

Growth: From Microorganisms to Megacities By Vaclav Smil **Growthzone** It seems too much to ask that he also be good at synthesizing the underlying laws or that he write in a way that can be digested by a person with no prerequisite knowledge. **Growth bookstore** Was I frustrated that Smil didn't hold my hand and walk me through? Hell yes! I hope lots and lots of readers are frustrated when reading Smil because they cannot help but ask.

## Growth kindle cloud

I think it is probably very important to add Smil's voice to the current debates about innovation.

**Book growth mindset** Smil is not afraid to get into the ring and spar with the likes of Ray Kurzweil who has an extremely optimistic view of how long it will take until we reach the singularity or how long it will take until humans can live forever. **Growth public school sacramento calendar** - Explanations of heavy tail distributions in power law sets( Zipf's Law logarithmic graphs with coefficients of -1) - Food Wastage : Total food Harvest increase from 1900-2000 :  $6x$  While world population increase : 3. **Growth fees** : Average peak to trough - 17 months Trough to new peak - 39 months - Can China(or India) become truly rich before it becomes old? - Productivity Growth is declining (Product Differentiation happening rather than Product innovation) - For the same GDP(both total and per capita) some affluent nations use much higher energy than the others.

**Growth book author** Vaclav Smil طرح کتاب مطرَح که در این کتاب اسمیل و دغدغه‌های اسمیل که در این کتاب مطرح شده‌اند به او دادم، نه به خاطر خود کتاب اما از آن به بعد، می‌توان صرفاً بخشی از کتاب را خواند که به آن **Growth yogi** شده‌اند. علاقه‌مندیم، مثلاً بخش دوم به تمام موجودات زنده روی زمین و مسیرهای رشد آنها می‌پردازد: باکتری‌ها، حیوانات، گیاهان و از آنجا که یکی از رشته‌های اصلی مورد پژوهش اسمیل - که به طور کلی پژوهشگری **Growth synonym** انسان‌ها ای است - بحث انرژی است، او در این فصل مطالب بسیار جالبی برای ارائه دارد، که می‌تواند علاقه‌مندان را به خوبی چندزمینه فصل بعد، به صفر تا صد آنچه بشر اختراع کرده می‌پردازد؛ از صنایع دستی کوچک **Growth formula excel** . جلب کند اسمیل با در نظر گرفتن فاکتورهای دیگری **Growthnext-demo** . گرفته تا راه‌آهن، خودرو، جاده‌ها و ابزارهای الکترونیک مثل شاخص توسعه انسانی برای بررسی شکوفایی اقتصادی GDP مثل پایداری رشد، پیشنهاد می‌کند از معیارهای دیگری جز اسمیل از اینجا به بعد نگاهی رو به آینده دارد، و تلاش می‌کند به این **Science growth mindset** . کشورها استفاده شود جایی که بالاخره از عدد و رقم و **Growth fund of america** . سوال جواب دهد که: حالا بعد از رشد چه اتفاقی می‌افتد **Growth matrix** . نمودار فاصله می‌گیریم و نقطه نظرات اصلی اسمیل، این متفکر و دانشمند عجیب و غریب را می‌خوانیم اسمیل ابتدا مسیر پارسا شد تمام پدیده‌هایی که بیشتر بررسی‌شان کرد را شرح می‌دهد، مثلاً موجودات زنده با مرگ منقرض می‌شوند، ساخته‌های دست انسان از بین می‌روند یا در موزه‌ها قرار می‌گیرند یا به زباله‌هایی بدل می‌شوند که زمین را به تدریج سپس اسمیل برای چندمین بار هشدار می‌دهد که انسان‌ها و به ویژه سیاست‌گذاران **Book growth mindset** . نابود می‌کنند او با آوردن مثال‌های **Growthnext-demo** . نباید بیش از اندازه به پیش‌بینی‌های خود از مسیرهای آتی رشد متکی باشند متعددی از مواردی که پیش‌بینی انسان‌ها غلط از آب درآمده، گوشزد می‌کند که همیشه باید چندین سناریو را در پیش‌بینی‌ها لحاظ به طور خلاصه: آیا اصلاً نیازی به این همه رشد هست؟ آیا **Growth supplements** . کرد و برای همه آنها آمادگی داشت حواسمون به این نکته است که بخش بزرگی از این رشد پایان‌ناپذیر به قیمت بزرگ‌تر شدن شکاف بین افراد فقیر و ثروتمند در این دنیا است؟ یا این نکته که سیاره زمین اصلاً ظرفیت این همه رشد را دارد؟ انسان تا به کجا برای ارضای تمایل خود مبنی بر رشد و داشتن بهترها و بزرگ‌ها و بیشترها تلاش می‌کند؟ شاید وقت آن باشد که این روند را کند یا حتی موقوف کنیم شاید بهتر باشد روی مناطقی از جهان تمرکز کنیم که در حال دست و پنجه نرم کردن با گرسنگی‌اند، به جای **book review** **Growth mindset** Meu único ponto contra é que o Vaclav Smil dedica bastante tempo e atenção à revisar números e princípios o que faz desse livro algo mais próximo de um review da área do que um conteúdo para todo tipo de público. **Growthmentor** Vaclav Smil After astronaut Rusty Schweickart looked down on Earth from space for the first time he described a sense of awe that has become common to almost

