Superstorm Sandy may have temporarily paralyzed New York but it didn’t stop one tireless individual from continuing to plan its future in detail. “My office still has no internet or heat so I’ve been working from home,” says Charles Komanoff from Manhattan, just days after the storm. “I’ve been adding more bells and whistles to the model.”

He calls it a model but its scale is truly monumental, which is only right for a piece of work that could solve the Big Apple’s traffic problems. Its full name is the Balanced Transportation Analyzer, and, so far, it has consumed five years of Komanoff’s life. It’s a spreadsheet – but don’t turn the page yet because it’s utterly extraordinary. It’s a stack of 60 worksheets, some having up to 68,000 data cells, others with linked arrays and fourth power formulae. And he keeps building it because he knows it will unshackle his city’s streets.

“I’m Sam’s modeler,” Komanoff says, referring to Sam Schwartz, the traffic engineer who three decades ago coined the term ‘gridlock’ and is the figurehead for ‘Sam’s Plan’ to improve transport and travel in his native New York. “To some extent, I suggest to Sam how he might fine-tune the parameters of his traffic plan.”

It sounds like nice work, so how did Komanoff get hired? If you’re going to ask him a question, you have to be prepared to take the details. “I was at Harvard during the 1960s studying economics,” Komanoff reveals. “I didn’t come out with much professional training because I was very active in the anti-war movement. But I did come out with a habit of mind that said price is a fundamental driver for human activity. And I do subscribe to that, deep down in my bones.”

The numbers game
Prices are numbers so Komanoff’s training as a mathematician is crucial. “I’m not one of those abstract guys who can fill boards with equations that nobody outside the priesthood knows what the letters and numbers relate to,” he continues. “You could say I’m a quantifier.”

In the 1970s, he quantified the costs of building nuclear power plants in a revelatory way that had not been done before, and so he became an expert witness at regulatory hearings. “That gave me a certain professional standing. It also gave me a very good nest egg so that in the mid-1980s – when that work started to become a little bit repetitive and I was seeking a new challenge – I was able to jump to a completely unrelated field.”

In the event, it was not so much a field, more a narrow strip of pot-holed asphalt next to the sidewalk. “I assumed the leadership of the cycling advocacy community in New York City,” Komanoff recalls. Having grown up in the relative tranquility of Long Beach, Long Island, it was only when he’d got to febrile New York that he’d learned how to ride a bike – in Central Park – and by that point it was a travel mode that was being squeezed out of existence.

Komanoff teiled at reversing this decline. “In some way, I galvanized a movement of cycling revolutionaries,” he says, not in any way boastfully. “We were extremely vocal, principled, ardent, and, I think, effective in not just winning one advocacy campaign after another but in establishing cycling at the vanguard of environmental activism in the city of New York.”
Janette Sadik-Khan has communicated the message that the streets are not just a habitat of motor vehicles and drivers but that they have multipurpose.

It was toward the end of this six-year stint that Komanoff became interested in a larger segment of traffic. "I began to be fascinated by the societal cost of the automobile," he reveals, "I began attempting to quantify the societal cost nationally, but especially in New York, of traffic crashes, of traffic congestion, of traffic air pollution."

He goes on to rationalize the next 15 years of his life as "not very productive", even though he had two young sons to raise and became intimate with the minutiae of traffic pricing, tolls, and mass transit. Then he got a call from Ted Kheel, a skilled and wealthy New York arbitrator. Kheel was aged 93 by then but for decades he had wanted to unsmash his city. He realized he needed verifiable numbers to define and support his arguments in favor of congestion charging. "I was charged with making the spreadsheet model that would crunch the numbers," Komanoff recalls.

"I started putting it together in the summer of 2007 and by the fall I thought I had a profound piece of work that was as advanced as anybody could produce. It turned out it was barely the beginning. It's as if I had composed a one-movement string quartet and what I've got now is an evening-long symphony."

Balanced Transport Analyzer

That's because even after Kheel died in 2010, aged 96, his foundation continued to support Komanoff's work. The Balanced Transport Analyzer (BTA to its friends) grew to include modules taking into account transit fares, taxis, parking charges, times of day, trip characteristics, road network changes, air pollution costs, crash costs, longevity benefits from increased walking and cycling, and, crucially, time elasticity.

The latter estimates how people will change their travel plans as journey times change. Many changes to the price of traveling have an impact on journey times, which, in turn, affects people's journey decisions — and those rebound on journey times. So the BTA goes into great detail about time elasticity and repeats the calculations until the model settles down.

"The thing has to reach an equilibrium and in my modeling it takes 10 iterations before equilibrium is reached," Komanoff reveals. His model shows that the large majority of all the benefits in Sam's Plan are in time savings. "I sensed this five-and-a-half years ago when Mayor Mike Bloomberg proposed his congestion fee," he states.

In case you're thinking of standing on Komanoff's shoulders and applying the BTA to a city near you, think carefully. "I'm afraid that it's bespoke for New York," he says. "I would insist, though, that the underlying ideas - the spreadsheet architecture and how the different tabs of the model are linked to each other - can be duplicated. In addition, there is a set of assumptions that underlie the BTA and I would equally insist they can be applied to any other city."

Just as the BTA is dedicated to New York City, so is Komanoff. "I love it," he states. And he can't speak highly enough of transport commissioner Janette Sadik-Khan. "She has presided over a real transformation in the way New York's streets are thought of - and I would say she began a revolution in how the streets are used and what people refer to as 'repurposing the streets'. She has communicated the message that the streets are not just a habitat of motor vehicles and drivers but that they have multipurpose."

Our time is up. A New York radio station is about to broadcast a bulletin on the status of the subways, buses and transportation in the wake of Superstorm Sandy. It is important to Komanoff, both professionally and personally, to catch that news. He needs the details.

You can download the Balanced Transport Analyzer by visiting www.nynj.org/kheelplan/BTA_1.1.xls