11:23

A lot of the major companies are installing solar panels now, you know to help with the environment, and they are also giving an opportunity for the students to participate in some of these installations.

1:11:32

I knew one day my last name would pay off... My name is Angela Greene, so go green, grow green and give green.

1:11:44

[MAP]

[Sign TEXT]

*Real Goods  
Solar Living Center*

**[David Chernushenko voice-over]**

In the early Nineties, I came across a catalogue for the Real Goods company. Full of products for saving energy and water, it offered to me a glimpse into a more sustainable future. That vision has stayed with me.

1:12:03

**[David]**

We're here. Mecca for the solar people.

1:12:10

**[Title] John Schaeffer  
President and Founder, Real Goods and Solar Living Centre, Ukiah, USA**

For the first 20 years or so, from '78 to '98, basically there was no solar industry. We were only selling maybe 10-20-30 megawatts a year worldwide. And today we're up to almost 6 Gigawatts a year.

1:12:23

If we don't have installers to put it in, and we don't have sales people to sell it, then you can't have a solar industry.

Everyone wants to do green-jobs training now so it's suddenly completely mainstream, which is fantastic. To me it's everything we've been working for.

1:12:39

With solar right now there are a number of companies cropping up with financial incentives. If you can eliminate the barrier of having to put down \$20000 to get into a solar system, and you can do it for \$1000-\$2000 or better yet nothing, and you can pay it back over the years where you have a guaranteed rate less than your bill to the power company, it's a win-win situation.

1:13:02

The only reason you wouldn't want a solar system is a) you don't own your home, b) if you've got trees covering the south so it's too shaded to get any power out of it or, c) you're just too lazy to sign a contract.

1:13:15

Something like 97% of Americans think that solar is a good thing.

Ten years ago there was certainly a lot of resistance to solar because there was fear it was going to take power and money away from oil and utility companies. But you know all the evil oil companies have suddenly come to terms with the fact that you better get with the program or they're going to get left in the dust.

1:13:35

**[Adam]**

Come on David, let's see who can get their light bulb the brightest. All this electricity goes to the Solar Living Centre.

**[David off screen]**

You Olympians think you're such hot stuff.

**[Adam]**

OK, a little Canuck power...

**[David]**

Are we there yet?

**[Adam]**

Let's go check out the gift shop.

**[Sign TEXT]**

*Hydrogen Fuel Cell*

1:15:15

**[David off screen]**

Were you inspired?

**[Adam]**

Oh yah, it's an incredible place. How about you David?

**[David off screen]**

I'm inspired, I'm pumped up.

1:14:27

**[David off screen]**

Where are we?

**[Adam]**

We're at the only 24-hour biodiesel pump in all of North America. Rising Pheonix Biofuels in Phoenix, Oregon. Enough biodiesel for the ride home.

1:14:44

**[TEXT]**

*Are You Powerful?*

**[Adam]**

I got the power. Ooh, ooh. Been on the road too long.

**[David off screen]**

Yah!

MAP

1:15:12

**[David Chernushenko voice-over]**

Adam and I parted in Victoria, but he offered me the use of trusty Helmut.

A lot of people want to better integrate the values they hold with the way they live. One couple is actively building that connection, and sharing what they learn.

1:15:28

**[Title] Gord and Ann Baird  
Eco-Sense, Victoria, Canada**

About three years ago we moved onto the property and decided to try and build a home as sustainably as we could within the building codes.

Cob is a mixture, it's not corn cobs, it's actually clay, sand and straw.

The building can last 500 years. At the end of its useful life then it just goes back into the earth. So it's a complete life cycle.

Another wonderful thing about cob is that it breathes, it has a natural ability to absorb and de-absorb moisture so it makes a healthy living environment inside.

1:15:59

Living roofs are very popular right now.

Where green roofs have a beneficial impact is with controlling what's called the heat island effect. In the city when you have a lot of black roofs they can generate a lot of heat.

1:16:10

We just kind of worked with what was there, and a basic thing with designing a solar house is that you point it at the sun. We also have a clerestory house with windows that open up and we can control ventilation, which is a way of moving your fresh air around without high tech equipment.

1:16:31

If it's not affordable it's not sustainable because it means that the average person can't do it.

1:16:35

We were going to be going off the grid, but the more we learned about batteries: batteries have a fairly large environmental impact. So what we decided to do is to go with a grid inter-tie with BC Hydro. BC Hydro in essence acts as our battery bank.

1:16:50

We're actually starting to put more power in now than we're using.

1:16:53

**[Graph TEXT]**

## *Energy Consumption*

Using alternative energies is wonderful but to be able to use those alternative energies the first thing you have to do is look at conservation. And conservation comes two ways: it comes with lifestyle choices and with efficiencies within the systems that you have inside the house.