every space traveler since: “You realize that on that little blue and white thing there is everything that means anything to you all history and music and poetry and art and death and birth and love all of it on that little spot out there you can cover with your thumb. **Growth ppt icon** The author the Czech-Canadian professor Vaclav Smil approaches things from a scientist’s point of view not an astronaut’s but he reaches the same conclusion: Earth is fragile and “before it is too late we should embark in earnest on the most fundamental existential [task] of making any future growth compatible with the long-term preservation of the only biosphere we have. **Growth hormone** (“A plot of the annual totals of passenger-kilometers flown by all US airlines between 1930 and 1980 produces a trajectory that is almost perfectly captured by the quartic regression (fourth order polynomial with  $r^2=0.99$ . **Science growth mindset**”) And it has 99 pages of references! As Smil writes “My aim is to illuminate varieties of growth in evolutionary and historical perspectives and hence to appreciate both the accomplishments and the limits of growth in modern civilization. **Science growth mindset** Even if you don’t like math don’t let this chapter scare you off because it makes a really important point: It destroys the idea that you can take an early growth curve for a particular development—the uptake of the smartphone for example—and use it as the basis for predicting the future. **Book growth mindset** rex weighed only a bit more than a male African elephant and a tapeworm can live 25 years?) My favorite part of this chapter was Smil’s discussion of food production which is instructive for our foundation’s work in agriculture and does a good job of explaining what kinds of productivity gains are possible. **Growth yogi** In chapter 3 he lands on a topic he knows better than just about anyone else: the development and diffusion of new sources of energy—from traditional water wheels to nuclear reactors. **Kindle group of animals** But here he’s setting the stage for subsequent chapters on technological developments that were made possible by the conversion of resources like water wind carbon and solar radiation into energy. **Instagram growth pro ebook** Ultimately his analysis shows that what we’re trying to do in terms of changing our physical economy and the energy flows upon which it is built would be unprecedented in our history. **Growth kindle unlimited** In particular I’m more optimistic than he is about the degree to which today’s renewable energy technologies can be deployed and the pace at which scientists and engineers will develop new clean sources. **Growth science feeding chart** For example future generations of clean energy will be designed and tested in computers not on paper before we try them in the world—a process that will speed up innovation in a dramatic way. **Growthzilla pos** While it synthesizes an incredibly wide breadth of facts about growth the book lacks a grand synthesis of what it all means in terms of complexity or the the underlying laws that govern the growth of things in the universe or even on our planet. **EBook growth chart** But But what are the laws that govern all of this growth? Can the patterns of growth or energy ingestion consumption and expulsion be understood on a universal level? When people are bothered enough by having all the facts but not having the more general picture they will be compelled to do the research that will generate answers. **Growth yogi** The second general complaint reviewers seemed to express echoed one of Bill Gates criticisms that Smil was perhaps too pessimistic about the rate at which humans will create innovative ways to develop and use clean sources of energy. **Science growth mindset** It made me think that his extensive discussion of the conversion of energy from human power to animal power to machine power in his book *Energy And Civilizations* was the catalyst to write this book on growth. **Science growth** If I had to compare both books I would say *Energy and Civilization* is much better than *Growth* but both are five star books for the sheer amount of knowledge they compile and bring to the world. **Brand growth playbook ebook** The key message reinforced throughout the chapters is that we cannot expect unlimited growth on a planet with limited resources even though it's hard to predict the exact trajectory of complex systems. **Growth mutual funds** “Growth” is a deconstruction of the whole nine yards of everything around us ! I picked it up as a challenge because every single review on the Internet described it as immensely unreadable. **Growth ppt slide** It reminds me of the Kierkegaardian anxiety of choices but the amount of information floating around us today might have grown a trillion times however our knowledge base has grown nowhere close to the same rate. **Free instagram growth ebook** Chapter 1 kicks off with

a bunch of graphs trajectories laws that we need to familiarize ourselves with as this will help us understand the growth patterns in the next chapters. **Growth matrix** 7 environment (highly acidic) or those that can be found in extreme pressure surroundings like Mariana Trench the deepest point in the Pacific (10km deep !). A major consideration in this chapter was a variable that has not been included in the analyses of climate change VPD (Vapor Pressure Deficit) which is expected to increase from 2. **Growthzone api** Although all living beings in this chapter exhibit cellular growth infinite cellular growth is not possible because number of cells to be supplied with energy grows faster than the capacity of branching networks. **Growth rpg** It traces how changes in oil prices affected structural growth why speed is not a priority for airlines as they fly at the most fuel-efficient speed (for planes to fly faster they'd have to fly a lot faster). **Growth social** He begins with organisms whose mature sizes range from microscopic to enormous looking at disease-causing microbes the cultivation of staple crops and human growth from infancy to adulthood. **Growthology agency** He considers the challenges of tracing the growth of empires and civilizations explaining that we can chart the growth of organisms across individual and evolutionary time but that the progress of societies and economies not so linear encompasses both decline and renewal. **Growth social** A must read I really recommend this book Vaclav Smil Growth: From Microorganisms to Megacities by Vaclav Smil is a complex read on the concept of growth examining the connections between macro and micro the mathematical formula behind the concept of growth and in sum a refutation of the idea that growth can be infinite (in a practical sense bound by the temporal patterns of the Earth). **Growthworx** Many of our problems today from our misunderstandings of flora and fauna to the excesses of capitalism can be attributed to our poor conception of various statistical models including S-shaped curves (Sigmoid Curves). **Growth science nutrition** This book had some fascinating details on growth at all scales looking at everything from tree growth to bacterial/viral growth (with some fascinating tidbits in a pre-pandemic book that would sound familiar to the average news watcher today) all the way up to economics and societal concepts of growth. **Growthzilla** Instead Smil argues that growth (and presumably statistical modeling in general) is beset by variance depending on the subject in question so much so that sometimes it is better to use one statistical method to measure say a tree and another to measure a different species of tree. **Kindle group books** This is true of any statistical subject and doubly so in our conceptions of economics where many quack theorists would prescribe one method that will work in all cases and claim to be able to predict or solve future problems. **Growthworx** Smil notes that this is complete bunk and also offers the nuanced opinion that it is still important to use statistics to measure and model; but look at confidence levels and take theory with a grain of salt. **Growth synonym** Smil is brilliant in his analysis of energy history economics and so forth and I always enjoy his perspective on how we as humans connect so closely to the microbial world or just the world in general: Holding your hand as you interpret all of the facts Smil provides you with is not his deal, **Growthwheel** No one is better than Smil at bringing together massive numbers of figures about energy or growth and placing them in a compact 600+ page book, **Book growthzone** Smil's book deserves 5 stars because no other author has managed to provide such a detailed encyclopedic description of energy and growth, **Growthmentor** I love reading Kurzweil but always feel that he needs to be a bit more realistic. **Growth social** Smil strongly challenged many of Kurzweil's claims throughout the book, **EBook growth chart** He was entirely unhappy with Jared Diamond's explanation of collapse of Easter Island.

## Book growth mindset

We'd need 4-5 more earths - Maximum entropy comes from Cities: **Growth chart** 7x - Silicon production is energy intensive (also seen later in cars vs cellphones comparison) - Business Cycles in the U, **Growthmentor** Grounds for Competitive Taxation ? In chapter 6.