1:17:07

**[Graph TEXT]**

*Per Capita Home Energy Consumption (KiloWatt-hours per square foot)*

We're 67% more efficient than the average house in BC.

1:17:11

We have solar hot water that comes out of the tap.

Our particular type of solar hot water is the evacuated tubes. They work even in winter on a cloudy day.

1:17:20

We collect the heat, we put it into a hot water tank, we draw the heat out of that tank and we run it through tubes in the floor.

1:17:28

The power system in the house is one small segment of the house. You've got the water systems, you've got the lifestyle within the house and the gardens that feed the people in the house. They're all part of a much bigger integrated system.

1:17:41

So educating people on each of those integrated systems is a big part of what drives us.

1:17:49

Centralized systems are brittle.

**[Gord]**

Simple rule – don't fight nature.

**[Ann]**

Yah. Work with it.

1:17:55

**[David Chernushenko voice-over]**

While I've been on the road, energy debates have dominated the corridors of power. In British Columbia an election is under way, and the government's trail-blazing carbon tax is under attack.

And just over the mountains, so are Alberta's tar sands. California has passed a low carbon energy bill, which could rule out the import of Alberta's so-called "dirty oil".

And remember George Smitherman? Back in Ontario, word on the grapevine is that after meeting Hermann Scheer in Kingston, he visited Germany and Denmark. He has been working hard since then to craft some new energy legislation. His Green Energy Act is moving toward a vote in the Ontario legislature.

1:18:42

**[David Chernushenko voice-over]**

If reliable access to energy is essential to living well, how can we, as global citizens, ensure that everyone has access to the energy they need?

Our technology is bound to keep improving, but maybe it's in the human dimension, in our social interactions, where the real magic must be performed.

1:19:05

We have the ability to install renewable energy on a global scale. But should we be racing to put as much as possible online, or does it matter who does the building, and how?

**1:19:16**

**[Dr. Josef Pesch]**

Power is such a fundamental aspect of human life on this planet that we cannot possibly leave this to some multinationals to decide upon. Renewable energies are decentralized. We have to use them in a decentralized fashion. Community power will be the power of the future.

**[Title] Dr. Josef Pesch  
General Manger, FESA GmbH, Germany**

The minimum price law is the only chance that you have. Without it we wouldn't have a chance to stand up against the biggies.

1:19:45

**[Title] Prof. Steffen Lehmann,  
University of Newcastle, Australia**

Legislation and initiatives driven by the government are key.

1:19:52

**[Title] Tim Weis  
Pembina Institute**

Renewable energy happens when there is political leadership, not only to set the vision but also to create the policies that move renewable energy forward.

1:19:59

**[Title] Prof. Mark Jaccard  
School of Resource & Environmental Management, Simon Fraser University**

Policy has to happen now.

Look at the countries, look at the regions who are starting to get economy-wide changes happening, and what are the policies that they put in place and how did they do that.

1:20:10

We're moving towards policies that either put a price on emissions by charging for

them, or policies that constrain the market. People will argue with you about a carbon tax versus cap-and-trade; what we really just need is the price signal that comes out from either one of those kinds of policies.

1:20:30

**[Tim Weis]**

One of the most important things for the market in developing renewable energy is long term stable policy, not sort of short-term incentives that may be good for getting a handful of projects going but they don't create that market transformation.

1:20:43

**[Dr Josef Pesch]**

Everybody was amazed because no one had really expected that Parliament would pass a law like this, but they did!

1:20:50

If you get the framework right, you can leave the rest to the private market to develop. You need idealism too, but idealism alone won't do it.

1:21:07

**[Paul Gipe]**

How it is that a farmer in Germany just assumes he has the right to put up a wind turbine on his property and produce electricity for a profit to sell to the utility company?

1:21:19

**[Title] Louis Helbig, aerial photographer, Ottawa, Canada**

I would hope with my photography to help make the tar sands relevant to Canadians, or other citizens of this world, so that people can put a picture to what it is they might have heard of as a rumour.

1:21:37

I think we are not talking about it because the industry and government want it to be that way, crudely put (pardon the pun) and I actually think they are doing themselves a disservice by doing that because by trying to shield themselves from debate, they will actually lose the protection of civil society.

1:21:57

We all have a responsibility to engage in the world around us. I think that's the core of citizenship.

1:22:07

**[Louise Lundberg]**

You can't create sustainability with just technology, taxes, laws, things that come from above. You have to have hearts, to have people, you have to have wills. Otherwise nothing is going to happen.