## Plant growth and development ncert pdf

But that's where the merits of the book stop. **Growth synonym** خواندن این کتاب مانند خواندن دائرهالمعارفی **Growthwell** بخش اول به الگوهای رشد و دسته‌بندی آنها می‌پردازد **Growth ppt icon**, از آمار و نمودار و عدد است: اسمیل در ادامه‌ی کتاب دائماً به این الگوها اشاره می‌کند، بنابراین دانستن توابع رشد و آشنایی با نمودارها مفید است **Growthmentor** بخش سوم درباره منابع انرژی مختلف و نحوه تکامل و پیشرفت آنها در طی تاریخ است **Growth hormone** رشد جمعیت، **Book growth mindset** برای خود من فصل 5 و 6 مرتبط‌ترین و جالب‌ترین فصل‌ها بودند **Growth kindle store** شهرنشینی، شهرها، تمدن‌ها و اقتصادها در فصل 5 بررسی می‌شود اما بهترین و جالب‌ترین فصل و شاید **Growth matrix** این فصل نقد معیارهای موجود برای بررسی رشد اقتصادی است از بعضی صفحات با علم به اینکه نه به آنها نیاز **Growthnext-demo** تنها فصل غیر خسته‌کننده این کتاب فصل 6 باشد به شما هم توصیه می‌کنم بدون عذاب دادن به خود همین کار را بکنید **Growth mutual funds** دارم و نه جالب‌اند، پریدم **Growth matrix** **Growthwell** Vaclav Smil If you want to understand the growth dynamics of microorganisms.

## Growth chart

Um livro gigante sobre crescimento que passa por todo tipo de assunto: **Growth yogi** Como já tinha lido o Energy and Civilization - A History do mesmo autor muitas ideias se sobrepõe. **Growthnext-demo** Mas é uma ótima discussão sobre como energia é processada e como isso permite o crescimento desde microorganismos até cidades e tecnologias que criamos. **Growthzilla pos** Ainda acho que a melhor discussão sobre os processos por trás disso fica no Scale do Geoffrey West. **Growth kindle** "No matter what country you're from you return from space with a feeling that our home is tiny fragile and something we need to protect. **Growth synonym** Anyone who reads the new book Growth the newest of 39 brilliant books by one of my favorite thinkers will come away with similar urgency. **EPub growthzone** "Before I get into how Smil came to this conclusion I should warn you: **Growth mutual funds** Although Growth is a brilliant synthesis of everything we can learn from patterns of growth in the natural and human-made world it's not for everyone: **Growth os** 9998) and continuation of this growth pattern would have multiplied the 1980 level almost 10 times by 2015: **Science growth** Simply put this book deals in realities as it sets the growth of everything into long-term evolutionary and historical perspectives and does so in rigorous quantitative terms: **Growth yogi** "When Smil says "the growth of everything" he means everything, **Growthoid reviews** Chapter 1 introduces a lot of technical detail behind the three most common growth curves seen in our natural and built environments: linear exponential and hyperbolic: **Grow therapy** Yes Intel co-founder Gordon Moore made a surprisingly accurate prediction about the exponential growth in the number of transistors on a chip, **Growthmentor** But even that "law" is likely reaching the end of its useful life. **Growthx social** Transistors are now so small we're running into problems making them even smaller, **Growth synonym** Chapter 2 is all about the growth of living systems—from microorganisms to sequoia forests and from humans to dinosaurs, **Growthmentor** He has covered a lot of this terrain in previous books such as his masterful Energy and Civilization: A History: **Grow therapy** When I read chapters 4 (artifacts such as cathedrals cars and computers) and 5 (societies and economies) I had to marvel over how Smil's mind works: **Growthzilla** The way he synthesizes information from dozens of different domains is amazing: **Book growth mindset** I also marveled over all the miracles that modern civilization is built on including power grids water systems air transportation and computing, **Growth fund of america** The book gave me new appreciation for how many smart people had to try things out make mistakes and eventually succeed: **Corn growth stages pdf** Smil's goal for these chapters is to show that no matter what domain you're talking about eventually you hit growth limits. **Growthx accelerator** After many years of metallurgical and mechanical innovation we're simply not able to make it a lot

cheaper or with a lot less energy, **Growth fund of america** In chapter 6 and in a brief coda Smil sounds less like an academic than an activist, **Growth public school sacramento calendar** He concludes that “treating the biosphere as a mere assembly... of goods and services to be exploited (and used as a dumping ground) with impunity—must change in radical ways: **Human growth and development pdf** In my view Smil underestimates our accelerating ability to model the physical world using digital technologies equipped with artificial intelligence: **Growthmentor** But I’ve always felt that Smil’s great strength isn’t predicting the future it’s documenting the past: **Growth kindle paperwhite** There’s great value in that—you can’t see what’s coming next if you don’t understand what’s come before. **Growth bookstore** Nobody sees the big picture with as wide an aperture as Vaclav Smil. **Instagram growth program ebook** Vaclav Smil It seems that people’s rating of Smil’s book only 3 or 4 stars instead of 5 stems from 2 reasons. **Growth rpg** The first and more frequent criticism seems to be that the book is too encyclopedic, **Growth formula excel** If you do not want an encyclopedic book about growth then this book is not for you. **Growthops asia** He will point you to some people who are trying to tackle those questions: **Growth fund of america** To my absolute delight he focused quite a bit on Geoffrey West’s research and his book Scale: **Growthzone api** I think Smil’s predictions about the future of energy and growth are probably less important than the facts he provided about the past and present facts about energy and growth. **Growth synonym** However which suggested the inhabitants wiped out their own forests and drove their animals and plants to extinction. **Growth public school sacramento** Smil called those who buy into Diamond’s explanation uncritical readers and instead argued that rats had been largely responsible for the vast deforestation of the island. **Growth synonym** Such painstaking careful and rigorous methods definitely deserves 5 stars no matter how encyclopedic the book is. **Kindle group books** It’s an unprecedented resource that can be used by many different types of researchers and laypeople, **Growthzone api** If you then want to know what patterns underlie the growth discussed in the book read books by people like Geoffrey West Sarah Imari Walker or even Stuart Kauffman, **Growth fund of america** My favorite part of this book was when Smil discussed the growth of technologies starting with water mills, **Growth kindle** That section also made me want to go back and reread Energy and Civilization. **Growthx social** Vaclav Smil Super nerdy slightly repetitive exploration of a variety of growth trajectories, **Growth formula excel** Not a casual read but it does an excellent job at challenging prevailing assumptions narratives and metrics and occasionally offers unexpected insights, **Growth ppt template free download** I wouldn’t recommend this to anyone because it does read like a manual. **Growth book company** Before I proceed a few thoughts on the intent of a book like “Growth”, **Kindle crowd** A computer today is powerful enough to store the information contained in all the medieval libraries combined. **Growth synonym** Books like “Growth” are needed to acquire a politically agnostic view of the world: **Growth yogi** For example Individual growth trajectories are usually S-shaped but their envelope charts an exponential increase, **Growthzone api** Chapter 2 is dedicated to all living beings : trees forests animals pathogens and humans. **Growthx capital** Did you know there are bacteria species that can survive a pH 0: **Plant growth and development ncert pdf** As the VPD increases plants need to draw more water from roots, **Growthwheel** Chapter 3 talks about Energy which I believe is Vaclav Smil’s forte: **Growthzone api** It chronicles the growth of power to mass ratios and engine efficiencies of cars. **Growthx social** It also discusses how conversion efficiencies were achieved in photovoltaic cells and how LEDs will save 40% electricity by 2030, **EPub growth mindset** Chapter 4 is about skyscrapers man made objects and semiconductors. **Growth rpg** Another interesting topic in this chapter is about the fastest runners. **Growth mutual funds** 58) if the wind speed was 2 m/s and the sprint was done at an altitude of 1000m: **Kind led grow lights** Most of my notes were in Chapter 5 which is about us as a society. **Growth rpg** - Total Fertility Rates and the ideal replacement ratio of 2, **Growth synonym** 1 is considering premature deaths) - If the entire global population were to consume at the American level Smil essentially concludes that Degrowth is our only salvation, **Growthoid reviews** In the coda we come full circle where Smil mocks economists worrying about vigorous GDP forecasts “such people are either mad or an economist”. **Growthx capital** Perpetual