1:22:24

**[Jesper Kjems]**

What has made these people think so much about renewable energy? It has not so much

to do with the polar bears in Greenland, or the climate change, it has much more to do with the local society and a new project to be together about.

1:22:40

**[Dr Josef Pesch]**

We can do it ourselves. That is very liberating I think.

1:22:46

**[Melissa Hardy]**

People feel like what is going to save us is to put your dollars here, in a place they can actually touch and feel and know.

1:22:55

**[Angela Greene]**

My first install was just a block away from my home. I decided at that time that this was something I wanted to do, to be able to work with the community, work with the young individuals to show them that there is more to do with your life than just to hang out on street corners.

1:23:09

**[Dean Wallace]**

We can do so much more with so much less.

I bike or run everywhere. I have more miles on my shoes than I do on our vehicle.

1:23:21

**[Leann Cunningham]**

I have had my house, I have an old house and it's been fully insulated. I heat with wood, and I don't own a car; I bike everywhere.

It doesn't feel like a sacrifice at all.

1:23:35

**[Beth Caldwell]**

I'd like to see the price of gasoline go up. A lot of people think that's a crazy thing to say.

1:23:40

**[Craig Morris]**

I don't like to have to take a car everywhere. It feels like a tax.

1:23:48

**[Sue Roaf]**

The amazing thing of having for instance a passive solar house, where you are using the free energy of the sun in winter to keep the house warm, is it actually makes life more beautiful. It's absolutely, fundamentally about a better quality of life with a lower impact.

1:24:12

**[Annette Hartvig Larsen]**

We are joking that "you create your own future" but actually I think deep down we



actually believe it.

1:24:21

**[Jesper Kjems]**

If they really want to film me for being so good to the environment, I have to be so good to the environment. So, I think all the publicity also changes people's minds.

1:24:32

**[Sam Charles]**

One senior citizen said this program has renewed her hope in the youth, by just having those young people there and working diligently on her home and make it comfortable. It's awesome!

1:24:47

**[Ann Baird]**

It's not like everybody's got to go out and do what we've done, but they can take one part of that enthusiasm away with them and realise a different way of looking at energy and looking at resources and how we live within the planet's means.

**[Gord Baird]**

If you just talk about the problems what happens is it starts to...

Sap your energy.

It starts to sap your energy.

1:25:06

**[John Schaeffer]**

It's the most exciting thing I've ever done, teaching people about energy, teaching people about self empowerment.

1:25:14

**[Dr Josef Pesch]**

It is power by the people, and it's power for the people.

1:25:18

**[Adam Kreek]**

When you exercise your power you create more.

I have control over a very small sphere of influence, but this that I do have control over, I'm going to act upon it.

You start to feel like you belong to something bigger and you do.

1:25:32

The feeling of doing something on your own and achieving something on your own is incredible and it makes you feel great, but the feeling I had and the feeling my team mates had when we crossed that finish line in Beijing, when we won the gold medal, when we finished that together, when we finished that as a team...

1:25:55

**[Title] Johan Hultqvist**  
**Lead singer, Mr. Something Something**

Our bicycle powered show was an attempt to take audience participation to the next level.

The band's role is to help people along with what's already in them.

1:26:13

Usually at the beginning of the night the dance floor is empty and there is that awkward tension in the room and then all it takes is one brave soul, and that one person or maybe a couple of people will change the entire atmosphere in the room.

1:26:33

It's been a great pleasure to literally be electrified by the audience.

1:26:50

**[David Chernushenko voice-over]**

A year after George Smitherman's promise of "cleaner, greener sources of energy", the Ontario government released details of its Green Energy and Economy Act. Would it be worth the wait?

**[TEXT]**

*Renewable Energy: Moving Ontario Forward*

1:27:02

**[Title] Prof. Steve Lapp**  
**St. Lawrence College, Kingston, Ontario**

The Green Energy Act in Ontario is a policy, and regulations ultimately, intended to foster a green energy culture.

It's to create a foundation for all sorts of clean energy and energy conservation initiatives.

1:27:20

**[TEXT]**

*Green Energy Act Alliance presents: Why Green Energy? Toronto, Ontario*

1:27:26

**[Title] Denis Hayes**  
**Chairman, American Solar Energy Society, USA**

It seems to me to be at least as good as, arguably better than any other legislation I've seen out of Europe, out of Korea out of Japan or anyplace.

1:27:40

Politics is deeply flawed and occasionally there you have to make a step in the right direction and accept it because it's a step in the right direction. If it were politically

practicable to do it, wonderful to have a Green Energy Act that not only did not grow, but shrunk in a systematic way, your commitment to nuclear. My sense is that that's not going to happen because of the politically practical part right now.