quarter to quarter growth is outright unsustainable as per Smil: **Book growth mindset** Vaclav Smil A systematic investigation of growth in nature and society from tiny organisms to the trajectories of empires and civilizations. **Book growth-u** Growth has been both an unspoken and an explicit aim of our individual and collective striving, **Growthmentor** It governs the lives of microorganisms and galaxies; it shapes the capabilities of our extraordinarily large brains and the fortunes of our economies: **Growthminds** Growth is manifested in annual increments of continental crust a rising gross domestic product a child's growth chart the spread of cancerous cells, **Growthmentor** In this magisterial book Vaclav Smil offers systematic investigation of growth in nature and society from tiny organisms to the trajectories of empires and civilizations. **Growth rpg** Smil takes readers from bacterial invasions through animal metabolisms to megacities and the global economy. **Growthx capital** He examines the growth of energy conversions and man-made objects that enable economic activities—developments that have been essential to civilization. **Growth synonym** Finally he looks at growth in complex systems beginning with the growth of human populations and proceeding to the growth of cities: **Growth chart** The trajectory of modern civilization driven by competing imperatives of material growth and biospheric limits Smil tells us remains uncertain, **Growth public school sacramento** All to make the basic point that Infinite growth isn't feasible with finite resources. **Pdf growth and development** It could have been 30 pages unless of course you need a reference book for seemingly hundreds of different growth curves: **Growth bookstore** Some people qualify this book as encyclopedic but it really reads like the first draft of the literature study of a first year PhD student, **Growth ppt icon** It is just an enumeration of findings from papers without any attempt to provide a narrative, **Growth synonym** Maybe interesting if you need a reference list for your own work animals plants humans technology artifacts economies societies and cities Vaclav Smil book is the best: **Growth fund of america** Very comprehensive and clear based on evidence Smil shows in a brilliant way how growth behaves at so many levels: **Growth book company** The book also gives a clear picture of our long term survival in a finite resource planet and the challenges involved, **Growth synonym** He explains clearly the myth of infinite economic growth our economies are less resource intensive but population and consumption keep growing. **Growth book recipe** This book also goes a long way to try and diffuse our over-reliance on statistics as predictive measurement: **Plant growth and development ncert pdf** All in all an excellent book that suffers what some other readers on Goodreads have noted; it is complex and dry: **Grow therapy** I love good analysis and the drier the better for this reader most times, **Growthwell** As another reader here points out it is almost anxiety inducing at the things I have already forgotten when reading this book, **Growth chart** In sum this would make an excellent reference resource and a book to digest slowly over multiple reads and over a long period of time. **Growth science nutrition** All in all a really good book that I found to be quite dense and hard to engage with, **Growthzilla pos** Even so it is also I book I will be buying for my personal reference collection. **Growth matrix** Worthy of a read and would certainly be engaging for those readers with a good background in statistical modelling and with a strong understanding of mathematical concepts. **Growth formula** (Geography College of Earth and Mineral Sciences of Pennsylvania State University 1971; RNDr: **Growth hormone** Charles University Prague 1965) is Distinguished Professor Emeritus at the University of Manitoba, **Growth synonym** He is a Fellow of the Royal Society of Canada and in 2010 was named by Foreign Policy as one of the Top 100 Global Thinkers[1]

Those types of questions are for another book. Kurzweil was not the only researcher challenged by Smil. S. نقطه‌ی عطف کتاب همینجاست. در پایان، استدلال اصلی اسمیل مطرح می‌شود. پ.ن: من تمام صفحات این کتاب را خوانده‌ام. NASA calls this realization “the overview effect. Long sections read like a textbook or engineering manual. The next few chapters are easier to follow. (By the way did you know that the T. Steel the backbone of modern economies is a great example.” I don't agree with all of his analysis. That criticism is certainly true. It's not Smil's job to answer those questions. If you have not read it I highly recommend it. In fact Smil didn't take anyone at their word. He poured over many studies

and dissected their methods. He replicated findings on his own. In fact it is supposed to be encyclopedic. That is the whole point of the book. Go do your own research to try to find the answers. Vaclav Smil CAUTION : Growth percentages ahead. Vaclav Smil is a nerd's nerd. But having finished it below are chapter wise summaries. Such a view is doomed to be complex. 2 kPa in 2014 to 2.65 in 2050.5x) as transonic speeds are dangerous to fly at). Usain Bolt could achieve a 9.45 second world record (currently 9.1 (2 parents 2 kids ; the . Growth: From Microorganisms to Megacities Dry. Very very dry. Vaclav Smil Didn't finish it. It is amazing his understanding of so many topics. Even I however found this book difficult to read. Vaclav Smil Vaclav Smil Ph.D.