1:28:11

[TEXT]

*New Nuclear Build Suspended*

**[David Chernushenko voice-over]**

In June 2009, the Ontario government suspended its plan to build new nuclear stations. Three weeks later, a private sector nuclear expansion project was cancelled, for economic reasons.

[TEXT]

*Nuclear Expansion Cancelled*

1:28:24

**[Prof. Steve Lapp]**

We've seen that the quotations for building new nuclear plants in Ontario came in at a much higher dollar value than even the provincial government expected. So, I think this is a tremendous shot in the arm for the province to look at renewable energy generation and more energy conservation.

1:28:43

We've seen the economics of big centralized generation taking a turn for the worse, and that's going to only encourage the adoption of smaller, more easily managed projects, that result in a more distributed and ultimately I think safer and more beneficial system.

**[David Chernushenko voice-over]**

1:29:05

Charles Darwin warns us that the survivors are the ones most responsive to change. So how are we doing?

Are we becoming sufficiently resilient as individuals and as communities?

Not just to survive, but to actually thrive, in the face of peaking oil supplies, surging global energy demand and an unstable climate? Couldn't we be doing more, and doing it faster? Shouldn't we?

1:29:33

**[David Chernushenko voice-over]**

What about me and my solar panels? Can I finally hook them up, and sell my electricity under Ontario's new Feed in Tariff? Should I?

1:29:44

**[Prof. Steve Lapp]**

By the time you're doing the final edits of this film there should be in place legislation in Ontario that will allow you to take those panels and hook them up and generate I think 80.2 cents per kilowatt hour.

1:29:57

**[David Chernushenko voice-over]**

But now, that's only one option. Another would be to use the same roof space for a solar domestic hot water panel and take advantage of some generous government rebates. Perhaps, I could then use my existing panels to charge an electric vehicle when the time comes for a new one.

1:30:14

But now there is a third option available – one that I could not have imagined when this journey started. Investing money in a local renewable energy cooperative. My investment would be pooled with others to install a large solar array on one of the many vacant flat roofs in my community ... more bang for your buck!

1:30:33

There are many ways to feed into the grid, and take out what you need. It's great to have choices. That, after all, is power!

1:30:47

[CLOSING CREDITS]

*A film by David Chernushenko*

*Produced by Michael A. Dobbin & David Chernushenko*

*Associate producer Dick Bakker*

*Music by David Burns*

*Edited by Lisa Virtue*

*Assistant editors James Greatrex & Jith Paul*

*Title sequences Jeff Lively*

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1:32:15-20

[Credit cards]

1:32:26-31

[Credit cards]

1:32:41-45

[Credit cards]

1:32:51-55

[Credit cards]

1:32:56-1:33:07

*In September 2009, George Smitherman announced plans to close four coal-fuelled power units ahead of schedule.*

*Days later, the government published the rules for Ontario's renewable energy Feed in Tariff.*

*In November 2009 he resigned as minister to run for mayor of Toronto.*

1:33:08-13

[Credit cards]

1:33:14

*The Samsø Energy Academy has acquired its first electric cars and is now offering home energy efficiency services for seniors.*

1:33:20-25

[Credit cards]

1:33:26-30

*The Wolfe Island turbines were inaugurated in September 2009.*

1:33:31-36

[Credit cards]

1:33:36

*Dean Wallace sold his house and moved off the island.*

1:33:40-44

[Credit cards]

1:33:45

*The new conservative German government in late 2009 announced it would keep its nuclear plants open longer,*

*and reduce support for solar energy.*

1:33:53-57

[Credit cards]

1:33:58-1:34-05

*Ann and Gord Baird are promoting their Eco-Sense ideas on a larger scale as part of an integrated living community in the District of Highlands near Victoria.*

1:34:06-10

[Credit cards]

1:34:11-22

*Adam Kreek is living in a new sustainable neighborhood in Victoria.*

*He is putting together a local biodiesel company.*

*Adam plans to row across the Atlantic in 2011 to raise money for Right to Play and advocate self-awareness.*

1:34:23-38

[Credit cards]

1:34:39

*WITH THE VALUABLE ASSISTANCE OF*

*The Canadian Film or Television Production Tax Credit  
Government of Canada/ Gouvernement du Canada*

*Ontario Media Development Corporation  
Film and Television Tax Credits*

1:34:48-53

*All efforts were made to use renewable energy and to  
reduce emissions in the making of this film.*

*To off-set all carbon emissions, a donation was made  
to the Guatemala Stove Project.*

1:34:54-58

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1:35:00-04

\*\*

*in memoriam  
Anthony T. Chernushenko  
(1936-2009)  
who so generously shared his energy*

\*\*

1:35:03

*Powerfulthemovie.com*